REGENERATIVE DESIGN PRACTICES IN NIGERIA: A CASE STUDY OF NGOZIKA HOUSING ESTATE, AWKA, ANAMBRA STATE.

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Abstract
While Design has been acknowledged as a potent process of engaging the imagination, aspiration and creativity of the mind, in recent times, it has not been adequately deployed to engage the 'natural' world thus creating the vast rift that we see in the environment in the form of urban decay. In its resolution, an interest in regenerative approaches to design and development had grown in many foreign countries, while Nigeria, has occupied herself with regeneration in the aspect of sustainable urban renewal. This research therefore, is aimed at assessing the extent to which regenerative design is practiced in Ngozika Housing Estate with a view to effectively implement the concept within the study area. The study adopted the use of survey method of research, review of related literature, and structured questionnaires to source for information. Sample size of 285 residences from a population of 1000 residences in Ngozika Housing Estate Awka, and 116 sample size from a population 240 registered construction professionals within the study area were derived using Yaro Yamane's formular. A total of 207 questionnaires were retrieved and were analysed using descriptive statistics. The hypothesis of the study was postulated using the Z –test. This study revealed among others, 79% lack in the regenerative design thinking and practices within the study area. Hence, it strongly recommends among others, that designs should always take into consideration the interconnectivity of human activities and nature which have direct impact on energy consumption, environment and sustainability

Key Words: Regenerative design; Regenerative Development; Sustainability; Urban Renewal.

Introduction
Design is a process of engaging the imagination, aspiration and creativity of the mind, and the process in the transformation of localities and endowing value to objects and places. It has existed through history as exemplified in the legends and myths of creation of the world, and civilization from chaos. This design seeks to leave behind not only a designed solution, but the tools, skills and organizational capacity to respond to change. In the recent time, design has been on a fast track of change towards transformation of built environment which reflects a shift in designing of the built environment to be human-only oriented,

focusing on improving efficiencies, (Zari, 2010). Their design rarely engages the natural world in which it is placed creating a vast rift that exists between the environment and design**.** The environment are no more seen as a living ecosystem of which we are inextricably linked within, but as a collection of material things that serve more value to us when exploited and commoditized, (Foss, 2015).

These human oriented activities of man have made the built environment to be unfit for human habitation. Houses, especially in Nigeria and other underdeveloped countries are built without recourse to the environmental conditions resulting to exacerbated effects of environmental hazards and some degree of blight. This is demonstrated by conditions such as erosion, flooding and drainage issues; reduced human physical health and wellbeing; increased cost; ecological destabilization; and separated environment. These negative effects have posed a great challenge which made it needful for humans' to reconnect with nature. Regenerative design emerged to reconnect human aspirations and activities with the natural systems. It's focus was not only on reversing the degeneration of the earth's natural systems caused by anthropogenic activities, but also to design human systems that can co-evolve with natural systems, to generate mutual benefits with greater overall expression of life and resilience, (Mang and Reed, 2012B), to function at optimum levels without on-going human intervention. Interests on regenerative design have grown particularly in many foreign countries though still occupy a relatively small niche in the larger world of sustainability efforts. Because regenerative theory is relatively a new concept, it is not among the mainstream practices by the designers – Architects, Engineers, Environmental managers and Town Planners, and researches in this area have not been done in sufficient details. The situation is not the same in Nigeria, who is yet to acquaint with the practice. Their interests have been on sustainable urban renewal which only could deal with redevelopment reflecting on monetary investments and physical changes of urban centre to eradicate slums. This research therefore, is aimed at assessing the extent to which regenerative design is practiced with a view to effectively implement the concept in the study area. This is achievable by determining within the study area, the level of awareness of regenerative design among the professionals for its effective implementation.

Regenerative Design Framework

The response to minimize the destructive impacts of human activities has resulted to several frameworks. According to Bartlett and Gauthier (2013), Eco-efficiency first emerged, with the view to creating more goods and services using fewer resources; resulting in a dominance of technology solutions, a loss of focus on social systems and well-being. The challenge of green or eco-efficient design, they said was that it missed the real potencies of the human presence; the possibility of mutual benefits between human activities and the living systems within which they occur. Sustainability was next to evolve, it focused primarily on using resources more efficiently to minimize damage to the environment and human health, in effect, slowing down the degradation of earth's natural systems, opined Mang and Reed, (2012B). Contrary to this view, Robinson (2004) argued that "it is not enough, neither inspiring to focus on mitigating the effects of human activity." It then became necessary to redefine and conceptualize what sustainability means and requires. This led to the development of Ecosystem framework, according to Mang and Reed (2012B), it emerged as a new "governing concept of relationship between humanity and nature", and confronting some issues like: the role of buildings, the definition of the built environment, the role of designers and even the role of humans on the planet. This new paradigm was explored to also develop the field of permaculture. Consequently, it became obvious that a shift in perspective, with much more comprehensive, deeply integrated, and whole systems approach,

along with new forms of technology and new standards of ecological performance were required. Then regenerative design and development emerged from the stream of ecological sustainability, not only to lead the charge to redefine sustainability, but also to redefine what the built environment encompasses and what its role must be.

Regenerative Design

Design practices should not be harmful; they are to initiate regenerative processes to replace the degeneration of the past practices. In contrast, John Tillman Lyle in Bartlett and Gauthier (2013), defined design within the context of the built environment as giving form to physical processes, and regenerative design as the replacement of linear systems of throughput flows with "cyclical flows at sources, consumption centers, and sinks." The resulting systems provide for "continuous replacement, through (their) own functional processes, of the energy and materials used in their operation."

Regenerative Design has been defined by Mang and Reed (2012B) as

> "a system of technologies and strategies, based on an understanding of the inner working of ecosystems that generates designs to regenerate rather than deplete underlying life support systems and resources within socio-ecological wholes."

Williams (2014) said it "is a process-oriented systems theory based approach to design." The term "regenerative" he further stated describes processes that restore, renew or revitalize their own sources of energy and materials, creating sustainable systems that integrate the needs of society with the integrity of nature.The definition given by Mang and Reed acknowledged the fact that the approach is system-based, in connection with the ecosystems but has failed to relate it to its underlying characteristics and effects. Williams's definition, not only acknowledged the fact that it is system-based, but also stated its related effects. In that light, agreeing with Williams, and within the context of this research work, the regenerative design is taken to be:

> a system of technologies and strategies, based on an understanding of the inner working of ecosystems that generates designs to regenerate underlying life support systems and resources, through improved human and natural systems co-evolution for mutual benefits, greater expression of life and resilience without human intervention.

Regenerative design should therefore focus on processes that are integrated to the inner working of living systems in order to generate new and healthier patterns which will promote the co-evolution of the whole system over time. Its process promotes the pattern of relationships between the physical, built, and natural environment with the end-goal of redeveloping systems with absolute effectiveness that allows for the co-evolution of the human species along with other thriving species, (Nugent, *et al.,* 2011). A regenerative system makes no waste; its output is equal to or greater than its input; and part or all of this output goes toward creating further output — in other words, it uses as input what in other systems would become waste.

In regenerative design, there is a shift in perspective about the role of buildings; the buildings are not 'regenerated' rather, it is the act of building and inhabiting is regenerative. The buildings serve as catalysts for positive change within the place it is situated to support the mutually beneficial co-evolution of the human and natural systems in a partnered relationship (Cole, 2012; Reed, 2007; Mang and Reed, 2012A). To enhance human systems, designs are made with the intention of increasing health, well-being and social systems; for ecological

systems, the man made systems must be designed to produce more than they consume in areas such as carbon, water, energy, materials, nutrients, and so on.

Regenerative Development

Regenerative development, according to Jenkin and Zari (2009), investigates how humans can participate in ecosystems through development, to create optimum health for both human communities (physically, psychologically, socially, culturally and economically) and other living organisms and systems. It acknowledges humans as an integral part of ecosystems and aims to repair the capacity of ecosystems to function at optimum levels without on-going human intervention Zari (2010).

According to Gabel (2009), it is the use of resources to improve society's well being in a way that builds the capacity of the support systems needed for future growth. He further stated that Regenerative development is to sustainable development what sustainable development is to traditional economic development,

Mang and Reed (2012B) defined Regenerative development as

> "a system of technologies and strategies for generating the patterned whole system understanding of a place, and developing the strategic systemic thinking capacities, and the stakeholder engagement/ commitment required to ensure regenerative design processes to achieve maximum systemic leverage and support, that is self-organizing and self-evolving".

Regenerative development works at the intersection of understanding and intention, generating the patterned, whole-system understanding of a place, and developing the strategic, systemic thinking capacities and the stakeholder engagement required to ensure the design process achieves maximum systemic leverage and support. It integrates building, human and natural development processes within the context of place creating an environment that greatly enhances the effect and effectiveness of restorative and biomimetic designs, (Mang and Reed, 2012B). Regenerative development also contributes towards offsetting the on-going negative environmental impact of the existing building stock in its transition to better environmental performance. These aspects of regenerative development could mean greater acceptance of new development by the public and therefore faster transformation of the built environment. In turn, a more adaptable and resilient built environment is a potentially useful strategic response to climate change, (Zari, 2010).

Regenerative Constructs

The aim of Regenerative design is to merge nature, building and people; the final objective is to regenerate the earth ecosystems. To accomplish this we need to work in all level of work. In another words, we need green and sustainable design to mitigate our impacts (operate and maintain), but to sustain life we must engage the restoration and regeneration of the living systems around us (improve and regenerate), (Dias 2015). In other words, the role of regenerative development, more specifically, (Mang and Reed, 2012B), becomes to

I. determine the right phenomena to work on, or to give form to, in order to inform and provide direction for regenerative design solutions that can realize the greatest systemic potential, and
II. Build a field of commitment and caring in which stakeholders step forward as co-creators and ongoing stewards of those solutions.

In commitment to achieving regeneration and its net positive goals for the built environment, and to integrate human structures, processes and infrastructures with natural living systems, some factors were considered to have aligned with the results. They are:

Biomimetic – Biomimicry, where flora, fauna or entire ecosystems are emulated as a basis for design. There are three levels of biomimicry that may be applied to a design problem – form, process and ecosystem (Biomimicry Guild, 2007). It uses nature - its forms and its processes - as a model for humans to follow – an anthropocentric perspective, and while Ecosystem is what could be studied to look for specific aspects to mimic. Biomimetic is inspirational and offers a way to create a more sustainable and even regenerative built environment. It is posited that a biomimetic approach to architectural design that incorporates an understanding of ecosystems could become a vehicle for creating a built environment that goes beyond simply sustaining current conditions to a restorative practice where the built environment becomes a vital component in the integration with and regeneration of natural ecosystems, (Zari, 2007)

Biophilia – means "urge to affiliate with other forms of life", (Wilson, 1984). It was first used by Erich Fromm in 1964 to describe a psychological orientation of being attracted to all that is alive and vital. As a design philosophy, biophilia is relational in its approach – it is somewhat passive in its engagement with life and is anthropocentric in its purpose. "The concept of biophilia implies that humans hold a biological need for connection with nature on physical, mental, and social levels and this connection affects our personal wellbeing, productivity, and societal relationships." Sheeps Meadow, 2004 in Dias (2015). Human health is positively influenced in relation to life, and diminished if separated from living system connectivity.

Resilience – this uses both technical and social strategies to increase a community's resilience. In ecology, it was first introduced by C. S. Holling's seminal work (1973), Resilience and stability of ecological systems. Resilience was described as the degree of shock an ecosystem can absorb before returning to a stable state or changing to a different stable state. It can either be positive resilience, brought about through healthy diversity (e.g. alternative roads to avoid a traffic jam), or negative resilience, brought about through lock-in (e.g. politics stalling the provision of well-located affordable housing and amenities). It may not necessarily mean returning to an original state but may move towards a more viable state. It considers also the different time scales under which resilience operates, (Oliver *et al*., 2013).

Restorative – re-establishes the self-organizing and evolving capability of natural systems. This approach acknowledges that humans have a role to play. It is more highly integrated than biomemetic approaches and more active than biophilic approaches – yet it generally is an episodic and finite engagement, (Mang and Reed, 2012B). Restorative approach intervenes on an initial basis to re-establish the health of a sub-system of an ecosystem and community – such as wetlands, woods, beach dune systems, social systems, and so on. It is a biocentric approach. When the intervening human role is finished however—once the capacity of the system to self-organize is set in motion – the humans leave the engagement as expected.

Bioregionalism – this reflects in the contextual attribute of regenerative design by representing the understanding of place where we live, and inhabiting it sustainably and respectively through ecological design. In the bioregion according to Gene Marshall in Bioregional Listserve (2005), a geographical area is described in terms of its unique combination of flora, fauna, geology, climate and water features – the whole of which distinguishes it from other bioregions. This acknowledges that human awareness that their reconnection into the living biosphere through the place where they live is vital for their health and the health of the planet; and provides ways to nurture them.

The regenerative approach to evaluate sustainability

The regenerative and sustainability approaches are concerned with a healthy development of natural and human systems. The literature reviewed stipulated that sustainability, however, for the past few years it has been undergoing criticism in regards to its performance (0wen, 2009). In the assessment of sustainability and regenerative approaches using (criterion) referencing, the sustainability traced by the sustainable development approach concern the use of resources to improve society's well-being in a way that does not destroy or undermine the support systems needed for future growth. The approach is about mitigating/ sustaining the existing status quo which already includes hundreds of millions of acres of degraded to destroyed farmland and leveled rainforest, depleted to exhausted fisheries and aquifers, toxics choked streams, decreasing biodiversity, and changing climate. Hodges, (2009) supported this by saying that while attempting to be ecological, most sustainable design projects proved to be simply examples of conservation design. Thus, positing that most sustainable design efforts tended to remain energy and resource consumptive. On the contrary, the regenerative approach traced by Regenerative development is the use of resources to improve society's well-being in a way that builds the capacity of the support systems needed for future growth. The approach reverses the degeneration of the earth's natural systems, restores, renew or revitalize their own sources of energy and materials, creating sustainable systems that integrate the needs of society with the integrity of nature.

The sustainability traced by the sustainable development approach, even improved by adding a fourth or more dimensions to the first original three of environment, society and economy, proves to be a discrete process, made by step-by-step improvements, with a distant temporal horizon but still limited. It calls for a development more sustainable than before, but still insufficient for assuring the enduring life of natural and human systems. By reducing the effects of consumption, we can delay the deadline of life on the planet, but not preserve it (Singer, 2010). This approach is still in line with the belief that man is able to manage and control both natural and human systems, superimposing the last on the first. The regenerative approach insures redundancy to enhance the natural and human systems, by regenerating/ producing its sources even more than they consume. It appears as the result of a continuous process based on a co-evolutionary partnership between ecological and socio-cultural systems generating mutual benefits and greater overall expression of life and resilience. This can reactivate a human development aligned with the effort of nature (du Plessis, 2012).

The sustainability paradigm traced by the sustainable development approach is then disputable; in fact, many scholars are discussing its limits and pitfalls (Ahmad *et al*., 2012; Howard *et al*., 2008), particularly in the light of the regenerative approach (Cole, 2012). This criticism of sustainability required a new approach to design and construction resulting in emergence of regenerative design as a potential solution. Howard *et al*., (2008) suggests that regenerative design diverges from the perception of sustainability in three key ways. Firstly, it shifts the frame of reference from minimal to positive impact. Secondly, it questions

human/environment relations based on the Cartesian separation of subject and object. Thirdly it attempts to reconnect environmentalism with a socio-political dimension, which has been lacking in much sustainability discourse. According to Lyle, in Mang and Reed (2012B), the primary difference between regenerative model and the sustainability model lies in their end goals. He goes on further to suggest that in the current sustainability drive, efficiency has very much been the main focus of efforts as it has been for human consumption and production. In contrast, regenerative systems have a very different focus as regenerative design thinking seeks to overturn this concept of efficiency. Rather than asking the question of "is it efficient", the primary question that regenerative systems ask is this "is it effective".

The regenerative approach to evaluate urban renewal

The two approaches, regenerative design and urban renewal, deal with revitalization of decayed environment. This decline is typified by physical decay, economic issues such as increased unemployment, social exclusion and an overall deterioration in standards of living (Medhurst and Lewis, 1969). Urban regeneration is the attempt to reverse that decline by both improving the physical structure, and, more importantly and elusively, the economy of those areas. This was supported by Couch and Dennemann (2000), by saying that emphasis within most urban regeneration policies has tended to be on economic regeneration rather than on environmental or social regeneration. On the contrary, the regenerative approach, broadly speaking, seeks ways in which socio-cultural and ecological systems can mutually benefit each other; in other words, its long-term aim is to support the harmonious co-evolution of socio-cultural and ecological systems, (Cole and Oliver, 2012).

In addition, urban regeneration pay attention to buildings as object to be revitalized, as various literatures suggest the conclusions on the contribution of urban regeneration to be through housing development to sustainability, and their implications for policy, (Bromley, *et al*., 2005). According to Carley and Kirk (1998), these interventions are directed at disadvantaged areas and households, giving long-lasting improvements in the prospects of residents which are democratically determined, according with residents' needs and aspirations. Some researchers argued that only the earlier projects tended to focus on physical regeneration, usually housing, whereas later programmes have attempted to stimulate social and economic regeneration, (Weaver in the guardian, 2001). On the contrary, in regenerative approach, it is not the building that is "regenerated" in the same sense as the self-healing and self-organizing attributes of a living system but, as Pamela Mang and others in the Regenesis Group argue, by the ways that the act of building can be a catalyst for positive change within the unique "place" it is situated. Shifting their roles from the primary subject of interest, to become processes supporting the mutually beneficial co-evolution of the human and natural systems in a partnered relationship over time, (Cole, 2012; Reed, 2007). They are not considered as individual objects, but designed to become parts of larger systems, to improve damaged surrounding environments, restoring a site's natural hydrology or providing for lost wild-life and plant habitat, (Nugent *et al.*, 2011).

The urban regeneration seeks to raise the standard of living of mainly the urban centres. That is to say, sustainable urban regeneration considers how to reverse the cycle of urban decline by adopting integrated programmes that address the issues facing distressed urban areas holistically. Regenerative design on the contrary is practiced everywhere with the story of places and location patterns, and more importantly, it is place-based.

Research Design

This study began with defining the research statement through the articulation of relevant literatures to analysis. The research process administered the both the qualitative and

quantitative survey method of research. It used questionnaire to assist the researcher in an in-depth study on the practices of regenerative design and to describe the state of affairs as it exists at present. Sample size of 285 residences from a population of 1000 residence in Ngozika Housing Estate Awka, and 116 sample size from a population 240 registered construction professionals within the study area were derived using Yaro Yamane's formular. A total of 207 questionnaires were retrieved and were analysed using descriptive statistics.

In the light of the above, questions were prepared in four sections: section A dealt on demographic data and other general questions; section B addressed the awareness level and practice of the regenerative design by the respondents'. Section C was on the environmental studies of the study area and the last, D addressed the proposed strategies following existing thematic areas: Environment; Cultural; Social; Experiential; Economic and Educational.

However, walk through survey was also employed; it utilized the tracing or unobtrusive observation method for the case-studies which involved observing physical traces or systematically looking at physical surroundings to identify the reflections of previous activity not produced in order to be measured by the researcher (Barrett and Baldry, 2003). This technique enabled the researcher to ascertain how people actually use their environments or spaces where they work or live. The observations/walkthroughs were conducted separately as well as during the administration of questionnaires. This provided the researcher the opportunity to physically measure and observe the buildings and spaces in relation to the regenerative design approach.

The Case Study Area

Creating regenerative design and development looks at the bigger picture of the place beyond site boundaries, rather than buildings as separate entities. The research designation, Ngozika Housing Estate is situated in Awka, Anambra State, found in the south east Nigeria. Nigeria is one of the major countries found in West Africa. She lies within the West African sub-region, within the latitudes 4° and 14° N of the Equator and longitude 2° 2' and 14° 30' E of the Greenwich Meridian, (Helmer and Hespanhol 1997). The country shares boundaries with Republic of Benin (west), Cameroun (east), Niger Republic (north), Chad (north east) and Atlantic Ocean (south).

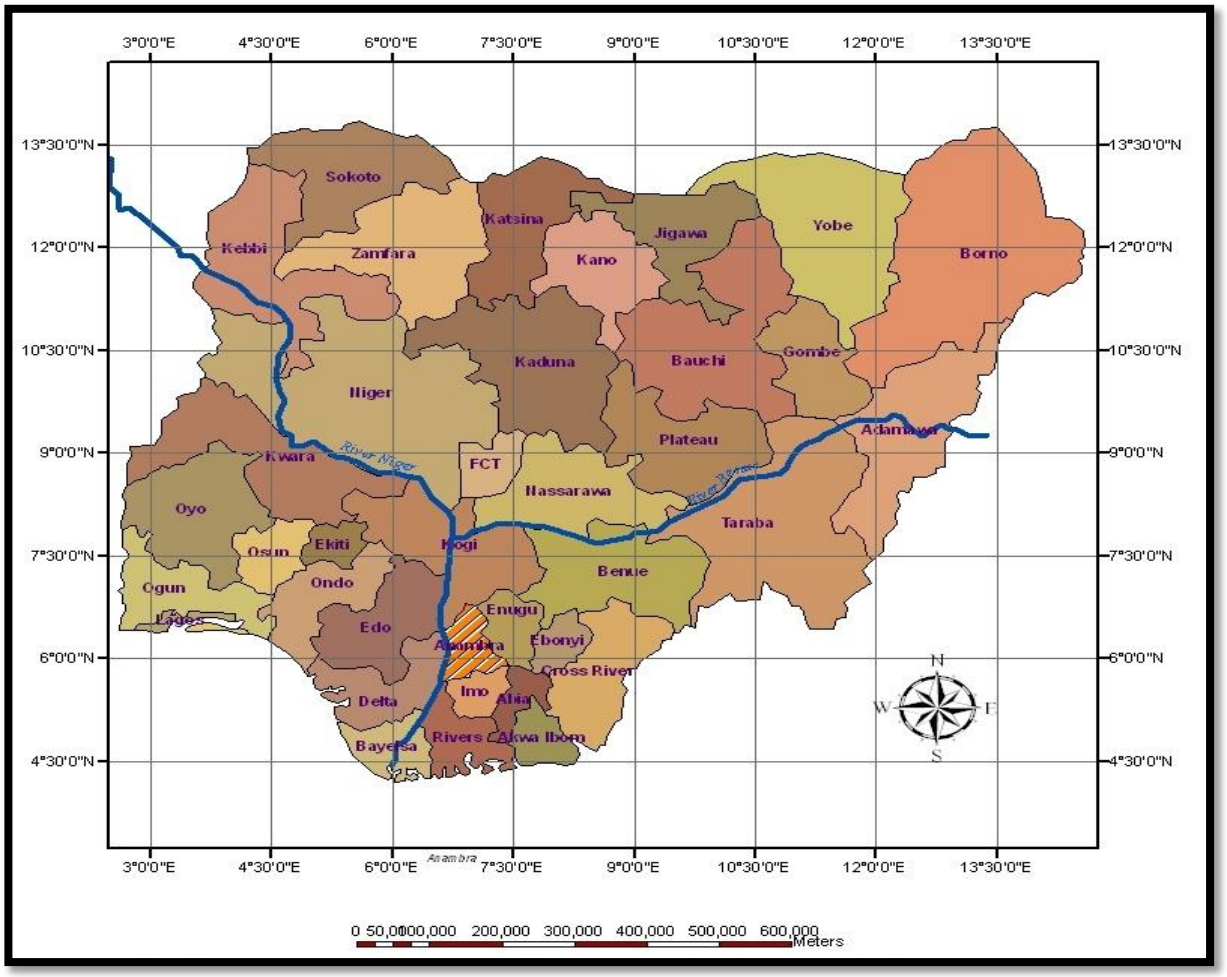

Figure 4 Map of Nigeria showing Anambra state
Source: (www.nasrda.gov.ng)

Awka is one of the major and oldest settlements in Igboland; and is the capital of Anambra State, in the south eastern part of Nigeria, with a population of 1,130,020 inhabitants (NPC, 2006). Awka lies geographically between latitude 6.22^{o}N and longitude 7.07^{o}E (Iloeje, 2001), and within the flood plain of Udi escarpment, draining into the River Niger by the Omambara River and its tributaries (Iloeje, 2001). Awka is made of so many

neighbourhoods which includes; the Ahocol Housing Estates, Udoka Housing Estate, Commissioners Quarters, Esther Obiakor Housing Estate, Ngozika Housing Estate, G. R. A. Agu-Awka and so many others. She has several different environmental qualities demonstrated in the several housing estates and other areas, like swamps, hilly terrain in Udoka Housing Estate and others.

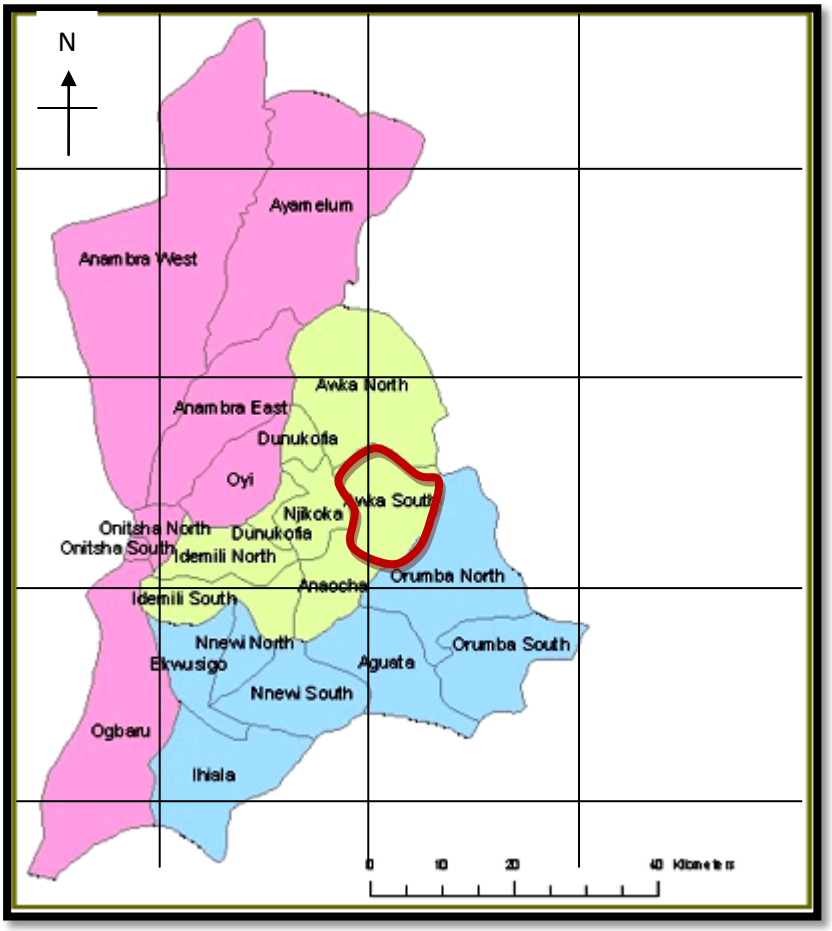

Figure 5 Map of Anambra showing Awka
Source: (*Agbonome et al, 2016)*

Figure 6 Map of Awka Capital Territory showing the location of Ngozika Housing Estate.

Source: (EVM CIS laboratory, UNIZIK, 2004)

In overcoming our tendency to generalize, to make it place-based, which Zari (2010) said that *"the diversity and uniqueness of each place (socially, culturally and environmentally) is crucial to the design."* The research was narrowed down to Ngozika Housing Estate.

Ngozika Housing Estate Awka was created in 2000 by the then Administration – Governor Chinwoke Mbadinuju, and realized in 2006 by the next Administration. It is situated along the Enugu-Onitsha Expressway and about 1km away from the expressway. The Housing Estate has Streams running almost round the site and forms boundary for some while serving as dividing attribute for others, relatively flat terrain with sloping area. The estate has three phases; phase I, phase I extension and phase II.

Presentation of the Existing Conditions of the Selected Neighbourhood

Ngozika Housing Estate, Awka is a neighbourhood situated within Awka and has been selected to be used for the regenerative evaluation in this study based on its neighbourhood qualities. This study reviews the state of the condition of the estate and current facilities with a view to justifying the necessity and viability of the research. Walkthrough and observation results; opinions and suggestions by respondents regarding the research are also presented.

Plate 1 Aerial photograph of Ngozika Housing Estate
Source: Field Survey (2016)

Brief Description of Ngozika Housing Estate, Iyiagu Awka

Ngozika Housing Estate was mapped out in 2000 during the regime of Governor Chinwoke Mbadinuju to be 1000 housing units and was supervised by the ministry of works and housing and was later abandoned. In 2006, under a new administration, it was handed over to the Anambra state housing corporation, (Vanguard, 2011). The corporation inherited 200 housing units consisting of four, three, two and one bedroom bungalows which were at various levels of development and created additional 241 plots and was named phase I, all of which were allocated to interested developers on site and service. Later, the Housing Development Corporation initiated the phase I extension consisting of 72 plots. Encouraged by the success recorded in the phase I and its extension, the Housing Development Corporation planned the Ngozika Estate Phase II, which was handled in partnership with a private developer, the Rockland Development Ltd. According to Mr. Law Chinwuba reporting in the vanguard newspaper (2011), he said that the phase II of the Ngozika Housing Estate was designed out of a deliberate answer to accommodate upper middle income and the top echelon of the society. The design options were strictly on four or five bedroom detached house with only two floors. The Phase I of the Ngozika Housing Estate was commissioned in 2011 by Governor Peter Obi and the phase II was flagged off.

Plate 2 A view of the Ngozika Housing Estate
Source: Field Survey (2016)

Brief Analysis of the Estate

The estate is located in the north of Awka, along Enugu-Onitsha expressway and opposite Udoka Housing Estate, and beside the Awka golf course. The Phase I of the estate has a total of 441 plots, accompanied with infrastructure like electricity, water and roads. It is bounded at most ends by stream. It has one major route and 6 minor tarred roads and 22 minor untarred roads. It has other facilities like 3 church spaces, 2 school spaces and I neighbourhood centre, see Appendix III.

Plate 3: A view of the phase 1 of the Ngozika Housing Estate
Source: Field Survey (2016)

Plate 4 A picture of the neighbourhood centre in Ngozika Housing Estate
Source: Field Survey (2016)

The phase I extension of the estate is separated from phase I by a stream, but is accessed from the same major access of the phase I. it is bounded by Uvunu stream at the end with phase II, and mega station the remaining end. It has 71 plots with 9 minor roads apart from the main access from that of the phase I. it has no estate servicing facilities like schools, church, neighbourhood centre, open space and so on, see Appendix IV.

Plate 6 A view of the phase I extension of the Ngozika Housing Estate
Source: Field Survey (2016)

Ngozika Housing Estate phase II covers a total area of 66.3 hectares with a total number of 449 plots mapped out for residence of 3 different sizes. It accommodates facilities and functions like 2 open spaces, 2 church spaces, provisions for 2 schools. The site has a

stream running at the other extreme end of the site opposite the entrance, which served as the boundary between it and the phase I extension, marking the entire site to have a triangular shape with the other two major roads. It has a gully run across 16 plots and 6 access routes and many of the roads terminate at this gully. The neighbourhood has 2 main access roads, 3 major routes and several minor routes.

The Regenerative Analysis

The aim of this study is to determine whether a regenerative approach was adopted in the design and development of this neighbourhood using the regenerative design best practices as contained in section 3.4 of this study. It will also examine if it has caused any particular changes in the levels of environmentally friendly behavior in the residents.

The regenerative design best practices were regenerative strategies and principles designed to promote the implementation of regenerative practices in our community. They were assembled by assessing and deducing the most considered and practiced strategies and principles in regeneration. These best practices were prepared under the thematic areas: environmental, cultural, social, experiential, economic and educational in both regenerative design and regenerative development. The practices under the regenerative design build the regenerative and self-renewing capacities and while regenerative development creates the condition necessary for a sustained positive evolution of the designed systems. These are the best considered to be the most influential in the regenerative approach.

Regenerative practice in the study area

Based on the analysis carried out in this research, the major findings are summarized as follows:

The study revealed that the level of practice of regenerative design is insignificant and has not been utilized in any development within the study area. It observed that the people are not yet equipped with the issue of regenerative design and development, thus, confronting them with difficulty in differentiating it from sustainability and urban renewal. Accordingly, this issue of regeneration tends to be vaguer.

There is excessive inability of the designing of our neighbourhood and communities to neither pay attention to uniqueness of our place nor incorporate the natural living systems and environment. The natural features and landscape are not studied or considered yet the peculiarities of a given place are supposed serve as parameters for determining the design solutions that are appropriate and possible in that place. In that regards, the neighbourhood faces environmental problems; flooding and drainage issues. Therefore, our designs should not be independent of its immediate environment.

On the area of environmental nuisance, the planners never incorporated and utilized natural energy system. They rather encourage more the consumption of fossil fuel going active in their designs, thereby generating more carbon into the atmosphere which is harzardous to the environment. Again, it was perceived that the available community centres and other estate facilities were not close to the users, discouraging trekking and site seeing for the experience of the place. As a result, they resorted to conventional methods which are costly and also destructive to the environment.

This study established the inactive participation of the stakeholders and communities in such issues like sustainability except when they are directly involved, as an owner occupying the property and/ or the consultant. This was believed to have shared strong link with awareness and was emphatic that knowledge is vital in the achievement of

regenerative practice and its sustenance. The level of what people can understand and interpret contributes to their beliefs and attitude, and the desire to participate.
The level of regenerative design thinking and practice in our society and Nigeria is very low, and could be promoted through:

a) Proper sensitization and adopting it as integral part of education.
b) The execution of developmental projects with best professional practices, prioritising the natural environment, and its diversified uniqueness.
c) The collaborative action between the different stakeholders and actors and their active participation will promote the application of this practice and its sustenance.
d) The incorporation of this practice as part of the approval process will not only quicken the application of this practice but will enforce its installation.

Recommendations

For the adoption of regenerative design and development in project execution in Awka, relating to the results of this study, the following recommendations are made:

i. The designs should be such that will not be independent of its environment. It should be built to place and not to formula, considering diversified uniqueness of each place.
ii. The designs should allow for the interconnectivity and co-evolution of humans, their activities and nature. They should be made to harmoniously co-exist in mutual relationship with each other to create a sense of place.
iii. The designs should incorporate the natural systems for energy which is generated without ecological destabilization. It should be utilized for our benefit to reconnect to the environment.
iv. There should be quality awareness and education for positive attitudes and good transition of these regenerative practices.
v. The collaborative actions and community participation should be encouraged for sustained regeneration.

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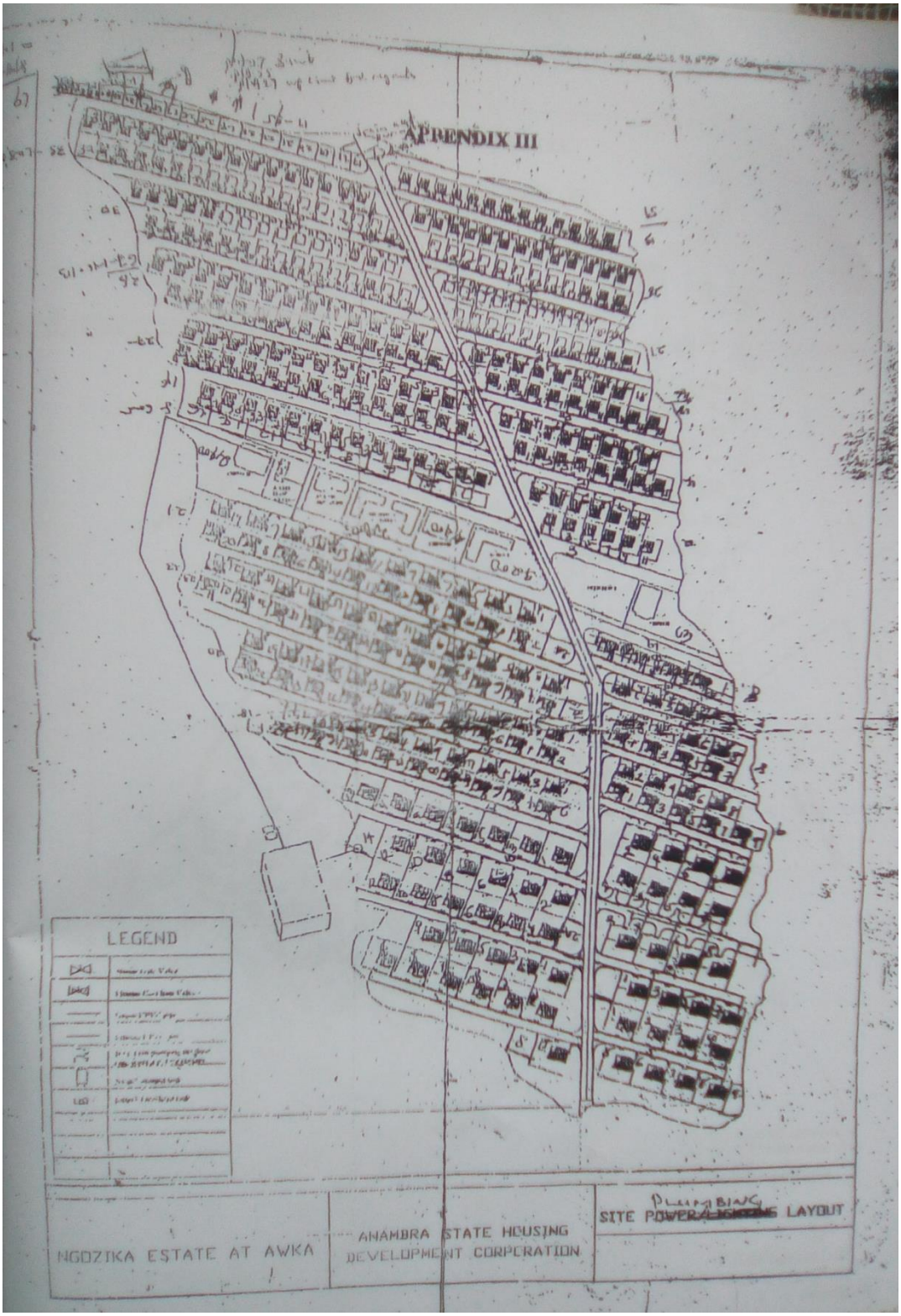
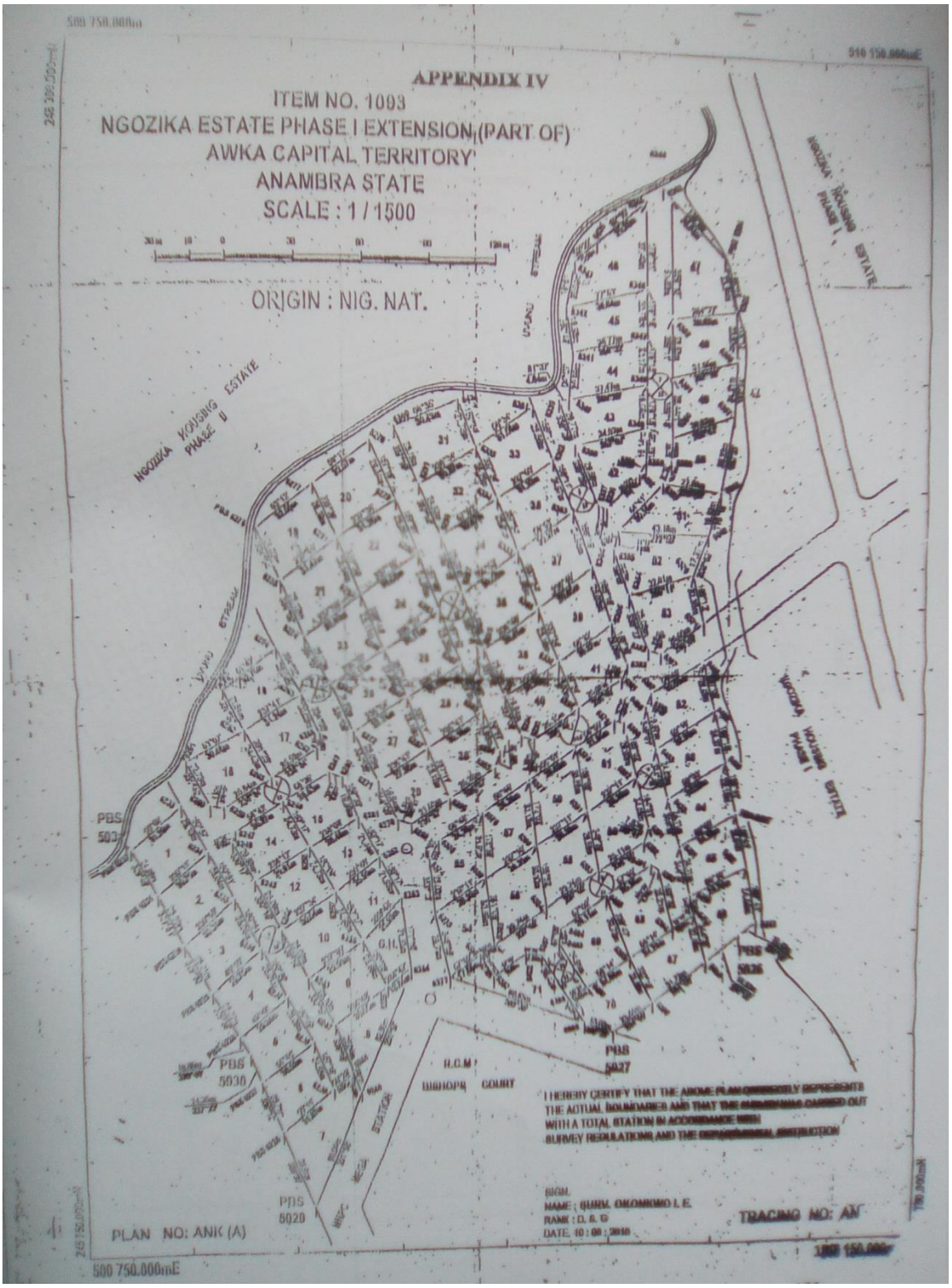
Appendix I: Ngozika Housing Estate Phase I layout Plan


APPENDIX III
LEGEND
NGOZIKA ESTATE AT AWKA
ANAMBRA STATE HOUSING DEVELOPMENT CORPERATION
SITE PLUMBING LAYOUT

Appendix II: Ngozika Housing Estate Phase II layout Plan



Appendix III: Ngozika Housing Estate Phase III layout Plan