



## Nacala region: a new approach to urban planning in Mozambique

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### Nacala region: a new approach to urban planning in Mozambique

Nacala region is located in a strategic position in the northern part of Mozambique and is the gateway to the Nampula-Nacala transport corridor. This corridor, designed within an international strategy to develop the north of the country, links Zimbabwe, Malawi and the hinterland of Mozambique with the Indian Ocean port. As a result of all the large scale projects in the area - among them the Nacala Development Corridor (CDN), the Nacala Special Economic Zone (ZEEN), Nacala International Airport, and the Nacala-a-Velha deep water port - the region is under extreme pressure to develop, with a growing demand for land to allocate to economic activities and housing. This pressure is producing a non-planned development in the area with slums and informal settlements consuming the territory. This growth is creating conflict between land-uses and many problems with respect to access to basic infrastructure such as water and electricity. The current situation in the Nacala region is indicative of a future that cannot be approached without urban planning.

The third Think Forum – a forum held to implement projects in the ZEEN - held in Nacala Porto in July 2013 analyzed the challenges of the existing situation and concluded that a territorial plan was needed to develop the Bay of Nacala. The Forum showed that the awareness of local authorities and stakeholders regarding the need to plan in order to maximize the benefits of the booming economic investments while avoiding the existing problematic of lack of infrastructure and land-uses conflicts.

UN-Habitat Mozambique selected the Nampula-Nacala corridor with the focus of the Nacala region for an innovative international planning program called Achieving Sustainable Urban Urban Development (ASUD). This ambitious program shows a new approach to sustainable development based on a three-legged approach: an enabling legal environment, local economic development, and

physical planning. This approach is central to the discussion of the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) to be held in Quito, Ecuador in October 2016.

This paper is structured within this context and based on the experience and work of the team of UN Habitat during the past three years. The team worked on an ambitious whole scale project using different instruments of planning for each scale. The Nacala inter-district land use plan, *Plano Inter-districtal de uso da Terra de Nacala* (PIDUT), is the tool for the 60.000 scale but the work went through the 30.000 scale in the review of the existing structural plan, *Plano de Estrutura* (PE) and the district land use plan, *Plano Distrital de uso da Terra* (PDUT). At the 10.000-5.000 scale the urbanization plans, *Planos Urbanização* (PU) were used and at the 2.000 scale for the PP *Plano Pormenor* where detailed sections at a 200 scale were designed to define the relation between the streets and the buildings in the urban regulations.

The Team first elaborated a full diagnostic document with a detailed analysis of the existing situation in the region, this way we could understand the problems in the area and could start to work on the PIDUT to be approved at the provincial level as required by law of land use planning, *Lei de Ordenamento do Território* (LOT) nº19/2007. Since the beginning of the process the plan has had full support of the government of the province of Nampula, the municipality of Nacala Porto, the district administration of Nacala Velha and Nacala Porto, as well as *Gabinete das Zonas Económicas de Desenvolvimento Acelerado* (GAZEDA).

The UN Habitat Team worked in coordination with the Japanese International Cooperation Agency (JICA) and the Economic Strategic Plan for Nacala corridor, *Projeto das Estratégias de Desenvolvimento Económico do Corredor de Nacala* (PEDEC). The ASUD program connects with PEDEC and goes deeper in the detail down to the urban scale. ASUD and PEDEC are complementary projects that provide an integrated vision of the Corridor future.

UN-Habitat has developed ASUD Mozambique program as a reference case for urban planning in the country at this inter-district level with the objective to plan the Bay of Nacala as a whole system. ASUD also shows a whole-scale planning strategy to build sustainable cities for the people based on five basic urban principles:

- Adequate space for streets and efficient street network (30% land, 18 km/km<sup>2</sup>)
- High density (150 people/hectare)
- Mixed land use (40% space for economic activities)
- Social mix (Minimum 20-50% low cost housing)
- Limited land use specializations (Maximum 10% single function)

## **ANALYSIS OF THE EXISTING SITUATION**

The administration of the Nacala region is multilayered with two districts, one municipality, a deep water port (Fig. 1), an international airport, and a restricted military area, all within the boundaries of the ZEEN.

A large number of plans were developed and approved individually prior to the decision to transform Nacala into the gateway to the transport corridor. All these existing plans require integration and harmonization into the administrative boundaries of the ZEEN.



**Fig. 1: Nacala Bay.**

Source Ricardo Miguel

the region, in order to get a clear picture of the problems of the area. The diagnostic document is divided into four systems to simplify the understanding the problems of the region as a whole: mobility-transport system, urban system, economic system and environment.

The pace and speed of the private economic investment has overcome the capacities of the local authorities to plan, administer and allocate land. This is primarily due to the lack of a valid instrument with insight and which is based on the comprehension of the present spatial requirements, challenges and opportunities of the region. Financial capacities of the administration bodies are also severely limited by low revenue generation of the municipality of Nacala-Porto and nil revenue generation in the district of Nacala-Velha.

The first step of the ASUD program was the creation of a diagnostic document with a detailed analysis of the existing situation in

**A) Mobility-transport System**

Nacala suffers from mobility problems due to unplanned growth. The lack of infrastructure and planning is producing congestion with heavy load transport traffic through the city on its way to the industrial area and the port. Due to little capacity to implement solutions, the problem is growing and the existing road system is quickly deteriorating.

**B) Urban System**

Informal and spontaneous settlements are appearing around Nacala Porto and Nacala Velha as the population grows rapidly due to migration into the ZEEN. Nacala Porto has urban characteristics and suffers a lack of available space while Nacala Velha is more rural with potential to grow.

**C) Economic System**

Capacities to provide economic and formal job opportunities in the area are still very limited despite the increasing private investment and need to be increased and diversified. The diagnostic document identifies areas around schools and health centers as potential areas of activities.

**D) Environmental System**

Nacala faces great environmental challenges in the near future, including soil erosion, sea-level rise, strong-winds and cyclones, as well as a potential risk of increasing the pollution of the Bay. The diagnostic document recognizes environmentally sensitive areas and natural areas.

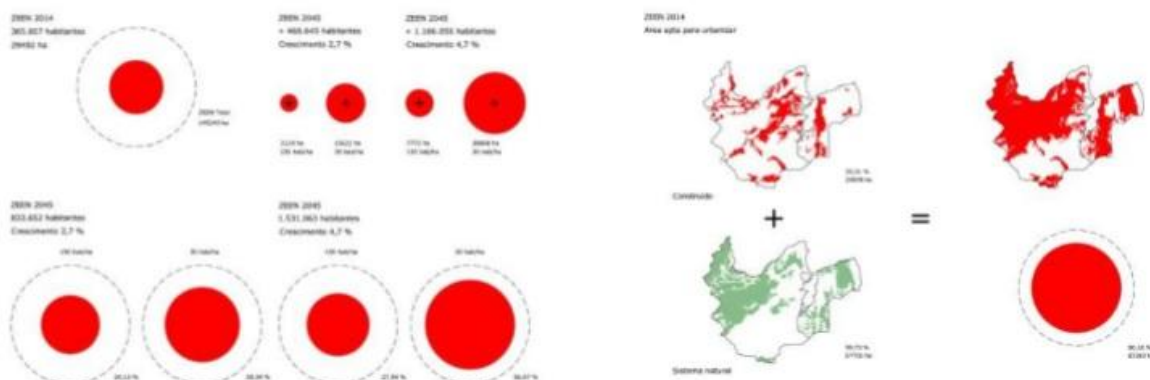
As a result of the diagnostic document the team concluded that Nacala region is heterogeneous and each district has very different characteristics. Nacala Porto is mainly urban and Nacala Velha is more rural. The combination of both characteristics offers many possibilities to design a territorial model because Nacala Porto and Nacala Velha can complement each other to build the future ZEEN.

## PROJECTIONS

Nacala region has grown extremely fast in the past decade and the projections show it will continue growing exponentially. Over three hundred thousand people (302,906) were living in the region in 2007. In 2015 the ZEEN already had over three hundred and sixty five thousand residents (365,007) which means there has been a 20.5% growth of the population in eight years.

The UN Habitat team considered different scenarios to estimate the growth of the population in the next thirty years. Finally the team selected two scenarios for the projections of Nacala 2045. The first scenario considers the current growth rate of Nampula province of 2.7%. This means Nacala will double its population to just below half a million people, 468.645, within the next 30 years. The second scenario considers the average national growth rate adding the migration balance rate registered in the ZEEN which is 4.7%. Therefore, Nacala 2045 would have over a million and a half habitants (1,531,063), nearly five times the current population.

These population growth projections have been translated into demand for space with two different density parameters employed to show the difference. The first one is a density of 150 people per hectare - the recommended density parameter by UN Habitat to achieve a sustainable city based on the concept of compact city. The second density is 30 people per hectare - the existing national density in city extensions with mono-functional residential neighborhoods. These new areas are typical illustrations of urban sprawl. They consume large tracts of land and produce unsustainable developments based on the use of the car with higher costs of infrastructure.



**Fig. 2: Projections and available space**

Source UN Habitat.

Figure 2 shows clearly the difference in the demand of space for the projected population scenarios. The first scenario of a 2.7% growth rate shows that with 150 habitants/hectare the urban space occupied would be 27.5% of the ZEEN. The amount of space occupied would rise to 56.5% in the second scenario of an urban sprawl density of 30 habitants/hectare.

In conclusion, projections show that currently low density occupation patterns risk of consuming all the territory and will end up creating higher costs of urbanization.

## TERRITORIAL MODEL

As a result of the projections and the analysis of the diagnostic document, the UN Habitat team defined a territorial model that will guide the spatial and functional configuration of the ZEEN into the future.

The territorial model envisages an occupation of the territory based on its potential and the existing characteristics of each area. The model integrates the different specific requirements or needs in a territorial city, solving problems and offering alternatives to the population. Each area preserves its character and its identity, strengthening its value in the ZEEN.

Looking at the existing situation, the diagnostic document recognized that both Nacala Porto's urban character and Nacala Velha's rural character are both enhanced and combined in the territorial model. Nacala Porto is designed for an urban city lifestyle while Nacala Velha offers the possibility of a countryside lifestyle, more connected to the landscape with agriculture as a supporting economic activity.



**Fig. 3: Territorial Model sketch**

Source UN Habitat

model (Fig. 3 and Fig. 4) makes use of to define clear limits to protect the sensitive bay area.

To work as a whole, the territorial model promotes connectivity in the ZEEN enhancing the road network and transport services. Focusing on offering better transit conditions for people and businesses, or even in the effective reduction of travel time and improved connection and accessibility.

The bay of Nacala is an environmentally sensitive area. For this reason, the territorial model proposes to isolate the inside of the bay area from the urbanization process. The landscape of the ZEEN has two clear man-made lines - the two railway lines - that the territorial

The territorial model is a strategic document divided into four structure systems that simplify the understanding of the proposal as was done in the diagnostic document.

### A) Urban System

The urban system is held up by two central points which are articulated by various sub centers around them that create a full urban network. This poly-nuclear structure will set out the main connection lines with the surrounding land outside the ZEEN.

### B) Socio-Economic and Competitiveness System

Community services and public facilities create the development of a matrix of productive activities around urban centers that strengthen the city life in the future ZEEN. The structure of the urban network and the economic vitality of the rural matrix proposed for the ZEEN, as well as the quality of the landscape and natural conditions, has the potential to turn the Nacala region in an attractive place to live and a city of reference in Africa.

### C) Environmental system

The structure of the environmental system of the ZEEN will be characterized by protected areas and environmental recovery areas. These include water resources, coastal, soil and landscape, as well as the theme of risk area. The environmental system identifies the most significant resources and values of the bay and its surroundings. This is in order to maintain, enhance and promote the landscape to improve the quality of life of the population and reduce risk of situations caused by extreme natural events. The territorial model aims to integrate the management of the natural environment in the ZEEN to keep pace with the rapid advance of urbanization in the region.

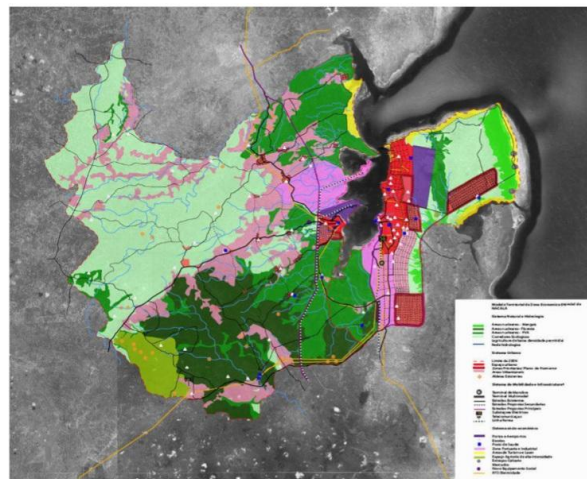
### D) Mobility and Transport system

The mobility system proposed by the team of UN Habitat for the ZEEN is based on enhancing the existing infrastructure network with new roads that increase accessibility and improve the connectivity of the network. UN Habitat Team also proposes to connect the main centers of Nacala Porto and Nacala Velha with Public Transport to ensure the mobility of people in the region ZEEN. Public transport between the two main urban centers will be the backbone of the ZEEN.

## Urban System

Nacala Porto concentrates its growth around the existing city with the urban expansion areas being developed with through PPU's. Despite its unfavorable topographical condition Nacala City will be an urban city with different centers connected with the urban tissue.

Nacala-a-Velha is different from Nacala Porto and so the proposal is not the same. As Nacala Velha has a rural aspect, the territorial model defines a city based on a closer contact to the landscape and the natural resources with the option to carry out economic activities based on small-scale agriculture. The objective of the plan is to develop the current rural areas with small centers around existing public facilities concentrating on economic activities. These centers will gradually transform the rural areas into a polycentric low density urban area with a huge potential to increase its density and absorb more population. At the same time the district main town Nacala Velha which is now limited, the railway will be fully developed with a general urbanization plan (PGU) and will become the center of the mesh. This model has a huge potential for future developments as the polynuclear structure allows future planned expansions around the poles. Nacala Velha is a large district with many different environmental restrictions, and some areas unsuitable for development. At the same time, however, Nacala Velha has an enormous positive development potential through the territorial model starts to develop.



**Fig. 4: Territorial Model**

Source UN Habitat

The area proposed by the territorial model covers 20.9% of the total area of ZEEN in a 30 years period. This area of 303.85 km<sup>2</sup> includes some areas unsuitable for urbanization. These areas will need to be defined at an appropriate scale and will be included in the environmental system.

**Table 1. Urban systems**

	Nacala Porto	Nacala Velha	ZEEN	% ZEEN
1. URBANO	71.416.555	17.178.422	88.594.977	6,10
1.1 Urb. consolidado	2.745.655	131.266	2.876.921	0,20
1.2 Não consolidado	32.708.528	3.844.994	36.553.522	2,52
1.3 Prioritária	35.962.372	13.202.162	49.164.534	3,38
Aeroporto	4.294.434			
Quissimanjulo	14.181.098			
Nacala Porto Este	4.594.296			
Nacala Porto Sul	12.892.544			
Nodos N.Velha		8.342.358		
Vila Nacala Velha		4.859.804		
2. URBANIZAVEL	15.952.352	199.297.900	215.250.252	14,82
3. TOTAL	87.368.907	216.476.322	303.845.229	20,92

Table 1 quantifies the urban ZEEN. We can conclude from the analysis of these data that the urban expansion areas have a much higher incidence in Nacala Porto while Nacala Velha has a huge growth potential in the future because of its size.

Urban expansion areas are specified for priority interventions in the territorial model as they will accommodate the projected population growth. Following UN

Habitat recommendations for urban density of 150 inhabitants per hectare to achieve a sustainable city we can estimate that Nacala Porto expansion areas have capacity to accommodate 539,436 inhabitants while Nacala Velha is able to accommodate 198,032 inhabitants. The total of the expansion areas of the ZEEN can accommodate in this way, 737,468 inhabitants.

Urbanization Areas, *Áreas Urbanizáveis*, are the reserve expansion areas for future development in line with the timeline of 2045. These areas are defined based in the existing rural settlements. The territorial model points at these areas, already transformed by human actions, as the areas that will reduce the pressure on the existing urban areas in the future. These areas developed with the multi-center structure defined in the territorial model will become strategic areas with economic activities and public facilities.

Urban system in the territorial model has been designed looking at sustainability and a maximum respect for environmental systems. The urban system has a strong dependence on the mobility system as the transport system has to guarantee the transits between the different urban areas of the ZEEN for a proper performance of the model.

### **Socio-economic and competitiveness system**

Major production centers as well as community services and public facilities define the economic system. The territorial model plans expansion areas around the existing economic activities in order to satisfy future demands of space.

The main activity areas are planned adjacent to the logistical doors of the ZEEN: the commercial port of Nacala, the new Nacala international airport and the deep water port in Nacala Velha. The two ports and the airport are strong magnets of complementary activities and the territorial model expect a big demand of land or space around them.

The ZEEN has been attracting many economic and social activities in the recent years due to the attractiveness of the big investments. Such activities have been emerging, especially along the roads towards Memba and Mossuril because of the topography and natural conditions. The spatial configuration of the territorial model creates opportunities for the integration of all these activities according to the principles of sustainable urbanization promoted by UN Habitat with a mixture of uses within neighborhoods.

**Table 2**

	Nacala Porto	Nacala Velha	ZEEN	% ZEEN
PRODUCTIVO	26.290.132	38.393.033	64.683.165	4,45

Table 2 quantifies the productive surfaces of economic system of the territorial model.

### **Environmental system**

The environmental system is essential in the territorial model. There are a number of crucial issues for the sustainability of the model, with particular attention to the geomorphology, presence of water resources, land-use patterns, landscape, nature conservation, biodiversity as well as agricultural activities as the region has high agricultural production potential in terms of soil fertility. Water management has a particular importance in the model as water is a key resource in the ZEEN and it eventually flows into the bay.

The approach of the territorial model is to define protection areas in the most environmental sensitive spaces as wetlands along the bay, course of streams, coastal dunes, areas susceptible to erosion as well as areas with any possible environmental risk.

The criteria followed include: continuity of ecological systems, hierarchy relating to the size of environments, and uniqueness of ecosystems located in the most sensitive areas such as the surrounding areas of Nacala Bay and the coastal areas of Nacala Porto.

The environmental system is supported by a set of territorial areas and corridors that include areas with the greatest natural value or ecological sensitivity. This structure permits maintenance of the biodiversity of the region and the fundamental ecological processes, while keeping the integrity of its sensitive ecosystems.

This hierarchical network of systems and subsystems is embodied in two levels: nuclear areas and ecological corridors. The nuclear areas include essentially remarkable landscapes with high interest for nature conservation and biodiversity; these areas are particularly very sensitive to human activities. Nuclear areas are connected to each other through ecological corridors that aim to guarantee the continuity of ecological processes and facilitate the transits.

The nuclear areas and the ecological corridors identified in the environmental system correspond to areas where the values have a dominant character even if inside there may be areas which could apply other arrangements or conservation status. This guidance does not require that the land uses remain static in these areas but it ensures that its changes due to territorial dynamics should consider the environmental issues and ecological values involved.

Nuclear areas include key ecological units with high natural and landscape value and whose conservation priorities are relevant to the scale of the whole ZEEN. These areas include sand dunes, the coastal seafront, mangroves, wetlands or some patches of forests.

The ecological corridors are mainly made by the water courses, streams and areas of depression and permanent water accumulation. They also include areas of confluence of water deposited by surface water courses. These areas have outstanding biological value that should be preserved and guaranteed. Some of these areas have a lot of potential for low density agricultural uses.



## **Mobility and transport system**

The ZEEN mobility transport system is based on the existing network of roads, railway, ports and airport infrastructure that connects Nacala bay into the national and international level.

New roads are proposed to complete the main road network increasing the accessibility conditions in the ZEEN. Improving connectivity in the network is one of the keys for success in the territorial model, as without mobility the urban system will not work for the ZEEN. New routes increase urban connectivity and reduce the increasingly frequent traffic jams.

The UN Habitat team proposes four strategic interventions for the main road network within the territorial model.

- Nacala Porto ring road. The new road will connect directly the international airport with the N12 Nacala-Nampula road. This road will become a ring of Nacala providing new access to the city from the east and will organize the natural urban growth of Nacala to Matibane and Mossuril. This new route can be extended in the future to connect with the R1169 Matibane-Mossuril without going through N12. This connection will benefit the tourism pole designed in Mossuril as it will be connected directly with the international airport.
- Direct access to the port of Nacala. This intervention is combined with the construction of a multimodal maneuvers terminal that will release the urban center of Nacala from heavy transits to the port. This direct access to the port is being developed by JICA and it is already proposed in PEDEC.
- Nacala Velha Ring Road (Mossuril- Memba). This new road will run alongside the railway and the power line creating an infrastructural corridor that will release part of the current traffic going from Nacala Porto to Nacala Velha through flooding inland areas.
- Nacala Bay Ring Road (Namialo – Memba). This connection will create an interesting new crossroads with potential paths crossing to become a new pole in the region releasing the pressure over Nacala Velha.

The road network proposed for the ZEEN is completed with some new secondary roads that improve connections creating a mesh offering different alternatives for the same route.

The Special Economic Zone ZEEN Mobility Transport System proposes to connect the main centers of Nacala Porto and Nacala Velha with public transport (bus or busa rapid transit –BRT-) to ensure the mobility of people in the region ZEEN. A maritime connection of the two Nacalas with small vessels for passengers and goods is also proposed. The integration of the different transport alternatives in the mobility system is achieved with a design strategy of urban center transit oriented developments (TOD) where public transport is combined with bicycle paths and walkways.

Public transport between the two main urban centers will be the backbone of the ZEEN. The UN Habitat team highly encourages and promotes the use of public transport as this is the most efficient alternative for mobility in the ZEEN.

## **CONCLUSIONS**

The only way to approach the future is through urban planning. Urban planning anticipates the impact of population growth and starts preparing the region by creating conditions for sustainable urban development.

Dynamic complex areas such as Nacala, as well as some other areas in Mozambique like Maputo, Nampula, Beira or Pemba, receive a lot of pressure to develop their territories. They require new planning instruments to control the organization of urban areas as traditional planning simply cannot do it.

When the city exceed its limits and territorial models begin to appear without a planning strategy, the existing *Plano de Estrutura* or *Plano Distrital* are not enough and territorial planning is needed.

The processes that we are now observing in Mozambique is not new and many other cities had to deal with the same problems in the past to become regional cities. There are many successful regional cities, such as San Francisco, that we can look at and learn from to implement solutions.

The territorial planning for Nacala has been a pilot project in Mozambique. The experience of Nacala can be very useful for other cities in Mozambique as it shows the way forward.

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