

## Chapter 5 SPATIAL FRAMEWORK

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### 5.1 OVERVIEW

In principle, regional approach considers region as a system which consists of regional formation unit, namely natural resources, artificial resources, and human activities, including political, economics, socio-cultural and national defence, which interact to form a spatial framework. By considering that region is a set of system in which human conduct their activities, the realisation of the system is reflected through the utilisation pattern and space structure which could provide direction in the development planning process which is efficient, harmonious, and sustainable.

Timor-Leste's national spatial framework is prepared to sustain Timor-Leste's vision and mission of long-term development (2020). The spatial framework will direct the acceleration of sustainable economic growth and equitable development from national level to sucos level in a unified regional and national unity framework of the people of Timor-Leste.

The mainland area of the Democratic Republic of Timor-Leste is about 14,610 km<sup>2</sup>, with a mountainous and hilly geomorphology and topographic condition in the central part of the country stretching from east to west, then sloping towards the coast in the north and south as well as the east which is the tip of Timor Island. As a result, naturally the socio-economic activities are concentrated predominantly along the plains in the northern and southern corridor of the island of Timor, forming the agglomeration of economic activity and production that eventually grew into urban centres.

Timor-Leste's mainland area is approximately 14,610 km<sup>2</sup>, with geomorphology and topography characteristic are mountainous and hilly especially extreme in centre of country. The mountainous and hilly areas could be found along eastern to western region. The other side, lowland characteristic could be found in southern region and small part in northern region. This situation have grown all social-

economic activities especially in northern and southern corridor and in turn have formed economic and production agglomeration that growing settlements distribution.

Considering the geomorphology conditions and concentration trends of economic activities in the society today, the approach for the development of the national territory of Timor-Leste must be carried out through a special approach called 'corridor' development, which is basically a regional economic development plan which extends spatially to form growth bands (ribbons), with the city development plan as the hierarchical central growth.

## 5.2 CORRIDOR DEVELOPMENT FRAMEWORK

The term corridor refers to a linear spatial structure that has a role to serve main social-economic flows in a micro scale. A dynamic main social-economic flow moves from an upstream economic activity to a downstream economy activity and ends in the regional outlet.

Timor-Leste's regional development corridor is the most appropriate approach because a pattern spatial structure concentrated in the north, namely from Dili – Liquica – Batugade – Motoain (link to West Timor Province/Indonesia) and to the eastern side namely Dili – Hera – Manatuto – Baucau. Elsewhere, the southern corridor also has the potency to be developed as a new corridor in the future, because this corridor can be developed as a new economic growth engine in Timor-Leste, with regards to the development of the oil and gas industry from Bayu Undan and Greater Sunrise in Timor Gap Sea. This potency in the south is appropriate for developing a new corridor and has potential in contributing to the system.

Corridor development's objective is to increase services and commodity mobility and also public transportation demand. In turn, corridor development can create faster economic growth, promote equality and Timor-Leste's national economic position globally. Finally, corridor development can improve the investment climate and increase investment for all stakeholders.

Corridor development consists of infrastructure provision such as road networks, sea ports, airports, electricity, telecommunication and water. Corridor development will be the basis for a centre of national production, industry, trade

and services. Corridor development will have an engine of growth in the form of an integrated economic zone and national strategic economic zone in the Timor-Leste - Indonesia border area

At the macro level, the trend of Timor-Leste's spatial framework will be divided into two regional development corridors such as

1. Northern corridor development,
2. Southern corridor development,
3. National strategic zone development especially in cross border areas in instances such as the Oecusse Enclave and Cross Border in Bobonaro and Covalima District.

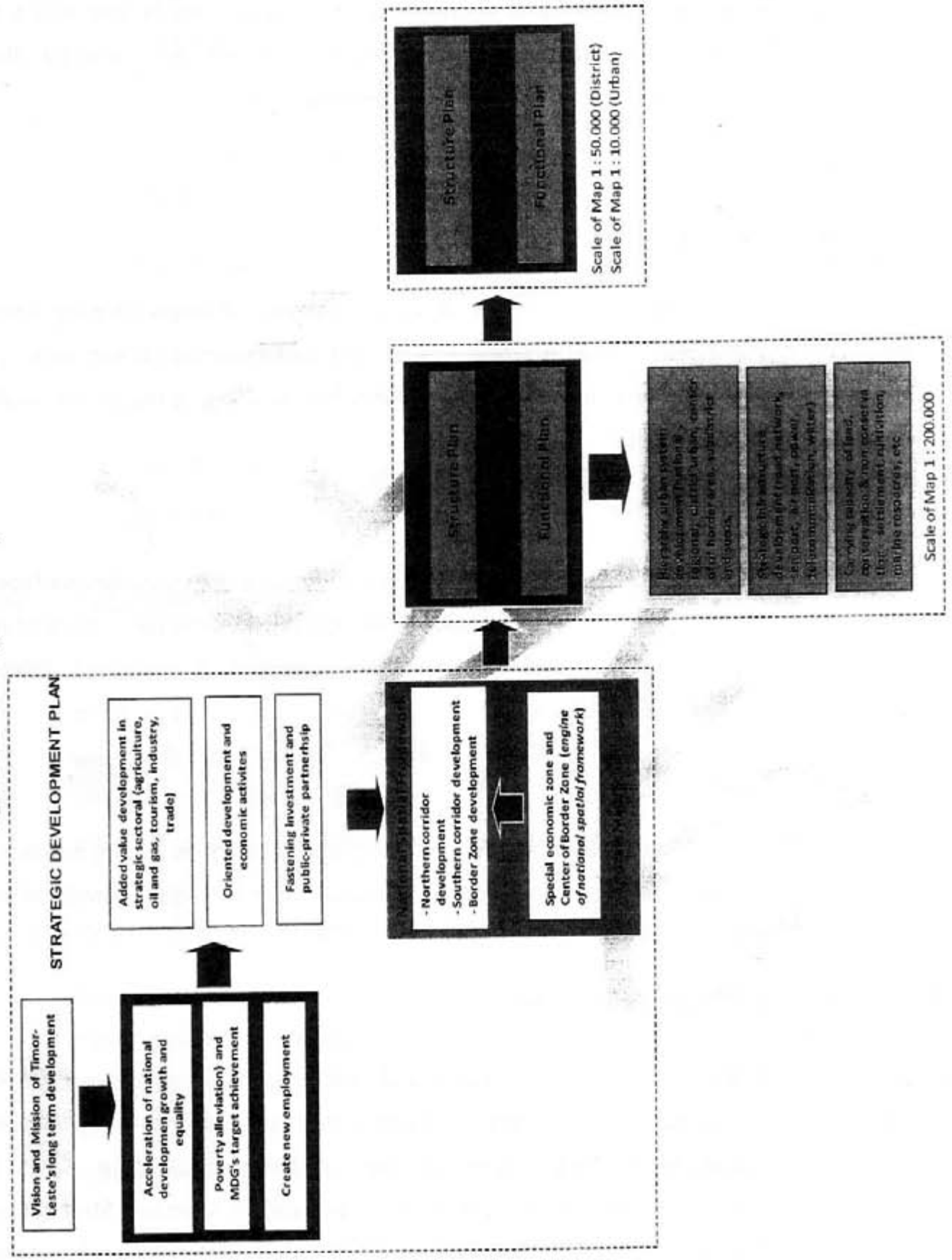
The spatial framework will be expected to become a guide for Timor-Leste's national spatial structure and functional plan. This plan will have a time frame of 20 years. The national spatial structure plan will be covering:

1. National Urban Development System, as a growth centre
2. Infrastructure network development

Whereas, the national spatial function plan will be covering:

1. The plan for a Protection Zone. This plan is utilized to balance a sustainable environment and ecosystem, safe human settlements, coastal areas, river banks, green areas, and conservation areas for natural biodiversity.
2. The plan for a Cultivation Zone. This plan is utilized to serve human activities and whole production activities (good and services), forestry, agriculture, mining, industry, tourism and human settlements in urban or rural areas.

Figure 5.1 - Strategic Development Plan



### 5.3 URBAN SYSTEM SPATIAL FRAMEWORK

Timor-Leste's national urban system spatial framework will be oriented to accelerate the northern and southern corridor development and also a national strategic zone in border the area between Timor-Leste and Indonesia. The urban system will be created as a hierarchical urban system.

The urban system is divided into:

1. National Urban

The national urban is planned as a functional urban area having functions as the nodes of export-import activities, international trade and centre of national-scale industries and services including a node of multi-mode transportation.

2. Regional Urban

The regional urban is planned as a functional urban area having functions in support as a feeder to the node of export-import activities, centre of regional-scale industries and services and including a node of interregional transportation.

3. District Urban

The district urban is planned as functional urban area having functions in the centre of district-scale industries and services including a node of intra-sub district transportation.

4. National Strategic Urban

The national strategic urban is planned as a functional urban area fostering the Junction Point between Timor-Leste and Indonesia while developing interactive social-economic activities including facilitating CIQS services (Custom, Immigration, Quarantine, Security) in selected Strategic Junction Points (northern, centre and southern part of cross border zone). The strategic urban is part of the strategies to develop the surrounding areas.

Considering the definition of a hierarchical urban system, the Timor-Leste's national urban system is indicated as such:

1. The national urban will be promoted in Dili (District of Dili) and linked to the capital city and Suai (centre of Covalima District). In the future, Suai is planned to become the supply base for the oil and gas industry and a new functional urban area in the development of the southern corridor.
2. The regional urban will be promoted in Baucau (centre of Baucau District) and Viqueque (centre of Viqueque District)
3. The district urban will be promoted in Liquica (centre of Liquica District), Glenno (centre of Ermera District), Aileu (Centre of Aileu District), Manatuto (Centre of Manatuto District), Ainaro (centre of Ainaro District), and Same (Centre of Manufahi District).
4. The National Strategic urban will be prioritized in Maliana (centre of Bobonaro District) and Pante Macassar (centre of Oecusse District).

## 5.4 STRATEGIC INFRASTRUCTURE DEVELOPMENT SPATIAL FRAMEWORK

Timor-Leste's strategic infrastructure development spatial framework will be oriented to promoting urban system linkages, corridor development and integrated economic development zones as well as urban-rural linkages. Strategic infrastructure development spatial framework will cover the transportation network, power, telecommunication, and water resource infrastructures.

### 5.4.1 National Transportation System

Timor-Leste's transportation system spatial framework will be addressed towards three integrated transportation development, such as land transportation, sea transportation and air transportation. The integration of three transportation systems will be synergized to enhance optimum capacity for internal and external mobility and on the other hand to develop services in the area.

#### 1. Land transportation system

This system is divided into the national road network, regional road network (district road) and rural road network. The land transportation system is

developed to enhance road capacity in dealing with national, district, rural road assignments and will be followed up with improving levels of service in related to promoting effective and efficient mobility for road users.

According to the land transportation spatial framework above, there are three priorities in road and bridge network development such as:

- a) Improving and developing all rural roads network and feeder road to national roads or district roads.
- b) Improving national roads especially in the northern and southern corridor development
- c) Developing road interconnection in the northern and southern corridor development through highway road development. These highway roads will connect to international urban roads namely in Dili and Suai.

## 2. Sea Transportation System

The Sea transportation system will cover the hierarchical system of the sea port and nautical navigation. The hierarchical system of the sea port will be developed into an international port, national port, and special port especially as a supply base or fishery port. The promotion of an international/national port will be complementary in supporting the northern and southern corridor development. Besides, a special port will be oriented to specific economic activities such as a supply base for the oil and gas industry or fishery activities. Whereas, a feeder port is needed to serve transportation demand in Oecusse Enclave and Atauro island.

The hierarchical seaport system is regulated by the Infrastructure Ministry that relates to all aspects of sea transportation system. The sea transportation spatial framework will be oriented to enhance the capacity of national, regional, feeder and special ports that follow with regulating the nautical navigation system.

Today, Timor-Leste has only one sea port, namely the Dili Sea Port. This port covers whole distribution goods and users that are not only internationally oriented (export – import) but also oriented in meeting regional and local transport demand. For the medium term (2016 – 2020), sea port

development will be planning a new commercial sea port located in Tibar (to west from Dili). The passenger terminal will still be retained in Dili Sea Port.

Considering our current situation and an optimistic trend, Dili Port cannot yet serve all container- loading and unloading activities, such that before Tibar Port begin operating, there is a need for a dry port to support the Dili Port activities.

In addition to developing a new commercial sea port in Tibar, local port or special ports for specific commodities will be developed by improving existing quays such as Com – Lautem, Caravela in Baucau, Oecusse and Atauro Island. Whereas, Hera Port will be utilized for Timor-Leste's Marine Military Facility. In the future, the Marine Military Facility requires the development of a new facility especially in eastern Timor-Leste such as in Viqueque District or Baucau District.

Dealing with oil and off-shore oil and gas exploration in the south located in Bayu Undan and Greater Sunrise or other potential sites in Timor Gap, There are plans to develop the Suai Supply base. Meanwhile, a new port is planned in Betono. Betano port will be developed to support the oil refinery industry and Beaco Port will support the LNG processing (LNG Plant).

### **3. Air Transportation System**

The air transportation system will cover airport and aerodrome regulation. The air transportation system will be developed through the promotion of Nicaloa Labato international airport and feeder airports such as those in Suai and in Oecusse. The rest are special airports such as that in Baucau (Military Facility). The air transportation system spatial framework is intended to enhance the capacity of the international airport, feeder airports, and special airports that follows with the aerodrome regulation system involving international and domestic flights. In the future, Timor-Leste will need national flights that will be start from local flight companies that are currently serving the domestic route and still awaiting the completion of the Suai airport and Oecusse development.

#### 5.4.2 National Energy Network System

Timor-Leste's energy network system will cover electricity network system, as well as oil and gas pipeline system. The electricity network system is oriented to develop high-voltage system in the northern and southern corridor, north-south interconnection and enclave system especially in Oecusse and Atauro Island.

Development of national energy network system will be improved by development of power plant capacity and enhancement of power supply for all remote sites in Timor-Leste. This system is expected to be capable of handling quality power supply services. The quality of services could be assessed through the following:

1. Enhancement of power plant capacity;
2. 24-hours of operational service in every district, not only in the urban areas, but also in remote areas in Timor-Leste in proportion to the corridor, enclave, and small islands development;
3. Contributing and stimulating national strategic activities such as industry, plantation, domestic industry, household industry, and trade activities, as well as urban and rural services.

#### 5.4.3 National Telecommunication System

The national telecommunication system spatial framework will be utilized to increase the capacity of fixed-line telephone and Internet connections with a range of services provided nationwide.

The backbone of the national telecommunication system will be sourced from:

1. *Terrestrial system development.* This system will be developed in the northern, southern and northern-southern interconnection, enclaves and isolated areas by using the microwave radio system;
2. *Satellite system.* This system will provide Internet services, and mobile phone networks that are supported by ground stations and the base transceiver system (BTS).

#### 5.4.4 Water Resources System

The water resource system in Timor-Leste will cover water resources from watersheds and ground water. Watershed resources number 12 watersheds systems and inter watersheds between Timor-Leste and Indonesia. Ground water resources are identified in the north section, southern section, centre section, and in the enclave of Oecusse and small islands.

Water management systems such as check dams, ponds and irrigation systems will be developed in all districts in the form of small local irrigation systems. Meanwhile, a big check dam is not present in Timor-Leste. A big check dam has multiple functions such as providing hydropower for electricity, water resources for drinking water and irrigation. In total, irrigation covered areas in Timor-Leste are approximately 71.258 hectares (MAP, 2007) with functional areas approximately 56.266 hectare. Because of poor construction, this resulted in decreasing rehabilitation of irrigation systems approximately 15.000 hectares.

The drinking water system is limited and new especially for urban people in Dili. People in Dili still have limited access to water pipes such as those that are household connected, hydrant points and ground water resources. Meanwhile, rural areas (sucos) still use water from the ground and rivers. In general, the condition of water supplied to networks is poor because of physical leaks in the transmission and distribution network.

### 5.5 PROTECTED ZONES

Spatial framework of protection zone management is addressed to protect a vulnerable zone from disaster and national strategic value zones. Zones vulnerable to disaster in the areas of floods, landslides and abrasion hazards. The protection of national strategic value zones will give protection to biodiversity and green-belts in cross border area.

In summary, the protection zone will cover:

1. Protected forests
2. Natural conservation areas
3. Riparian buffer zones

#### 4. Green-belt zones in Timor-Leste's cross border

##### 5.5.1 Protected Forest Zone

The protected forest zone is a zone that has the unique characteristic of protecting the surrounding areas. The main functions of protecting forests cover supplying freshwater, preventing floods and erosion, maintain the hydrological function and to ensure ground-water availability.

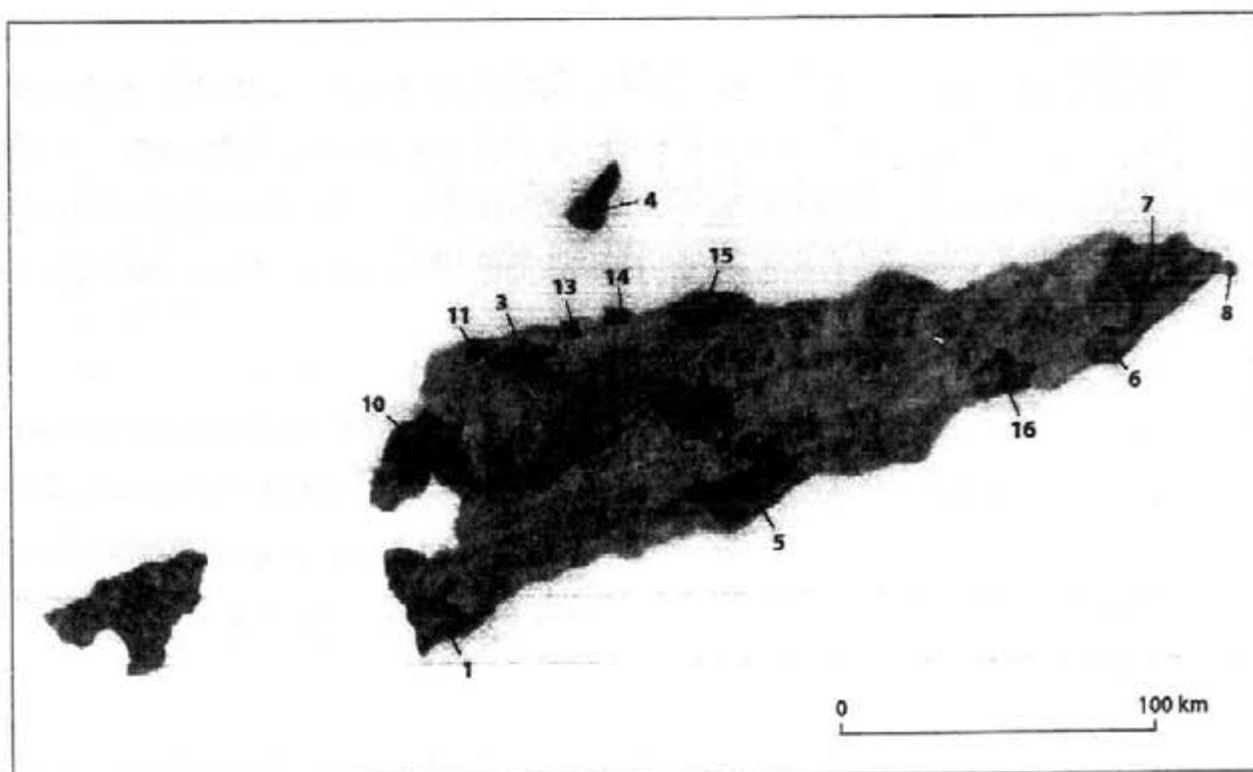
Determination of protected forests in Timor-Leste uses related criteria such as those with slopes between and more 40%, more than 2.000 metres away from the sea level, locations in coastal areas (such as mangrove zones). Physically, a protected forest zone serves to protect the ecological system in the northern, southern corridors, central areas, Oecusse enclave and small islands (such as Atauro and Jaco Island).

##### 5.5.2 Natural Conservation Area

The natural conservation area spatial framework has special and specific characteristics that are not only located in the mainland or coastal areas. The function of zoning is to support the protection of the living buffer system, biodiversity and specific ecosystems. One of the natural conservation areas is Nino Konis National Park. This park is located in Lautem District (eastern part of Timor-Leste). National park zones have main functions of dealing with conserving genuine ecosystem through the use of a zoning system management and to benefit for research, knowledge, education, culture creation, tourism and recreation.

The other areas, besides Nino Konis Santana National Park is intersected bird areas (IBA area). IBA is promoted to be part of a nature conservation management in Timor-Leste. IBA's location in Timor-Leste is suggested here: 1) Tilomar ; (2) Ramelau; (3) Fatumasin; (4) Atauro Island-Manucoco; (5) Clere River; (6) Lore; (7) Paitchao Mountain and Iralalero Lake; (8) Jaco Island ; (9) Diatuto Mountain; (10) Be Male-Atabae; (11) Maubara ; (12) Mak Fahik and Sarim Mountain (13) Tasitolu; (14) Branca Areia Coast; (15) Curi Mountain ; (16) Irebere and Ilimoar Estuary.

Figure 5.2 - Nino Konis Santana National Park and IBA Location



### 5.5.3 Riparian Buffer Area Spatial Framework

A riparian buffer area are on the left and right side of rivers, water resource infrastructures, lakes and coast lines that have functions dealing with water resource conservation and floodplain control. The determination a riparian buffer area boundary is oriented to the protection, development, and utilization and controlling of objective-based water resources.

The spatial framework of riparian buffer areas in Timor-Leste will focus on all activities related to permit procedures especially in developing housing, industry or built up areas and etc. Related reasons dealing with permissions in built up areas are:

1. Not creating excessive pressures on water resource systems (river, lake, coastal) by related human activities
2. Optimizing environmental sustainability
3. Controlling flood and abrasion hazards in surrounding areas of water resources like river banks, lake banks or coast sides.

Furthermore, the determination of riparian buffer area boundaries will be decided by ministry law related to water resource development.

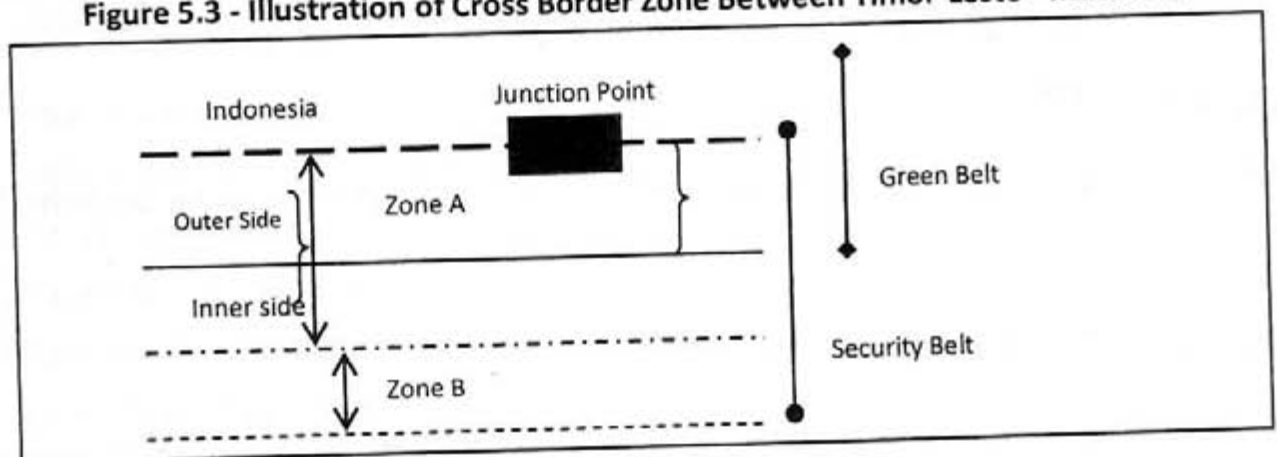
#### 5.5.4 Green-belt Area in Timor-Leste's Cross Border

Physically, Timor-Leste borders with Indonesia. The cross border between Timor-Leste and Indonesia is located in three districts namely Bobanaro, Covalima and Oecusse District. This cross border area connects to Nusa Tenggara Timur Province (Indonesia) with Atambua as its closest city through Junction Point in the cross border area.

In relation to the importance of security and defence, the cross border area needs joint cooperation between Timor-Leste and Indonesia Government. One of the many cooperative efforts in the cross border area is green-belt development alongside the north-south axis in Bobanaro and Covalima district and also the Oecusse Enclave.

The green-belt area spatial framework is developed in the outer zone of Zone A. Besides developing the green-belt landscape in Zone A, this zone will be planned to develop inspection roads related to our security interests. The inspection road can be used for 4- wheel vehicles or military vehicles. Besides developing the inspection road, the cross border spatial framework will plan to develop buffer zones such as limited cultivation zones, for example forest zones or plantations without settlements. This area will be located in the inner of Zone A. Furthermore the cross border will be integrated with Zone B. Zone B consists of human settlements and production activities and also social-economic facilities.

Figure 5.3 - Illustration of Cross Border Zone Between Timor-Leste - Indonesia



In the future, the joint cross border cooperation is needed to facilitate social-economic bilateral cooperation between Timor-Leste and Indonesia.

## 5.6 CULTIVATION ZONE

### 5.6.1 Agriculture

The Agriculture Zone Spatial Framework is based on national agriculture production data in a variety of commodities from all districts. Data is analyzed by location quotient models to investigate leading commodities on the national level. Moreover, agriculture zone development will consider land suitability, climate factors, land use intensity and economic viability and also supporting policies. With regards to all our considerations above, we recognize the leading sub sectors and commodity of each district.

#### 1. Food Crops Agriculture Sub Zone

In general, food crops agriculture dominates and is cultivated in most of Timor-Leste Districts. Referring to agricultural statistical data, it is found that dominant food crops commodities are located in 8 districts, specifically Baucau, Manatuto, Viqueque, Bobonaro, Ainaro, Lautem and Covalima District. Besides them, Oecusse Districts tend to produce dried field food crops. While three other districts such as Liquica, Ermera, and Aileu is dominated by coffee plantations, Dili District is oriented to becoming an urban area.

Dominant food crops agriculture commodities are produced by traditional farmers in Timor-Leste. Like common traditional farmers, the production of each wet or dried field paddy is consumed nationwide. The other commodities are maize, cassavas, sweet potatoes, peanuts, mugbeans, potatoes and a variety of other vegetables.

The production of food crops increases annually, but it is still not able to serve national consumption demand. It is shown by rice-import that is continuously increasing from 38,455 tons in 2006.

The contribution of irrigated areas of rice production is predicted at approximately 88 % (2005) of total national rice production. Out of 71,258 hectares of irrigated areas, the first step in rehabilitation will be as much as 34.734 hectares (48.7%) and the second step will be as much as 21.538 hectares by ARP, JICA, CFET projects. The rest of the irrigated areas that need to be rehabilitated are as much as 15.000 hectares.

Related to national food security, it is targeted that by the end of 2015, food security will be achieved. However, it is necessary to complete the rest of the irrigated areas and irrigation network revitalization and maintenance so that any loss of irrigated water can be managed especially in widely irrigated areas such as Manatuto, Baucau, Viqueque, Lautem, Bobonaro, Covalima, Manufahi and Oecusse District.

## 2. Plantation

Three dominant plantation commodities in Timor-Leste are coffee, candlenut and coconut. Coffee is a primary plantation commodity that is cultivated since the Portuguese Era and a source of income and livelihood for farmers in rural areas. Today, coffee is only one commodity that is becoming a primary contributor for national produce from the agriculture sector with an increasing value of exports. In 2006, the value of export from coffee is approximately 6,900 USD (or 6.5% of totally export) and the continuing increase is becoming 12,632 USD (or 34.8% of totally export). In 2008 year, the production centre of coffee commodity is located in western parts of Timor-Leste such as Aileu, Manufahi, Liquica, Ermera, Ainaro and Bobonaro District.

Candlenut commodity has been cultivated and exported to many countries such as Hawaii with volumes of approximately 10.800 litres of oil. Candlenut has the potential to be cultivated in six other districts such as Lautem, Baucau, Viqueque, Manatuto, Covalima and Oecusse District.

Another commodity in Timor-Leste is coconut. This commodity is located in five districts, with production centres located in Lautem, Baucau, Viqueque, Manatuto and Covalima. Although there are no official data dealing with export volumes, it is indicative that coconut contributions have successfully met the demand from Indonesia. Based on trends of increasing global demand, it is a great opportunity to cultivate coconut and develop processing industries.

## 3. Husbandry

The husbandry sub sector has been developing well and becoming an important income source and asset for Timor-Leste's people in the future. Although husbandry sub sector cannot be cultivated commercially yet, it is

possible to cultivate cattle because cattle become social and cultural assets that are supported by the savannahs.

The kind of cattle which raised are divided into big cattle such as cow, buffalo and horse and small cattle such as goat, sheep, pig and poultries. Based on statistical data from 2004 to 2008, the population of these cattle are increasing.

Based on a district basis, potential for cow and goat cattle production are Aileu, Manufahi, Liquica, Ermera, Ainaro, Bobonaro, Covalima and Oecusse District. The development area potentials for buffalo and sheep can be cultivated in Lautem, Baucau, Viqueque and Manatuto District. Lastly, development area potentials for pig and horse cattle are located in Aileu, Manufai, Liquica, Ermera and Ainaro District.

Referring to existing conditions and savannah areas, it is a prospective opportunity to develop cattle as a leading sub sector, not only on the national level, but as national export contribution by cattle or meat exports. Consequently it is needed for cultivating cattle commercially such as ranch areas with cows as its main product. Ranch areas can be developed in the eastern region, especially in Lautem, Baucau, Viqueque and Manatuto. In the western part, this can be developed in Covalima and Bobonaro District. In the central part, it is possible to develop dairy cow farms especially in Liquica, Ermera, Aileu and Ainaro District. Dairy development in Timor-Leste is addressed to meet the demand for nutrients of the people.

#### 4. Fishery

Sea fishing potential can be indicated alongside coast lines approximately 735 kilometres within Exclusive Economy Zone. Fishery potential is spatially located in coastal areas except in Aileu and Ermera District. Relatively, both Ainaro and Manufahi Districts have short coast lines in the southern part. Based on the number of fishermen and motor boats, the concentration of sea fishing is dominated by the Dili District. It could be related to the high demand for a variety of fish catches. The other locations in Timor-Leste are requesting for fishing only as subsistence for the local people.

Based on statistical data, the contribution of the fishery sector to GDP is small. Combining the contributions from the fishery sub sector, husbandry

and forestry, it is still small and only contributes 6%. However, fishery sub sector has exported as much as 492.5 tons, but in 2008 it decreased to 55.4 tons. Decreasing fishery exports is due to the increase of domestic consumption in Dili.

The expansion of fishery activities in the short term (2011-2015) is oriented to increasing the catch of fishes from traditional fishermen and exploiting fishing grounds (Economic Exclusive Zone). However, the next stage (medium term/2016-2020) is planned to be ocean-based fishery and oriented towards exports and the development of fishery centres in the Southern coastline especially in Lore (Lautem District).

It is important to introduce the production of fish by developing certain districts in rolling or hilly areas with supporting water resources in Aileu, Ermera, Liquica and Ainaro District. It is expected to be able to fulfil all nutrient demands with variety of fishes, especially those needed by children. Related to fishery activities development near the coast, there is potential to develop in all districts that are relatively close to coast line in areas such as shrimp.

### 5.6.2 Energy and Mining Development Spatial Framework

The oil and gas sector is becoming a major national financial resource for Timor-Leste's economy and framework of a development fund. Oil and gas revenue contributes to the resource fund to develop infrastructure, production sector and social-welfare services.

The oil and gas industry will be planned and placed in Timor-Leste's southern corridor development, namely the Suai-Betano-Beaco development zone. That zone is provided to support offshore oil and gas exploration in Bayu Undan and planned in Greater Sunrise and also other sites in Timor Gap Sea that will be explored.

Suai is now the capital district of Covalima and will be prepared as a supply base to support all related logistics in offshore activities. In addition, this area is planning to support Betano in Manufahi District that will be developed as a petroleum industry and also Beaco in Viqueque District as a LNG Plant.

In related to meeting electricity demand for Timor-Leste's people, electricity power resource is currently generated from diesel generators. Furthermore, to promote the use of alternative renewable energy in the future, there are possibilities in developing wind power, biogas, hydropower, solar power, and biodiesel and agriculture commodity waste.

Wind energy development will be located at Ira lalero Suco and Faho Bagarkoholau Suco (Lautem District) and also in Dili District. Biogas energy development is located at Ponilala Suco (Ermera District), Loihuno (Viqueque District) and Waguia (Viqueque District). For min-hydro-gas is located at Loihunan. Solar panel development will be located at Uibobo (Baucau District), Uaguia (Baucau District), Nahareka (Viqueque District), Lisapat (Ermera District) and Saburai (Bobonaro District), Aiasa (Bobonaro District), Ilomara Suco (Lautem), Laco Mesak Suco (Manatuto), Poinala (Ermera District) and Cai-cai/Vermasse Suco.

Agro-industrial energy such as biodiesel energy will be developed in Viqueque, Manatuto, Maliana, Suai, Ermera, Liquica, Lospalos, Same, Aileu, Dili, and Oecusse. In the future it is expected to be able to have check dam developments that have multi-functions such as hydropower and water resources for irrigation.

Mining sector potential in Timor-Leste is scattered in some districts, for instance, copper potential is found in Ossoala (Baucau), gold potential is found in Hilimanu (Manatuto), chromite potential is found in Baucau, Hilimanu (Manatuto) and Manufahi. Manggan potential is found in Vermasse, Talamata, Venilale (Baucau), and Uato-Carbau (Viqueque). Phosphate potential is found in Daemana, Abo (Queilcae-Baucau) and Laleia (Manatuto). Bentonit potential is found in Venilale (Baucau), Bobonaro, while marble potential is found in Cablaci – Same (Manufahi), Lado (Manatuto) and Builale (Viqueque) and gypsum potential found in Laleia-Obrato (Manatuto).

### 5.6.3 Industry, Trade and Tourism Development Spatial Framework

Currently, the tourism sector is not planned to be developed as the leading sector in short term development plan (2011 – 2015). Tourism sector development requires reliable infrastructure support. Therefore in the initial step, we plan to develop 3 zones of tourism destinations, namely:

1. Zone I which covers Dili, Maubessi and Atauro Island

2. Zone II which covers northern coastal and mountainous areas and also historic places like in Baucau
3. Zone III which covers Com in the northern coast, Tutuala, Lore and Iralaloro Lake and National Park that are located in Los Palos' southern mountain part.

In addition, there is a potential to develop an alternative tourism destination, for instance a specific location in Liquica-Aileu-Dili-Manatuto-Baucau and Lautem.

Furthermore, we plan to develop a centre of international trade that will be located in Dili which is supported by the sea port development in Tibar. Besides that, there is potential to develop specific ports to support export-import activities and logistic issues related to the oil and gas industry in Suai. In addition, the ocean fishery port will be provided to exploit two fishing ground regions such as the northern and southern marine region.

National and regional trade centres will be developed in five cities that can be divided into, one national urban in Suai, two regional urban in Baucau and Viqueque and two national strategic urban in Maliana and Pante Macassar. While local trade centres will be located on the rest of the capital district.

Meanwhile, the centre of new industry activity will be placed in Hera Industrial Zone, while the petroleum industry and the LNG Plant are located at Suai-Betano-Beaco Zone. Besides, there is potential to develop a centre of agriculture processing activity in each district because they have advantages for primary sector processing and economies of scale. In addition, it is necessary to develop new industries for instances a household industry like handicraft will be promoted in all rural areas in Timor-Leste.

## 5.7 INTEGRATED ECONOMIC ZONE

The development of Integrated Economic Zones (IEZ) and National Strategic Zone (NSZ) will be promoted as engines of growth for two main corridor development (Northern and Southern Corridor Development) and Cross Border Area in the mainland and Oecusse Enclave. Each IEZ or NSZ will be introduced to investors based on the leading sector in each corridor development and enclave district. Dealing with the development of IEZ and NSZ, the national government will play a role as a key stakeholder to provide strategic infrastructure with a variety of

schemes where private sector participation is essential. The possibility of infrastructure development where the private sector takes part in this scheme, namely Built and Transfer Scheme or Built Operate Transfer (BOT) Scheme will probably be a Public Private Partnership (PPP).

Based on sectoral sections explaining with regards to leading sector developments in each region and correlation to the corridor developments (northern and southern), there is potential to develop proposed IEZ and NSZ as engines of national economic growth based on their advantages, specialization in each sector or commodity. Therefore, there are selected IEZ and NSZ in Timor-Leste, namely:

**1. Dili – Tibar – Hera’s IEZ**

There are a variety of potential sectors related to services, trading, industry and promoted zones like Tibar Commercial Port, Industrial Estate in Hera, large scale housing, new higher education areas, marine tourism, new central business district, international airport and etc.

**2. Suai –Betano – Beaco’s IEZ**

This zone covers 4 districts, namely Covalima, Ainaro, Manufahi and Viqueque. There are a variety of potential sectors related to the oil and gas industry. This IEZ will promote supply base development in Suai, a new CBD in Suai, a new petroleum industry and an oil refinery in Betano and also a LNG Plant development in Beaco.

**3. Liquica –Ermera – Aileu’s IEZ**

There are a variety of potential sectors related to new plantation developments like new coffee estates, new processing industries, new food crops agriculture zones and new mountainous tourist destinations.

**4. Manatuto – Baucau –Lautem’s IEZ**

There are a variety of potential sectors that will be developed, for instance new husbandry areas, new plantation areas (candlenut, coconut and cacao), new fishery processing industries, a variety of thematic tourism, for instance historical tourism, ecotourism, marine tourism, spiritual tourism and etc.

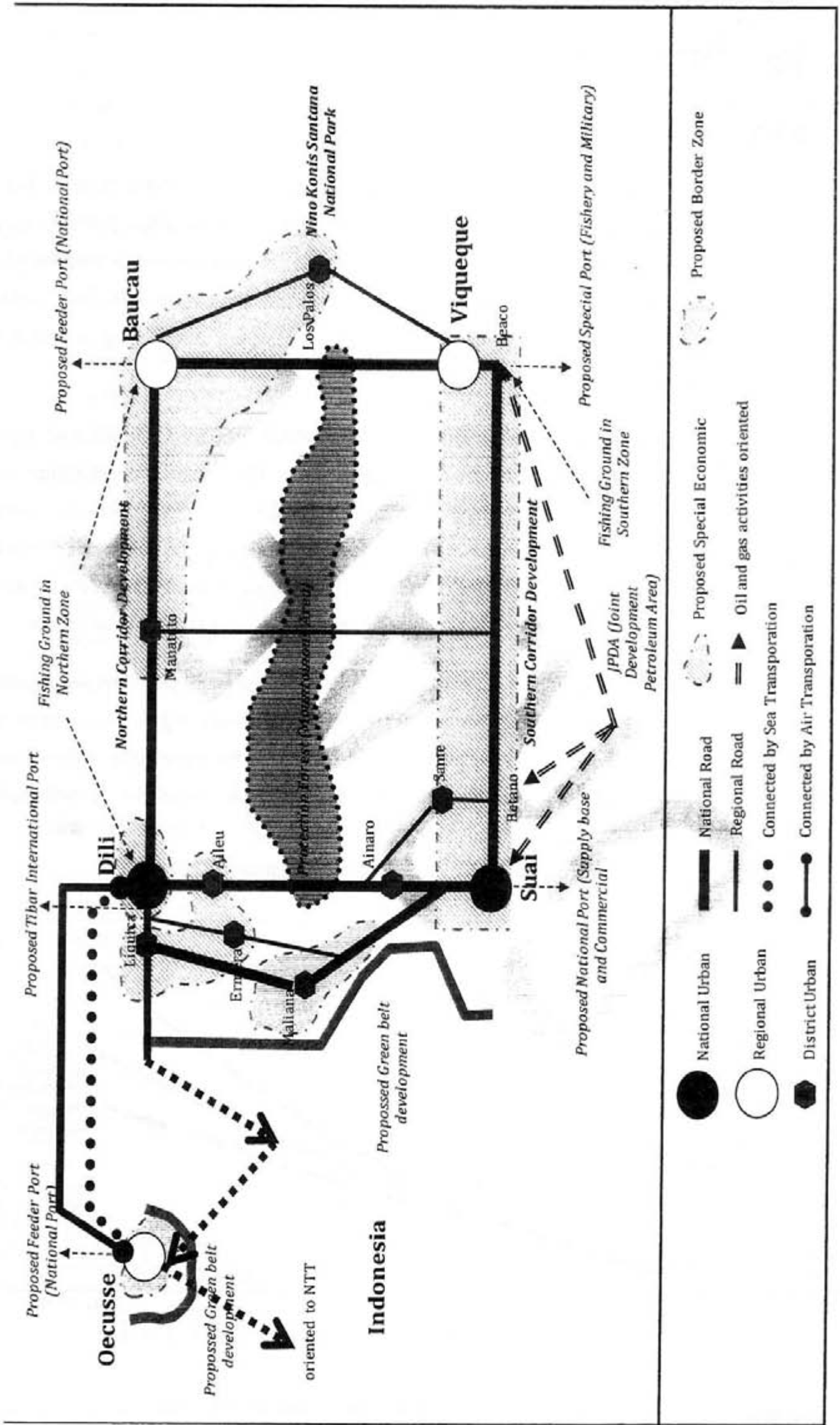
**5. Bobanaro – Covalima's NSZ**

There are a variety of potential sectors that will be developed, for instance creating opportunities regarding international trade, CIQS (Custom, Immigration, Quarantine, Security) services development in selected Junction Points, new food crops agriculture extensification, new husbandry areas and a new creative industry and also new tourist destination sites.

**6. Oecusse Enclave's NSZ**

There are a variety of potential sectors that will be developed, for instance international trade, CIQS (Custom, Immigration, Quarantine, Security) services development in selected Junction Points, new plantation areas, and new husbandry extensification, new fishery processing industries and a new creative industry as well as new tourist destination sites.

Figure 5.4 - National Spatial Structure Plan Model



## 5.8 POPULATION PROJECTION

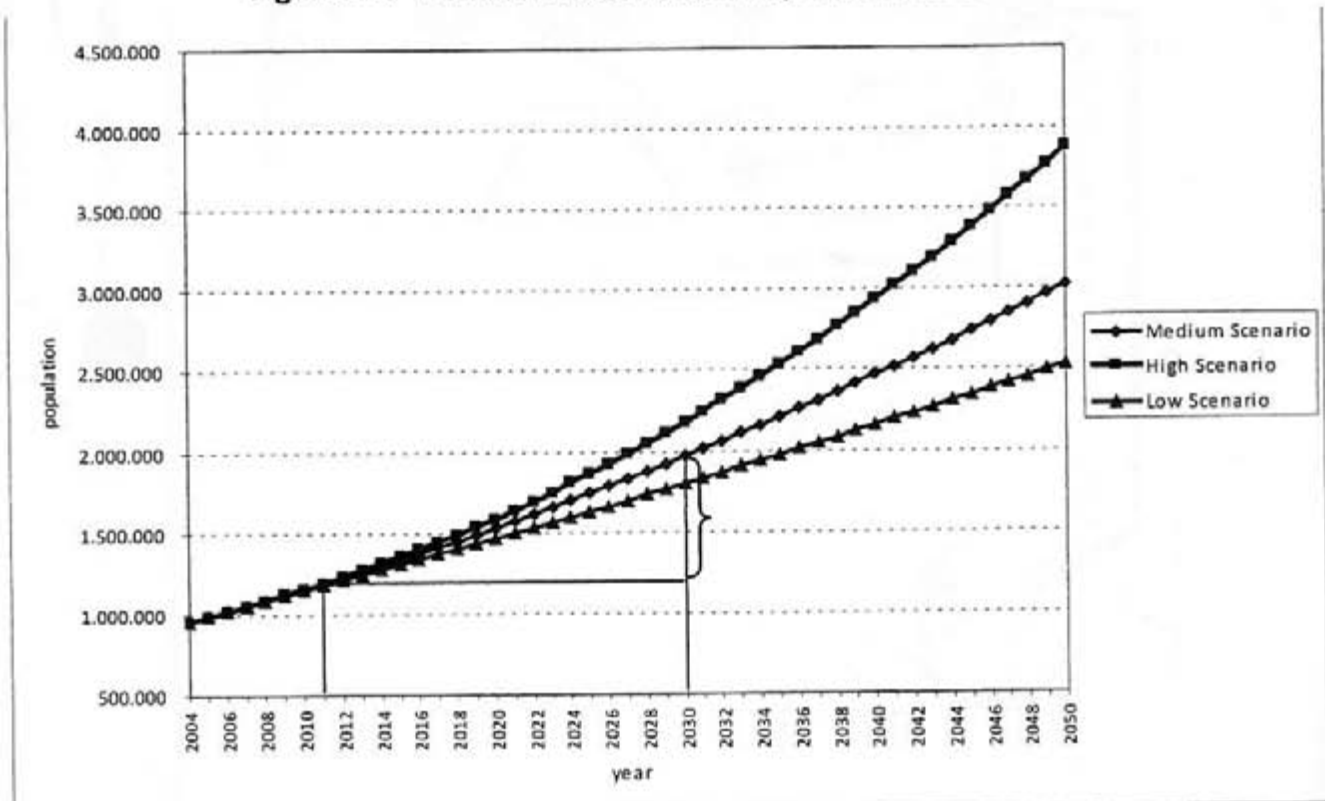
### 5.8.1 National and Districts

Population projection is a major substance in the National Spatial Framework. Without capturing all demographic projections, for instance age structure, urban and rural dweller proportions, it will be hard to determine the amount of facilities needed (schools, hospitals, etc) to reach full education coverage, urban sucos development in future and a response to backlog in housing in order to avoid housing shortages.

A national population projection (2004-2050) has been conducted by National Statistics Directorate funded by the UNFPA. The result of population projection tends to be more of a prospective exercise than a prediction. These projections are based on the 2004 Census of Population and Housing. The result of projections will provide information dealing with the size of population by using certain assumption regarding mortality, fertility and migration levels and trend in the future.

The result of population projections, as in most projection exercises, provides three scenarios namely medium, high and low scenarios. Using the three scenarios approach is an important way to select which the most likely rate of population growth will occur in the future. The medium scenario is selected as the recommended projection.

Figure 5.5 - Trend of Timor-Leste's Population 2011 – 2050



Source: National Statistics Directorate, 2010

After projecting mortality and fertility levels and structures, the national population by age and sex was projected according to the three scenarios. For 2010, the total population of Timor-Leste will be approximately 1.1 million according to the three scenarios (see figure above). In 2020, it will be 1.5 million according to the medium and low variants and 1.6 million according to the high variant. A population of 3.0 million is expected for 2050 in the medium scenario. The high scenario suggests a much larger population: 3.9 million and the low one a much smaller population: 2.5 million. (Executive Summary of *Population Projections by Sex and Age Groups 2004-2050 National Level*, p.8).

According to the medium scenario, population growth will be 3.0% by the end of the present decade. It will reach 2.7% by the early 2020 and will be below 2.0% by the end of the projection period. As expected, the rates projected by the high and low variants are larger or smaller, respectively. (Executive Summary of *Population Projections by Sex and Age Groups 2004-2050 National Level*, p.8).

Given the population growth of medium scenario as recommended growth, hence it could be elaborated to predict population by all districts. Based on the table below, the Dili District becomes the largest population distribution in Timor-Leste with as many as 384.557 inhabitants. Subsequently the Ermera District comes next with as many as 218.512 inhabitants and Baucau with as many as 213.023 inhabitants. Whereas population distribution above 100.000 inhabitants quite dominant in end of 2030 especially in the Bobonaro District. Aileu and Manatuto District consistently have the smallest population distribution in Timor-Leste.

Table 5.1 - Population Projections by Districts (2011 – 2030)

No	District	Base	Population Projection				
		2004	2011	2015	2020	2025	2030
1	Aileu	37,967	48,677	54,601	62,383	70,869	79,676
2	Ainaro	52,480	67,463	75,738	86,871	98,776	111,441
3	Baucau	100,748	128,560	144,380	165,547	188,550	213,023
4	Bobonaro	83,579	107,140	120,322	138,268	157,602	178,099
5	Covalima	53,063	67,955	76,279	87,606	99,769	112,795
6	Dili	175,730	226,812	256,229	296,497	339,597	384,557
7	Ermera	103,322	132,709	149,049	170,758	194,102	218,512
8	Lautem	56,293	72,075	80,946	92,852	105,574	119,193
9	Liquica	54,973	70,322	78,991	90,543	103,051	116,356
10	Manatuto	36,897	47,181	52,984	60,680	69,071	78,099
11	Manufahi	45,081	57,758	64,862	74,368	84,494	95,342
12	Oecusse	57,616	74,006	83,099	95,657	108,992	123,408
13	Viqueque	65,449	83,535	93,873	107,786	122,793	139,086
	<b>Total</b>	<b>923,198</b>	<b>1,184,193</b>	<b>1,331,354</b>	<b>1,529,817</b>	<b>1,743,239</b>	<b>1,969,587</b>

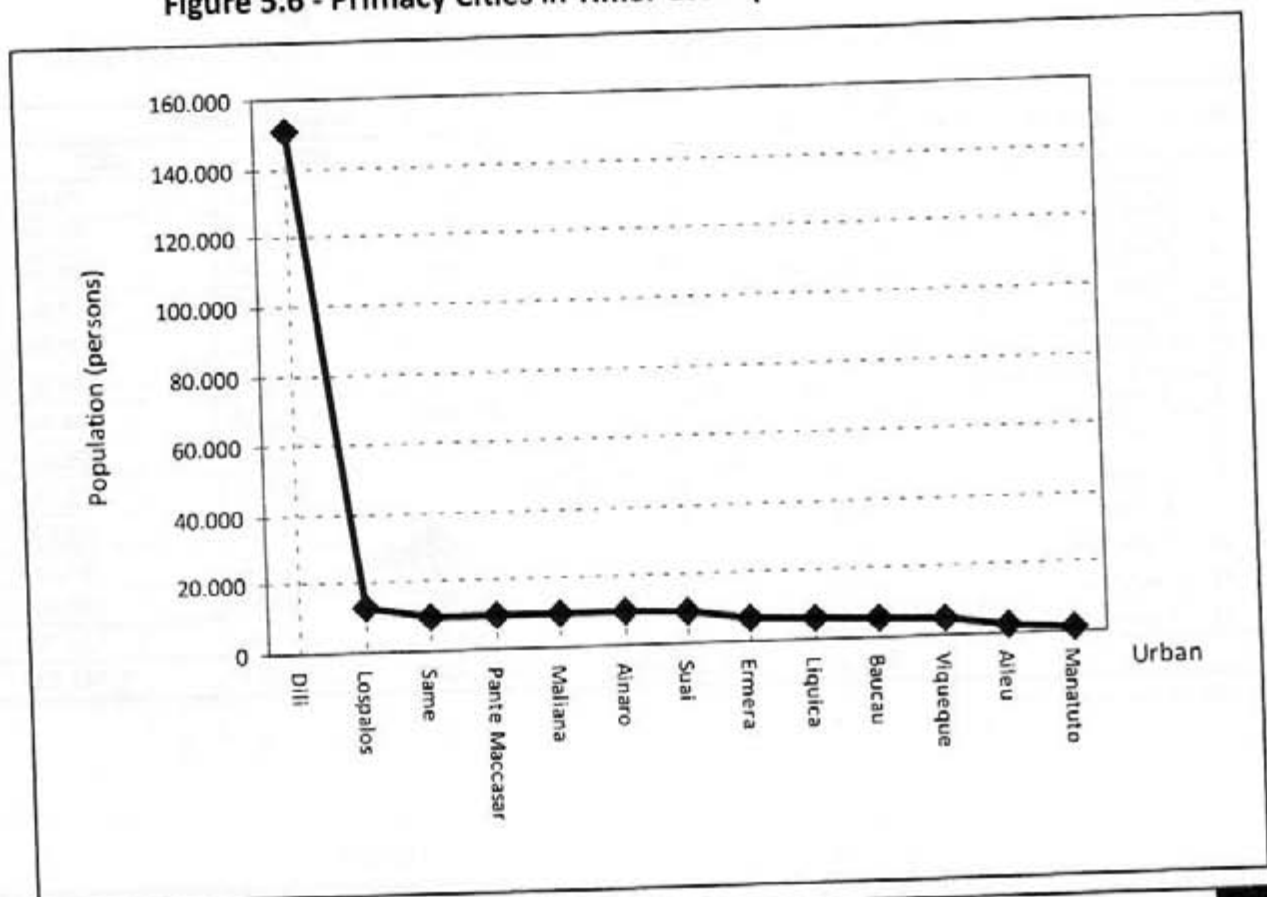
Source: Analysis, 2010

## 5.8.2 Urban and Rural Area Inhabitants

Furthermore, the result of national population projections (2011-2050) will be developed to predict the proportion of urban and rural area dwellers. It is important because of the proportion of urban and rural area dwellers indicate the urbanization level in Timor-Leste. Urbanization is seemingly a spatial transformation from agriculture to non-agriculture based society that can be determined by market-driven and/or special policy stimulation. Spatial transformation which determined by market-driven is solely linear to the expanding market. Special policies are usually created by policy intervention, for instance policy dealing with new capital city, higher education or industry centre development.

Urbanization levels in Timor-Leste (particularly before 2006) are dominated by Dili which has a population reach of 150.000 inhabitants while compared with other urban areas with averagely under 20.000 inhabitants (see figure below). Urban population in Dili has proportion 63.18% of urban population total in Timor-Leste or 16.36% of Timor-Leste population. Dili has strong magnet for all people because this urban become centre of national government and socio-economic. In future, without secondary cities development, population growth in Dili is absolutely dominant compared with other urban in all districts. Intensifying economic development in secondary cities is absolutely required to develop entrepreneurship/skilled people so that create new job themselves.

Figure 5.6 - Primacy Cities in Timor-Leste (based on Census 2004)



However, the proportion in rural areas inhabitants is still larger than urban areas inhabitants. Based on table below could be seen that proportion between rural and urban in 2004 is 74.11 % compare with 25.89%. It is correlated with economic resources dominated by agriculture sector (food crop, livestock, plantation or forestry). In future, oil and gas industry or tourism even services could be shifting proportion of urban and rural areas inhabitants. In this section will be calculation dealing with shifting proportion of urban and rural areas inhabitants.

Table 5.2 - Population in Urban and Rural Area by Districts in 2004

No	District	Population (persons)		Population (%)	
		Urban	Rural	Urban	Rural
1	Aileu	2.460	35.507	6,48%	93,52%
2	Ainaro	9.688	42.792	18,46%	81,54%
3	Baucau	5.422	95.326	5,38%	94,62%
4	Bobonaro	9.721	73.858	11,63%	88,37%
5	Covalima	9.136	43.927	17,22%	82,78%
6	Dili	151.026	24.704	85,94%	14,06%
7	Ermera	6.990	96.332	6,77%	93,23%
8	Lautem	12.612	43.681	22,40%	77,60%
9	Liquica	6.115	48.858	11,12%	88,88%
10	Manatuto	1.051	35.846	2,85%	97,15%
11	Manufahi	9.966	35.115	22,11%	77,89%
12	Oecusse	9.754	47.862	16,93%	83,07%
13	Viqueque	5.105	60.344	7,80%	92,20%
	Total	239.046	684.152	25,89%	74,11%

Source: Analysis, 2010

The calculation of population projection in urban areas uses the Urban Rural Growth Difference (URGD) equation. Defining assumption of URGD for district level is divided into three groups:

1. High URGD, for the district with an urban rural growth difference (URGD) more than 30 percent. The district group with a high URGD is assumed to experience a decrease in URGD as much as 10 percent every 5 years. Districts mentioned in high URGD are Dili, Covalima, Viqueque and Baucau
2. Medium URGD, for the district with an urban rural growth difference (URGD) approximately 20 percent. The district group with a medium URGD is assumed to experience a decrease in URGD as much as 7 percent every 5 years. Districts that are mentioned in this group are: Ainaro, Bobonaro, Lautem, Manufahi and Oecusse.
3. Low URGD, for the district with an urban rural growth difference (URGD) approximately 10 percent. The district group with a low URGD is assumed to

experience a rise in URGD as much as 5% every 5 years. Districts that are mentioned in this group are: Aileu, Ermera, Liquica, Manatuto.

Table 5.3 - Urban Rural Growth Difference by Districts, 2011-2025

No	District	Urban Rural Growth Difference (URGD)			
		2011-2015	2016-2020	2021-2025	2026-2030
1	Aileu	0.10	0.11	0.11	0.12
2	Ainaro	0.20	0.19	0.17	0.16
3	Baucau	0.30	0.27	0.24	0.22
4	Bobonaro	0.20	0.19	0.17	0.16
5	Covalima	0.30	0.27	0.24	0.22
6	Dili	0.30	0.27	0.24	0.22
7	Ermera	0.10	0.11	0.11	0.12
8	Lautem	0.20	0.19	0.17	0.16
9	Liquica	0.10	0.11	0.11	0.12
10	Manatuto	0.20	0.19	0.17	0.16
11	Manufahi	0.20	0.19	0.17	0.16
12	Oecusse	0.20	0.19	0.17	0.16
13	Viqueque	0.30	0.27	0.24	0.22

Source: Analysis, 2010

Using the URGD rate that is divided into three periods for each district, population projections of urban and rural areas inhabitants during 2011-2030 can be seen in the table below. Based on the result of projections, it is estimated increasing the proportions of urban inhabitants until 2030. Urban population will increase from 25.89% in 2004 to 36.31 % in 2030. While rural populations will decrease from 74.11 % to 63.69%. Particularly, Dili is estimated still high by proportion in total urban population even in total population. Population distribution will be concentrated in Dili as many as 51.39% of total urban population or as many as 18.66% of total population.

Compared with 2004 situation, population concentration in Dili tends to decrease because other urban areas are strongly promoted to be grown as secondary cities, especially Suai (will be promoted centre of supply base for oil and gas), Viqueque (will be promoted as services partner for LNG plant), Baucau, Maliana, Pante Macassar and Lospalos (will be promoted as urban entrepreneurship basis). These scenarios will be reached if spatial transformation from agriculture to non-agriculture based is pushed by national spatial planning or sectoral investment program.

Table 5.4 - Population Projections of Urban and Rural Areas Inhabitants by Districts

No	District	2011		2015		2020		2025		2030	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1	Aileu	3.384	45.293	4.111	50.491	5.096	57.288	6.305	64.564	7.753	71.923
2	Ainaro	14.034	53.429	17.978	57.760	23.171	63.700	29.286	69.490	36.358	75.083
3	Baucau	8.458	120.102	11.869	132.511	16.550	148.997	22.470	166.080	29.715	183.309
4	Bobonaro	14.179	92.960	18.385	101.937	24.024	114.245	30.817	126.785	38.816	139.283
5	Covalima	13.969	53.986	19.009	57.270	25.685	61.920	33.663	66.106	42.936	69.859
6	Dili	201.296	25.516	234.198	22.032	276.440	20.057	321.169	18.428	367.500	17.056
7	Ermera	9.630	123.079	11.709	137.340	14.547	156.211	18.003	176.100	22.156	196.356
8	Lautem	18.105	53.970	23.045	57.901	29.501	63.352	37.025	68.549	45.671	73.522
9	Liquica	8.366	61.956	10.134	68.856	12.544	77.999	15.468	87.583	18.986	97.370
10	Manatuto	1.548	45.633	2.038	50.946	2.699	57.981	3.518	65.553	4.515	73.584
11	Manufahi	14.321	43.437	18.237	46.626	23.347	51.020	29.297	55.196	36.140	59.202
12	Oecusse	14.149	59.857	18.177	64.923	23.565	72.092	29.922	79.069	37.375	86.033
13	Viqueque	7.928	75.607	11.062	82.812	15.336	92.450	20.667	102.126	27.169	111.918
	<b>Total</b>	<b>329.367</b>	<b>854.826</b>	<b>399.950</b>	<b>931.404</b>	<b>492.504</b>	<b>1.037.313</b>	<b>597.609</b>	<b>1.145.630</b>	<b>715.090</b>	<b>1.254.497</b>

No	District	2011		2015		2020		2025		2030	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1	Aileu	6,95%	93,05%	7,53%	92,47%	8,17%	91,83%	8,90%	91,10%	9,73%	90,27%
2	Ainaro	20,80%	79,20%	23,74%	76,26%	26,67%	73,33%	29,65%	70,35%	32,63%	67,37%
3	Baucau	6,58%	93,42%	8,22%	91,78%	10,00%	90,00%	11,92%	88,08%	13,95%	86,05%
4	Bobonaro	13,23%	86,77%	15,28%	84,72%	17,37%	82,63%	19,55%	80,45%	21,79%	78,21%
5	Covalima	20,56%	79,44%	24,92%	75,08%	29,32%	70,68%	33,74%	66,26%	38,07%	61,93%
6	Dili	88,75%	11,25%	91,40%	8,60%	93,24%	6,76%	94,57%	5,43%	95,56%	4,44%
7	Ermera	7,26%	92,74%	7,86%	92,14%	8,52%	91,48%	9,27%	90,73%	10,14%	89,86%
8	Lautem	25,12%	74,88%	28,47%	71,53%	31,77%	68,23%	35,07%	64,93%	38,32%	61,68%
9	Liquica	11,90%	88,10%	12,83%	87,17%	13,85%	86,15%	15,01%	84,99%	16,32%	83,68%
10	Manatuto	3,28%	96,72%	3,85%	96,15%	4,45%	95,55%	5,09%	94,91%	5,78%	94,22%
11	Manufahi	24,79%	75,21%	28,12%	71,88%	31,39%	68,61%	34,67%	65,33%	37,91%	62,09%
12	Oecusse	19,12%	80,88%	21,87%	78,13%	24,63%	75,37%	27,45%	72,55%	30,29%	69,71%
13	Viqueque	9,49%	90,51%	11,78%	88,22%	14,23%	85,77%	16,83%	83,17%	19,53%	80,47%
	<b>Total</b>	<b>27,81%</b>	<b>72,19%</b>	<b>30,04%</b>	<b>69,96%</b>	<b>32,19%</b>	<b>67,81%</b>	<b>34,28%</b>	<b>65,72%</b>	<b>36,31%</b>	<b>63,69%</b>

Based on population projections of urban and rural areas dwellers, it is described that the trend of primary cities till 2030 will be changed from 2004. Referring to the figure below, it can be seen that other urban areas will reach 50.000 inhabitants especially Lospalos and Suai. Both Lospalos and Suai will be planned as a center of urban entrepreneurship basis and supply base for oil and gas industry. Malinana, Pante Maccasar, Ainaro and Same will be predicted to pass 35.000 inhabitants of urban areas. Finally spatial transformation will occur as long as economic strategy is consistently pushed by development of industry, services and entrepreneurship.

Figure 5.7 - Trend of Primacy Cities and Dominate Function in Timor-Leste in 2030

