

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)  
PROVINCIAL GOVERNMENT OF NANGGROE ACEH DARUSSALAM  
BANDA ACEH CITY  
REHABILITATION AND RECONSTRUCTION AGENCY (BRR)

THE STUDY  
ON  
THE URGENT REHABILITATION AND RECONSTRUCTION  
SUPPORT PROGRAM  
FOR  
ACEH PROVINCE AND AFFECTED AREAS  
IN NORTH SUMATRA  
  
(URGENT REHABILITATION AND RECONSTRUCTION PLAN  
FOR BANDA ACEH CITY)  
  
IN THE REPUBLIC OF INDONESIA  
  
ADDITIONAL STUDY ON URRP  
VOLUME III : ANNEX

MARCH 2006

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## LIST OF REPORTS

VOLUME I : EXECUTIVE SUMMARY  
VOLUME II : MAIN REPORT  
VOLUME III : ANNEX

JICA STUDY TEAM FOR  
URGENT REHABILITATION AND RECONSTRUCTION PLAN  
FOR BANDA ACEH CITY

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**IN THE REPUBLIC OF INDONESIA**

**FINAL REPORT  
VOLUME I : MAIN REPORT**

**FOR  
ADDITIONAL STUDY  
ON  
URRP**

**FEBRUARY 2006**



**PT WISWAKHARMAN**



**Location Map of Banda Aceh City - Aceh Besar - Sabang**

**FINAL REPORT  
VOLUME I : MAIN REPORT  
FOR  
THE STUDY  
ON  
THE URGENT REHABILITATION AND RECONSTRUCTION PLAN  
FOR BANDA ACEH CITY**

**ADDITIONAL STUDY ON URRP  
(ANNEX)**

**FEBRUARY 2006**

LOCATION MAP OF BANDA ACEH CITY

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## ABBREVIATIONS

ADB	Asian Development Bank
AIPRD	Australia-Indonesia Partnership for Reconstruction and Development
AMDAL	Environmental Impact Assessment <i>Analisis Mengenai Dampak Lingkungan</i>
ANDAL	Environmental Impact Statement <i>Dokumen Analisis Dampak Lingkungan</i>
ARF	Aceh Recovery Forum
ARI	Acute Respiratory Infection
ARRIS	Aceh Rehabilitation and Reconstruction Information System
AusAID	The Australian Agency for International Development
BAPEL	Rehabilitation and Reconstruction Executing Agency <i>Badan Pelaksana Rehabilitasi dan Rekonstruksi</i>
BAPPENAS	National Development Planning Agency <i>Badan Perencanaan dan Pembangunan Nasional</i>
BAPPEDA	Regional Development Planning Agency <i>Badan Perencanaan Pembangunan Daerah</i>
BAPEDALDA	Regional Environmental Impact Management Agency <i>Badan Pengendalian Dampak Lingkungan Daerah</i>
BPOM	Drug and Food Control Center <i>Badan Pengawasan Obat dan Makanan</i>
BCPR	Bureau for Crisis Prevention and Recovery
BPN	National Land Agency <i>Badan Pertanahan Nasional</i>
BPS	National Statistics Bureau <i>Badan Pusat Statistik</i>
BRR	Rehabilitation and Reconstruction Agency for Aceh and Nias <i>Badan Rehabilitasi dan Rekonstruksi NAD-Nias</i>
CBD	Central Business District
CEIC	Center for the Study of Education in an International Context
CEP	Community Empowerment Program
CHO	City Health Office
CGI	Consultative Group on Indonesia
Desa	Village
DFID	The United Kingdom Department for International Development
DKP	Department of Sanitary and Park <i>Dinas Kebersihan dan Pertamanan</i>
DOTS	Direct Observation and Treatment, Short Term
DPU	Department of Public Works <i>Dinas Pekerjaan Umum</i>
DTM	Digital Topographic Map
EDB	Education Department of Banda Aceh City
EDNP	Education Department of NAD Province
EIA	Environmental Impact Assessment (AMDAL)
EIS	Environmental Impact Statement (ANDAL)



EOJ	Embassy of Japan
EPI	Expanded Immunization Program
ERTR	Emergency Response and Transitional Recovery
ETESP	Earthquake and Tsunami Emergency Support Project
GIS	Geographical Information System
GNI	Gross National Income
GOI	Government of Indonesia
GOJ	Government of Japan
GTZ	German Technical Cooperation Agency <i>Deutsche Gesellschaft für Technische Zusammenarbeit</i>
GRDP	Gross Regional Domestic Product
HIC	UN Human Information Centre
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
IATPI	Indonesian Society of Sanitary and Environmental Engineers <i>Ikatan Ahli Teknik Penyehatan dan Teknik Lingkungan Indonesia</i>
IDPs	Internal Displaced Peoples
IDPC	Internal Displaced Peoples' Camps
IFRC	International Federation of Red Cross and Red Crescent Societies
INGO	International Non Governmental Organization
ILO	International Labor Organization
IMR	Infant Mortality Rate
IPLT	Human Excrement Treatment Plant
IOM	International Organization for Migration
IRD	International Relief and Development
JICA	Japan International Cooperation Agency
JICS	Japan International Cooperation System
Kabupaten	District
Kecamatan	Sub-district
Kota	City/ Municipality
LGSP	Local Government Support Project
LGU	Local Government Unit
LPMP	Quality Assurance in Education Institution <i>Lembaga Penjamin Mutu Pendidikan</i>
LSM	Non Governmental Organization <i>Lembaga Swadaya Masyarakat</i>
MA	Islamic Senior High School <i>Madrasah Aliyah</i>
MOC	Ministry of Communication
MCK	Communal toilet/ bath facility <i>Mandi Cuci Kakus</i>
MDGs	Millennium Development Goals
MI	Islamic elementary school <i>Madrasah Ibtidaiyah</i>
MMR	Maternal Mortality Rate
MOH	Ministry of Health
MONE	Ministry of National Education

MORA	Ministry of Religion Affairs
MOU	Memorandum of Understanding
MPU	Muslim Leader Consultative Council <i>Majelis Permusyawaratan Ulama</i>
MT	Islamic Junior High School <i>Madrasah Tsanawiyah</i>
NAD	Nanggroe Aceh Darussalam
NGO	Non Governmental Organizations (LSM)
O&M	Operation and Maintenance
PALYJA	Water Company of Jakarta City <i>PT PAM Lyonnaise Jaya</i>
PAUD	Early Age Children Education Institution <i>Pendidikan Anak Usia Dini</i>
PDAM	Water Supply Authority <i>Perusahaan Daerah Air Minum</i>
PEQIP	Primary Education Quality Improvement Project
PHO	Provincial Health Office
PKBI	Indonesia Planned Parenthood Association (NGO) <i>Perkumpulan Keluarga Berencana Indonesia</i>
PKBM	Community Learning Center <i>Pusat Kegiatan Belajar Masyarakat</i>
PMI	Red Cross Indonesia <i>Palang Merah Indonesia</i>
Propinsi	Province
Posyandu	Integrated Health Service Post <i>Pos Pelayanan Terpadu</i>
PSDAK	Road and Water Resources Department, Banda Aceh City <i>Dinas Prasarana Jalan dan Sumber Daya Air Kota Banda Aceh</i>
PTSD	Post Traumatic Stress Disorder
PU	Ministry of Public Works <i>Departemen Pekerjaan Umum</i>
PVC	Polyvinyl chloride
QIP	Quick Impact Project
RA	Islamic kindergarten <i>Raudatul Athfal</i>
RDB	Religion Department of Banda Aceh City
RDNP	Religion Department of NAD Province
REDIP	Regional Education Development and Improvement Program
RRI	The State Radio of Indonesia <i>Radio Republik Indonesia</i>
RTRW	Revised Plan of Regional Space Layout <i>Rencana Tata Ruang dan Wilayah</i>
R3MAS	Rehabilitation and Reconstruction Plan for the People of Aceh & North Sumatra <i>Rencana Rehabilitasi dan Rekonstruksi Masyarakat Aceh &amp; Sumatra Utara</i>
SD	Elementary school <i>Sekolah Menengah</i>
SDC	Swiss Agency for Development and Cooperation

SETNEG	National Secretariat <i>Sekretariat Negara</i>
SMA	Senior High School <i>Sekolah Menengah Atas</i>
SMK	Senior Vocational High School <i>Sekolah Menengah Kejuruan</i>
SMP	Junior High School <i>Sekolah Menengah Pertama</i>
SPK	District Nursing School <i>Sekolah Perawat Kesehatan</i>
STI	Sexually Transmitted Infections
THW	German Federal Agency for Technical Relief <i>Technisches Hilfswerk</i>
TK	Kindergarten <i>Taman Kanak-kanak</i>
TLC	Temporary Location Center
TOR	Terms of Reference
TOT	Training of Trainers
TPA	Reading Al Qur'an Institution <i>Taman Pengaiaan Al-Qur'an</i>
TVRI	National Broadcast of Indonesia <i>Televisi Republik Indonesia</i>
UFW	Unaccounted for Water
UKL	Environmental Management Plan <i>Upaya Pengelolaan Lingkungan</i>
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UPL	Environmental Monitoring Plan <i>Upaya Pemantauan Lingkungan</i>
USACE	The United States Army Corps of Engineers
USAID	The US Agency for International Development
URRP	Urgent Rehabilitation and Reconstruction Plan
VCT	Volunteer Testing and Counseling
WB	World Bank
WHO	World Health Organization
WTP	Water Treatment Plant
YAB	(Acehnese NGO) <i>Yayasan Anak Bangsa</i>
YADESA	(NGO) <i>Yayasan Desa</i>
YASINDO	(NGO) <i>Yayasan Sinar Desa Indonesia</i>
YCDI	(Acehnese NGO) <i>Yayasan Citra Desa Indonesia</i>

YIPD (Acehnese NGO)  
*Yayasan Inovasi Pemerintahan Daerah*

YNDN (Acehnese NGO)  
*Yayasan Nandra Dian Nusantara*

## CHAPTER 1 INTRODUCTION

### 1.1 BACKGROUND

In response to the request of the Government of Indonesia, the Japan International Cooperation Agency decided to conduct “The Urgent Rehabilitation and Reconstruction Support Program for Aceh Province and Affected Areas in North Sumatra (Urgent Rehabilitation and Reconstruction Plan for BAC)” (URRP). The JICA Study Team on URRP commenced from March 2005 and its Final Report (1) (Draft) was submitted to BAPPENAS on August 13, 2005, followed by the meeting on the said report on August 13, 2005 at BAC among BAPPENAS, PU Jakarta, BRR, BAPPEDA Province, BAPPEDA City, Dinas Tata Kota, Mayor of BAC, PU Dinas, other agencies concerned, JICA Indonesia office and the JICA Study Team.

Through the meeting, the urgent rehabilitation and reconstruction plan proposed in the above-said report was in principle accepted by all the Indonesian organizations and agencies concerned, subject to incorporation of their comments into final report to be submitted to BAPPENAS at end of August 2005.

In the course of the above study, the Government of Indonesia established “Rehabilitation and Reconstruction Agency” (BRR, Badan Rehabilitasi and Rekonstruksi) for Aceh and Nias in April 2005. Its mandate was defined by Regulation in Lieu of a Law No. 2/2005 issued by the President of the Republic of Indonesia. BRR has the authority to coordinate, collaborate, and monitor rehabilitation activities including those funded directly by foreign donors.

BAC represented by Mayor is responsible for implementation of rehabilitation and reconstruction activities as implementing agency. The Mayor strongly places great emphasis on prompt implementation of URRP. The Mayor however is in need of materializing URRP through parliament procedure of BAC, while actually implementing part of URRP.

The Mayor and BRR are in opinion that there is a need of elaborating a long-term vision, a definite spatial plan and a sector development plan of BAC with more community-oriented strategies, making reference to three (3) guidelines (village mapping, village planning, housing development) and building code which were recently published by BRR, and paying attention to geographic, traditional, cultural and religious conditions particular in BAC.

The Mayor and BRR therefore requested to the Japan International Cooperation Agency (JICA) to continue technical assistance to achieve the above objectives.

JICA and BAPPENAS accordingly agreed to conduct additional study in accordance with the scope of work and other conditions set forth herein and in accordance with relevant laws and regulations in force in Japan.

In accordance with the procurement guidelines of JICA, the JICA Study Team called for tender to procure the consultant for the Additional Study in September 2005. As a result PT Wiswakharman (the Local Consultant) was awarded the contract by the JICA Study Team in October 15, 2005.

The Local Consultant has submitted the Interim Report and Draft Final Report as stipulated in the Contract and consulting services have progressed further. This Final Report is prepared by summarizing all activities by the Local Consultant and final findings which are identified through analysis and study during the period from the middle of October 2005 to the middle of February 2006.

## **1.2 OBJECTIVES AND SCOPE OF ADDITIONAL STUDY**

### **1.2.1 Objectives**

The Study is to support the BAC Administration to legislate spatial plan and city development plan and the following objectives shall be achieved through the Study:

- (1) Establish a long term vision for development of BAC and its surroundings
- (2) Provide a detailed BAC Structure Plan
- (3) Formulate immediate and short-term program for rehabilitation and reconstruction works in BAC including cost estimate and annual fund requirements
- (4) Formulate and prepare layout plan for three (3) reconstruction model areas for future implementation

The contemplated study shall be executed by means of utmost use of the outputs by the JICA Study Team including GIS in order to achieve and complete the objectives set forth above.

### **1.2.2 Scope of Additional Study**

The structure plan shall associate with a detailed plan for primary land use (built-environment and conservation area), primary urban facilities and infrastructure that are able to direct a more speedy rehabilitation and reconstruction works, to ensure safe from potential disaster, and to assure that the post-disaster environment and people livelihoods will be better off. The structure plan shall include, but not limited the following aspects:

- (1) Define the Concept of BAC Metropolitan Area including
  - ① Lhok Nga, Mata Ie, Keutapang, Lampeunerut, Lambaro, Ulee Kareng, Darussalam, Sibreh, Blang Bintang, Kaju and Krueng Raya
  - ② The Conceptual Corridor Structure of BAC – Sabang
  - ③ Ecological Town at Ulee Lheue.

- (2) Create BAC as Green City in conjunction with a the provision of more detailed mitigation plan against incoming tsunami
- (3) Develop the concept of BAC as a Cyber City
- (4) Develop conceptual structure of Non-Polluted and Energy Saving Mass Transport System in BAC, i.e. LRT.
- (5) Create BAC free from flooding.
- (6) Develop BAC for regional tourism (nature and cultural heritage)
- (7) Designate a new land use for industrial zone.
- (8) Formulate a more detail structure plan at the sea-front (including affected) areas for tourism development and center for fishery and agriculture industry, with due attention to conservation of aqua-ecology and disaster warning and mitigation aspects.
- (9) Formulate and prepare outline plan and indicative project cost estimate for three (3) reconstruction model areas

The Study will produce the following outputs:

- (1) BAC and its Surroundings Urban Development Visions
  - (1.1) Urban Rehabilitation/Reconstruction and Development Concept
  - (1.2) Urban (Spatial) System
    - ① Social, culture and tradition
    - ② Commercial and industrial activities
    - ③ Housing, transportation and Infrastructure
    - ④ Administration and institutional services
    - ⑤ Public services facilities
    - ⑥ Environmental conservation and technology
- (2) BAC Metropolitan Area Conceptual Structure
  - ① Social and economic linkages
  - ② Spatial linkages
  - ③ Conceptual metropolitan structure
- (3) Structure Plan
  - ① Urban Skeleton

- ② Urban Pattern
- ③ Urban Hierarchy
- ④ Primary Land Use
  - Primary land uses including primary economic, public and social facilities
  - Natural environment conservation
- ⑤ Preliminary Infrastructure Plan
  - Roads
  - Drainage and flood control
  - Water Supply
  - Waste Water
  - Solid Waste
  - Electricity
  - Telecommunication
  - Maritime and Air transport
- ⑥ Specific Spatial Structure, in particular defining structurally the layout and uses of space for:
  - Relief, escape and evacuation roads
  - Evacuation and relief service space/facilities
  - Urban greenery (also in relation with disaster mitigation)
  - LRT or conceptual structure for LRT or other Non-Polluted Mass Transport system.
  - Cyber system and networks
  - Open water amenity system (fish-ponds-water park-river-rivers-canals-city drainage-sea)
  - Urban tourism, Disaster memorial facilities, and recreation
  - Industry

#### (4) Formulation and Lay out Planning for Three (3) Reconstruction Model Areas

Three (3) reconstruction areas would be (a) Ulee Lheu, (b) newly proposed central business district on the south, and (c) Peunayong, subject to authorization by the BAC Administration.

- ① To prepare layout plan, which will be of multi-sector, for the respective model areas
- ② To produce indicative project cost estimate for the respective model area



- (5) Setting up of Immediate and Short Program for Rehabilitation and Reconstruction Works in BAC
  - ① Continuous advisory for immediate rehabilitation programming including annual fund requirement to the BAC government and BRR
  - ② Short Term reconstruction works including annual fund requirement to be submitted to the BAC government and BRR
  - ③ Medium term and Long Term indicative program and fund requirement
- (6) Regular Consultations and Assistance to BAC Government
  - ① Consultation to all stakeholders and community
  - ② Parliament Task Forces for BAC Master Plan Legislation

### **1.3 ACKNOWLEDGEMENT**

The completion of this Study is only possible with the help and cooperation of all parties involved. Therefore the Consultant would like to express its sincere gratitude to the Governor of NAD Province, Mayor of BAC and related offices government, Regent of Aceh Besar and related offices government, City and Provincial Parliament (DPRD I and DPRD II), JICA Study Team on Urgent Rehabilitation and Reconstruction Program of Banda Aceh, Badan Rehabilitasi dan Rekonstruksi (BRR Aceh-Nias), NGOs/Donors, Heads of District, Heads of Village/Kheuchik, and the people of BAC and Aceh Besar Regency.

## CHAPTER 2 PRESENT CONDITION OF THE STUDY AREA

### 2.1 LOCATION AND AREA

- 1) The Study Area covers the entire administrative area of:
  - Banda Aceh City (BAC), covering approximately 61 km<sup>2</sup>. BAC is the capital and the center of commerce, education and culture in NAD province. There are 9 kecamatan (districts) in this city, which are Meuraxa, Baiturrahman, Kuta Alam, Ulee Kareng, Jaya Baru, Banda Raya, Lueng Bata, Syiah Kuala and Kuta Raja.
  - Aceh Besar Regency (ABR), covering a total area of 2,686 km<sup>2</sup>. There are 22 districts (596 villages) in this regency.
  - Sabang City, covering a total area of 119 km<sup>2</sup>. The administrative area of Sabang City covers Weh, Rubiah, Klah, Seulako and Rondo Islands.
- 2) The Study Area boundaries are as follows:
  - North : Malacca Strait
  - South : Aceh Jaya Regency
  - East : Pidie Regency
  - West : Indonesian Ocean
- 3) Geographically the Study Area is located on 05°20'00"- 05°54'28" Northern Latitude and 95°00'-95°80' Eastern Longitude.

Figure 2.1.1 Location of Study Area



Source: RTRW ABR

## 2.2 TOPOGRAPHY AND LAND USE

### 2.2.1 Topography

The study area has varying topography, ranging from flat to undulating relief (in BAC) to steep areas (ABR and Sabang City).

Figure 2.2.1 Topography of Study Area

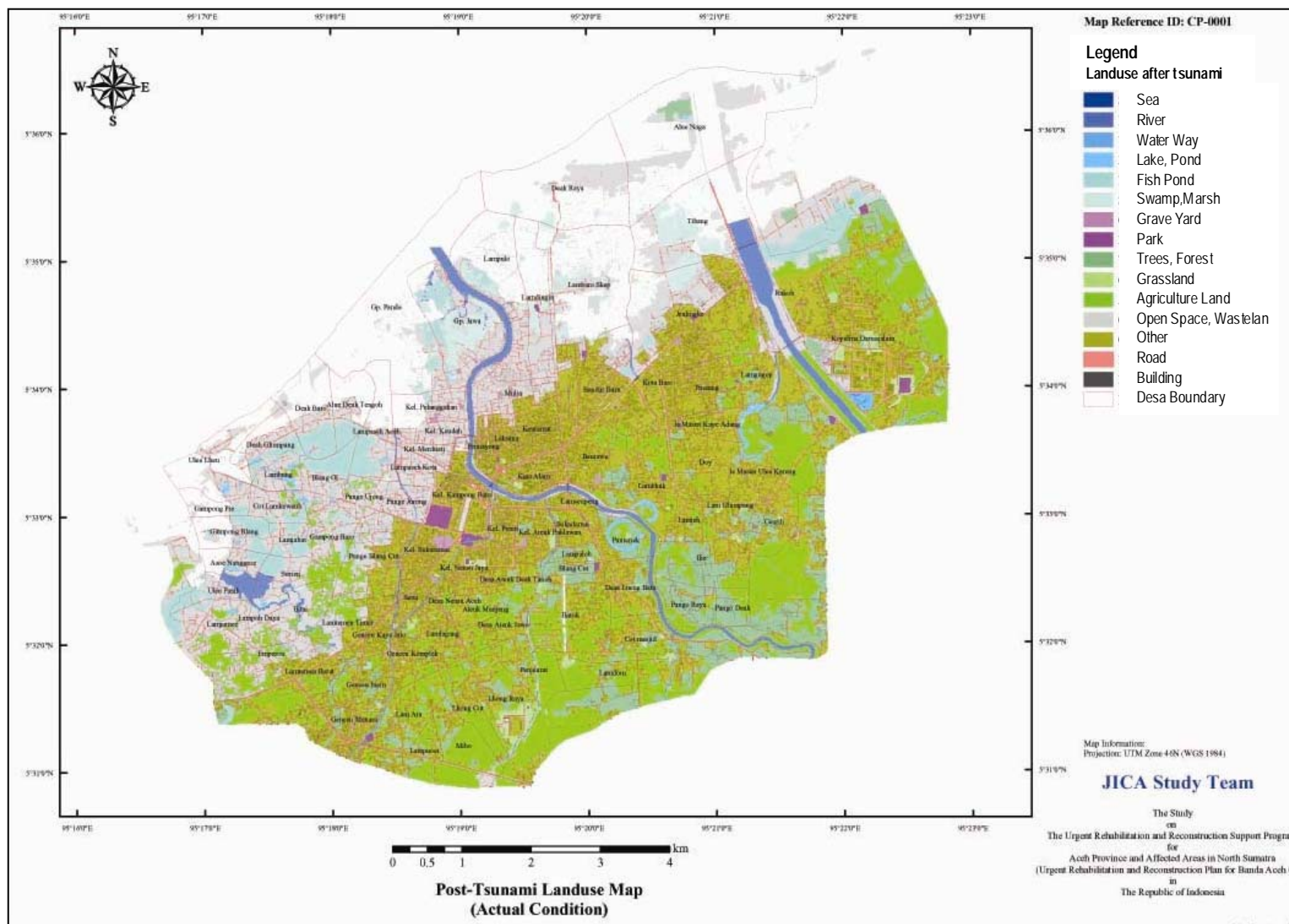


Source: BAKOSURTANAL Map

### 2.2.2 Land Use

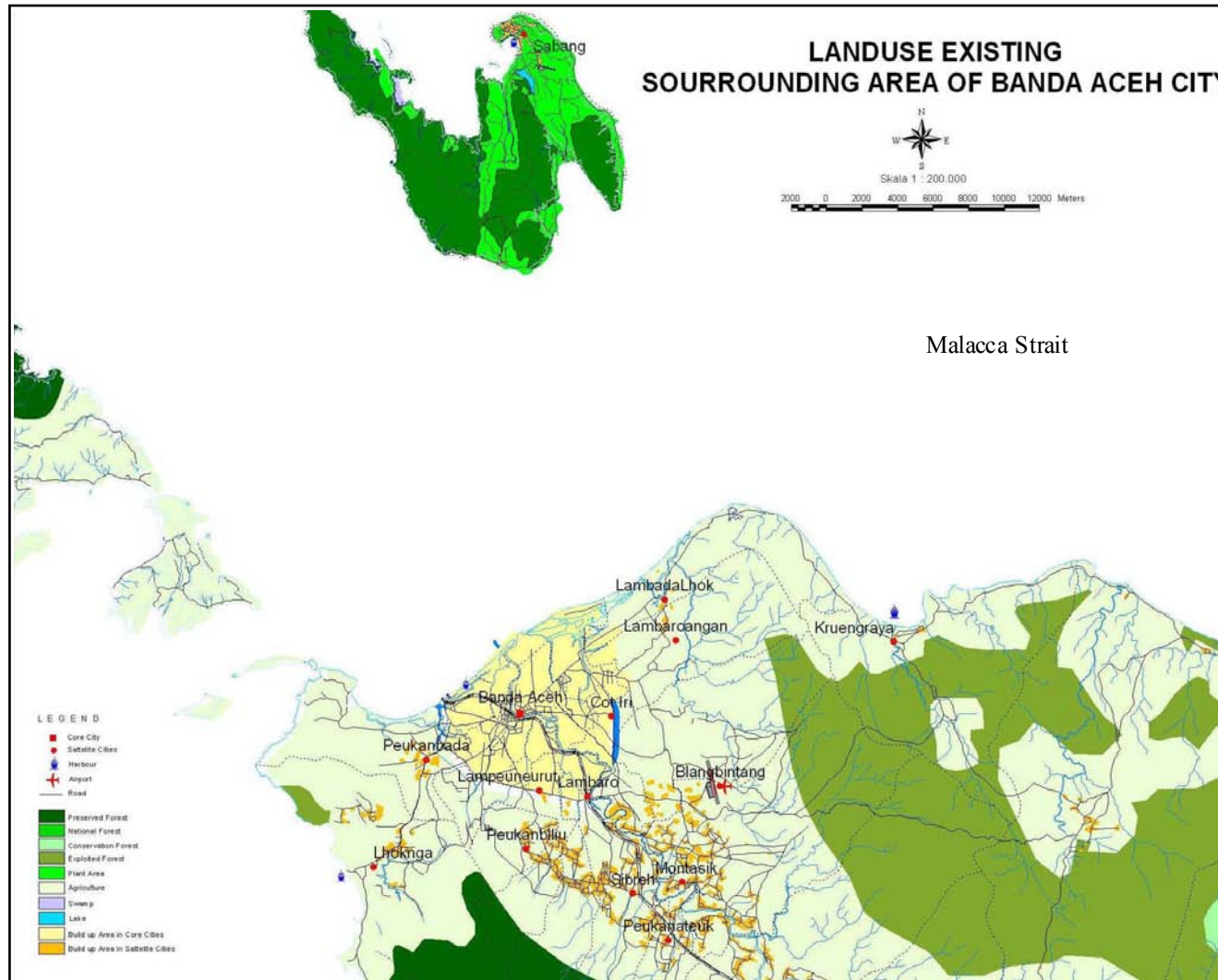
Three distinctive land uses of built area, pristine forest and plantation area characterize different parts of the study area. Eighty percent of BAC land use consists of built up area, while the rests are agricultural areas, fishponds and swamps. The dominant land use in ABR is pristine forest (49.48%). Two types of land use, plantation and national park, with almost the same proportion (38% and 32%, respectively) are most significant in Sabang City administrative area. The rests of Sabang City consists of agricultural land, farms, ranch, forests, swamp and fishponds.

Figure 2.2.2 Existing Land Use in BAC



Source: JICA Study Team, 2005

Figure 2.2.3 Existing Land Use of ABR and Sabang City



Source: BAKOSURTANAL Map and Regional Map (RIRW ABR)

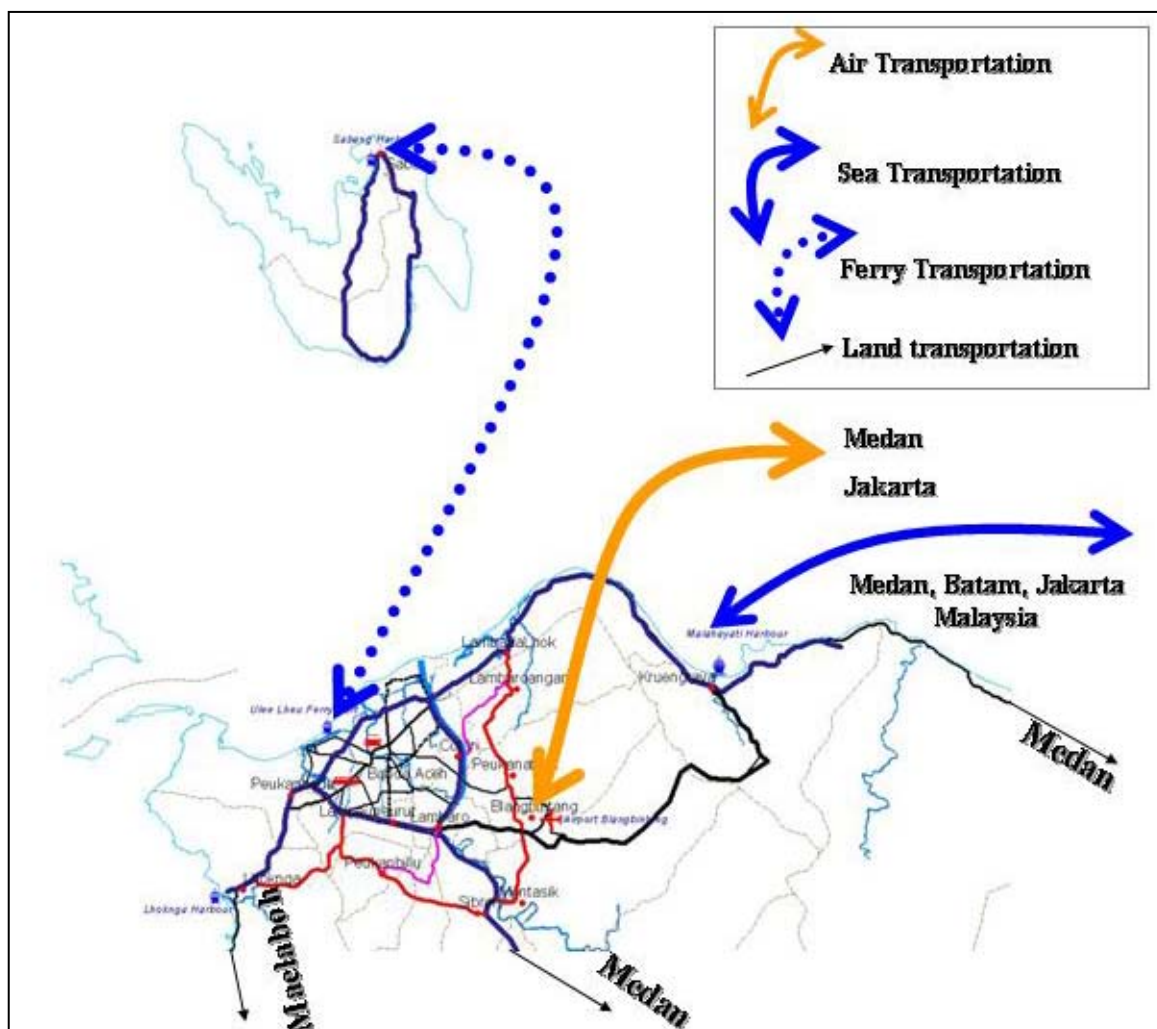
### 2.2.3 Access to the Study Area

Access to study area may be classified into external access and internal access. External access is provided by ground transport, marine transport and air transport.

- 1) Ground access: BAC is connected by 650 km of highway to Medan. Average travel time is 12 hours. The average travel time from Jantho, the capital of ABR, to Medan is 10 hours.
- 2) Marine access: the study area is connected to Jakarta, Batam and Medan by regular sailing routes from Malahayati Port. There is also a ferry terminal in Ulee Lheue which connects BAC and ABR to Sabang City.
- 3) Air access is provided by Sultan Iskandar Muda Airport, which offers regular flights from Jakarta, Medan, Batam, and Penang (Malaysia). At present there are four airlines offering a total of six flights per day.

There are two internal accesses within the study area: ferry service (linking BAC and Sabang) and ground access (road network between BAC and ABR).

Figure 2.2.4 Access to the Study Area



Source: Additional Study Team, 2006

## 2.3 POPULATION AND GROWTH RATE

### 2.3.1 Population

The study area total population in 2003 is 563,774. BAC population shows an interestingly dynamic pattern compared to other parts of study area. There was a population increase between 2003 and 2004, which was mainly attributed to the inflow of migrants seeking refuge from conflict-stricken areas around BAC. This caused BAC population to increase to 265,097 in 2004. The December 2004 disaster caused BAC population to plunge drastically to 200,843 in early 2005. Approximately 64,254 people (around 24% of original population) fell victim to the disaster.

The most populous district in ABR is Darul Imarah District, while the most sparsely populated district is Kuta Malaka District.

Sabang City population in 2003 is 26,505. Of this, 12,348 or 47% lived in Sukajaya District while 14,157 (53%) lived in Sukakarya District.

Table 2.3.1 Population in the Study Area

No	Area Study	Population				
		1999	2000	2001	2002	2003
1	BAC	217,397	220,864	224,766	226,050	235,523
2	ABR	287,876	285,925	285,498	290,582	301,746
3	Sabang City	22,879	23,654	24,376	25,262	26,505
<b>Total Population</b>		<b>528,152</b>	<b>530,443</b>	<b>534,640</b>	<b>541,894</b>	<b>563,774</b>

Source: NAD Dalam Angka 2003; BAC Dalam Angka 2003; Sabang Dalam Angka 2003; ABR Dalam Angka 2003

### 2.3.2 Growth Rate

Geometric projection formula:

$$P_n = P_o[1+r]^n$$

$P_n$  = projected population in target year n

$P_o$  = initial population

r = growth rate

n = time interval (year)

The natural growth rate in study area is calculated based on population data in 1999 to 2002 (Table 2.3.1). The natural growth rate of BAC population is 1.47 %. The districts showing highest population growth rate in BAC are Ulee Kareng and Lueng Bata (10-11%). ABR growth rate is 0.31%, the highest in Simpang Tiga District (2.3%) while the lowest in Kota Jantho District (-10%). Sabang City population growth rate is 3.87%, the highest growth in Sukajaya district.

## 2.4 REGIONAL/URBAN CENTER IN THE STUDY AREA AND THEIR CHARACTERISTICS

### 2.4.1 Definition of Regional/Urban Center

A regional center can be classified based on its population.

Table 2.4.1 Regional/Urban Center Classification

No	Classification	Population
1	Megapolitan City	higher than 5,000,000
2	Metropolitan City	1,000,000 to 5,000,000
3	Big City	500,000 to 1,000,000
4	Medium City	100,000 to 500,000
5	Small City	50,000 to 100,000 (Java Island), or 20,000 to 100,000 (outside Java Island)
6	Rural center	Less then 50,000 (Java Island), or 20,000 (outside Java Island)

Source: National Standard (Department of Public Works)

Rural centers can be classified further based on their geographic location, such as coastal, lowland and mountainous rural centers. Other classification may be made based on ability to fulfill their needs (self-help center (*swadaya*), self-sufficient (*swasembada*), or self-motivated (*swakarsa*)).

### 2.4.2 Identification of Regional/Urban Center in Study Area

Based on the above classification of regional/urban center, in the study area there is one medium city (BAC), four small cities (Kota Baro, Ingin Jaya, Sabang and Darul Imarah), while the rests are classified as rural centers.

### 2.4.3 Functions of Regional/Urban Center

According to their functions, the identified regional/urban centers in study area may be classified further as agricultural area (rural centers), development area (small cities, particularly those in close proximity to BAC), and social & public facility service center (medium cities). Agricultural areas are mainly utilized for paddy-field cultivation, plantation and fish-farms (local scale). Development areas are particularly oriented to residential, commercial and service functions (city scale). Social and public service center has a city and regional scale role. Table 2.4.2 describes the functions of regional/urban centers.

Table 2.4.2 Functions of Regional/Urban Centers in Study Area

Regional Center	Function
Montasik, Peukan Bada, Seulimeum, Baitussalam, Indrapuri, Lhoknga, Darussalam, Mesjid Raya, Suka Makmur, Lhoong, Kuta Cot Glie, Krueng Barona Jaya, Leupung, Lembah Seulawah, Pulo Aceh, Darul Kamal, Jantho, Simpang Tiga, Kuta Malaka	agriculture activity (main function) Social/public service center of local scale Local and neighborhood scale retail
Ingin Jaya / Lambaro ("Lambaro" Satellite City)	Newly developed residential area in Banda Aceh Core City Paddy cultivation, small industry and various industry
Kuta Baro / Peukan Ateuk (Production Center Area "Peukan Ateuk")	Paddy cultivation, ranch, newly developed residential area in Banda Aceh Core City
Sabang City / Sabang ("Sabang" Satellite City)	Tourism, Fishery, Plantation, Small Industry



Regional Center	Function
Darul Imarah / Lampeneurut (Core City Growth Center “Lampeneurut”)	Small Industry and Various Industries, Growth of new residential area in Banda Aceh Core City, Hot-spring Tourism
BAC	City and regional scale commercial and service City and regional scale Government Offices City and regional scale Business District City and regional scale public and social facilities City and regional scale education

Source: NAD Dalam Angka 2003; BAC Dalam Angka 2003; Sabang Dalam Angka 2003; ABR Dalam Angka 2003

## 2.5 SOCIO-ECONOMIC CONDITION

### 2.5.1 Gross Regional Domestic Product (GRDP)

The GRDP data is based at current prices (excluding oil) using data from the year 2002.

- 1) BAC GRDP is 992,662.55 million rupiahs. Transportation and communication sectors contributes the most (33.21%), followed by commercial sector, hotel & restaurant (21.85%)
- 2) ABR GRDP is 1,509,977.82 million rupiahs. The most significant contribution comes from agricultural sector (52.74%), followed by manufacturing sector (18.95%)
- 3) Sabang City GRDP is 142,629.18 million rupiahs. Approximately 22.22% comes from construction sector, followed by commercial sector, hotel & restaurant (22.16%).

These GRDP data reflects the fact that the most prominent function of BAC is its service function, ascertaining BAC position as the capital of the province. Sabang City is also a service city although in more limited scale and more tourism oriented. ABR exhibits distinctively rural characteristics.

### 2.5.2 Employment

The total number of labor in study area is 213,358. Of this, 86,110 labors are in BAC, 12,579 in Sabang and 114,669 in ABR. Unemployment level in the study area is 15% from total labor (31,373).

The high unemployment level may trigger social problems in BAC and surrounding areas. Thus it is imperative to prepare a spatial plan that can allocate space for economic activities in order to create job opportunities, for instance in agricultural, industrial, commercial and service sectors, etc.

### 2.5.3 Cultural Activities

The Acehese are stout Moslems as reflected from their customs. Furthermore, it is the only Indonesian province that has been enforcing Islamic Law since 2005.

Strong devotion to Islam religion has an influence on Acehese culture. It is reflected in daily Acehese behavior, land use and spatial pattern both in micro scale and city scale, ritual activities in the form of prayers and respectful behavior to religious leaders, and tsunami victims (grave visiting).

Acehese culture is also shown in day to day life of the people. Most of the population works in agricultural sector (farming and fishery) in rural areas. While urban population mostly works as merchants. Acehese like to relax and chat in their spare time.

Based on this observation of Acehese culture, it is necessary to propose the following recommendation:

- Acehese society highly appreciates their cultural value, therefore any development plan must respect and take it into consideration.

- Any rehabilitation and reconstruction effort should carefully conserve historical objects.
- The enforcement of Islamic Law is expected to have good repercussions on community behavior and also on urban land use and plan.

#### **2.5.4 Industrial Activities**

Industrial activities in the three parts of study area are significantly distinctive. In BAC, there are only small (home industries) to medium scale industries. The investment values are generally less than 1 billion rupiahs. On the other hand there are large heavy industries in Malahayati (Krueng Raya) and Lhoknga, both in ABR.

Based on their raw materials, small and medium industries can be classified into food industry, garment, domestic appliances, furniture, carpentry, metalworks. Food industry consists of traditional cookies (in Lumbang, Lam Seupeung, Lam Keuweh, Ulee Kareng, Desa Doi, Kp. Jawa); fermented soybean products (in Blower); fish cannery (Ulee Lheue, Kp. Jawa, Lam Pulo) and dried cow meat (Lam Seupueng, Peunayong). Garment industry consists of traditional embroidery products (in Lambaro Skep, Lam Dingin, Ulee Lheue, Ulee Kareng, Blower), traditional bag (in Ateuk Munjung). Domestic appliances consists of earthenware products (in Ateuk Munjung) and cutlery products (in Ulee Kareng). Wooden and rattan furniture and carpentry industries are located in Beurawe, Lambhuk, Ulee Kareng, Lam Teumen and Darussalam. Metal work industries are located in Lam Seupueng.

These industries are randomly located among residential areas, therefore operation and environmental pollution control is difficult. However, based on data from Dinas Perindustrian dan Perdagangan of BAC (Industry and Commerce Agency), the industries in BAC are not environmentally dangerous.

Prior to the tsunami, these industries were city scale industries having no competitive advantage whatsoever, and could not compete with products from other areas. After the tsunami most industries had been destroyed or heavily damaged. Only a few are still operational.

#### **2.5.5 Tourism Activities**

Pre-tsunami tourism activities in study area were limited to fulfill recreational and spiritual needs of local people.

Banda Aceh tourism is influenced by tourism in Weh Island (in Sabang City administrative area) and Lhoknga Beach. Weh Island is significant because it is considered as national scale tourism (underwater sea garden and the “zero kilometer” of Indonesia).

##### **(1) Urban Tourism Location and Activity**

The recreational need of BAC people is reflected in their regular visits to urban parks, such as:

- Taman Sari, children playground and family recreation space.
- Historic Objects, especially the martyr memorial burial (Syiah Kuala grave, Moslem leader grave at Tibang, etc.).
- Baiturrahman Grand Mosque Park is a popular tourism place. People waiting to do Maghrib prayer often wait in its yard or climb the Modal Tower which offers beautiful scenery.
- Specific places related with culinary activity such as Ulee Kareng (famous Ulee Kareng coffee), Reg Peunayong Park (popular spot to relax at night).
- Aceh Cultural Showcases (Pekan Kebudayaan Aceh) in Lampriet, in the form of traditional houses, which is considered as a strategic medium to introduce the whole array of Aceh culture.

## (2) Tourism Area Condition

Prior to the tsunami, tourism sites and objects generally suffer neglect, mistreatment and mismanagement. This has reduced their potentials as a tourism and cultural resource. Many historical sites with priceless heritage value had been destroyed either by the tsunami or inconsiderate development.

The tsunami brought two sided impacts on most tourism sites and objects in affected area. Although some sites were destroyed, disappear or submerged by the tsunami, on the other hand the catastrophe has created new potential locations for tourism areas.

## (3) Recommendation

- Aceh has a potential to be world wide famous by means of its historical sites. Therefore it is necessary to have a government policy that is conducive to the preservation of historical sites, in the form of a master plan that protects the historical sites and its vicinity.
- The tsunami disaster has turned global attention to BAC. BAC has an important potential as a living laboratory/museum of science. It is possible that in the future specific (intellectual) tourists (foreign and domestic scientists) may spend longer visiting time than regular tourists.

## 2.6 EXISTING INFRASTRUCTURE

### 2.6.1 Road

#### A. ABR

Approximately 87.72% of total roadways in ABR are asphalt paved road. Of this, 51.31% are in good condition. Based on road class, 73.35% of total roads are III C class road. Table 2.6.1 describes the classification and condition of roads in ABR.

Table 2.6.1 ABR Roads Based on Road Class and Condition, 2003

Description	Road Length (km)			Total	Percentage
	State Street	Province Street	Regency Street		
<b>Pavement:</b>					
1. Asphalt	154.00	105.00	848.97	1,107.97	87.72%
2. Limestone			64.53	64.53	5.11%
3. Unpaved			90.55	90.55	7.17%
4. Others					
<b>Road Condition:</b>					
1. Good	154.00	105.00	424.975	683.98	51.31%
2. Average			486.208	486.21	36.47%
3. Damaged			162.919	162.92	12.22%
4. Totally Damaged					
<b>Road Class:</b>					
1. Class I					
2. Class II					
3. Class III A	154.00			154.00	15.84%
4. Class III B		105.00		105.00	10.80%
5. Class III C			713.00	713.00	73.35%
6. Others					

Source: Aceh Besar dalam Angka, 2003

## B. Sabang City

Almost all (90.70%) roadways in Sabang City are asphalt paved. About 37.34% of roads in this area are damaged. Among all roads, 60.43% are class II roads. Table 2.6.2 describes the road class and conditions in Sabang City.

Table 2.6.2 Sabang City Roads Based on Road Class and Condition, 2003

Description	Road Length (km)		Total	Percentage
	District road	Provincial roads		
Surface Type:				
1. Asphalt	134,920	32,485	167,405	99.70%
2. Limestone	0	0	0	0.00%
3. Land	500	0	500	0.30%

Source: Sabang dalam Angka, 2003

### 2.6.2 Maritime Transportation

There are two types of sea transportation in the study area, ferry terminal and sea port. Ferry transportation plays vital role in regional transportation, connecting BAC with Sabang City in Weh Island. As a Free Port, Sabang is considered as a traffic generating zone.

The earthquake and tsunami had destroyed the ferry port in Ulee Lheue.

Malahayati Port in Krueng Raya is supported by arterial road network, providing access to BAC, Krueng Raya, Medan and other cities.

Table 2.6.3 Goods and Passenger Traffic in Study Area

No	Ports	Ships		Goods (ton)				Passengers			
		Number of trips		Departure		Arrival		Domestic		International	
		National	Foreign	Import	International	Export	International	Departure	Arrival	Departure	Arrival
1	Malahayati	2,738	301	55,965	441,434	170,526	807,998	156,400	159,965		
2	Sabang	979	137	58,667	65,326	2,405	41,532	139,636	130,758		
	<b>TOTAL</b>	4,976	745	5,916,457	2,770,276	21,414,431	3,854,093	336,395	329,251	1,739	

Source: Tatravil, 2004

Table 2.6.4 Port Facilities in Study Area

No.	Ports	Wharf Capacity	Sea side			Land side		
			Facilities	Unit/Volume	Conditions	Facilities	Volume	Condition
1	Ulee Lheue	2,000 grt	- concrete pier	1 unit	Good	- terminal & office	1 unit	Under construction
	BAC		- causeway			- parking lot	8,274 m <sup>2</sup>	Under construction
			- trestle	202.80 m <sup>2</sup>	Good	- access road		
			- catwalk	15 m <sup>2</sup>	Good	- Weighing platform radius		
			- breast-hink dolphin	3 units	Good	- weighing platform		
			- fender		Good	- toll gate (25 m <sup>2</sup> )	1 unit	Good
			- mooring dolphin		Good	- shelter		
			- movable cylinder			- generator cabin		
			A. Hydraulic cylinder			- generator set		
			B. Bridge			- radio communication		
			C. Control panel			- sound system		
			D. Control room			- fence	1 package	Good
			E. Abutment			- entrance	1 package	Good
			- mb protector			- fire alarm		
			- gangway/boarding	1 package	Good	- lighting protection		
			- bridge			- telephone		

No.	Ports	Wharf Capacity	Sea side			Land side		
			Facilities	Unit/Volume	Conditions	Facilities	Volume	Condition
			- break water	1 package	Good	- fire hydrant		
			- light beacon			- water facility	1 unit	Good
			- retaining wall	268 m <sup>2</sup>	Good	- fuel facility	1 unit	Good
			- lighthouse	1 unit	Good	- lighting	1 package	Good
						- security post		
						- park	1 package	Under construction
2	Balohan	1,500 grt	- pier	485 m <sup>2</sup>	Good	- terminal & park	370 m <sup>2</sup>	Good
	Sabang City	4 m	- causeway			- parking lot	3731 m <sup>2</sup>	Good
			- trestle	202.80 m <sup>2</sup>	Good	- access road	155 m <sup>2</sup>	Good
			- catwalk	66.12 m <sup>2</sup>	Good	- r. weighing platform		
			- breastthink dolphin	3 units	Good	- weighing platform		
			- fender	6 units	Good	- toll gate	7 m <sup>2</sup>	Good
			- mooring dolphin	2 units	Good	- shelter	3 units	under construction
			- movable cylinder			- generator cabin		
			A. Hydraulic cylinder			- generator		
			B. Bridge			- radio communication	2 units	Good
			C. Control panel			- sound system	2 units	Good
			D. Control room			- fence	202.5 m	Good
			E. Abutment			- entrance	14 m	Good
			- mb protector			- fire alarm		
			- gangway/boarding	145.80 m <sup>2</sup>	Good	- lighting protection		
			- bridge	155 m <sup>2</sup>	Good	- telephone	2 units	Good
			- break water			- fire hydrant	3 units	Good
			- light beacon			- water facility	1 unit	Good
			- retaining wall	3588.90 m <sup>2</sup>	Good	- fuel facility		
			- lighthouse	1 unit	Good	- lighting	32 points	Good
						- security post	8 m <sup>2</sup>	Good
						- park	1	Good

No.	Ports	Wharf Capacity	Sea side			Land side		
			Facilities	Unit/Volume	Conditions	Facilities	Volume	Condition
							package	
3	Lamteng	600 grt	- pier	1 unit	Under construction	- terminal & office		
	Pulo Aceh		- causeway	133.65 m <sup>2</sup>	Good	- parking lot	5.250 m <sup>2</sup>	Good
			- trestle			- access road		
			- catwalk			- Weighing platform radius		
			- breastthink dolphin			- weighing platform		
			- fender			- toll gate		
			- mooring dolphin			- shelter		
			- movable cylinder			- generator cabin		
			A. Hydraulic cylinder			- generator set		
			B. Bridge			- radio communication		
			C. Control panel			- sound system		
			D. Control room			- fence		
			E. Abutment			- entrance		
			- mb protector			- fire alarm		
			- gangway/boarding	348.56 m <sup>2</sup>	Under construction	- lightning protection		
			- bridge			- telephone		
			- break water			- fire hydrant		
			- light beacon			- water facility		
			- retaining wall	512 m <sup>2</sup>	Good	- fuel facility		
			- lighthouse	1 unit	Under construction	- sign		
						- security post		
						- park		

Source: Tatravil Study, 2004

### 2.6.3 Airport

There are two airports in the study area, Sultan Iskandar Muda airport in Blang Bintang, ABR, and Maimun Saleh airport in Sabang City. Based on 2003 data, the total flight to Sultan Iskandar Muda Airport was 1,503 trips. Total passengers boarding was 100,306 people. There is no data for 2004 and 2005, but the total passengers were predicted to increase. Table 2.6.5 provides detailed data about the two airports.

There are 3 roads that provide access to Sultan Iskandar Muda Airport. An arterial road connects the airport to Lambaro. Two local roads links the airport to Darussalam and Ulee Kareng.

Table 2.6.5. Airport Facilities in Study Area

No.	Facilities	Sultan Iskandar Muda (BAC)	Maimun Saleh (Sabang City)
1	Runway number	17 - 35	09 - 27
2	Runway length	2,500 m x 45 m	1,850 m x 30 m
3	Slope	0.9%	
4	Construction	Hotmix	Hotmix
5	Taxiway	175 m x 23 m	150 m x 23
6	Apron	Flexible 260m x 90m Rigid 96 x 90m	140 m x 60m
7	Turning area	Available	Available
8	Paved shoulder (right)	80cm x 2690cm	60 cm x 1910 cm
9	Paved shoulder (left)	80cm x 2690cm	60 cm x 1910 cm
10	Overrun	2 x 60 m x 45 m	2 x 30 m x 30 m
11	Open drainage	Available	Available
12	Closed drainage	Available	Available
13	Border fences	Available	Available
14	Capacity	B - 737	F - 28
15	Apron perimeter fence		
16	Marking	Available	Available
17	Coordinate	05 31' n 095 20' e	05 52' n 095 20' e
18	Elevation	65 feet	110 m

Source: Tatravil Sutdy, 2004

### 2.6.4. Water Supply

#### (1) BAC

Public water supply in BAC is provided by PDAM (Water Supply Authority) Tirta Daroy Banda Aceh. There are two water treatment plants (WTP), Lambaro and Siron whose capacities are 37,584 and 1,728 m<sup>3</sup>/day, respectively, serving a total of 14,656 house connections.

The planning and design criteria set by URRP are realistic, as well as the prediction for water demand. URRP preliminary design proposed the urgent rehabilitation of Lambaro WTP, and it had already been done. It is important to rehabilitate the water supply distribution network in order to guarantee potable water provision for the community in a quality, quantity, and continuity that conforms to prevailing requirements. Mission, strategy, and goals must be planned to achieve a good performing water supply system.

The principal goals of water supply system are as follows: (i) Provision of potable water for the community in a quality, quantity, and continuity that conforms to prevailing requirements; (ii) The fulfillment of a steady water supply system, with operation and



maintenance conforming to proper procedure; (iii) Urban water supply system that can fulfill water demand according to the growth of the city; (iv) Reducing Unaccounted For Water/UFW; (v) Institutional and financial empowerment of PDAM; (vi) The delivery of first quality service.

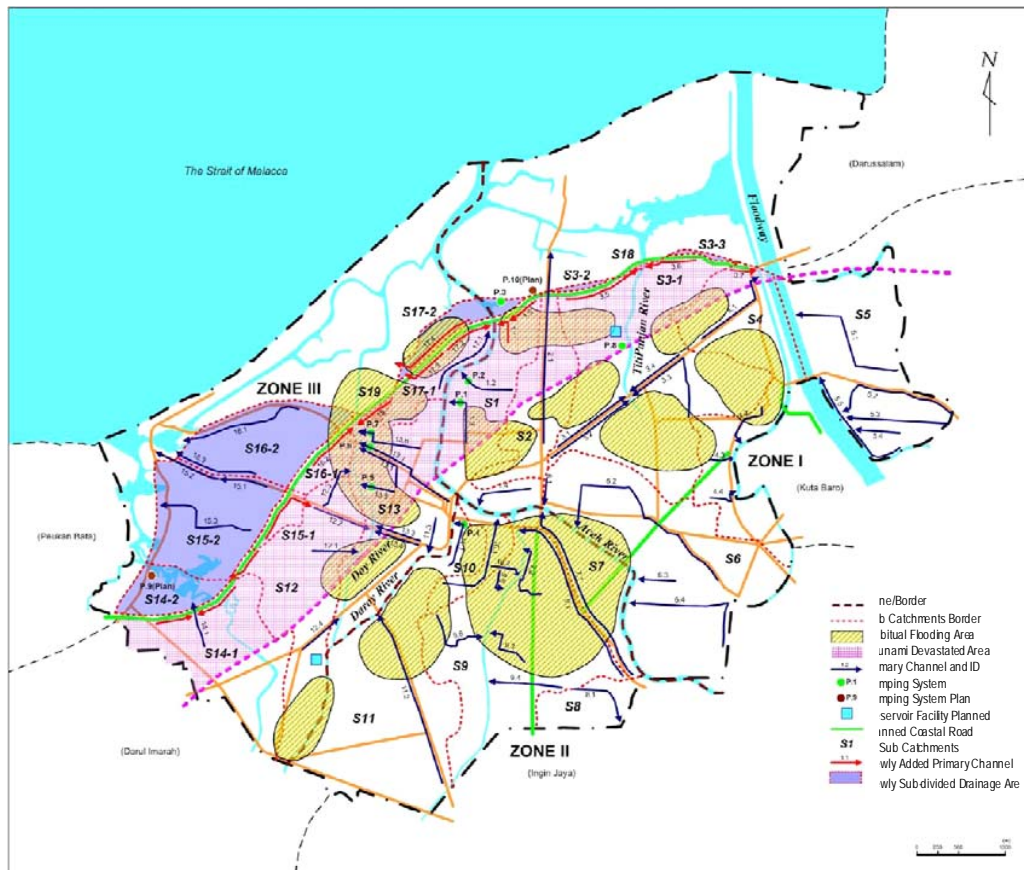
**2. Surrounding Area (ABR and Sabang City)**

Total population served in surrounding area (ABR) 2005 is 66,000, forecasted to grow to 101,000 on 2008 and 143,000 on 2010. Public water supply in Sabang is provided by PDAM (Water Supply Authority) Tirta Anak Laut Kota Sabang. Capacities are 49 liter/second m<sup>3</sup>/day, respectively, serving a total of 2,067 house connections.

**2.6.5 Drainage**

According to DPU, the entire 35 km<sup>2</sup> drainage area is divided into three (3) drainage zones as shown in Figure 2.6.1. Each zone is provided with a network of covered drainage conduits, mostly aligned along the roads, and there were 8 pumping stations in total, owing to topographic characteristics.

Figure 2.6.1 Outline of Rehabilitation and Reconstruction Plan for Urban Drainage



Source: JICA Study Team, 2005

Primary drains are connected to rivers such as Krueng Aceh, Krueng Doy, floodway, etc. It should be noted that drainage conduit receives effluent from septic tanks and discharges to the rivers and there exist habitual inundation areas in many locations within the city area as also shown in Figure 2.6.1.

After the disaster, the network of drainage conduits was seriously damaged, eroded and destroyed at many places, especially in the area along the coast. Also dykes and floodwalls along the major




rivers were broken and destroyed at many locations, causing inundation in surrounding areas. Such damages to the drainage system and dykes are shown in Table 2.6.6.

Table 2.6.6 Status of Drainage Facilities Before and After Disaster

Structures	Description	Unit	Zone I	Zone II	Zone III	Total
	Drainage area	ha	957	992	1,550	3,499
	Number of sub-zones	Nos.	6	5	6	17
Pumping stations	Existing	Nos.	4	1	3	8
	Damaged	Nos.	4	0	3	7
	Damage ratio	%	100	0	100	88
Primary drains	Existing	m	22,735	12,937	15,690	51,362
	Damaged	m	6,177	3,490	1,927	11,594
	Damage ratio	%	27	27	12	23
Water gates	Existing	Nos.	25	30	43	98
	Damaged	Nos.	15	7	8	30
	Damage ratio	Nos.	60	23	19	31

Source: Dept. of Public Works (DPU)

Figure 2.6.2 Damages on Drainage Structures

	<p>Pumping Station and gate at Titi Panjang River were washed away and seriously damaged respectively.</p>
	<p>Break of the Doy river dyke and subsequent inundation.</p>
	<p>Recovery Work for Digging Channels, Kuta Raja Region.</p>

Source: JICA Study Team, 2005

## 2.6.6 Waste Water Treatment and Disposal

### (1) BAC

Waste water disposal in BAC relies exclusively on on-site sanitary system. The accumulated effluent is extracted once a year by The Department of Sanitary and Park. The existing Septage Treatment Plant (STP) is located in Gampong Jawa.

Table 2.6.7 STP Capacity

Description	Retention Time (day)	Storage Capacity (m <sup>3</sup> )	Treatment capacity (m <sup>3</sup> /day)
STP Existing	60	3,382	56

Source: JICA Study Team, 2005

Rehabilitation works for STP were completed on December 2005. STP was handed over from JICA to the city government.

### (2) Surrounding Area (ABR and Sabang City)

There is no waste water management in the surrounding area, and there is no STP in ABR.

## 2.6.7 Solid Waste Management

### (1) BAC

The residual life of existing landfill in Gampong Jawa is 2 years. Planning criteria with rehabilitation target set for 2006 and reconstruction target set for 2009 can progress faster with pre-selection (32 alternatives) and selection (4 alternatives) of sanitary landfill site with a residual life of 20 years and areas covering 15 - 25 Ha.

### (2) Surrounding Area (ABR and Sabang City)

Solid waste in surrounding area is self-collected and handled by the community. The government does not conduct any form of solid waste management in this area.

## 2.7 HOUSING EDUCATION AND HEALTH SERVICES

### 2.7.1 Housing

According to URRP Study, the earthquake and tsunami on December 26, 2004 damaged 44,544 houses, both wooden as well as reinforced concrete buildings, particularly those located within a radius of 2 km from the shoreline. Out of 44,544, approximately 67% are reportedly destroyed. This widespread destruction had caused 65,000 people to become internally displaced people.

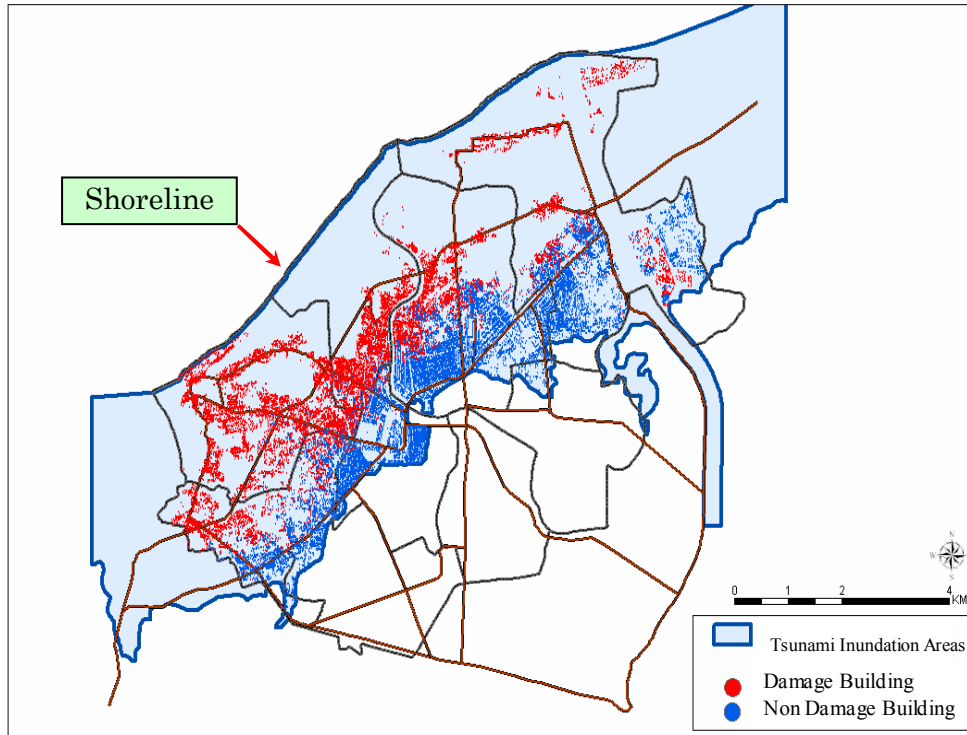
The slow progress of house construction all over the disaster area has forced these homeless people to continue living in shelters such as barracks, temporary living centers, staying in relatives' house, even in tents. These temporary shelters, especially tents, and their environment, are not designed to accommodate such prolonged stay and had begun to deteriorate, exposing the refugees to health risks.

Table 2.7.1 Temporary Accommodation

ACCOMMODATION	NUMBER
Tent	6,921
Temporary House	2,892
Rental House	55,653
Mosque	34
<b>TOTAL</b>	<b>65,500</b>

Source: JICA Study Team, 2005

Figure 2.7.1 Damaged and Non-damaged Houses and Buildings



Source: JICA Study Team, 2005

## 2.7.2 Education

### (1) Student and Teacher

The study area education system is part of NAD education system. The formal education has two tracks, which are a general school education under the jurisdiction of MONE (Ministry of National Education) and an Islamic school education under MORA (Ministry of Religion Affairs).

Based on JICA Study Team:

- Total number of students and teachers of a general school including private schools in BAC before the Tsunami disaster in 2004 are 50,687 and 3,468 respectively.
- Students of the national schools are: (1) 21,378 in elementary schools; (2) 11,519 in junior high schools; (3) 11,970 in senior high schools. On the other hand, the private schools have only 5,820 students in all education level, which accounts for 11.4 % of a total of the general schools' students.
- Ratio of students to a teacher in general school is 18.1 in elementary schools, 11.4 in junior high schools, and 13.7 in senior high schools.

### (2) School Infrastructure

BAC has 131 elementary schools, 40 junior high schools, 34 senior high schools and 7 vocational schools where include Islamic schools before the tsunami disaster in 2004.

### (3) Lost and Damage Identification

In BAC there were totally 65,902 students in an elementary and high school level before the tsunami; however the number has dropped sharply by 55 % after the tsunami. Approximately 3,411 students passed away and teacher casualty is 405 killed and 411 missing.

The JICA Study Team has prepared ARRIS (Aceh Rehabilitation & Reconstruction Information System). Digital maps in ARRIS present the locations of elementary schools, junior high schools and senior high schools, the catchment's area and the damage level caused by the tsunami

(4) Recommendation

- According to Education Department of NAD Province, BAC needs approximately 200 permanent teachers and 200 contract teachers for elementary schools, junior high schools and senior high schools urgently.
- Reconstruction of educational facilities in integration to urban/rural mitigation system. Building construction standard should be heightened to withstand earthquake.
- Education facilities is proposed to be designed as multi-functioned escape building that can serve the mitigation needs of school staffs and students as well as neighboring community.

### 2.7.3 Health Services

#### 1. Health Condition

(1) Survival and Diseases

Pre-Tsunami period

Based on JICA Study Team, generally health condition in urban areas in BAC is better than the rural areas. Infectious diseases and diseases related to nutrition and/or sanitation condition such as acute respiratory infection (ARI), diarrhea, skin diseases, tuberculosis and malaria were still popular in BAC. However, hypertension was also one of major causes of morbidity.

Post-Tsunami period:

Ministry of Health, Provincial Health Office and WHO have been jointly monitoring incidence of major infectious diseases.

Morbidity of infectious diseases in the affected areas in post-tsunami cause by acute watery diarrhea, bloody diarrhea, malaria, measles, acute respiratory infection

(2) Maternal and Child Health

Pre-tsunami period:

Maternal mortality rate in BAC lower than provincial level it's because good access to maternal and child health services.

Post-Tsunami period:

In post-tsunami period, access to maternal and child health services might be worse because of damages on related facilities as well as loss of health personnel, especially midwives. Provincial/district/city health offices, donors and NGOs have been providing basic health services including primary medical care, preventive activities and nutrition support for internally displaced people.

(3) Mental Health

Pre-tsunami period:

Major causes of mental disorders were stress caused by economic difficulty, human relations and extremely experiences (in conflict areas). Period of inpatient was longer as patients could not go back their family or community because of stigma, difficulty in taking medicines and livelihoods, and insufficient supporting system in their community.

Post-Tsunami period:

Most of the survivors showed one or more of stress-related symptoms such as fear, panic, helplessness, emotional numbing, disbelief, confusion, nightmares and flashbacks, hyper-activity, fear of returning to original place, fear of water, fear of being inside a building, dan restlessness.

**2. Health Service Providers**Pre-tsunami period:

In BAC, besides public health facilities, lots of private health service providers such as private clinics are available therefore number of doctors per 100,000 populations in BAC was much higher than provincial average. Health Service Providers consist of health center, sub-health centers, posyandu and village birthing homes.

Number of Major Hospitals in BAC (2001) consist of: (i) General hospital 6 units; (ii) Maternal and Child Health Hospitals 1 unit; (iii) Mental Hospitals 1 unit. Bed occupancy rates in each hospital in BAC were not high except the mental hospital.

Post-Tsunami period:

In BAC, about 20% of staff in city health office and health centers was lost. In Meuraxa area, only 65% of pre-tsunami staff is remaining

Some of school buildings of public health school were heavy damaged or destroyed. Teachers and instructors were also lost and some of students could not continue their study because of financial difficulty.

Based on JICA Study Team, damage of primary care service facilities in BAC are: (i) Health Centers (damage = 2 units, destroyed = 1 unit); (ii) Sub Health Centers (damage = 2 units, destroyed = 11 units); (iii) Village Birthing Homes (no available data)

Two out of 7 major hospitals in BAC were not functioning because those were destroyed or heavy damaged.

**3. Recommendation**

- Rehabilitate and reconstruct health facility buildings in accordance to the direction of urban growth. Provision of health facility needs, based on urban system and population distribution.
- Recruitment of paramedics to anticipate lack of medical staffs after the tsunami.
- Health facility buildings are proposed to be designed as multi functioned escape buildings to cater for population in the vicinity.

## 2.8 ENVIRONMENTAL CONDITION

Environment condition of BAC before and after disaster shows significant differences in social and nature environment, especially in the coastal area. The changes are most significant in coastal area, as listed in Table 2.8.1.

Table 2.8.1 Environment condition (before and after tsunami)

No	Pre-Tsunami Condition	Post-Tsunami Condition
<b>1</b>	<b>Coastal Zone</b>	
	– Healthy coral reef	– Damage to coral reef, abraded beach, submerged land.
	– Relatively good sea water condition / clear	– Water mix with mud
<b>2</b>	<b>Eco Zone</b>	
	– Relatively good surface and ground water condition	– Surface water mixed with mud and ground water mixed with salt
	– Healthy vegetations (mangrove, cemara laut, etc)	– Destroyed/lost Mangrove Forest
	– Healthy fishpond ecosystem	– Destroyed fishpond: boundary/embankment destroyed, fishpond area sinking, water condition is contaminated.
	– Coastal settlement in good condition	– Devastated coastal settlement
	– Social relationship among community area very close/homogeny	– The social relationship was changed because many missing/die people in the disaster
	– Community source of revenue is mostly depends on fishery sector (fishpond/sea)	– Increasing numbers of unemployment caused by dis-functioned working equipment/place.
<b>3</b>	<b>Traditional City Center Zone</b>	
	– High density settlement in good condition.	– Most of settlement are heavily destructed, the rest suffer average damage
	– Developed commercial/mixuse area	– Most of settlement are heavily destructed, the rest suffer average damage
	– Average condition public population distribute evenly	– Most of settlement are heavily destructed, the rest suffer average damage
	– Relatively good for road network and drainage	– Seriously damaged, and partly disconnected
	– Relatively good for solid waste, water supply and sanitation system and condition.	– destructed, city network system is
	– Healthy vegetations	– Several destroyed species, some vegetation survive the disaster
	– Community source of revenue are employment and fisherman	– Some people got unemployed
<b>4</b>	<b>Urban Development Zone</b>	
	General condition of this zone is not significantly change	

Source: Additional Study Team, 2006

### Recommendation

- (1) Preservation for some potential area to be developed into environment green area/city.
- (2) Restoration of nature and environmental condition and to reconstruct the disaster area concerning ecosystem and to replanting open spaces (private domain and public domain).
- (3) Land and environment support potential has change due to the earthquake and tsunami, that the land use and the spatial structure must concern on the natural and environment conditional changes.

## 2.9 EXISTING DEVELOPMENT PLAN AND ACTIVITIES

### 2.9.1 Existing Development Plan

#### (1) Regional Plan (RTRW Nanggroe Aceh Darussalam Province)

The purpose of Regional Plan is to guide the development of NAD Province, elaborated by sector and by area in NAD Province. The formulation of this plan includes (i) fact and analysis; (ii) Master Plan guidelines and policy consideration; (iii) general condition of NAD Province; (iv) analysis of the development of regional function and land use.

Other policies considered in the preparation of BAC Master Plan are as follows:

- (a) National Master Plan Policy (RTRWN), legalized by Government Regulation No.47 year 1997. According to this Master Plan, NAD Province is divided into three development zones.
- (b) Regional Economic Cooperation Policy, among Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT). This policy stated that Banda Aceh is designated as industrial and commercial center.
- (c) Integrated Economic Development Policy (KAPET) of Sabang.

The designation of Sabang as a KAPET is based on Presidential Decree No. 89/ 1996, which was subsequently modified in Presidential Decree No. 9 Year 1998.

Based on Presidential Instruction No. 2/2000 and Law No. 37/2000 regarding the Government Regulation as Law No. 2/2000 KAPET Sabang was repositioned as *Free Trade Zone* and *Free Port Zone*.

- (d) Policy on Leuser Ecosystem Zone Management (KEL). This is the legal basis for the conservation, preservation and rehabilitation of Leuser Ecosystem.
- (e) Sumatra's Regional Master Plan Policy (RTRWS). This policy sets the basis for integrated development and cooperation across all Sumatran provinces in all sectors, as well as an arbitrary guide in the event of land use conflict between sectors and zones.
- (f) The policy regarding the re-arrangement of NAD Province stated that starting from the 1996 – 2003 period, NAD administrative area will be divided into 21 regencies/cities.

#### (2) Existing City Master Plan

The BAC administration established its City Master Plan (2001-2010) in March 2001. It is of multi-core type with linear growth along the major roads.

This city plan focuses on: (i) harmonizing and optimizing land uses, (ii) provision of adequate infrastructure and facilities, (iii) provision of efficient transport system, (iv) improvement of environmental quality and sustainability.

According to the Master Plan, the projected population and population density of BAC in 2010 is 307,695 and 52 people/ha, respectively. The number of households is predicted at 61,539, based on average family size of 5.

The city administration unfortunately abandoned the implementation of this plan because of the 2004 disaster.

#### (3) Blueprint- BAPPENAS

In March 2005, just within three months after the disaster, BAPPENAS had prepared "The Master Plan for Rehabilitation and Reconstruction for Aceh Region and Nias", widely known as "Blueprint" through coordination with government agencies, donors, local government and NGOs.



The Blueprint covers various important aspects of rehabilitation and reconstruction of affected areas. Its implementation was set to be conducted in three (3) stages: (i) Emergency Relief Stage (initial 3 months), (ii) Rehabilitation Stage (after 3 months to 2006), (iii) Reconstruction Stage (2007 to 2009).

The Blueprint proposes 9 zonings for BAC. However, it appears that the Blueprint pays less attention to population increase and disaster preparedness. Under the present study, the said zoning was reviewed in the light of the proposed city development concept, population growth, available land resources and disaster preparedness. As a result, it is proposed to divide the city area into four (4) zones with keen attention to disaster preparedness.

#### (4) Study on the Urgent Rehabilitation and Reconstruction Plan (URRP) for BAC

The study is implemented by The Japan International Cooperation Agency (JICA) under agreement with BAPPENAS, during the period from March 2005 to August 2005

The study recommendation for the Plan to restore pre-tsunami social and environmental conditions of BAC and to establish the city plan with disaster preparedness for future development of the BAC.

The objectives of the study are: (i) Formulation of URRP for BAC with target year 2009, (ii) Designing, Cost Estimation and Monitoring of Quick Impact Projects, and (iii) Establishment of Aceh Rehabilitation and Reconstruction Information System (ARRIS).

The study area covers the entire administrative area of BAC (approximately 61 Km<sup>2</sup>) and its surroundings.

The city area is proposed to be classified into four (4) zones with keen attention against disaster preparedness, (i) Coastal Zone, (ii) Eco Zone: evacuate area, (iii) Traditional City Center Zone, (iv) Urban Development Zone: emergency base-Disaster Mitigation Center.

### 2.9.2 Rehabilitation and Reconstruction Activities in Progress

Based on BRR information in the beginning of February 2006, the following spatial planning and infrastructure programs have been approved by BRR for actual implementation.

Table 2.9.1 Rehabilitation and Reconstruction Activities in Progress  
(in spatial planning and infrastructure sectors)

No	Project Title	Location	Project Status	Project Cost/ Request (USD)
1	Livelihood Revitalization (Cash-For-Work) for Disaster-Affected Families in Aceh (Donors: USAID/OFDA, UNDP, DAI, Private Sources).	All district in BAC	Design	731,679
2	IDRF-funded Livelihood Program - Islamic Relief.		Ongoing	174,524
3	Supporting Recovery of Small Industries and Trades in Banda Aceh.		Ongoing	625,071
4	Support to Restoring Sporting Facilities in Nanggroe Aceh Darussalam.		Ongoing	64,118
5	AIPRD Aceh Rehabilitation Program: Expanded Support for Construction.		Ongoing	11,450,382
6	Logistics support (storage, boat and truck transportation) for all humanitarian organizations.		Ongoing	2,870,370
7	Banda Aceh Flood Relief Flow Valves & Pump Stations.		Fisblty. Study	4,500,000

No	Project Title	Location	Project Status	Project Cost/ Request (USD)
8	AIPRD Aceh Rehabilitation Program: Expanded Support for Construction.		Ongoing	1,893,250
9	Spatial Planning Environmental Management.		Ongoing	1,250,000
10	The Study on The Urgent Rehabilitation and Reconstruction Plan for BAC (URRP).		Design	866,000
11	Environmental Health Interventions for survivors of the December 2004 Tsunami and the March Nias earthquake.	Baiturachman District, BAC	Ongoing	316,338
12	Development & Construction of "PASAR ACEH" Complex.		Ongoing	12,320,900
13	Construction of Intensive Care Unit of the BLPKM Hospital; Construction of Emergency Room and equipping of the Permata Hati Hospital; Equipping the Emergency Room of the BLPKM Hospital; Equipping Nurbarhari Clinic.		Ongoing	179,500
14	Rehabilitation of the City Council.		Ongoing	395,580
15	Reconstruction and Community Recovery Program in Banda Aceh, Indonesia.		Design	440,234
16	City Park Restoration, Banda Aceh.		Ongoing	351,985
17	Banda Aceh-Meulaboh Road and Bridge Project.	District to be defined –BAC	Design	1,000,000
18	Environmental Services Delivery-Drinking Water Supply and Sanitation.		Design	750,000
19	Municipal Finance.		Design	125,000
20	Homes & Community Buildings – Banda Aceh.		Ongoing	20,314
21	Support To The Reconstruction Of The Aceh Land Administration System.		Ongoing	179,377
22	Emergency Water and Environmental Sanitation for Nanggroe Aceh Darrussalam and North Sumatra Provinces.		Ongoing	1,599,167
23	Rehabilitation of wells.		Ongoing	76,880
24	Rehabilitation of Lambaro Water Treatment Plant.		Design	4,177,215
25	Reconstruction and Community Recovery Program in Banda Aceh, Indonesia.		Design	440,234
26	Shelter and Water and Sanitation.		Design	7,000,000
27	Tsunami Disaster Response Project.	Jaya Baru District, BAC	Ongoing	840,000
28	Environmental Health Interventions for survivors of the December 2004 Tsunami and the March Nias earthquake.		Ongoing	63,268
29	Rebuilding Acehese Communities through Shelters (and Livelihood Support).		Ongoing	81,000
30	Reconstruction of Punge Blang Cut Village.		Ongoing	1,607,300
31	Cash for Work (CfW)		Design	800,000
32	Support for Return and Village Recovery.		Design	1,000,000
33	Rehabilitation and Reconstruction of Housing and Human Settlements.		Design	6,329,114
34	Tsunami Disaster Response Project.	Kuta Alam District, BAC	Ongoing	875,000
35	Environmental Health Interventions for survivors of the December 2004 Tsunami and the March Nias earthquake.		Ongoing	316,338
36	Banda Aceh/Aceh Besar: Permanent Housing.		Ongoing	416,666
37	Rebuilding Aceh Community Together(Re:Act).		Design	924,180
38	ACEH RELIEF.		Compltd	300,000
39	Banda Aceh/Aceh Besar: Water/Sanitation.		Ongoing	144,000

No	Project Title	Location	Project Status	Project Cost/ Request (USD)
40	Environmental Health Interventions for survivors of the December 2004 Tsunami and the March Nias earthquake.	Kuta Raja District, BAC	Ongoing	316,338
41	Banda Aceh/Aceh Besar: Permanent Housing.		Ongoing	1,666,664
42	Banda Aceh/Aceh Besar: Water/Sanitation.		Ongoing	216,000
43	Aceh-Nias Settlements Support Programme (ANSSP).		Ongoing	5,075,034
44	Canal wall repair in Lampaseh Kota, Banda Aceh (CPL71 PL115).		Ongoing	33,000
45	Habitat (housing, water & sanitation) for fishing village communities.		Ongoing	971,386
46	Earthquake and Tsunami Emergency Support Project (ETESP); Housing component.		Ongoing	495,745
47	Sanitation and Park Department, Banda Aceh Municipality.		Ongoing	866,000
48	Housing Construction “Perumahan Cinta Kasih “ Tzu chi in Nanggroe Aceh Darussalam.	Lueng Bata District, BAC	Ongoing	12,333,334
49	Reconstruction and Community Recovery Program in Banda Aceh, Indonesia.		Design	440,234
50	Recycle Aceh.	Meuraxa District, BAC	Design	462,000
51	Banda Aceh/Aceh Besar: Permanent Housing.		Ongoing	4,166,660
52	Banda Aceh/Aceh Besar: Water/Sanitation.		Ongoing	756,000
53	Aceh-Nias Settlements Support Program (ANSSP).		Ongoing	1,925,013
54	YBI Housing Reconstruction Project.		Ongoing	834,000
55	Ulee Lheue Port Rehabilitation.		Ongoing	2,000,000
56	Tsunami Disaster Response Project.	Syiah Kuala District, BAC	Ongoing	1,715,000
57	Transitional Housing In Nanggroe Aceh Darussalam.		Ongoing	
58	Environmental Health Interventions for survivors of the December 2004 Tsunami and the March Nias earthquake.		Ongoing	316,338
59	Banda Aceh/Aceh Besar: Permanent Housing.		Ongoing	1,249,998
60	Rebuilding Acehnese Communities through Shelters (and Livelihood Support).		Ongoing	5,400
61	Reconstruction of Rukoh Village.		Ongoing	2,250,000
62	Reconstruction and Road Repairs in Alue Naga Village.		Ongoing	3,593,400
63	Syiah Kuala Lecturers' Houses.		Ongoing	130,000
64	Yayasan Obor Berkat Indonesia -Health Project in Banda Aceh and Aceh Besar, Housing Project in Aceh Besar and Aceh Jaya, Livelihood project in Aceh Jaya.		Ongoing	600,000
65	Water supply, sanitation and hygiene promotion in temporary location centers (TLCs) in Aceh Besar and Schools in Banda Aceh.		Ongoing	128,571
66	Rebuilding of Kindergarten.	Ulee Kareng District, BAC	Ongoing	98,377
67	Food and non food distribution, reconstruction, livelihoods, child protection, Water Sanitation.		Ongoing	5,000
68	Reconstruction and Community Recovery Program in Banda Aceh, Indonesia.		Design	880,469
69	WFP Logistic.	All Districts in Sabang City	Ongoing	4,920,000
70	Watsan, and to provide healthcare as well as general welfare for children and their families affected by the Tsunami, and the resulting damage, on the island of Pulau Weh.	District to be defined - Sabang City (SC)	Design	350,000

No	Project Title	Location	Project Status	Project Cost/ Request (USD)
71	Habitat (housing, water & sanitation) for fishing village communities.	Suka Jaya District, SC	Ongoing	45,536
72	Balohan Ferry Port Rehabilitation.		Ongoing	900,000
73	Tsunami Disaster Response Project.	Suka Karya District, SC	Ongoing	840,000
74	Habitat (housing, water & sanitation) for fishing village communities.		Ongoing	212,679
75	Rehabilitation of Water pump.		Design	253,165
76	Reconstruction & Rehabilitation Buildings, at Dept of Agriculture Dinas Perkebunan.		Ongoing	19,670
77	Reconstruction and Community Recovery Program in Banda Aceh, Indonesia.		Design	880,469
81	Cash for Work (CfW).		Design	800,000
82	Support for Return and Village Recovery.		Design	1,000,000
83	WFP Logistic.	All District in Aceh Besar (AB) Regency	Ongoing	4,920,000
84	Environmental Health Interventions for survivors of the December 2004 Tsunami and the March Nias earthquake.	Baitusalam District, AB Regency	Ongoing	316,338
85	Banda Aceh/Aceh Besar: Permanent Housing.		Ongoing	326,102
86	Rebuilding Acehese Communities through Shelters (and Livelihood Support).		Ongoing	319,000
87	AIPRD Interim Governance Program.		Initial ph	1,262,626
88	International Water Distribution in IDP Camps in Aceh Besar.		Ongoing	37,248
89	Construction of Earthquake Resistant Homes.		Ongoing	497,280
90	Housing, reconstruction and rehabilitation in Aceh Besar, Aceh Jaya and Nias Utara (CPR 21 & 42).		Ongoing	15,117,000
91	Provision of safe water and sanitation facilities for IDP populations living in TLCs and tent camps (EMW5).		Ongoing	99,000
92	Construction proram of permanent house, school, Health facility, mosque rehabilitation Gampong Aneuk.		Ongoing	1,722,000
93	Earthquake and Tsunami Emergency Support Project (ETESP); Housing component.		Ongoing	1,204,388
94	Shelter/Construction.		Compltd	1,055
95	Water Sanitation.		Ongoing	242,650
96	Reconstruction and Community Recovery Program in Banda Aceh, Indonesia.		Ongoing	440,234
97	Cash for Work (CfW).		Design	800,000
98	Tsunami Disaster Response Project.	Darul Imarah District, AB Regency	Ongoing	840,000
99	Environmental Health Interventions for survivors of the December 2004 Tsunami and the March Nias earthquake.		Ongoing	316,338
100	Provision of safe water and sanitation facilities for IDP populations living in TLCs and tent camps (EMW5).		Ongoing	198,000
101	Food and non food distribution, reconstruction, livelihoods, child protection, Water Sanitation.		Ongoing	6,000
102	Yayasan Obor Berkat Indonesia -Health Project in Banda Aceh and Aceh Besar, Housing Project in Aceh Besar and Aceh Jaya, Livelihood project in Aceh Jaya.	Aceh Jaya District, AB Regency	Ongoing	15,000
103	Building to house 4 Labs.		Ongoing	158,250
104	Reconstruction and Community Recovery Program in		Design	440,234

No	Project Title	Location	Project Status	Project Cost/ Request (USD)
	Banda Aceh, Indonesia.			
105	Grant Agreement with Badan Metereologi dan Geofisika Department (BMG) of Banda Aceh for the provision of basic operating equipment.		Completed	5,880
106	Tsunami Disaster Response Project.	Darussalam District, AB Regency	Ongoing	875,000
107	Environmental Health Interventions for survivors of the December 2004 Tsunami and the March Nias earthquake.		Ongoing	316,338
108	Rebuilding Acehese Communities through Shelters (and Livelihood Support).		Ongoing	202,500
109	Housing, reconstruction and rehabilitation in Aceh Besar, Aceh Jaya and Nias Utara.		Ongoing	17,000
110	House reconstruction and rehabilitation in Tanjung Deah Village.		Ongoing	1,350,940
111	Yayasan Obor Berkati Indonesia -Health Project in Banda Aceh and Aceh Besar, Housing Project in Aceh Besar and Aceh Jaya, Livelihood project in Aceh Jaya.	Indrapuri District, AB Regency	Ongoing	10,000
112	Rehabilitation of wells.		Ongoing	10,995
113	Transitional Housing In Nanggroe Aceh Darussalam.	Ingin Jaya Districts, AB Regency	Ongoing	1,854,000
114	Provision of Submersible Water Supply Pumps.		Design	350
115	Improving Transport for Recovery and Reconstruction Through Rehabilitation Works at Lanud Military Airport in Banda Aceh.		Ongoing	11,355
116	Gle Taron Water Line - West Banda Aceh.		Ongoing	100,000
117	Rehabilitation of Siron II water treatment plant.		Ongoing	50,000
118	Rehabilitation of Lambaro water treatment plant.		Ongoing	3,902,400
119	Water supply, sanitation and hygiene promotion in temporary location centers (TLCs) in Aceh Besar and Schools in Banda Aceh.		Ongoing	257,143
117	Reconstruction Waterworks.		Ongoing	422,333
118	Provision of Submersible Water Supply Pumps.	Kota Janto, AB Regency	Design	350
119	Upgrading Spring Jantho.		Ongoing	1,081,886

Source: BRR NAD &amp; Nias, 2006

## **2.10 GOVERNMENT SERVICES**

The Government of Indonesia recognizes the complexity and magnitude of the decentralization policy, and is aware that the implementation of the policy will need commitment and long-term effort of all stakeholders involved. Having the regulatory framework for decentralization in place is just the starting point – making the implementation of regional autonomy run smoothly and with the expected outcomes requires learning and adjustment not only by regional administrators but also by members of the regional councils, local communities, NGOs and civil society organizations in the regions. It also requires the adjustment of the working system and working mechanisms of the central government, and the establishment of a different pattern of relationships with the regions by sector ministries and other relevant central government agencies. It requires institutional reform at all levels, new skills and qualifications of government personnel, and new ways of communication between the public sector and the citizens. Proper monitoring and evaluation will be necessary to identify successes and failures and, where necessary, to adjust procedures and mechanisms.

### **2.10.1 Central Government Unit**

- Overall systems improvement
- Improved co-ordination between departments
- Financial management
- Revenue collection/mobilization
- Planning and decision making processes
- Office automation
- Human resource development/ motivation

### **2.10.2 Provincial Government Unit**

- Co-ordination between local government and other government levels/entities
- Coordination among local governments (e.g. in a metro area)
- Transfer of resources from higher levels to local governments such as block grants etc.
- Replacement of paper transactions

### **2.10.3 City Government Unit**

- Citizen's charters/service guarantees
- Formalizing and regularizing participation in planning and decision-making
- Partnerships with the private sector to improve service delivery or local government
- Management systems
- Neighborhood watch programs
- Access to decision makers

## **CHAPTER 3 FORMULATION OF BANDA ACEH METROPOLITAN CONCEPT**

### **3.1 INTRODUCTION**

The development of BAC is inseparable from other surrounding cities because 1) administratively, some of BAC's services is located in ABR (such as Sultan Iskandar Muda Airport); 2) The residential area in BAC has spread to growth centers in the southern part of the city (such as Cot Iri, Lampeunerut, Lambadha Lhok, Peukan Bada, etc.); 3) The infrastructure in ABR (such as water supply in Lambaro); 4) as an anticipation of the sprawling growth of BAC (unplanned).

It is imperative to conduct a spatial planning to integrate BAC as a core city to satellite cities and growth centers. Like common occurrence in Metropolitan cities, fusion or movement functions or activities symptoms and main city, which is BAC, to its satellite cities has occur with movement and movement plan/expansion cities functions as residential sub-centers. Remembering the functions that will be fused or moved out and anticipated the long-term, thus long-term concept for Banda Aceh as Metropolitan City are needed.

Theoretical conception explained city that has 1 million or more populations amount will shows the city characters as a Metropolitan city. This city, as main city, will have city satellite surrounding the city. Connection between Metropolitan city and others satellite cities marked by society commuting behavior and satellite city to the main city. These main city or Metropolitan city together with the satellite cities surround it formed Metropolitan Area.

### **3.2 VISION**

URRP has produced urgent rehabilitation and reconstruction plan of BAC for the target year 2009. The BAC government however envisages establishment of a city structure plan with a longer term and expanded vision.

Principal vision of BAC development based on "Draft City Strategic Plan" is "Tamaddun" City with a Civil Society ("Madani") Islamic Society.

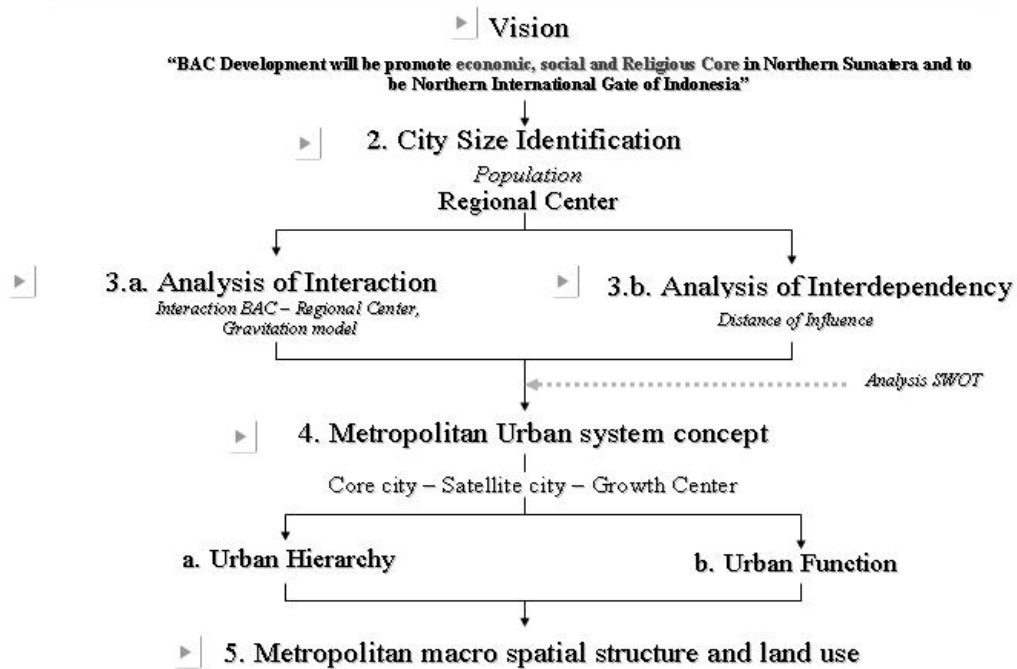
In addition to the above, BAC will be directed towards the following development visions:

- (1) In accordance with the national and provincial policy BAC development will be promoted to be economic, social, culture and religious core in Northern Sumatra. It should be developed to create various benefits and social and economic impacts to its regional centers.
- (2) BAC will be motivated to be the northern international gate way of the nation taking its geographic advantage to the South and Middle East. Along with this principle, BAC will accommodate industrial development, most prospectively (i) labor-intensive type aiming at creating job opportunity and maximizing use of abundant labor force and (ii) also natural resources oriented type by use of forestry products and natural gas to be exploited in regional centers.
- (3) BAC and its population will be protected against future potential natural disaster and eventually they will be proud and secure dignity that they are successfully recovered from the 2004 catastrophic disaster.
- (4) BAC will co-exist with the precious natural environment.

### 3.3 METHODOLOGY OF FORMULATION OF METROPOLITAN CONCEPT

The formulation of Banda Aceh Metropolitan Concept is conducted through the following stages: 1) determine the vision of BAC, as the future goal; 2) city size identification, to determine the regional center based on population variable; 3) analysis of interaction (gravitation model) and analysis of interdependency (distance of influence) combined with SWOT, to determine the core city, satellite city and growth center; 4) metropolitan urban system concept, to determine the function of and the constellation of cities; 5) metropolitan macro spatial structure and land use, drawing up the spatial structure and land use concept into a map.

Figure 3.3.1 Methodology of Formulation of Metropolitan Concept



Source: Additional Study Team, 2006

### 3.4 PROJECTED POPULATION

The projected population of BAC to target year 2009 had been calculated in URRP Study. This will be extrapolated to target year 2015, population growth in Sabang City and ABR is based on normal population growth in each district/city. Therefore the total population in target year 2015 will be 758,735 of 1) BAC: 360,304; 2) Sabang: 41,227; 3) ABR: 355,884. For further details please refer to Table 3.4.1.

Table 3.4.1 Projected Population for Target Year 2015

No.	City/District	PROJECTED POPULATION		
		2003	2009	2015
1	BAC	235,523	254,000	360,304
2	Sabang	26,505	33,325	41,900
3	Lhoong	11,592	12,578	13,648
4	Krueng Raya	12,277	13,321	14,455
5	Peukan Bada	19,457	21,112	22,908
6	Lampuyang	6,002	6,524	7,091
7	Lampu'uk	10,756	11,705	12,664



No.	City/District	PROJECTED POPULATION		
		2003	2009	2015
8	Lamxamox	7,184	7,705	8,458
9	Indrapuri	16,658	18,075	19,693
10	Sibreh	12,137	13,169	14,290
11	Samahani	4,768	5,174	5,614
12	Kruen Mak	5,009	5,435	5,897
13	Peukan Bilui	5,932	6,448	7,009
14	Peukn Ateuk	20,107	21,817	23,673
15	Montasik	19,997	21,698	23,554
16	Lampeuneuret	34,420	37,490	40,751
17	Lambaro Angan	16,355	17,746	19,256
18	Lambada Lhok	18,177	19,723	21,401
19	Lhoknga	16,556	17,984	19,473
20	Leupung	7,878	8,548	9,275
21	Lambaro	21,466	23,292	25,273
22	Cot Iri	10,338	11,217	12,172
23	Kota Jantho	5,736	6,224	6,753
24	Seulimeum	18,944	20,556	22,304
	Total ABR	301,746	327,997	356,531
	<b>Total</b>	<b>539,774</b>	<b>695,415</b>	<b>758,735</b>

Source: JICA Study Team, 2005 and Additional Study Team, 2006

### 3.4.1 City Size Identification

Based on 2015 population, there are one medium city (BAC), 8 small cities (Sabang, Lampeunereut, Lambaro, Peukan Ateuk, Montasik, Peukan Bada, Lambada Lhok and Seulimeum), while the rests are still rural centers. Further elaboration is described in Table 3.4.2

Table 3.4.2 Classification of City Based on Population

City	Population (people)
Megapolitan City	more than 5,000,000
Metropolitan City	between 1,000,000 to 5,000,000
Big City	between 500,000 to 1,000,000
Medium City	between 100,000 to 500,000
Small City	50,000 to 100,000 (in Java Island), or 20,000 to 100,000 (outside Java Island).
Rural	Population in rural area may be less than small city population, covering wider area with low population density.

Source: Additional Study Team, 2006

Figure 3.4.1 City Size Identification



Source: Additional Study Team, 2006

### 3.5 INTERACTION AND INTERDEPENDENCY ANALYSIS

After determining the regional centers among cities around BAC, the next stage is to determine the satellite cities and growth centers of BAC as a core city. In this step the analysis used is “Interaction and Interdependency” analysis.

**Interaction analysis**, Purpose: 1) assess the dependency between regional center and BAC and between regional center and regional center, 2) Transportation Infrastructure System Planning, particularly for areas showing low interaction.

Formulation Interaction:

$$\text{Interaction} = \frac{P_1 \times P_2}{J^2}$$

- I = Interaction between cities 1 and 2
- P1.2 = Populations of city 1 and 2
- J = Distance between cities 1 and 2

**Distance of influence analysis**, Purpose: 1) divide the population into two groups, one group depends on BAC while the other part depends on Regional Center. 2) delineation of BAC area of influence as a core city using imaginary line and area.

Formulation of distance of influence:

Distance of influence from BAC =  $\sqrt{\frac{1 + Pop . 2}{Pop . 1}}$   
 Pop1.2 = Populations of city 1 and 2

$$\text{Distance of } 2 - 1 = \sqrt{\frac{1 + Pop . 2}{Pop . 1}}$$

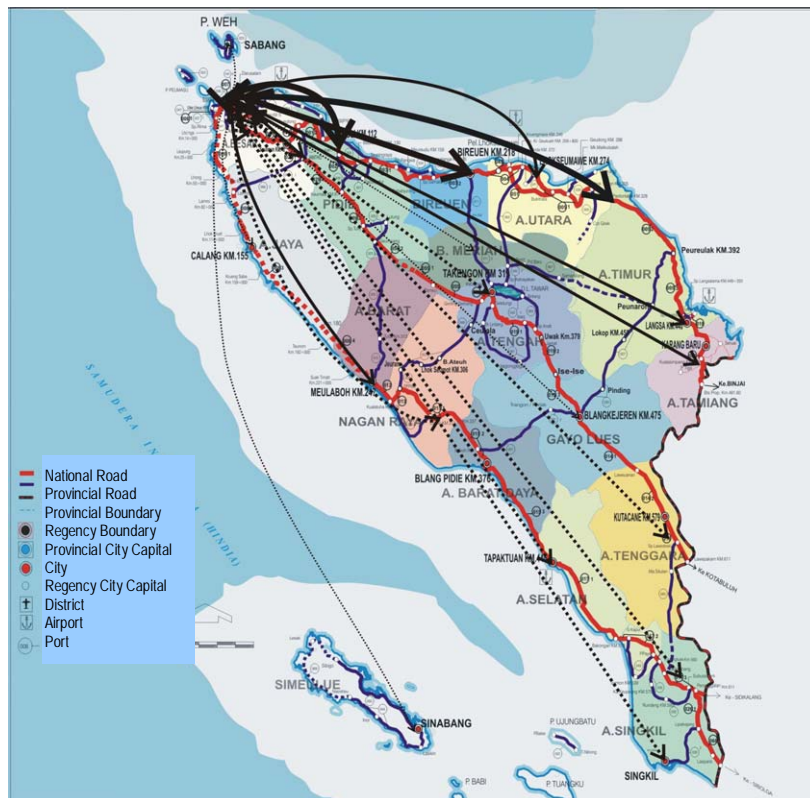
**3.5.1 Interaction Analysis**

Interaction analysis is used to assess the following interaction in the study area: 1) BAC and NAD Province; 2) BAC and regional center; 3) regional center and regional center. It is described in the following section.

**(1) Interaction of “BAC – NAD”**

The interaction of BAC to cities/regencies in the east coast of NAD is stronger than to cities/regencies in the west coast, such as: ABR (Jantho), Bireun Regency (Bireun), East Aceh Regency (Langsa), and Aceh Tamiang Regency (Kuala Simpang). The linkage is stronger because of the following factors: population is concentrated in eastern NAD Province. Good accessibilities (provided by Eastern Trans-Sumatra highway). Low Interaction linkage between cities in NAD Province with BAC, located in Gayolues Regency (Blankejeran), Aceh Jaya Regency (Calang), Aceh Singkil Regency (Singkil), Bener Meriah Regency, Sabang City, and Simeleu Regency. Low Interaction between BAC and other cities are caused by: Small Population, Far Distance from BAC, Primitive/Remote area, Low Community Accessibility (Fig. 3.5.1).

Figure 3.5.1 Regional Strong Interaction Pattern

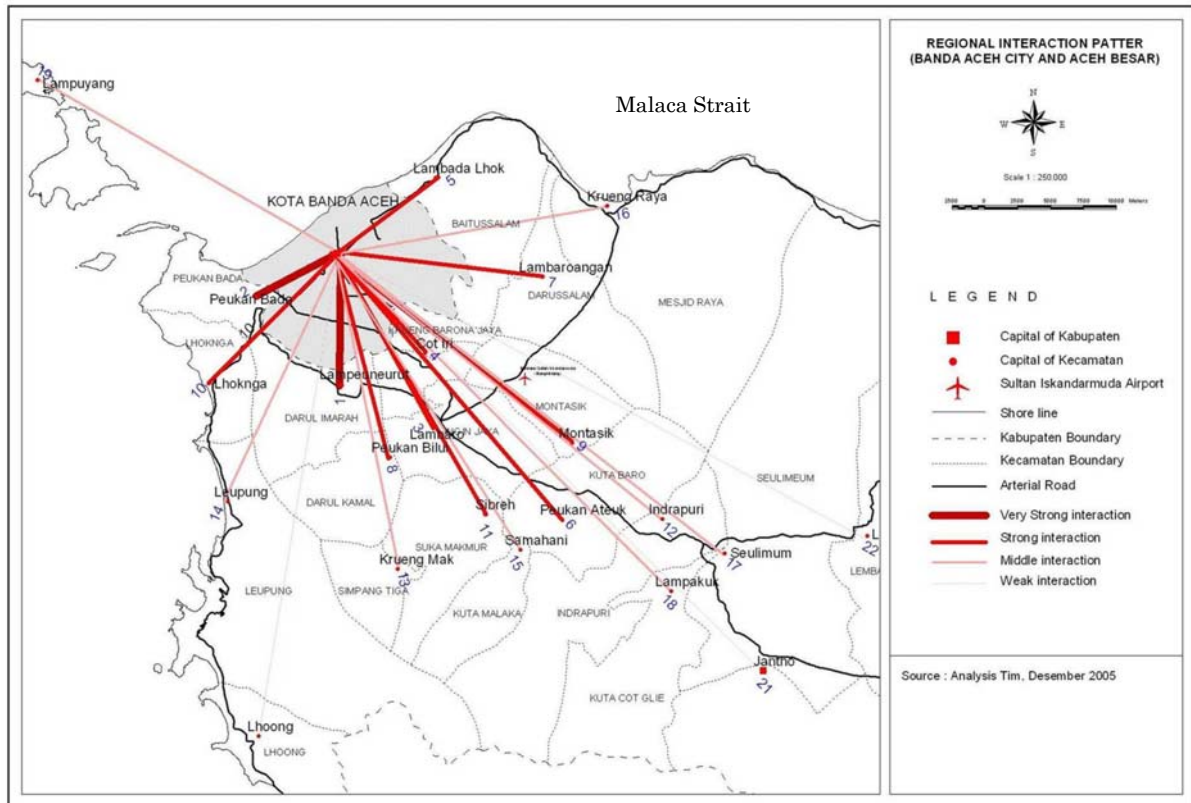


Source: Additional Study Team. 2006

## (2) Interaction of BAC and Regional Center (ABR)

From the regional linkages / interaction it can be seen that the capital of Darul Imarah District (Lampeuneurt), Ingin Jaya (Lambaro), Kuta Baro (Peukan Ateuk), Montasik (Montasik) and Peukan Bada (Peukan Bada) all have strong linkages with BAC. While the link with the capital of Kuta Malaka District (Samahani), Simpang Tiga (Krueng Mak) is weak (Fig. 3.5.2).

Figure 3.5.2 Urban Interaction of BAC and ABR



Source: Additional Study Team, 2006

## (3) Proposed Satellite City / Growth Center Metropolitan BAC

This section integrates the discussion of city size identification with interaction analysis of BAC and regional center. Its result is an illustration of cities that can function as the satellite cities of BAC.

- Cities that are classified as small city: Sabang, Lampeunereut, Lambaro, Peukan Ateuk, Montasik, Peukan Bada, Seulimeum, Lambada Lhok.
- Cities having strong interaction (value of interaction between 12,000,000 to 308,000,000) or whose rank of interaction is between 1 to 11: Lampeunereut, Peukan Bada, Lambaro, Cot Iri, Lambada Lhok, Peukan Ateuk, Lambaro Angan, Peukan Bilui, Montasik, Lhoknga, Sibreh.
- Regional center which can be recommended as satellite cities and growth center: Lampeunereut, Peukan Bada, Lambaro, Cot Iri, Lambada Lhok, Peukan Ateuk, Lambaro Angan, Peukan Bilui, Montasik, Lhoknga, Sibreh, Sabang. Seulimeum is excluded because it is considered too far from BAC (42 km) and has weak interaction.

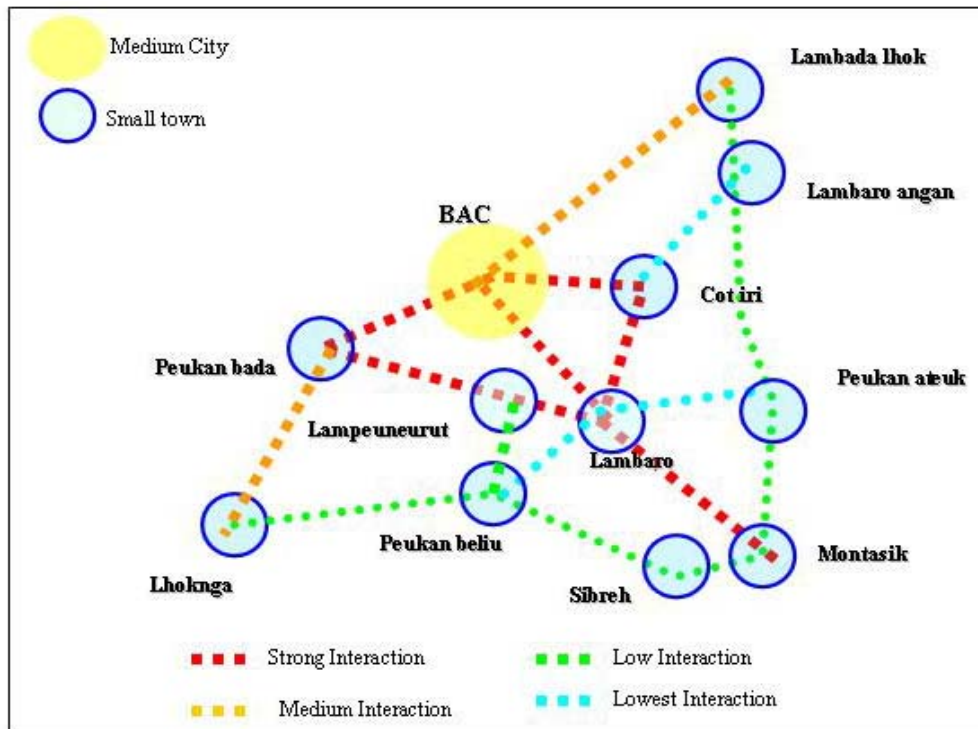
## (4) Interaction of Regional Center to Regional Center of ABR

After determining the candidates of satellite cities and growth centers, the next analysis is creating an interaction between the cities, as described in the following table and figure.

**(5) Recommendation Based on Interaction Analysis**

After performing interaction analysis on each city/regional center, between BAC and regional center as well as between regional center and regional center, an imaginary line of intercity interaction pattern can be delineated. 1) Strong interaction: between BAC and Peukan Bada - Lampeuneurut - Lambaro - Cot Iri 2) Medium interaction: BAC with Lhoknga - Lambada Lhok 3) Low interaction: Lhoknga and Peukan Beliu, Lampeuneurut and Peukan Beliu, Peukan Beliu and Sibreh, Sibreh and Montasik, Montasik and Peukan Ateuk, Lambaro Angan and Lambada Lhok-Peukan Ateuk. 4) Lowest interaction: Peukan Beliu - Lambaro - Peukan Ateuk and Cot Iri with Lambaro Angan. This is illustrated in Figure 3.5.3.

Figure 3.5.3 Imaginary Line of Intercity Interaction Pattern



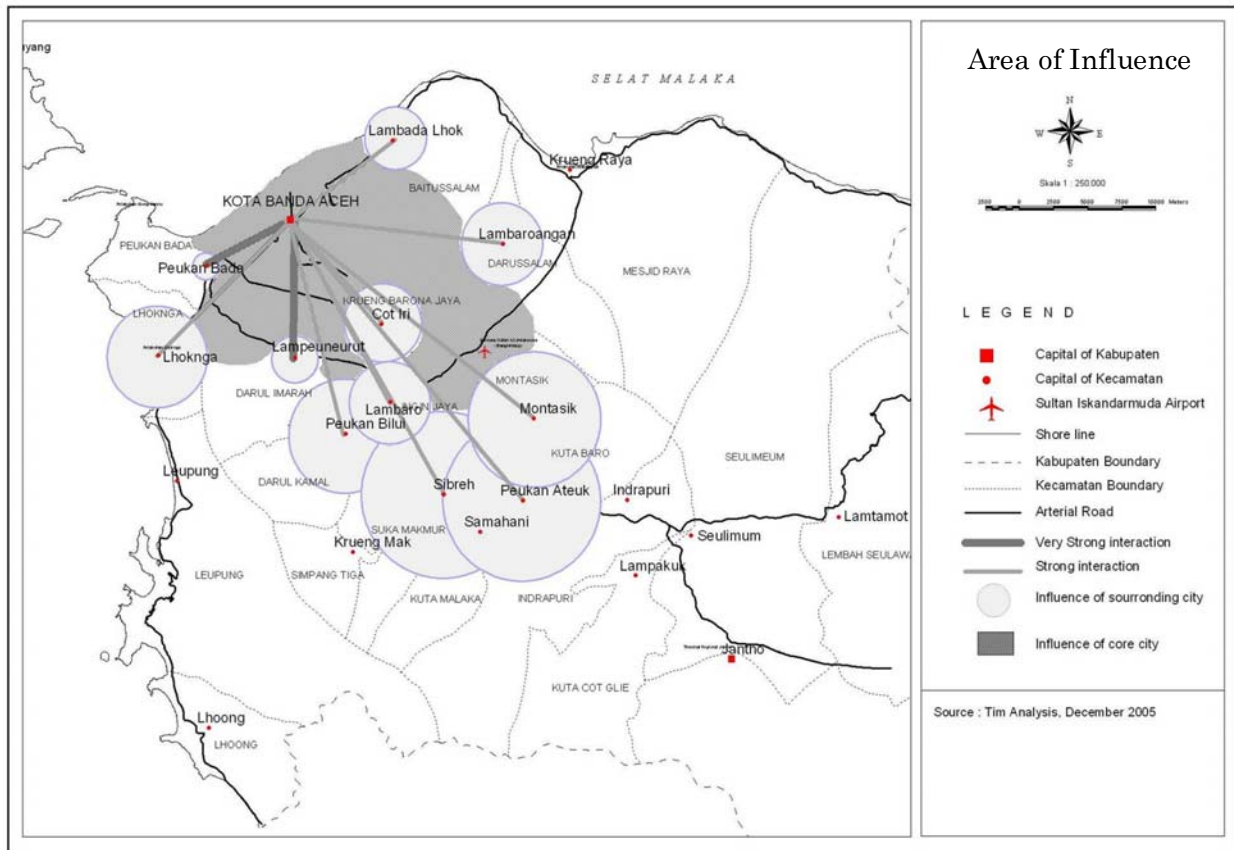
Source: Additional Study Team, 2006

**3.5.2 Interdependency Analysis**

**(1) Distance of Influence**

This analysis is conducted using the formulation of distance of influence (breaking point), Breaking Point formulation is conducted in order to study the Interdependency between BAC and other regional center. Through this analysis, the following can be determined: the spatial sizes of surrounding cities, spaces not serviced by core city, independent areas in cities around core city. Distance of influence BAC to: Lhoknga 14 km, Darussalam 13 km, Lambada Lhok 11 km, Peukan Ateuk 12 km, Montasik 16 km, Lambaro 8 km, Cot Iri 6 km, Sibreh 15 km, Lampeuneureut 5 km, Peukan Bilui 8 km, Peukan Bada 6 km.

Figure 3.5.4 BAC's Area of Influence

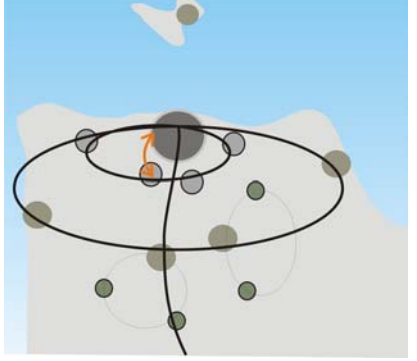
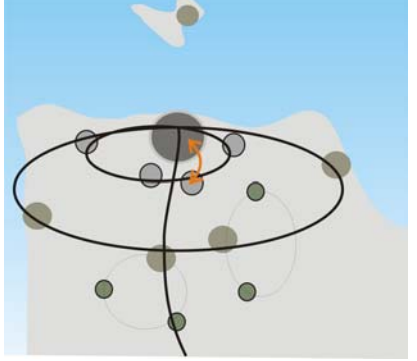
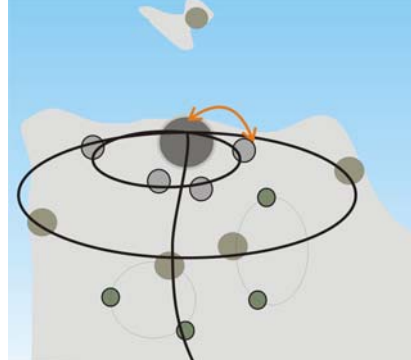


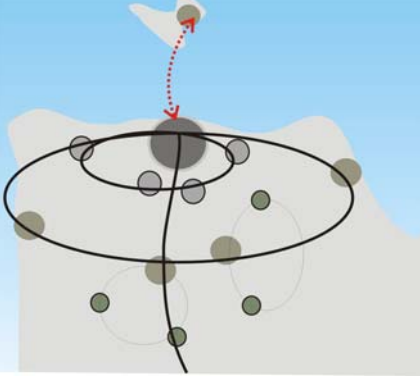
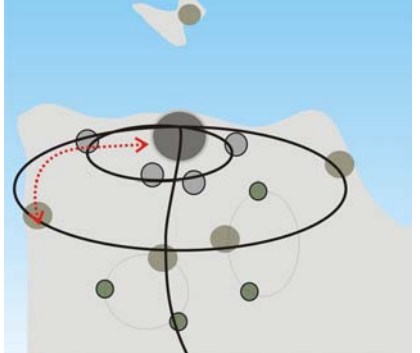
Source: Additional Study Team, 2006

**(2) Interdependency of Core City – Regional Center, Regional Center-Regional Center**

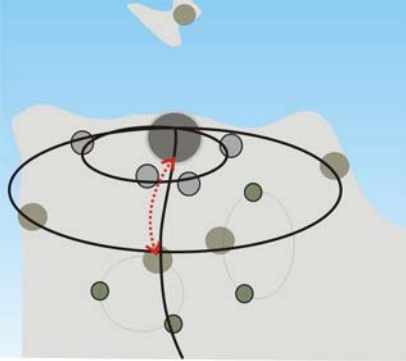
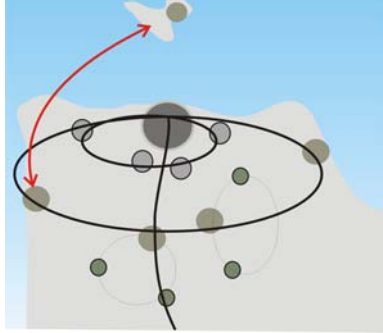
Table 3.5.1 Interdependency

DEPENDENCE OF PEUKAN BADA TO BAC	DEPENDENCE OF BAC TO PEUKAN BADA	SCHEMATIC PEUKAN BADA TO BAC
<p>a) <b>Labor:</b> Provides work opportunities</p> <p>b) <b>Public and Social Facilities:</b> Provision of city and regional scale level (Entertainment, Education, commercial and service, offices)</p> <p>c) <b>Economy:</b> Market for ocean and fishpond fishery products</p> <p>d) <b>Tourism:</b> Urban Tourism Destination</p>	<p>a) <b>Labor:</b> Supplier of labors</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b> Producer of ocean and fishpond fishery products</p> <p>d) <b>Tourism:</b> Nature Tourism Destination</p>	<p>The schematic diagram shows Peukan Bada as a regional center. It features concentric circles representing the area of influence, with arrows indicating the flow of labor, public and social facilities, and economic products towards BAC. The diagram also shows Peukan Bada's position relative to other regional centers in the area.</p>

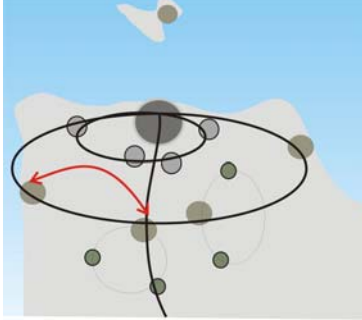
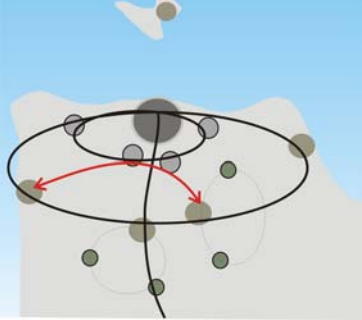
DEPENDENCE OF LAMPEUNEURUT TO BAC	DEPENDENCE OF BAC TO LAMPEUNEURUT	SCHEMATIC LAMPEUNEURUT TO BAC
<p>a) <b>Labor:</b> Provides work opportunities</p> <p>b) <b>Public and Social Facilities:</b> Provision of city and regional scale level (Entertainment, Education, commercial and service, offices)</p> <p>c) <b>Economy:</b> Producer of home industry products</p> <p>d) <b>Tourism :</b> Urban Tourism Destination</p>	<p>a) <b>Labor:</b> Supplier of labors</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b> Supplier of home industry products</p> <p>d) <b>Tourism :</b> Nature Tourism Destination (waterfall)</p>	
DEPENDENCE OF COT IRI TO BAC	DEPENDENCE OF CORE CITY TO BAC	SCHEMATIC COT IRI TO BAC
<p>a) <b>Labor:</b> Provides work opportunities</p> <p>b) <b>Public and Social Facilities:</b> Provision of city and regional scale level (Entertainment, Education, commercial and service, offices)</p>	<p>a) <b>Labor:</b> Supplier of labors</p> <p>b) <b>Public and Social Facilities:</b> --</p>	
DEPENDENCE OF LAMBADALHOK TO BAC	DEPENDENCE OF BAC TO LAMBADALHOK	SCHEMATIC LAMBADALHOK TO BAC
<p>a) <b>Labor:</b> Provides work opportunities</p> <p>b) <b>Public and Social Facilities:</b> Provision of city and regional scale level (Entertainment, Education, commercial and service, offices)</p> <p>c) <b>Economy:</b> Market for ocean and fishpond fishery products</p> <p>d) <b>Tourism :</b> Urban Tourism Destination</p>	<p>a) <b>Labor:</b> Supplier of labors</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b> Producer of ocean and fishpond fishery products</p> <p>d) <b>Tourism :</b> Nature Tourism Destination (beach)</p>	

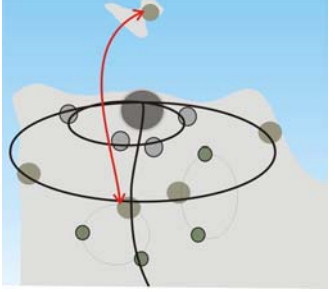

DEPENDENCE OF SABANG TO BAC	DEPENDENCE OF BAC TO SABANG	SCHEMATIC SABANG TO BAC
<p>a. <b>Labor:</b> Provides work opportunities</p> <p>b. <b>Public and Social Facilities:</b> Provision of city and regional scale level (Entertainment, Education, commercial and service, offices)</p> <p>c. <b>Economy:</b> Market of ocean &amp; fishpond fishery and plantation products</p> <p>d. <b>Tourism :</b> Urban Tourism Destination</p> <p>e. <b>Transportation</b> Gate to cities in Sumatera Island</p>	<p>a) <b>Labor:</b> Supplier of labor</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b> Producer of ocean &amp; fishpond fishery and plantation products</p> <p>d) <b>Tourism :</b> Nature (beach) and Cultural Tourism Destination</p> <p>e) <b>Transportation</b> Gate to free harbor</p>	
DEPENDENCE OF LHOKNGA TO BAC	DEPENDENCE OF BAC TO LHOKNGA	SCHEMATIC LHOKNGA TO BAC
<p>a) <b>Labor:</b> Provides work opportunities in the city</p> <p>b) <b>Public and Social Facilities:</b> Provision of city and regional scale level (Entertainment, Education, commercial and service, offices)</p> <p>c) <b>Economy:</b> Market for Lhoknga industrial products</p> <p>d) <b>Tourism :</b> Urban Tourism Destination</p>	<p>a) <b>Labor:</b> Supplier of labor</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b> Lhoknga industrial products</p> <p>d) <b>Tourism :</b> Nature Tourism Destination (beach)</p>	

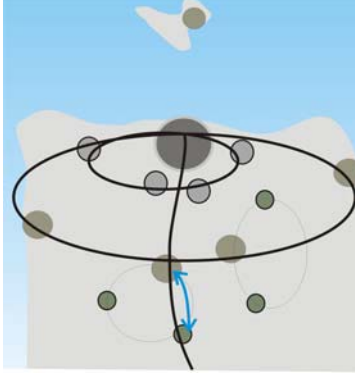


DEPENDENCE OF LAMBARO TO BAC	DEPENDENCE OF BAC TO LAMBARO	SCHEMATIC LAMBARO TO BAC
<p>a) <b>Labor:</b> Provides work opportunities</p> <p>b) <b>Public and Social Facilities:</b> Provision of city and regional scale level (Entertainment, Education, commercial &amp; service, offices)</p> <p>c) <b>Economy:</b></p> <ul style="list-style-type: none"> <li>▶ Market for agricultural products (particularly food crops)</li> <li>▶ Market for small/home industry products</li> <li>▶ Demand of <i>Alsintan and Saprotan</i></li> </ul> <p>e) <b>Tourism :</b> Urban Tourism Destination</p> <p>d) <b>Transportation</b> --</p>	<p>a) <b>Labor:</b> Supplier of labor</p> <p>b) <b>Public and Social Facilities:</b></p> <p>c) <b>Economy:</b></p> <ul style="list-style-type: none"> <li>▶ Demand of agricultural products (particularly food crops)</li> <li>▶ Market for small/home industry products</li> <li>▶ Market for <i>Alsintan and Saprotan</i><sup>1</sup></li> </ul> <p>d) <b>Tourism :</b> --</p> <p>f) <b>Transportation</b> Ground transportation gate (Integrated Terminal)</p>	
DEPENDENCE OF LHOKNGA TO SABANG	DEPENDENCE OF SABANG TO LHOKNGA	SCHEMATIC INTERACTION BETWEEN LHOKNGA - SABANG
<p>a) <b>Labor:</b> --</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b> Market for industrial products from Lhoknga</p> <p>d) <b>Tourism :</b> Tourism Destination</p> <p>e) <b>Transportation</b> Gate to free harbor</p>	<p>a) <b>Labor:</b> --</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b> Market for industrial products from Lhoknga</p> <p>d) <b>Tourism :</b> --</p> <p>e) <b>Transportation</b> --</p>	

<sup>1</sup> Alsintan: Agricultural Equipments and Tools, Saprotan: Agricultural Production Consumables

DEPENDENCE OF LHOKNGA TO LAMBARO	DEPENDENCE OF LAMBARO TO LHOKNGA	SCHEMATIC INTERACTION BETWEEN LHOKNGA - LAMBARO
<p>a) <b>Labor:</b> Supplier of labor for industrial sector</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b></p> <ul style="list-style-type: none"> <li>▶ Demand of agricultural products (food crops)</li> <li>▶ Market for industrial products from Lhoknga</li> </ul> <p>d) <b>Tourism :</b> --</p> <p>e) <b>Transportation</b> Ground transportation gate (Integrated Terminal)</p>	<p>a) <b>Labor:</b> Work opportunities in industrial sector</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b></p> <ul style="list-style-type: none"> <li>▶ Market for agricultural products (food crops)</li> <li>▶ Demand of industrial products from Lhoknga</li> </ul> <p>d) <b>Tourism :</b> Nature Tourism (beach)</p> <p>e) <b>Transportation</b> --</p>	
DEPENDENCE OF LHOKNGA TO BLANGBINTANG	DEPENDENCE OF BLANGBINTANG TO LHOKNGA	SCHEMATIC INTERACTION BETWEEN LHOKNGA - BLANGBINTANG
<p>a) <b>Labor:</b> Supplier of labor for industrial sector</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b></p> <ul style="list-style-type: none"> <li>▶ Demand of agricultural products (food crops)</li> <li>▶ Market for industrial products from Lhoknga</li> <li>▶ Market for ocean and fishpond fishery products</li> </ul> <p>d) <b>Tourism :</b> --</p> <p>e) <b>Transportation</b> Air transportation gate, particularly national and international scale</p>	<p>a) <b>Labor:</b> Work opportunities in industrial sector</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b></p> <ul style="list-style-type: none"> <li>▶ Market for agricultural products (food crops)</li> <li>▶ Demand of industrial products from Lhoknga</li> <li>▶ Demand of ocean and fishpond fishery products</li> </ul> <p>d) <b>Tourism :</b> ▶ Nature Tourism (beach)</p> <p>e) <b>Transportation</b> --</p>	

DEPENDENCE OF LAMBARO TO SABANG	DEPENDENCE OF SABANG TO LAMBARO	SCHEMATIC INTERACTION BETWEEN LAMBARO - BLANGBINTANG
<p>a) <b>Labor:</b> --</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b></p> <ul style="list-style-type: none"> <li>▶ Market for agricultural products (food crops)</li> <li>▶ Demand of fishery products</li> </ul> <p>d) <b>Tourism :</b> Tourism Destination</p> <p>e) <b>Transportation</b> Free harbor gate</p>	<p>a) <b>Labor:</b> --</p> <p>b) <b>Public and Social Facilities:</b> --</p> <p>c) <b>Economy:</b></p> <ul style="list-style-type: none"> <li>▶ Demand of agricultural products (food crops)</li> <li>▶ Market for fishery products</li> </ul> <p>d) <b>Tourism :</b> Tourism Destination</p> <p>e) <b>Transportation</b> --</p>	
DEPENDENCE OF LAMBARO TO PEUKAN BILU	DEPENDENCE OF PEUKAN BILU TO LAMBARO	SCHEMATIC LAMBARO - PEUKAN BILU
<p>a) <b>Labor:</b> --</p> <p>b) <b>Public and Social Facilities:</b> ---</p> <p>c) <b>Economy:</b></p> <ul style="list-style-type: none"> <li>▶ Demand of agricultural products (food crops)</li> <li>▶ Demand for <i>Alsintan</i> and <i>Saprotan</i></li> </ul> <p>d) <b>Tourism :</b> --</p> <p>e) <b>Transportation</b> --</p>	<p>a) <b>Labor:</b> --</p> <p>b) <b>Public and Social Facilities:</b> Market, Service of local and city scale</p> <p>c) <b>Economy:</b></p> <ul style="list-style-type: none"> <li>▪ Market for agricultural products (food crops)</li> <li>▪ Demand for <i>Alsintan</i> and <i>Saprotan</i></li> </ul> <p>d) <b>Tourism :</b> --</p> <p>e) <b>Transportation</b> Ground transportation gate (Integration Terminal)</p>	

DEPENDENCE OF LAMBARO TO KSP.SIBREH	DEPENDENCE OF KSP. SIBREH TO LAMBARO	SCHEMATIC LAMBARO - KSP.SIBREH
<p>a) <b>Labor:</b> --</p> <p>b) <b>Public and Social Facilities:</b> ---</p> <p>c) <b>Economy:</b> Agricultural and dairy center</p> <p>d) <b>Tourism :</b> --</p> <p>e) <b>Transportation</b></p>	<p>a) <b>Labor:</b> --</p> <p>b) <b>Public and Social Facilities:</b> Market, Service of local and city scale</p> <p>c) <b>Economy:</b>  <ul style="list-style-type: none"> <li>▣ Market for agricultural products (food crops)</li> <li>▣ Demand for <i>Alsintan</i> and <i>Saprotan</i></li> </ul> </p> <p>d) <b>Tourism :</b> --</p> <p>e) <b>Transportation</b> Ground transportation gate (Integrated Terminal)</p>	

Source: Additional Study Team, 2006

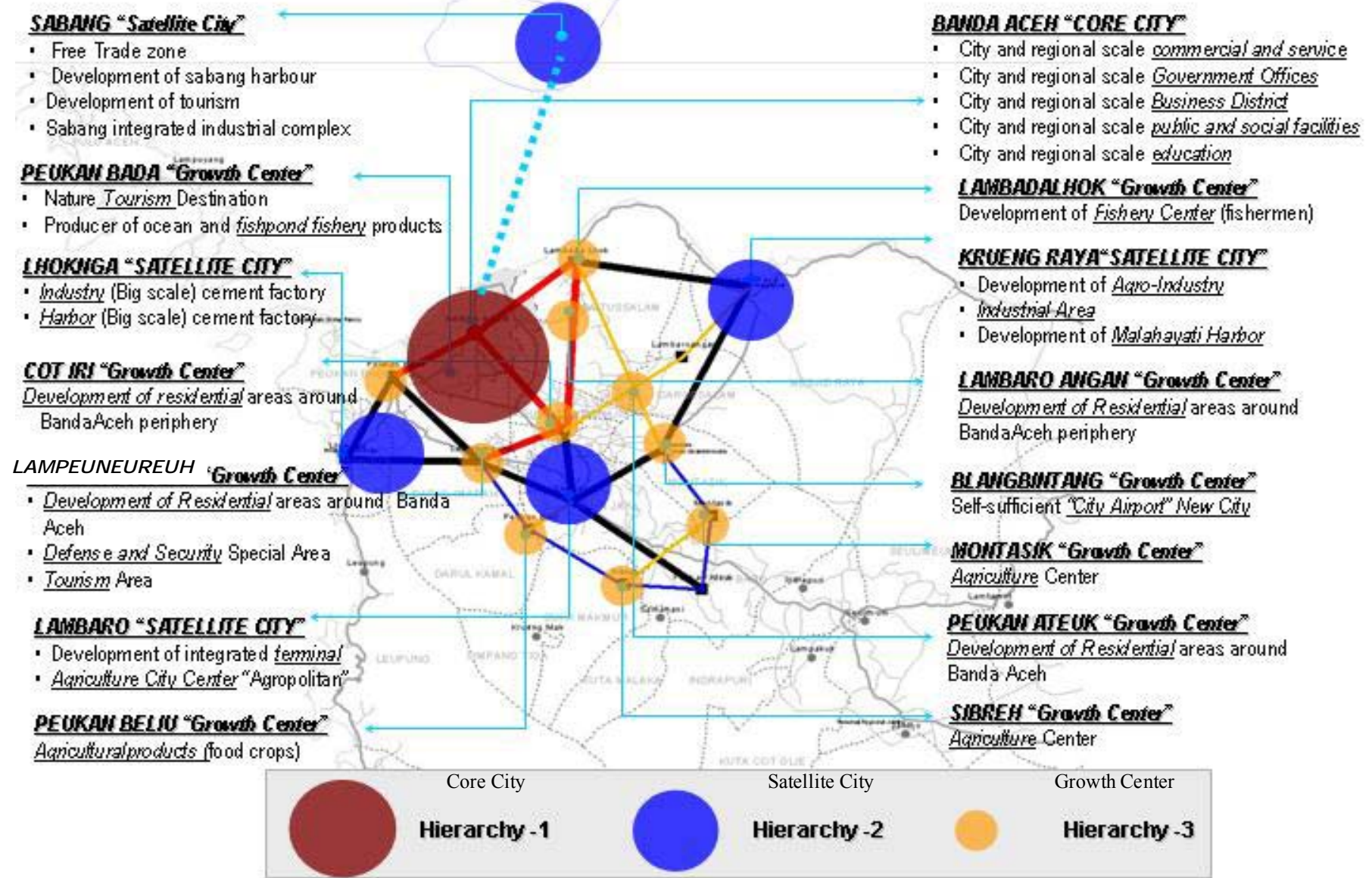
### 3.6 METROPOLITAN URBAN SYSTEM CONCEPT

The steps to determine urban system concept for Metropolitan BAC are as follows: 1) determine the cities that can be designated as core city, satellite city and growth center. Based on the Interaction analysis and Swot analysis, the most potential city to be the satellite city and growth center in BAC metropolitan are: Lampeunereut, Peukan Bada, Lambaro, Cot Iri, Lambada Lhok, Peukan Ateuk, Lambaro Angan, Peukan Bilui, Montasik, Lhoknga. Strategic area considerations, such as: Blangbintang (Airport), Malahayati (Industrial Port), Sabang (Free Port). 2) determine the function of cities 3) determine the role and position of cities 4) determine core city, satellite city and growth center. The concept is illustrated in Fig. Metropolitan Urban system concept.

### 3.7 RECOMENDATION

- The total area of Metropolitan BAC is 2,866 km<sup>2</sup> , consisting of non-cultivated area: 1,2897 km<sup>2</sup> (45%), cultivated area: 1,5763 (55%)
- The total population of Metropolitan BAC in target year 2015 is projected at = 758,735 people and average population density (gross density, Metropolitan BAC = 10 people/ha)
- A further study is needed for a spatial planning regarding Metropolitan BAC area.
- A cooperation between 3 administrative areas (BAC, ABR and Sabang) needs to be established.

Figure 3.7.1 Metropolitan Urban System Concept



Source: Additional Study Team, 2006

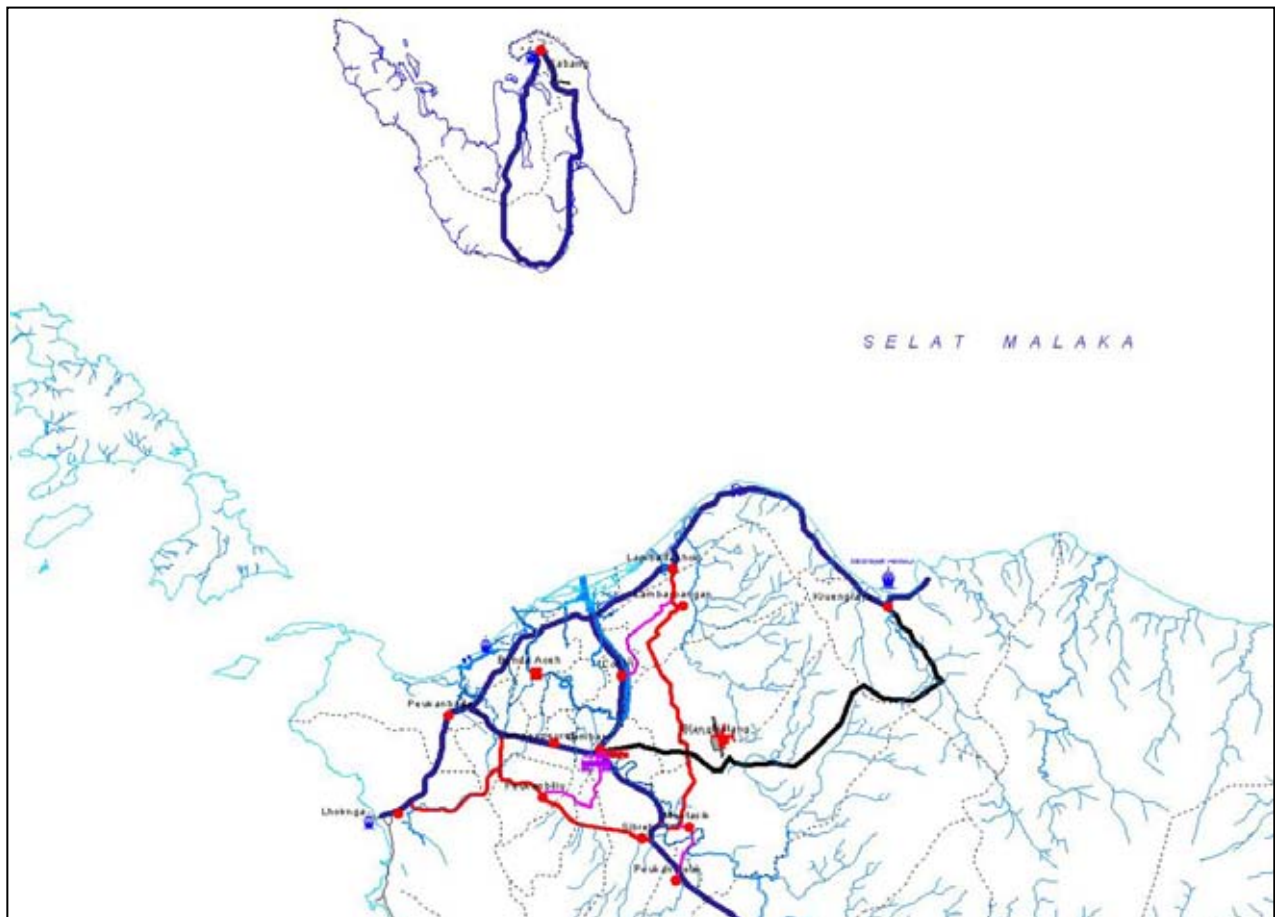
### 3.8 METROPOLITAN MACRO SPATIAL STRUCTURE AND LAND USE

The existing road network in ABR is sufficient to serve the movement demand that generates both inside and outside the district nowadays. However, as population continuing to rise up to 2015, the supply will be overloaded and rising congestion, jam, interrupted traffic, and so on. Thus, the network should grow up by itself in line with the rising demand year by year it should serve.

The upcoming network aims at serving all movement types both it comes from internal city generation or intercity attraction. It is obvious that the presence of interaction among cities will influence the pattern of future road network. Shortly saying that planning transportation network especially road will always considers many factors such as regional linkage, regional trip pattern, internal city generation and attraction flow, land use interaction, etc.

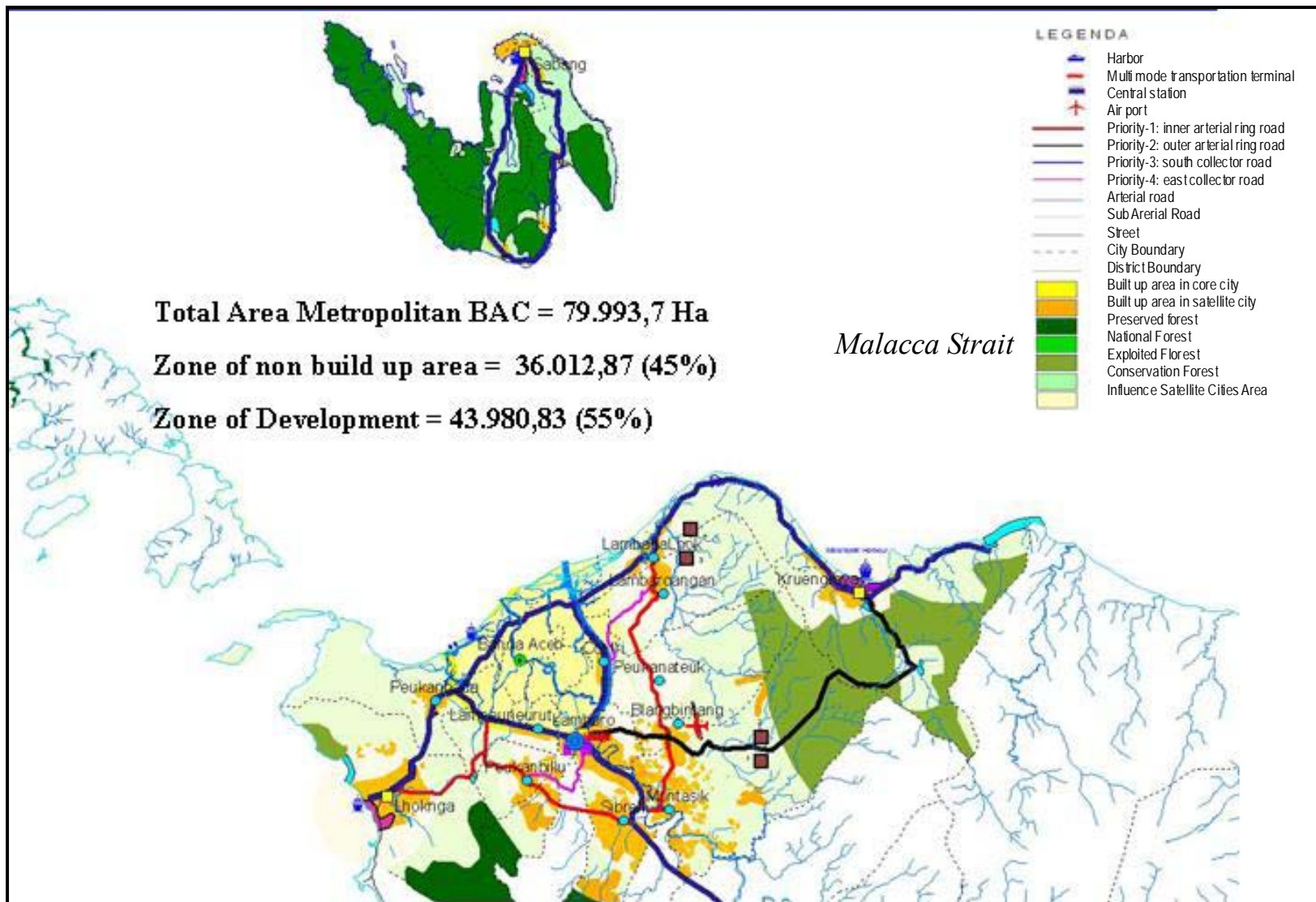
For that, it suggests at least five steps used to find out the mutual road network for coming years. The steps start from scanning regional highway connection, finding intercity linkage, overlapping both into first concept on road network, suggesting specific strategy concerning with CBD circulation pattern, and the last proposing the final road network plan.

Figure 3.8.1 Proposed Road Network Plan



Source: Additional Study Team, 2006

Figure 3.8.2 Metropolitan Macro Spatial Structure and Land Use



Source: Additional Study Team, 2006

## CHAPTER 4 PROPOSED STRUCTURE PLAN

### 4.1 INTRODUCTION

The background of formulation of proposed structure plan for BAC is based on the following steps.

In 2000 the City Government of BAC legalized a 10 year development plan (2000-2010) which is known as RTRW BAC for Target Year 2010. BAC as the planning area is divided into four urban units.

On 26 December 2004 major earthquake and tsunami hit the area, causing large scale destruction and alteration of spatial structure. Shortly after the emergency and relief period, a global effort to rebuild the afflicted area started, involving various donors who proposed a multitude of programs. During this stage it was felt that a spatial plan was necessary for a reference for rehabilitation and reconstruction programs.

The central government quickly took action to prepare a master plan known as the Blue Print. This Blue Print has no definite time frame, and its planning area covers NAD (inclusive of BAC) and Nias. The planning unit used in this master plan consists of planning zones.

Realizing that the Blue Print is temporary in nature, the Government of Japan funded a program called the Urgent Rehabilitation and Reconstruction Program of Banda Aceh and Surrounding Areas. The planning horizon of this program is 2009. Its study area covers BAC and surrounding areas, while the planning unit is ecological and administrative zones (as to combine Blue Print and RTRW).

Additional Study on URRP is meant to be a supplementary study, by extending the target year to 2015. The planning area of Additional Study covers BAC and surrounding areas. Planning unit used in this study is urban units.

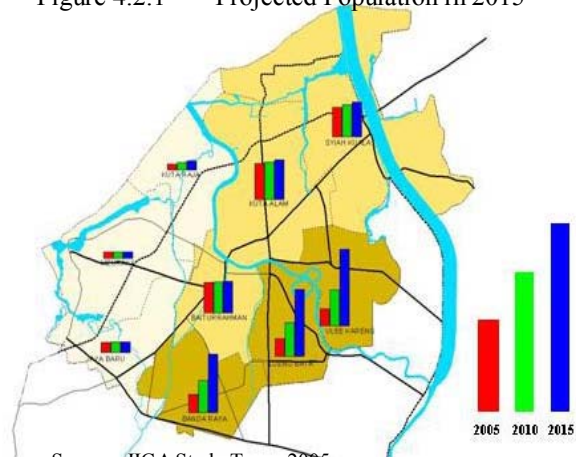
The material covered in the Proposed Structure Plan of BAC is: 1) Projected population 2015 2) Urban System 2015 3) Urban Hierarchy 2015 4) Urban skeleton 2015 5) Urban Pattern 2015 6) Primary Land Use 2015, including primary economic, public and social facilities, Natural environment conservation 7) Preliminary infrastructure plan for 2015: roads, drainage and flood control, water supply, waste water, solid waste, electrical, telecommunication, maritime and air transport. 8) Urban development concept: Green City Concept, Cyber City Concept, Tourism Development Concept, Industrial Development Concept, Non-Polluted Mass Transport Concept, Disaster Mitigation.

### 4.2 PROJECTED POPULATION IN 2015

In this analysis the study area population is extrapolated further from 2009 to target year 2015. The calculation is conducted using growth rates based on URRP Study as elaborated below.

Population projection of BAC for target year 2009 and 2015 is calculated according to specific scenario for each planning zone. Population in coastal zone and eco-zone are projected according to low population scenario (e.g. Jaya Baru, Meuraxa, Kuta Raja Districts). Population in zone of traditional city center are calculated based on medium population scenario (e.g. Baiturrahman, Kuta Alam and Syah Kuala Districts). The

Figure 4.2.1 Projected Population in 2015





population in the third zone, urban development zone, is projected in conformity to high population scenario (e.g. Banda Raya, Lueng Bata and Ulee Kareng districts).

By following the aforementioned scenarios, total BAC population in 2015 will be 360,304. Per district proportion to total population is as follows: Ulee Kareng 15%, Lueng Bata 14%, Banda Raya 14%, Kuta Alam 18%, Syah Kuala 15%, Baiturrahman 15%, Jaya Baru 4%, Kuta Raja 3%, Meuraxa 2%. Per year population projection between 2005 to 2009 including 2015 are listed in Table 4.2.1.

Table 4.2.1 Projected Population, Target Year 2015

No.	District	Projection					
		2005	2006	2007	2008	2009	2015
1.	Meuraxa	5,661	5,667	5,671	5,677	5,683	8,061
2.	Baiturrahman	36,894	30,012	37,152	37,303	37,480	53,166
3.	Kuta Alam	43,507	43,929	44,392	44,906	45,484	64,520
4.	Ulee Kareng	20,196	24,237	28,472	32,886	37,658	53,419
5.	Jaya Baru	11,362	11,375	11,388	11,402	11,417	16,195
6.	Banda Raya	21,225	24,415	27,737	31,185	34,784	49,342
7.	Lueng Bata	20,637	24,098	27,788	31,727	36,144	51,271
8.	Syah Kuala	35,985	36,501	37,086	37,767	38,559	54,697
9.	Kuta Raja	5,376	4,659	5,981	6,353	6,791	9,633
Total		200,843	204,893	225,667	239,206	254,000	360,304

Source: JICA Study Team 2005, Additional Study Team 2006

## 4.3 SPECIAL THEME IN BAC DEVELOPMENT

### 4.3.1 Green City Concept

#### (1) Definition

- Definition of a Green City

Green city is defined as a city that implements a principle of balance between built environment and natural environment in order to guarantee a sustainable development.

- Elements of a Green City

Green city elements includes: urban forest, city parks, protected conservation area (river, marshland, coastal area, hills), waste treatment system, the community's social behaviour, city policy and regulation in order to guarantee the sustainability of ecosystem.

- Handling/management

Efforts to achieve green city is through the following: conservation, preservation and rehabilitation of urban elements by considering environmental, economic and social principles.

#### (2) Nature and Environment Condition of BAC

The earthquake and tsunami disaster had caused tremendous environmental destruction and pollution in BAC, with direct implications to public and environmental health. The destruction consists of:

- Sea, water, land and soil pollution, triggering a scarcity of clean water supply and creating serious implications to public health
- Alteration of shoreline

- Pollution and destruction of coral reefs and mangrove
- Reduction/extinction of fish resources and coastal species (biodiversity potentials)
- Destruction of wetlands ecosystem
- Destruction of built ecosystem (cultivated, port and fishing villages), bringing significant impacts on economic activities

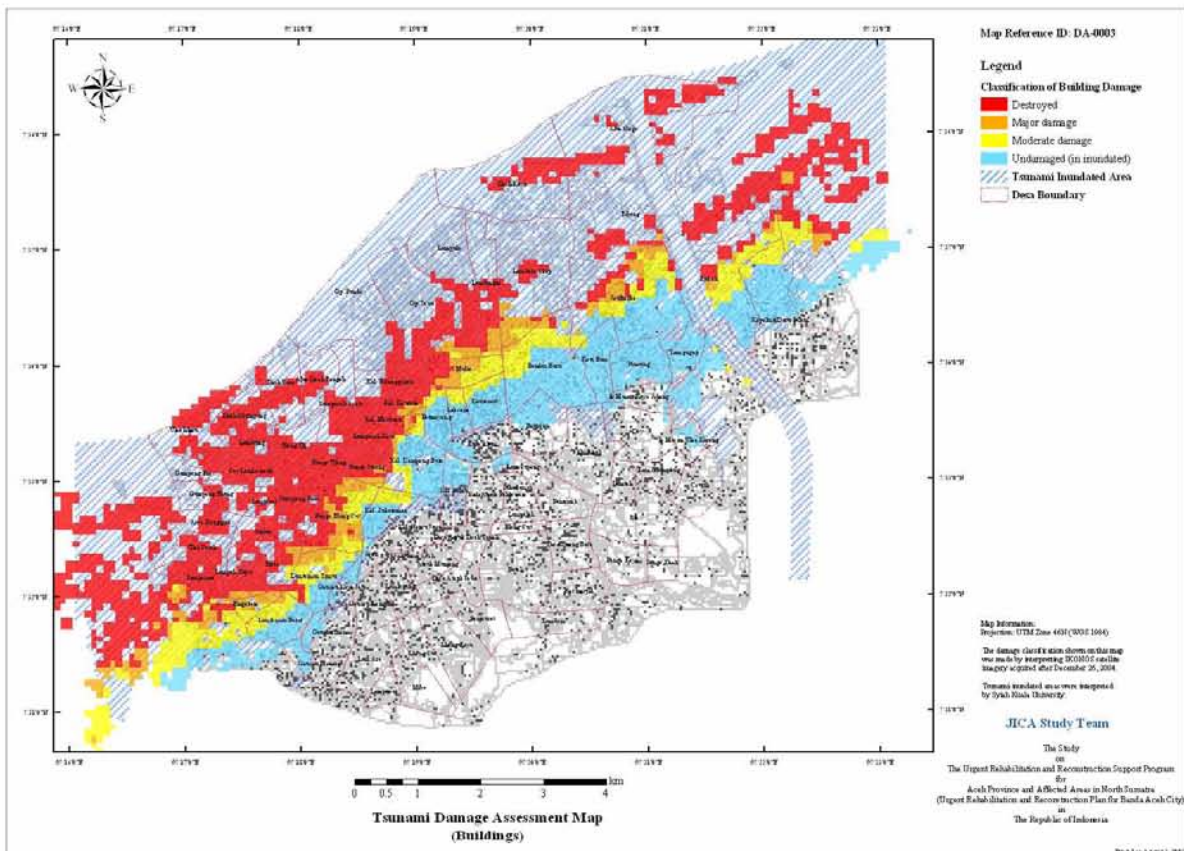
Based on URRP map (Tsunami Damage Assessment Map) the degree of nature and environmental damage is as described in the following table and map:

Table 4.3.1 Degree of Nature and Environmental Damage in BAC caused by the Tsunami

No	Degree of Damages	Area (Ha)	Percentages
1	Destroyed	1,053 Ha	17.25 %
2	Major Damage	196 Ha	3.22 %
3	Moderate Damage	295 Ha	4.83 %
4	Un-damage (in inundated)	740 Ha	12.13 %
5	Tsunami Inundated area	1,978 Ha	32.42 %
6	Un-inundated area	1,840 Ha	30.15 %
Total BAC Area		6,102 Ha	100 %

Source : JICA Study Team, 2005

Figure 4.3.1 Tsunami Damage Assessment Map



Source : JICA Study Team, 2005

**(3) Recommendation for BAC**

It is imperative that BAC be developed based on green city concept, because the principle of natural balance had been disrupted (destruction of mangrove forests, altered shoreline, lack of green space in the city). The disruption has been caused by man-made failures (such as building by disregarding prevailing legislations) as well as natural disasters (such as tsunami). The urban environment becomes flood-prone, vulnerable to full moon high-tide, micro-climate that becomes increasingly uncomfortable

**(4) Green City Concept for BAC**

Creating an urban environment that is resilient enough to restore the ecosystem itself, able to adapt to the growth of new urban life as an environmentally friendly city, and can protect the city from other natural forces (flood, sea wave, tidal influence, heat and wind).

**(5) Green City Development Strategy for BAC**

- Preserve existing open space and vegetation through conservation, rehabilitation, and revitalization of green city area and elements, to maintain environmental sustainability.
- Change public attitude and behavior in order to make them more aware and respectful to nature and environment.
- Provide urban facilities and infrastructures that support an environmentally friendly city.
- Control building density in order to guarantee the protection of water recharge areas and green areas.

**(6) Banda Aceh Green City Development Plan**

Banda Aceh Green City development plan is described in Table 4.3.2.

Table 4.3.2 Banda Aceh Green City Development Plan

No	Banda Aceh Green City Development	Proposed Area Development
1	Conserve/protect coastal zones by achieving a synergy of land utilization in coastal areas, which support the economic, socio-cultural and nature/environmental sustainability aspects.	<ul style="list-style-type: none"> <li>- Peukan Bada District (ABR).</li> <li>- Meuraxa District: Ulee Lheu, Deah Glumpang, Deah Baro, Aloe Deah Tengoh, Lampaseh Aceh.</li> </ul>
2	Use of the on-going tidal embankment construction program, as a coastal road with economic, leisure and esthetic functions along the outer perimeter of coastal villages. Rest areas are proposed to be constructed in certain interval.	<ul style="list-style-type: none"> <li>- Kota Raja District: Gampong Pande, Gampong Jawa.</li> <li>- Kota Alam District: Lampulo, Lam Dingin, Bandar Baru, Lambaro Skep.</li> <li>- Syah Kuala District: Jelingke, Tibang, Deah Raya and Alue Naga.</li> </ul>
3	Fishpond area development by planting mangrove in harmony with tidal fluctuation, sea wave, as well as nature conservation (habitat), green belt/buffer, economic and recreational area.	<ul style="list-style-type: none"> <li>- Peukan Bada District (ABR).</li> <li>- Meuraxa District: Ulee Lheue, Deah Glumpang, Deah Baro, Aloe Deah Tengoh, Lambung, Blang Oi, Lampaseh Aceh.</li> <li>- Kota Raja District: Gampong Pande, Gampong Jawa.</li> <li>- Kota Alam District: Lampulo, Lam Dingin, Bandar Baru, Lambaro Skep.</li> <li>- Syah Kuala District: Jelingke, Tibang, Deah Raya and Alue Naga.</li> </ul>
4	Develop inner city ponds/retarding ponds ( <i>situ</i> ) as part of urban drainage system, which can also be functioned as urban green area, recreation area, public socio-economic area and urban aesthetics.	<p><u>Locations of retarding ponds (on-going city program):</u></p> <ul style="list-style-type: none"> <li>- Lambaro Skep (in Titi Panjang river mouth).</li> <li>- Lampulo (in Krueng Aceh riverside).</li> <li>- Lampaseh Aceh (in Krueng Doy riverside).</li> <li>- Asoe Nanggroe (in Krueng Neng river mouth).</li> </ul>
5	Conduct urban greening in main urban skeletons (roads, rivers) and urban open spaces. It multi-functions as element of disaster mitigation in the form of escape routes and escape area, and protect the city against the effects of micro climate changes and create urban aesthetics.	
	A Development of urban green elements along main urban roads, by maintaining existing vegetation and planting new hardwoods such as angšana, kepula trees, etc.	<ul style="list-style-type: none"> <li>- Meulaboh – Malahayati access: Jl. Cut Nyak Dien, Kl. Tengku Umar, Jl. Sultan Alaidin, Jl. Muhamad Daud Beureuh, Jl. Tengku Nyak Arief, Jl. Laksamana Malahayati.</li> <li>- North – South access: Jl. Syiah Kuala, Jl. TH. GLP Payong, Jl. Hasan Dek, new road (from Simpang Surabaya to Jl. Sukarno Hatta).</li> <li>- Ring Road: Jl. Sukarno Hatta.</li> </ul>

No	Banda Aceh Green City Development	Proposed Area Development
		<ul style="list-style-type: none"> <li>- East – West Access: Jl. Iskandar Muda, Jl. Rama Setia, Jl. Habib Abdurahman, Jl. Tengku Cik Ditiro, Jl. Tengku Imum Lueng Bata, Jl. Tengku Iskandar, Jl. Tengku Nyak Makam.</li> <li>- Inner city: Jl. Panglima Polim, Jl. Tentera Pelajar, Jl. KH.Ahmad Dahlan.</li> </ul>
	B Development of urban green elements along river basin, by maintaining existing vegetation and planting new hardwoods such as angšana, kepula trees, etc	<ul style="list-style-type: none"> <li>- Banjir Kanal Aceh. -- Krueng Daroy.</li> <li>- Krueng Aceh. -- Krueng Neng.</li> <li>- Krueng Doy. -- Lueng Paga.</li> </ul>
	C Development of urban green elements in urban public space, by maintaining existing vegetation and planting new hardwoods such as angšana, kepula trees, etc	<ul style="list-style-type: none"> <li>- City park: Blang Padang, Darussalam Field, Brimob Field in Lingke, Taman Sari, KODAM field in Neusu.</li> <li>- Urban mosque’s yards: Grand Mosque Baiturrahman field, Tengku Umar Mosque in Setui, Lampriet, Prada, Darussalam, Beurawe, Kuta Alam.</li> <li>- Open spaces in government offices and public &amp; social facilities.</li> </ul>
6	Enforcement of building codes regarding building coverage ratio, floor area ratio (BCR), floor area ratio (FAR) building distance (building setback and river setback)	All areas in BAC.
7	Provision of garbage management facility (by Dinas Kebersihan dan Pertamanan Kota/DKP) which separate organic and non-organic garbage from household level to city level.	All residential, commercial and public facilities areas in BAC, from neighborhood scale until city scale.
8	Provision of communal waste water treatment system for high density area in areas with low carrying capacity soil condition. Provision of a naturally safe and clean city waste treatment system.	All areas in BAC especially in high density residential and commercial areas.
9	In the level of spatial planning, as far as possible avoid to allocate land for heavy/polluting industries in BAC.	All areas in BAC.
10	Promote public understanding and community education to all citizens of BAC about the importance of nature and environmental protection through various media and forms of education (formal and informal education)	All areas in BAC.

Source: Additional Study Team, 2006

Figure 4.3.2 Development of Banda Aceh Green City



**Conservation, Rehabilitation and Revitalization:**

- Coastal zones and fishpond areas: from Peukan Bada to Alue Naga.
- River: Banjir Kanal Aceh, Krueng Aceh, Krueng Doy, Krueng Daroy, Krueng Neng, Lueng Paga.
- City ponds / retarding ponds.
- Main road.
- Open space.

**Urban Infrastructures and Utilities**

- Solid waste management facilities.
- Communal waste water treatment system.

**Regulation & Spatial Plan:**

- Enforcement of Building Codes: BCR, FAR, building distance, building setback and river setback.
- Heavy/polluted industry is not allowed in BAC.

**Community Behavior**, to make aware and more respectful to nature and environment

Source : Additional Study Team, 2006

### 4.3.2 Cyber City Concept

#### (1) Definition

Cyber City is a city that has been set according to public policy to empower its citizens, so that they can have access to the global information network, using public/private partnerships to achieve these goals; also called "community networks".

#### (2) Development Concept of Cyber City

- Gridlock

Such space restrictions necessitate the city exploit its non-physical assets. Thus, commerce that generates wealth but doesn't contribute to traffic or pollution is highly desired. Cyber city features can meet these needs.

- Social Equity Policy

The cities featured here viewed the Internet and its wealth of information as the new currency of the realm. Access to the goods, services, jobs and wealth which are available on the net are viewed as a basic right for residents, like any other legal right.

- Competitive Advantage

City increasingly views other cities as competitors for jobs and investment; attempt to entice investors to bring capital.

- Population Shifts

Across the globe, small towns are losing population to urban areas. To counteract this loss, some towns are investing in cyber-infrastructure as a way of both keeping jobs and keeping young people.

- Government Relations

Governments are increasingly called upon to justify their expenditures to voters. If "good government is good politics", then leaders who are viewed as visionary and bringing new services to constituents will be viewed favorably. City is using a WAN to communicate with residents, conduct business, promote commerce, reduce traffic, and increase efficiency.

#### (3) Vision

To transform Aceh into an IT driven economy.

Objectives:

- Upgrading the standard and quality of administration, particularly in social and public services sector through a process of modernization and rationalization of the administrative set up,
- Providing public centered, efficient and cost-effective Government,
- Extensive percolation of IT literacy and education in the City Government,
- Promoting investments in IT,
- Encouraging private sector initiative in IT related infrastructure and services,
- Increasing the share of IT in Local Government Gross Domestic Product,
- Generating IT related employment opportunities, and
- Enhancing earning capacity of the residents thereby ensuring a better quality of life.

#### (4) Policy and Public Domain

- Re-engineering of administrative processes
- IT Budget
- IT Initiative Fund for e-Governance

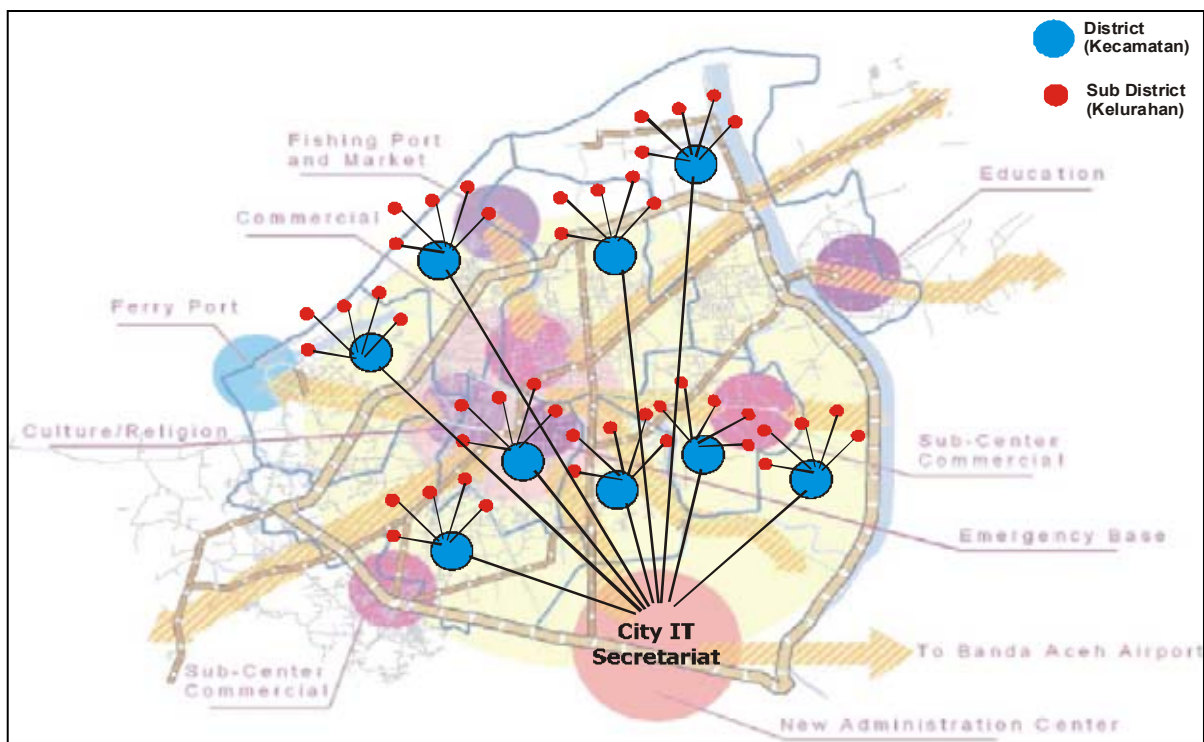
- State-wide Area Network
- Standardization of IT Infrastructure, Data and Applications
- GIS Technology
- Development of Portal Website
- IT Literacy in Government

**(5) Development Strategy of Cyber City**

- Universal citizen access (most important goal).
- Cooperative sharing of networking facilities between schools, libraries, hospitals and other government institutions.
- Improved government management and operation/improved citizen responsiveness.
- Improved workforce effectiveness through better education and training.
- Closer community/government/business relations through online access.
- Improved quality of life for residents (less gridlock, more communication) Extensive broadband infrastructure.

The major attraction of this scheme (Figure 4.3.3) is the provision of high quality infrastructure including high speed data communication links, local loops side-stepping the dependence on local telephone companies, ready to-use built up space with networking and backup power, uninterrupted power supply, and common services like photocopying, fax and security.

Figure 4.3.3 Schematic of BAC Area Network



Source : Additional Study Team, 2006