



JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

REPUBLIC OF INDONESIA

MINISTRY OF PUBLIC WORKS

DIRECTORATE GENERAL OF HIGHWAYS

**THE STUDY ON ARTERIAL ROAD NETWORK
DEVELOPMENT PLAN FOR SULAWESI ISLAND
AND
FEASIBILITY STUDY ON PRIORITY ARTERIAL
ROADS IN SOUTH SULAWESI PROVINCE**

**FINAL REPORT
VOLUME 1 : MASTER PLAN STUDY
SUMMARY**

MARCH 2008

NIPPON KOEI CO., LTD.
KRI INTERNATIONAL CORP.
ALMEC CORPORATION

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COMPOSITION OF FINAL REPORT

- Volume 1: Master Plan Study (Summary and Main)
- Volume 2-1: Feasibility Study (Summary and Main)
- Volume 2-2: Feasibility Study (Drawings)
- Volume 2-3: Feasibility Study (EIA & Public Consultation)

CURRENCY EXCHANGE RATE

Following currency exchange rates were adopted in this report unless otherwise stipulated.

(1) Indonesia Rupiah vs. US Dollar
Selling rate of Bank Indonesia on May, 16 2007
USD 1= IDR 9,322

(2) Indonesia Rupiah vs. Japanese Yen
Selling rate of Bank Indonesia on May, 16 2007
JPY 1 = IDR 77.55

Preface

In response to the request from the Government of Republic of Indonesia, the Government of Japan decided to conduct the Study on Arterial Road Network Development Plan for Sulawesi Island and the Feasibility Study on Priority Arterial Roads in South Sulawesi Province, and entrusted the Study to the Japan International Cooperation Agency (JICA).

JICA sent the Study team, headed by Mr. Hiroki SHINKAI of Nippon Koei Co., Ltd. and organized by Nippon Koei Co., Ltd., KRI International Corporation, and ALMEC Corporation to Indonesia four times from December 2006 to March 2008.

The Study team had a series of discussions with the officials concerned of the Directorate General of Highways (Bina Marga), Ministry of Public Works and Regional Planning and Development Agency (Bappeda), South Sulawesi Province and conducted related studies. After returning to Japan, the Study team conducted further studies and completed this final report.

I hope that this report will contribute to the promotion of the plan and to the enhancement of amity between two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Indonesia, especially the counter part agencies of Directorate General of Highways, Ministry of Public Works and Regional Government of South Sulawesi Province for their close cooperation throughout the Study.

March, 2008

Takashi KANEKO

Vice President

Japan International Cooperation Agency

March 2008

Mr. Takashi KANEKO
Vice President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Submittal

Dear Sir,

We are pleased to submit to you the report on the Study on Arterial Road Network Development Plan for Sulawesi Island and Feasibility Study on Priority Arterial Roads in South Sulawesi Province in Indonesia. The report compiled all findings obtained through the study from December 2006 to March 2008 in Indonesia conducted by Nippon Koei Co. Ltd., KRI International Corporation and ALMEC Corporation in accordance with the contract with Japan International Cooperation Agency (JICA).

The Study consists of the master plan study on road network development covering 6 provinces in Sulawesi Island and the feasibility study on priority arterial roads in South Sulawesi Province.

The master plan formulates the comprehensive road network system based on the analysis of existing and future socio/economic framework, environment and road conditions in Sulawesi and proposes the realistic and practical implementation plan, taking into consideration possible financial plan aiming at the year of 2024.

The feasibility study on the high priority 5 project roads, including Trans Sulawesi Mamminasata Road from Maros to Takalar, concludes that the projects will be technically and economically feasible and acceptable from the environmental aspects and will contribute to the enhancement of economic development of South Sulawesi. Therefore, the Study team recommends earlier implementation of the projects.

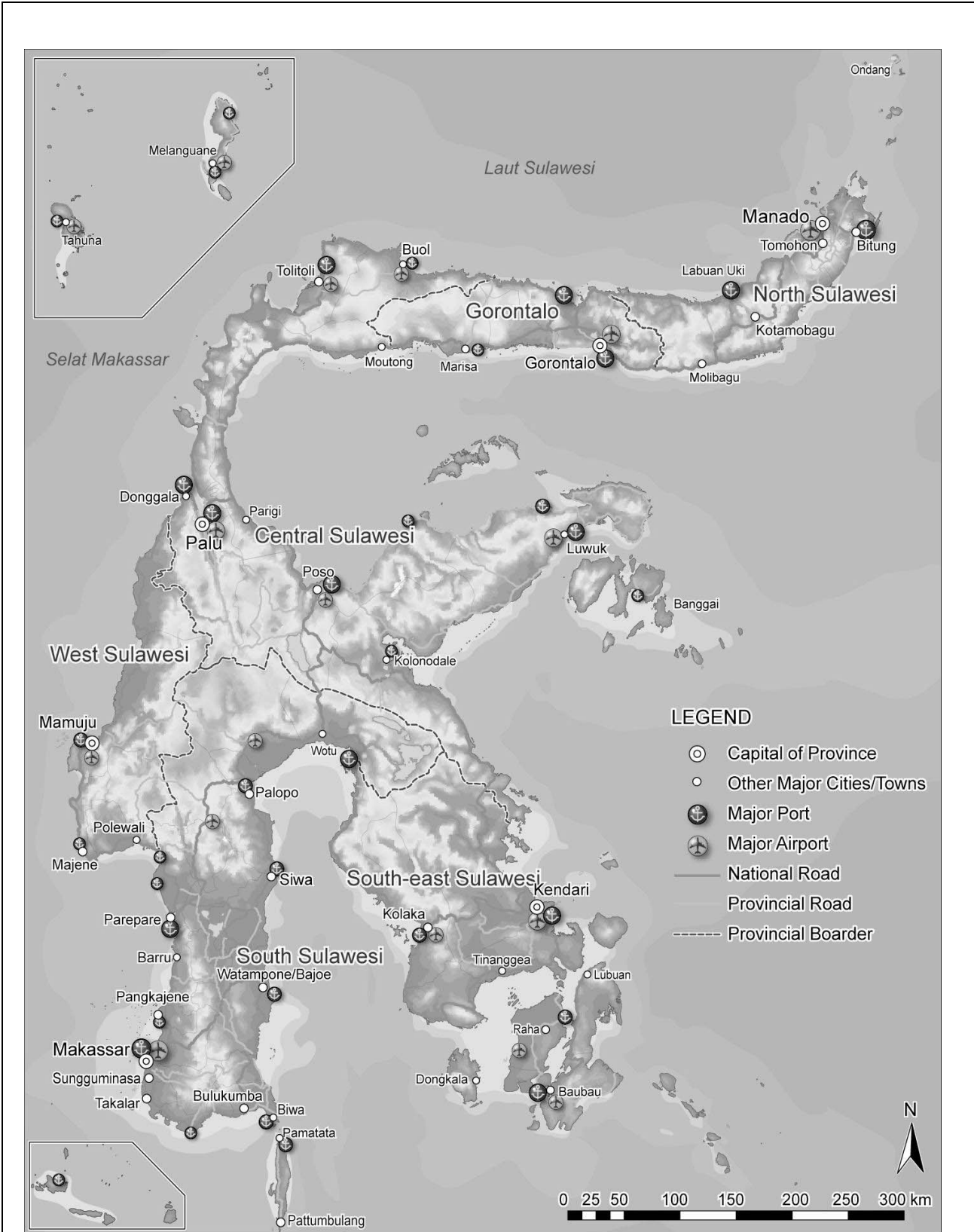
We wish to express our sincere gratitude to your agency, including the JICA experts concerned, and also wish to express our deep appreciation to the government of Indonesia, especially the counterpart agencies of the Directorate General of Highways of Ministry (Bina Marga), Public Works and Regional Planning and Development Agency (Bappeda) of South Sulawesi Province for their close cooperation and assistance extended to us during the study.

We hope this report will contribute to the development of the Republic of Indonesia.

Very truly yours,

Hiroki SHINKAI

Leader of the Study Team



The Study on Arterial Road Network Development for Sulawesi Island and Feasibility Study on Priority Arterial Road Development for South Sulawesi Province

LOCATION MAP (M/P)

Study Road Length (km)

YEAR	2005	2024
National Road	7,092	8,141
Provincial Road	4,976	4,785
Total	12,068	12,926

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A

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Office
AC	Asphalt Concrete
ADSRP	Abdullah Daeng Sirua Road Project
AMDAL	Analisis Mengenai Dampak Lingkungan Hidup
ANDAL	Analisis Dampak Lingkungan (Environmental Analysis)
APBD	Anggaran Pendapatan dan Belanja Daerah (<i>Local Budget of Income and Expenditure</i>)
APBN	Anggaran Pendapatan dan Belanja Nasional (<i>National Budget of Income and Expenditure</i>)
ASEAN	Association of Southeast Asian Nations
ASTM	American Society for Testing and Materials

B

BALAI BESAR	Regional Office of DGH
BAPEDALDA	Badan Pengelolaan dan Pengendalian Dampak Lingkungan Daerah (<i>Environmental Impact Management Agency</i>)
BAPPEDA	Badan Perencanaan Pembangunan Daerah (<i>Regional Planning and Development Agency</i>)
BAPPEDAL	Badan Pengendalian Dampak Lingkungan
BAPPENAS	Badan Perencanaan dan Pembangunan Nasional (<i>National Planning and Development Agency</i>)
B/C	Benefit/Cost Ratio
BINA MARGA	Directorate General of Highways
BKSPMM	Badan Kerja Sama Pembangunan Metropolitan Mamminasata

(Mamminasata Metropolitan Development Cooperation Body)

BMS	Bridge Management System
BOT	Built-Operate-Transfer
BP	Bypass
BPN	Badan Pertanahan Nasional <i>(National Land Agency)</i>
BPS	Badan Pusat Statistik <i>(Central Bureau of Statistics)</i>

C

CBD	Central Business District
CBR	California Bearing Ratio
CCC	Celebes Convention Center
CESA	Cumulative Equivalent Standard Axle

D

DAK	Dana Alokasi Khusus <i>(Special Allocation Fund)</i>
DAU	Dana Alokasi Umum <i>(General Allocation Fund)</i>
DCP	Dynamic Cone Penetrometer
DGH	Directorate General of Highways
DINAS	Regional Infrastructure Agency
PRASWIL	
DINAS PU	Dinas Pekerjaan Umum <i>(Regional Public Works)</i>

E

EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EIRTP	Eastern Indonesia Region Transportation Project
ESAL	Equivalent Standard Axle

F

FIRR	Financial Internal Rate of Return
FS or F/S	Feasibility Study

G

GDP	Gross Domestic Product
GMTDC	Gowa Makassar Takalar Development Center
GOI	Government of Indonesia
GOJ	Government of Japan
GRDP	Gross Regional Domestic Product

H

Ha	Hectare
HCM	Highway Capacity Manual
HRP	Hertasing Road Project

I

IBRD	International Bank for Reconstruction and Development
IC	Interchange
IEE	Initial Environment Examination
IHCM	Indonesian Highway Capacity Manual
IMF	International Monetary Fund
IRMS	Integrated Road Management System

J

JBIC	Japan Bank for International Cooperation
JC	Junction
Jembatan	Bridge
JICA	Japan International Cooperation Agency
JKT	Jakarta
JL	Jalan (Road / Street)

K

K A-ANDAL	Kerangka Acuan – ANDAL
KAB or Kab.	Kabupaten (Regency)
KANWIL	Kantor Wilayah (Regional Office)
KEC, or Kec.	Kecamatan (District)
KIROS	Kawasan Industri Maros (Maros Industrial Estate)

KIMA	Kawasan Industri Makassar (<i>Makassar Industrial Estate</i>)
KITA	Kawasan Industri Takalar (<i>Takalar Industrial Estate</i>)
KIWA	Kawasan Industri Gowa (<i>Gowa Industrial Estate</i>)

L

LRT	Light Rail Transit
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M

MB	Mamminasa Bypass
MBP	Mamminasa Bypass Project
MCA	Multi Criteria Analysis
MDGs	Millennium Development Goals
MOC	Ministry of Communication
MOT	Ministry of Transport
MoU	Memorandum of Understanding
MPW	Ministry of Public Works
MRR	Middle Ring Road
MRT	Mass Rapid Transit
MST	Muatan Sumbut Terbulat (Maximum Axle Load)
Mt.	Mountain (Gunung)

N

NPV	Net Present Value
-----	-------------------

O

OD	Origin/Development
O/D	Origin/Destination
ODA	Official Development Assistance
OR	Outer Ring

P

P2JJ	Perencanaan dan Pengawasan Jalan dan Jembatan (Design and Supervision Road/Bridge)
PC	Pre-stressed Concrete
PC	Public Consultation

PCC	Portland Cement Concrete
PCU	Passenger Car Unit
PDAM	Perusahaan Daerah Air Minum (Regional Water Supply Company)
PIU	Project Implementation Unit
PMU	Project Management Unit
PPP	Public Private Partnership
Pre-FS	Pre-feasibility Study
PRASWIL	Infrastructure Agency
PT	Perseroan Terbatas (<i>Company Limited</i>)
PU	Department of Public Works

Q

R

RC	Reinforced Concrete
Rd.	Road
RDS	Road Design System
RKL	Rencana Pengelolaan Lingkungan
RKP	Rencana Kerja Pemerintah (<i>Government Action Plan</i>)
ROW	Right of Way
RPJM	Rencana Pembangunan Jangka Menengah (<i>Mid-term Development Plan</i>)
RPJMN	Rencana Pembangunan Jangka Menengah Nasional (<i>Mid-term Nasional Development Plan</i>)
RPL	Rencana Pemantauan Lingkungan
Rp	Rupiah (Indonesian Currency)
RSP	Regional Spatial Plan

S

SITRAMP	The Study on Integrated Transportation Master Plan for Jabotabek
SPT	Standard Penetration Test

T

TEU	Twenty-foot Equivalent Unit
TOR/EIA	Terms of Reference EIA
TPA	Tempat Pembuangan Akhir (<i>Land Fill Site</i>)
TSMR	Trans-Sulawesi Mamminasata Road
TSMRP	Trans-Sulawesi Mamminasata Road Project
TTC	Travel Time Cost

U

UPTD	Unit Pelaksana Teknis Dinas (<i>Technical Implementor Unit Agency</i>)
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V

VAT	Value Added Tax
VDF	Vehicle Damage Factor
VOC	Vehicle Operation Cost

W, X, Y, Z

EXECUTIVE SUMMARY

(1) Background of the Study

Development of Eastern Indonesia (KTI) has been one of the priority policy of the GOI to reduce the disparity between Western Indonesia (KBI) and KTI. To support the regional development in KTI, strategic importance of infrastructure has been identified as one of the priority measures for linking different regions and for poverty reduction.

The GOI requested the GOJ to provide technical assistance in carrying out “The Study on Arterial Road Network Development Plan for Sulawesi Island and Feasibility Study on Priority Arterial Road Development for South Sulawesi Province”. In response to this request, the GOJ conducted the Study in line with “The Northeastern Indonesia Regional Development Program” and “The South Sulawesi Province Regional Development Program” undertaken by JICA.

The Study has been implemented with the following objectives:

- i) To formulate the Sulawesi Island Arterial Road Master Plan (Master Plan).
- ii) To prepare an action plan for implementation of the arterial road development.
- iii) To conduct Feasibility Study on Priority Arterial Roads in South Sulawesi Province.

(2) Sulawesi Island Arterial Road Master Plan

The target year of Master Plan is set as the year of 2024 covering 17 years in accordance with the new Law (No. 17 of 2007) of “National Long-term Development Plan in 2005-2025”, and time frame of master plan is as shown below:

Short-term Plan	; 2008 – 2014 (7 years)
Medium-term Plan	; 2015 – 2019 (5 years)
Long-term Plan	; 2020 – 2024 (5 years)

The study area for the Sulawesi Island arterial network development plan covers the entire Sulawesi Island which consists of six (6) provinces, that is, North Sulawesi Province, Gorontalo Province, Central Sulawesi Province, West Sulawesi Province, South Sulawesi Province and Southeast Sulawesi Province. The study covers all arterial roads (national road, provincial road and other important routes for economic and regional development).

(3) Regional Development Needs and Potential

As the spearhead of development in East Indonesia, the development of Sulawesi is expected to contribute to the total prosperity of Indonesia, especially since a balanced economic development throughout Indonesia as well as the urgent development of eastern Indonesia, specifically Maluku and Papua, is dependent on the success of Sulawesi’s development.

The items that are necessary to promote the regional development in Sulawesi Island are as shown

below:

- a. Enhancement of Processing Industries for Potential Agricultural Resources
- b. Improvement of Quality and Value of Cash Crops
- c. Paradigm Shift to Sustainable Development
- d. Environmental Protection and Conservation
- e. Development of Potential Resources

Table S.1 summarized the prospective industries for Sulawesi on the category-wise analysis of global market trends, global and domestic competitiveness of Sulawesi products and production capacity of Sulawesi

Table S.1 Prospective Industrialization in Sulawesi

Category of Industry	Prospective Product/Market	Prospective Source Area	Development Phase	
			Short Term	Med/Long Term
1) Agricultural Processing	Biodiesel fuel for domestic fuel consumption in Sulawesi.	Coconut production areas such as Manado, Makassar, Palu.	○	
	Food processing of cacao, copra, coffee, vanilla, clave, vegetable, cashew nuts, etc. for foreign markets, especially China.	<ul style="list-style-type: none"> • Processing and trading centers of agricultural and fishery products such as Manado, Makassar, Palu, and other provincial capitals. • Consolidated food processing centers (CFPC) are recommended. • Residual processing in CFPCs for animal feeds/organic fertilizers, etc. for domestic livestock industries 	○	○ (final Processing)
2) Livestock/Meat Processing/Animal Feed Processing	(Halal) meat for the Middle East market/Kalimantan, etc. Animal feeds from copra, maize, cassava, soybean, and fish residuals for domestic livestock breeders.		○	○ (final Processing)
3) Fishery and Marine Product Industry	New products such as Milkfish for the export/domestic market Promotion of processing of Tuna, Sea weeds, etc. for export		○	○ (final Processing)
4) Mining Industry	Development of oil and natural gas for export and domestic market. Enhancement of Nickel, Asphalt, Gold, etc. for export and domestic market	On-site production and primary processing in Southeast Sulawesi, etc.	○	
5) Construction Materials Industry	Gravel, stone, cement export to development areas in Kalimantan and Luwuk.	Central and South Sulawesi.	○	
6) Light Industry	Labor-intensive manufacturing such as wood materials, plywood, furniture, garment, shoes, etc. for export.	Processing and trading centers such as Manado, Makassar, Palu, and Kendari.	○	○ (final Processing)
7) Tourism Industry	Marine eco-tourism.	Manado and the remote islands of Wakatobi in Southeast Sulawesi and Bantaeng in South Sulawesi.	○	○

Source: JICA Study Team

(4) Development Strategies and Concepts

Based on the analysis of current conditions, potentials, and existing development plans, the development goals and strategies for an integrated regional development for Sulawesi Island were formulated and summarized.

1) Regional Development Goals

- | | |
|---------|---|
| Goal 1: | Development of Sulawesi as the Leading Island in East Indonesia as the Gateway to the Other Islands of Indonesia and Asian Countries, and |
| Goal 2: | Development of Environmentally Friendly Sulawesi with Poverty Reduction |

2) Regional Development Strategies

To attain the development goals, the following regional development strategies are proposed:

- Strategy 1: Economic growth through industrial development
- Strategy 2: Economic growth in activity centers
- Strategy 3: Alleviation of Social and Economic Disparities
- Strategy 4: Development of Sulawesi with due Consideration on Environment, and Safety for Disaster

3) Concept of Land-use Plan for Sulawesi in 2024

Figure S.1 shows the concept of land-use for Sulawesi Island in 2024, which has been developed taking into consideration Development of National/Regional Activity Centers, Enhance of Industrial Clusters and Development of Coordinated Transport System.

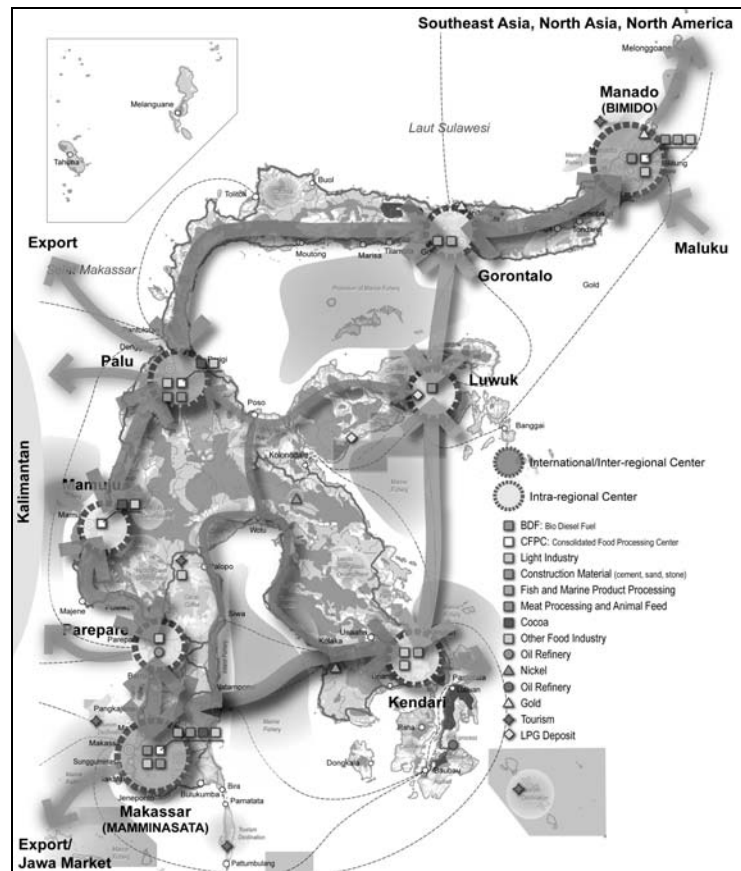


Figure S.1 Land-use Framework for Sulawesi Island in 2024

(5) Setting Socio-economic Frame

The forecasts were made based on the 2005 Inter census and covered for the period 2006 - 2025. The total population of Sulawesi is estimated to reach 19.7 million by 2024, increasing by approximately 4.0 million from the 15.7 million in 2005. The labor force in Sulawesi was forecasted to increase from 6.3 million to 9.8 million during 2005 - 2024, with an annual growth rate of 2.33%.

Long-term GRDP forecasts by regency was forecasted to increase from Rp. 73,089 billion in 2005 to Rp. 265,150 billion in 2024 with an annual average growth rate of 7.02% as shown in Table S.2.

Table S.2 GRDP by Agricultural and Nonagricultural Sectors

	2005 (billion Rp.)				2024 (billion Rp.)			
	Agri'l (A)	Nonagri'l (B)	Total (C)	A / C	Agri'l (A')	Nonagri'l (B')	Total (C')	A'/C'
North Sulawesi	2,778	9,967	12,745	21.80%	5,377	38,236	43,614	12.33%
Central Sulawesi	5,348	5,808	11,156	47.94%	14,507	31,852	46,359	31.29%
South Sulawesi	11,032	25,392	36,424	30.29%	22,771	103,903	126,674	17.98%
Southeast Sulawesi	2,798	4,682	7,480	37.41%	8,024	21,228	29,252	27.43%
Gorontalo	624	1,401	2,025	30.83%	1,431	6,008	7,439	19.24%
West Sulawesi	1,727	1,532	3,259	52.99%	3,546	8,267	11,813	30.02%
Sulawesi Total	24,307	48,782	73,089	33.26%	55,656	209,494	265,150	20.99%

Source: JICA Study Team

(6) Direction of Transport Network Development

Prior to the formulation of road development plan for Sulawesi, existing national transport development plans were reviewed. The basic directions and policies stated there form an integral part of the road network development plan to be proposed in this study.

Based on the existing transport development plans described above and various analyses conducted earlier, the following directions have been identified to establish an integrated transport network for the entire island of Sulawesi:

- (1) International linkage proposed in the concept of BIMP-EAGA should be strengthened
- (2) Road network should be developed focusing widening, rehabilitation, maintenance and some new projects with strategic importance
- (3) Energy-saving marine transport should be effectively incorporated in the road network
- (4) Long- and medium-distance passenger travel by air will grow in the light of lowering airfares and airport development should be promoted
- (5) Railway development should be better be studied in the future when inter-city road capacity has been reached

(7) Development Policy for Sulawesi Road Master Plan

The Study team established road development policies in order to formulate the road master plan taking into consideration existing road conditions, regional economic development strategy and transport development policy as shown below:

Table S.3 Road Development Policy to be applied for Road Master Plan

Development Goal	Regional Development Strategy	Road Development Policy
[Goal 1] Development of Sulawesi as the Leading Island in East Indonesia and as the Gateway to other Asian Countries	[Strategy 1] Effective Economic Growth by Strengthening Inter-regional Linkages not only in Sulawesi but also with other Asian Countries [Strategy 2] Economic Growth through Development of Processing Industry on the Basis of Potential Resources of Sulawesi	[Policy 1] Strengthening inter-regional transport network of six provinces in Sulawesi [Policy 2] Accommodation of increasing large traffic volume and heavy vehicle [Policy 3] Improvement of accessibility to the potential resources areas
[Goal 2] Development of Sulawesi as an Environmentally Friendly Island with Poverty Reduction	[Strategy 3] Alleviation of Social and Economic Disparities in Rural Area by Strengthening Public Administration Services through Integration of Priority Regional Center and Cities [Strategy 4] Development of Sulawesi with due Consideration on Environment, Safety and Human Resources	[Policy 4] Strengthening the road network in rural area and isolated island [Policy 5] Reduction of environmental load in transport sector [Policy 6] Enhancement of Traffic Safety and Capacity of Suburban Arterial Roads [Policy 7] Development of road network paying due consideration on environment [Policy 8] Strengthening the road management including maintenance system

(8) Staged Application of New Road Standard Regulation

The Study team prepared the proposal on “Stage-wised Road Development of Standard 7m Travel-way Specified in New Road Regulation (PP Mo 34 Year 2006) for Arterial Road and Collector Roads in Sulawesi Island” and submitted it to the Bina Marga as the Discussion Paper on October 5, 2007, for this study

Figure S.4 shows the proposed stage-wised application on new road standard by type of existing road width, road classification and proposed improvement measures based on the present and future traffic demands and the following is the summary of recommendations:

- * Primary arterial roads should be widened to the standard 7.0m travel-way by the target year of 2024
- * Primary collector roads should be widened to 7.0m by stages based on the present and future traffic demand.

Periodic and routine maintenance should be given the first priority to sustain the national and provincial road assets.

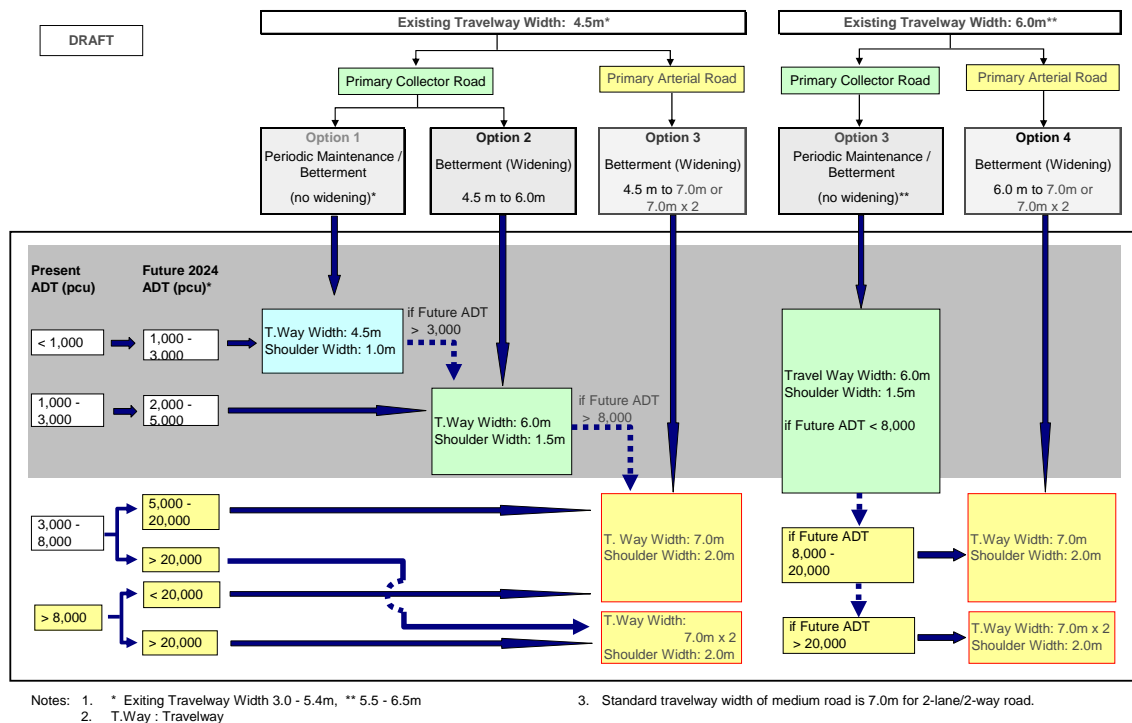


Figure S.3 Proposed Stage-wise Application on New Road Standard

(9) Traffic Demand Forecast

All vehicle trips will be about more than 1.5 times in year 2024 as compared to the present, however, vehicle trips in cities will be growing more quickly up to about 2 times in the future, since usually intra zonal trips increase more quickly.

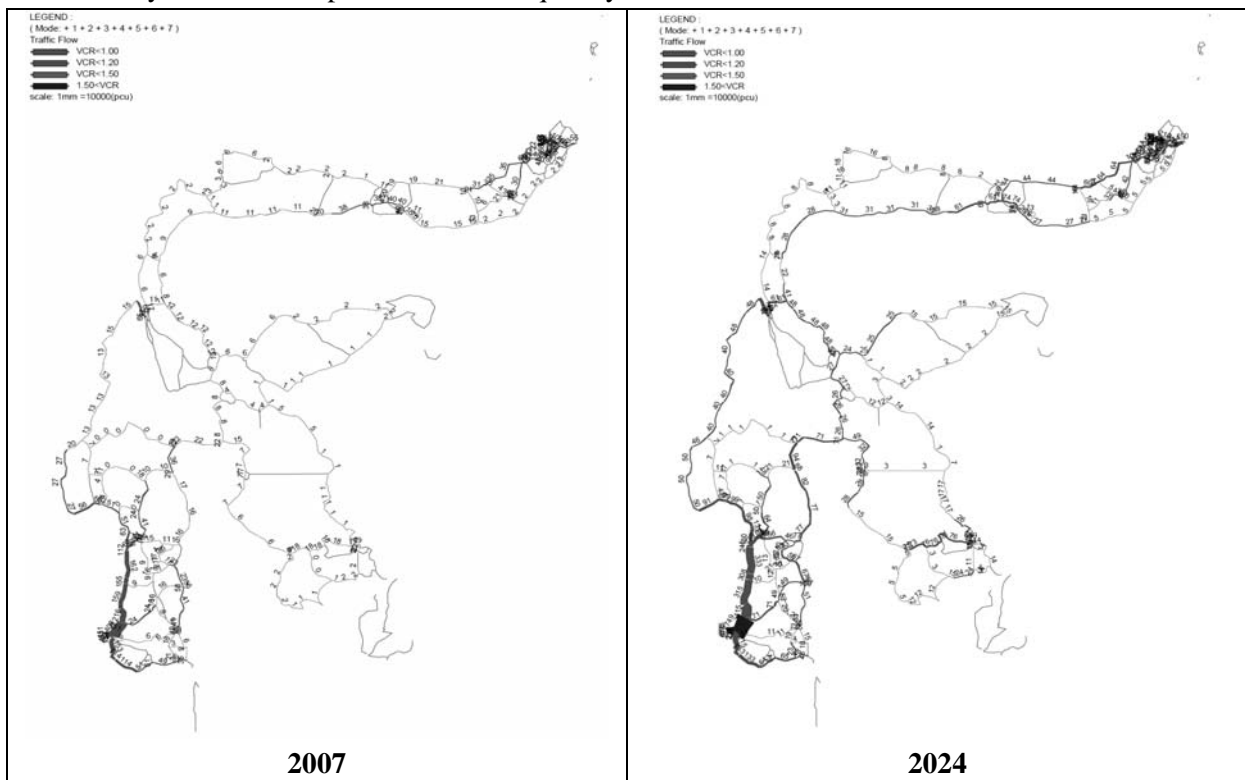


Figure 9.3 Result of Traffic Assignment (“Do-all” Case with 19 Projects)

(10) Sulawesi Road Master Plan in 2024

The Study team examined the road improvement plan taking into account the necessity on up-grading of road classification, needs of capacity expansion and needs of pavement improvement based on the existing road and traffic conditions. Improvement measures are consisted of three categories, namely, new road construction, betterment and periodic and routine maintenance.

Sulawesi Road Master Plan in 2024 has been formulated based on the development concept as shown in Table S.4 and illustrated in Figure S.4. Upon completion of the road network system in 2024, following benefits would be expected;

- i) Harmonized Economic development in Sulawesi would be expected by strengthening of economic linkage between six provinces through completion of Trans Sulawesi Road with a high standard of all weather road condition.
- ii) Improvement of basic human needs as well as poverty alleviation would be expected in rural areas and isolated islands through strengthening road network system by completion of missing roads.
- iii) Development of processing industries utilizing potential resources in Sulawesi would be expected by increasing accessibility to the potential areas.
- iv) Natural environment and isolated culture community would be properly protected by road development with due consideration of environment.
- v) Increase of environmental load in Sulawesi would be minimized through incorporation of energy-saving transport ferry service in the road network system and strengthening the nautical highway network.

Table S.4 Development Concept of Sulawesi Road Master Plan

Road Classification		Road Structure		Development Concept of Sulawesi Road Master Plan	
		Nos. of Lane	Pavement Width		
I	Nationa Road	Arterial Road	2 lanes 7.0 m	All arterial national road become 7.0m road regardless of traffic volume and will be improved to be all weather condition with sufficient capacity and standard	
		Collector Road (K-1)	2 lanes	6.0m – 7.0 m	The road carrying the traffic more than 3,000 p.c.u/day – 8,000 p.c.u/day become 6.0 m road and the road more than 8,000 p.c.u/day become 7.0m road
			1.5 lanes	4.5m (3.5m–5.4m)	The road carrying the traffic less than 3,000 p.c.u/day will be the 1.5 lanes road but improved to be all weather condition road with asphaltic concrete
II	Provincial Road	Collector Road (K-2&3)	2 lanes	6.0m – 7.0 m	Same as Collector K-1 Road
			1.5 lanes	4.5m (3.5m–5.4m)	Same as Collector K-1 Road

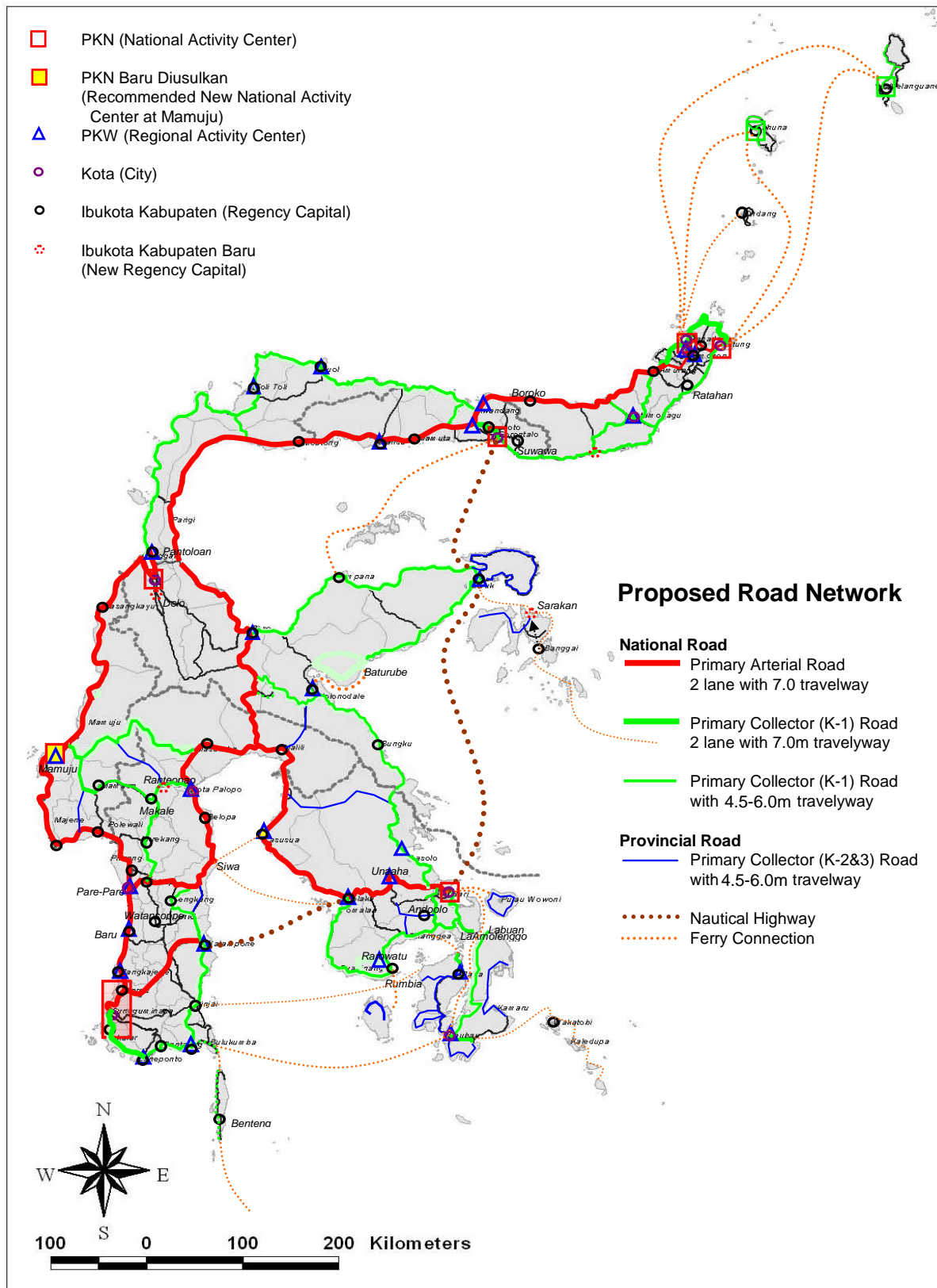


Figure S.4 Sulawesi Road Master Plan in 2024 (SRMP)

(11) Implementation Plan

To establish the realistic and effective implementation plan, the following concept was applied:

- (i) Completion of on-going project in the short-term
- (ii) Implementation of “Urgent Bridge Repair Program” in the short-term plan
- (iii) Allocation of the project in accordance with priority order

The Study team prepared the road investment plans with the three alternatives as follows:

- Case 1: Equal Investment Plan (Development cost is allocated equally in the short-term, medium-term and long-term)
- Case 2: Intermediate Investment Plan between Case 1 and Case 3
- Case 3: Early Investment Plan (60% of development cost is allocated positively in the short-term plan)

The maintenance cost is allocated into the short-term (20%), medium-term (30%) and long-term (50%) taking into consideration the progress of road improvement work by new construction and betterment. The above distribution pattern of maintenance cost applied to all cases in the same way. The Study team recommends that Case 3 as the most realistic and effective investment plan for the master plan taking into account that the investment cost and budget is balanced in all period as shown in Table S.5.

Table S.5 Proposed Investment Allocation and Financing Plan
 (Case 3: Early Investment Plan)

(1) Proposed Investment Allocation Plan US\$1.0 = Rp. 9,322, Rp. 1.0 = ¥ 0.013

Improvement measures	Total Project Cost				Short-term (2008-2014)		Medium-term (2015-2019)		Long-term (2020-2024)		Remarks				
	Arterial Road	Collector Road	Total	Amount	Length	Amount	Length	Amount	Length	Amount					
	(km)	(km)	(km)	Rp Billion	(km)	(%)	Rp Billion	(km)	(%)	Rp Billion		(km)	(%)	Rp Billion	
A. National Road (Arterial road + Collector (K-1) road)															
Development Cost	3,123	2,946	6,069	13,644	3,641	60%	8,402	1,821	30%	3,878	607	10%	1,364	Rp.431Billion of Urgent Bridge Repair on National Road (345Nos or 6,000m) is included in the short-term plan	
Periodic and Routine Maintenance Costs	3,256	4,885	8,141	10,127	1,628	20%	2,025	2,442	30%	3,038	4,071	50%	5,064		Urgent overlay of pavement (675km) is required in the short-term
Total A				23,771	5,270		10,428			6,916			6,428		
B. Provincial Road (Collector road K-2 & K-3)															
Development Cost	0	2,342	2,342	5,249	1,405	60%	3,376	703	30%	1,348	234	10%	529	Rp.431Billion of Urgent Bridge Repair on Provincial Road (397Nos or 6,500m) is included in the short-term plan	
Periodic and Routine Maintenance Costs	0	4,785	4,785	6,179	957	20%	1,236	1,436	30%	1,854	2,393	50%	3,090	Urgent overlay of pavement (982km) is required in the short-term	
Total B	0	7,127	7,127	11,428	2,362		4,612			3,201			3,614		
Total A+B				35,199			15,040			10,117			10,042		

(2) Prospect of Road Budget

	Expected Budget	Short-term (2008-2014)		Medium-term (2015-2020)		Long-term (2020-2024)		Remarks
		Total Amount		Total Amount		Total Amount		
A. National Road	Development Budget	15,968	8,631	4,316	3,021			
	Difference (surplus / ▲shortage)		229	438	1,657			
	Maintenance Budget	14,926	4,760	4,420	5,746			
	Difference (surplus / ▲shortage)		2,735	1,382	683			
	Total (A)	30,894	13,391	8,736	8,767			
Difference (surplus / ▲shortage)		2,963	1,820	2,339				
B. Provincial Road	Development Budget	2,396	1,295	648	453			
	Difference (surplus / ▲shortage)		▲ 2,081	▲ 700	▲ 72			
	Maintenance Budget	2,107	672	624	811			
	Difference (surplus / ▲shortage)		▲ 564	▲ 1,230	▲ 2,279			
	Total (B)	4,503	1,967	1,272	1,264			
Difference (surplus / ▲shortage)		▲ 2,645	▲ 1,929	▲ 2,350				
Total A+B	35,397	15,358	10,008	10,031				
Difference (surplus / ▲shortage)	198	318	▲ 109	▲ 11				

Implementation plan of Proposed Project in Road Master Plan is developed based on the above concept and cost allocation plan as shown in Figure S.5.

Figure S.5 Summary of Proposed Implementation Plan

Project	Package No.	Location	Priority by EIRR	Length km	Const. Cost (Rp.Billion)	Implementation Schedule (Rp.Billion)																				
						Short-term					Medium-term					Long-term										
						2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024				
0) Road Development Project																										
I. Proposed Project																										
TS-1	TS Main Corridor (West south Corridor) including connected provincial roads	TS-1-1	Jeneponto – Makassar – Parepare	1	658	2,742	(AusAID, APBN included)																			
		TS-1-2	Parepare – Mamuju	4	692	1,111																				
		TS-1-3	Mamuju – Palu	12	387	890	(WB)																			
	Crossing Road	TS-1-4	Maros – Bajoe	5	144	157																				
		TS-1-5	Parepare – Palopo	6	290	414																				
		TS-1-6	Wonomulyo – Kaluku	3	200	372	(APBN included)																			
TS-2	TS Main Corridor (West-North section) including connected provincial roads	TS-2-1	Palu – Kwandang	7	1,019	465																				
		TS-2-2	Kwangdang – Manado – Bitung	8	1,399	2,109	(APBN included)																			
	Crossing Road	TS-2-3	Molibagu – Worotican	14	184	331																				
TS-3	TS Main Corridor (Central south section) including connected provincial roads	TS-3-1	Jeneponto – Watampone – Wotu	2	1,452	1,892	(Aus AID included)																			
		TS-3-2	Wetu – Peso – Toboli	17	1,069	1,346	(WB)																			
TS-4	TS Main Corridor (Central north section) including connected provincial roads	TS-4-1	Toboli – Gorontalo	10	973	1,785																				
		TS-4-2	Gorontalo – Bitung	9	893	1,052	(AusAID, APBN)																			
	Crossing Road	TS-4-3	Wotu – Kolaka	15	435	972																				
TS-5	TS Main Corridor (East Corridor) including connected provincial roads	TS-5-1	Kolaka – Tinanggea – Kendari	18	1,060	902	(AusAID/APBN)																			
		TS-5-2	Kendari – Tondoyondo	16	373	547	(AusAID)																			
		TS-5-3	Tondoyondo – Luwuk – Poso	13	1,235	709																				
	Crossing Road	TS-5-4	Kolaka – Kendari	11	312	440	(WB)																			
		TS-5-5	Landawe – Tolala	19	150	860																				
		TS-5-6																								
2. On-going or omitted projects in the Short-term Plan																										
EINRIP by AusAID, EIRTP by WB																										
Other Road Improvement by APBN Multi Year Contract (2007 – 2009)																										
Manado Bypass, Gorontalo Bypass and other Priority Roads																										
3. Recommended priority projects proposed in the Master Plan																										
Urgent Bridge Repair Program (Repair of Bridges in Grade 4, Grade 5 and Wooden Bridges)																										
Priority Roads Projects proposed in this Master Plan Study (Expected finance: Yen Loan, APBN, APBD and others)																										
Trans Sulawesi Mamminasata Maros – Takalar Section (Expected finance: Yen Loan, APBN and others)																										
Priority urban roads in Mamminasata including Hortasening Road, Abdullah Daeng Sirua Road, Mamminasata Bypass, Tg Bunga-Takalar Road and other important roads																										
Bridge Reconstruction Projects in Southeast Sulawesi Province and others																										
Total Road Development Cost (I)				12,925	18,894		1,689	2,231	1,821	1,789	1,581	1,344	1,322	1,146	1,206	1,213	964	698	436	491	302	330	330			
II. Road Maintenance*																										
Urgent Pavement Repair Program (Repair of Pavement in Class III and Class IV)																										
Routine and Periodic Maintenance																										
Total Road Maintenance Cost (II)				12,925	16,305		300	350	450	500	511	550	600	750	900	1,000	1,100	1,140	1,250	1,400	1,650	1,800	2,054			
Grand Total (I)+(II)				12,925	35,199		1,989	2,581	2,271	2,289	2,092	1,894	1,922	1,896	2,106	2,213	2,064	1,838	1,686	1,891	1,952	2,130	2,384			
							11,778					5,227					1,889									
							3,261					4,890					8,154									
							15,039					10,117					10,043									

Notes 1: * Bad conditioned road links (Class IV) will be given higher priority under the road maintenance programs irrespective of EIRR.
 2: * Road maintenance program could be changed to betterment program at the time of detailed project planning under IRMS by reviewing the validation of each road link on both economical, technical and other aspects.
 Source: JICA Study Team

As a result of economic analysis for implementing Case 3, it was recognized that the project is economically feasible and viable with a high economic EIRR at 21.5%, a B/C ratio at 1.58 and an NPV at Rp. 6,475 Billion.

(12) Environmental Consideration

As the result of the multi-criteria analysis under the Strategic Environmental Assessment (SEA), the road network improvement including the ferry transport “Option 3” was selected as the best solution for the Master Plan.

“Option 3” focused on the improvement of road network together with the improvement of accessibility through marine transport, therefore, it is more environmentally friendly than “Option 2” which was focused the road network development only.

(13) Recommendations

1) Regional Development

It is recommended that the industrial development should focus on the agro-processing industries in order to enhance value added in Sulawesi and secure employments especially for the younger generations who would flow out from the rural villages in the course of the planned period. Trade should also be promoted more aggressively for exports of processed products, particularly to the ASEAN and BRIC countries. Transfer trade and inter-regional trade should also be promoted as a center for development of Eastern Indonesia.

For regional development as well as for industrial and trade development, clusters should be formed not only at the provincial level but also at the regional and island levels. Special attention should be paid to the BDF clusters, as they would promote linkages among the agricultural and industrial sectors as well as contribute to the reduction of pollutant emission that would otherwise increase in Sulawesi.

It is also recommended that the proposed regional development would be implemented together with capacity development, inclusive of institutional building.

2) Transport Development

The international linkage proposed in the concept of BIMP-EAGA should be strengthened by improving air and shipping services between northern Sulawesi (Manado and Gorontalo) and Mindanao (Davao and General Santos) of the Philippines. The arterial road network of Sulawesi should be considered as an integral part of the global transport network such as Asian/ASEAN Highways in the future.

Energy-saving maritime transport should be effectively incorporated in the road network considering the long winding coastlines. Port facilities should be improved together with the feeder roads to/from the ports. In addition, an inter-peninsula nautical highway using high-speed low-cost RoRo ships should be developed.

Long- and medium-distance passenger travel by air will grow rapidly in the light of lowering airfares due to the proliferation of LCCs (low-cost carriers), therefore, airport development should be promoted as proposed in the National Spatial Plan.

There are some railway projects proposed for Sulawesi, however, the estimated traffic demand for these railways is generally small, and their financial viability is quite doubtful in the absence of financial analyses in past studies. Since inter-city roads have enough capacity at present to absorb increasing traffic demand, the implementation of railway projects should better be studied in the future when road capacity has been reached.

3) Road Development and Sulawesi Road Master Plan

It is advised that the feasibility of each project in terms of EIRR, B/C etc. should be evaluated again to justify the project viability at the time when the project is implemented.

Overloaded vehicle is one of the critical issues which will shorten the pavement life significantly, therefore, in addition to the ordinary improvement measures, the Study team recommends introducing a computer-assisted system at weighing stations.

Insufficient budget is still the most critical issue for both provincial and regency roads. In order to overcome the shortage of road budget, the road fund is one of the instruments that generally become the main source of finance for road maintenance and other road expenditures. Some of the road fund could be used for road safety, overload control and others, including road asset management activities.

The Study team recommends the early implementation of “Trans Sulawesi Mamminasata Road (Maros-Takaral)” since the project was confirmed to be economically feasible with a high economic internal rate of return and Environmental Impact Assessment was already completed in accordance with the JBIC guideline.

Since the collapse of a bridge and deteriorated pavement on major roads would have an adverse impact on local socio-economic activities, it is recommended that these bridges which are identified as the condition of Grade III “Poor”, Grade IV “Bad” and Grade V “Impassable” including wooden bridge and deteriorated pavement (Class III “Poor” or Class IV “Bad”) should be improved in the short-term plan and reconstructed as urgent rehabilitation measures in the short-term plan.

Integrated road projects and programs should be implemented for national, provincial and local roads for attaining synergy effects on regional development. The program should include capacity development in management, planning, execution and maintenance.

The development and use of natural asphalt (Asbuton) will make contribution to both national and regional economy. The central government should make an appropriate policy on use of Asbuton to assure the domestic demand, especially for road pavement material, and laws for inducing foreign investments as Asbuton refinery project.

In order to realize the projects proposed in the master plan, the Study team recommends that the Indonesian government should take an appropriate action to arrange the financial assistance of Japan and/or other donor agencies in addition to an Indonesian budget.

SUMMARY OF THE STUDY ON ARTERIAL ROAD NETWORK DEVELOPMENT PLAN FOR SULAWESI ISLAND

CHAPTER 1 INTRODUCTION

(1) Background

In Indonesia, the quality of life and social welfare has been significantly improved due to the recent development policies, while regional disparity has appeared as a new issue. Particularly between Western Indonesia (KBI) and Eastern Indonesia (KTI), the disparity is quickly getting serious being one of the major issues for the Government of the Republic of Indonesia (hereinafter referred to as “GOI”) to tackle. The development of KTI has been advocated in the past National Development Plans and also in the new National Mid-Term Development Plan 2005-2009. To support the regional development in KTI, strategic importance of infrastructure has been identified as one of the priority measures for linking different regions and for poverty reduction.

For entire Sulawesi, a master plan for arterial road development is needed to support the sustainable economic development of the island. The plan should include an investment plan with a balance between new construction and maintenance of existing facilities considering the limited resources, and efficient and effective policies for transport network development.

Addressing to the above, the Government of the Republic of Indonesia (hereinafter referred to as “GOI”) requested the Government of Japan (hereinafter referred to as “GOJ”) to provide technical assistance in carrying out “The Study on Arterial Road Network Development Plan for Sulawesi Island and Feasibility Study on Priority Arterial Road Development for South Sulawesi Province” (herein after referred to as the “Study”). In response to this request, the GOJ decided to conduct the Study and entrusted its execution to the Japan International Cooperation Agency (hereinafter referred to as “JICA”), the official agency responsible for the implementation of technical cooperation programs of the GOJ. JICA dispatched a Study Team (hereinafter referred to as the “JICA Study Team”) in December 2006 to conduct the Study in close cooperation with the relevant authorities from the GOI.

(2) Study Objectives

The major objectives of the Study are:

- i) To formulate the Sulawesi Island arterial road master plan.
- ii) To prepare an action plan for implementation of the arterial road development.
- iii) To conduct Feasibility Study on Priority Arterial Roads in South Sulawesi Province.

The Study should be conducted in accordance with the objectives of “Northeastern Indonesia Regional Development Program” and “The South Sulawesi Province Regional Development Program” undertaken by JICA. In particular, the Study is expected to contribute to the acceleration

of economic and social development (poverty reduction) in the region.

(3) Target Year of Master Plan

The Study team proposes the new target year of Master Plan in 2024 covering 17 years in accordance with the new Law (No. 17 of 2007) of "National Long-term Development Plan in 2005-2025", instead of the target year in 2023 based on the Sulawesi Island Spatial Plan.

New time frame of master plan study is as shown below:

Short-term Plan	; 2008 – 2014 (7 years)
Medium-term Plan	; 2015 – 2019 (5 years)
Long-term Plan	; 2020 – 2024 (5 years)

(4) Study Area

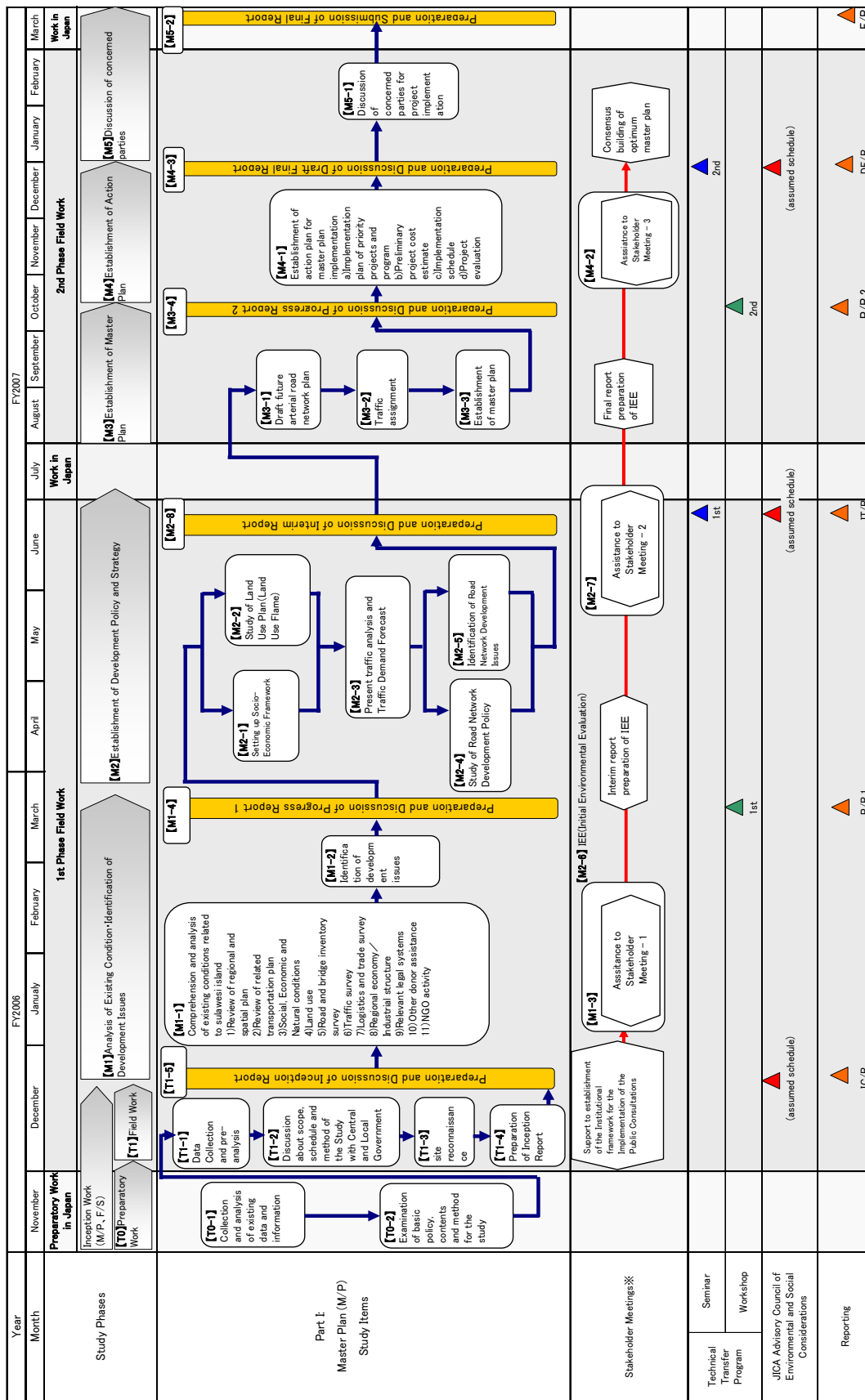
The study area for the Sulawesi Island arterial network development plan covers the entire Sulawesi Island which consists of the following six (6) provinces:

- North Sulawesi Province.
- Gorontalo Province.
- Central Sulawesi Province.
- West Sulawesi Province.
- South Sulawesi Province.
- Southeast Sulawesi Province.

The study area covers all arterial roads (national roads and other important routes for economic and regional development).

(5) Study Method

The master plan study on arterial road network development was conducted in accordance with the work flow chart of Figure 1.1.



Note: **Subject to change based on discussion and clarification with Directorate General of Highways and other concerned agencies.

Figure 1.1 Detailed Study Flow of the Master Plan

CHAPTER 2 PRESENT CONDITION OF THE STUDY AREA

(1) Natural Conditions

Geographical Conditions of Sulawesi

Sulawesi Island, previously known as Celebes (its old Portuguese name), lies in the middle of the Malay archipelago between Kalimantan and Maluku. It shares a common border with the Philippines to the north. Sulawesi, which covers a total land area of 174,600 km², is the world's eleventh-largest island and is Indonesia's fourth-largest island.

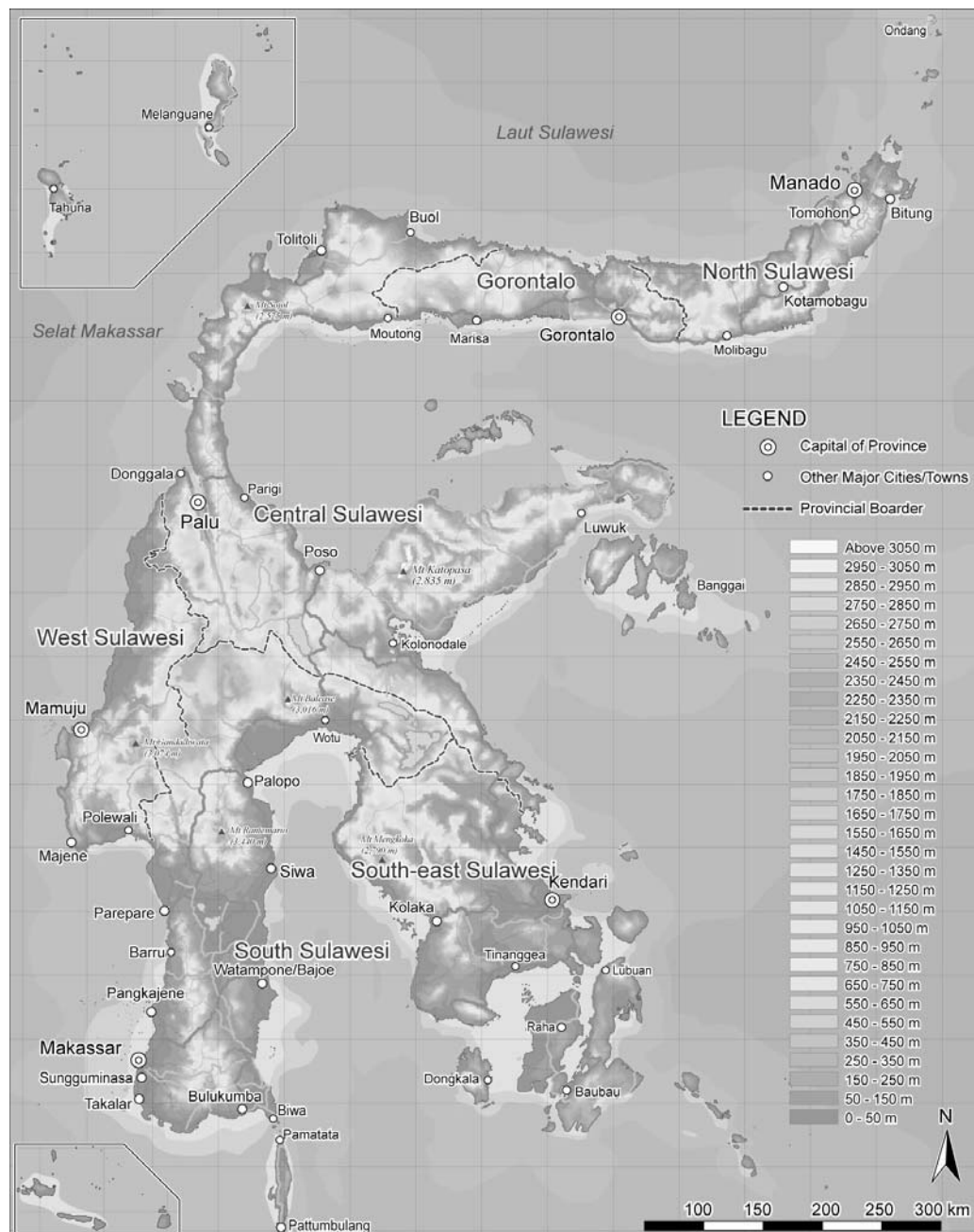


Figure 2.1 Topographic Map of Sulawesi Island

Climate and Meteorological Conditions

Generally, Sulawesi has sufficient rainfall for practicing agriculture. Particularly, the Maminasata area, Manado, as well as the mountainous region in Central Sulawesi have ample rainfall at more than 2,500 mm per annum as shown in Figure 2.2.

On the other hand, Gorontalo, Palu, Kendari, Majene, Luwuk, and their surrounding areas receive lower rainfall (annual rainfall is less than 1,600 mm). Particularly, the coastal region around Palu with an annual sum of precipitation of only 600 mm belongs to the driest regions of Indonesia.

Present Land Uses

Figure 2.3 shows land-use patterns in Sulawesi Island. Around 53% of the land area in Sulawesi is covered with forest. Land for settlements and agriculture (including rice fields, plantations, and dry land farming) accounts for 0.4% and 26.1% of the total land area respectively.

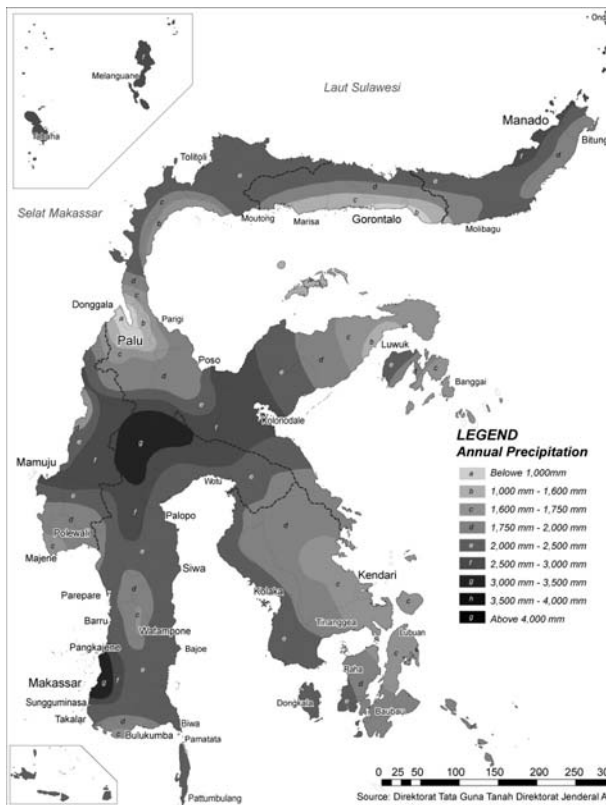


Figure 2.2 Distribution of Annual Rainfall

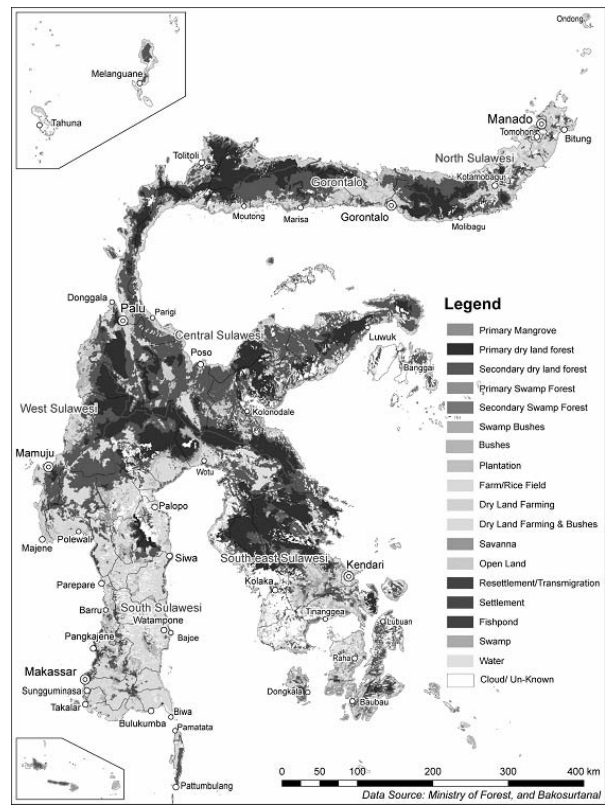


Figure 2.3 Land Uses in Sulawesi Island

(2) Socio-Economic Condition

Population

In 2005, the population of Sulawesi was 15,981,056, which is about 7.30% of Indonesia's total population. Population density in the island was 81.2 /km², lower than the national average of 115.8 /km² and higher than the outer-island¹ average of 51.3 /km². Makassar is the biggest city in Sulawesi with a population of 1,195 thousand, followed by Manado with 406 thousand, Palu with 291 thousand, Kendari with 236 thousand, Gorontalo with 153 thousand, and Palopo with 129 thousand.

While population density was particularly higher in the southern part of South Sulawesi and the eastern part of North Sulawesi, it was lower in Central Sulawesi and Gorontalo. Makassar City had the highest population density with 7,749/km², followed by Gorontalo City with 2,557/km² and Manado City with 2,440/km².

Labor Force and Unemployment

Figure 2.4 shows the composition of the labor force by type of industry in 2005. Primary industries include agriculture, plantation, fishery, livestock and forestry which substantially contribute in absorbing the labor force in Indonesia and in Sulawesi. Except for North Sulawesi, the primary sector absorbed more than half of the local labor force. The percentage of labor engaged in the primary sector was higher in West Sulawesi (75.1%), Central Sulawesi (65.4%), and Southeast Sulawesi (62.8%). In North Sulawesi, 44.2% of labor were absorbed by the tertiary sector.

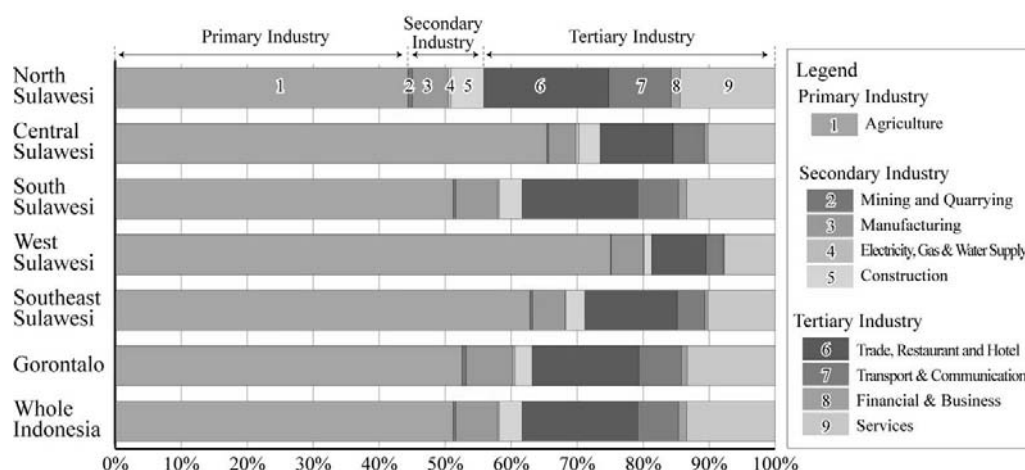


Figure 2.4 Sectoral Composition of Labor Force by Province

As of February 2006, unemployment ratios in North Sulawesi (13.7%) and South Sulawesi (12.3%) were higher than the national average (10.5%). On the other hand, Gorontalo (9.8%), Central Sulawesi (8.9%), Southeast Sulawesi (7.4%), and West Sulawesi (4.6%) had lower unemployment ratios.

¹ In this Study, outer islands refer to other islands except Java and Bali.

Distribution of Poverty

According to the National Socio-economic Survey (Survei Sosial Ekonomi Nasional, hereafter called Susenas) as sampled and compiled by the Bureau of Central Statistics (BPS), the poverty ratio in Sulawesi was 18.9% in 2002, almost similar to the national average (18.2%) for the same year.

Figure 2.5 shows the poverty ratios in Central Sulawesi, Gorontalo, southern West Sulawesi, and Southeast Sulawesi as higher than in other areas. Particularly, the poverty ratio in Gorontalo (29.7% on average) was the highest among the provinces in Sulawesi. The poverty ratio in North Sulawesi (11.2% on average) and South Sulawesi (14.7%) was lower than the national average.

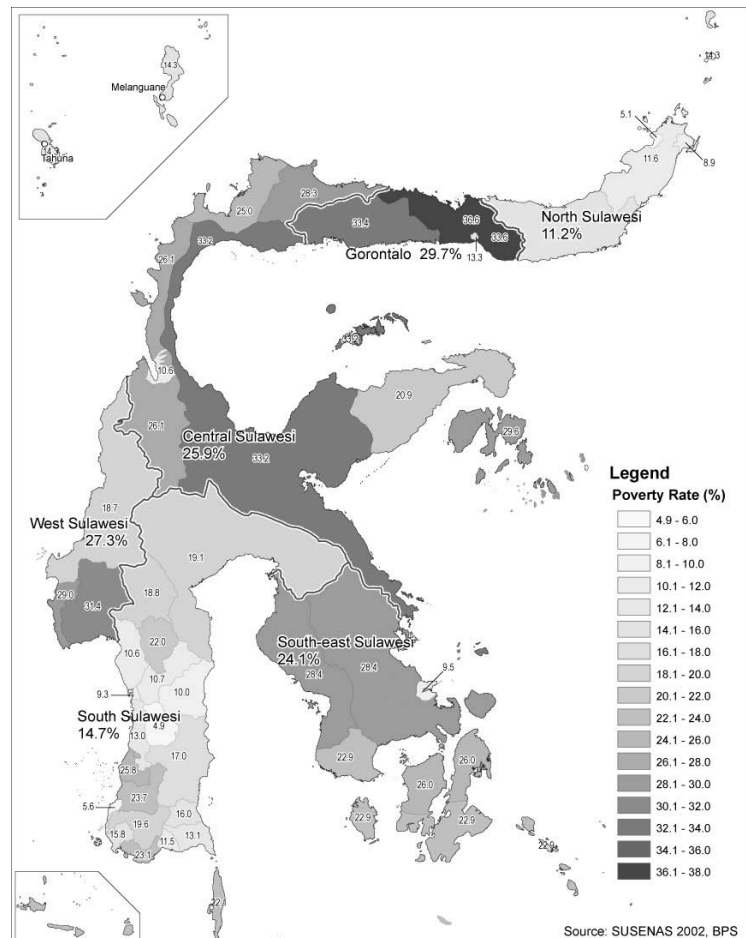


Figure 2.5 Poverty Rate in Sulawesi, 2002

Regional Economy and Industrial Structure

In 2005, total GRDP in the island was Rp. 73,089 billion (in constant prices since 2000) contributing only 4.2% to the country's GDP (Rp. 1,749,546 billion) while its population accounted for 7.30% of Indonesia's total population. Agriculture (including plantations, fishery, forestry, and livestock) plays a vital role in the economy of Sulawesi, contributing 9.7% to the national total for agriculture. On the other hand, manufacturing and financial/business respectively account for only 1.6% and 2.6% of the national total for these sectors.

Figure 2.6 illustrates the amount of GRDP for each province and its proportion. The size of the diameter indicates the amount of GRDP. As shown in the figure, the GRDP of South Sulawesi is the most outstanding in Sulawesi. Its GRDP solely accounted for more than half (57.8%) of the total GRDP of Sulawesi. North Sulawesi had 16.8%, Central Sulawesi 14.36%, and Southeast Sulawesi 10.3%. On the other hand, West Sulawesi and Gorontalo shared only 4.2% and 2.6% of the island's GRDP, respectively.

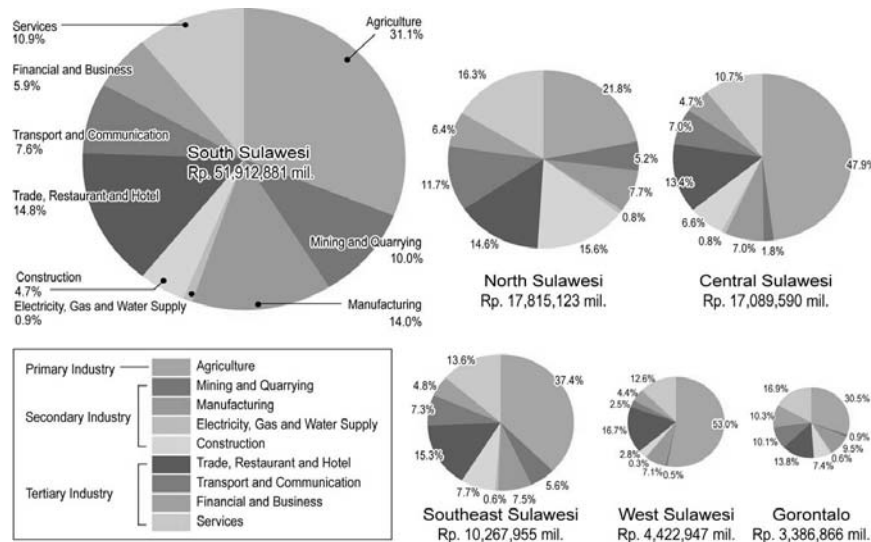


Figure 2.6 GRDP of Sulawesi by Province, 2005 Current Prices

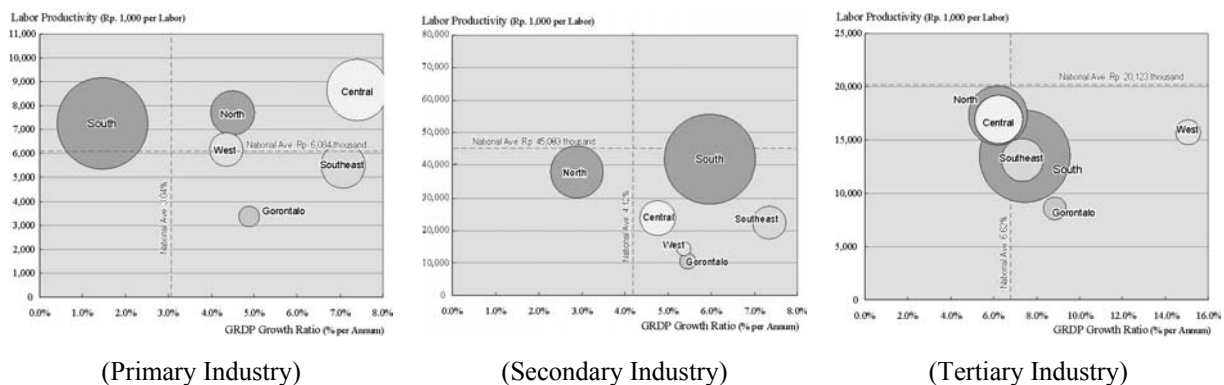
Per-capita GRDP

In 2005, the per-capita GRDP of the island (US\$ 593.6) was about 60% of the national average (US\$ 1,026.9). North Sulawesi had the highest per-capita GRDP (US\$ 718.9), next was South Sulawesi (US\$ 631.7), and Central Sulawesi (US\$ 625.5). On the other hand, Gorontalo had the lowest at US\$ 298.1 or less than a third of the national average.

GRDP Growth Ratio and Labor Productivity

Figures 2.7 compare the GRDP growth ratio during the period 2001- 2005 (x-axis), the labor productivity in 2005 (y-axis) among the 6 provinces in Sulawesi and the Indonesian average. As shown in these figures, the GRDP growth ratio in Sulawesi was generally higher than the national average. In terms of labor productivity, the primary sector's growth ratio was higher than the national ratio, but that of the secondary and tertiary sectors were lower.

In the case of Gorontalo, not only the size of economy but also labor productivity was clearly smaller than those of the other provinces.



(Primary Industry) (Secondary Industry) (Tertiary Industry)
Figure 2.7 Economic Performance by Sector

(3) Existing Development Plans

Prior to the formulation of the development strategies, existing national and regional development plans were reviewed. At the same time, development potentials were also assessed.

The National Spatial Plan (RTRWN)

The National Spatial Plan (RTRWN) is prepared by the National Spatial Planning Coordination Board, which prepared the plan in 2007 in accordance with Law No. 24 in 1992 and No. 26 in 2007 regarding spatial management, so as to give a sense of direction to national development investments, making it the grand spatial template of the national development program.

RTRWN specified important cities in the country into following three hierarchical levels;

- 1) National Activity Centers (PKN),
- 2) Regional Activity Centers (PKW), and
- 3) National Strategic Activity Centers (PKSN)

In Sulawesi, the plan selected 5 national activity centers (PKN), 24 regional activity centers (PKW), and 2 national strategic activity centers (PKSN) as shown in Table 2.1.

Table 2.1 Urban Systems of the Sulawesi Island

PROVINCE	PKN	PKW		PKSN
North Sulawesi	-Urban Area of Manado Bitung (I/C/1)	-Tomohon (I/C/1) -Tondano (III/C/1)	-Kotamobagu (II/C/1)	-Melonguane (I/A/2) -Tahuna (I/A/2)
Central Sulawesi	-Palu (I/C/1)	-Poso (II/C/3) -Luwuk (II/C/1) -Buol (III/C/1)	-Kolonedale (II/C/1) -Tolitoli (III/C/1) -Donggala (II/C/1)	
South Sulawesi	-Mamminisata Metropolitan Area (Makassa- Sungguminasa- Takalar- Maros) (I/C/3)	-Pangkajene (II/C/1) -Jeneponto (I/C/1) -Palopo (I/C/1) -Watampone (II/C/1)	-Bulukumba (I/C/1) -Barru (III/C/1) -Pare-pare (II/C/1)	
Southeast Sulawesi	-Kendari (I/C/1)	-Unaaha (IV/C/1) -Lasolo (III/C/1)	-Bau-bau (I/C/1) -Raha (II/C/1)	
Gorontalo	-Gorontalo (I/C/1)	-Isimu (III/C/2) -Kuangdang (III/C/2)	-Tilamuta (II/C/2)	
West Sulawesi		-Mamuju (I/C/1)		

Source: National Spatial Plan 2007

Note I ~ IV in the in parentheses shows stage of development

A: Primary cities on Border areas (A/1: Improvement, A/2: New Development, A/3: Revitalization)

C: Growth Center Cities for National Growth (C/1: Improvement, C/2: New Development, C/3: Revitalization)

Provincial Development Strategies

In the course of the study, the JICA Study Team visited each province to discuss relevant issues with the BAPPEDA as well as with other provincial authorities. From the interviews with BAPPEDA officers and personnel and a review of existing provincial plans, the major focal points of the existing development strategies are summarized as follows:

Table 2.2 Summary Results of Interviews with BAPPEDA

Province	Major Product/Industry	Regional Development Plan	Priority Road & Infrastructure Development
South Sulawesi	Nickel, Cacao, Palm Oil, Coffee, Vegetable, Vanilla Processing, Manufacture of Cement, Food, Etc.	Mamminasata Regional devt. Parepare KAPET	- Roads improvement/ development in Mamminasata - Maros-Parepare-West Sulawesi Province road - Makassar- Maros- Watampone road - Makassar- Bulukumba- Plau Selayar road via ferry - Parepare- Palopo- Malili road
North Sulawesi	International Tourism Destination, Gold, Pearls, Coconut, Vanilla, Fish Meal, Coconut Oil/Coir, Vanilla Processing	- Manado-Bitung-Likpang Triangle zone dev. - Amurang new port FEZ - Bitung KAPET	- Manado – Bitung toll road Note: Southern coastal road is under construction by ADB & AusAID - Shortage of power supply despite of Tanggari hydro power & geo-thermal plant (20MW) near Tondano
Gorontalo	Corn, Coconut, Fish	-Great Gorontalo Development Plan - Kwandang Area Development Plan	- Gorontalo city bypass - Northern coastal road - Bologtio- Limgato North-South road (Long term) - Improvement of Anggrek port (Kwandang) - Expansion of existing coal power plant (40 MW) + new coal power plant (20MW)
Southeast Sulawesi	Nickel, Sand/Rock, Asphalt, Cacao, Cashew Nuts, Fish Products (tuna, canned fish in Buton Island)	Kendari-Kolaka KAPET	- Kolaka- Malili national road - North-bound coastal road from Kendari to Central Sulawesi - Baubau – Labuan road in Buton Island - Lasolo River basin development (electricity, irrigation)
West Sulawesi	Palm Oil, Cacao, Coconut, Coffee, Orange	Cyber water front city (new Provincial Capital in Mamuju)	- West Coast Trans Sulawesi Highway up to Palu - Connection road from Mamuju to Sabbang/Traja area in South Sulawesi Province - Connection road from Mamuju to Kab. Mamasa - Port expansion for shipping to Kalimantan (Vegetable, rice, pepper, cow) - Expansion of the airport near Mamuju (1,200m→2,100m, long term) - Hydro power development to supplement power shortage
Central Sulawesi	Coconut, Cacao, Coffee, Clove, Wood, Construction Materials	Luwuk KAPET	-Kolonodale-Tokala near Morowali reserve forest

(4) Problems and Constraints in Regional Development

Lower GRDP and Regional Disparities

The Sulawesi economy remains at around 58% of the national average in terms of per-capita GRDP. Its contribution to the national economy remains at 4.2%.

Per-capita GRDP is low at US\$ 300 in Gorontalo (29% of the national average) and at US\$ 390 in West Sulawesi which is 38% of the national average. These substantial gaps should be taken into account if policies to promote development equity are to be pursued.

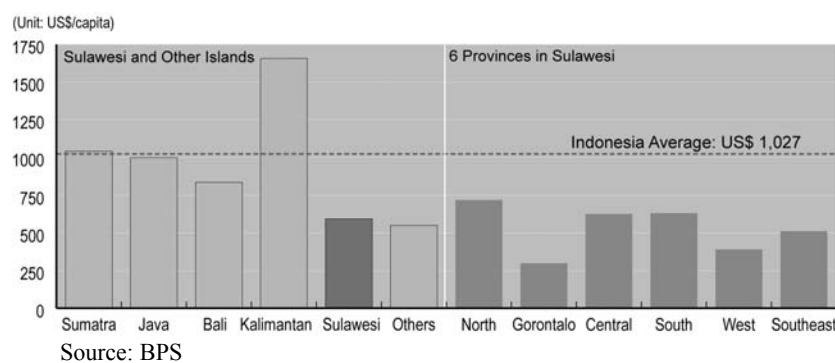


Figure 2.8 Per-capita GRDP

Dependence on Agricultural Sector and an Undeveloped Manufacturing Sector

Sulawesi's relatively weak economy is partly attributable to its great dependence on its agricultural sector. More than half of the economically active population is engaged in agriculture, livestock, and fisheries. Agricultural population is high in West Sulawesi (75.1% in 2005), Central Sulawesi (65.4%), and Southeast Sulawesi (62.8%). Meanwhile, the manufacturing sector's contributions to the Sulawesi economy are still limited, accounting from 6.2% to 11.5% of employment.

The agricultural sector's low productivity is another factor that retards the economic growth of Sulawesi. Although the sector's labor productivity in recent years has increased at a higher rate than the national average (except for Gorontalo) due mainly to extensive improvements in irrigation and other farming practices, major agricultural products remain unprocessed. Crop diversification, to some extent, has advanced, but such cash crops again have largely remained unprocessed, resulting in a lesser integration of farmers into the economic growth of Sulawesi. It is also noted that the cultivation of traditionally diversified crops, such as coconuts, cacao, etc., has not been well managed, with production declining in recent years.

Low Utilization of Rich Natural Resources

Aside from agriculture, Sulawesi is also rich in fishery resources. The main marine resources in Sulawesi are tuna, skipjacks, pelagics, seaweed, shrimps, crabs, sea cucumber, and lobsters. Aquaculture, involving such products as pearls, shrimps, seaweed, and sea cucumber, is a common local industry in various coastal areas. However, except for South Sulawesi, marine and inland fishery resources are not being fully utilized. Production volumes of marine and inland fishery products are mainly concentrated in South Sulawesi which in 2005 accounted for 46.8% and 78.9% of Sulawesi's marine and inland fishery resources, respectively.

Sulawesi also has substantial mineral resources such as nickel, gas, gold, cement, marble, oil, and asphalt. Because of this, the mining sector has the potential of becoming a much larger contributor to the island's economy and to overall regional development. However, except for the cement industry in South Sulawesi and the nickel industry in South and Southeast Sulawesi, the development of the mining sector also remains delayed. A significant part of Sulawesi is still

unexplored and some of these areas are reputed to hold vast reservoirs of mineral resources. The development of the mining sector will especially depend on how and when the natural gas reserves in Central Sulawesi will be explored on a large scale.

It can be said, therefore, that the development of agricultural products and the further utilization of its resources have been insufficient. The island's primary processing of agricultural and forest products is mainly done for the export market and traditional domestic consumption. Further processing of agricultural and forest products is needed to attain the necessary added value that will fuel domestic growth, increase incomes, and transform Sulawesi into a robust local and regional economic engine.

Mountainous and Dispersive Geographical Conditions and Weak Linkages among Areas

Sulawesi's physical conditions and demographic distributions characterize its current land uses. Because most of the island is mountainous, available lands for various economic activities are limited. Rice fields and dry land farming areas account for a mere 8.1% of its area, while plantations only represent about 1.0%. On the other hand, Sulawesi's forest cover (including swamp forests and mangroves) cover 60% of the entire island.

Due to its geographic conditions, Sulawesi's population density, which stands at 81.2 /km², and urban population rate of 28.0% (both 2005 figures) are smaller than the national average of 115.8 /km² and 42.1%, respectively for 2005. Settlements are mostly scattered along the island's coastal areas and these communities are commonly separated from each other by steep mountain ranges, bays and seas. Exacerbating these natural divisions are the lack of a sufficient transportation infrastructure, such as a road network and sea lanes, resulting in the relatively weak economic linkages among the provinces.

Limited Forest Lands

Ironically, although the island's forests cover 60% of its total land area, its developable forest is quite limited due to environmental factors. Forest preserves occupy a large chunk of its forest lands which include mangroves and swamp reserves, which are scattered throughout the island. Although the island has secondary forest cover, these are commonly utilized for crop harvesting by local farmers. These are the basic factors why the expansion of farm lands in Sulawesi is difficult. Moreover, concerns on deforestation and environmental degradation have placed a premium on the preservation of the island's forest cover and its resources.

Disaster Management

As in all Indonesia, disaster prevention is a priority issue in the island. Although Sulawesi has relatively been spared from such disasters as tsunamis and volcanic eruptions, calamities such as landslides are probable especially among communities in mountainous areas. The development of Sulawesi into a disaster-free island that is properly prepared should be given high priority by the government.

CHAPTER 3 PRESENT TRANSPORT SITUATION OF SULAWESI

(1) Existing Transport Development Studies and Projects

Studies

The national strategy for the transport sector is to support the development goals stipulated in the National Long-Term Development Plan 2005-2025 (BAPPENAS 2007) and National Mid-Term Development Plan 2005-2009 (BAPPENAS 2004). Their focuses are on: (1) accessibility, (2) environmental friendliness, (3) sustainability, (4) multi-modality, (5) consistency with regional development, (6) maintenance, and (7) cooperation among related parties. Other important studies include:

- A. Heavy Loaded Road Improvement Project-II; Master Plan Review Study for National Network of Roads, Ministry of Settlement and Regional Infrastructure, JBIC, 2001
- B. Land Transportation Master Plan (Masterplan Transportasi Darat), Ministry of Communications, 2005

These studies were reviewed and taken into account in formulating the master plan.

Projects

In Sulawesi, the proposed and ongoing road projects are mostly improvements of existing roads. At present, road improvement works, including rehabilitation and maintenance, are vigorously pursued in Sulawesi with the assistance of international donors such as the World Bank, Asian Development Bank, and AusAID. Three major ongoing projects are as follows:

- A Eastern Indonesia Region Transport Project (EIRTP I and II) – World Bank
- B Road Rehabilitation Sector Project (RRSP) – Asian Development Bank
- C Eastern Indonesia National Road Improvement Project (EINRIP) – AusAID

Since 2007, however, the ADB project has shifted its focus to Sumatera and Kalimantan. The major task of road improvement in Sulawesi is shouldered mainly by WB and AusAID at present. EIRTP and EINRIP have improved a number of national road sections in Sulawesi, and the national road network is relatively well maintained.

Proposals for the construction of new roads in Sulawesi are few. This is due to the fact that its coastlines and flat areas are already linked by existing roads if the levels of service are not considered. Of course, there are a small number of new routes proposed by different agencies and local governments as seen in the Sulawesi Island Road Network System Development Study (Studi Pengembangan Sistem Jaringan Jalan di Pulau Sulawesi). Of these, the Manado-Bitung Toll Road Project requires a careful review.

(2) Road Network

Road Planning Framework

The cities in Indonesia are classified into national activity center (PKN), regional activity center (PKW), local activity center (PKL), and other smaller cities according to the spatial plans (Rencana Tata Ruang Wilayah Nasional).

In January 2006, the Ministry of Public Works, Bina Marga and Bina Program prepared a draft guideline on the functional classification of roads (Klasifikasi Jaringan Jalan Menurut Fungsi/Peranan dan Status [Wewenang Pengaturan]). It is summarized as follows:

Road Hierarchy vs. Hierarchy of Activity Centers

Between national activity centers or between a national activity center and a regional activity center, the connecting road shall be an arterial, and as the connection level lowers the road becomes collector, local, then district.

Functional Classification vs. Administrative Classification

Arterial road is under national administration. Collector roads range from national, provincial to district (kabupaten) roads according to their sub-functional classification of K-1 to K-4.

Existing Road Network System

Sulawesi's road network is composed of national, provincial, regency and other roads. Figure 3.1 shows the national and provincial roads, and Table 3.1 summarizes their lengths by province. From the standpoint of function, these roads are differently classified into arterial, collector, local and district roads as mentioned above. National roads cover most of the coastlines except in the eastern peninsula. Until 2004, however, some national roads were classified as provincial roads.

Sulawesi's road density is generally higher than the national average. However, it varies largely by province. While all cities (or kotas) such as Manado, Gorontalo, Palu, Makassar, Parepare, and Kendari show relatively high road densities, it is very low in most regencies particularly in Central Sulawesi and Southeast Sulawesi. Regencies in South Sulawesi have higher densities due to their flat topography and proximity to Makassar.

Table 3.1 Lengths of National and Provincial Roads by Province, 2005

(unit: km)

Province	National	Provincial	Total
North Sulawesi	1,267	741	2,008
Gorontalo	616	284	900
Central Sulawesi	1,806	1,977	3,783
South/West Sulawesi	2,108	1,487	3,595
Southeast Sulawesi	1,294	489	1,783
Sulawesi Total	7,091	4,977	12,069

Source: Penetapan Ruas-Ruas Jalan Menurut Statusnya Sebagai Jalan Nasional 2004 and Road Inventory Balai VI

The national roads in 2007 are 78% in good/fair and 22% in poor/bad condition (Table 3.2). That of provincial roads is 60% in good/fair and 40% in poor/ bad condition (Table 3.3). The local roads are 56% in good/fair and 44% in poor/ bad condition in 2005 and only 41% are asphalt paved roads (Table 3.4).

Table 3.2 Road Conditions of National Roads, 2005/2007

Unit: km

Province	Condition (2005)*					Condition (2007)*				
	Good	Fair	Poor	Bad	Total	Good	Fair	Poor	Bad	Total
North Sulawesi	486	363	228	190	1,267	886	137	193	51	1,267
	38.4%	28.7%	18.0%	15.0%	100.0%	69.9%	10.8%	15.2%	4.1%	100.0%
Gorontalo	373	186	51	6	616	180	358	25	53	616
	60.6%	30.2%	8.3%	1.0%	100.0%	29.2%	58.1%	4.1%	8.6%	100.0%
Central Sulawesi	850	630	150	177	1,807	687	589	351	181	1,807
	47.0%	34.9%	8.3%	9.8%	100.0%	38.0%	32.6%	19.4%	10.0%	100.0%
West Sulawesi						160	137	64	190	552
						29.1%	24.9%	11.6%	34.5%	100.0%
South Sulawesi	1,509	446	84	69	2,108	997	496	42	21	1,556
	71.6%	21.2%	4.0%	3.3%	100.0%	64.1%	31.9%	2.7%	1.3%	100.0%
Southeast Sulawesi	482	499	98	215	1,294	380	514	276	124	1,294
	37.2%	38.6%	7.6%	16.6%	100.0%	29.3%	39.7%	21.4%	9.6%	100.0%
Total	3,700	2,124	611	657	7,092	3,290	2,230	951	620	7,092
	52.2%	29.9%	8.6%	9.3%	100.0%	46.4%	31.5%	13.4%	8.7%	100.0%
	82.1%		17.9%			77.8%		22.2%		

Sources: * Transportation and Communication Statistics 2005, MOC

** Balai VI, MPW (Dec,2006)

Table 3.3 Road Conditions of Provincial Roads, 2005/2007

Unit: km

Province	Condition (2005)*					Condition (2007)**					Length Increase	
	Good	Fair	Poor	Bad	Total	Good	Fair	Poor	Bad	Total	km	%
North Sulawesi	181	275	139	146	741	342	143	223	33	741	0	100%
	24.4%	37.1%	18.8%	19.7%	100.0%	46.2%	19.3%	30.1%	4.5%	100.0%		
Gorontalo	79	46	24	135	284	72	48	91	104	315	31	111%
	27.8%	16.2%	8.5%	47.5%	100.0%	22.8%	15.2%	28.9%	33.2%	100.0%		
Central Sulawesi	896	458	380	242	1,976	243	1,044	302	448	2,037	61	103%
	45.3%	23.2%	19.2%	12.2%	100.0%	11.9%	51.3%	14.8%	22.0%	100.0%		
West Sulawesi						150	126	100	205	581		
						25.7%	21.8%	17.2%	35.3%	100.0%		
South Sulawesi	300	338	175	673	1,486	238	545	238	189	1,209	304	120%
	20.2%	22.7%	11.8%	45.3%	100.0%	19.6%	45.0%	19.7%	15.6%	100.0%		
Southeast Sulawesi	80	228	75	106	489	136	386	262	159	943	454	193%
	16.4%	46.6%	15.3%	21.7%	100.0%	14.4%	40.9%	27.8%	16.9%	100.0%		
Total	1,536	1,345	793	1,302	4,976	1,180	2,292	1,216	1,138	5,826	850	117%
	30.9%	27.0%	15.9%	26.2%	100.0%	20.3%	39.3%	20.9%	19.5%	100.0%		
	57.9%		42.1%			59.6%		40.4%				

Sources: * Transportation and Communication Statistics 2005, MOC

** Dinas PU Province (Sep,2007)

Table 3.4 Road Conditions of Local (City and Regency) Roads, 2005

Unit: km

Province	Surface Type					Condition				
	Asphalt	Gravel	Soil	Others	Total	Good	Fair	Poor	Bad	Total
North Sulawesi	2,334	1,040	116	0	3,490	1,108	1,216	899	267	3,490
	66.9%	29.8%	3.3%	0.0%	100.0%	31.7%	34.8%	25.8%	7.7%	100.0%
Gorontalo	1,514	340	470	126	2,450	1,114	140	448	748	2,450
	61.8%	13.9%	19.2%	5.1%	100.0%	45.5%	5.7%	18.3%	30.5%	100.0%
Central Sulawesi	2,924	2,853	1,920	309	8,006	3,085	1,825	1,410	1,686	8,006
	36.5%	35.6%	24.0%	3.9%	100.0%	38.5%	22.8%	17.6%	21.1%	100.0%
West Sulawesi	961	1,432	2,408	0	4,801	760	731	2,155	1,154	4,801
	20.0%	29.8%	50.2%	0.0%	100.0%	15.8%	15.2%	44.9%	24.0%	100.0%
South Sulawesi	8,475	5,132	4,389	830	18,826	5,389	5,390	3,255	4,793	18,826
	45.0%	27.3%	23.3%	4.4%	100.0%	28.6%	28.6%	17.3%	25.5%	100.0%
Southeast Sulawesi	1,719	2,939	1,432	201	6,291	1,991	1,756	1,058	1,486	6,291
	27.3%	46.7%	22.8%	3.2%	100.0%	31.6%	27.9%	16.8%	23.6%	100.0%
Total	17,927	13,736	10,735	1,466	43,864	13,447	11,058	9,225	10,134	43,864
	40.9%	31.3%	24.5%	3.3%	100.0%	30.7%	25.2%	21.0%	23.1%	100.0%
	40.9%			59.1%			55.9%		44.1%	

Source: Transportation and Communication Statistics 2005, MOC

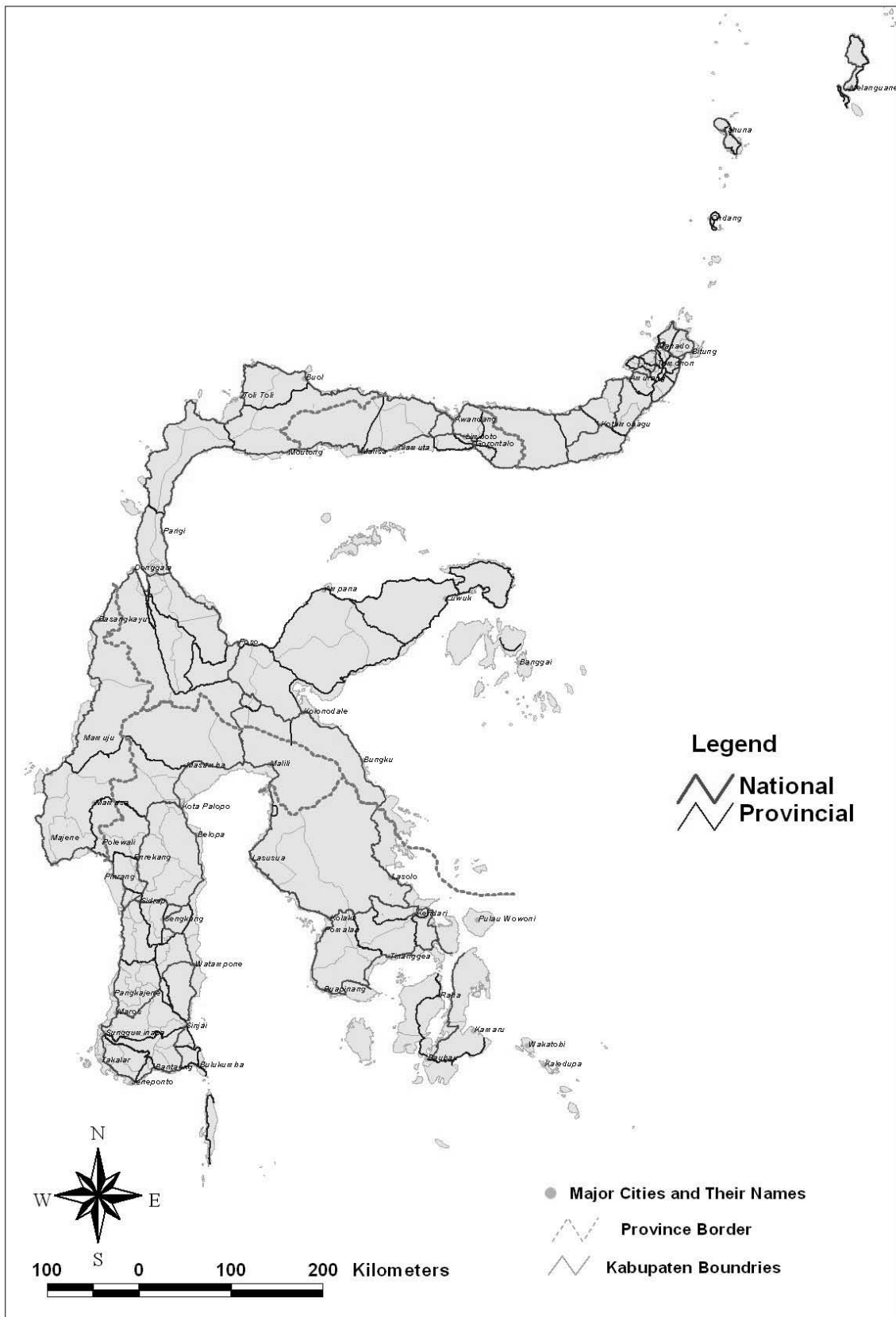


Figure 3.1 National and Provincial Road Network, 2006

Existing Road Conditions based on IRMS and Other Data

Most of the inter-city roads in Sulawesi have 2 lanes with road widths of less than 7 meters. National roads that were formerly designated as provincial roads tend to have narrow road widths. Regarding surface type, most national roads are of asphalt concrete (AC) or hot rolled sheet (HRS), although LASBUTAG / BUTAS and gravel are seen in some sections. National roads in Sulawesi are relatively well maintained. This is mainly due to the road improvement projects financed by the national budget (APBN) and various donor agencies mentioned earlier. Those previously designated as provincial roads, however, still have poorly maintained sections.

Existing Bridge Conditions based on the IBMS and Other Data

In Sulawesi, there are 3,344 bridges on national roads and 2,523 bridges on provincial roads at present. Most of them are small, short bridges of less than 30m length. However, 65 bridges or 2% for national roads and 24 bridges or 1% for provincial roads are long with more than 100m length.

Table 3.5 Number of Bridges on National Roads by Province and Length, 2006

Province	Length												No. of Bridges of Unknown Lengths	Total
	< 10m		10-30m		30-60m		60-100m		100m <		Subtotal			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
North Sulawesi	299	51	186	32	81	14	11	2	9	2	586	100	5	591
Gorontalo	131	46	109	38	36	13	5	2	3	1	284	100	0	284
Central Sulawesi	513	56	287	31	85	9	20	2	20	2	925	100	0	925
West Sulawesi	107	39	102	37	47	17	10	4	11	4	277	100	0	277
South Sulawesi	396	57	172	25	85	12	28	4	13	2	694	100	0	694
Southeast Sulawesi	298	52	218	38	41	7	7	1	9	2	573	100	0	573
Total	1,744	52	1,074	32	375	11	81	2	65	2	3,339	100	5	3,344

Source: IBMS

Table 3.6 Number of Bridges on Provincial Roads by Province and Length, 2006

Province	Length												No. of Bridges of Unknown Lengths	Total
	< 10m		10-30m		30-60m		60-100m		100m <		Subtotal			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
North Sulawesi	241	63	112	29	25	7	3	1	1	0	382	100	0	382
Gorontalo	16	57	11	39	1	4	0	0	0	0	28	100	26	54
Central Sulawesi	443	57	256	33	56	7	14	2	12	2	781	100	1	782
West Sulawesi	62	70	16	18	9	10	1	1	0	0	88	100	0	88
South Sulawesi	453	66	177	26	36	5	13	2	4	1	683	100	1	684
Southeast Sulawesi	281	53	191	36	45	8	9	2	7	1	533	100	0	533
Total	1,496	60	763	31	172	7	40	2	24	1	2,495	100	28	2,523

Source: IBMS

As for the conditions of the bridges, about 64% for national roads and 71% for provincial roads are no damage/good, and 26% for national roads and 13% for provincial roads are fair/poor. However, these data are only for the bridges that were surveyed. If the unsurveyed bridges were included, these percentages would have changed considerably.

Table 3.7 Number of Bridges on National Roads by Province and Condition, 2006

Province	No Damage/Good	Fair/Poor	Bad/Very Bad	Wooden/Unknown	Total
North Sulawesi	399 (67.5%)	109 (18.4%)	41 (6.9%)	42 (7.1%)	591 (100%)
Gorontalo	271 (95.4%)	10 (3.5%)	3 (1.1%)	0 (0%)	284 (100%)
Central Sulawesi	496 (53.6%)	381 (41.2%)	40 (4.3%)	8 (0.9%)	925 (100%)
West Sulawesi	178 (64.3%)	43 (15.5%)	20 (7.2%)	36 (13.0%)	277 (100%)
South Sulawesi	489 (70.5%)	194 (28.0%)	11 (1.6%)	0 (0%)	694 (100%)
South East Sulawesi	308 (53.8%)	140 (24.4%)	75 (13.1%)	50 (8.7%)	573 (100%)
Total	2,141 (64.0%)	877 (26.2%)	190 (5.7%)	136 (4.1%)	3,344 (100%)

Source: IBMS

Table 3.8 Number of Bridges on Provincial Roads by Province and Condition, 2006

Province	No Damage/Good	Fair/Poor	Bad/Very Bad	Wooden/Unknown	Total
North Sulawesi	272 (71.2%)	51 (13.4%)	1 (0.3%)	58 (15.2%)	382 (100%)
Gorontalo	21 (38.9%)	0 (0%)	33 (61.1%)	0 (0%)	54 (100%)
Central Sulawesi	726 (92.8%)	9 (1.2%)	0 (0%)	47 (6.0%)	782 (100%)
West Sulawesi	63 (71.6%)	22 (25.0%)	2 (2.3%)	1 (1.1%)	88 (100%)
South Sulawesi	476 (69.6%)	127 (18.6%)	56 (8.2%)	25 (3.6%)	684 (100%)
South East Sulawesi	242 (45.4%)	117 (22.0%)	69 (12.9%)	105 (19.7%)	533 (100%)
Total	1,800 (71.3%)	326 (12.9%)	161 (6.4%)	236 (9.4%)	2,523 (100%)

Source: IBMS

(3) Air and Maritime Transportation

Air

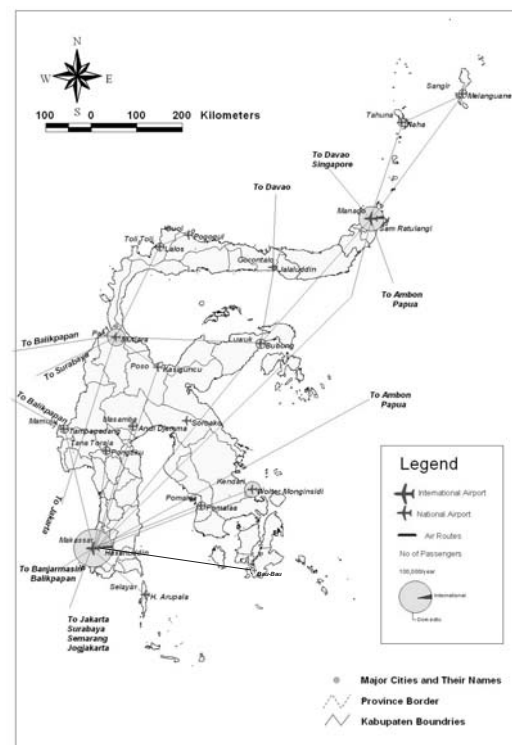
Figure 3.2 illustrates the current air routes by airport in Sulawesi. In Sulawesi, air traffic volume has increased dramatically after 2000. This is mainly due to the open-sky policy adopted in 1999 and the consequent fare reduction. It is said that the maritime industry was seriously affected by the stiff competition from the air transport industry. In 2005, Hasanuddin Airport in Makassar handled about 2.6 million domestic passengers which is about 60% of Sulawesi's total air traffic volume that year. Sam Ratulangi Airport in Manado handled the second-largest domestic passenger volume, at about 0.9 million (about 20%). Although the handling volume in other airports is still small, they show the same trend of rapid growth. In addition, international flights are now available from Makassar and Manado (and Gorontalo in 2007) to Singapore, Davao, etc.

The domestic air transport demand is highly concentrated in Jakarta. It is the center of air travel in Indonesia which reflects the prime status of this metropolis. Surabaya, Medan, Balikpapan, and Makassar have large air transport demands that justify their status as secondary domestic airport hubs. In Sulawesi, there are 22 airports. In terms of function, Sam Ratulangi Airport (Manado) and Hasanuddin Airport (Makassar) are airport hubs, while Jalaluddin-Gorontalo, Mutiara-Palu, Wolter Monginsidi-Kendari, and Bubung-Luwuk are secondary airports in Sulawesi.

Maritime

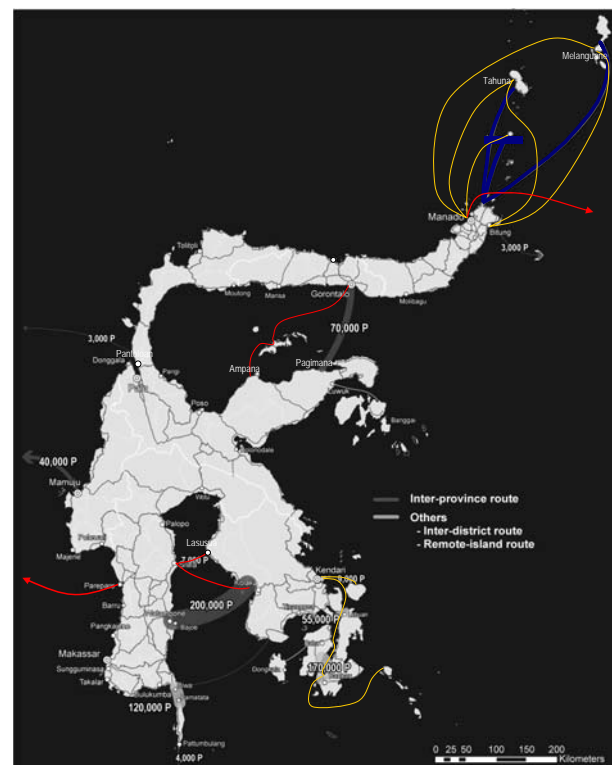
Maritime transportation, which connects islands separated by gulf, straits and rivers, is one of the most important transportation systems in Indonesia for vehicles, passengers, and cargoes.

With regard to ferry, the service started initially only in a few ports in Sulawesi particularly in Bajoe (South Sulawesi), Kolaka and Torobulu-Tompo (Southeast Sulawesi), Bitung (North Sulawesi), and Bira-Pamatata (South Sulawesi). Today there are 28 ferry ports consisting of 12 inter-provincial ports and 16 inter-regional ports. Moreover, there are 19 routes servicing 8 inter-provincial routes, 7 intra-provincial routes and 4 inter-regional routes. The number of passengers transported by ferry within Sulawesi in 2005 was reported at around 1.5 million passengers. However, statistics show a decrease in the number of passengers, vehicles, and volume of cargo in the period 2001-2005. The decline in the number of passengers and vehicle units might be caused by the shift to domestic air transport services among intra-island passengers.



Source: JICA Study Team

Figure 3.2 Present Air Routes in Sulawesi, 2007



Source: PT. ASDP

Figure 3.3 Ferry Operation in Sulawesi, 2006

(4) Cargo Transport

Port

There are about 150 general ports in Sulawesi, as classified in Table 3.9. There are three international ports, namely Makassar Port in South Sulawesi, Pantoloan Port in Central Sulawesi and Bitung Port in North Sulawesi. These ports are port hubs not only for Sulawesi Island but also for northeastern Indonesian islands such as Kalimantan, Maluku, and Papua.

Table 3.9 Number of Ports in Sulawesi by Province, 2007

	International Port	National Port
North Sulawesi	1	0
Gorontalo	0	1
Central Sulawesi	1	2
South Sulawesi	1	1
West Sulawesi	0	0
Southeast Sulawesi	0	0
Total	3	4

Source: National Spatial Plan, 2007

Cargo Throughput in Major Sea Ports

In 2006, the total cargo throughput in the major sea ports was around 12.8 million tons. Of the total cargo, international cargo was 2.8 million tons (22%) and the domestic cargo was around 10.0 million tons (78%).

Of the total outbound cargo volume, the shares of export and domestic volumes were 36% and 64%, respectively. Of the total inbound cargo volume, the shares of import and domestic volumes were 12% and 88%, respectively. Of the total domestic outbound cargo, the volume for intra-island destinations was 22% and 78% was for inter-regional destinations. As such, the cargo volume transported to and from the other islands in Indonesia through Sulawesi (10.0 million tons) in 2006 was much bigger than the international cargo volume (2.8 million tons).

As shown in Table 3.10, South Sulawesi registered the largest share in all categories of maritime cargo traffic (51%), followed by Central Sulawesi (26%).

Table 3.10 Share of Cargo Throughput in Major Ports by Province and Cargo Category (%)

	South Sulawesi	Southeast Sulawesi	Central Sulawesi	Gorontalo	North Sulawesi	Total
International Cargo Volume	57	23	5	1	14	100
Domestic Cargo Volume	49	7	26	5	13	100
Total	51	9	26	3	17	100

The major exported and imported commodities are agricultural and mineral products. At present, the export and import of industrial products are not significant.

Major Commodities Traded and Processed

Trading in Sulawesi is composed of six types, namely: (1) domestic distribution within Sulawesi, (2) regional export, (3) international export, (4) regional import, (5) international import and, (6) international transfer trade. Sulawesi's economy largely depends on agriculture and mining. Sulawesi is endowed with long limestone mountain ranges along the sea coast. This resource makes Sulawesi an important cement supplier in eastern Indonesia. Although the volume of cement export is limited, the potential of supplying cement in the region is high. Sulawesi is also endowed with a considerable size of nickel mine in South Sulawesi and Southeast Sulawesi. The nickel mines are developed and exploited by international mining companies.

As for international transfer trade, Sulawesi imports 730,000 tons of wheat from Australia through Makassar. It is then exported as unprocessed wheat or as wheat flour at about 127,000 tons to other Asian countries. The remaining volume of wheat which is processed into wheat flour is distributed in Sulawesi (230,000 tons) and to other regions of Indonesia, including the east (46,000 tons). Therefore, Sulawesi can be regarded as a hub for wheat transfer in Indonesia.

Sulawesi is geographically located as a gateway to eastern Indonesia in general and to northeastern Indonesia in particular. Sulawesi imports wheat, sugar, and fertilizer and exports them to other regions of Indonesia. Sulawesi imports other products from northeastern and eastern Indonesia then processes those into final products for consumption in Sulawesi or for export to other regions or abroad. For example, imported log from the region is processed into wood or plywood, and the imported copra into coconut oil.

Containerization of International Cargo

Of the total volume of cargo handled at Makassar Port, the volume of container cargo was only 135,000 tons in 2006. Therefore, the containerization ratio is quite low in Sulawesi. This is attributed to the characteristics of major commodities produced and handled by the international ports in Sulawesi. The major cargoes are wheat and cement which are transported mostly by bulk carriers. In addition to this, most of the containerized cargo is carried by 20-foot containers because of the restrictions in land transportation in Sulawesi. Most of the roads in agricultural areas are of the 1 lane-1 way type. Multiple-lane highways are limited only in and around the surrounding areas of Makassar Port and Bitung Port where cargo traffic is concentrated.

In Sulawesi, most of the roads are of the 2 lane-2 way type and their widths are rather narrow because most of the land is covered by rugged mountains and hills. Therefore, 20-foot containers dominate the container traffic. Its share is probably more than 90%.

(5) Administration Framework and Financial Situation in Road Sector

System of Highway Administration

Based on the decentralization policy, the majority of local offices of the central government at provincial governments and Kabupaten/Kota governments were once abolished and many of their staff and functions were integrated into each local government. However the local autonomy laws were revised by the Law No. 32/2004 and the Law No. 33/2004. With regard to the highway administration, the once abolished Department of Highway (PU) has been restored from the Department of Settlement and Regional Infrastructure and the regional offices of PU (Balai Besar) have been re-established in January 2007 to coordinate the activities of PU at the regional level and conduct the procurement and implementation of the development of the national road network. The New Road Law No. 38 of 2004 stipulates clearly the responsibilities of each government body for the corresponding road categories, which include regulation, cultivation, development and supervision activities of each government body, namely the central government for national roads, provincial government for provincial roads, kabupaten government for kabupaten roads and city government for city roads.

Mechanism of Revenue and Budget Allocation in Indonesia

The laws of regional autonomy established in 1999 have changed the mechanism of revenue and budget allocation in Indonesia in terms of balance between the local and central governments. There are two major revenue sources for a local government, namely its own revenue from local tax and levies and the revenue allocation from the central government. The majority of tax revenues from automobiles and gasoline are collected at the provincial level and allocated to Kabupaten/Kota within the province concerned.

Road Sector Budget Allocation

After the enforcement of the Local Autonomy Policy, the ratio of capital expenditure of the Central Government against GDP has been decreasing due to the fiscal reform program of IMF and the decentralization of fiscal resources towards local governments. Before that the ratio remained at the level of about 6% to 9%, but it immediately went down to 3% after the Policy has been enforced for the years 2002, 2003 and 2004, then lowered further recently to 1.9% for the years 2005 and 2006. The revenue of the Central Government has been constantly increasing for the last five years and about 34% to 35% of the revenue has been transferred to the local governments as transfer fund.

The budget allocated to the road sector accounted for 1.2% to 1.3% of the Government Expenditure recently and its tendency has been fairly stable. About 4.0 to 7.0 trillion Rupiahs have been allocated to the road sector for the last five years. The maintenance budget has been from Rp 0.9 trillion to Rp 1.5 trillion and has not been increasing. The budget for betterment and new construction has been fluctuating from Rp 2.2 trillion to Rp 5.9 trillion depending on the years. The budget for the year 2007 was set at Rp 9.8 trillion with its maintenance budget increasing by about

30% from the year 2006. However, as the funding size required to keep 90% of the national roads in the “good/fair” status has been estimated to be Rp 15 to 20 trillion every year, the total budget allocated for the year 2007 is still far below the requirement.

As for the national road, the total amount of the budget allocated from Bina Marga to all provinces was Rp 9.8 trillion for the year of 2007. The annual average growth rate of the budget for the period has been about 28%. The Sulawesi Region has a 12 % share of the whole country for the year 2007 which is Rp 1,054 billion. Its average share for the period from 2001 to 2007 has been 11.4%. The share of the Sulawesi Region in the country has been fairly stable for the last 3 years ranging between 11% and 12%. Among the provinces of the Sulawesi Region the share of the South Sulawesi Province has been growing in recent years. The total road sector budget of 6 Sulawesi provinces for 2007 is 354 billion.

(6) Transport Problems and Issues in Sulawesi

Transport Sector and Road Subsector

Indonesia’s transport sector is generally dominated by road transport. Road transport accounts for more than 80% for passengers and 90% for freight. This is closely related to the concentrated population in Java Island particularly in Jakarta. It has been a national strategy to disperse population from Java to less populated regions to attain a balanced development. It is also essential for Sulawesi to realize more balanced modal shares. At present, the modal share of road transport in Sulawesi for freight is estimated at 64%, which is considerably lower than the national average of 92%.

The decentralization process in the management of the transport sector is still ongoing though some reactions were observed. Since Law No. 22 and No. 25 were enacted in 1999, a considerable part of the responsibilities over sector management and project implementation have been transferred from the central government to local governments. Although the efficiency and capacity of the sector have been partially improved by deregulation, the quality of sector management has not improved. It even caused some confusion in the road transport sector coupled with other reasons such as lack of capacity of local officials to shoulder the transferred responsibilities and to coordinate among central/local government agencies.

Road Infrastructure

Sulawesi’s road infrastructure is under-developed. Although its road density is slightly higher than the national average, the level is still far from satisfactory. Most of the arterial roads have 2 narrow lanes, while road conditions tend to be bad in remote places. Alignment is generally poor and winding in hilly/mountainous areas. The long rugged coastline of Sulawesi also makes road alignment long and winding with frequent rises and falls. Table 3.5 reveals how extreme detours are forced when traveling between provincial capital cities through existing roads that are winding due to a steep topography and complex coastlines. This problem can be solved by improving the

alignment of existing roads and developing new roads. However, its effect is only to a certain extent as the severe topographic constraints cannot be easily overcome. The more realistic solution would be a more positive usage of ferries and the realignment of extremely curved sections of existing arterial roads. Particularly for Kendari, the capital city of Southeast Sulawesi, a nautical highway system could be proposed using inter-peninsular ferries to improve its accessibility to other provinces.

Table 3.11 Actual Road Distances and Crow-Fly Distances between Provincial Capital Cities

	Actual Distance (km) - A	Crow-fly Distance (km) - B	Ratio A/B
Manado - Gorontalo	416	226	1.84
Manado - Palu	963	619	1.56
Manado - Mamuju	1356	801	1.69
Manado - Makassar	1800	949	1.90
Manado - Kendari	1872	685	2.73
Gorontalo - Palu	617	395	1.56
Gorontalo - Mamuju	1010	582	1.74
Gorontalo - Makassar	1454	746	1.95
Gorontalo - Kendari	1421	504	2.82
Palu - Mamuju	393	218	1.80
Palu - Makassar	837	468	1.79
Palu - Kendari	1007	445	2.26
Mamuju - Makassar	444	276	1.61
Mamuju - kendari	1009	419	2.41
Makassar - Kendari	1057	361	2.93

Source: JICA Study Team's estimate based on IRMS.

Another important fact in Sulawesi is that the poorer areas have less roads. This does not necessarily mean, however, that underdevelopment of roads is the cause of poverty. Since roads have been historically developed along with the expansion of economic activities, the fact is that economic activities require roads and road development enables economic growth. Thus road development should be implemented in close coordination with regional development plans.

The central government seems to be taking on the task of sector management more than directly involving itself in planning, implementation, and daily operation of roads due probably to lack of budget and other underlying reasons. For roads where significant traffic is foreseen, private sector participation naturally should be pursued. Even if traffic demand is not so large as to produce profits sufficient to the private sector, PPP (public-private partnership) may be applied with a government subsidy shouldering part of the project cost.

In the current legal/institutional framework, the central government conducts an open bidding and selects a private proponent for a toll road project where the proponent forms a joint venture company with PT. Jasa Marga. Since PPP projects are hardly implemented recently in Indonesia, current discussions are held regarding the legal/institutional scheme of PFI/PPP project and the status/role of PT. Jasa Marga.

In Sulawesi, some toll road projects are proposed using PFI/PPP scheme, such as the

Manado-Bitung Toll Road Project. Financial feasibility has not been tested yet for this project, and the project is likely to require considerable government subsidy. Hence, this should be a PPP project which needs scrutiny under the current legal/institutional system. Generally speaking, 100% privately financed road projects would be possible only in and near the city area such as Makassar and Manado. PPP schemes could be applied more widely depending on the ongoing institutional reform.

Environment and Traffic Safety

Regional development and environmental protection generally conflict with each other. This problem is also true in the road transport subsector. Fortunately, however, most road projects likely to be proposed in this study are of the improvement of existing roads, such as minor upgrading (partial widening and realignment), rehabilitation, and maintenance. Their environmental and social impacts, particularly of resident relocation and resettlement would be minimal. However, there should certainly be negative impacts attributed to road projects. These impacts should be minimized through better planning, design, implementation, and maintenance. The cost needed to carry out the measures on environmental protection should be reflected in the project evaluation.

Although accident statistics are only partially available in Sulawesi, records show that South Sulawesi registered 676 deaths due to traffic accidents in 2005. This is equivalent to 0.09 deaths per 1,000 population, which is significantly lower than the national average of 0.141. In the future, when traffic volume will be larger, there is a strong possibility that the number of accidents will dramatically increase. Long-distance vehicles run quite fast on inter-city arteries paying no attention to local residents and villages located along the roads particularly in Sulawesi. This problem should be taken seriously and proper countermeasures should be proposed.

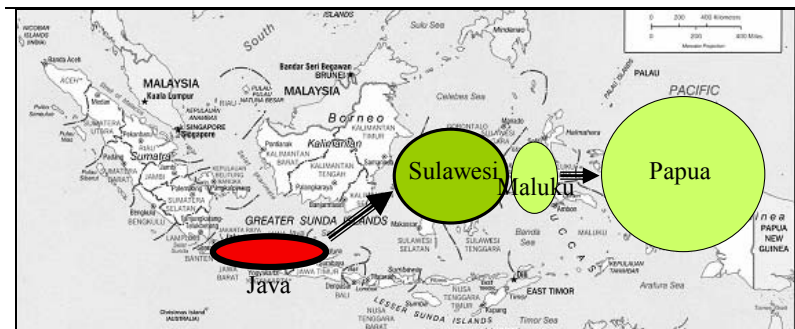
CHAPTER 4 IDENTIFICATION OF REGIONAL DEVELOPMENT NEEDS AND POTENTIALS

(1) Social and Economic Needs and Potentials

Spearhead of Development in East Indonesia

The development of Sulawesi is expected to contribute to the total prosperity of Indonesia, especially since a balanced economic development throughout Indonesia as well as the urgent development of eastern Indonesia, specifically Maluku and Papua, is dependent on the success of Sulawesi's development.

It is a common agreement that the development of this naturally blessed and culturally rich islands will help in the greater development of the Eastern Indonesian economy and society in the first half of the 21st century.



Source; JICA Study Team

Figure 4.1 Sulawesi as Spearhead of Eastern Indonesia Development

Development of Sulawesi Economy

With a population of 16 million (in 2005) or 7.3% of the country's total population, Sulawesi Island contributes only 4.2% to the national GDP. The average per-capita GRDP in Sulawesi was about US\$ 600 in 2005, or 60% of the national average of more than US\$ 1,000.

The probable reasons for Sulawesi's stagnant economy can be explained by the characteristic of its major economic sectors, as follows:

- i) The primary sector (with the lowest productivity among primary, secondary, and tertiary sectors) is still predominant in the GRDP at the range of 22% to 53% per province, which is much higher than the national average of 15%.
- ii) The primary sector is still predominant in the labor force through absorptions of 45% to 75% per province, which is higher than the national average of around 50%, except for North Sulawesi.
- iii) The secondary sector is growing at a higher rate than the national average, while its labor productivity is still lower compared with the national average except for the Southeast areas where nickel production is remarkable.

- iv) The tertiary sector is growing at a higher rate than the national average, while its labor productivity is still lower than the national.

It is further summarized that the primary sector should remain important for the Sulawesi economy even in the future, while the secondary and tertiary sector should improve in their productivity while keeping attention to social environment aspects such as the creation of employment.

Enhancement of Productivity

To some extent, agricultural productivity has been improved in the last two decades, partly due to improvements in irrigation and other farming practices. Combined with the cultivation of other cash crops (e.g. coconuts, cacao, pepper, vanilla) mostly in small backyard farms, per-capita GRDP has increased to about US\$ 600. However, further enhancement of GRDP would not be attainable unless productivity is further improved in the primary economic sector. Sizable expansion of production areas cannot be expected from the viewpoint of environmental conservation.

An example is coconut production. Indonesia is the world's largest coconut producer (about 32% of the world production), and Sulawesi accounts for 18% of the Indonesian output. Traditionally, the major coconut production centers in Sulawesi are North Sulawesi and Central Sulawesi. However, the coconut trees in these provinces are already old, tall, and less productive. The coconut processing industries in North Sulawesi collect raw materials from other provinces and the Maluku islands. Likewise, cacao is primarily based on household cultivation and most cacao trees are overaged with reduced productivity. Cultivation of these cash crops has not been well maintained enough to keep their productivity high and to expand their production in a sustainable manner. The competitiveness of these traditional products has diminished in recent years.

Improvement of Quality and Value

In addition to decreasing productivity, the quality of major cash crops has degraded or has become uneven due to improper cultivation practices. For instance, cacao production has primarily become dependent on household production which gives less attention to the control of diseases and fermentation before they are marketed.

Good practices can be learned from the excellent coffee cultivation in Toraja, South Sulawesi. The investor (TOARCO) has operated its own coffee plantation, extending guidance services to the independent coffee growers near its estate in order to improve and maintain the quality of the products for marketing, thereby establishing a reputable brand name. Although strenuous efforts are required, such a production process should better be replicated in other products to improve product quality and gain more income.

Most Sulawesi products in the primary and secondary sectors are transported and marketed in Java, or exported as raw materials with minimal processing in Sulawesi, resulting in low levels of value added in the region. For instance, since most cacao is exported as beans, their processing into cacao

butter and powder has not increased in Sulawesi. Corns are also exported without local processing along with marine products such as fishes, seaweeds, sea cucumber, etc., which are also marketed without local processing.

Since the expansion of cultivation areas in Sulawesi is less expected and employment opportunities must be expanded in view of growing urbanization, Sulawesi products should be processed to the maximum extent in order to help attain sustainable development.

Some of the key issues that need to be addressed therefore are: (1) attracting investors into the processing industry, (2) initiating programs that would attract Java-based firms to expand or shift operations to Sulawesi, and (3) encouraging foreign-based investors to jointly invest in local processing of Sulawesi products. In this context, improvements in the investment environment in Sulawesi will play a vital role.

Paradigm Shift to Sustainable Development

As mentioned above, the per-capita Sulawesi GRDP is currently at the US\$ 600 level, or 60% of the national average. To catch up with the national average of more than US\$ 1,000, conventional approaches in production and processing would not be sufficient., thus requiring a paradigm shift.

This paradigm shift can be made possible through the improvement of productivity and the quality of Sulawesi's products, resulting in enhanced product competitiveness in the domestic and international markets. An example is a shift from household cultivation of cash crops to the combination of household and plantation cultivation as in the case of Toraja TOARCO coffee. To this end, the investment environment for domestic and international investors

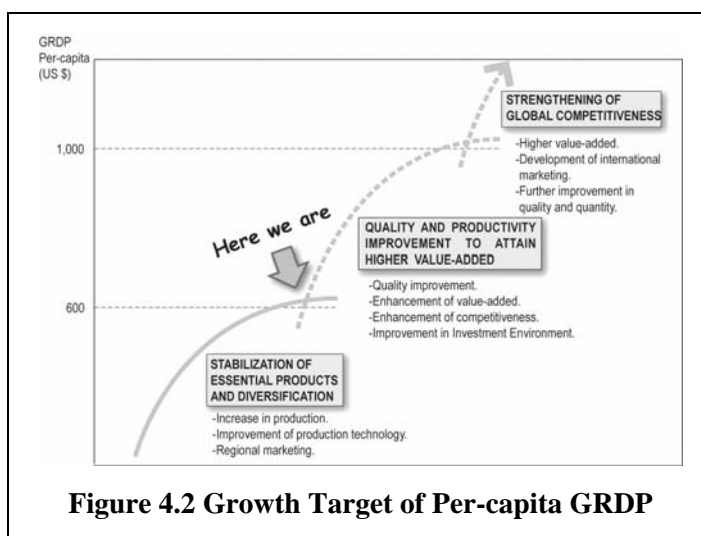


Figure 4.2 Growth Target of Per-capita GRDP

in Sulawesi should be improved. Otherwise, such a paradigm shift could be hardly attainable.

Environmental Protection and Conservation

To a certain extent, Sulawesi's natural environment has degraded through accelerated deforestation, urbanization, and other economic activities. Further deterioration of the environment should be prevented to the maximum extent.

In order to balance environmental protection and economic development, the principal issue is creating a cycle-oriented region/society in Sulawesi, lowering the environmental loads in every activity, including improvements in the transportation network. Instead of degrading limited natural resources, efforts should be made to promote renewable energy sources, renewal of

products, and maximum utilization of unused materials. It may be that GRDP growth rates would not be high enough under a cycle-oriented economy compared with a resource-depriving economy. However, it will be more beneficial to the people of Sulawesi if they accept that their living environment would be more comfortable for generations to come should they follow a cycle-oriented economy.

Potential Resources

Based on a review of the existing plans and available information, the JICA Study Team came up with a distribution of the islands potential resources in agriculture, fishery and mining, as illustrated in Figure 4.3. In addition to conventional resource development, some technologies have to be mobilized to create innovative approaches to development (e.g. biological technologies) so that development plans are cycle-oriented and their environmental loads are minimized.

(2) Industrial Development Needs and Potentialities in Sulawesi

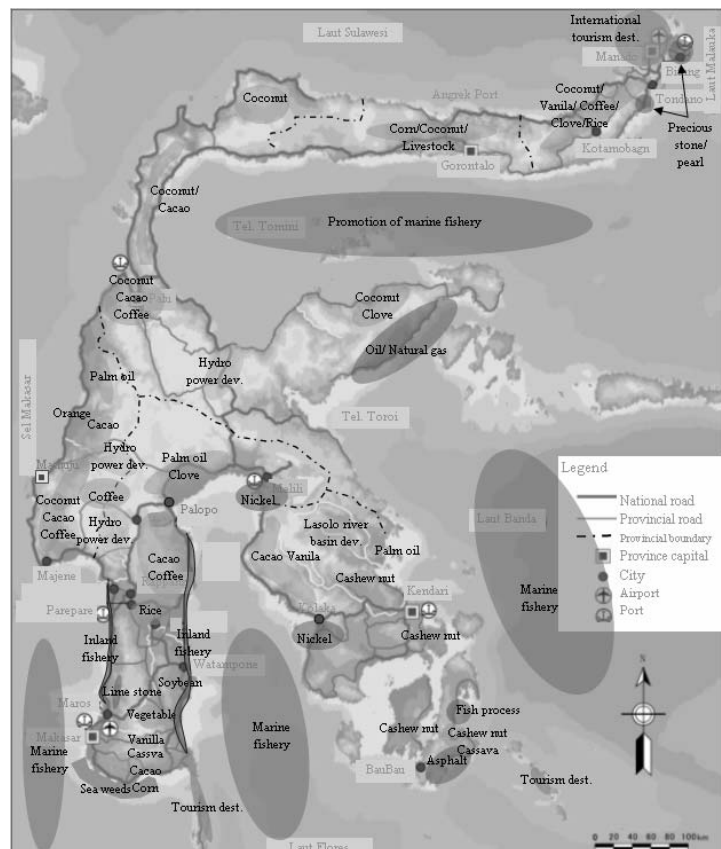


Figure 4.3 Prospective Resources/Industries

The major agricultural commodities, such as cocoa and coconut oil, are typical Sulawesi industries. These commodities have been exported to the international markets without high value-added activities, or in other words, without industrial processing except for traditional preliminary treatments such as sun drying. However, these products are traded in bulk and in big quantities per shipment. Trade volumes of these international commodities account for a considerable portion of the total world trade volume.

Table 4.1 summarized the prospective industries for Sulawesi on the category-wise analysis of global market trends, global and domestic competitiveness of Sulawesi products, and the production capacity of Sulawesi.

Table 4.1 Prospective Industrialization in Sulawesi

Category of Industry	Prospective Product/Market	Prospective Source Area	Development Phase	
			Short Term	Med/Long Term
1) Agricultural Processing	Biodiesel fuel for domestic fuel consumption in Sulawesi.	Coconut production areas such as Manado, Makassar, Palu.	○	
	Food processing of cacao, copra, coffee, vanilla, clave, vegetable, cashew nuts, etc. for foreign markets, especially China.	<ul style="list-style-type: none"> Processing and trading centers of agricultural and fishery products such as Manado, Makassar, Palu, and other provincial capitals. 	○	○ (final Processing)
2) Livestock/Meat Processing/Animal Feed Processing	(Halal) meat for the Middle East market/Kalimantan, etc. Animal feeds from copra, maize, cassava, soybean, and fish residuals for domestic livestock breeders.	<ul style="list-style-type: none"> Consolidated food processing centers (CFPC) are recommended. Residual processing in CFPCs for animal feeds/organic fertilizers, etc. for domestic livestock industries 	○	○ (final Processing)
3) Fishery and Marine Product Industry	New products such as Milkfish for the export/domestic market Promotion of processing of Tuna, Sea weeds, etc. for export		○	○ (final Processing)
4) Mining Industry	Development of oil and natural gas for export and domestic market. Enhancement of Nickel, Asphalt, Gold, etc. for export and domestic market	Luwuk in Central Sulawesi, On-site production and primary processing in Southeast Sulawesi, etc.	○	
5) Construction Materials Industry	Gravel, stone, cement export to development areas in Kalimantan and Luwuk.	Central and South Sulawesi.	○	
6) Light Industry	Labor-intensive manufacturing such as wood materials, plywood, furniture, garment, shoes, etc. for export.	Processing and trading centers such as Manado, Makassar, Palu, and Kendari.	○	○ (final Processing)
7) Tourism Industry	Marine eco-tourism.	Manado and the remote islands of Wakatobi in Southeast Sulawesi and Selayar in South Sulawesi.	○	○

Source: JICA Study Team

Marketing channels for international commodities are quasi-established and are quite labor intensive to get Sulawesi's products into existing channels. For instance, world marketing channels for cacao products are already established, making it difficult to change the importing sources and channels of raw materials. Exporters of cacao beans, butter, and powder, therefore, will have to maintain the existing export channels and find new markets.

New markets of the Sulawesi products can be found in China and in the BRIC countries where the demand for imported products is increasing and marketing channels are less established. To open up markets in China some measures should be strategically taken under the framework of the ASEAN-China Free Trade Agreement (FTA). For instance, the export of cacao butter and powder processed in Sulawesi would find new markets if the imposition of VAT on locally processed cacao is lifted. Other tropical products could also find markets in China. Therefore, further detailed studies on trade linkages with China in both the medium and long terms are important.

CHAPTER 5 DEVELOPMENT STRATEGIES AND CONCEPTS

(1) Regional Development Goals and Strategies

Based on the analysis of current conditions, potentials, and existing development plans, the development goals and strategies for an integrated regional development for Sulawesi Island were formulated and summarized.

1) Regional Development Goals

The development goals of regional development in Sulawesi are as follows:

Goal 1: Development of Sulawesi as the Leading Island in East Indonesia as the Gateway to the Other Islands of Indonesia and Asian Countries

Goal 2: Development of Environmentally Friendly Sulawesi with Poverty Reduction

2) Regional Development Strategies

To attain the development goals, the following regional development strategies are proposed:

Strategy 1: Economic growth through industrial development

To boost the economic growth of Sulawesi, industrial development, especially processing industries utilizing agricultural, forest, fishery, and mining resources is necessary.

Strategy 2: Economic growth in activity centers

Sulawesi economy will be promoted by the economic development in the national and regional activity centers (cities). The national activity centers will be networked to form a cluster over Sulawesi by utilization of the existing inter and intra island linkage.

Strategy 3: Alleviation of Social and Economic Disparities

Social and economic disparities should be alleviated by strengthening of public administration services and integration with regional economy throughout the island, particularly in the isolated communities of rural areas.

Strategy 4: Development of Sulawesi with due Consideration on Environment, and Safety for Disaster

Sulawesi should be developed with due attention on the environment preservation, reduction of environmental load and safety for disaster.

(2) Sulawesi Island Development Concept

1) Industrial Development Concept

To attain the goals of economic growth through industrial development as indicated in Regional Development Strategy 1, 4 industrial development plans are proposed, as shown in Figure 5.1. These were based on the results of an analysis of development needs, development potentials, and global economic circumstances.

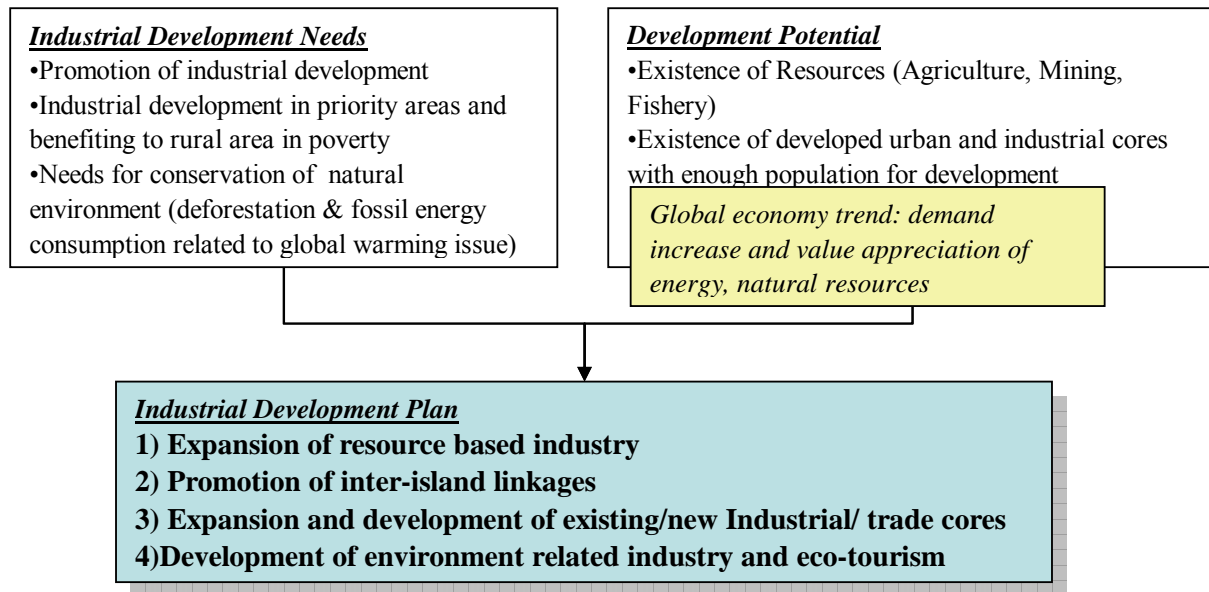


Figure 5.1 Industrial Development Plan for Sulawesi

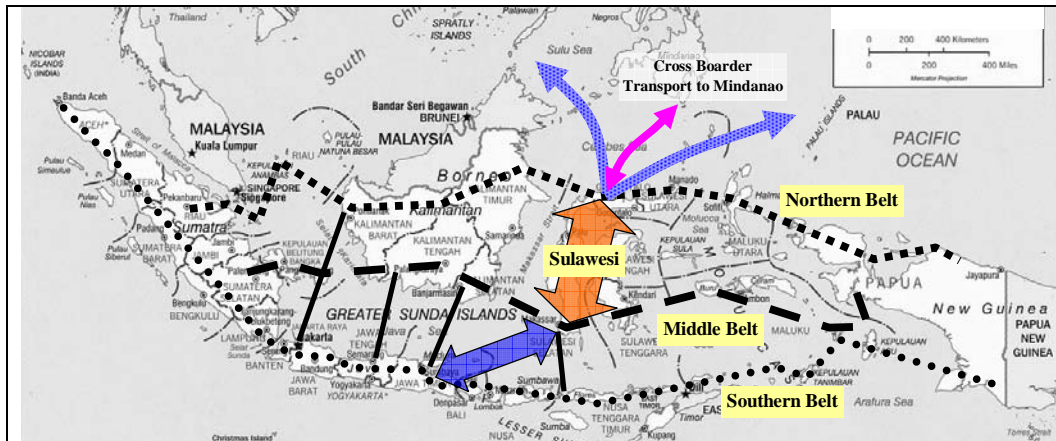
Prospective Resource-based Industries in Sulawesi

Several resource-based industries have great potential for development based on their production potential, global market trends, and domestic market linkages. New market tactics are important in order to realize the development of these prospective industries. To open up markets, especially China, some strategic measures should be taken under the framework of the ASEAN-China Free Trade Agreement (FTA). For instance, the export of cacao butter and powder processed in Sulawesi would find new markets if the imposed VAT is modified to benefit locally processed cacao. Moreover, the better treatment of FDI/DDI (domestic direct investment) should also be tactically studied.

Promotion of Interisland Linkages

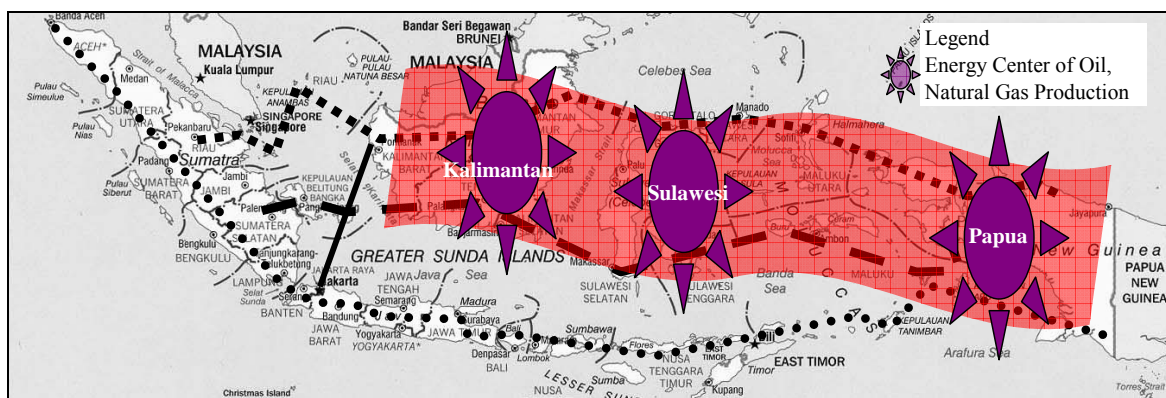
The national spatial plan defines three development belts for Indonesia. These are the Northern Belt, Middle Belt, and Southern Belt, as shown in Figure 5.2. Sulawesi occupies a strategic location that could link the three development belts including the neighboring ASEAN countries and even the northeastern Asian countries through Sulawesi's northern tip of Manado.

Another vital aspect of Sulawesi's role in the national development of Indonesia is that it is located near the energy- resource-rich Kalimantan and Papua, as shown in Figure 5.3.



Source: JICA Study Team

Figure 5.2 Proposed Linkage of Development Belts in Sulawesi

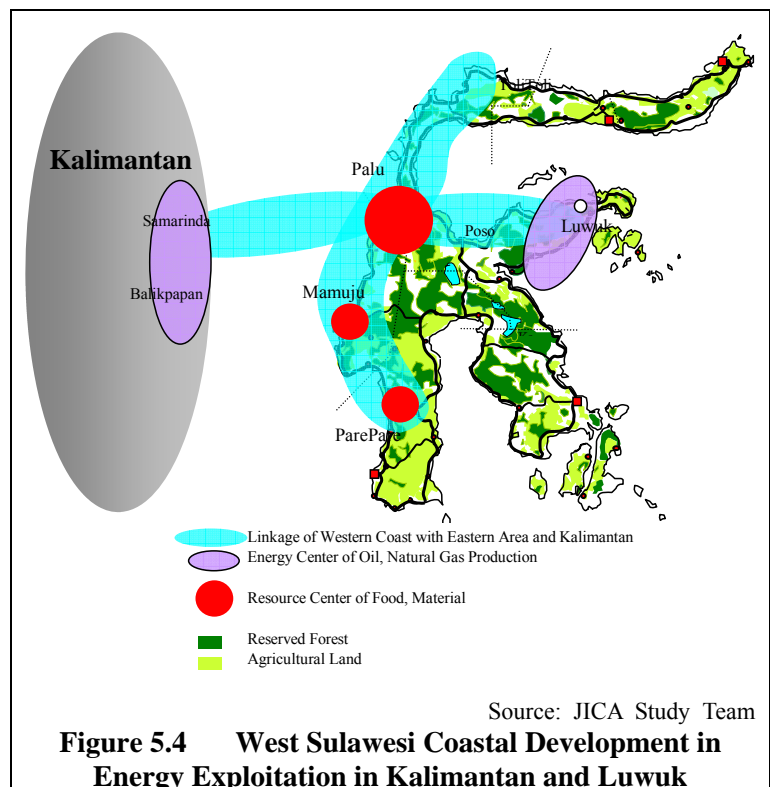


Source: JICA Study Team

Figure 5.3 Sulawesi's Role in Energy Resource Development in Eastern Indonesia

The western coast of Sulawesi Island can play a significant role in energy development in Kalimantan through the provision and trade of such resources as agricultural products, construction materials, and commodities, as shown in Figure 5.4. The cities of Palu, Mamuju, and Parepare will be the trading and distribution centers with Kalimantan. Also, considering that the Luwuk energy development area likewise holds great potential and significance, a resource supply mechanism should be utilized to support the Luwuk area.

Development of Industrialized

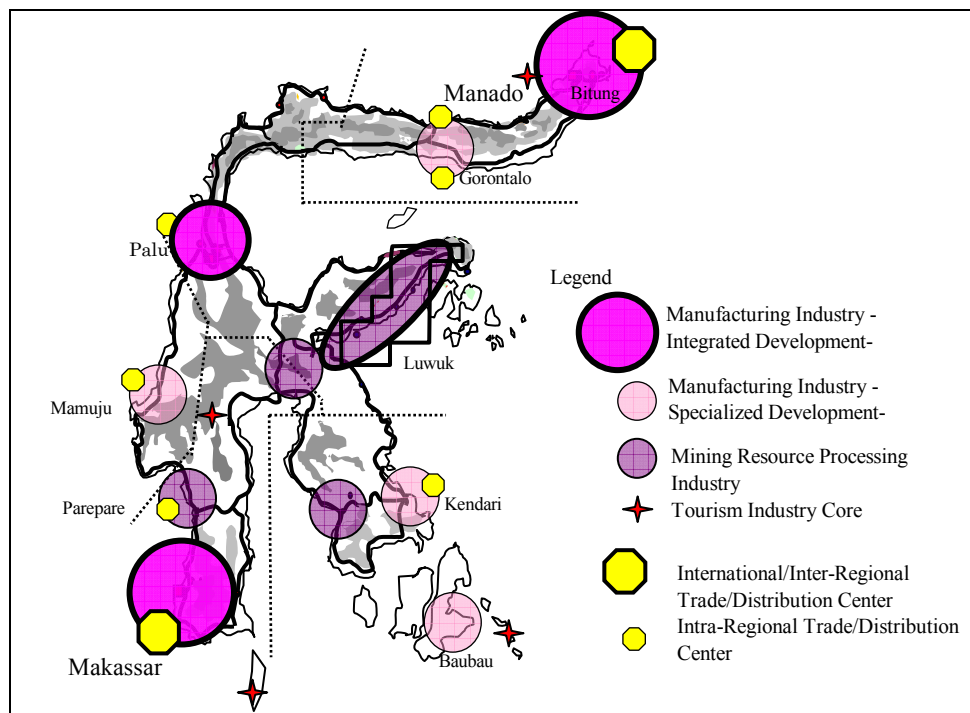


Source: JICA Study Team

Figure 5.4 West Sulawesi Coastal Development in Energy Exploitation in Kalimantan and Luwuk

Centers

To promote industrial development, industrial centers should be enhanced in a manner that the investment environment for FDIs and DDIs are improved. Considering the availability and distribution of resources and the establishment of existing industries, the following concept of industrialized centers can be proposed, as shown in Figure 5.5.



Source; JICA Study Team

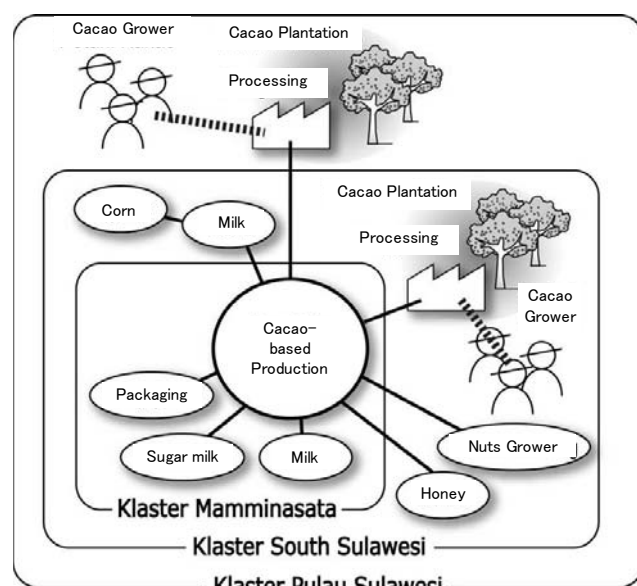
Figure 5.5 Concept of Industrial/Trade Centers

Development of Cluster-type Industrial Chains

The development of clustered industrial chains should be promoted. Concurrently, local communities, including resource growers, should be developed as primary processors in the cluster chains.

To connect the clusters, an efficient logistics system should be established to link production areas, processing zones, and markets.

Different types of cluster chains will be established by category of resources. Figure 5.6 is a case for cacao products.



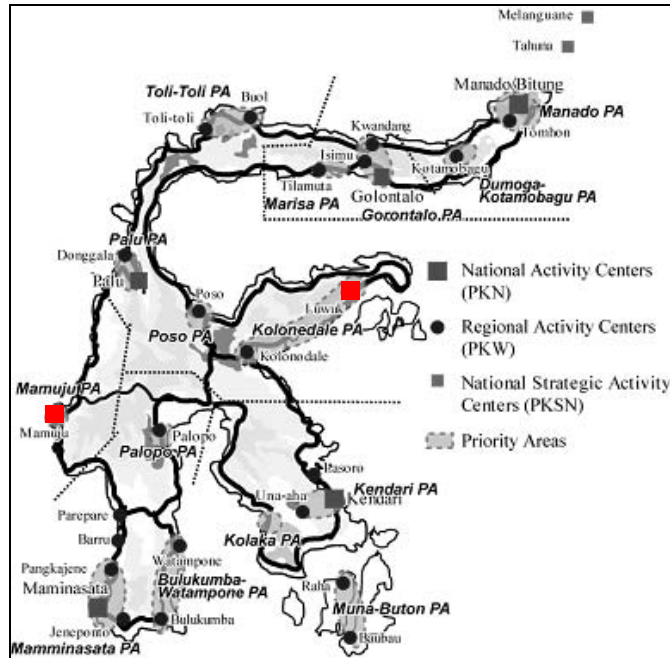
Source: JICA Study Team

Figure 5.6 Idea of Cacao Industry Cluster Chain

2) Economic Growth in Activity Centers

Development of Activity Centers

Sulawesi economy will be promoted by the economic development in the national and regional activity centers (cities). The National Spatial Plan designated the national and regional activity centers throughout Sulawesi as shown in Figure 5.7. Especially, the national activity centers such as Makassar, Manado, Palu, Kendari, Luwuk, Gorontalo and Mamuju will spearhead the economic development to benefit the region. Mamuju, presently designated as the regional activity center in the national spatial plan, is proposed as the National Activity Center in this report.



Source: National Spatial Plan 2007

Figure 5.7 Priority Areas and Service Centers Based on the Spatial Plan

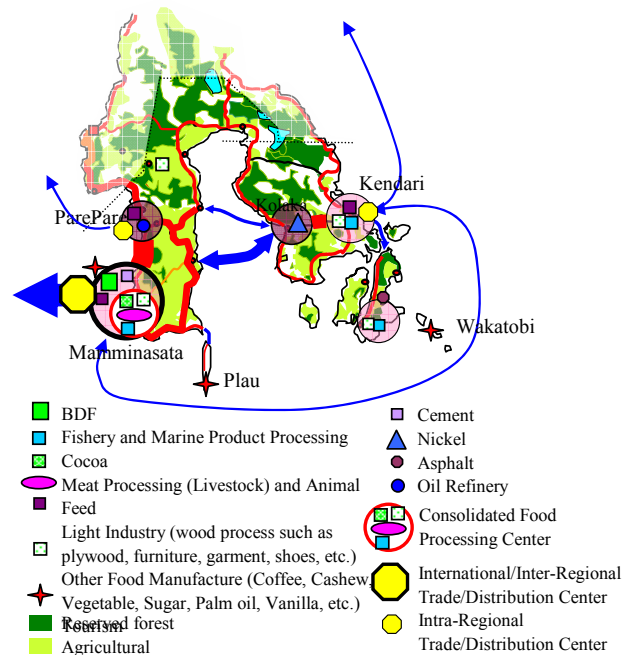
Development by Utilization of Existing Economic Linkage

To form the cluster-type industrial chain, activity centers will be networked over Sulawesi by utilization of the existing inter and intra island linkage as described below.

(South Province and Southeast Province)

The development on the basis of economic linkage between Makassar-Kendari is most important in the connection, utilization, and further promotion of concentrated populations and industries. Success of this development will contribute to the total economic growth of the island.

Makassar will continuously function as the gateway for interisland linkages. Both the neighboring Kalimantan energy base and Java Island will be tightly linked with the



Source: JICA Study Team

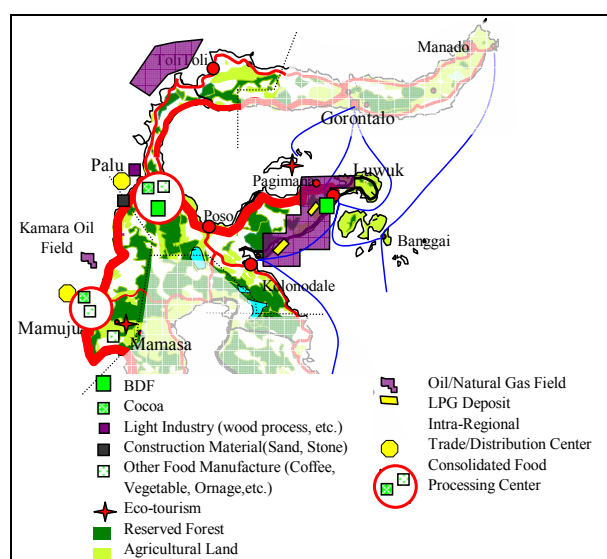
Figure 5.8 Development Plan of Makassar, Kendari

Makassar and Pare-pare priority areas through the distribution and transportation of commodities and passengers.

Kendari/Kolaka priority area will be further developed as a mineral resources industrial center for nickel and asphalt. Agricultural (cashew nut, palm oil, cacao) and fishery, as well as wood processing industries will have great potentials for growth. Eco-tourism activities, on the other hand, can be promoted in the remote islands of Wakatobi and Bantaeng, as shown in Figure 5.8.

(Central Province and West Province)

Palu-Mamuju-Luwuk is rich in agricultural and forest resources as well as construction materials. The Palu and Mamuju priority areas will be the trade center for products that will be shipped to the energy development areas in the eastern Kalimantan. Processing industries for cacao, wood, and food items such as vegetables and livestock, have great growth potentials in the priority area. Coconut- and Jatropha-based bio-diesel fuel industry is also proposed for Palu. In Mamasa area of West Province which is isolated due to the lack of arterial road access has rich potential of agricultural product and tourism destination like Tana Traja.



Source: JICA Study Team

Figure 5.9 Development Plan of Palu, Mamuju-Luwuk

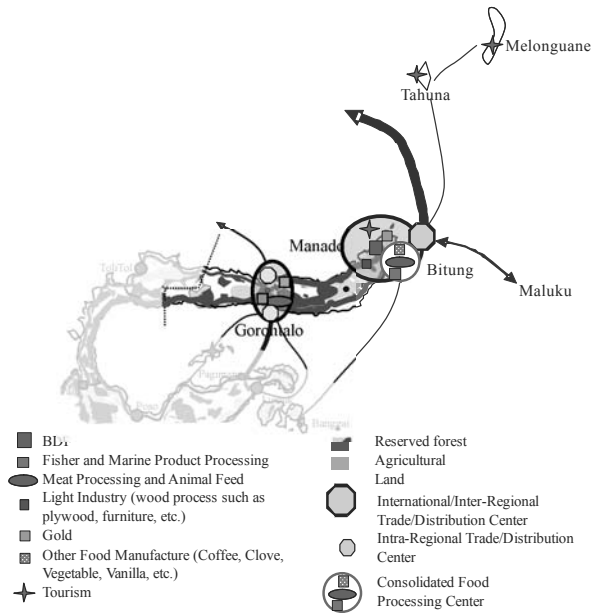
The Luwuk priority area will produce oil and natural gas, and this will be one of the strategic energy resources bases of Indonesia. The Luwuk energy production area will be supplied by Palu and others with food, materials, and manpower. Figure 5.9 shows the development plan on the basis of economic linkage between Palu-Mamuju-Luwuk.

(North Province and Gorontalo Province)

In the hinterland of the Provinces of Manado and Gorontalo, various kinds of agricultural, fishery and wood products can be produced for trading with southeast and northern Asian and Pacific countries through the Manado/Bitung gateway. Food manufacturing (e.g. fish canning, coconuts, coffee, vegetable oil, clove, animal feeds) and light industries will be developed and expanded in the Manado-Bitung priority area. The development of the coconut- or Jatropha-based bio-diesel fuel industry is also recommended in this priority area. To promote these industries, the introduction of an economic development zone comprising Manado, Bitung and Likpa will be effective.

In Gorontalo, the processing of maize and animal feeds from maize as well as fish and livestock processing holds promise.

Taking advantage of its reputation as a marine tourism destination, it is recommended that Manado should further promote marine eco-tourism especially with the growing world tourism market especially China. This will call for coordination between the development of industrial tourism and strict environmental and marine protection. Figure 5.10 shows the development plan on the basis of economic linkage between for the Manado-Gorontalo.



Source: JICA Study Team

Figure 5.10 Development Plan of Manado, Gorontalo

Development for Western Coastal Area

The western coastal area of Sulawesi Island includes the three provinces of South Sulawesi, West Sulawesi and Central Sulawesi covering the cities of Pare-pare, Mamuju, Palu, and Toli-toli. This coastal area occupies a strategic location that can support the energy-resource-rich Kalimantan due to the scarcity in food, construction materials, and commodities in the energy developing area of Kalimantan. Sulawesi's western coastal areas will have an edge in supporting Kalimantan with the rich agricultural, construction, and human resources from the hinterlands of Central and South Sulawesi as shown in Figure 5.11.

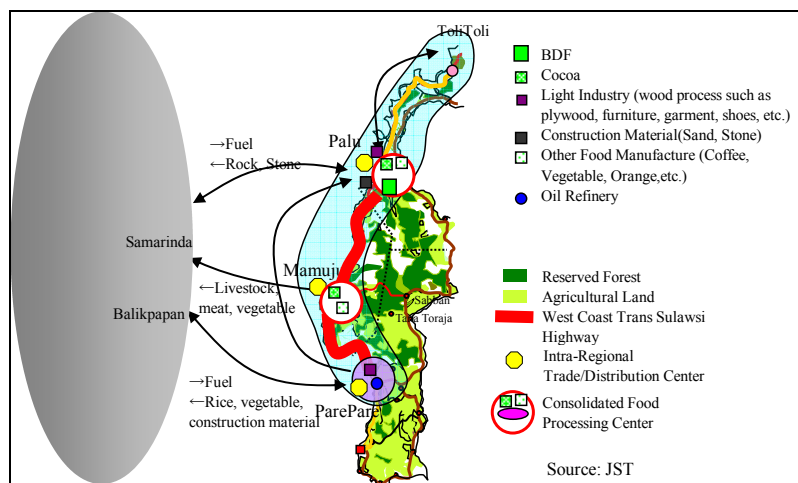


Figure 5.11 West Coast Development Plan with Linkage of Kalimantan

3) Social Service Improvement and Mitigation of Economic Gaps

In order to implement the Regional Development Strategy 3 on “alleviation of social and economic

disparities,” the following plan between areas was conceived:

- In line with population increases, the population concentration in the two developed cores of Makassar and Manado will accelerate, thereby requiring that the two developed cores be further developed to cope with such increases. At the same time, each provincial capital should function as the social and economic center of each province. Due to migration from rural areas, population increases are also predicted in the provincial capitals and regional urban service centers. Therefore, linkages between cities, provincial capitals, and urban service centers should be reinforced to improve social service provision and mitigate regional gaps.
- The transportation linkage concept connecting the activity centers and to be developed through a phased strategy is shown in Figure 5.12.

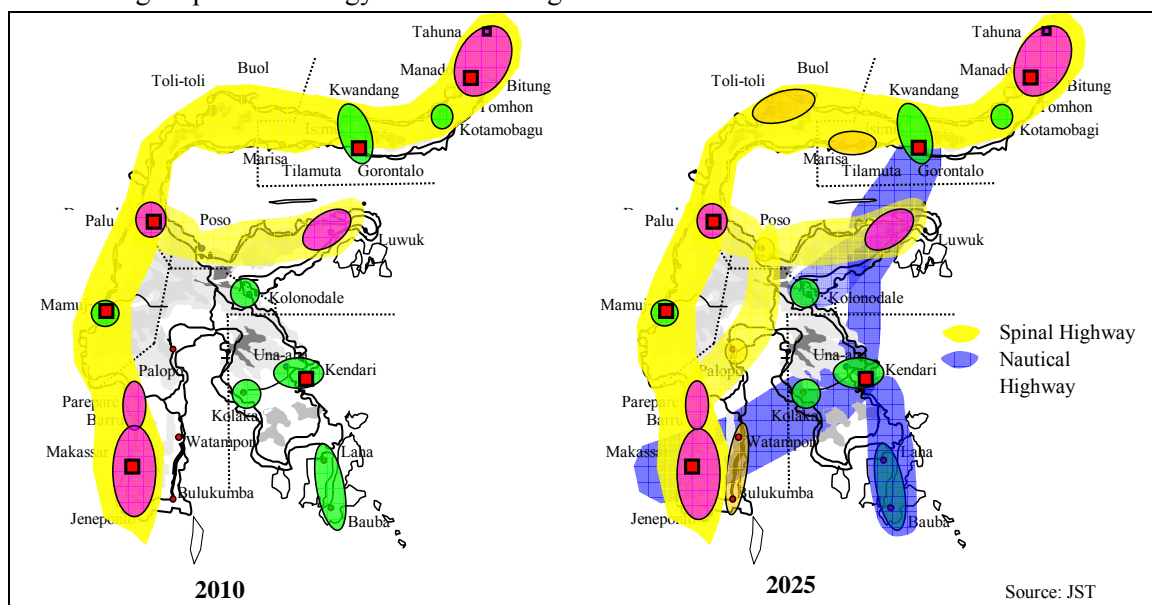


Figure 5.12 Transportation Network Concept connecting Priority Areas

- For isolated communities, especially those which are directly unapproachable from national and provincial roads and which suffer from high poverty rates, as shown in Figure 5.13, proper development support is necessary to attain government goals and improve the poverty rates of Indonesia. Providing road access to poor areas is one of the most effective socio-economic measures to alleviate poverty.
- The empowerment of local farmers through agricultural technology transfer and livelihood improvement is important to mitigate regional economic disparities. Agricultural technologies assisted by plantation investors and FDIs in the manufacturing industries, in addition to public agricultural institutes will help farmers in producing market-oriented products. Moreover, educational interventions by the local government, nongovernmental organizations, and donors will help local families in improving their livelihoods.

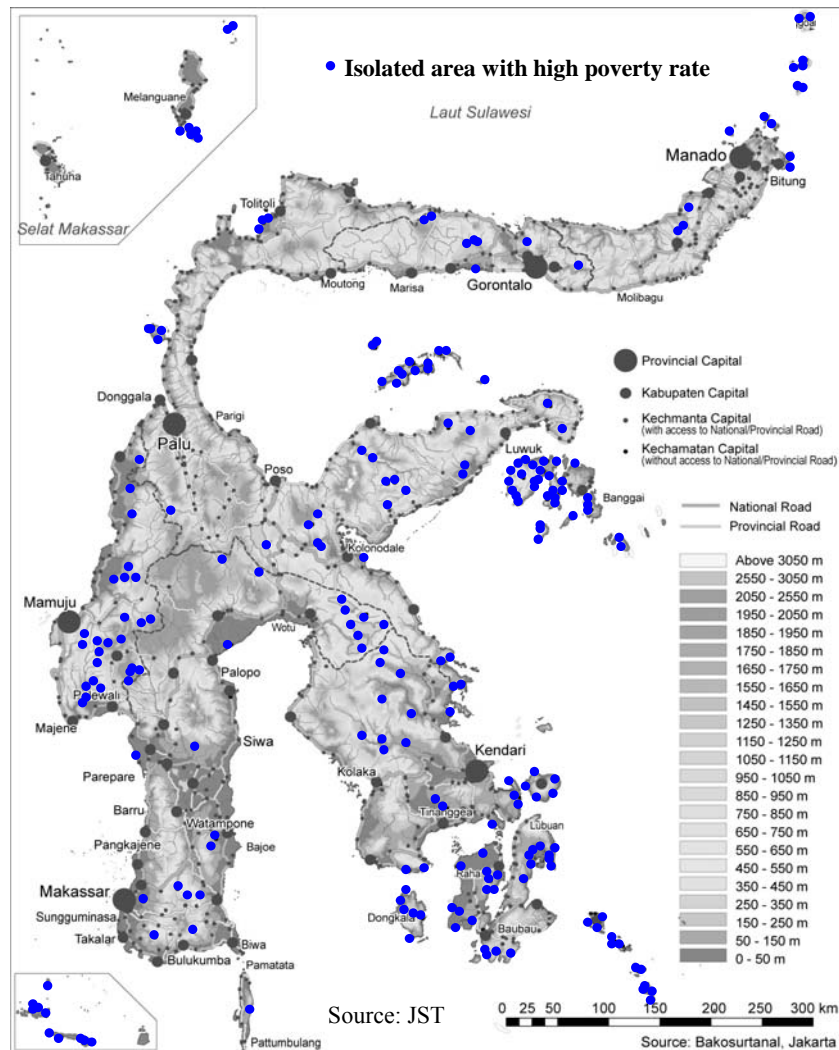


Figure 5.13 Isolated Human Settlements with High Poverty Rates

4) Environment-friendly Development and Disaster Prevention

For the Regional Development Strategy 4 which calls for a “development that pays full attention to environmental preservation and disaster resistance,” three concepts are proposed below.

Vertical Development

The land in Sulawesi Island has been utilized to its full extent, thus horizontal expansion for agricultural use is now difficult. Meanwhile, to address criticisms that Indonesia has the worst deforestation records, reforestation or, at least, the preservation of the remaining forest lands should be properly planned and carried out.

- Instead of deforestation, vertical land use by replacing aging trees in existing croplands is recommended so as to help increase yields. Intercropping and multiple cropping of high-yielding corn or other crops, such as soybean, are also proposed. .
- Natural resource management is important. Through proper natural resource management, communities throughout Sulawesi will be able to improve their incomes and enhance their

living standards in tandem with the conservation of their natural environment so as to preserve the island's biodiversity.

Reduction of Environmental Load (Idea for new energy and cycle-oriented industry)

The development of new energy sources, such as bio-diesel fuel (BDF), and the introduction of cycle-oriented industries through the reuse of residues are proposed hereunder.

(BDF)

Tentatively, 4 coconut-based bio-diesel development zones are proposed, as shown in Figure 5.14. Each zone is planned to have at least one unit of bio-diesel production plant with a capacity of 110,000 kl per year. The total capacity of the 4 plants will be 440,000 kl per year. Sulawesi's 400,000 kl BDF demand, which corresponds to 20% of the 2 million kl petroleum diesel consumption of Sulawesi, will be covered by the 4 BDF plants.

The four BDF plants will require around 660,000 hectares of land planted to coconuts. Because of the lack of virgin land for coconut plantation, several measures to ensure high productivity should be taken. This will include the replantation of existing coconut farms with more productive species and an effective harvest practice based on a 45-day cycle.

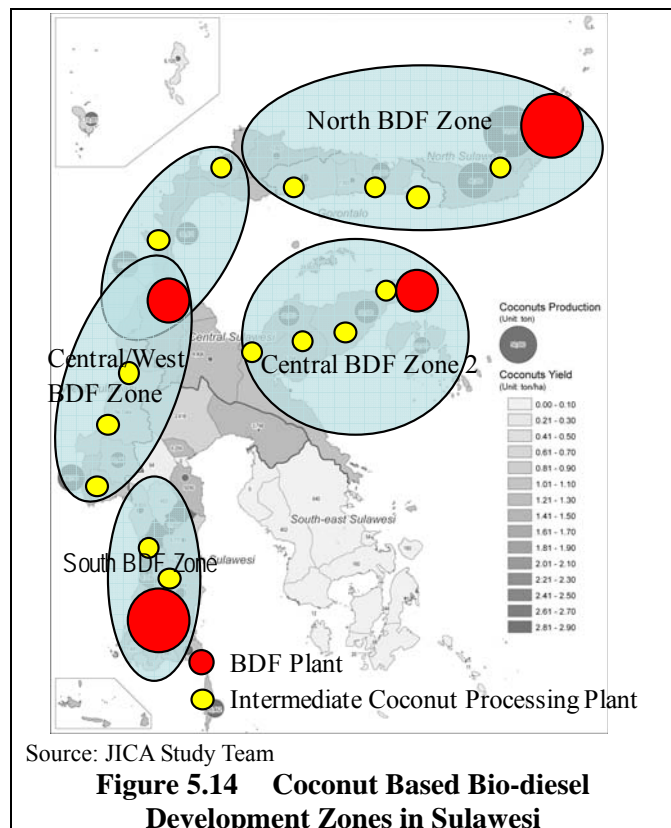


Figure 5.14 Coconut Based Bio-diesel Development Zones in Sulawesi

Theoretically, if pump prices of diesel remain constant at, say, US\$ 0.55 per liter, the annual sales of 400,000 kl of bio-diesel will be US\$ 220 million in Sulawesi alone.

(Recycling of Residues in CFPC)

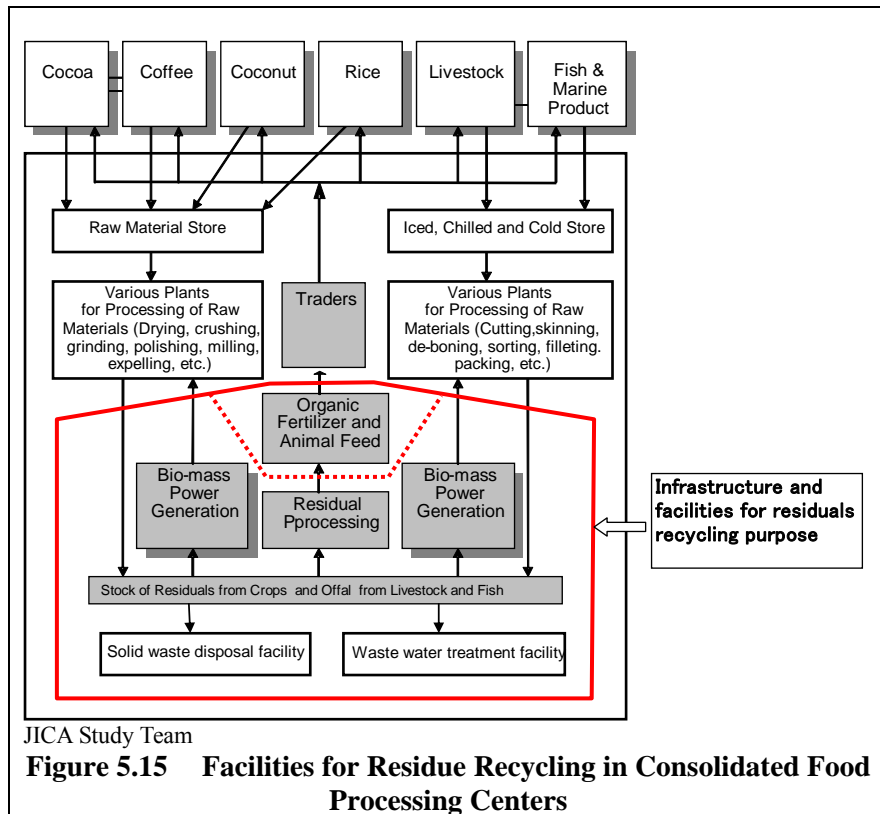
Figure 5.15 proposes the development of consolidated food processing centers (CFPCs) in Mamminasata and Manado, which are food processing industrial complexes.

The proposed CFPCs will comprise the following facilities for recycling residues:

- Residue processing plants.
- Bio-mass generation plants.
- Organic fertilizer and animal feed makers.

- Power supply system, water supply system, liquid waste treatment system, solid waste treatment system.

The significant function of the CFPCs is that its function is not limited to food processing but also to the production of by-products from residues from the first processing and recycling these back to the farm as organic fertilizers or animal feeds. Solid wastes which can be burned (i.e. rice hull, coconut husk, corn cob, etc.) could be used as bio-mass energy sources to generate electricity or run the boilers, which are needed for food processing.



(Disaster-free Island)

To cope with potential natural disasters, regional disaster prevention capacities should be enhanced. In the event of disasters, the relief, recovery, rehabilitation, and reconstruction of the damaged areas will be necessary.

Although Sulawesi has not suffered from catastrophes, such as volcanic eruptions and tsunamis, or disasters, such as floods and landslides, these are events that could still happen. To prepare for disasters, mitigate damages, and ensure prompt recovery from them, disaster information and alert systems, as well as accessibility to damaged areas for relief, recovery, and reconstruction, will be necessary.

(3) Land-use Plans

1) Land Use Principles

Since land for development is quite limited in Sulawesi, future economic growth will require more intensive uses of built-up or developed areas. At the same time, in order not to bring about negative environmental impacts, there is a need to pay attention to environmental sustainability.

A center is defined as a node which accommodates (or will accommodate) a dense number of

people as well as intensive economic activities. Existing nodes, i.e. cities, towns, and major villages, can be categorized as centers. The Study classifies the potential nodes into interregional/international center and intraregional centers in consideration of their population and scale of economic activities.

A zone is defined as a spatial extent where valuable natural resources for supporting people's lives and economic activities (in a center) are available. In the Study, classifications of zones are: (1) agriculture zone, (2) regional forest zone, (3) nature park, and (4) nature/wildlife reserve.

Table 5.1 shows a general idea of the land-use classification.

Table 5.1 Land Use Classification

1 st Classification	2 nd Classification	Remarks
Center	Inter-regional/International Center	National Activity Center (<i>PKN: Pusat Kegiatan Nasional</i>) would be candidate
	Intra-regional Center	Regional Activity Center (<i>PKW: Pusat Kegiatan Wilayah</i>) would be candidate
Zone	Agriculture Zone	Existing agriculture area and its surroundings
	Regional Forest Zone	Forest area (including protection forest) and its surroundings
	Nature Park	Designated nature park
	Nature/Wildlife Reserve	Designated reserve

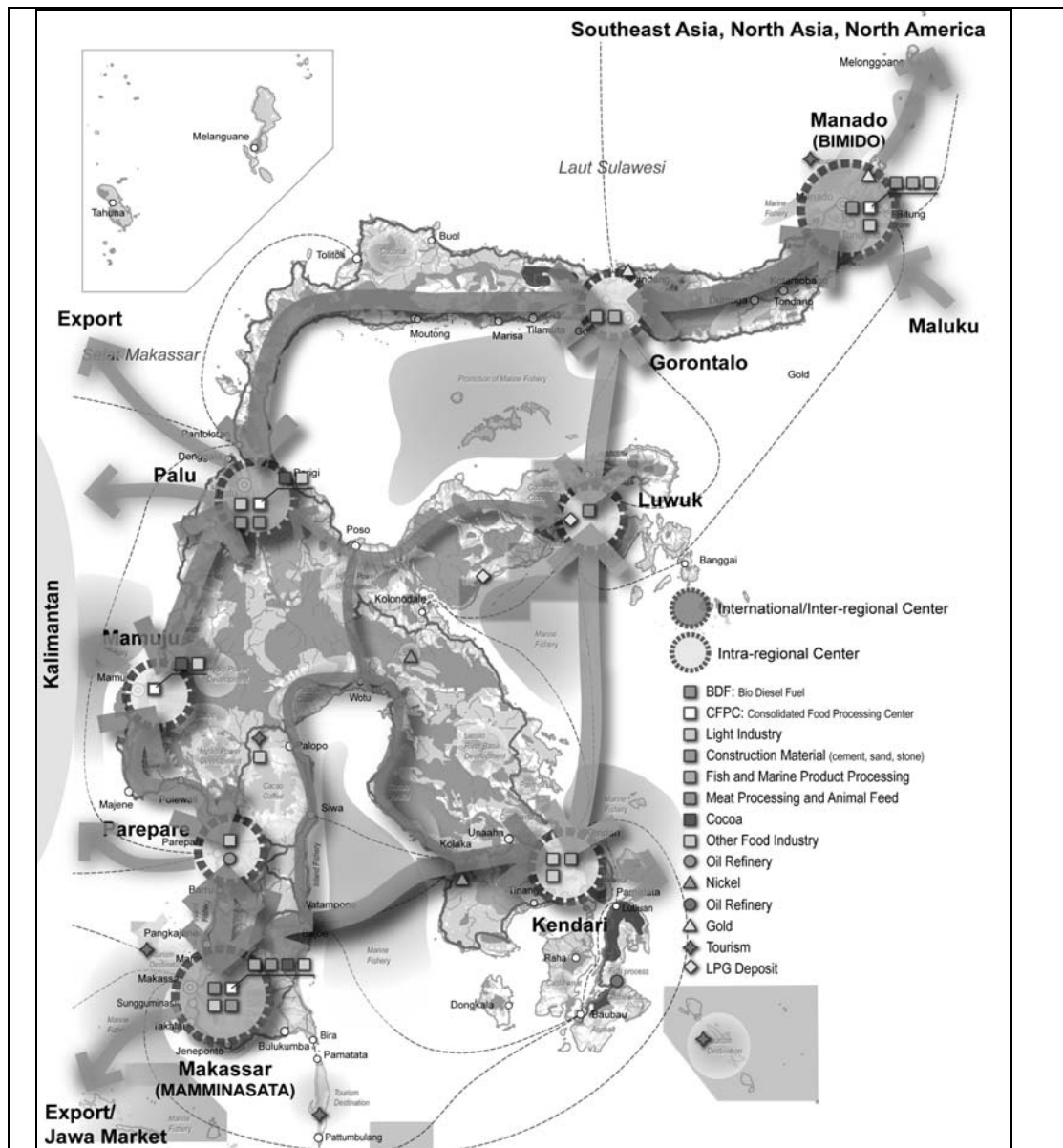
Source: JST

It is hoped that the stakeholders concerned, including provincial governments, would take into consideration the proposed Land Use Classification in addition to their own plans/programs, so as to have good coordination each other in a whole island perspective.

2) Land Use Framework

Based on the land-use classifications, the Study has proposed a preliminary land-use framework for Sulawesi Island up to 2023, as illustrated in Figure 5.16.

Three interregional/international centers (shown in red circles) and five intraregional centers (shown in yellow circles) are to be created in the whole island. Economic linkages among the centers are expected to be enhanced by means of improved or upgraded arterial road networks and sea lanes. At the same time, agricultural zones should be enhanced through improved production and quality of priority crops, while green hinterlands should be appropriately managed in compliance with proper laws and regulations.



Source: JICA Study Team

Figure 5.16 Land-use Framework for Sulawesi Island up to 2024

North Sulawesi Province would play a leading role in Northern Economy Linkage. Particularly, Manado and its surroundings, called BIMIDO (Bitung-Minahasa-Manado), designated as the interregional/international center is expected to grow for an international trading core toward the future. It is proposed in the Study, to strengthen the linkage to the west, that the northern coastal road to Gorontalo should be urgently upgraded as a Trans-Sulawesi section, while the southern coastal road would be a long-term priority in consideration of the cost-effectiveness.

Gorontalo Province is now applying as a KAPET aimed mainly at promoting food-industries. A corn-related industry is one of the potential or strategic industries according to their regional economic plan. City of Gorontalo is in a key location in transportation, from which national road and national sea lane extend for Central Economic Linkage. Meanwhile, there is a need for improving inland crossing transportation between the northern coastal line and the southern

coastal line in order to enhance the accessibility in the isolated areas.

Palu, the Capital of Central Sulawesi Province, is designated as the interregional/international center, while Luwuk is the intraregional center. Palu has a strategic location that connects it with Sulawesi and Kalimantan. It has a potential for an integrated industrial development with emphasis on hinterland agriculture which can be supported by the sea port (Pantoloan) and the airport (Palu). Luwuk holds a huge potential for natural oil/gas which can be exploited in the near future. It is expected to boost energy-related industries, while its green area should be appropriately conserved or protected. Even though it has already been designated as a KAPET, this area is not yet developed due to its geographic characteristics. To open this area to the Sulawesi economy, sea lane transportation from and to Luwuk (and Pagimana) is proposed to be enhanced in order to strengthen its linkages with the other peninsulas (to Gorontalo and to Kendari), while improving its inland transport to Palu via Poso.

Mamuju, the Capital of West Province, is in a strategic location with the potential hinterland agriculture zones, which is expected to contribute to plural economic linkages, i.e. Central Economy Linkage, Western Economy Linkage and Southern Economy Linkage. Currently, the road network between Mamuju and Palu is under poor condition. Therefore, this road, as a Trans-Sulawesi section between Palu, Mamuju and Pare-pare, should be improved. In addition, inland road network to the isolated areas should be improved so that agricultural products can be smoothly transported.

Makassar, the Capital of South Province, and its surroundings called MAMMINASATA (Makassar-Gowa-Maros-Takalar) are designated as the interregional/international center, while Pare-pare is the intraregional center. Makassar, with its relatively good infrastructures, is the largest city in Sulawesi Island in terms of population and economic activities. To further create a more intensive industrial development, the Mamminasata Integrated Spatial Plan was recently drafted through coordination with a provincial development coordination body (BKSPMM), which proposed several new industrial areas for development after KIMA. Pare-pare is located 150km north of Makassar. Although it is already designated as a KAPET supported by a sea port, it has yet to see substantial progress in development. A plan for an oil refinery plant has already been drafted to lead the regional economy there.

To further enhance the South Sulawesi economy, the national road section between Makassar and Pare-pare is highly prioritized, following the national development policy.

Kendari, the Capital of Southeast Province has been designated as a KAPET, and has been in a top position in per-capita GRDP in Sulawesi because of the mining production of nickel and asphalt. To integrate this area more with the overall Sulawesi economy, an enhanced sea lane transport is ideal measures as nautical highway to South Sulawesi and to Central Sulawesi. At the same time, since the province has a lot of small islands without efficient accessibility, local transportation system in such remote areas should be taken into consideration.