

Ministry of Regional Development, Building, Housing and Public Works (MAHTP)
Government of the Republic of Madagascar

The Project on Master Plan Formulation for Economic Axis of TaToM (Antananarivo-Toamasina, Madagasikara)



Final Report Summary

October 2019

Japan International Cooperation Agency (JICA)

Oriental Consultants Global Co., Ltd.
CTI Engineering International Co., Ltd.
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Currency Exchange Rates

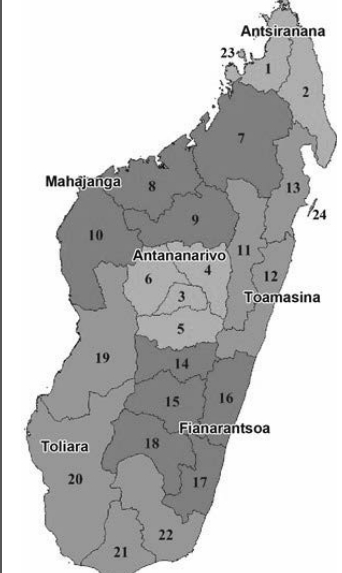
EUR 1.00 = JPY 127.145
EUR 1.00 = MGA 3,989.95
USD 1.00 = JPY 111.126
USD 1.00 = MGA 3,489.153
MGA 1.00 = JPY 0.0319

Average during the period between June 2018 and June 2019

Administrative Divisions of Madagascar

The decentralised administrative divisions of Madagascar is divided into 22 regions which are further divided into 114 districts. The districts are further divided into communes and each communes into fokontany. Besides the decentralised administrative divisions, the country is subdivided into six provinces, divided into 24 prefectures. The prefectures are divided into 117 districts and further into arrondissements.

The boundary of region and prefecture are same except for two prefectures Nosy Be and Sainte Marie, which are exception. The boundaries of these two prefectures follows the district boundaries.

	Provinces	Regions	Provinces	Regions
	Antsiranana	1 Diana 2 Sava	Toamasina	11 Alaotra-Mangoro 12 Atsinanana 13 Analanjirofo
	Antananarivo	3 Itasy 4 Analamanga 5 Vakinankaratra 6 Bongolava	Fianarantsoa	14 Amoron'i Mania 15 Matsiatra Ambony 16 Vatovavy-Fitovinany 17 Atsimo-Atsinanana 18 Ihorombe
	Mahajanga	7 Sofia 8 Boeny 9 Betsiboka 10 Melaky	Toliary	19 Menabe 20 Atsimo-Andrefana 21 Androy 22 Anosy


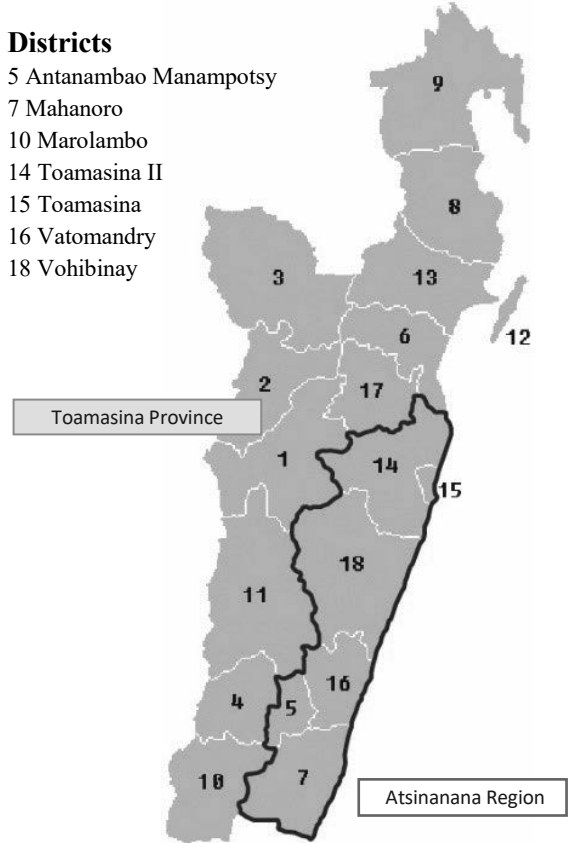
Analamanga Region	Atsinanana Region
<p>Districts</p> <ul style="list-style-type: none"> 2 Ambohidratrimo 3 Andramasina 4 Anjozorobe 5 Ankazobe 6 Antananarivo-Atsimondrano 7 Antananarivo-Avaradrano 8 Antananarivo-Renivohitra 16 Manjakandriana 	<p>Districts</p> <ul style="list-style-type: none"> 5 Antanambao Manampotsy 7 Mahanoro 10 Marolambo 14 Toamasina II 15 Toamasina 16 Vatomandry 18 Vohibinay 

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List of Abbreviations

ABBREVIATION	ENGLISH	FRENCH
AfCFTA	The African Continental Free Trade Area	-
AFD	French Development Agency	Agence Francaise de Développement
APIPA	Authority for Protection against Flooding of the Plain of Antananarivo	Autorité pour la Protection contre les Inondations de la Plaine d'Antananarivo
CMP	Cutting, Making and Packaging	-
COMESA	Common Market for Eastern and Southern Africa	-
CSB	Basic Health Centre	Centre de Sante de Base
CUA	Urban Commune of Antananarivo	Commune Urbaine d'Antananarivo
CUT	Urban Commune of Toamasina	Commune Urbaine de Toamasina
EAC	East Africa Community	-
EDBM	Economic Development Board of Madagascar	-
EDF	European Development Fund	-
EU	European Union	-
FAO	Food and Agriculture Organization	-
FDI	Foreign Direct Investment	-
FTA	Free Trade Area	-
GDP	Gross Domestic Product	-
GIS	Geographic Information System	-
GRDP	Gross Regional Domestic Products	-
HDI	Human Development Index	-
ICT	Information and Communication Technology	-
IMF	International Monetary Fund	-
INSTAT	National Institute for Statistics	Institut National de la Statistique
IOC	Indian Ocean Commission	-
IORA	Indian Ocean Rim Association	-
JICA	Japan International Cooperation Agency	-
LSC	Local Steering Committee	-
M2PATE	Ministry attached to the Presidency in charge of Presidential Projects, Planning and Equipment	Minitere aupres de la Presidence en charge des Projets Presidentiels, de l'Amenagement du Territoire et de l'Equipement
MAHTP	Ministry of Regional Development, Building, Housing and Public Works	Ministère de l'Aménagement du Territoire, de l'Habitat et des Travaux Publics
MGA	Malagasy Ariary	-
MTM	Ministry of Transports and Meteorology	Ministère des Transports et de la Météorologie
MTTM	Ministry of Transports, Tourism and Meteorology	Ministère des Transports, du Tourisme et de la Météorologie
NR	National Road	-
NSC	National Steering Committee	-
ODA	Official Development Assistance	Aide Publique au Développement
PIAA	Integrated Sanitation Program of Antananarivo	Programme Intégré d'Assainissement d'Antananarivo

PMU	Project Management Unit	-
PND	National Development Plan	Plan National de Développement
PPP	Public Private Partnership	-
PRESAN	Regional Programme for Food Security and Nutrition	Programme régional de sécurité alimentaire et de nutrition
PUDi	Urban Master Plan	Plan d'Urbanisme Directeur
RECs	Regional Economic Communities	-
SADC	Southern African Development Community	-
SAMVA	Autonomous Department for Maintenance of Antananarivo	Service Autonome de Maintenance de la Ville d' Antananarivo
SEA	Strategic Environmental Assessment	-
SEZ	Special Economic Zone	-
SME	Small and Medium Enterprise	-
TaToM	Antananarivo-Toamasina, Madagascar	-
TaToM Project	The Project on Master Plan Formulation for Economic Axis of TaToM	-
USD	United State Dollar	-

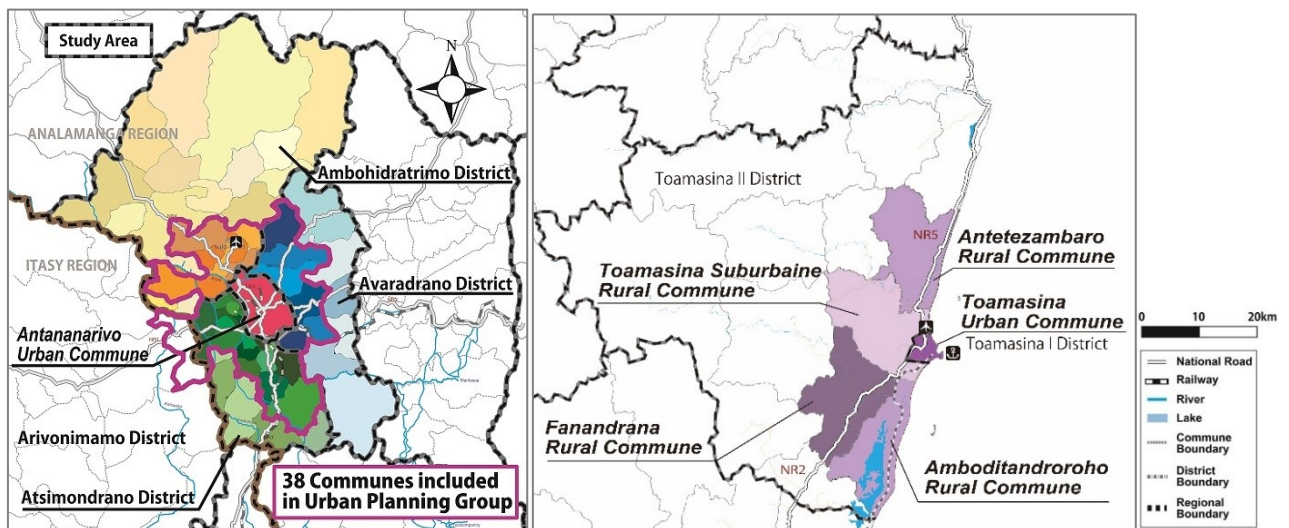
ABBREVIATION	ENGLISH	MALAGASY
JIRAMA	Malagasy Water and Electricity	Jiro sy Rano Malagasy

Executive Summary

Overall TaToM Area

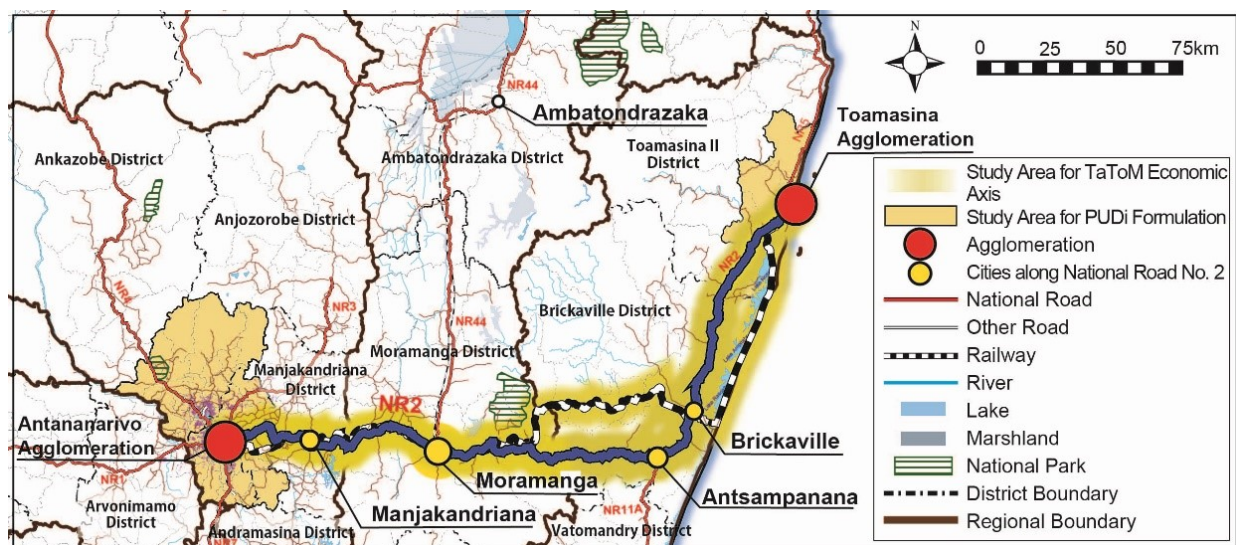
Target Area for the Master Plan: TaToM Area covering Antananarivo Agglomeration (Antananarivo Urban Commune (CUA: *Commune Urbaine d'Antananarivo*) and its surrounding 37 communes), Toamasina Agglomeration (Toamasina Urban Commune (CUT: *Commune Urbaine de Toamasina*) and its surrounding four communes) and TaToM Economic Axis (connecting the two agglomerations).

The whole area of TaToM (the Overall TaToM Area) is composed of three areas, namely, Antananarivo Agglomeration, Toamasina Agglomeration and the TaToM Economic Axis.



Source: JICA Study Team

Figure 1 Study Area for Antananarivo Agglomeration and Toamasina Agglomeration



Source: JICA Study Team

Figure 2 Study Area for Antananarivo - Toamasina Economic Axis

Future Vision for Overall TaToM Area: Through the development of the Overall TaToM Area, Madagascar's economy will be reconstructed and the stability of Madagascar's society will be regained. The Overall TaToM Area will sustainably develop its own economic sectors. Furthermore, it could support the development of economies of other regions by enhancing the connectivity to other regions from Antananarivo and the connectivity to other regions from Toamasina Port through the upgrading of the transport function of the TaToM Economic Axis.

Target Years of the Master Plan: Year 2023 for the Short Term, Year 2028 for the Mid Term and Year 2033 for the Long Term

Present Situation and Issues of Madagascar and Overall TaToM Area:

- In Madagascar, an abundant, relatively low-wage labour force exists. The wage level of Madagascar belongs to the group of 25 countries with the lowest minimum wages. The labour force is also hard working and good with hands. This labour force is concentrated especially in Antananarivo Agglomeration, the capital of Madagascar.
- An export-oriented textile industry is prominent in Madagascar. It has been incorporated in the global value chain. Madagascar is also one of the world-famous destinations of nature tourism because of rare animals and plants.
- On the other hand, the condition of economic infrastructure, such as power supply, water supply and access roads, is poor. As a result, it is difficult to attract investments to economic sectors so as to promote the development of the economic sectors. Government funds for infrastructure development are largely lacking. In addition, government capacity is too weak to promote agricultural and industrial development.
- However, the school education system has so degraded that students cannot acquire basic academic skills. As a result, the basic academic skills of young people have declined.

Table 1 National GDP Composition by Sub-Sector (at constant prices)

(Top: Billion Ariary, Bottom: %)

	2007	2008	2009	2010	2011	2012	2013	2014 (*)	2015 (*)	2016 (*)
Primary Sector	4,423.0 (28.8)	4,524.8 (27.8)	4,770.8 (30.3)	4,658.2 (29.6)	4,759.4 (29.7)	4,875.8 (29.4)	4,606.2 (27.4)	4,683.9 (27.0)	4,610.2 (25.9)	4,672.1 (25.4)
Agriculture	2,989.5 (19.5)	3,075.3 (18.9)	3,263.0 (20.8)	3,254.7 (20.7)	3,310.2 (20.7)	3,421.7 (20.6)	3,131.0 (18.6)	3,167.0 (18.2)	3,073.7 (17.3)	3,101.1 (16.9)
Livestock and Fishing	1,266.7 (8.3)	1,281.0 (7.9)	1,287.2 (8.2)	1,180.6 (7.5)	1,233.7 (7.5)	1,248.2 (7.5)	1,266.2 (7.5)	1,304.2 (7.5)	1,321.6 (7.4)	1,354.0 (7.4)
Forestry	166.8 (1.1)	168.5 (1.0)	220.7 (1.4)	222.9 (1.4)	215.5 (1.3)	205.8 (1.2)	208.9 (1.2)	212.8 (1.2)	214.9 (1.2)	217.0 (1.2)
Secondary Sector	2,022.7 (13.2)	2,138.7 (13.1)	2,002.3 (12.7)	2,038.7 (13.0)	2,111.3 (13.2)	2,294.2 (13.8)	2,784.9 (16.6)	2,966.7 (17.1)	3,194.5 (17.9)	3,292.0 (17.9)
Extractive industry	116.0 (0.8)	126.4 (0.8)	118.8 (0.8)	194.4 (1.2)	218.4 (1.4)	356.8 (2.2)	848.0 (5.0)	975.8 (5.6)	1,159.6 (6.5)	1,118.0 (6.1)
Food, drink, tobacco	763.7 (5.0)	803.0 (4.9)	789.0 (5.0)	797.7 (5.1)	819.0 (5.1)	840.4 (5.1)	825.0 (4.9)	846.5 (4.9)	864.3 (4.9)	902.9 (4.9)
Textile	345.7 (2.3)	343.0 (2.1)	314.4 (2.0)	282.8 (1.8)	285.9 (1.8)	288.9 (1.7)	304.9 (1.8)	309.7 (1.8)	299.7 (1.7)	340.3 (1.9)
Wood, paper, printing	174.9 (1.1)	168.2 (1.0)	170.5 (1.1)	184.1 (1.2)	177.9 (1.1)	179.5 (1.1)	184.7 (1.1)	188.8 (1.1)	197.3 (1.1)	212.1 (1.2)
Construction materials	56.4 (0.4)	63.3 (0.4)	59.0 (0.4)	60.9 (0.4)	63.3 (0.4)	65.0 (0.4)	61.1 (0.4)	63.1 (0.4)	64.7 (0.4)	68.1 (0.4)
Metal industry	156.7 (1.0)	219.5 (1.3)	172.6 (1.1)	143.8 (0.9)	165.7 (1.0)	168.6 (1.0)	149.2 (0.9)	153.7 (0.9)	164.9 (0.9)	175.4 (1.0)
Machine, electrical equipment	63.7 (0.4)	48.8 (0.3)	39.1 (0.2)	27.5 (0.2)	24.8 (0.2)	25.1 (0.2)	25.4 (0.2)	25.8 (0.1)	26.3 (0.1)	26.8 (0.1)
Various industries	187.5 (1.2)	197.5 (1.2)	171.0 (1.1)	167.9 (1.1)	170.5 (1.1)	172.8 (1.0)	172.6 (1.0)	175.9 (1.0)	181.9 (1.0)	195.8 (1.1)
Electricity, water, gas	158.1 (1.0)	169.0 (1.0)	167.9 (1.1)	179.8 (1.1)	185.7 (1.2)	197.1 (1.2)	214.1 (1.3)	227.4 (1.3)	235.8 (1.3)	252.6 (1.4)
Tertiary Sector	8,899.0 (58.0)	9,611.0 (59.1)	8,949.1 (56.9)	9,041.3 (57.4)	9,130.2 (57.1)	9,416.9 (56.8)	9,405.1 (56.0)	9,717.3 (55.9)	9,999.1 (56.2)	10,422.7 (56.7)
Public Work	1,285.2 (8.4)	1,663.6 (10.2)	1,370.4 (8.7)	1,412.1 (9.0)	1,460.3 (9.1)	1,511.7 (9.1)	1,482.8 (8.8)	1,529.9 (8.8)	1,677.4 (9.4)	1,778.6 (9.7)
Trade, maintenance, repairs	1,837.9 (12.0)	1,879.9 (11.6)	1,936.2 (12.3)	1,912.6 (12.2)	1,954.4 (12.2)	1,996.6 (12.0)	1,934.5 (11.5)	1,990.2 (11.5)	2,015.5 (11.3)	2,083.4 (11.3)
Hotel, Restaurant	334.6 (2.2)	364.2 (2.2)	178.0 (1.1)	195.5 (1.2)	212.0 (1.3)	239.9 (1.4)	231.5 (1.4)	251.6 (1.4)	258.4 (1.5)	294.3 (1.6)
Transportation	1,424.2 (9.3)	1,510.4 (9.3)	1,317.3 (8.4)	1,352.8 (8.6)	1,342.7 (8.4)	1,413.6 (8.5)	1,465.1 (8.7)	1,486.4 (8.6)	1,498.1 (8.4)	1,588.7 (8.5)
Post and telecommunication	249.0 (1.6)	265.0 (1.6)	296.8 (1.9)	335.6 (2.1)	351.5 (2.2)	371.9 (2.2)	405.3 (2.4)	412.5 (2.4)	394.2 (2.2)	430.8 (2.3)
Bank	326.7 (2.1)	356.0 (2.2)	420.4 (2.7)	405.2 (2.6)	429.8 (2.7)	446.5 (2.7)	465.2 (2.8)	528.4 (3.0)	627.6 (3.5)	677.8 (3.7)
Business services	1,233.4 (8.0)	1,307.1 (8.0)	1,245.6 (7.9)	1,281.9 (8.1)	1,323.3 (8.3)	1,367.1 (8.2)	1,406.9 (8.4)	1,427.7 (8.2)	1,466.4 (8.2)	1,520.9 (8.3)
Administration	1,211.0 (7.9)	1,336.6 (8.2)	1,294.5 (8.2)	1,254.0 (8.0)	1,216.4 (7.6)	1,193.4 (7.2)	1,172.5 (7.0)	1,185.0 (6.8)	1,162.3 (6.5)	1,149.5 (6.3)
Education	509.2 (3.3)	431.2 (2.6)	407.8 (2.6)	407.0 (2.6)	350.6 (2.2)	381.6 (2.3)	343.5 (2.0)	396.7 (2.3)	393.4 (2.2)	389.6 (2.1)
Health	247.5 (1.6)	253.2 (1.6)	231.9 (1.5)	226.9 (1.4)	224.0 (1.4)	222.5 (1.3)	217.7 (1.3)	220.3 (1.3)	219.3 (1.2)	223.8 (1.2)
Services provided to households	240.3 (1.6)	243.9 (1.5)	250.1 (1.6)	257.7 (1.6)	265.1 (1.7)	272.1 (1.6)	280.1 (1.7)	288.6 (1.7)	286.5 (1.6)	305.3 (1.7)
Total	15,344.7 (100.0)	16,274.5 (100.0)	15,722.2 (100.0)	15,738.2 (100.0)	16,000.9 (100.0)	16,586.9 (100.0)	16,796.2 (100.0)	17,367.9 (100.0)	17,803.8 (100.0)	18,386.8 (100.0)

Note: (*) Provisional Version

Source: JICA Study Team based on National Statistics Institute (INSTAT) (June, 2018)

Future Socio-Economy, Changes of External Environment and Development Potential for Madagascar and Overall TaToM Area

- Madagascar is a member country of regional economic communities (RECs), such as SADC, COMESA and IORA, as well as AfCFTA. By promoting the regional economic integration related to those organizations, it will become possible to get access to the regional markets with high growth potentiality and to develop economic sectors targeting their regional consumer markets.
- With expansion of Toamasina Port, world largest container vessels will be able to call at the Toamasina Port for transshipment like Port Louis in Mauritius and feeder ships will run from Toamasina Port to ports in the eastern and southern Africa. As a result, access by cargo ships to markets of countries in the Indian Ocean and on the African Continent will become easier, the cost of transport to those countries will be reduced and the possibility of promoting economic sectors targeting regional markets will increase.
- Madagascar's national population growth rates are still high, and its demographic dividend will reach the highest after year 2050.
- Wages of workers in China and Southeast Asia are gradually increasing. Still having cheap, abundant labour force, South Asian countries, like Bangladesh and Pakistan, do not have so large production capacity as China. There are not so many countries that can take over China's position of low cost manufacturing. However, Madagascar is one of such candidate countries for low-cost manufacturing.
- With the rehabilitation of Pangalanes Canal and land development for agriculture along the canal, agricultural production targeting world markets will increase. There is a possibility to develop processing industry in Toamasina Agglomeration, using part of the agricultural products from Pangalanes Canal.

Selected Growth Scenario for Overall TaToM Area: Three alternative growth scenarios are identified for the Overall TaToM Area considering 1) Possible locations of light industries and agro-processing industries, as well as of textile industries in the Overall TaToM Area and 2) How to improve the connectivity between Antananarivo and Toamasina to support the economic growth of Overall TaToM Area. Growth Scenario C aims at establishment of Antananarivo Service-Industrial Metropolis in connection with a strong economic axis with Toamasina Industrial City, based on the rapid growth of economic sectors as a whole of the Overall TaToM Area. For following this growth scenario, much effort at development of economic sectors will be made both for Antananarivo Agglomeration and Toamasina Agglomeration, by emphasizing the attraction of investments to textile industries, agro-processing industries and other light industries.

Socio-Economic Framework for TaToM Area

The population of Overall TaToM Area in 2033 is estimated to reach 9.4 million accounting one fourths of the total population of Madagascar. In Antananarivo Agglomeration and Toamasina Agglomeration, the population will become 4.2 million and 0.8 million respectively by 2033.

The Gross Regional Domestic Product (GRDP) in 2033 for Overall TaToM Area is estimated to reach 34,308 million Ariary (at 2007 constant prices) equivalent to 21,113 million US dollar (at 2010 constant prices), which is four times larger than the current GRDP. The share of GRDP to national GDP will become 58.7%. The GDP per capita for Overall TaToM Area will also increase and reach 3.7 million Ariary (equivalent to approximately 2,250 USD) by 2033.

Table 2 Future Population, GRDP and GDP per Capita of Overall TaToM Area

	Unit	2014	2023	2028	2033
Population		5,683,080	7,286,638	8,286,628	9,388,468
Annual Growth Rate			2.80%	2.61%	2.53%
GRDP	MGA Billion, at 2007 constant prices	8,154	14,503	21,812	34,308
	USD Million, at 2010 constant prices	5,018	8,925	13,423	21,113
Annual Growth Rate			6.61%	8.50%	9.48%
GDP per Capita	MGA, at 2007 constant prices	1,434,785	1,990,355	2,632,192	3,654,270
	USD, at 2010 constant prices	883	1,225	1,620	2,249
Annual Growth Rate			3.70%	5.75%	6.78%

Source: JICA Study Team based on various data

Table 3 Future Population Framework for Antananarivo Agglomeration

		2018	2023	2028	2033
CUA	Population	1,275,207	1,426,472	1,586,890	1,763,099
	Annual Growth Rate	-	2.27%	2.15%	2.13%
Outside CUA	Population	1,283,038	1,596,175	1,960,581	2,388,368
	Annual Growth Rate	-	4.46%	4.20%	4.03%
Antananarivo Agglomeration	Population	2,558,245	3,022,647	3,547,471	4,151,467
	Annual Growth Rate	-	3.39%	3.25%	3.19%

Source: JICA Study Team based on data from INSTAT

Table 4 Future Population Framework for Toamasina Agglomeration

		2018	2023	2028	2033
CUT	Population	326,286	379,373	440,170	506,111
	Annual Growth Rate	-	3.06%	3.02%	2.83%
Outside CUT	Population	110,718	141,618	186,691	256,728
	Annual Growth Rate	-	5.05%	5.68%	6.58%
Toamasina Agglomeration	Population	437,004	520,991	626,861	762,839
	Annual Growth Rate	-	3.58%	3.77%	4.01%

Source: JICA Study Team based on data from INSTAT

Revision of PUDI for Antananarivo Agglomeration

Future Vision for Antananarivo Agglomeration

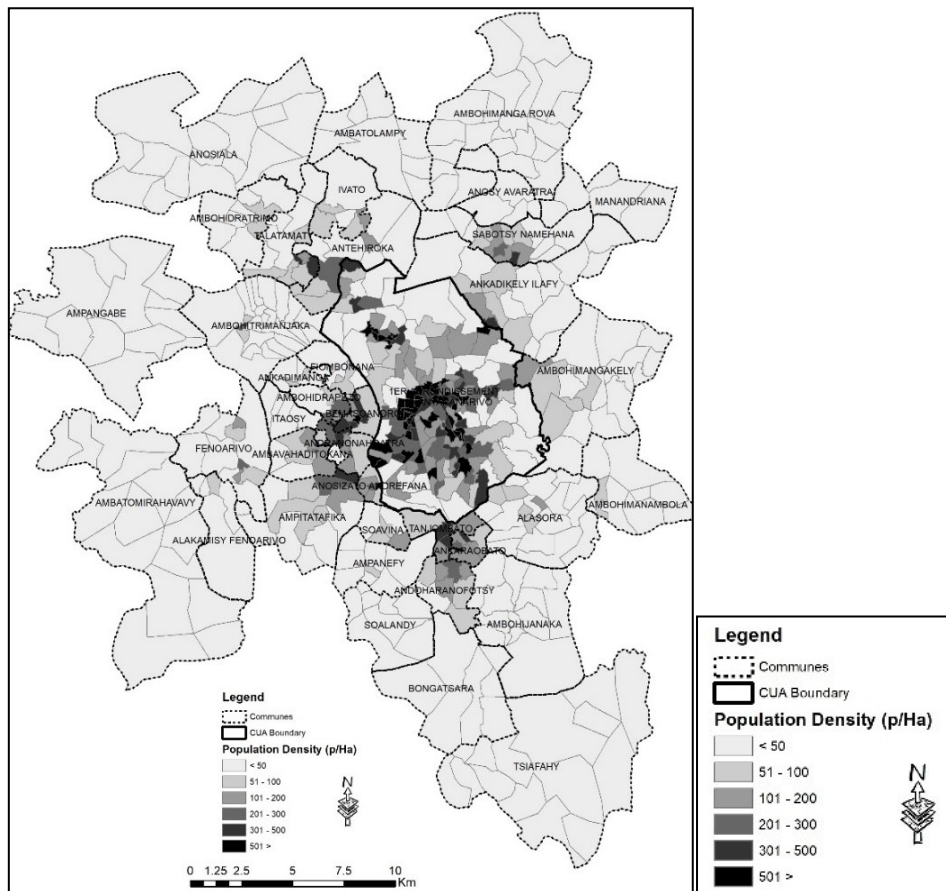
In addition to the national centre of government and economy, Antananarivo Agglomeration will be **a thriving production centre and a modern life centre**, which is not only to support the welfare of people of Antananarivo Agglomeration, but also the national economy of Madagascar.

In order to develop such a centre, Antananarivo Agglomeration will create a competitive and vibrant economy, while seeking inclusive and sustainable development, by creating a healthy, resilient, interconnected urban structure and by preserving and strengthening its unique identity.

Characteristics and Problems on Urban Development of Antananarivo Agglomeration

- In Antananarivo Agglomeration, economic sectors have not been sufficiently developed so that it cannot generate enough employment opportunities for the large number of population.
- Business support functions of Antananarivo Agglomeration are still weak in promoting the development of economic sectors for Antananarivo Agglomeration and other regions.
- In Antananarivo Agglomeration, land for manufacturing and logistics industries is lacking inside and outside CUA.
- The logistics function in Antananarivo Agglomeration is inefficient so that it cannot support the development of the economic sectors.
- Many urban functions and population are over concentrated within CUA. As a result, serious traffic congestion disrupts economic and social activities in Antananarivo and its surrounding areas.
- Due to the extremely high population density, a healthy living environment is not maintained in some areas in CUA
- There is an issue with sanitation in CUA because the population density is very high and sewerage treatment is not properly done.
- Because of underdeveloped public transportation, the mobility in urban life is constrained and travelling results in loss of time. Travelling is sometimes dangerous.
- Housing provision is inadequate in terms of quantity and quality, compared with the rapid population growth in Antananarivo Agglomeration
- Urban amenities, such as parks and open space, is lacking both inside and outside CUA in Antananarivo Agglomeration.
- Water Supply: The water supply master plan formulated in 2003 does not intend to provide water for the current entire population of Antananarivo Agglomeration. Current water production is insufficient. Water resource development and additional water treatment plants are necessary for water supply targeting the outside of CUA for promoting suburbanization.

- Power Supply: If WB's Electricity Sector Operations and Governance Improvement Project (PAGOSE) is implemented, the power generation can satisfy the potential demand. However, facility development for distribution of electricity is urgently needed. In particular, development of transmission and distribution facilities to the urbanized areas outside CUA is necessary.
- Education Facilities: The classrooms of public primary and secondary schools are lacking in CUA, while the classrooms of public secondary and high school are not enough outside CUA.
- Health Service Facilities: Public CSBs are insufficient in populated CUA and its adjacent areas. There is a problem with the quality of medical services of public hospitals.
- Risk for inundation due to rainfall flooding is rising in CUA partly because the decline of wetlands and paddy fields have deprived CUA of water retaining function and partly because the mal-maintenance of drainage facilities decreased the capacity of draining of water from CUA.
- The risk of river flooding is increasing outside CUA partly due to the decrease of paddy fields by land filling for the expansion of urban areas and partly due to the deterioration of irrigation canals.
- The physical environment (in other words, landscape) which reflects the traditional identity of Antananarivo and its surrounding areas has been disappearing in the urbanization in Antananarivo Agglomeration



Source: JICA Study Team based on data from INSTAT
Figure 3 Population Density of Antananarivo Agglomeration per Fokontany (2018)



Source: JICA Study Team
Figure 4 Landscape reflecting the Identity of Antananarivo and its Surrounding Areas

Selected Growth Scenario for Antananarivo Agglomeration

In order to continuously create employment opportunities for the increasing population in the agglomeration and to revitalize the urban economy, Antananarivo Agglomeration needs new export-oriented industries which can lead not only its own urban economy, but also Madagascar's national economy. The export-oriented industry should target the growing regional markets of recently developing "Free Trade Areas" in African and the Indian Ocean countries. Madagascar is a member country of SADC, COMESA and IORA, as well as AfCFTA.

The selected growth scenario for Antananarivo Agglomeration will accommodate a variety of economic sectors aiming at balanced development of the two agglomerations. With construction of the Outer Ring Road, industrial areas will be developed in the north of Ivato Airport and the area along the Outer Ring Road.

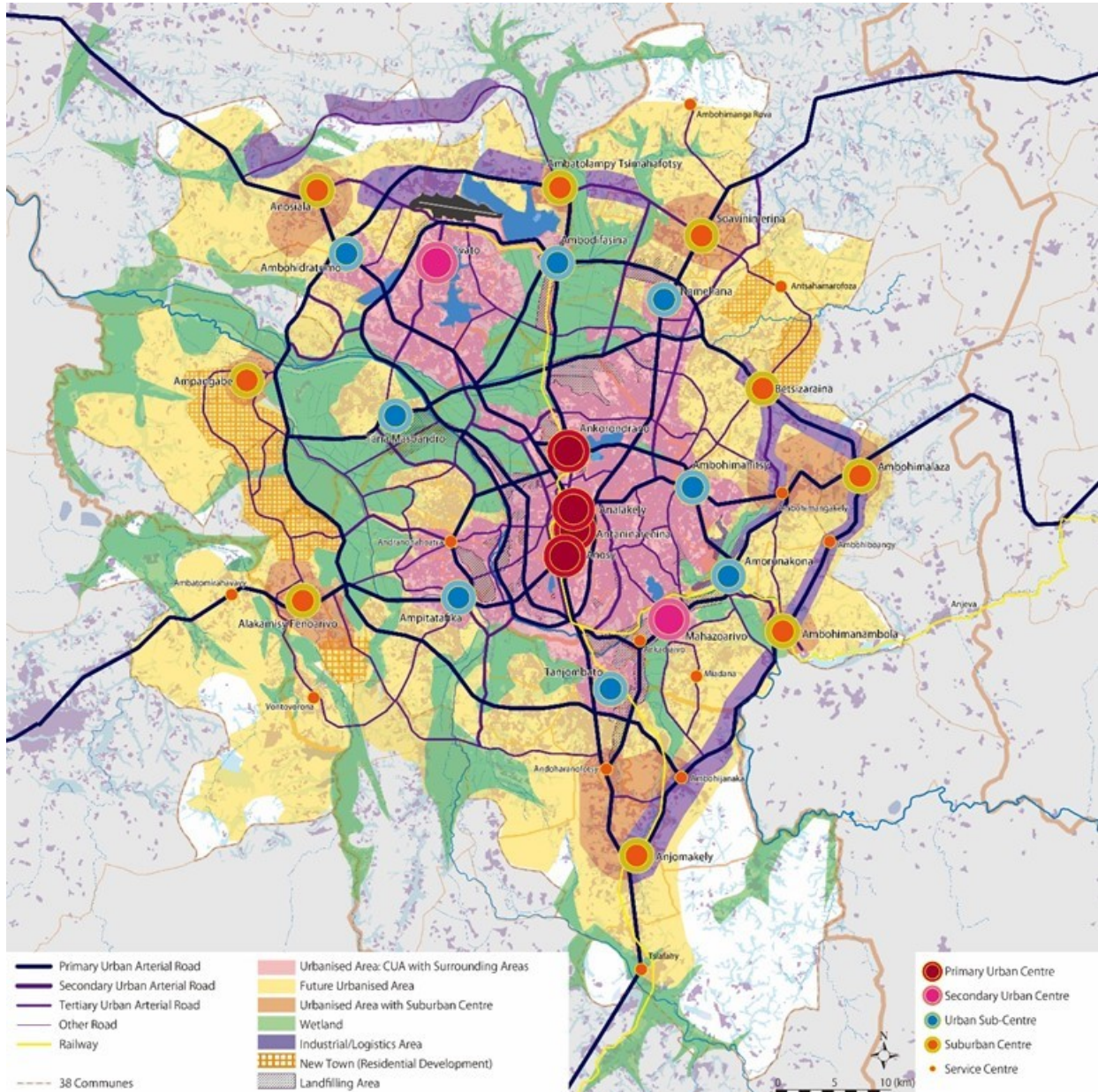
By upgrading business support functions in addition to the function as the centre of politics and government, Antananarivo Agglomeration will support not only the economic sectors in Antananarivo Agglomeration, but also the industries in Toamasina Agglomeration and other areas, and will attract investment not only to Antananarivo Agglomeration, but also to other areas including Toamasina Agglomeration. Then more highly advanced service industries, such as health, education and research, should be developed within CUA for attracting investments to economic sectors in Antananarivo Agglomeration. It is also necessary to develop and distribute commercial and service functions outside CUA for supporting the lives of people.

Urban Development Strategies, Urban Structure, and Land Use Policies for Antananarivo Agglomeration

- (1) Overall strategies for Antananarivo Agglomeration are formulated by restructuring the urban structure as follows:
 - To strengthen urban centre functions within the CUA, especially those of accommodating the headquarters of international, regional and national corporations and organizations
 - To develop new urban centres outside the CUA and to provide basic infrastructures, such as electricity, water supply and access roads, in the outside of CUA, in order to promote suburbanization outside CUA
 - To strengthen the radial road capacities connecting the inside of CUA and the outside of CUA in order to promote diffusion of population and urban functions to the outside of CUA within Antananarivo Agglomeration
 - To construct an Outer Ring Road for strengthening the connectivity with Toamasina Port and for creating enough land for attracting industries and logistics facilities along the sections of the Outer Ring Roads near the National Road No.2 (NR2)
 - To improve the high-density residential environment within CUA by inserting local roads with gutters and providing water supply infrastructure
 - To enhance the water retarding capacity of urban areas of CUA by maintaining and constructing water retarding ponds and by enforcing land use regulations
 - To selectively conserve wetland paddy fields by rehabilitating irrigation facilities for agricultural fields
- (2) The urban structure for the selected scenario of Antananarivo Agglomeration has the characteristics listed below.
 - Four primary urban centres in CUA will make the urban core for Antananarivo Agglomeration. Furthermore, the linear connection between Ivato Airport, Ivato business centre (secondary urban centre) and the primary urban centres will be strengthened, in order to enhance the service industry and trade and commerce industry. The areas to be supported by the strong connectivity among primary and secondary urban centres compose an urban central axis.
 - Urban sub-centres and suburban centres outside CUA will be developed for upgrading the urban function of Antananarivo Agglomeration. The connection between sub-centres and suburban centres and primary urban centres will be strengthened by widening or constructing radial roads.
 - An Outer Ring Road will connect these suburban centres. The Outer Ring Road will create new industrial land in the periphery of the agglomeration, especially in the area north of Ivato Airport, and in the north east area between National Road No. 2 (NR2) and National Road No. 3 (NR3).

At the same time, this area with strong access to NR2, linked to Toamasina Port is suitable for industrial development. In addition, large-scale industrial parks will be developed along this bypass road from NR2 to NR7. This bypass road will enhance the connectivity between Antananarivo, Toamasina and Antsirabe.

- The new town areas in the east and west of Antananarivo Agglomeration are connected by east-west roads to serve the accessibility to the urban core



Source: JICA Study Team

Figure 5 Future Urban Structure for Antananarivo Agglomeration

(3) Land use policies for Antananarivo Agglomeration are summarized below.

- High and mid-density residential areas will be further expanded and the height of residential buildings will be increased.
- Outside CUA, the development of middle-density residential areas including middle-rise mid-density residential areas, will be promoted along the radial roads and in the surrounding of urban sub-centres.
- Outside the Outer Ring Road, the development of low-density residential areas is promoted. Outside the Outer Ring Road, in some areas, the development of new towns accommodating middle-rise mid-density residential areas is promoted in order to accommodate increasing low and middle income populations.

- Within CUA, commercial areas including office areas will be expanded along newly constructed major roads, as well as in existing commercial centres, such as Analakely and Ankorondrano. More height of commercial buildings will be allowed in commercial areas.
- Outside CUA, the commercial function of these existing commercial areas will be upgraded to be “Urban Sub-Centres”, the area size of these existing commercial areas will be expanded, and their building height will be increased, in respond to planned development of arterial road network.
- Around the planned Outer Ring Road, suburban centres will be developed in order to accommodate not only commercial/office areas, but also other urban functions.
- The existing industrial areas will be transformed to commercial/office and residential areas under a mixed land use category.
- Industrial areas will be largely expanded in suburban areas along the planned Outer Ring Road, which could have good connection to Toamasina Port through the existing NR2 and/or through the prospective Antananarivo-Toamasina Expressway.
- Conservation of wetlands will be done in order to maintain the water retention capacity of 15 million m³ within CUA, in accordance with PIAA’s Drainage Master Plan.
- There are many planned urban development in association with land filling in wetlands, and there is also possibility of spontaneous land filling in wetland. It will be necessary to strictly control the volume of wetland land filling by two methods. The one is land use zoning regulation, which is shown in the land use zoning plan of PUDi. The other is to construct water retention ponds in certain urban areas under high urbanization pressure.
- Outside CUA, there are wide areas under threats of inundation from heavy rainfall and flooding of rivers. In the future, land filling in wetlands outside CUA will be limited to the cases of high necessity, especially for development of urban sub-centres and construction of major roads.
- The demand for city parks and sports grounds will increase largely. Therefore, potential lands for city parks and sports grounds are designated by the revised PUDi. Such potential lands include 1) areas surrounding water retention ponds, 2) unused lands in highly populated areas, and 3) forested lands in suburban areas.

Based on the above land use policies for Antananarivo Agglomeration, a land use zoning plan covering Antananarivo Agglomeration is prepared at a scale of 1:10,000.

Action Plan for Integrated Urban Development in Antananarivo Agglomeration

In order to implement the Revised PUDi for Antananarivo Agglomeration, an Action Plan is formulated by consisting of the following three sets of actions:

- Capacity Development for Communes in Utilization of Land Use Zoning Regulations in Antananarivo Agglomeration
- Action Areas to Promote Integrated Urban Development in Antananarivo Agglomeration
- Priority Projects and High Priority Projects of Various Sectors in Antananarivo Agglomeration

There are **17 Action Areas** designated for promoting integrated development in Antananarivo Agglomeration.

100 priority projects are identified for Antananarivo Agglomeration covering economic sectors, infrastructure sectors and urban development sector to implement the strategies in accordance with the selected growth scenario. These priority projects are organized into four phases which are Phase 1: 2019-2023, Phase 2: 2024-2028, Phase 3: 2029-2033 and Phase 4: 2034-2038.

Revision of PUDI for Toamasina Agglomeration

Future Vision for Toamasina Agglomeration

Based on its enhanced gateway function connecting sea transport and land transport, Toamasina Agglomeration will be a thriving industrial hub and major tourist destination in the Indian Ocean, around the international Port of Toamasina, with a healthy lifestyle and beauty of Pangalanes Canal along with coastal and mountainous landscapes enjoyed by the residents and tourists as well.

Characteristics and Problems on Urban Development of Toamasina Agglomeration

- In CUT, basic infrastructure (e.g., for power and water supply), and social services are significantly lacking while population and urban functions are over concentrated in this area.
- It is difficult to promote development of economic sectors because of inadequate infrastructure, such as for power and water supply.
- Because urbanisation has been progressing in low-lying areas and maintenance of the drainage infrastructure has been insufficient, rainwater flooding occurs almost every year.
- Public transport is not well developed.
- There are not enough hospitals, educational facilities, and recreation facilities for middle-income people.
- It takes 8 hours by passenger car or 2 days by cargo freight to travel 350 km distance on NR2 from Antananarivo, the capital of the country as well as the centre of the economy.
- Due to the time cost and transport cost between Antananarivo and Toamasina, the function of the Port of Toamasina (the primary major port of Madagascar), is not fully utilised for the development of economic sectors in Toamasina Agglomeration.

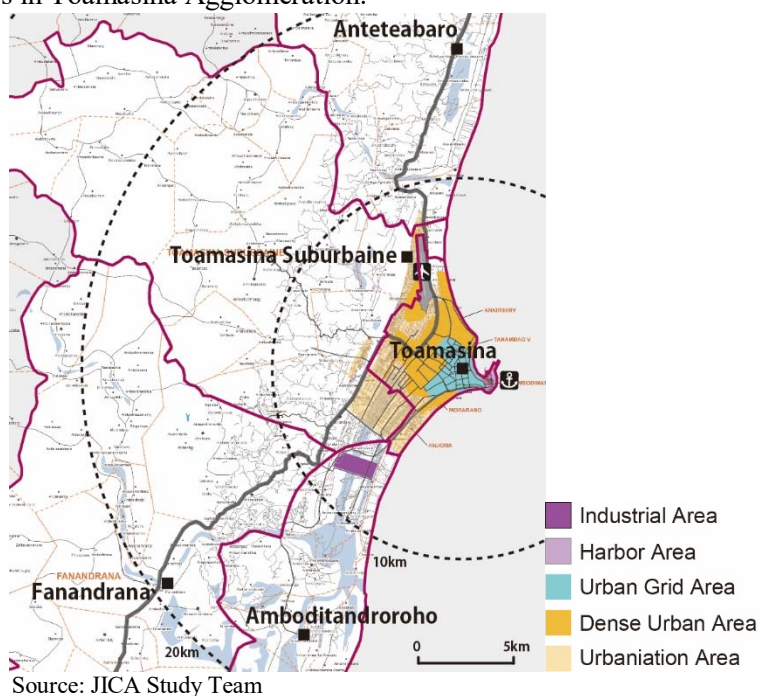


Figure 6 Urbanised Areas in Toamasina Agglomeration in 2017

Selected Growth Scenario for Toamasina Agglomeration

The selected growth scenario for Toamasina Agglomeration aims to develop economic sectors in Toamasina Agglomeration, in addition to logistics industry. The advantage of strategic location of Toamasina will be fully utilised to develop light industry and agro-processing for export and transshipment targeting the regional markets in Africa and around the Indian Ocean. In parallel, logistics function will be enhanced to support the port function as a gateway of the country, in particular, that of Antananarivo Agglomeration. As a result, industrial areas will be expanded to suburban areas of CUT and in adjacent communes. Tourism will be also promoted by developing tourism development zones along the coast where luxury hotel resorts,

shopping malls, and leisure facilities are to be located. Toamasina Agglomeration will be also the market for towns and villages in the hinterland and those in other coastal regions connected by sea.

Toamasina Agglomeration will be a vibrant hub of industry and shall be an attractive coastal tourism town, while supporting the economy of Antananarivo, for the sake of balanced development.

Urban Development Strategies, Urban Structure, and Land Use Policies for Toamasina Agglomeration

(1) Overall strategies on urban development for Toamasina Agglomeration are formulated as follows:

- To implement necessary strategies to establish an efficient logistics system based on Toamasina Port to be expanded
- To implement a set of development strategies focusing on the promotion of economic sectors, specifically light industries and agro-processing industries targeting regional consumer markets, in order to transform Toamasina Agglomeration into a thriving industry city
- To set up Economic Development Zones and develop industrial parks, together with providing economic infrastructure including access roads, electricity supply and water supply, for attracting investments to light industries targeting the markets of Free Trade Areas of the Regional Economic Organizations with which Madagascar is affiliated
- To promote international and domestic tourism by setting up Tourism Development Zones and hotel zones for purposes of attracting investment to hotels, based on the existing infrastructure. The results of this measure on tourism development will be also effective eventually in attracting investments to industries.

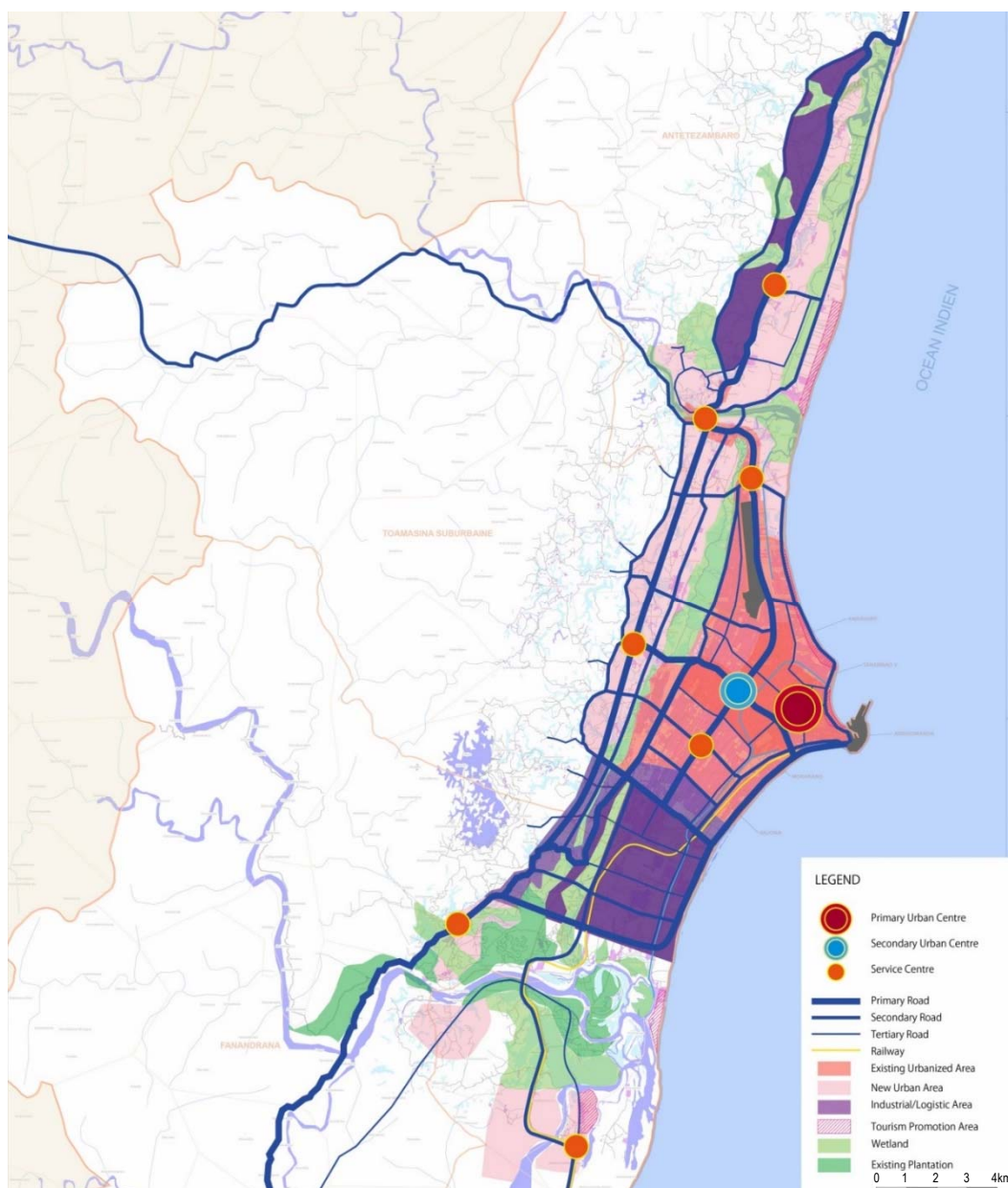
(2) The urban structure for the selected scenario of Toamasina Agglomeration has the characteristics listed below.

- There will be three access roads to Toamasina Port from NR2 for the purpose of strengthening of the accessibility to Toamasina Port.
- A western bypass road will be constructed to support the industrial area located to the north beyond the Ivoloïna River.
- Large industrial areas will be established to accommodate new manufacturing industries and logistic industries, along with hotel zones for international and domestic tourists. Industrial zones for manufacturing industries and logistic industries are located in the north and the south of Ambatovy Factory, and also to the north beyond the Ivoloïna River.
- Residential areas will be expanded to the north beyond the Ivoloïna River, southwards until the industrial zone, and also to the west of Toamasina Airport and beyond the wetlands.
- Urban centres will remain in and around CUT. New urban centres will be developed along National Road No.5 (NR5): one just north of Toamasina Airport, another close to the Ivoloïna River, and also one area in the north of the Ivoloïna River.

(3) Land use policies for Toamasina Agglomeration are summarized below.

- High and mid-density residential areas will be further expanded and the height of residential buildings will be increased.
- Outside CUT, the development of low-density residential areas, will be promoted along the north and south of CUT in the surrounding of urban sub-centres.
- Within CUT, commercial areas including office areas will be expanded along major roads, as well as in existing commercial centres, such as Ankirihiry. More height of commercial buildings will be allowed in commercial areas.
- Outside CUT, the commercial function of these existing commercial areas will be upgraded to be "Service Centres." Service centres will be developed in order to accommodate not only commercial/office areas, but also other urban functions.
- The coastal area in CUT has risk of erosion. It is necessary to protect these areas from development. However, such areas are also tourism potential area. In the future, it is necessary to limit certain development to protect the coastal area and also avoid effect from coastal erosion.
- There are still large areas with unspoiled environment outside CUT which has mangroves. In the future, limited development for tourism promotion will be allowed but only to certain extent.

Based on the above land use policies for Toamasina Agglomeration, a land use zoning plan covering the area to be urbanised by 2038 within Toamasina Agglomeration is prepared at a scale of 1:10,000.



Source: JICA Study Team

Figure 7 Future Urban Structure for Toamasina Agglomeration

Action Plan for Integrated Urban Development in Toamasina Agglomeration

In order to implement the Revised PUDi for Toamasina Agglomeration, an Action Plan is formulated by consisting of the following three sets of actions:

- Capacity Development for Communes in Utilization of Land Use Zoning Regulations in Toamasina Agglomeration
- Action Areas to Promote Integrated Urban Development in Toamasina Agglomeration
- Priority Projects and High Priority Projects of Various Sectors in Toamasina Agglomeration

There are **three Action Areas** designated for promoting integrated development in Toamasina Agglomeration.

32 priority projects are identified for Toamasina Agglomeration covering economic sectors, infrastructure sectors and urban development sector to implement the strategies in accordance with the selected growth scenario. These priority projects are organized into four phases which are Phase 1: 2019-2023, Phase 2: 2024-2028, Phase 3: 2029-2033 and Phase 4: 2034-2038.

Transport and Territorial Development Plan for TaToM Economic Axis

Future Vision for TaToM Economic Axis

TaToM Economic Axis will continue to be the most important transport axis for Madagascar because its connectivity by NR2 and railway would be the basis for sustainable development of economic sectors of both Antananarivo Agglomeration and Toamasina Agglomeration. Since the two agglomerations are expected to grow their economic sectors, the importance of the transport function of TaToM Economic Axis will become much larger than that at present.

Together with the transport systems of Antananarivo and Toamasina Agglomerations, TaToM Economic Axis will contribute to the enhancement of the connectivity between Antananarivo and other regions and the connectivity between Toamasina Port and other regions within Madagascar.

Based on an upgraded connectivity through the TaToM Economic Axis, urban and rural economies of Moramanga, Brickaville, Manjakandriana and Antsampanana will flourish not only by expansion of trade and vehicle repairing services for passengers and cargo trucks, but also by investment to economic sectors taking advantage of proximity to Toamasina Port.

Characteristics and Problems on TaToM Economic Axis

- The cities and villages in TaToM Economic Axis connecting Antananarivo Agglomeration and Toamasina Agglomeration have locational advantage for economic development compared with other cities and villages in Madagascar. However, economic activities have not yet been facilitated and are limited. In some of the cities and villages, the main source of income for the residents are small business on trade and car repairing for road users of NR2.
- In 2019, the government of Mauritius agreed to develop an industrial park for textile industry in Moramanga. However, at present, there is no skilled labour for such industry in Moramanga and it will be a challenge to attract necessary workforce to Moramanga, as well as to develop existing human resources of Moramanga.
- There are also national parks in TaToM Economic Axis accessible from NR2, which attract tourist. The most recognized is Mantadia National Park in Andasibe, where a few kinds of lemurs habitat. Due to this national park, some hotels and restaurants for both national and international tourists are located around Andasibe.
- Although NR2 and railway between Antananarivo and Toamasina composed an essential transport corridor for Madagascar, the traffic volume of NR2 was limited to around 1,700 vehicles per day (2018) and the cargo volume of the railway was around 96,000 tonne per year (2017).
- Antananarivo and Toamasina has approximately 1,400m difference of elevation. NR2 has to go through mountainous areas. Therefore, NR2's horizontal and vertical alignments are so bad that it is very costly to improve the horizontal and vertical alignments for the purpose of increasing transport volume and travel speed on NR2.
- The railway for cargo runs between Antananarivo and Toamasina, transporting mainly fuel. However, passenger train only runs between Moramanga and Toamasina once or twice a week. The railway infrastructure has been degraded due to heavy rainfall and shortage of maintenance and rehabilitation budgets. It is also necessary to improve the alignment partly to ensure its sufficient functioning.
- For the economic development of Madagascar, it is important for Antananarivo Agglomeration and Toamasina Agglomeration to promote economic sectors development. However, the current transportation system of TaToM Economic Axis does not have sufficient safety to support the two economic hubs. Furthermore, the capacity of transportation system will not be sufficient to satisfy the future demand of Antananarivo Agglomeration.

Selected Growth Scenario for TaToM Economic Axis

The improvement of the transportation function of TaToM Economic Axis is required for promoting industrial development in both Antananarivo Agglomeration and Toamasina Agglomeration.

The selected growth scenario will make the following two different efforts at developing the transportation system of TaToM Economic Axis for the economic development of two agglomeration:

- Upgrade the cargo transport volume for the development of economic sectors of Antananarivo Agglomeration

- Increase the speed of transport for the development of economic sectors of Toamasina Agglomeration
- For the development of each agglomeration, the development of transportation system of TaToM Economic Axis is essential. However, the cost of necessary measures to develop the transportation system of TaToM Economic Axis are not cheap. Therefore, it is important that each measure brings benefit to not only one agglomeration but to both agglomerations for sustainable development of the TaToM Economic Axis.

Since the selected scenario aims to develop the economic sectors in both Antananarivo and Toamasina Agglomeration, it will enhance the development of the transportation system of TaToM Economic Axis.

Overall Development Strategies for TaToM Economic Axis

(1) The following overall strategies are formulated for TaToM Economic Axis:

- To strengthen the transport capacity for basic materials (e.g., fuel, industrial raw materials, and intermediate goods) and consumer goods from Toamasina Port to Antananarivo Agglomeration to hasten the activities of economic sectors and everyday life of residents in Antananarivo Agglomeration and also support the economic development in Moramanga.
- To improve cargo transport between Toamasina Port and Antananarivo Agglomeration considering, firstly, safety and resilience; secondly, transport capacity; and thirdly, transport speed in the TaToM Economic Axis.
- To prepare the investment environment that facilitates decisions of investments to economic sectors of Toamasina Agglomeration, and to create the business environment for better business/industrial management of its economic sectors, by improving the speed of passenger transport between Toamasina and Antananarivo Agglomerations.
- To improve passenger transport between Toamasina and Antananarivo Agglomerations considering, firstly, safety and resilience; secondly, travel speed; and thirdly, transport capacity in the TaToM Economic Axis.

(2) The transportation system for the selected scenario has the characteristics listed below.

- A safe and resilient connectivity between Antananarivo and Toamasina is ensured through installation of safety devices and implementation of work for resilience on NR2.
- Passenger cars' higher speed is ensured through the construction of climbing lanes on the prioritized sections of NR2 between Antananarivo and Moramanga. This construction work will start in the middle of Phase 1, and continue throughout Phase 2.
- Cargo transport volume is upgraded by partial operation of motorway, and also by continuing the rehabilitation of railway infrastructure.

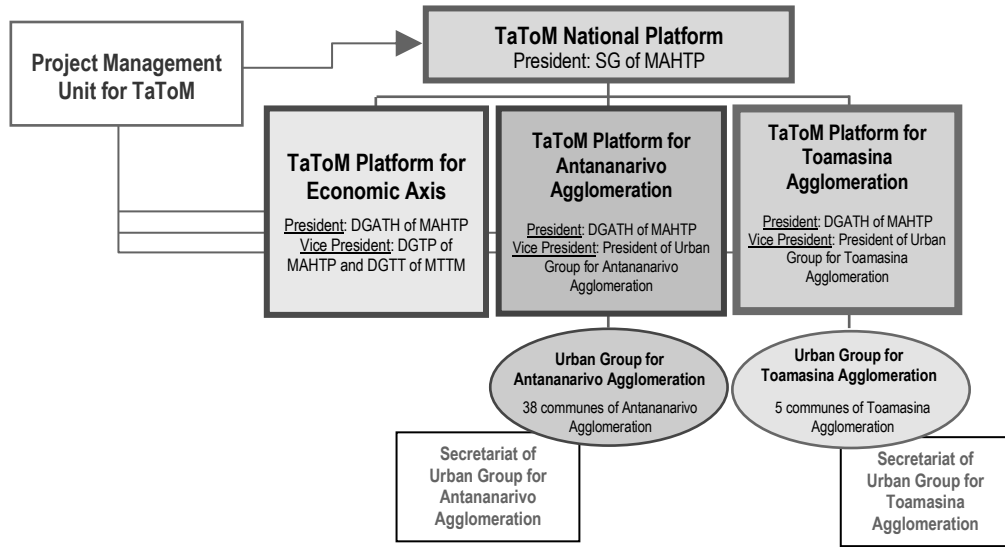
Priority Projects for Development of TaToM Economic Axis

Transport and Territorial Development Plan for TaToM Economic Axis covers the transportation system between Antananarivo Agglomeration and Toamasina Agglomeration, and Economic Development Plan for Moramanga.

17 priority projects are identified for TaToM Economic Axis covering economic sectors and transport sector to implement the strategies in accordance with the selected growth scenario. These priority projects are organized into three phases which are phase 1: 2019-2023, phase 2: 2024-2028 and phase 3: 2029-2033.

Implementation Framework for TaToM

An implementation framework for TaToM is recommended by Project TaToM as presented in Figure 8, based on the framework for formulating the plans under Project TaToM.



Source: JICA Study Team

Figure 8 Implementation Framework for TaToM

Chapter 1 Introduction

1.1 Background

Since its independence in 1960, Madagascar has gone through a number of political crises, namely, protests by farmers and students called “rotaka,” turmoil during several elections, two coups by the military, and an assassination of the president. The prolonged political crises brought about a devastating impact on the nation’s economy, international relations, and living standards, and have hampered investments in urban development and social infrastructure. The Malagasy economy was hit hard by the political crises in 2001 and 2009 as well as the world financial crisis in 2008. The poverty rate jumped to 75.5% in 2010. Not only because the international community did not endorse the new regime that came to power without going through a democratic procedure after the 2009 coup, but also because the European Union and the United States suspended the export quotas of textiles given to Madagascar, therefore the national economy depending on the textile and garment exports was severely damaged.

The democratic presidential election held in 2013 was expected to bring about political stability to the country; however, the new administration faced mounting criticism by the citizens. After the president’s party won the majority of the seats in the Senate election in December 2015, the new cabinet was organized in April 2016 and eventually the political situation became stabilized. Consequently international economic cooperation and assistance from Japan and other donors were resumed. Now a number of international assistance projects are on-going and under preparation.

Urban master plans (PUDi: Plan d’Urbanisme Directeur, hereafter) were prepared for the Antananarivo Agglomeration, the capital of politics and economy of the country, in 1974, 1985, 2004, and 2007. However, those plans were not fully implemented. Currently, illegal construction and development have been mushrooming due to rapid population growth and uncontrolled urbanisation. Informal settlements have emerged in lowlands which are not only prone to rainwater inundation but also with problems of public safety. It is anticipated that the lack of infrastructure adversely affects the economic activities and functions of the national capital, and leads to the deterioration of the living environment. Meanwhile, the Toamasina Agglomeration located on the east coast of the country, has an important international port, Toamasina Port, which is a gateway of goods to the Antananarivo Agglomeration, as well as a hub of export of processed goods and agricultural products. However, infrastructure that supports industry and people’s lives has not been sufficiently developed, and industrial development has been delayed.

Hence, in order to strengthen the political, administrative, and economic functions of the Antananarivo Agglomeration as the national capital, to develop disaster resilience and a liveable environment, and to create a stately character and appeal of the capital, it is an urgent task to formulate an Urban Master Plan, which entails a future vision, urban structure based the vision, a land use plan, and infrastructure development plans. At the same time, it is important to accelerate the economic development of Madagascar by creating synergy through supporting urban and industrial development of the Toamasina Agglomeration and the development of a transport route (economic axis) connecting the two agglomerations. For the sake of these stated objectives, the Government of Madagascar requested the Government of Japan to provide assistance to formulate and revise the PUDis for Antananarivo and Toamasina Agglomerations, and develop a transport and territorial development plan for the economic axis.

1.2 Objectives and Outputs of the Project

The objective of the Project is to formulate Urban Master Plans (PUDis) for the Antananarivo Agglomeration and Toamasina Agglomeration, and a Transport and Territorial Development Plan for the economic axis connecting the two agglomerations. During the formulation process of these

three plans, growth scenarios at the regional level were also considered to bring out synergetic effect not only to the TaToM area but also to Madagascar as a whole.

The expected outputs of the Project are as follows:

- PUDi of the Antananarivo Agglomeration 2004 is revised.
- PUDi of the Toamasina Agglomeration 2004 is revised.
- Transport and Territorial Development Plan for TaToM Economic Axis is formulated
- A mechanism for coordination, monitoring, and management of the implementation of the formulated plans is established.

By implementing these plans to be formulated by the Project on Master Plan Formulation for Economic Axis of Antananarivo-Toamasina, Madagascar (Project TaToM), it is expected to promote development of the two agglomerations and strengthen connectivity between them for integrated and sustainable economic growth.

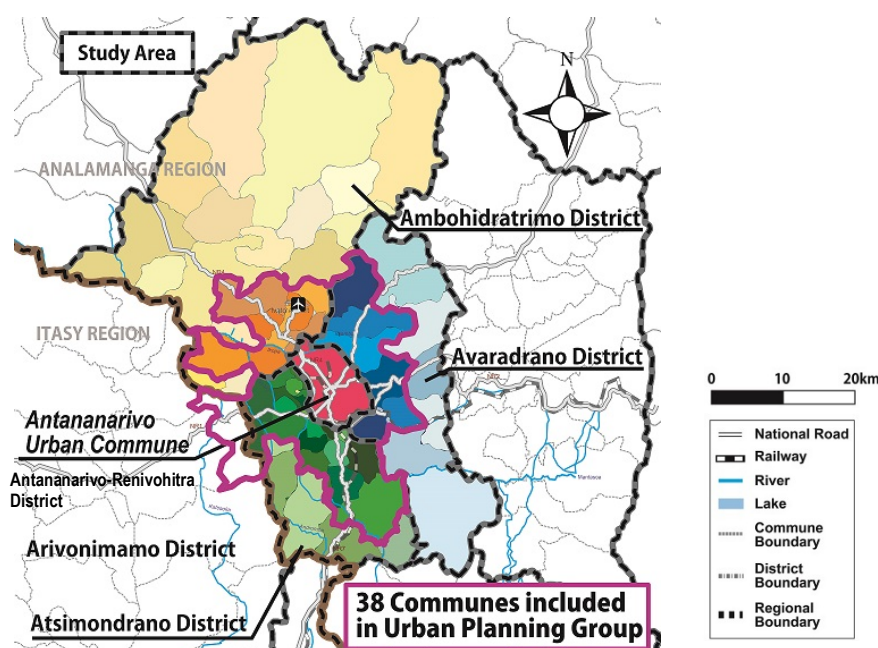
1.3 Study Areas and Planning Areas of the Project

1.3.1 Study Areas for the Project

The Study Areas for the Project covers the following areas:

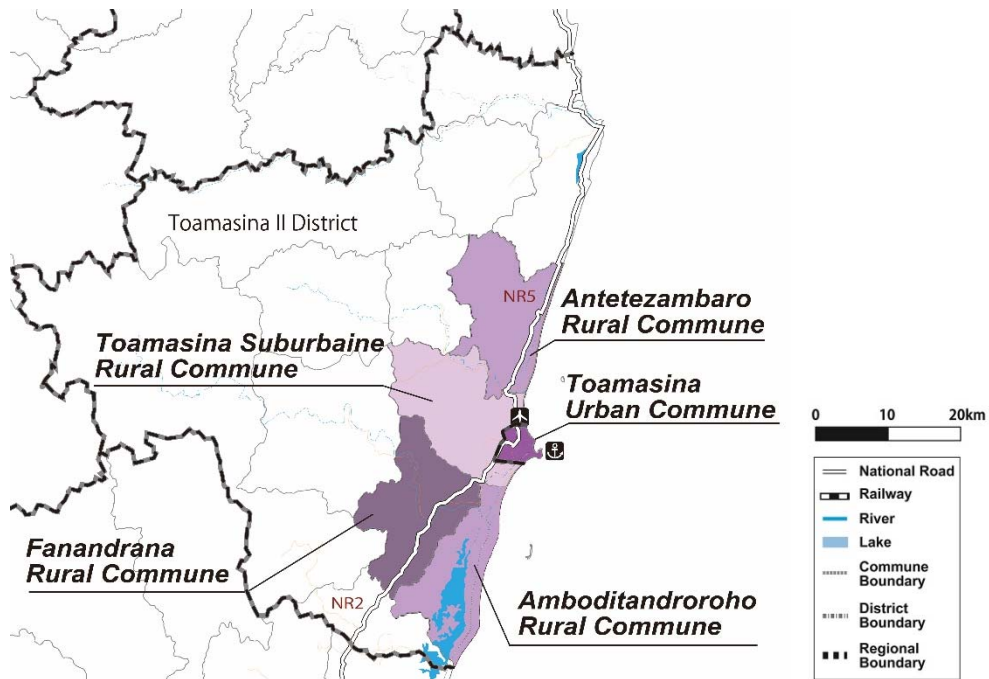
- The Study Area for Antananarivo Agglomeration is four districts, namely, Antananarivo-Renivohitra District (also known as Antananarivo Urban Commune (CUA: *Commune Urbaine d'Antananarivo*)), Ambohidratrimo District, Atsimondrano District and Avaradrano District, and Ambatomirahavavy Rural Commune in Arivonimamo District, Itasy Region.
- The Study Area for Toamasina Agglomeration is Toamasina Urban Commune (CUT: *Commune Urbaine de Toamasina*), Toamasina Suburbaine Rural Commune, Antetезambaro Rural Commune, Amboditandreroho Rural Commune and Fanandrana Rural Commune.
- The Study Area for Antananarivo – Toamasina Economic Axis is the areas along National Road No. 2 (NR2) and along the railway between Antananarivo and Toamasina.

These Study Areas for the two agglomerations are determined as Antananarivo Sub-Region and Toamasina Sub-Region.



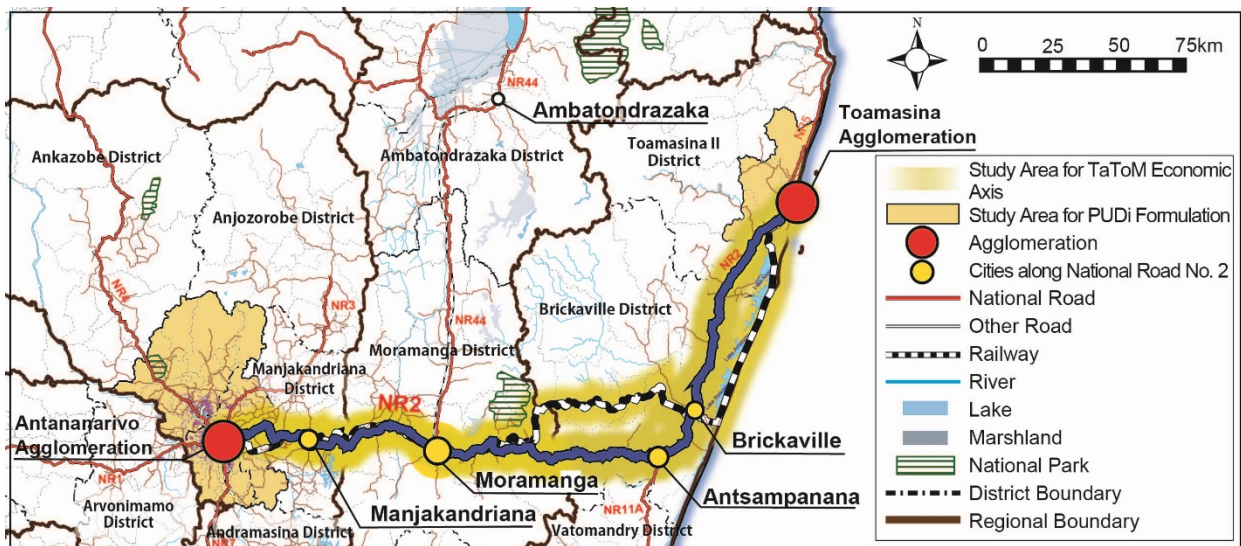
Source: JICA Study Team

Figure 1.1 Study Area for Antananarivo Agglomeration (Antananarivo Sub-Region)



Source: JICA Study Team

Figure 1.2 Study Area for Toamasina Agglomeration (Toamasina Sub-Region)



Source: JICA Study Team

Figure 1.3 Antananarivo - Toamasina Economic Axis

1.3.2 Planning Areas for the Project

The planning areas for the two PUDis are as follows:

- The planning area for Antananarivo Agglomeration comprises the following two areas.
 - The area to develop a land use plan, an urban infrastructure plan, and an urban transportation improvement plan at a scale of 1:10,000 is the urban and urbanising areas within Antananarivo Urban Commune and its surrounding peripheral communes by the target year 2033.
 - The area to formulate a spatial development framework at a scale of 1:50,000 is outside of the urban and urbanising areas in the study area
- The planning area for Toamasina Agglomeration to develop a land use plan, an urban infrastructure plan, and an urban transportation improvement plan at a scale of 1:10,000 is

the urban and urbanising areas within Toamasina Urban Commune and its surrounding peripheral communes by the target year 2033.

1.4 Project Organisation

1.4.1 Project Management Structure

In order to carry out TaToM Project effectively and efficiently, the National Steering Committee (NSC) and three Local Steering Committees (LSCs) are organised in the Malagasy counterpart side. The roles of the NSC and the three LSCs for respective three project components are shown in Table 1.1.

Table 1.1 Project Management Structure (National Steering Committee and Three Local Steering Committees)

Project Management Structure	Roles and Timing
National Steering Committee (NSC)	<ul style="list-style-type: none"> To discuss and define main items of the Project to guide the Project, and take necessary actions required for smooth implementation of the Project. To hold a meeting as every main report of the Project becomes ready to discuss
Local Steering Committee (LSC) for Antananarivo Agglomeration	<ul style="list-style-type: none"> To discuss technical aspects of the Project properly and provide the necessary data and information for the Project. To hold a meeting as every main report of the Project becomes ready to discuss although the topic and the timing will be set based on necessity.
Local Steering Committee (LSC) for Toamasina Agglomeration	<ul style="list-style-type: none"> To discuss technical aspects of the Project properly and provide the necessary data and information for the Project. To hold a meeting as every main report of the Project becomes ready to discuss although the topic and the timings will be set based on necessity.
Local Steering Committee (LSC) for TaToM Economic Axis	<ul style="list-style-type: none"> To discuss technical aspects of the Project properly and provide the necessary data and information for the Project. To hold a meeting as every main report of the Project becomes ready to discuss although the topic and the timing will be set based on necessity.

Source: MINISTERIELLE NOTE N°56/2016-M2PATE/SG/DGATE/DVPT; MINISTERIELLE NOTE N°564/2016-M2PATE/SG/DGATE/DVPT.

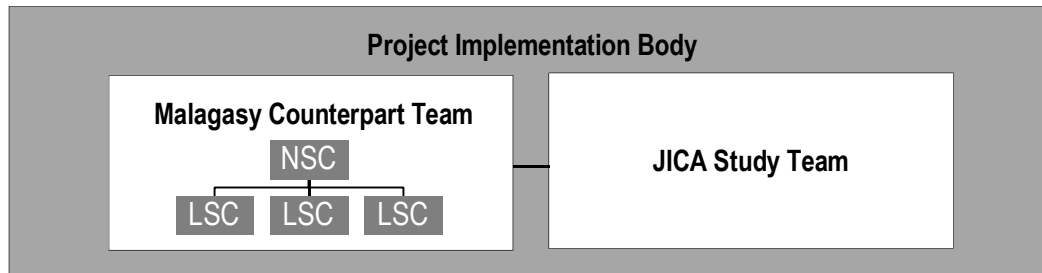
The members of these committees are fixed by the Ministerial Notes issued by M2PATE in 2016. These Ministerial Notes were revised in April 2017. Furthermore, in January 2019, a new government was established in Madagascar and the government ministries were reorganized. The presidents and vice presidents of the NSC and three Local Steering Committees (LSCs) for the respective three project components are shown in Table 1.2.

Table 1.2 Presidents and Vice Presidents of NSC and LSCs

Committee	President and Vice President in Ministerial Note	President and Vice President under Present Government
NSC	<ul style="list-style-type: none"> President: Secretary-General of M2PATE 	<ul style="list-style-type: none"> President: Secretary-General of MAHTP
LSC for PUDI Antananarivo Agglomeration	<ul style="list-style-type: none"> President: Director General of Land Development and Equipment (DGATE/M2PATE) Vice President: President of Urban Planning Group of Antananarivo Agglomeration 	<ul style="list-style-type: none"> President: Director General of Spatial Planning and Housing (DGATH/MAHTP) Vice President: President of Urban Planning Group of Antananarivo Agglomeration
LSC for PUDI Toamasina Agglomeration	<ul style="list-style-type: none"> President: Director General of Land Development and Equipment (DGATE/M2PATE) Vice President: President of Urban Planning Group of Grand Toamasina 	<ul style="list-style-type: none"> President: Director General of Spatial Planning and Housing (DGATH/MAHTP) Vice President: President of Urban Planning Group of Grand Toamasina
LSC for Transport and Territorial Development Plan	<ul style="list-style-type: none"> President: Director General of Land Development and Equipment (DGATE/M2PATE) Vice President: Director-General of Land Transport (MTM) Vice President: Director-General of Public Works (MTP) 	<ul style="list-style-type: none"> President: Director General of Spatial Planning and Housing (DGATH/MAHTP) Vice President: Director-General of Land Transport (MTTM) Vice President: Director General of Public Works (DGTP/MAHTP)

Source: MINISTERIELLE NOTE N°56/2016-M2PATE/SG/DGATE/DVPT; MINISTERIELLE NOTE N°57/2016-M2PATE/SG/DGATE/DVPT.

The Project is carried out by the JICA Study Team in close collaboration with the Malagasy counterpart agencies and counterpart personnel. The Malagasy counterparts and the JICA Study Team compose the Project Implementing Body as shown in Figure 1.4.



Source: JICA Study Team

Figure 1.4 Project Implementing Body consisting of Malagasy Counterparts and JICA Study Team

1.5 Organisation of Final Report

The Final Report is composed of the following volumes:

- Summary
- Main Text

The Summary of the Final Report has 21 chapters which are organised as follows:

- Chapter 1: Introduction
- Chapter 2 -3: National Development and Overall TaToM Area Development
- Chapter 4-8: Revised PUDi for Antananarivo Agglomeration
- Chapter 9-13: Revised PUDi for Toamasina Agglomeration
- Chapter 14: Common Land Use Zoning Regulation for Madagascar
- Chapter 15-19: Transport and Territorial Development Plan for TaToM Economic Axis
- Chapter 20: Implementation Framework for TaToM
- Chapter 21: Conclusions and Recommendations

The Main Text of the Final Report is organised into the following seven parts and appendix:

- Part I: Introduction
- Part II: National Development and Overall TaToM Area Development
- Part III: Revised PUDi for Antananarivo Agglomeration
- Part IV: Revised PUDi for Toamasina Agglomeration
- Part V: Transport and Territorial Development Plan for TaToM Economic Axis
- Part VI: Implementation Framework for TaToM
- Part VII: Strategic Environmental Assessment (SEA)
- Appendix

The PUDi is composed of the following components:

- Urban Development Strategies and Priority Projects
- Land Use Policy and Land Use Zoning Regulations
- Strategies for Development of Economic Sectors and Priority Projects
- Strategies for Disaster Risk Reduction and Management and Priority Projects
- Strategies for Road and Transport Development and Priority Projects
- Strategies for Development of Infrastructure Sectors and Priority Projects

Chapter 2 Madagascar: Future Vision, Potentials for National Development

2.1 National Future Vision for Madagascar

The manifesto of the newly elected president, the former administration's National Development Plan (PND: *Plan national de développement*) 2015-2019 and Madagascar's Vision 2030 have similar directions towards national development.

National Future Vision for Madagascar can be summarised as follows:

“Madagascar will recover and emerge to be a Modern and Prosperous Country with Middle-Income Status by efficient and sustainable utilisation of its national territory, as well as of natural and human resources, by promoting economic sectors development oriented to export markets, as well as to domestic markets, and by attracting investments for enhancing the productivity of economic sectors.”

2.2 National Development Potential of Madagascar

2.2.1 National Structure of Economic Sectors of Madagascar

(1) National GDP and GDP per Capita of Madagascar

In 2015, Madagascar had a GDP of US\$ 9.7 billion at current prices. The trend patterns of GDP and GDP per capita in Madagascar are shown in Table 2.1. These are characterised by the sudden drops in 2009, which have been heavily influenced by Madagascar's political crisis in 2009 and Global Financial Crisis in 2008. Madagascar's economic growth rates collapsed from above 6% in 2006-2008 to an average of 1.3% in 2009-2015. While GDP in US dollars sharply declined due to political instability in 2009, it has recovered gradually since 2012.

Table 2.1 GDP and GDP per Capita of Madagascar

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GDP (Current, US\$ Million)	5,515.9	7,342.9	9,413.0	8,550.4	8,729.9	9,892.7	9,919.8	10,601.7	10,673.5	9,738.7
GDP (Current, Ariary Billion)	11,816.7	13,759.7	16,080.9	16,726.3	18,245.1	20,033.9	21,773.6	23,397.0	25,774.5	28,568.4
Real GDP Growth (Annual %)	5.0	6.2	7.1	-4.0	0.3	1.5	3.0	2.3	3.3	3.1
GDP per capita (Current, US\$)	293.0	379.1	472.4	417.2	414.1	456.3	445.0	462.5	452.8	401.8
GDP per capita (Current, Ariary Thousands)	627.7	710.3	807.0	816.1	865.5	924.1	976.7	1,020.6	1,093.5	1,178.8
Growth Rate of GDP per capital (Annual %)	2.0	3.3	4.1	-6.7	-2.5	-1.4	0.2	-0.6	0.5	0.2

Source: JICA Study Team based on World Development Indicator (World Bank, 2017)

According to the World Economic Outlook Database (IMF, October 2016), Madagascar is the 136th largest economy in the world. Furthermore, Madagascar is ranked 186th out of the 191 countries in GDP per capita, at current prices.

(2) National GDP Structure of Madagascar

The tertiary sector is predominant in the Malagasy economy, accounting for 55.8 percent of the national GDP in 2014, as shown in Table 2.2. Trade, transportation, and service activities dominate the tertiary sector in terms of GDP.

The primary sector accounts for 25.4 percent of the national GDP. Its share has gradually decreased since 2010. In the primary sector, agriculture is the most important contributor. Agriculture is one of the main livelihood sources for rural populations. Madagascar's climates are varied being tropical along the coasts, moderate in the highlands and arid in the south, enabling cultivation of a variety of crops.

The share of the second sector has slightly increased since 2010. In the secondary sector, the role of Export Processing Zone (EPZ), which are export-oriented industries including the textile and apparel industry, is the most significant, followed by the food industry, beverage industry, and energy. The EPZ, which was introduced in 1990, has helped Madagascar to move from a dependency on agricultural products, mainly vanilla and coffee, to a more diversified economy. Although the importance of mining sector is growing due to two recent large-scale mining operations (Rio Tinto's ilmenite mining operation in the south-eastern part of the country, and Ambatovy's nickel and cobalt mining in the eastern part of the country), the contribution to the national GDP is still small.

Table 2.2 National GDP Composition by Sub-Sector (at constant prices)

(Top: Billion Ariary, Bottom: %)

	2007	2008	2009	2010	2011	2012	2013	2014 (*)	2015 (*)	2016 (*)
Primary Sector	4,423.0 (28.8)	4,524.8 (27.8)	4,770.8 (30.3)	4,658.2 (29.6)	4,759.4 (29.7)	4,875.8 (29.4)	4,606.2 (27.4)	4,683.9 (27.0)	4,610.2 (25.9)	4,672.1 (25.4)
Agriculture	2,989.5 (19.5)	3,075.3 (18.9)	3,263.0 (20.8)	3,254.7 (20.7)	3,310.2 (20.7)	3,421.7 (20.6)	3,131.0 (18.6)	3,167.0 (18.2)	3,073.7 (17.3)	3,101.1 (16.9)
Livestock and Fishing	1,266.7 (8.3)	1,281.0 (7.9)	1,287.2 (8.2)	1,180.6 (7.5)	1,233.7 (7.7)	1,248.2 (7.5)	1,266.2 (7.5)	1,304.2 (7.5)	1,321.6 (7.4)	1,354.0 (7.4)
Forestry	166.8 (1.1)	168.5 (1.0)	220.7 (1.4)	222.9 (1.4)	215.5 (1.3)	205.8 (1.2)	208.9 (1.2)	212.8 (1.2)	214.9 (1.2)	217.0 (1.2)
Secondary Sector	2,022.7 (13.2)	2,138.7 (13.1)	2,002.3 (12.7)	2,038.7 (13.0)	2,111.3 (13.2)	2,294.2 (13.8)	2,784.9 (16.6)	2,966.7 (17.1)	3,194.5 (17.9)	3,292.0 (17.9)
Extractive industry	116.0 (0.8)	126.4 (0.8)	118.8 (0.8)	194.4 (1.2)	218.4 (1.4)	356.8 (2.2)	848.0 (5.0)	975.8 (5.6)	1,159.6 (6.5)	1,118.0 (6.1)
Food, drink, tobacco	763.7 (5.0)	803.0 (4.9)	789.0 (5.0)	797.7 (5.1)	819.0 (5.1)	840.4 (5.1)	825.0 (4.9)	846.5 (4.9)	864.3 (4.9)	902.9 (4.9)
Textile	345.7 (2.3)	343.0 (2.1)	314.4 (2.0)	282.8 (1.8)	285.9 (1.8)	288.9 (1.7)	304.9 (1.8)	309.7 (1.8)	299.7 (1.7)	340.3 (1.9)
Wood, paper, printing	174.9 (1.1)	168.2 (1.0)	170.5 (1.1)	184.1 (1.2)	177.9 (1.1)	179.5 (1.1)	184.7 (1.1)	188.8 (1.1)	197.3 (1.1)	212.1 (1.2)
Construction materials	56.4 (0.4)	63.3 (0.4)	59.0 (0.4)	60.9 (0.4)	63.3 (0.4)	65.0 (0.4)	61.1 (0.4)	63.1 (0.4)	64.7 (0.4)	68.1 (0.4)
Metal industry	156.7 (1.0)	219.5 (1.3)	172.6 (1.1)	143.8 (0.9)	165.7 (1.0)	168.6 (1.0)	149.2 (0.9)	153.7 (0.9)	164.9 (0.9)	175.4 (1.0)
Machine, electrical equipment	63.7 (0.4)	48.8 (0.3)	39.1 (0.2)	27.5 (0.2)	24.8 (0.2)	25.1 (0.2)	25.4 (0.2)	25.8 (0.1)	26.3 (0.1)	26.8 (0.1)
Various industries	187.5 (1.2)	197.5 (1.2)	171.0 (1.1)	167.9 (1.1)	170.5 (1.1)	172.8 (1.0)	172.6 (1.0)	175.9 (1.0)	181.9 (1.0)	195.8 (1.1)
Electricity, water, gas	158.1 (1.0)	169.0 (1.0)	167.9 (1.1)	179.8 (1.1)	185.7 (1.2)	197.1 (1.2)	214.1 (1.3)	227.4 (1.3)	235.8 (1.3)	252.6 (1.4)
Tertiary Sector	8,899.0 (58.0)	9,611.0 (59.1)	8,949.1 (56.9)	9,041.3 (57.4)	9,130.2 (57.1)	9,416.9 (56.8)	9,405.1 (56.0)	9,717.3 (55.9)	9,999.1 (56.2)	10,422.7 (56.7)
Public Work	1,285.2 (8.4)	1,663.6 (10.2)	1,370.4 (8.7)	1,412.1 (9.0)	1,460.3 (9.1)	1,511.7 (9.1)	1,482.8 (8.8)	1,529.9 (8.8)	1,677.4 (9.4)	1,778.6 (9.7)
Trade, maintenance, repairs	1,837.9 (12.0)	1,879.9 (11.6)	1,936.2 (12.3)	1,912.6 (12.2)	1,954.4 (12.2)	1,996.6 (12.0)	1,934.5 (11.5)	1,990.2 (11.5)	2,015.5 (11.3)	2,083.4 (11.3)
Hotel, Restaurant	334.6 (2.2)	364.2 (2.2)	178.0 (1.1)	195.5 (1.2)	212.0 (1.3)	239.9 (1.4)	231.5 (1.4)	251.8 (1.4)	258.4 (1.5)	294.3 (1.6)
Transportation	1,424.2 (9.3)	1,510.4 (9.3)	1,317.3 (8.4)	1,352.8 (8.6)	1,342.7 (8.4)	1,413.6 (8.5)	1,465.1 (8.7)	1,486.4 (8.6)	1,498.1 (8.4)	1,568.7 (8.5)
Post and telecommunication	249.0 (1.6)	265.0 (1.6)	296.8 (1.9)	335.6 (2.1)	351.5 (2.2)	371.9 (2.2)	405.3 (2.4)	412.5 (2.4)	394.2 (2.2)	430.8 (2.3)
Bank	326.7 (2.1)	356.0 (2.2)	420.4 (2.7)	405.2 (2.6)	429.8 (2.7)	446.5 (2.7)	465.2 (2.8)	528.4 (3.0)	627.6 (3.5)	677.8 (3.7)
Business services	1,233.4 (8.0)	1,307.1 (8.0)	1,245.6 (7.9)	1,281.9 (8.1)	1,323.3 (8.3)	1,367.1 (8.2)	1,406.9 (8.4)	1,427.7 (8.2)	1,466.4 (8.2)	1,520.9 (8.3)
Administration	1,211.0 (7.9)	1,336.6 (8.2)	1,294.5 (8.2)	1,254.0 (8.0)	1,216.4 (7.6)	1,193.4 (7.2)	1,172.5 (7.0)	1,185.0 (6.8)	1,162.3 (6.5)	1,149.5 (6.3)
Education	509.2 (3.3)	431.2 (2.6)	407.8 (2.6)	407.0 (2.6)	350.6 (2.2)	381.6 (2.3)	343.5 (2.0)	396.7 (2.3)	393.4 (2.2)	389.6 (2.1)
Health	247.5 (1.6)	253.2 (1.6)	231.9 (1.5)	226.9 (1.4)	224.0 (1.4)	222.5 (1.3)	217.7 (1.3)	220.3 (1.3)	219.3 (1.2)	223.8 (1.2)
Services provided to households	240.3 (1.6)	243.9 (1.5)	250.1 (1.6)	257.7 (1.6)	265.1 (1.7)	272.1 (1.6)	280.1 (1.7)	288.6 (1.7)	286.5 (1.6)	305.3 (1.7)
Total	15,344.7 (100.0)	16,274.5 (100.0)	15,722.2 (100.0)	15,738.2 (100.0)	16,000.9 (100.0)	16,586.9 (100.0)	16,796.2 (100.0)	17,367.9 (100.0)	17,803.8 (100.0)	18,386.8 (100.0)

Note: (*) Provisional Version

Source: JICA Study Team based on National Statistics Institute (INSTAT) (June, 2018)

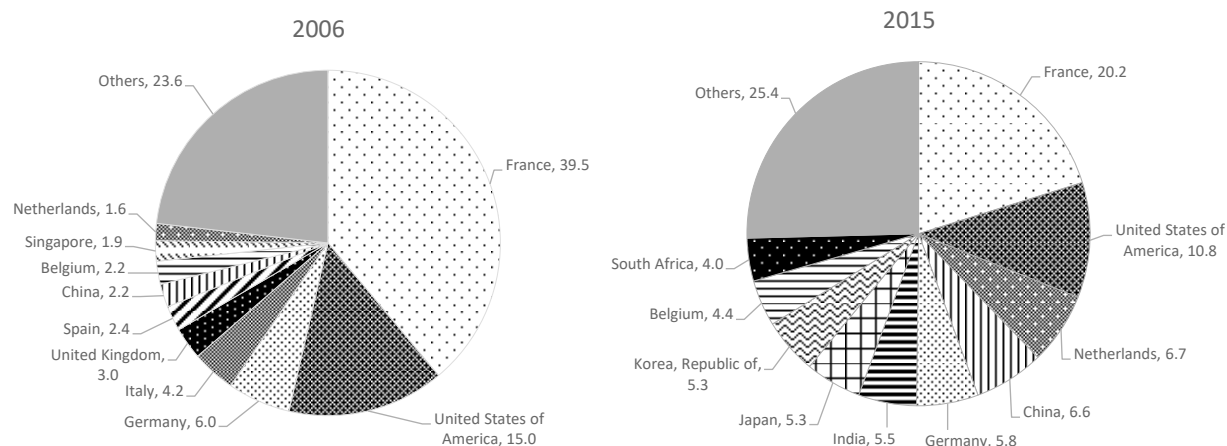
(3) External Trade of Madagascar

There are major changes in the geographic structure of Madagascar's export markets, as Figure 2.1 (a) shows. In the most recent ten years, the country's export markets have become highly

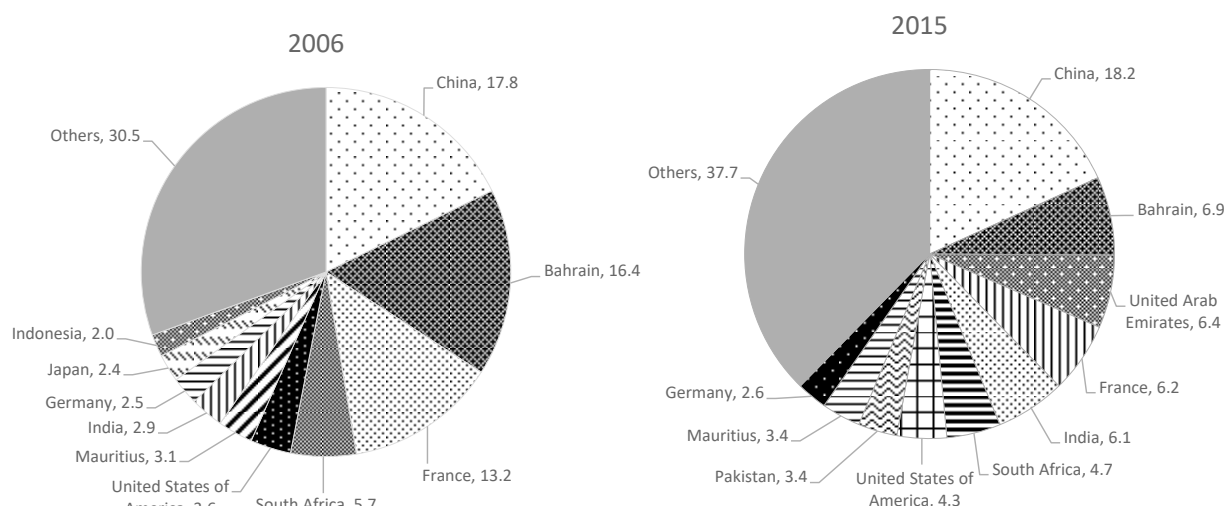
diversified, with the shares accounted for by the European Union (EU) and the United States declining considerably, while those of Asian countries have grown.

On the other hand, China is one of Madagascar’s main suppliers, accounting for over 18 percent of its imports in value terms in 2015. India has also significantly grown its market share of total Malagasy imports, rising from 2.9 percent to 6.1 percent.

(a) Exports



(b) Imports



Source: JICA Study Team based on International Trade Centre (ITC) Data (July, 2017)

Figure 2.1 Directions of Merchandise Trade of Madagascar, 2006 and 2014 (% of Total Value)

Madagascar also experienced significant changes in the structure of its merchandise exports. The country became a major exporter of nickel and other minerals, as Table 2.3 (a) indicates. In contrast, exports of clothing and other manufactured products, which had traditionally comprised the main group of products exported by Madagascar, plummeted in the wake of the trade sanctions imposed by Madagascar’s trading partners. Despite this fact, the amount of exports of clothing and apparel goods increased slightly from 2006 to 2015. Exports of plant products also grew, consisting of cloves, vanilla, cocoa beans, groundnuts, lychees, unroasted coffee, and beans.

On the import side, as Table 2.3 (b) illustrates, the top 3 commodities are the same in 2006 and 2015. The largest import commodity is “Petroleum oils, other than crude” (HS code 2710).

Table 2.3 Top 10 Export and Import Commodities of Madagascar in 2006 and in 2015

(a) Exports

		2006		2015	
		US\$ mil.	%	US\$ mil.	%
1	Articles of apparel and clothing accessories, knitted or crocheted	183.4	18.2	Nickel and articles thereof	550.7 25.4
2	Articles of apparel and clothing accessories, not knitted or crocheted	160.7	15.9	Coffee, tea, maté and spices	393.4 18.2
3	Fish and crustaceans, molluscs and other aquatic invertebrates	139.2	13.8	Articles of apparel and clothing accessories, knitted or crocheted	206.4 9.5
4	Coffee, tea, maté and spices	93.2	9.2	Articles of apparel and clothing accessories, not knitted or crocheted	205.8 9.5
5	Mineral fuels, mineral oils and products of their distillation; bituminous substances; minerals	80.4	8.0	Other base metals; cement; articles thereof	95.2 4.4
6	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	45.1	4.5	Fish and crustaceans, molluscs and other aquatic invertebrates	90.5 4.2
7	Natural or cultured pearls, precious or semi-precious stones, precious metals, metal clad products	28.8	2.9	Ores, slag and ash	71.7 3.3
8	Printed books, newspapers, pictures and other products of the printing industry; manuscripts	28.8	2.9	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral	64.2 3.0
9	Wood and articles of wood; wood charcoal	20.9	2.1	Edible vegetables and certain roots and tubers	42.6 2.0
10	Cotton	16.4	1.6	Cotton	41.6 1.9
	Others	211.267	21.0	Others	402.3 18.6
Total		1,008.2	100.0	Total	2,164.5 100.0

(b) Imports

		2006		2015	
		US\$ mil.	%	US\$ mil.	%
1	Mineral fuels, mineral oils and products of their distillation; bituminous substances; minerals	329.2	18.7	Mineral fuels, mineral oils and products of their distillation; bituminous substances; minerals	496.9 16.8
2	Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof	128.5	7.3	Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof	237.8 8.0
3	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television	94.1	5.3	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television	174.0 5.9
4	Vehicles other than railway or tramway rolling stock, and parts and accessories thereof	89.3	5.1	Salt; sulphur; earths and stone; plastering materials, lime and cement	159.6 5.4
5	Wool, fine or coarse animal hair; horsehair yarn and woven fabric	84.3	4.8	Vehicles other than railway or tramway rolling stock, and parts and accessories thereof	156.5 5.3
6	Cotton	77.5	4.4	Wool, fine or coarse animal hair; horsehair yarn and woven fabric	112.8 3.8
7	Plastics and articles thereof	55.3	3.1	Cotton	109.0 3.7
8	Knitted or crocheted fabrics	54.2	3.1	Cereals	106.6 3.6
9	Paper and paperboard; articles of paper pulp, of paper or of paperboard	52.8	3.0	Plastics and articles thereof	100.5 3.4
10	Cereals	48.1	2.7	Pharmaceutical products	98.4 3.3
	Others	747.1	42.4	Others	1,208.9 40.8
Total		1,760.3	100.0	Total	2,960.9 100.0

Source: JICA Study Team based on International Trade Centre (ITC) Data (July, 2017)

2.2.2 Human Development of Madagascar

The human development index (HDI) of Madagascar ranked 161th among 189 countries in 2018. However, the rank of HDI among 31 low income countries is fourth in the world and is high despite its poor economic production (GDP per capita was ranked 185th among 194 countries in 2019). Some of the factors contributing to this ranking of Madagascar is the education and health situation. Socio-economic sustainability index such as share of skilled labour is also large compared to some of the neighbouring countries and francophone countries in Africa.

Table 2.4 HDI of Madagascar, Neighbouring Countries and Major Francophone Countries in Africa (2018)

	Madagascar	Mozambique	Kenya	Tanzania	Côte d'Ivoire	Burkina Faso	Senegal
Overall Ranking	161	180	142	154	170	183	164
HDI Index	0.519	0.437	0.590	0.538	0.492	0.423	0.505
Education Index	0.498	0.385	0.551	0.441	0.424	0.286	0.368
Expected Years of Schooling	10.6 years	9.7 years	12.1 years	8.9 years	9.0 years	8.5 years	9.7 years
Literacy Rate	71.6%	50.6%	78.7%	77.9%	43.9%	34.6%	42.8%
Gender Development Index	0.962	0.906	0.931	0.928	0.841	0.870	0.911
HIV Prevalence, adult	0.2%	12.3%	5.4%	4.7%	2.7%	0.8%	0.4%
Life Expectancy at Birth	66.3	58.9	67.3	66.3	54.1	60.8	67.5
Mortality Rate, infant (per 1,000)	34	53.1	35.6	40.3	66	52.7	33.6
GDP per Capita (2011 PPP \$)	1,416	1,136	N.A.	2,683	3,601	1,703	2,471
People using Improved Drinking Water Sources	50.6%	47.3%	58.5%	50.1%	73.1%	59.3%	75.2%
People using Improved Sanitation Facilities	9.7%	22.6%	29.8%	23.5%	29.9%	22.5%	48.4%
Skilled Labour Force (% of Labour Force)	38.4%	8%	N.A.	5.1%	8.8%	4%	11.8%

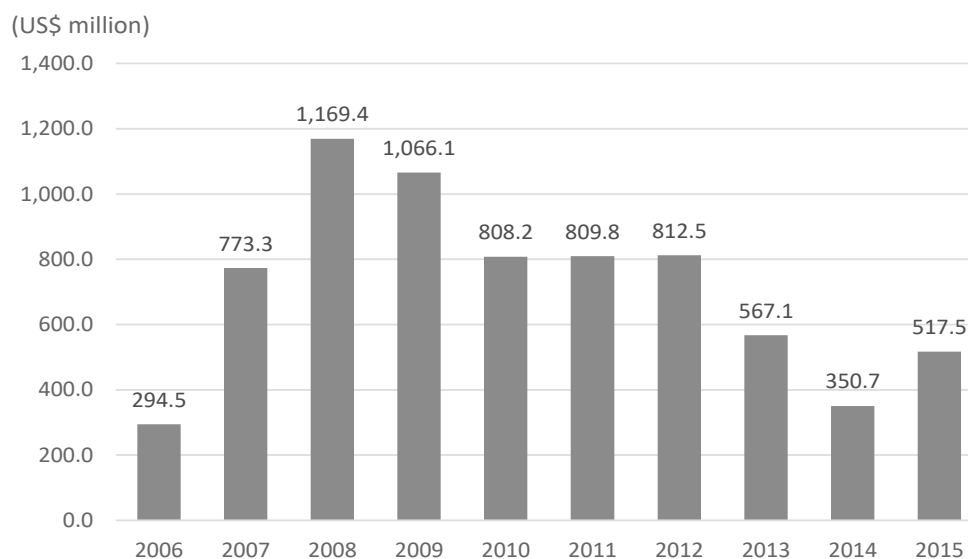
Note: Numbers in bold letters are the top three countries among the seven countries compared in the table.

Source: United Nations Development Programme HP

2.2.3 Investment

(1) Recent Trend of Foreign Direct Investment

Foreign Direct Investment (FDI) in Madagascar peaked in 2008 at around US\$1,200 million, as Figure 2.2 illustrates. As with economic growth, FDI dropped significantly after the 2009 crisis, to US\$ 800 million in 2010, and flows have since been flat. However, because of continuing uncertainties in the political situation, FDI remains at a low level.



Source: JICA Study Team based on UNCTAD Data

Figure 2.2 Net FDI Flows of Madagascar

Table 2.5 shows that the largest FDI inflow was toward the extractive industry. There have been two large-scale investments in the mining sector since 2006 (QIT Madagascar Minerals (QMM) and the Ambatovy project). The other main FDI destinations are financial activities, telecommunications, manufacturing (including free-zone manufacturing) and construction and public works.

Table 2.5 FDI Inflow to Madagascar by Sector

(Billion Ariary)

	2007	2008	2009	2010	2011	2012	2013
Agriculture, Hunting, livestock and forestry	-4.8	1.5	14.2	-0.8	-3.3	10.1	21.8
Fisheries, aquaculture	-26.1	6.5	18.8	34.7	7.3	41.7	2.1
Manufacturing operations	15.6	1	99.6	41.5	137	93.6	76.4
Production and distribution of gas, electricity and water	4.0	-2.5	0.3	0.2	3.8	1.1	28.2
Construction and public works	236.7	17.6	31.9	53.6	58.9	0.5	6.8
Mining and quarrying	886.2	1,637.5	2,069.8	1,360.0	1,000.6	750.5	231.0
Trade	0.9	42.4	30.9	18.4	34	48.7	26.6
Hotels and restaurants	171.1	1.1	37.5	36.1	1.8	6	2.9
Transports	-2.8	2.2	10.9	2.9	3.7	30	30
Financial activities	37.7	38.1	59.7	57.4	245.4	532.5	560
Real estate and business services	0.6	5.3	7.6	10.5	70.8	31.6	29.7
Oil distribution	108.9	16.3	65.4	58.2	7.8	14.3	90.4
Telecommunication	28.9	147.8	85.8	16.5	72	222.9	145.7
Others			0.2	-0.1	0.0		-0.1
Total	1,456.9	1,914.8	2,532.5	1,689.1	1,639.9	1,783.4	1,251.5

Source: JICA Study Team based on Etude sur les Investissements Directs Etrangers a Madagascar (INSTAT, 2015)

(2) Environment for Doing Business

Improving the business environment is a government priority. According to “Word Bank’s Doing Business 2017”, Madagascar’s aggregated ranking on the ease of doing business is 167 out of 190 countries, as shown in Table 2.6. The repeated political crises account for the decline of most of the country’s indicators used by the Doing Business report, but there has been significant progress regarding the cost and number of days needed to start a business.

Table 2.6 Business Environment for Enterprises in Madagascar and in Neighbouring Countries, 2008 and 2017

	Madagascar		Mauritius		Mozambique		South Africa	
	2008	2017	2008	2017	2008	2017	2008	2017
Overall Ranking (a)	149	167	27	49	134	137	35	74
Starting a business	61	113	8	48	125	134	53	131
Dealing with construction permits	-	184	-	33	-	30	-	99
Access to electricity	-	185	-	110	-	168	-	111
Registering property	165	159	153	98	126	107	76	105
Getting credit	176	170	97	44	97	157	26	62
Protecting minority investors	51	114	11	32	33	132	9	22
Paying taxes	86	117	11	45	72	112	61	51
Trading across borders	126	129	17	74	140	106	134	139
Enforcing contracts	151	158	78	34	138	185	85	113
Resolving insolvency	-	127	66	39	134	65	68	50

Notes: (a) The 2008 and 2017 rankings are based on 178 and 190 countries and economies, respectively.

Source: JICA Study Team based on Doing Business (World Bank, 2008 and 2017)

2.2.4 SWOT Analysis of Madagascar

A SWOT Analysis was conducted considering Madagascar's socio-economic development in relation to the development of the Overall TaToM Area.

Table 2.7 SWOT Analysis for Madagascar

Strength	Weakness
<ul style="list-style-type: none"> • An abundant, relatively low-wage labour force exists in Madagascar. The wage level of Madagascar belongs to the group of 25 countries with the lowest minimum wages. • The labour force is hard working and good with hands. • A large amount of labour force is concentrated especially in Antananarivo Agglomeration, the capital of Madagascar. • An export-oriented textile industry is prominent in Madagascar. It has been incorporated in the global value chain. • Madagascar is one of the world-famous destinations of international tourism because of rare animals and plants. 	<ul style="list-style-type: none"> • The school education system has so degraded that students cannot acquire basic academic skills. As a result, the basic academic skills of young people have declined. • The condition of economic infrastructure, such as power supply, water supply and access roads, is poor. As a result, it is difficult to attract investments to economic sectors so as to promote the development of the economic sectors. • Government funds for infrastructure development are largely lacking. • Government capacity is too weak to promote agricultural and industrial development. • Night-soil is not properly treated and disposed. Hygiene is problematic in urban areas including Antananarivo and Toamasina Agglomerations where population is concentrated. • National land is vast in comparison with the population size. Hence population density is low and national land is not fully utilised because every part of the country is not connected to each other effectively by modes of land or sea transport. • Management reform of Air Madagascar has been in progress. Due to the difficult reform of Air Madagascar, cities in Madagascar are not effectively connected by airline flights; therefore, it is not possible to use national land (e. g., promotion of tourism) effectively for socio-economic development.
Opportunities	Threat
<ul style="list-style-type: none"> • Madagascar is a member country of regional economic communities (RECs), such as SADC, COMESA and IORA. By promoting the regional economic integration related to those organizations, it will become possible to get access to the regional markets with high growth potentiality and to develop economic sectors targeting the regional consumer markets. • With the expansion of Toamasina Port, the world's largest container vessels will be able to call at the Toamasina Port for transshipment like Port Louis in Mauritius and feeder ships will run from Toamasina Port to ports in eastern and southern Africa. As a result, access by cargo ships to markets of countries in the Indian Ocean and on the African Continent will become easier, the cost of transport to those countries will be reduced and the possibility of promoting economic sectors targeting regional markets will increase. • Madagascar's national population growth rates are still high, and its demographic dividend will reach the highest after year 2050. • Wages of workers in China and Southeast Asia are gradually increasing. Still having a cheap, abundant labour force, South Asian countries, like Bangladesh and Pakistan, do not have so large production capacity as China. There are not so many countries that can take over China's position of low cost manufacturing. However, Madagascar is one of those such countries. • With the rehabilitation of Pangalanes Canal and land development for agriculture along the canal, agricultural production targeting world markets will increase. There is a possibility to develop processing industry in Toamasina Agglomeration, using part of the agricultural products. • If the market value of high viscosity crude reserved in the western part of Madagascar increases, crude oil development will progress and Madagascar's fuel will rely on domestic crude oil. Abundant energy will be available and the economic sectors will be further developed. 	<ul style="list-style-type: none"> • Political crises and instability will continue in Madagascar. Madagascar will not attract investments to its economic sectors. Since ODA will be reduced, economic infrastructure will not be substantially developed. As a result, economic sectors will not develop well. • There is a possibility that the regional economic integration will not be implemented as expected, even with the institutionalisation of the regional economic integration of COMESA, SADC, and IORA. • Even if the regional economic integration progresses, economic sector development in Madagascar will not be realised because the influx of products from South Africa and other countries in the region will reduce development opportunities of Madagascar's economic sectors.

Source: JICA Study Team

2.2.5 National Development Potential of Madagascar

(1) Population, Urbanization and Changes in the Lifestyle and Consumption Patterns of the African Countries

In the recent past, Madagascar has been liberalizing its trade regime on a regional basis. In particular, the Common Market for Eastern and Southern Africa (COMESA) and the Southern African Development Community (SADC) are leading regional integration in southern Africa.

Although Madagascar was suspended from SADC's activities because of its political instability, since 2014, Madagascar has resumed its participation in the various SADC meetings. Within the Free Trade Agreement (FTA), trade in goods considered as SADC-originating have been completely duty free since 2012, with a few exceptions.

Moreover, the Heads of State and Government of the Common Market for Eastern and Southern Africa (COMESA), East African Community (EAC) and Southern African Development Community (SADC) have been discussing to officially launch the COMESA-EAC-SADC Tripartite Free Trade Area (TFTA). At present, 24 of the 26 member states have signed the Declaration leaving Libya and Eritrea yet to sign.

The countries in these regional economic partnerships are countries with growing population and economy. In 2015, the total population of these two regional economic communities were 675 million, and is projected to increase to 958 million in 2030 and further to 1,393 million by 2050. The urban population is also increasing rapidly in these countries with total of 216 million urban population in 2014 which is to become over 700 million in 2050. This is equivalent to the present urban population in China.

Table 2.8 Size of Populations and Economies of the Countries in COMESA and SADC

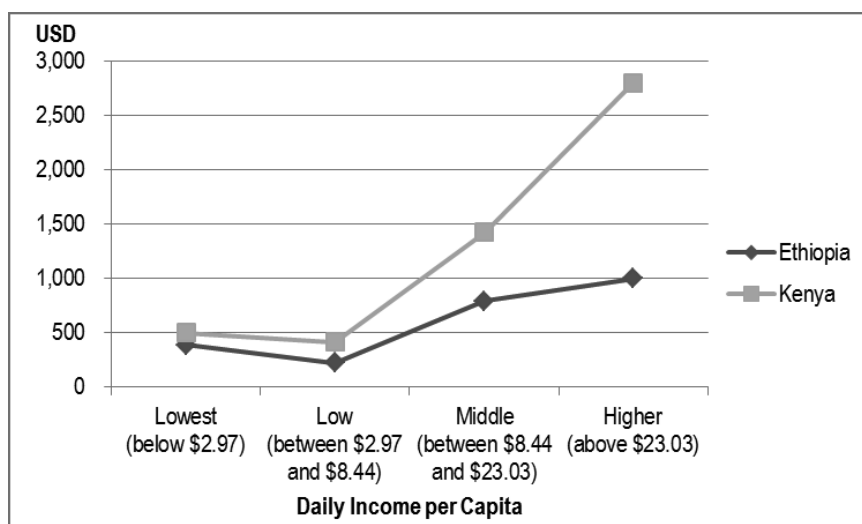
Country	Regional Economic Community		Population (thousand)			Urban Population (thousand)	GDP Current Price (Million USD)	GDP per Capita (USD)
	COMESA	SADC	2015	2030	2050	2014	2015	2015
Angola		✓	25,022	39,351	65,473	9,580	102,621	4,101
Botswana		✓	2,262	2,817	3,389	1,166	14,445	6,386
Burundi	✓		11,179	27,244	42,789	1,233	3,005	269
Union of Comoros	✓		788	1,081	1,502	212	590	749
DR Congo	✓	✓	77,267	120,304	195,277	29,115	38,402	497
Djibouti	✓		888	1,054	1,186	685	1,727	1,945
Egypt	✓		91,508	117,102	151,111	35,914	332,075	3,629
Eritrea	✓		5,228	7,311	10,421	1,451	4,442	850
Ethiopia	✓		99,391	138,297	188,455	18,363	64,683	651
Kenya	✓		46,050	65,412	95,505	11,476	63,995	1,390
Lesotho		✓	2,135	2,486	2,987	562	2,351	1,101
Libya	✓		6,278	7,418	8,37	4,900	17,194	2,739
Madagascar	✓	✓	24,235	35,960	55,294	8,125	9,744	402
Malawi	✓	✓	30,331	36,107	40,725	2,710	6,402	211
Mauritius	✓	✓	1,273	1,310	1,249	497	11,511	9,042
Mozambique		✓	27,978	41,437	65,544	8,454	14,798	529
Namibia		✓	2,459	3,272	4,322	1,073	11,577	4,708
Seychelles	✓	✓	96	101	100	50	1,377	14,344
South Africa		✓	54,490	60,034	65,540	34,168	317,698	5,830
Sudan	✓		40,235	56,443	80,284	13,034	64,059	1,592
Swaziland	✓	✓	1,287	1,507	1,792	270	3,929	3,053
Tanzania		✓	53,470	82,927	137,136	15,685	45,634	853
Uganda	✓		39,032	61,929	101,873	6,124	25,208	646
Zambia	✓	✓	16,212	25,313	42,975	6,079	21,243	1,310
Zimbabwe	✓	✓	15,603	21,353	29,615	4,745	16,072	1,030
Total	18	15	674,697	957,570	1,392,919	215,671	1,194,782	1,771

Source 1: United Nations Economic & Social Affairs, 2015, World Population Prospects: The 2015 Revision

Source 2: United Nations Economic & Social Affairs, 2014, World Urbanization Prospects: The 2014 Revision

Source 3: IMF, World Economic Outlook April 2018

Although these countries still have most of their population living under US\$8.44 per day, the lifestyle in these countries are also changing as the middle income population is gradually increasing in the urban areas. The consumption amount of food and clothes by consumption segment in the urban areas of two of the major COMESA countries are shown in Figure 2.3. In these countries although the consumption amount does not change so much between the lowest and low consumption segment, the yearly consumption amount more than doubles for the household in the middle consumption segment which earns between US\$ 8.44 and US\$ 23.03. This shows the trend that the amount of each household uses for daily basic goods increase from the middle consumption segment.



Source: World Bank, Global Consumption Database

Figure 2.3 Household Consumption of Food and Clothing by Consumption Segment in Ethiopia and Kenya (2010)

Along with the development of Toamasina Port, which will increase the capacity of handling volume for transshipment and export-import, and the increase in the size of market in COMESA and SADC countries, Madagascar could become one of the major producing countries to supply consumer goods to these growing markets.

(2) Potential of Madagascar as Future Labour Market

The economically active population is relatively young in Madagascar as those who are below 25 years old represented 49% of the economically active population. The population of Madagascar is expected to continue to increase at a high rate and the productive population (population aged between 15 and 64) will reach 36 million in 2050 and 69 million in 2100.

Madagascar is also an attractive country in terms of cost of labour. Although Madagascar's minimum wage was revised in 2015 and there are several countries with lower wages as of today, Madagascar is still one of the countries with low minimum wages among textile or clothing exporting countries and is the lowest among the African important clothing producers, namely, Morocco, Mauritius, Tunisia and Madagascar. Compared with Bangladesh, one of the major textile exporting countries in Asia, the minimum wage for textile industry is US\$ 816 per year, slightly lower than the minimum wage of Madagascar.

In addition, China's shares in the world textile and apparel exports, which has the largest share in the world are dropping and could be taken over by other countries with cheaper labour cost including Madagascar.

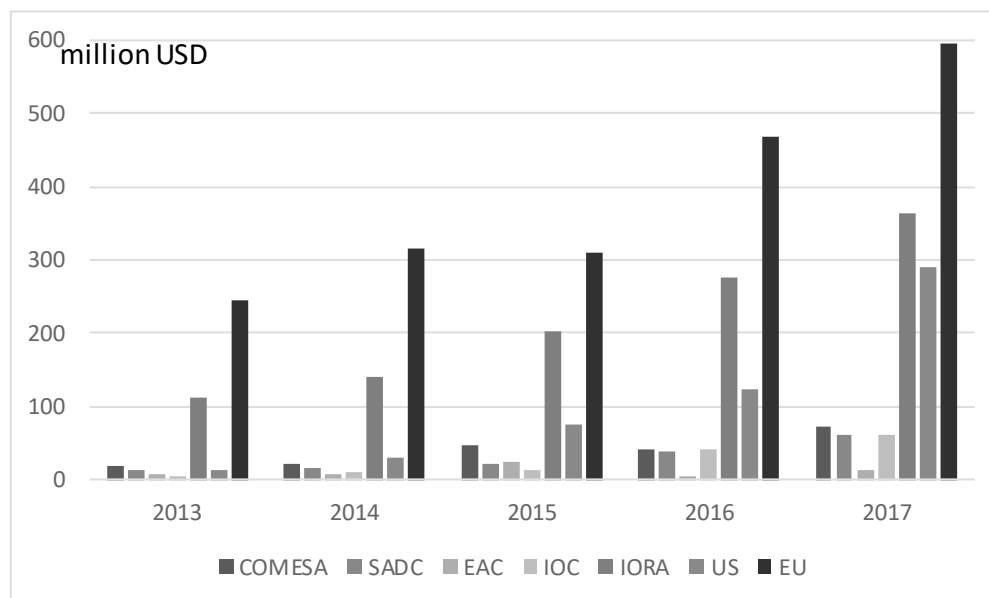
Madagascar's minimum wage is also the lowest among the Francophone counties in Africa. This has brought French firms to start call centres in Madagascar which is expected to grow to 100,000 by 2020 according to the Economic Development Board of Madagascar (EDBM).

In accordance with the data of values of manufacturing merchandize export (for year 2018), Madagascar has the 19th largest exporting country of manufacturing merchandize export in African countries. When limiting to low labour cost countries among the African countries, Madagascar is one of the top five countries of manufacturing merchandize export including Kenya, Tanzania, Uganda, Ethiopia.

(3) Development Potential of Agro-industry and Manufacturing Light Industries

Agriculture and agro-industry are important sectors of the national economy of Madagascar, although both have a number of development constraints. Recognising the potential of agricultural production of Madagascar, the Indian Ocean Commission (IOC) launched the regional food security project that would supply food products to its member countries as well as neighbouring and other countries. This project, aiming to make Madagascar the “Grenier de l’ocen Indien”, was adopted by the Council of Ministers of the IOC in February 2016 as the Regional Programme for Food Security and Nutrition (PRESAN: *Programme régional de sécurité alimentaire et de nutrition*). The project, technically supported by FAO and financed by the European Development Fund (EDF), was implemented for five years to promote agricultural products of common interest in the region as well and increase productivity, output, competitiveness and trade between the island countries in the Indian Oceans hence improving food and nutrition security in the Indian Ocean States.

Although the biggest export market for Madagascar’s agriculture and food products is the EU, the export to IOC has been steadily increased to almost the same level with that of COMESA and SADC. However, its export to IORA (Indian Ocean Rim Association) is much larger than the export to these countries, and it is growing more rapidly. In addition, export to the US market has been also increasing.



Source: JICA Study Team based on Comtrade data

Figure 2.4 Trend of Agriculture and Food Products¹ Export by Madagascar to Neighbouring Regional Groups, US and EU

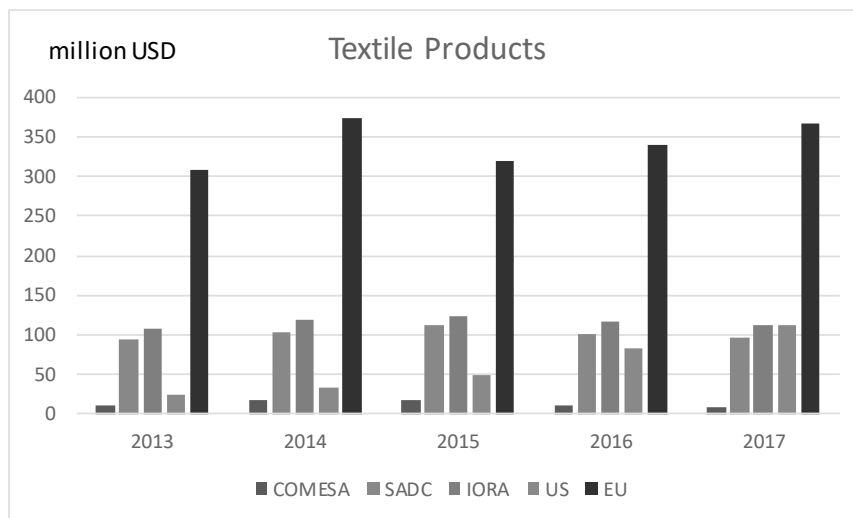
Considering the limited number of member countries (i.e., Madagascar, Mauritius, Comoros, Seychelles and Reunion) and thus small market size of IOC vis-à-vis the numerous and various (in fact, partly overlapping with IOC) member countries of IORA², the latter is a much more attractive market for Madagascar. Utilising the cooperation in the framework of IOC, Madagascar is

¹ Aggregation of HS categorized goods from HS01 to HS24.

² The member states of IORA are Australia, Bangladesh, Comoros, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Mauritius, Mozambique, Oman, Seychelles, Singapore, Somalia, South Africa, Sri Lanka, Tanzania, Thailand, UAE and Yemen.

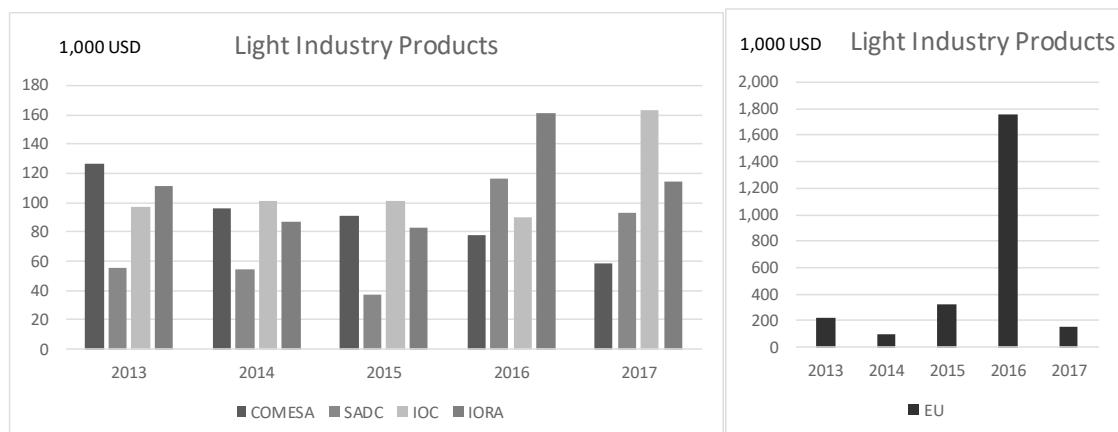
expected to enhance and expand its production and export capacity of agriculture and food products to IORA countries.

The potential of export development to IORA and other countries is also recognised in other sectors. For instance, textile products exported from Madagascar to IORA and SADC countries are valued at around 100 million USD every year which is around 1/3 of the export to the EU market. In 2016, the combined export of light industry products (including soap, footwear, ceramic products, glassware and cutlery) to COMESA, SADC, IOC and IORA was over 500 thousand USD which is larger than the export to the EU market in every recent year except for 2016. Furthermore, in 2017, the combined export of essential oil (which is one of the most important exports of Madagascar) perfumery and cosmetics to COMESA, SADC, EAC and IORA countries was more than 20 million USD, which is close to the export to EU in the same year. These figures show that the capacity enhancement of the above-mentioned sectors will contribute to the increase of exports to the surrounding countries in Africa and the Indian Ocean. In addition, the expansion of Toamasina Port and its utilisation in a competitive, but complementary, manner with Port Louis in Mauritius will reduce the present high cost of transportation.



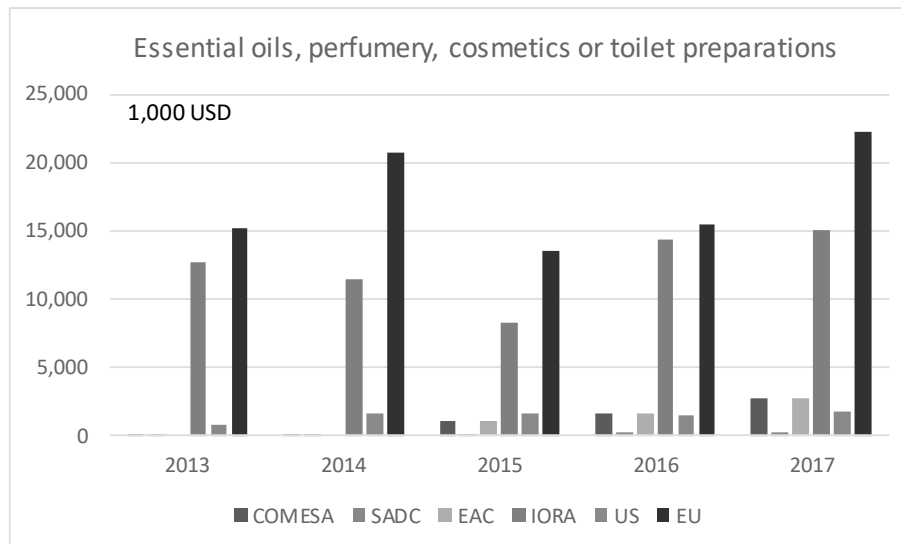
Source: JICA Study Team based on Comtrade data

Figure 2.5 Trends of Textile Export by Madagascar to Neighbouring Regional Groups, US and EU



Source: JICA Study Team based on Comtrade data

Figure 2.6 Trends of Light Industry Products Export by Madagascar to Neighbouring Regional Groups and EU



Source: JICA Study Team based on Comtrade data

Figure 2.7 Trends of Essential Oils Export by Madagascar to Neighbouring Regional Groups, US and EU

2.2.6 Development Potential Industries in Madagascar

As described above, the following industrial sectors and products have the potential of further development with export expansion to the surrounding countries in Africa and the Indian Ocean:

- Agriculture and food industry (agro-processing)
- Textile and apparel industry
- Light industry
- Essential oil, perfumery and cosmetics

In addition, the mining, tourism and ICT sectors have been attracting foreign investment with abundant resources. These sectors also have further development opportunities with expanding their markets on a global scale.

Compared with these industries, the above mentioned potential industries, i.e., agriculture and manufacturing may have potential for more dynamic growth because of the population increase, urbanization and changes in the lifestyle and consumption patterns of the middle income groups in the African and Indian Ocean countries. Such increasing demands by middle income populations could be satisfied by agro-processing, textile-apparel and light industrial products shown in Table 2.9.

To meet the increasing demand in these areas, strengthening of the supply capacity is necessary over any other things. However, considering the current situation of Madagascar, improvement of the overall economic infrastructure and administrative set up is required.

One effective way to resolve the “weakness” not only in Madagascar, but also in developing countries in general, is establishing industrial parks and “Economic Development Zones”³ with well-developed infrastructure and various incentives to attract foreign investment. In Madagascar, Economic Development Zones for investment promotion are planned and promoted to be established under new legislations. Therefore, these facilities should be utilized to develop the potential industries.

It is quite important to promote linkages between companies in industrial zones and local suppliers in the region to develop value chains. In this regard, capacity improvement of the local suppliers (SMEs and small farmers) in terms of production skills and facilities is also required.

³ The Economic Development Zone proposed here is called “Special Economic Zone (SEZ) in many countries.

Subsector compositions of each potential industry located in the industrial zones and linkage with local suppliers are envisaged in Table 2.9.

Table 2.9 Subsector Composition of Potential Industries and Local Suppliers

Industry Sector	Subsectors in Industrial Zones	Local Suppliers
Agro-processing	<ul style="list-style-type: none"> • Food and Beverage, • Spices, • Essential oils and perfumery 	<ul style="list-style-type: none"> • Small farmers, Farmers associations, • Package manufacturers, • Traders/Importers
Textile and apparel	<ul style="list-style-type: none"> • Fabric clothing, • Spinning, Weaving, • Dyeing 	<ul style="list-style-type: none"> • Accessory /finding manufacturers, • Package manufacturers, • Cotton producers/traders
Light industry	<ul style="list-style-type: none"> • Soap, Footwear, Ceramic products, Glassware and Cutleries, Cosmetics, • Household Sundries, Kitchen and Dining Products, Baby Goods and Body Care Products • Crafts and artisanal products, etc. 	<ul style="list-style-type: none"> • Palm tree farmers, • Mining companies, • Metal manufacturers, • Package manufacturers, • Traders/Importers

Source: JICA Study Team

The agro-processing sector includes food, beverage, spices, essential oils and perfumery producers. These products need various agriculture products for materials, such as vegetables, fruits, grains, sugar cane, meat, etc. Among others, high value cash crops such as vanilla, clove and ylang-ylang are indispensable for spices, essential oils and perfumery. To realize sustainable development of these agro-processing industries, contract farming and grouping of small-scale farmers are particularly important, as the farmers tend to be separated and exploited by middlemen and foreign buyers, as well as exposed to insecurity.

The textile and apparel industry in Madagascar is mostly operated by a so-called CMP (cutting, making and packaging) system, in which designs and patterns of clothes are made by foreign orderers, and factories in Madagascar are only in charge of assembling elements, most of which are also provided by the orderers. In other words, Madagascar (and many other developing countries that are engaged in CMP system) only provides cheap labour and work places and are incorporated as one part of supply chains.

However, subsector companies to be located in the industrial zones should include not only fabricators, but also other players in supply chain, i.e., spinning, weaving and dyeing factories. The linkage with local material suppliers should be also promoted, including cotton producers and traders.

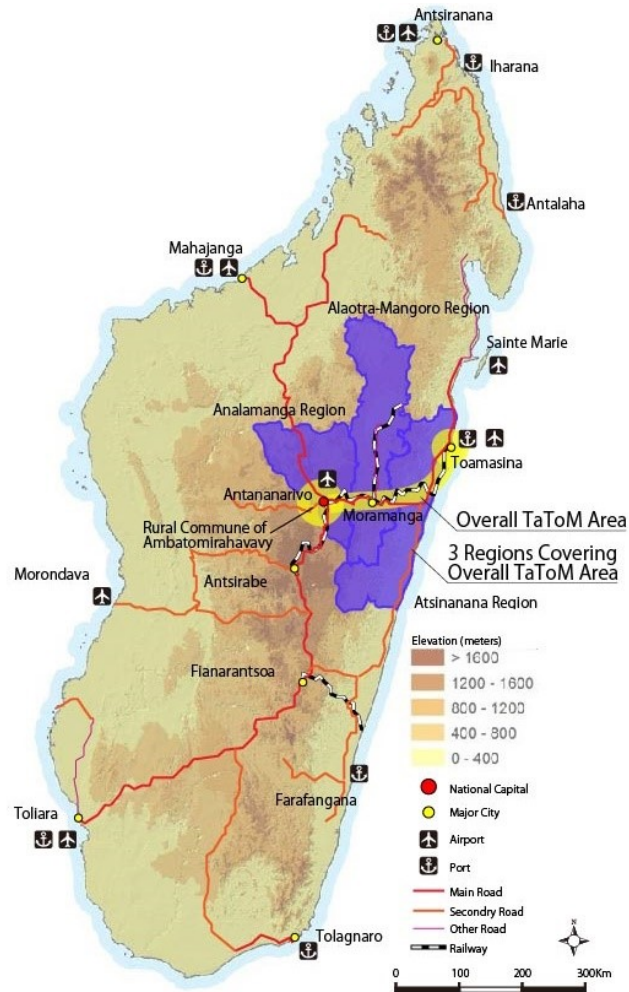
Light industry is supposed to include various subsectors as indicated before, such as soap, footwear, ceramic products, glassware and cutleries. In addition, cosmetics, crafts and artisanal products and many others also could be included. These various manufacturing industries (most of them are supposed SMEs and micro enterprises) are concentrated in the Antananarivo Agglomeration, and to some extent, in Toamasina Agglomeration.

Although these industries can procure materials from local market, many of them should be imported, thus the process engineering technology to absorb import cost is required. When indigenous materials, such as palm (for soap), clay (for ceramic) silica sand (for glassware), and metals (for cutleries) are available, their stable supply and quality control are necessary. In both cases, upgrading of technologies and human capacity for subsector companies and suppliers are also necessary.

Chapter 3 Overall TaToM: Future Vision, Growth Scenarios and Socio-Economic Framework

3.1 Overall TaToM Area

The whole area of TaToM (the Overall TaToM Area) is composed of Antananarivo Agglomeration, Toamasina Agglomeration and TaToM Economic Axis connecting the two agglomerations.



Source: JICA Study Team

Figure 3.1 Location of Overall TaToM Area

3.2 SWOT Analyses of Antananarivo Agglomeration, Toamasina Agglomeration and TaToM Economic Axis

For seeking the vision of Madagascar, it is considered that new types of economic sectors should be developed in the Overall TaToM Area aside from the existing ones (i.e., primary commodity production and textile industries), so as to contribute to national economic development as well as provide enough job opportunities to the increasing population of the Overall TaToM Area.

In addition to urban economic sectors within the Overall TaToM Area, urban and rural economic sectors outside the Overall TaToM Area should be promoted. The development of the Overall TaToM Area could support the economic sector development outside the Overall TaToM Area

through development of the business functions of Antananarivo and Toamasina Agglomerations and the strengthening of transport functions within the Overall TaToM Area.

SWOT analyses for Antananarivo Agglomeration, Toamasina Agglomeration, and TaToM Economic Axis were conducted in order to see the possibilities to attract investments to economic sectors and to manage the development of economic sectors of the agglomerations and the economic axis, as shown in Table 3.1, Table 3.2 and Table 3.3.

Table 3.1 SWOT Analysis for Antananarivo Agglomeration

Strengths	Weaknesses
<ul style="list-style-type: none"> Antananarivo Agglomeration has better infrastructure and economic conditions compared with other areas, and the population is continuously increasing. As a result, a large amount of cheap labour force exists in Antananarivo Agglomeration. The labour force is hard working and good with hands. Such labour force does not exist much in other countries of Africa. An export-oriented industry (textile industry) already exists. It is incorporated in the global value chain of textile industry. Madagascar is a world famous destination of international tourism because of its rare animals and plants. Antananarivo is one of the gateways of the country for international tourists. 	<ul style="list-style-type: none"> Fuel transport supporting economic and social activities in Antananarivo Agglomeration is unstable due to Antananarivo's inland location and its large distance (350 km) to seaports. The school education system has been degraded to the point that it is not functioning properly so that students cannot acquire basic academic skills. As a result, the basic academic skills of young people are lacking at present. The condition of economic infrastructure development (such as those for power supply, water supply and access roads) is poor. As a result, it is difficult to attract investments to economic sectors. Development of the economic sectors is not well promoted. Although government funds for infrastructure development have been spent more for Antananarivo Agglomeration than other regions, they were largely lacking compared with the necessary amount. Administrative capacity on the promotion of agriculture and industries is weak for the Analamanga Region, including Antananarivo Agglomeration. Drainage infrastructures are not well maintained resulting in increased inundation risks in urban areas of Antananarivo Agglomeration. Night soil is not properly treated and disposed. Hygiene is a problem in urban areas of Antananarivo Agglomeration.
Opportunities	Threats
<ul style="list-style-type: none"> Madagascar is a member of SADC, COMESA and IORA, as well as AfCFTA. By promoting the regional economic integration related to these organisations, it is possible to access the regional markets with high growth potential by developing economic sectors targeting those regional consumer markets. With the expansion of Toamasina Port, the world's largest container vessels will be able to stop at the Toamasina Port for trans-shipment (like Port Luis in Mauritius). Feeder ships will sail from Toamasina Port to ports in the eastern and southern Africa. As a result, access by cargo ships from Madagascar to the markets of countries in the Indian Ocean and African Continent will become easier, the cost of transport to those countries will be reduced and the possibility of promoting economic sectors targeting regional consumer markets will increase. Wages of workers in China and Southeast Asia are gradually increasing. South Asia still has a cheap, abundant labour force but does not have the production capacity like China. There are not many countries that can take over low-cost manufacturing after China, but Madagascar is one of the possible countries. 	<ul style="list-style-type: none"> Investments to economic sectors are not promoted because of the repeated political crises and prolonged economic instability. Due to political crises, ODA might be cut off so that economic infrastructure development could be disrupted. There is a possibility that the regional economic integration will not be implemented as expected even with the institutionalisation of the regional economic integration of COMESA, SADC, and IORA as well as that of AfCFTA. Even if the regional economic integration progresses, economic sector development in Madagascar will not be realised because of the influx of competitive regional products from South Africa and other countries of the region. The cargo transport function between Antananarivo and Toamasina Port will be maintained but, for some reasons, not upgraded to accommodate an increasing amount of transport demand. As a result, it will be difficult for Antananarivo Agglomeration to import fuel and commodities for supporting people's needs and economic production.

Source: JICA Study Team

Table 3.2 SWOT Analysis of Toamasina Agglomeration

Strengths	Weaknesses
<ul style="list-style-type: none"> The most important port of Madagascar, Toamasina Port, is located in Toamasina Agglomeration. Toamasina Agglomeration is the second largest city in Madagascar in terms of population size. Ambatovy's nickel and cobalt refining plant is located in Toamasina Agglomeration. Toamasina Port is a destination of regular international cruise ships. Toamasina Agglomeration has tropical climate and beaches. 	<ul style="list-style-type: none"> The school education system has been degraded to the point that it is not functioning properly so that students cannot acquire basic academic skills. As a result, the basic academic skills of young people are lacking at present. The condition of economic infrastructure development (such as those for power supply, water supply and access roads) is poor. As a result, it is difficult to attract investments to economic sectors. Development of the economic sectors is not well promoted. Tourist infrastructure, such as hotels, are limited to attract international tourists in Toamasina Agglomeration. Government funds for infrastructure development are largely lacking.

	<ul style="list-style-type: none"> • Regional and local administrative capacity on industrial development is weak for the Atsinanana Region, including Toamasina. The policy of the central government on the industrial development in Toamasina Agglomeration is also weak. • Drainage infrastructures are not well maintained resulting to frequent inundation in urban areas of Toamasina Agglomeration. • Night soil is not properly treated and disposed. Hygiene is a problem in Toamasina Agglomeration. • Management reform of Air Madagascar has been in progress. Due to the difficult reform process of Air Madagascar, cities in Madagascar are currently not connected effectively by airline flights. Flights between Antananarivo and Toamasina tend to be delayed or cancelled. As a result, putting in investments to economic sectors in Toamasina Agglomeration has not been so attractive. • Vertical and horizontal alignments of National Road No.2, connecting Antananarivo and Toamasina, are not good because said road passes through mountainous areas. Therefore, cars cannot be driven fast on NR2. Connectivity between Antananarivo and Toamasina is weak, which creates an unfavourable condition for investments to economic sectors in Toamasina Agglomeration. • Toamasina Agglomeration is currently not economically active and it is not a comfortable place for people to work and live in. As a result, population inflow to Toamasina Agglomeration is low. • Madagascar has a cheap, abundant labour force who are hard workers and good with their hands. However, the labour force exists in Antananarivo and Antsirabe which are inland areas. Therefore, it is necessary to bring the labour force from those inland cities to Toamasina Agglomeration in order to develop economic sectors in Toamasina Agglomeration. • An export-oriented industry (textile industry) already exists in Madagascar. It is incorporated in the global value chain of textile industry. However, such industry is located in inland urban areas, such as Antananarivo and Antsirabe. • Madagascar has rare flora and fauna and it is a world famous destination for international tourists. However, the major gateway to Madagascar is Antananarivo. Toamasina is not considered as one of the major gateways for international tourists.
Opportunities	Threats
<ul style="list-style-type: none"> • Toamasina Agglomeration is located near the Port of Toamasina, a deep sea port. It is close to the markets of regional countries in the Indian Ocean and Africa, and strategically advantageous in promoting the manufacturing industry targeting those consumer markets. • Madagascar is a member of SADC, COMESA and IORA, as well as AfCFTA. By promoting the regional economic integration related to these organisations, it is possible to access the regional markets with high growth potential by developing economic sectors targeting the regional consumer markets. • With the expansion of Toamasina Port, the world's largest container vessels will be able to stop at the Toamasina Port for trans-shipment (like Port Luis in Mauritius) and feeder ships will sail from Toamasina Port to ports in the eastern and southern Africa. As a result, access by cargo ships from Toamasina to markets of countries in the Indian Ocean and African Continent will become easier, the cost of transport to these countries will be reduced and the possibility of promoting economic sectors targeting regional markets will increase. • Wages of workers in China and Southeast Asia are gradually increasing. South Asia still has a cheap, abundant labour force but does not have the production capacity like China. There are not many countries that can take over low-cost manufacturing after China, but Madagascar could be one of these countries. Strategically, Toamasina Agglomeration has the advantage due to its location close to the Toamasina Port. • With the development of Pangalanes Canal, agricultural production targeting world markets could increase in areas along the canal. There is a possibility to develop processing industry using part of the agricultural products. 	<ul style="list-style-type: none"> • Investments to economic sectors are not promoted because of repeated political crises and prolonged economic instability. ODA might be cut off, so that economic infrastructure development could be disrupted. • There is a possibility that more funds for infrastructure development will be used intensively for Antananarivo Agglomeration, and not for Toamasina Agglomeration, because of political reasons and development policies • There is a possibility that the regional economic integration will not be implemented as expected, even with the institutionalisation of the regional economic integration of COMESA, SADC, and IORA, as well as that of AfCFTA. • Even if the regional economic integration progresses, economic sector development in Madagascar will not be realised because of the influx of competitive regional products from South Africa and other countries of the region.

Source: JICA Study Team

Table 3.3 SWOT Analysis of TaToM Economic Axis

Strengths	Weaknesses
<ul style="list-style-type: none"> The transport function of TaToM Economic Axis is indispensable for importing fuel and other necessary commodities for everyday life and also for importing commodities for economic production in the Antananarivo Agglomeration. Because of its high degree of necessity, NR2 is always maintained. Cities and local communities along NR2 have some opportunities to do small business on trade and car repair because of the traffic of heavy truck vehicles, taxi brousses and passenger cars on NR2 connecting Antananarivo and Toamasina. Since Moramanga is located in the middle of Antananarivo and Toamasina, many heavy truck vehicles stop here to rest. Moramanga area has tree plantations and natural forests for timber production. Ambatovy mining site of nickel and cobalt is located near Moramanga. Moramanga is a junction between NR2 and NR44. NR44 connects with Alaotora Lake Area, which is a good rice-producing area. 	<ul style="list-style-type: none"> Although NR2 and railway between Antananarivo and Toamasina composed an essential transport corridor for Madagascar, the traffic volume of NR2 was limited to around 1,700 vehicles per day (2018) and the cargo volume of the railway was around 96,000 ton per year (2017). The government continuously conducts road maintenance for NR2. However, this is just for maintaining the existing road function and capacity of NR2; not for the upgrading of the road function and capacity of NR2. Therefore, the cargo transport costs between Toamasina Port and Antananarivo Agglomeration (and farther other inland regions) remain high. The cargo transport time is also large (over 12 hours). The horizontal and vertical alignments of NR2 are so bad that it is very costly to improve the horizontal and vertical alignments for the purpose of increasing transport volume and travel speed on it. The road traffic safety is problematic for both heavy trucks and passenger vehicles on NR2. Traffic accidents also involve people in communities along NR2. The resilience of NR2 against heavy rainfall due to cyclones is not so strong, considering that it is the national major axis connecting the national capital (Antananarivo) and the national main port (Toamasina). The railway infrastructure has been degraded due to heavy rainfall and shortage of maintenance and rehabilitation budgets.
Opportunities	Threats
<ul style="list-style-type: none"> Since the Overall TaToM Area produces around 50% of the national total of GDP, this area will continue to attract more population and economic activities. As a result, the traffic demand for TaToM Economic Axis will increase steadily. For supporting the most important national axis, the upgrading of transport function of TaToM Economic Axis will become necessary sooner or later. It will be possible to further develop the economic sectors of Antananarivo and Toamasina Agglomerations by targeting the regional consumer markets of SADC, COMESA and IORA, as well as that of AfCFTA. When Antananarivo and Toamasina Agglomerations develop their economic sectors, the traffic demand for TaToM Economic Axis will largely increase. Then it will be possible to upgrade the transport function of TaToM Economic Axis to support the further development of economic sectors of Antananarivo and Toamasina Agglomerations. This possibility of development by economic sectors in Antananarivo and Toamasina Agglomeration, as well as in Moramanga and other towns along TaToM Economic Axis, will be enhanced by the prospective expansion of Toamasina Port. The necessity of upgrading the transport function of TaToM Economic Axis will become larger also due to the expansion of Toamasina Port. A new power substation will be constructed in Moramanga in order to connect a power transmission line between Antananarivo and Toamasina. Then the increased power supply will be available in Moramanga. Because of the relative proximity to Toamasina Port and the availability of improved power, Moramanga will be able to attract investments to its economic sectors. 	<ul style="list-style-type: none"> There is a possibility that sufficient funds will not be spent on the upgrading of NR2 and the rehabilitation of the railway between Antananarivo and Toamasina. One of the reasons is repeated political crises and prolonged economic instability. Because of this situation, investments to economic sectors will not be promoted in Antananarivo and Toamasina Agglomerations, and ODA might be cut off, so that transport infrastructure development will be disrupted including those for NR2 and railway. Another reason could be the early construction of Antananarivo-Toamasina Expressway in the next 5-10 years. In the next 5-10 years, the traffic demand for the expressway will not be large enough to support the repayment of the borrowed money for its construction. This could lead to large increase of international debt for Madagascar. As a result, due to the shortage of development funds, many priority projects of TaToM will not be implemented. This situation will lead to the limited development of economic sectors both of Antananarivo and Toamasina Agglomeration. The regional economic integration will not be implemented as expected, even with the institutionalisation of the regional economic integration of COMESA, SADC, and IORA, as well as that of AfCFTA. This situation will not bring the possibility of development of economic sectors in Antananarivo and Toamasina Agglomerations. As a result, traffic demand for TaToM Economic Axis will not largely increase, and it will not be able to upgrade its transport function. Even if the regional economic integration progresses, economic sector development in Madagascar will not be realised because of the influx of competitive regional products from South Africa and other countries of the region. This situation will result in low-level development of economic sectors in Antananarivo and Toamasina Agglomerations. As a result, traffic demand for TaToM Economic Axis will not largely increase, and it will not be able to upgrade its transport function.

Source: JICA Study Team

3.3 Future Vision for the Overall TaToM Area

Since 1991, Madagascar has experienced three political crises, and economic sectors have been damaged during the uncertain twenty years. Considering these economic and transport roles and developmental potentialities, the TaToM Area is expected to contribute to “reconstruction of Madagascar’s economy” and “recovery of the stability of Madagascar’s society.”

This expectation can be interpreted as the future vision for the Overall TaToM Area. The statement of the future vision is proposed as follows:

[Future Vision for the Overall TaToM Area]

“Through the development of the Overall TaToM Area, Madagascar’s economy will be reconstructed and the stability of Madagascar’s society will be regained. The Overall TaToM Area will sustainably develop its own economic sectors. Furthermore, it could support the development of economies of other regions by enhancing the connectivity to other regions from Antananarivo and the connectivity to other regions from Toamasina Port through the upgrading of the transport function of the TaToM Economic Axis.”

3.4 Growth Scenarios for the Overall TaToM Area

3.4.1 Alternative Growth Scenarios for the Overall TaToM Area

Three alternative growth scenarios are formulated for the Overall TaToM Area considering the following:

- Possible locations of light industries and agro-processing industries, as well as of textile industries in the Overall TaToM Area
- How to improve the connectivity between Antananarivo and Toamasina to support the economic growth of Overall TaToM Area

Major characteristics of alternative growth scenarios are summarized and compared as shown in Table 3.4.

Table 3.4 Summary of Major Characteristics of the Three Alternative Growth Scenarios for Overall TaToM Area

	Name of Growth Scenario	Antananarivo Agglomeration	Transport System of TaToM Economic Axis	Toamasina Agglomeration
Growth Scenario A	Mega City Antananarivo and Toamasina Logistics City	<ul style="list-style-type: none"> • Upgrading of Advanced Service Sectors • Expansion of Residential Areas outside CUA • Development of Economic Sectors including Textile, Agro-Processing and Other Light Industries 	<ul style="list-style-type: none"> • Upgrading of Cargo Transport Volume between Antananarivo Agglomeration and Toamasina Port in Longer Sections of NR2 	<ul style="list-style-type: none"> • Strengthening of Logistics Function centring on Toamasina Port • Development of domestic tourism
Growth Scenario B	Antananarivo Service Capital and Toamasina Industrial City	<ul style="list-style-type: none"> • Upgrading of Advanced Service Sectors • Expansion of Residential Areas outside CUA 	<ul style="list-style-type: none"> • Upgrading of Passenger Transport Speed by Constructing a Climbing Lane in Selected Sections of NR2 • Upgrading of Cargo Transport Volume by Widening in Selected Sections of NR2 	<ul style="list-style-type: none"> • Development of Economic Sectors including Agro-Processing, Textile and Other Light Industries, as well as Tourism • Expansion of Residential Areas outside CUT
Growth Scenario C	Antananarivo Service-Industrial Metropolis and Toamasina Industrial City	<ul style="list-style-type: none"> • Upgrading of Advanced Service Sectors • Expansion of Residential Areas outside CUA • Development of Economic Sectors including Textile, Agro-Processing and Other Light Industries • Antananarivo Agglomeration’s speed of economic sectors development in the first 10 years is much higher than after the first 10 years, due to its relatively well-developed existing infrastructure and relatively well-trained human resources 	<ul style="list-style-type: none"> • Upgrading of Passenger Transport Speed by Constructing a Climbing Lane in Selected Sections of NR2 • Upgrading of Cargo Transport Volume by Widening in Selected Sections of NR2 	<ul style="list-style-type: none"> • Development of Economic Sectors including Agro-Processing, Textile and Other Light Industries, as well as Tourism • Expansion of Residential Areas outside CUT • After the first 10 years, Toamasina Agglomeration’s development of economic sectors will be accelerated because the upgrading of the transport system of Economic Axis and expansion of Toamasina Port are to be completed.

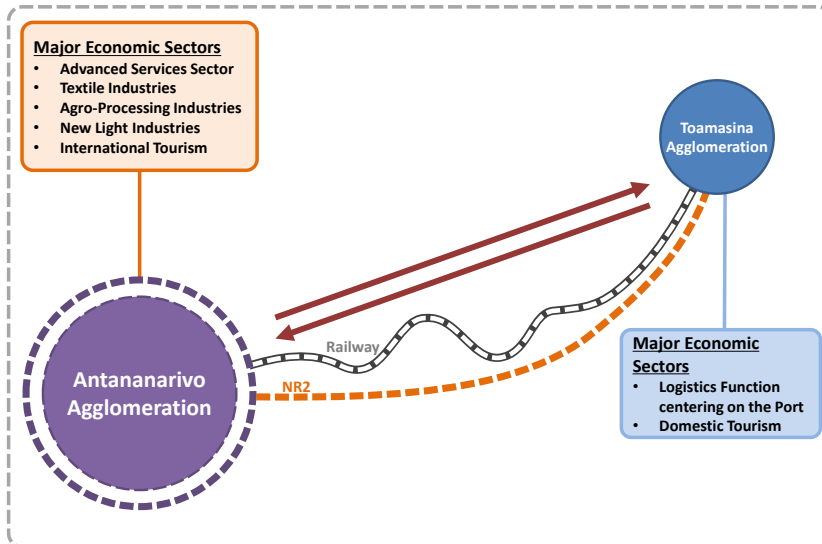


Figure 3.2 Growth Scenario A for Overall TaToM Area: “Mega City Antananarivo and Toamasina Logistics City”

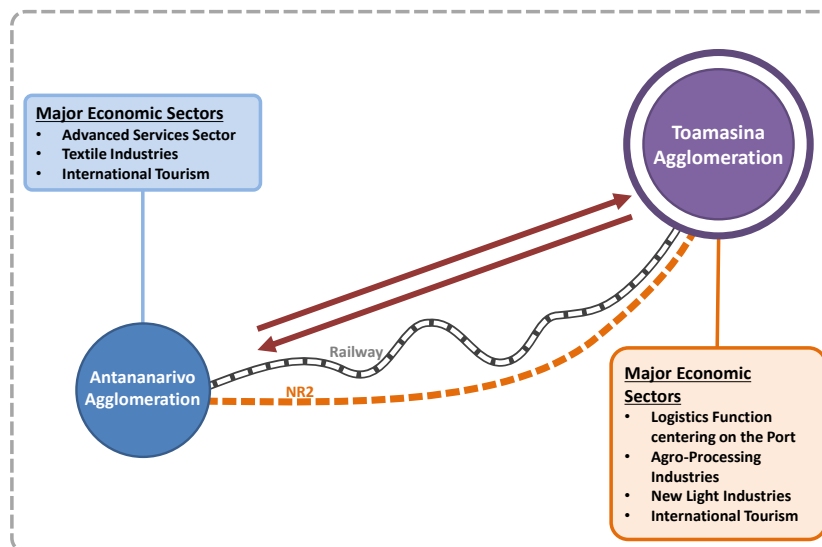


Figure 3.3 Growth Scenario B for the Overall TaToM Area: “Antananarivo Service Capital and Toamasina Industrial City”

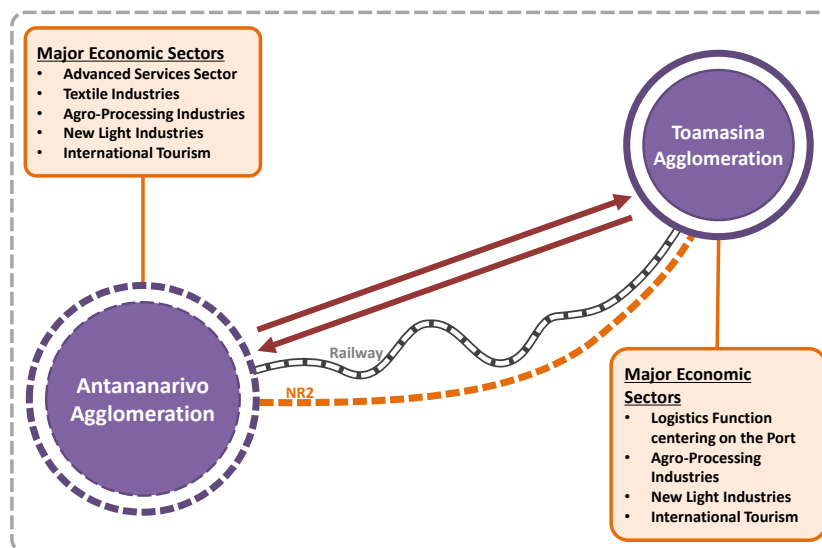


Figure 3.4 Growth Scenario C for the Overall TaToM Area: “Antananarivo Service-Industrial Metropolis and Toamasina Industrial City”

3.4.2 Selected Growth Scenario for the Overall TaToM Area

The three growth scenarios were evaluated by using the following three criteria:

- Employment Generation by Implementation of TaToM
- Sustainability of Implementation of TaToM Development Strategies
- Cost for Implementation of TaToM Development Strategies

The result of evaluation is shown in Table 3.5.

Growth Scenario C is selected for the development of the Overall TaToM Area. In accordance with Growth Scenario C for the Overall TaToM Area, PUDi for Antananarivo Agglomeration, PUDi for Toamasina Agglomeration, and Transport and Territorial Development Plan for TaToM Economic Axis are formulated.

Table 3.5 Comparative Evaluation of the Three Alternative Growth Scenarios of Overall TaToM Area

	Growth Scenario A	Growth Scenario B	Growth Scenario C
Name of Growth Scenario	Mega City Antananarivo and Toamasina Logistics City	Antananarivo Service Capital and Toamasina Industrial City	Antananarivo Service-Industrial Metropolis and Toamasina Industrial City
Employment Generation by Implementation of TaToM	Medium Growth Scenario A depends mostly on Antananarivo Agglomeration in development of economic sectors and generation of employment opportunities. Since Antananarivo Agglomeration has relatively good infrastructure compared to other regional cities and rural areas, it is efficient to concentrate government and private investment to infrastructure provision and economic sectors development. However, this growth would have limitation in the medium-long terms. It is partly because too much concentration of population and economic activities would cause mal-functioning due to heavy traffic congestion. Moreover, Antananarivo Agglomeration will have to continue to depend on National Road No.2 (NR2) for its export and import.	Small-Medium Since Toamasina Agglomeration is much smaller than Antananarivo Agglomeration, it is difficult to generate a larger amount of employment opportunities than Scenario A and Scenario C in the next 15 years. In the longer term, this scenario would become possible to generate a substantially large amount of employment opportunities.	Large In this growth scenario, both Antananarivo Agglomeration and Toamasina Agglomeration will be able to develop economic sectors based on their own characteristics. The two agglomerations are expected to general a larger amount of employment opportunities than Scenario A and Scenario B.
Sustainability of Implementation of TaToM Development Strategies	Small Partly because Antananarivo Agglomeration will accumulate too much population and economic activities in the medium-long terms. As a result, Antananarivo Agglomeration would become too congested and mal-functional, causing serious environmental deterioration. Partly because the limited transport capacity of NR2 will eventually cause the increase of inefficiency of development and operation of economic sectors in Antananarivo Agglomeration.	Small-Medium Antananarivo Agglomeration will continue to attract populations from regional cities and rural areas. However, Antananarivo Agglomeration will not be able to generate enough employment opportunities for the incoming populations. As a result, Antananarivo Agglomeration will not be sustainable in urban and economic development.	Medium-High In the short and medium terms (5-10 years), this scenario depends on the development of economic sectors of Antananarivo Agglomeration. Therefore, a large influx of population and economic activities to Antananarivo Agglomeration might cause overcrowding and traffic congestion, and furthermore, environmental deterioration. This might lead to the malfunctioning of Antananarivo Agglomeration. However, the development of economic sectors in Toamasina Agglomeration will be accelerated in the medium and long terms. Moreover, in the medium term, the spatial restructuring of Antananarivo Agglomeration will become effective in reducing concentration in CUA. Therefore, eventually in the medium-long terms, the sustainability of the Overall TaToM Area could be managed.
Cost for Implementation of TaToM Development Strategies	Large Since this growth scenario needs the upgrading of the cargo transport capacity of NR2 for promoting economic sectors development in Antananarivo Agglomeration, a larger amount of cost is required, especially	Medium Since this scenario needs the upgrading of the transport system of TaToM Economic Axis by constructing a climbing lane of NR2, it is costly.	Large This growth scenario needs spatial structural transformation of both agglomerations of Antananarivo and Toamasina, as well as the upgrading of cargo transport volume and passenger transport speed of NR2, the total cost for implementing TaToM development

	for Antananarivo Agglomeration and TaToM Economic Axis. The majority of the cost for TaToM Economic Axis will be spent for the widening of a narrow 2-lane road to 4 lanes on NR2. As a result, the total cost for Growth Scenario A is larger than that of Growth Scenario B and equally large as Growth Scenario C.	However, its cost is smaller than that for Scenario A and C.	strategies is the highest among these three scenarios.
Integrated Evaluation of Effectiveness	Small-Medium Effective This scenario requires a large cost for implementation of TaToM development strategies. However, the effectiveness of employment generation is medium and sustainability is small. Therefore, it is considered the effectiveness of this scenario is medium.	Small-Medium Effective Since the employment generation is small-medium, while the cost for implementation of this scenario is medium, the effectiveness of implementing of this scenario would be small-medium.	Medium Effective Although the cost for implementing this scenario is large, the degree of economic sectors development and employment generation is large enough to make the effectiveness of this scenario large. In addition, the sustainability is medium-high. Therefore, it is considered recommendable for development of the Overall TaToM Area.

3.5 Future Socio-Economic Framework for the Overall TaToM Area

3.5.1 Future Economic Framework for Madagascar and the Overall TaToM Area

Future population by region is projected based on the past trend of demographic changes in the country and the future attractiveness of the TaToM Area due to developments proposed under this master plan. The result is shown in Table 3.6. The share of the population will increase the most in the Analamanga Region.

Table 3.6 Future Population by Region (2023, 2028 and 2033)

Province	Region	Population				Annual Growth Rate		
		2018	2023	2028	2033	2018-23	2023-28	2028-33
Antananarivo	Analamanga	3,618,128	4,178,447	4,787,688	5,465,075	2.92%	2.76%	2.68%
	Bongolava	674,474	819,581	982,078	1,165,351	3.97%	3.68%	3.48%
	Itasy	897,962	1,010,194	1,121,093	1,232,526	2.38%	2.11%	1.91%
	Vakinankaratra	2,074,358	2,268,479	2,450,172	2,624,604	1.81%	1.55%	1.38%
Fianarantsoa	Atsimo-Atsinanana	1,026,674	1,206,408	1,398,285	1,605,336	3.28%	3.00%	2.80%
	Aoron'i Mania	833,919	922,901	1,008,745	1,093,580	2.05%	1.79%	1.63%
	Ihorombe	418,520	522,480	643,831	786,386	4.54%	4.27%	4.08%
	Haute Matsiatra	1,447,296	1,619,693	1,789,302	1,959,594	2.28%	2.01%	1.83%
	Vatovavy-Fitovinany	1,435,882	1,614,038	1,790,667	1,969,025	2.37%	2.10%	1.92%
Toamasina	Atsinanana	1,484,403	1,676,328	1,875,844	2,089,831	2.46%	2.27%	2.18%
	Alaotra-Mangoro	1,255,514	1,431,863	1,623,096	1,833,562	2.66%	2.54%	2.47%
	Analanjirifo	1,152,345	1,298,873	1,446,710	1,599,164	2.42%	2.18%	2.02%
Mahajanga	Betsiboka	394,561	461,056	531,872	608,263	3.16%	2.90%	2.72%
	Boeny	931,171	1,093,832	1,268,566	1,458,653	3.27%	3.01%	2.83%
	Melaky	309,805	365,646	425,874	491,553	3.37%	3.10%	2.91%
	Sofia	1,500,227	1,736,041	1,982,962	2,245,193	2.96%	2.70%	2.52%
Toliary	Androy	903,376	1,077,421	1,267,618	1,477,435	3.59%	3.30%	3.11%
	Atsimo-Andrefana	1,799,088	2,115,812	2,454,750	2,821,435	3.30%	3.02%	2.82%
	Anosy	809,313	918,576	1,028,151	1,139,648	2.57%	2.28%	2.08%
	Menabe	700,577	826,647	962,422	1,110,272	3.36%	3.09%	2.90%
Antsiranana	Diana	889,736	1,052,534	1,229,047	1,422,699	3.42%	3.15%	2.97%
	Sava	1,177,013	1,328,352	1,478,645	1,630,276	2.45%	2.17%	1.97%
Madagascar		25,734,342	29,545,202	33,547,418	37,829,461	2.80%	2.57%	2.43%
Total Population of 3 Regions Covering Overall TaToM Area		6,358,045	7,286,638	8,286,628	9,388,468	2.76%	2.61%	2.53%

Source: JICA Study Team

The total population of the three regions which covers Overall TaToM Area will increase from 6.4 million in 2018 to 9.4 million in 2033. This is 24.8% of the national population in 2033.

3.5.2 Future Economic Framework for Madagascar and the Overall TaToM Area

The indicators of the economic growth are shown in Table 3.7. The indicators are mainly based on the growth rates of GDP by National Development Plan (PND), INSTAT statistics (Tableau de Bord Économique, Avril 2017), and sectors' plans. Based on the real growth rates of GRDP set in Table 3.7, the share of GRDP of Overall TaToM Area will increase from 47.0% in 2014 to 58.7% in 2033 as shown in Table 3.8.

It is assumed that GRDP of Overall TaToM Area is the total amount of GRDP of the three regions (Analamanga, Atsinanana and Alaotra-Mangoro) in Project TaToM.

Table 3.7 Real Growth Rates of GRDP for the Overall TaToM Area

Country / Regions	2016-2023	2024-2028	2029-2033
Madagascar	5.6 %	7.7 %	7.9 %
3 Regions Covering the Overall TaToM Area	6.8 %	8.5 %	9.5 %
Analamanga	6.9 %	8.6 %	9.5 %
Atsinanana	6.1 %	8.2 %	9.5 %
Alaotra-Mangoro	5.6 %	7.6 %	8.7 %

Source: JICA Study Team

Table 3.8 Changes in Share of GRDP of the Overall TaToM Area

	2014	2023	2028	2033
Overall TaToM Area	47.0%	52.5%	54.6%	58.7%
Outside the TaToM Area	53.0%	47.5%	45.4%	41.3%
Madagascar	100.0%	100.0%	100.0%	100.0%

Source: JICA Study Team

Table 3.9 and Table 3.10 illustrates the change of share of economic sector and growth rates by economic sector for Madagascar and Overall TaToM Area respectively.

Table 3.9 Future Economic Framework for Madagascar

(a) Change of Share of Economic Sector

	GDP (MGA Billion, at 2007 constant prices)	GDP (USD Million, at 2010 constant prices)	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)
2014 (Actual)	17,368	10,688	28.3	13.8	57.9
2023 (Projected)	27,642	17,011	25.0	16.4	58.6
2028 (Projected)	39,966	24,595	23.1	20.0	56.8
2033 (Projected)	58,455	35,973	21.2	22.1	56.8

(b) Change of GDP per Capita

	Unit	2014	2023	2028	2033
Total Population		22,848,573	29,545,202	33,547,418	37,829,461
GDP	MGA Billion, at 2007 constant prices	17,368	27,642	39,966	58,455
	USD Million, at 2010 constant prices	10,688	17,011	24,595	35,973
GDP per Capita	MGA, at 2007 constant prices	760,135	935,583	1,191,329	1,545,224
	USD, at 2010 constant prices	468	576	733	951
Annual Growth Rate of GDP per Capita at 2007 constant prices		-	2.33%	4.95%	5.34%

Source: JICA Study Team

Table 3.10 Future Economic Framework for the Overall TaToM Area

(a) Change of Share of Economic Sector

	GRDP (MGA Billion, at 2007 constant prices)	GRDP (USD Million, at 2010 constant prices)	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)
2014 (Actual)	8,154	5,018	6.5	19.8	73.7
2023 (Projected)	14,503	8,925	5.1	19.4	75.4
2028 (Projected)	21,812	13,423	4.6	20.1	75.3
2033 (Projected)	34,308	21,113	3.9	21.0	75.1

(b) Growth Rates by Economic Sector

	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)	Total (%)
2016-2023 (Projected)	4.5	6.2	7.1	6.8
2024-2028 (Projected)	6.0	9.3	8.5	8.5
2029-2033 (Projected)	6.0	10.5	9.4	9.5

(c) Change of GDP per Capita

	Unit	2014	2023	2028	2033
Total Population of the 3 Regions		5,683,080	7,286,638	8,286,628	9,388,468
GRDP of the 3 Regions Covering the Overall TaToM Area	MGA Billion, at 2007 constant prices	8,154	14,503	21,812	34,308
	USD Million, at 2010 constant prices	5,018	8,925	13,423	21,113
GDP per Capita for the TaToM Area	MGA, at 2007 constant prices	1,434,785	1,990,355	2,632,192	3,654,270
	USD, at 2010 constant prices	883	1,225	1,620	2,249
Annual Growth Rate of GDP per Capita at 2007 constant prices		-	3.70%	5.75%	6.78%

Source: JICA Study Team

Chapter 4 Antananarivo Agglomeration: Present Situation and Challenges of Urban Development

4.1 Present Situation of Urban Development in Antananarivo Agglomeration

(1) Present Spatial Characteristics of Antananarivo Agglomeration

1) Urban Centres within CUA

CUA has five centres with the following characteristics.

- **Anosy:** The surrounding area of Lac Anosy (Anosy Lake) is a central government centre not only for CUA but also for the nation. Government buildings are located especially in the south-west of the Anosy Lake area. Mahamasina Stadium and other public facilities are also located in this area.
- **Analakely:** Analakely Area is a commercial centre of Antananarivo Agglomeration. This commercial centre is composed of Independence Avenue, which is a commercial area, and Analakely Market, which is a central market of the city.
- **Antaninarenina:** Antaninarenina has been the politics and finance centre in Antananarivo City. It is located on the hill between Analakely and Anosy, and the Presidential Palace and several banks are located there.
- **Ankorondrano:** This is a new urban centre within CUA, located approximately 3.5 km north of Anosy Lake. Some new office buildings accommodating corporate headquarters are located in this area. Former buildings for industry are transformed into these modern office buildings.

2) Urban Expansion and Suburbanization in Antananarivo Agglomeration

Antananarivo's urbanization started from the hill where Queen's Palace is located, and urbanised areas have gradually expanded towards its surrounding areas. Figure 4.1 shows the historical expansion of urban areas within Antananarivo Agglomeration.

Antananarivo Agglomeration has hills, paddy fields and wetlands. This topographic condition determined the urbanization pattern of CUA. Around 1960, the urbanised areas were still on the several hills in the agglomeration. In recent years, urbanised areas have been expanded by filling wetlands. These urbanizations have happened without planning control or proper infrastructure development. It caused increasing risks of flooding or inundation and declining living conditions.

Generally, these urbanizations are remarkable, especially along the major national roads. On the other hand, the areas between the national roads are still not urbanised.

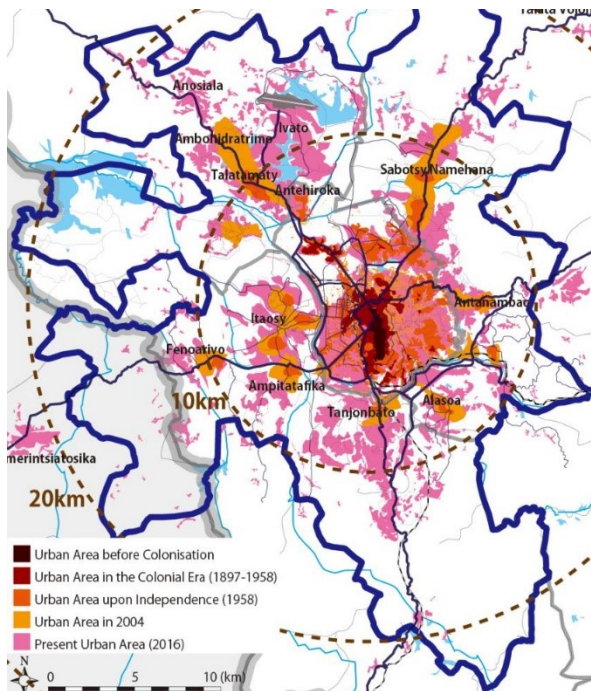
3) Mono-Centric Urban Structure and Poorly Developed Suburban Centres

At present, Antananarivo Agglomeration has a mono-centric spatial structure. Most of the major administrative, business, commercial and social functions are concentrated within CUA. Urbanization follows major national roads, which run radially from the city centre to surrounding areas. Although there are some market towns in suburban areas, they have been poorly equipped with urban functions and basic infrastructure. This concentrated pattern of urban functions tends to cause heavy concentration of traffic, resulting traffic congestion on radial national roads to CUA.

4) Potential Suburban Centres

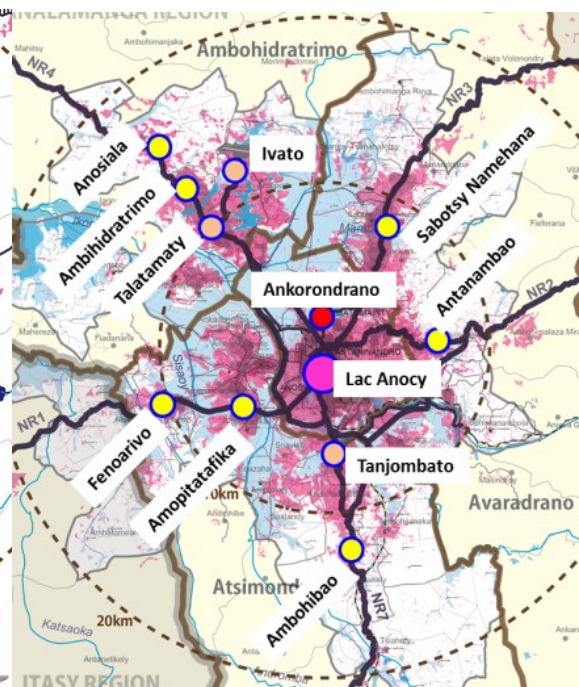
Due to rapid suburban growth, some towns are getting larger and they become potential urban centres as shown in Figure 4.2. Several cities have been growing rapidly and serving some

commercial and public functions, such as market places, shops and public services in suburban areas. Most of these centres are located along the national roads and have a good connectivity with the city centre of Antananarivo.



Source: JICA Study Team

Figure 4.1 Urban Expansion of Antananarivo Agglomeration



Source: JICA Study Team

Figure 4.2 Potential Urban Centres in Antananarivo Agglomeration

(2) Existing Land Use Distribution

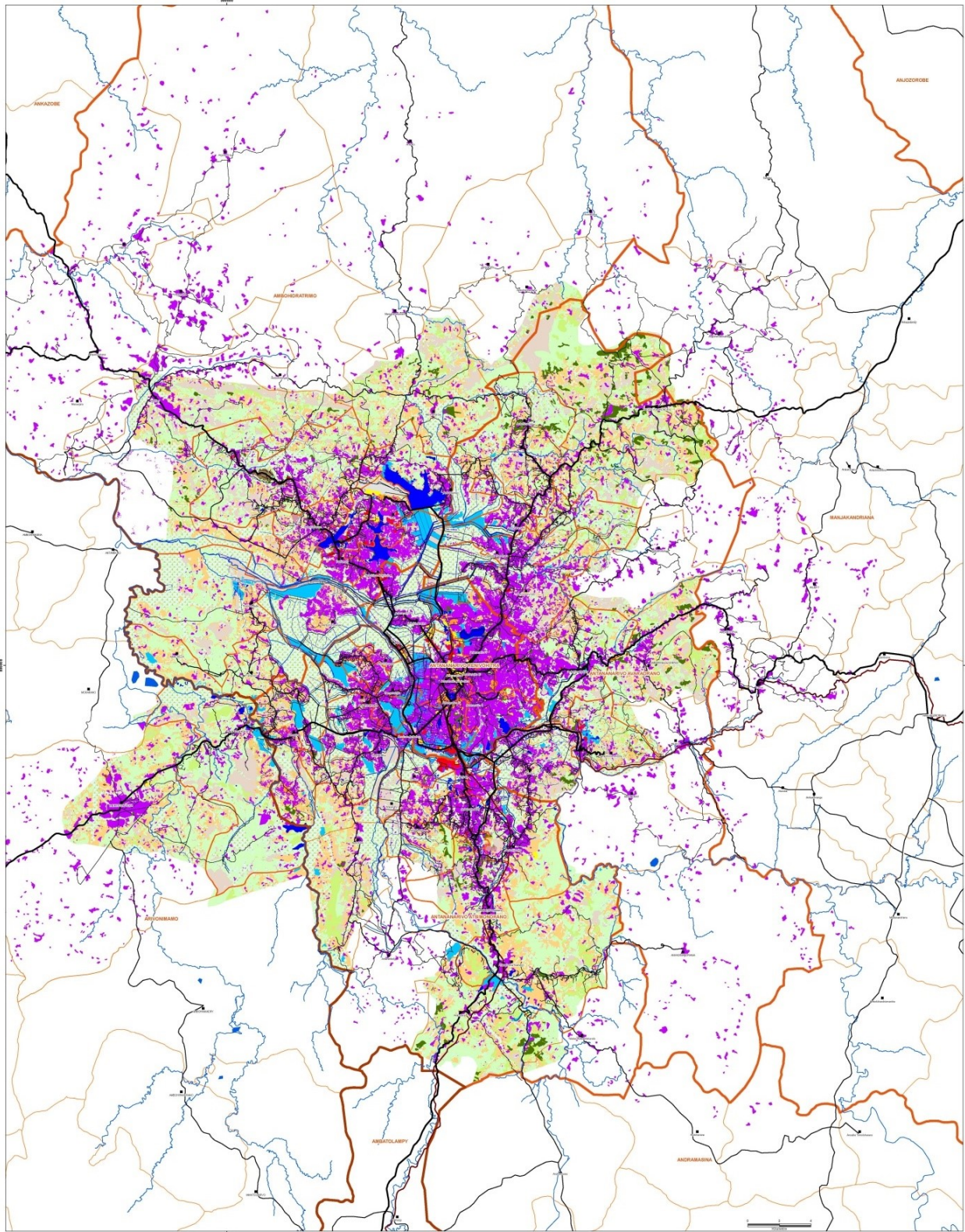
The total surface area of urbanised areas in Antananarivo Agglomeration is 153 km², which is 20% of the agglomeration. While 52% of the lands in CUA are urbanised, the other districts are still less urbanised; only 15 - 17% are used for urban purposes.

Urbanizations in Antananarivo Agglomeration are taking place in paddy fields and swamplands, and at the same time, urbanizations are limited by paddy fields and swamplands. There are huge wetlands in the northern and western parts of Antananarivo Agglomeration, and 35% of the total lands of the agglomeration are wetland or paddy field.

Commercial or business type of land uses are mainly found within CUA. Some shopping centres are located along major roads. Many small retail shops exist along roads in the agglomeration.

Administrative uses are found south of Lac Anocoy, where central government offices are located. While 3.7% of the total lands of CUA are dominant for government buildings, other districts have very few administrative uses.

A large extent of industries is located in Tanjombato, on both sides of the Ikopa River. In Ankorondrano, along the National Roads 1 and 4, there are some factories. Apart from that, a few large scale industrial areas are found in the agglomeration.



Source: JICA Study Team interpreting the satellite images taken in 2016

Figure 4.3 Present Land Use Map in Antananarivo Agglomeration

4.2 Challenges on Urban Development for Antananarivo Agglomeration

(1) Characteristics and Problems on Economic Sectors in Antananarivo Agglomeration

1) Insufficient Development of Economic Sectors

In Antananarivo Agglomeration, economic sectors have not been sufficiently developed so that it cannot generate enough employment opportunities for its large population. Because there is no economic sector that leads the economy of the large agglomeration with an urban population of nearly 3 million, many people are engaged in informal jobs.

Analamanga Region has 15.3% of the national population in 2014 and produces 42.6% of GDP. Its per capita income is about 2.8 fold of the national average. It cannot be said that the economic sectors have sufficiently developed as the national capital region that is supposed to be the driving force of the entire national economy.

2) Weak Business Support Functions

Business support functions (including administrative and management, financing, accounting and legal services, logistics, ITC, marketing, research & development,) of Antananarivo Agglomeration are too weak to support the promotion of economic development for Antananarivo Agglomeration and other regions. Business support functions cannot be developed without a good urban environment, such as transport infrastructure, power supply, water supply, and ICT. These basic infrastructures for business support functions are lacking in Antananarivo.

In Antananarivo, modern urban centres have not been developed for accommodating national or regional headquarters of multinational corporations.

3) Lack of Land for Manufacturing and Logistics Industries

With the expansion of the urban area, factories and logistics facilities have been developed along the radial National Roads. Because of the rapid urbanization, the land for industry use is getting scarce. As a result, in Antananarivo Agglomeration, land for manufacturing and logistics industries is lacking inside and outside CUA.

4) Inefficient Logistics Function

Transport in Antananarivo Agglomeration is inefficient and costly. This is partly because the import of basic goods relies on truck transport on a 350km length of NR No. 2 from the Port of Toamasina to Antananarivo, and partly because the road traffic is chronically congested within Antananarivo Agglomeration.

Due to the dependency on the inefficient and costly logistics function, Antananarivo Agglomeration is not so attractive for investors and establishments of economic sectors.

The logistics function in Antananarivo Agglomeration is inefficient so that it cannot support the development of the economic sectors.

(2) Characteristics and Problems on Habitation in Antananarivo Agglomeration

1) Serious Traffic Congestion Disrupting Economic and Social Activities

Establishments of services and industries and their jobs are concentrated in CUA. Public service functions to support daily life are concentrated in CUA, including education and health facilities.

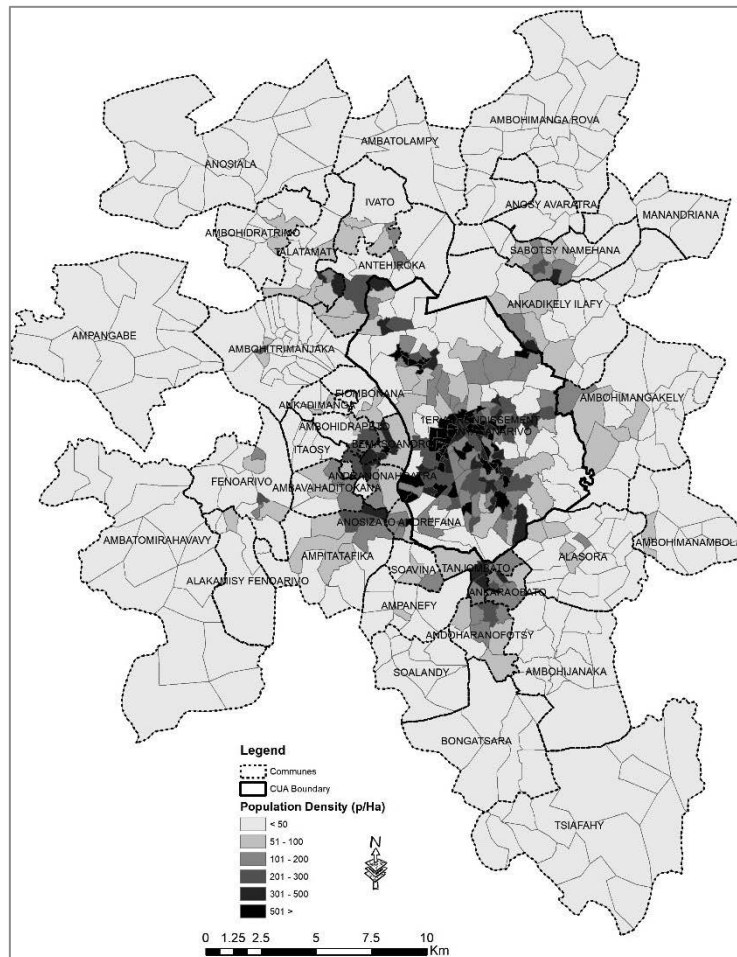
As a result, traffic is concentrated in CUA, causing traffic congestion. In particular, severe traffic congestion is occurring on five radial National Roads connecting the inside of CUA and the outside of CUA.

The population is concentrated in CUA and the population density is extremely high. On the other hand, land is limited for urbanization in CUA, and the urban areas have been expanded by filling in wetlands.

2) Unhealthy Living Environment in CUA

There are high density areas where population density reaches 500 people / ha. In such high population density areas, the road density is very low, the drainage is poor, and water kiosks are far away. Due to the extremely high population density, a healthy living environment is not maintained in some areas in CUA. Their living environment is being degraded and those areas are expanding.

The area with high population density is expanding in some areas outside CUA as well.



Source: JICA Study Team based on data from INSTAT

Figure 4.4 Population Density of Antananarivo Agglomeration per Fokontany (2018)

3) Lack of Sewerage Treatment in CUA

In CUA, the population density is very high and black water is thrown away on roads and discharged to canals without proper sewerage and waste water treatment. During the rainy season, black water is spread all over the urban areas by rain water, while during the dry season, the waste gets dry and is diffused into the air with dust. In this sense, CUA is not a modern, sanitary city.

CUA has a wastewater collection system of a total length of approximately 175km. The combined sewer system is available in only the 1st and 3rd arrondissement that covers 17% of CUA's population.

As a result, there is an issue with sanitation in CUA.

4) Underdeveloped Public Transportation

Because of underdeveloped public transportation, the mobility in urban life is constrained and travelling results in loss of time. Travelling is sometimes dangerous.

Taxi-be, which is a dominant public transport mode used by the residents, is not convenient to move around the city. People have to spend a lot of time for travelling by Taxi-be and face the risks of traffic accidents and pickpocketing.

As a result, the productivity declines, and the quality of life is also deteriorating in Antananarivo Agglomeration.

5) Inadequate Housing Provision

Housing provision is inadequate in terms of quantity and quality, compared with the rapid population growth in Antananarivo Agglomeration. Insufficient provision of land equipped with infrastructure is one of the reasons of shortage of housing provision.

Land registration information is occasionally inaccurate. People are discouraged to apply for construction permits. It is because it takes time since an unknown land owner other than the registered owner might exist. Thus, it is difficult to obtain loans and mortgages for the purchase of land and construction of housing from financial institutions.

As a result, the real estate industry for residential area development and construction of housing has not developed much.

6) Lack of Urban Amenities

Wetland and vacant lands are decreasing; therefore, open space is declining inside and outside CUA. As a result, the congested urban space is expanding.

Urban amenities, such as parks and open space, is lacking both inside and outside CUA in Antananarivo Agglomeration.

(3) Characteristics and Problems on Infrastructure and Services for Supporting People's Life

1) Water Supply

The water supply master plan formulated in 2003 does not intend to provide water for the current population of Antananarivo Agglomeration. JIRAMA's water supply area is currently limited to part of the Antananarivo Agglomeration and access rate to urban water supply in JIRAMA's water supply area in 2015 is only 44.0%.

The capacities of water supply facilities, such as pipelines, reservoirs and pumping stations, are insufficient to cover the potential demand of the present population in Antananarivo Agglomeration

There is a large gap in population projection in 2033 between the JIRAMA's water supply area and TaToM. The population served by JIRAMA is projected to be only 2.28 million in 2033. JIRAMA's plan does not consider the rapid urbanization and population growth in suburban areas.

Water resource development and a water treatment plant are necessary for water supply targeting the outside of CUA for promoting suburbanization.

2) Power Supply

The total power generating capacity is expected to meet the peak demand from 2020 provided that all the planned power stations are constructed on schedule.

However, facility development for distribution of electricity is urgently needed. In particular, development of transmission and distribution facilities to the urbanized areas outside CUA is necessary, considering that the future power demand in 2033 becomes 3.2 times of that in 2016.

In addition, a significant number of outages and high distribution losses occur.

3) Education Facilities

Compared with the population growth in Antananarivo Agglomeration, public educational facilities are lacking and from 60 to 70% of the students are enrolled in private schools.

In particular, the classrooms of public primary and secondary schools are lacking in CUA, while the classrooms of public secondary and high schools are not enough outside CUA.

Recently, the education performance of Madagascar has declined and Madagascar is among the countries with lowest scores. Thus, the education quality should be improved by developing educational facilities.

4) Health Service Facilities

Public CSBs are lacking in CUA and communes adjacent to CUA, compared with their population. In suburban areas, there is no public CSB in some communes.

There are not enough health professionals such as doctors, nurses, and midwives.

Though public hospitals are planned to be developed in each district outside CUA, the quality of medical service is low, compared with the private hospitals.

(4) Characteristics and Problems on Disaster Risk Reduction

1) Risk for Inundation due to Rainfall Flooding

Risk for inundation due to rainfall is rising in CUA partly because the decline of wetlands and paddy fields deprives CUA of water retaining function and partly because the mal-maintenance of drainage facilities decreases the capacity of draining of water from CUA.

The government has used wetlands for the construction of roads and other urban infrastructure in order to enhance urban functions.

Meanwhile, wetlands are filled little by little along with the population growth of CUA.

2) Risk of River Flooding

The productivity of irrigated paddy fields tends to decline because irrigation facilities are not well maintained and water management is not done well. Those irrigated paddy fields have been gradually transformed into urban land use. As a result, the risk of river flooding is rising outside of CUA.

Meanwhile, the landscape of paddy fields is degrading and disappearing.

(5) Characteristics and Problems on Identity

The physical environment (in other words, landscape) which reflects the traditional identity of Antananarivo and its surrounding areas has been disappearing in the urbanization in Antananarivo Agglomeration

The beauty of the landscape of hills and paddy fields which the residents are familiar with for a long time are at the verge of deterioration.



Source: JICA Study Team

Figure 4.5

Landscape reflecting Identity of Antananarivo and its Surrounding Areas

Chapter 5 Antananarivo Agglomeration: Future Vision, Growth Scenarios and Socio-Economic Framework

5.1 Future Vision for Antananarivo Agglomeration

A vision statement expressing aspiration for Antananarivo Agglomeration in 2033 is proposed below.

Statement of Future Vision

In addition to the national centre of government and economy, Antananarivo Agglomeration will be a thriving production centre and a modern life centre, which is not only to support the welfare of the people of Antananarivo Agglomeration, but also the national economy of Madagascar.

In order to develop such a centre, Antananarivo Agglomeration will create a competitive and vibrant economy, while seeking inclusive and sustainable development, by creating a healthy, resilient, interconnected urban structure and by preserving and strengthening its unique identity.

5.2 Growth Scenario for Antananarivo Agglomeration

Along with the rapid population growth of the entire Madagascar, the influx of migration to Antananarivo Agglomeration has been continued, due to its relatively good conditions of the economy and infrastructure. This trend is expected to continue in the future.

In order to continuously create employment opportunities for the increasing population in the agglomeration and to revitalize the urban economy, Antananarivo Agglomeration needs new export-oriented industries which can lead not only its own urban economy, but also Madagascar's national economy. The export-oriented industry should target the growing regional markets of recently developing "Free Trade Areas" in African and the Indian Ocean countries. Madagascar is a member country of SADC, COMESA and IORA, as well as AfCFTA.

In the more than last two decades, low-cost manufacturing has been dominated by countries endowed with a low-wage and hard-working labour force, such as China, South-east Asia and South Asian countries. However, low-cost manufacturing companies are looking for countries suitable for their locations in the next China because of the increase in their wage levels. Madagascar is a good candidate for such low-cost manufacturing industries.

Both Antananarivo Agglomeration and Toamasina Agglomeration have developmental potentialities as the location of such industries. However, these two agglomerations have the following different characteristics in terms of industrial location:

- Toamasina Agglomeration has a higher advantage than Antananarivo Agglomeration as the industry location from the aspects of the proximity and connectivity to the regional markets, because Antananarivo is 350 km away from the Port of Toamasina and the transportation capacities (volume, speed, cost, safety and resilience of transportation for passengers and cargo) of National Road No. 2 and the existing railway are limited.
- A cheap and abundant labour force is already available and the infrastructure is relatively developed in Antananarivo Agglomeration.

By responding to these different characteristics of the two agglomerations, the selected growth scenario will make the following two different efforts at developing economic sectors for the two agglomerations:

- Industrial development will be promoted gradually with phased development of industrial infrastructure in Toamasina Agglomeration.
- Antananarivo Agglomeration will take advantage of existing infrastructure, human resources, business support functions⁴ and so forth. And investment to the economic sectors and efforts to attract industries will be actively promoted from the short-term in Antananarivo Agglomeration, and those industries will be developed in the mid- and long-terms.

At the same time, by upgrading business support functions in addition to the function as the centre of politics and government, Antananarivo Agglomeration will support not only the economic sectors in Antananarivo Agglomeration, but also the industries in Toamasina Agglomeration and other areas, and will attract investment not only to Antananarivo Agglomeration, but also to other areas including Toamasina Agglomeration. Then more highly advanced service industries, such as health, education and research, should be developed within CUA for attracting investments to economic sectors in Antananarivo Agglomeration. It is also necessary to develop and distribute commercial and service functions outside CUA for supporting the lives of people.

5.3 Future Socio-Economic Frameworks for Antananarivo Agglomeration

5.3.1 Population Framework for Antananarivo Agglomeration

Table 5.1 shows the future population framework for Antananarivo Agglomeration by short, medium and long term.

Table 5.1 Future Population Framework for Antananarivo Agglomeration

		2018	2023	2028	2033
CUA	Population	1,275,207	1,426,472	1,586,890	1,763,099
	Annual Growth Rate	-	2.27%	2.15%	2.13%
Outside CUA	Population	1,283,038	1,596,175	1,960,581	2,388,368
	Annual Growth Rate	-	4.46%	4.20%	4.03%
Antananarivo Agglomeration	Population	2,558,245	3,022,647	3,547,471	4,151,467
	Annual Growth Rate	-	3.39%	3.25%	3.19%

Source: JICA Study Team

Based on the above framework, future population by commune for Antananarivo Agglomeration was prepared as shown in Table 5.2.

The population framework for Antananarivo Agglomeration for 2033 is set based on the following factors:

- Population framework by region determined in Table 3.6
- Past trend of population growth in each commune of Analamanga Region
- Future growth potential of Antananarivo Agglomeration based on the vision and growth scenario selected in Section 5.2

⁴ Business support functions include administrative and management, financing, accounting and legal services, logistics, ITC, marketing, research & development, etc., which are highly specialized and provided by professionals and experts in each of the fields.

Table 5.2 Future Population for Antananarivo Agglomeration by Commune (2033)

Commune	District	Area ha	Population		Annual Population Growth Rate 2018-2033	Population Increase 2018-2033	Population Density Pop/ha
			2018	2033			
Antananarivo (CUA)	Antananarivo Renivohitra	8,494	1,275,207	1,763,099	2.18%	487,892	207.6
Ambatolampy	Ambohidratrimo	1,947	25,798	59,974	5.79%	34,176	30.8
Ambohidratrimo	Ambohidratrimo	1,223	22,176	47,749	5.25%	25,573	39.1
Ambohitrimanjaka	Ambohidratrimo	2,266	36,970	58,777	3.14%	21,807	25.9
Ampangabe	Ambohidratrimo	4,641	17,152	31,468	4.13%	14,316	6.8
Anosiala	Ambohidratrimo	5,459	51,288	120,600	5.87%	69,312	22.1
Antehiroka	Ambohidratrimo	1,638	46,550	84,838	4.08%	38,288	51.8
Ivato	Ambohidratrimo	1,000	47,615	89,135	4.27%	41,520	89.1
Talatomaty	Ambohidratrimo	1,106	51,181	98,196	4.44%	47,015	88.8
Alakamisy Fenoarivo	Atsimondrano	1,259	22,511	45,136	4.75%	22,625	35.9
Ambavahaditokana	Atsimondrano	620	39,257	80,113	4.87%	40,856	129.3
Ambohidrapeto	Atsimondrano	398	28,234	65,726	5.79%	37,492	165.1
Ambohijanaka	Atsimondrano	2,803	19,381	43,750	5.58%	24,369	15.6
Ampanefy	Atsimondrano	1,084	15,758	45,288	7.29%	29,530	41.8
Ampitatafika	Atsimondrano	1,987	62,937	101,310	3.22%	38,373	51.0
Andoharanofotsy	Atsimondrano	738	46,247	76,868	3.45%	30,621	104.1
Andranonahoatra	Atsimondrano	383	57,139	59,018	0.22%	1,879	154.1
Ankadimanga	Atsimondrano	279	7,745	16,052	4.98%	8,307	57.5
Ankaraobato	Atsimondrano	277	42,433	52,823	1.47%	10,390	190.7
Anosizato Andrefana	Atsimondrano	175	26,498	35,050	1.88%	8,552	200.7
Bemasoandro	Atsimondrano	346	51,573	58,058	0.79%	6,485	167.9
Bongatsara	Atsimondrano	2,547	26,680	88,915	8.36%	62,235	34.9
Fenoarivo	Atsimondrano	1,717	31,650	39,803	1.54%	8,153	23.2
Fiombonana	Atsimondrano	461	12,084	19,787	3.34%	7,703	42.9
Itaosy	Atsimondrano	552	16,520	22,015	1.93%	5,495	39.9
Soalandy	Atsimondrano	1,367	15,135	29,779	4.62%	14,644	21.8
Soavina	Atsimondrano	412	17,569	36,565	5.01%	18,996	88.7
Tanjombato	Atsimondrano	457	43,406	48,774	0.78%	5,368	106.7
Tsiafahy	Atsimondrano	5,870	20,114	28,333	2.31%	8,219	4.8
Alasora	Avaradrano	2,209	58,316	124,056	5.16%	65,740	56.1
Ambohimambola	Avaradrano	1,743	15,815	26,212	3.43%	10,397	15.0
Ambohimanga Rova	Avaradrano	4,650	30,130	59,579	4.65%	29,449	12.8
Ambohimangakely	Avaradrano	3,420	111,718	269,614	6.05%	157,896	78.8
Ankadikely	Avaradrano	3,293	55,740	86,758	2.99%	31,018	26.3
Anosy Avaratra	Avaradrano	871	16,881	39,058	5.75%	22,177	44.9
Manandriana	Avaradrano	1,364	9,149	19,817	5.29%	10,668	14.5
Sabotsy Namehana	Avaradrano	1,397	46,819	87,518	4.26%	40,699	62.7
Ambatomirahavavy	Arivonimamo	6,345	36,869	91,858	6.27%	54,989	14.5
Outside CUA		68,303	1,250,178	2,388,370	4.23%	1,105,332	35.0
Antananarivo Agglomeration		76,797	2,558,245	4,151,469	3.28%	1,593,224	54.1

Source: JICA Study Team

5.3.2 Economic Framework for Antananarivo Agglomeration

The indicators of the economic growth are shown in Table 5.3. The indicators are mainly based on the growth rates of GDP by National Development Plan (PND), INSTAT statistics (Tableau de Bord Économique, Avril 2017), and sectors' plans. Moreover, in the case of the projections in the region, the following potentials are considered: Abundance of people; Concentration of administrative functions; Existence of international airport; and Existence of several industrial zones (including plans).

Table 5.3 Real Growth Rates of GDP and GRDP for Antananarivo Agglomeration as Indicators of Economic Framework

	2016-2023	2024-2028	2029-2033
Madagascar	5.6%	7.7%	7.9%
Antananarivo Agglomeration	6.9%	8.6%	9.5%

Source: JICA Study Team

Table 5.4 illustrates the change of share of economic sector and growth rates by economic sector for Antananarivo Agglomeration.

Table 5.4 Change of Economic Structure in Antananarivo Agglomeration

(a) Change of Share of Economic Sector

	GRDP (MGA Billion, at 2007 constant prices)	GRDP (USD million, at 2010 constant prices)	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)
2014 (Actual)	7,235	4,452	4.1	19.2	76.8
2023 (Projected)	13,005	8,003	3.2	18.7	78.1
2028 (Projected)	19,626	12,078	2.8	19.4	77.8
2033 (Projected)	30,941	19,040	2.4	20.4	77.2

Source: JICA Study Team

(b) Growth Rates by Economic Sector

	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)	Total (%)
2016-2023 (Projected)	4.5	6.4	7.2	6.9
2024-2028 (Projected)	6.0	9.4	8.5	8.6
2029-2033 (Projected)	6.0	10.6	9.4	9.5

Source: JICA Study Team

Table 5.5 shows the changes of share of GRDP for Antananarivo Agglomeration to GDP for Madagascar. The share of Antananarivo will increase from 41.7 percent in 2014 to 52.9 percent in 2033.

Table 5.5 Change of Share of GRDP for Antananarivo Agglomeration

	Unit	2014 (Actual)	2023 (Projected)	2028 (Projected)	2033 (Projected)
Share of Antananarivo Agglomeration's GDP against Madagascar's Total GDP	%	41.7	47.0	49.1	52.9
GRDP of Antananarivo Agglomeration	MGA Billion, at 2007 constant prices	7,235	13,005	19,626	30,941
GDP of Madagascar	MGA Billion, at 2007 constant prices	17,368	27,642	39,966	58,455

Source: JICA Study Team

Table 5.6 Change of GDP per Capita for Antananarivo Agglomeration

	Unit	2014	2023	2028	2033
Population of Antananarivo Agglomeration	-	2,240,256	3,022,647	3,547,471	4,151,467
GRDP of Antananarivo Agglomeration	MGA Billion, at 2007 constant prices	7,235	13,005	19,626	30,941
	USD Million, at 2010 constant prices	4,452	8,003	12,078	19,040
GDP per Capita for Antananarivo Agglomeration	MGA, at 2007 constant prices	3,229,542	4,302,520	5,532,392	7,453,028
	USD, at 2010 constant prices	1,987	2,648	3,405	4,586
Annual Growth Rate of GDP per Capita at 2007 constant prices	-	-	3.24%	5.16%	6.14%

Source: JICA Study Team

Chapter 6 Antananarivo Agglomeration: Strategies for Urban Development

6.1 Overall Issues on Urban Development of Antananarivo Agglomeration

The overall issues on urban development and housing are as follows:

- Population is rapidly increasing in Antananarivo Agglomeration. It is necessary to accommodate the increasing population and economic activities.
- In Antananarivo Agglomeration, economic sectors have not been sufficiently developed so that it cannot generate enough employment opportunities for the large number of population.
- Housing provision is inadequate in terms of quantity and quality, compared with the rapid population growth in Antananarivo Agglomeration.
- Many urban functions and population are over concentrated within CUA. As a result, serious traffic congestion disrupts economic and social activities in Antananarivo.
- Basic infrastructure and services for supporting life are insufficient outside CUA.
- The logistics function in Antananarivo Agglomeration is inefficient so that it cannot support development of the economic sectors.
- In Antananarivo Agglomeration, land for manufacturing and logistics industries is lacking inside and outside CUA.

6.2 Overall Strategies for Urban Development of Antananarivo Agglomeration

In response to the overall issues and objectives on urban development for Antananarivo Agglomeration, overall strategies are formulated by restructuring the urban structure as follows:

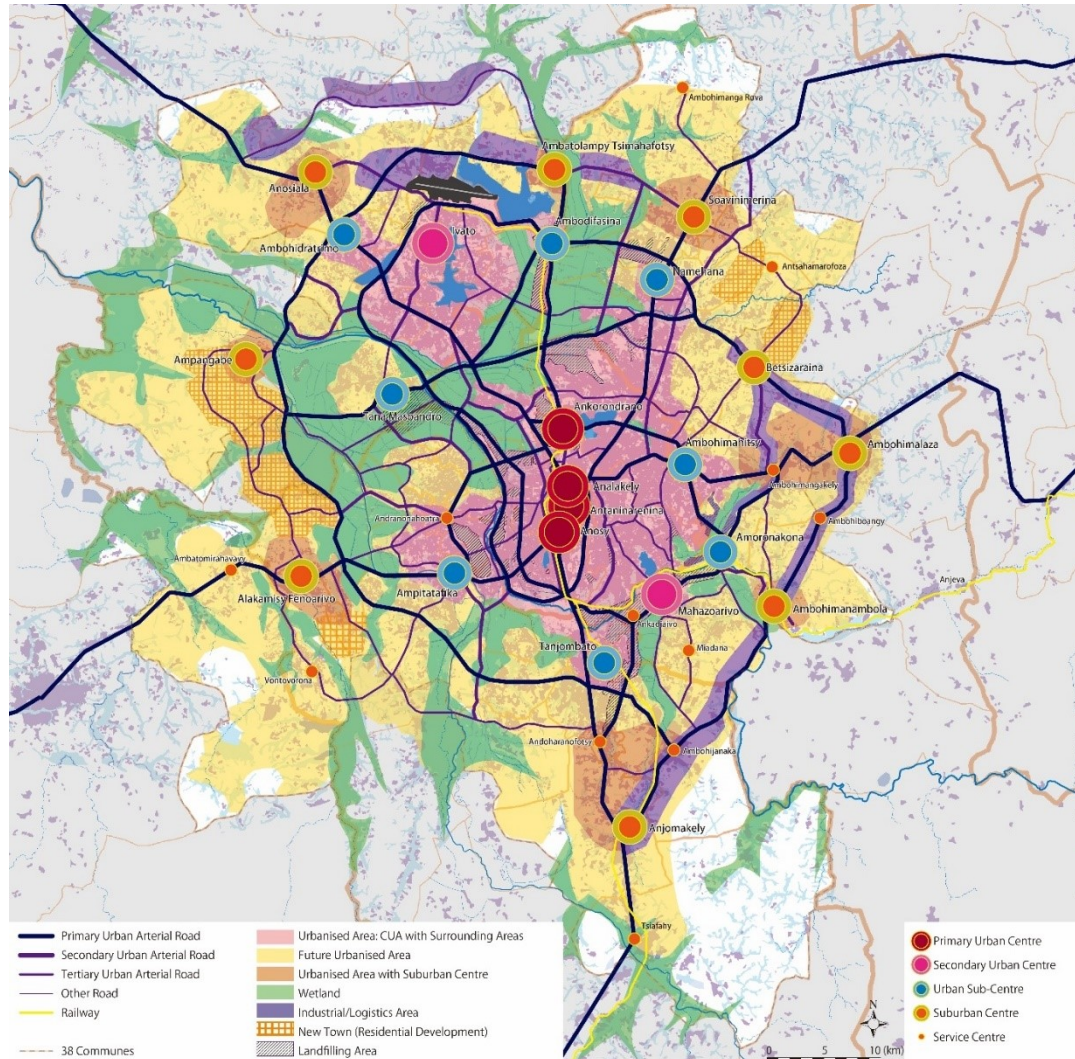
- To strengthen urban centre functions within the CUA, especially those of accommodating the headquarters of international, regional and national corporations and organizations
- To develop new urban centres outside the CUA and to provide basic infrastructures, such as electricity, water supply and access roads, in the outside of CUA, in order to promote suburbanization outside CUA
- To strengthen the radial road capacities connecting the inside of CUA and the outside of CUA in order to promote diffusion of population and urban functions to the outside of CUA within Antananarivo Agglomeration
- To construct an Outer Ring Road for strengthening the connectivity with Toamasina Port and for creating enough land for attracting industries and logistics facilities along the sections of the Outer Ring Roads near the National Road No.2
- To improve the high-density residential environment within CUA by inserting local roads with gutters and providing water supply infrastructure
- To enhance the water retarding capacity of urban areas of CUA by maintaining and constructing water retarding ponds and by enforcing land use regulations
- To selectively conserve wetland paddy fields by rehabilitating irrigation facilities for agricultural fields

6.3 Future Urban Structure for Antananarivo Agglomeration

6.3.1 Selected Future Urban Structure for Antananarivo Agglomeration

Figure 6.1 illustrates the selected future urban structure for the Antananarivo Agglomeration for 2038, five years beyond the target year of 2033. It reflects the above mentioned overall strategies for the Antananarivo Agglomeration.

The urban structure composed by different types of urban centres, roads, and railway lines. It also shows general land use direction containing urbanised areas, wetlands, and industrial areas.



Source: JICA Study Team

Figure 6.1 Future Urban Structure for Antananarivo Agglomeration

The Future Urban Structure is composed of the following different elements:

- Urban Core (Primary Urban Centres)
- Secondary Urban Centres
- Urban Central Axis
- Urban Rail Axis
- Urban Sub-Centres
- Suburban Centres
- Industrial and Logistics Areas along the Outer Ring Road
- Three East-West Roads Connecting to the Urban Central Axis
- New Towns

6.3.2 Phased Urban Development for Antananarivo Agglomeration

Table 6.1 Development of Antananarivo Agglomeration by Phases

Phase	Map	Key Features and Objectives
Phase 1: 2019-2023		<ul style="list-style-type: none"> To attract investment in light industry and promote industrial development, in addition to the existing textile industry, utilizing the existing infrastructure, the current workforces, and already available business support services To conduct rezoning to mixed development areas including industry along Tokyo Boulevard. To create land for industrial development by constructing the Outer Ring Road between NR No.2 and NR No. 3 To make a strong effort to develop Urban Sub-Centres which are located just outside CUA and currently developing, because they have a strategic location by construction of new roads To develop roads which will ease traffic congestion on the existing radial roads for strengthening the connectivity between the inside of CUA and the outside of CUA To develop a new Primary Urban Centre in Ankorondrano to enhance advanced business support functions of Antananarivo Agglomeration
Phase 2: 2024-2028		<ul style="list-style-type: none"> To construct the Outer Ring Road from the north of Ivato Airport to NR4 and develop the area for industry and logistics along the Outer Ring Road, and to attract light industries and logistics facilities To promote suburban development by improving the connectivity between CUA and outside CUA by constructing part of the Outer Ring Road, and developing Suburban Centres To develop a new town in the northern area of Alakamisy Fenoarivo Suburban Centre by constructing a bypass road parallel to NR1 and a western part of the Outer Ring Road To disperse road traffic by developing 4-lane roads connecting NR3, Tsarasaotra Road, NR4 and Bypass Road of NR4 in east-west direction, and to promote development of the suburban areas
Phase 3: 2029-2033		<ul style="list-style-type: none"> To construct the north-western part of the Outer Ring Road outside CUA linking NR1 and NR4 and to promote development of suburban areas by new town development To generate land for industrial and logistics use by developing a bypass road of NR7 in the south of the outside of CUA. This area has access to the urban railway. The expansion of the urban area is expected from the development of urban centres in the suburban area near the industrial area
Phase 4: 2034-2038		<ul style="list-style-type: none"> To create additional land for industry and logistics facilities by constructing the remaining sections of the Outer Ring Road in the southeast, southwest and northeast areas outside CUA and to promote investment to industries The expansion of the urban area is expected by developing Suburban Centres in the suburban areas near the industry area, while attracting industries

Source: JICA Study Team

Chapter 7 Antananarivo Agglomeration: Land Use Policies and Land Use Zoning Plan

7.1 Land Use Policies by Land Use for Antananarivo Agglomeration

(1) Policy on Residential Land Use

At present, inside CUA, high-density and middle-density residential areas are extensive. In the future, high and mid-density residential areas will be further expanded and the height of residential buildings will be increased.

At present, outside CUA, low-density residential areas are widely spreading. In the future, outside CUA, the development of middle-density residential areas including middle-rise mid-density residential areas, will be promoted along the radial roads and in the surrounding of urban sub-centres.

At present, outside 8-10 km radius from the city centre (outside the planned Outer Ring Road), low-density residential areas are mostly spreading in suburban and rural contexts. In the future, outside the Outer Ring Road, the development of low-density residential areas is promoted. Outside the Outer Ring Road, in some areas, the development of new towns accommodating middle-rise mid-density residential areas is promoted in order to accommodate increasing low and middle income populations.

(2) Policy on Commercial Land Use

At present, within CUA, commercial areas including office areas are mostly located along major roads. In the future, within CUA, commercial areas including office areas will be expanded along newly constructed major roads, as well as in existing commercial centres, such as Analakely and Ankorondrano. The increased height of commercial buildings will be allowed in commercial areas.

At present, just outside CUA, there are some commercial areas which have spontaneously developed along the radial national roads, including Tanjombato (on NR7), Ampitatafika (NR1), Ambohidratrimo (NR4) and Sabotsy Namehana (NR3). In the future, outside CUA, the commercial function of these existing commercial areas will be upgraded to be “Urban Sub-Centres”, the area size of these existing commercial areas will be expanded, and their building height will be increased, in respond to planned development of arterial road network.

At present, outside 8-10 km radius from the city centre (outside the planned Outer Ring Road), there is little commercial accumulation, while there are some spontaneously developed commercial areas. In the future, around the planned Outer Ring Road, suburban centres will be developed in order to accommodate not only commercial/office areas, but also other urban functions.

(3) Policy on Industrial Land Use

At present, industrial areas are located along the radial national roads near CUA’s boundaries and further beyond CUA’s boundaries. Urbanization has expanded so as to surround those existing industrial areas. In the future, those existing industrial areas will be transformed to commercial/office and residential areas under a mixed land use category.

In the future, industrial areas will be largely expanded in suburban areas along the planned Outer Ring Road, which could have good connection to Toamasina Port through the existing NR2 and/or through the prospective Antananarivo-Toamasina Expressway.

(4) Policy on Conservation Areas (Non-Development Areas)

At present, wetlands including irrigated paddy fields are supposed to be protected from any development without government permission. However, road development and residential area development have been done under the government permission of wetland land filling. In the future, conservation of wetlands will be done in order to maintain the water retention capacity of 15 million m³ within CUA, in accordance with PIAA's Drainage Master Plan. In the future, there are many planned urban developments in association with land filling in wetlands, and there is also the possibility of spontaneous land filling in wetlands. It will be necessary to strictly control the volume of wetland land filling by two methods. The one is land use zoning regulation, which is shown in the land use zoning plan of PUDi. The other is to construct water retention ponds in certain urban areas under high urbanization pressure.

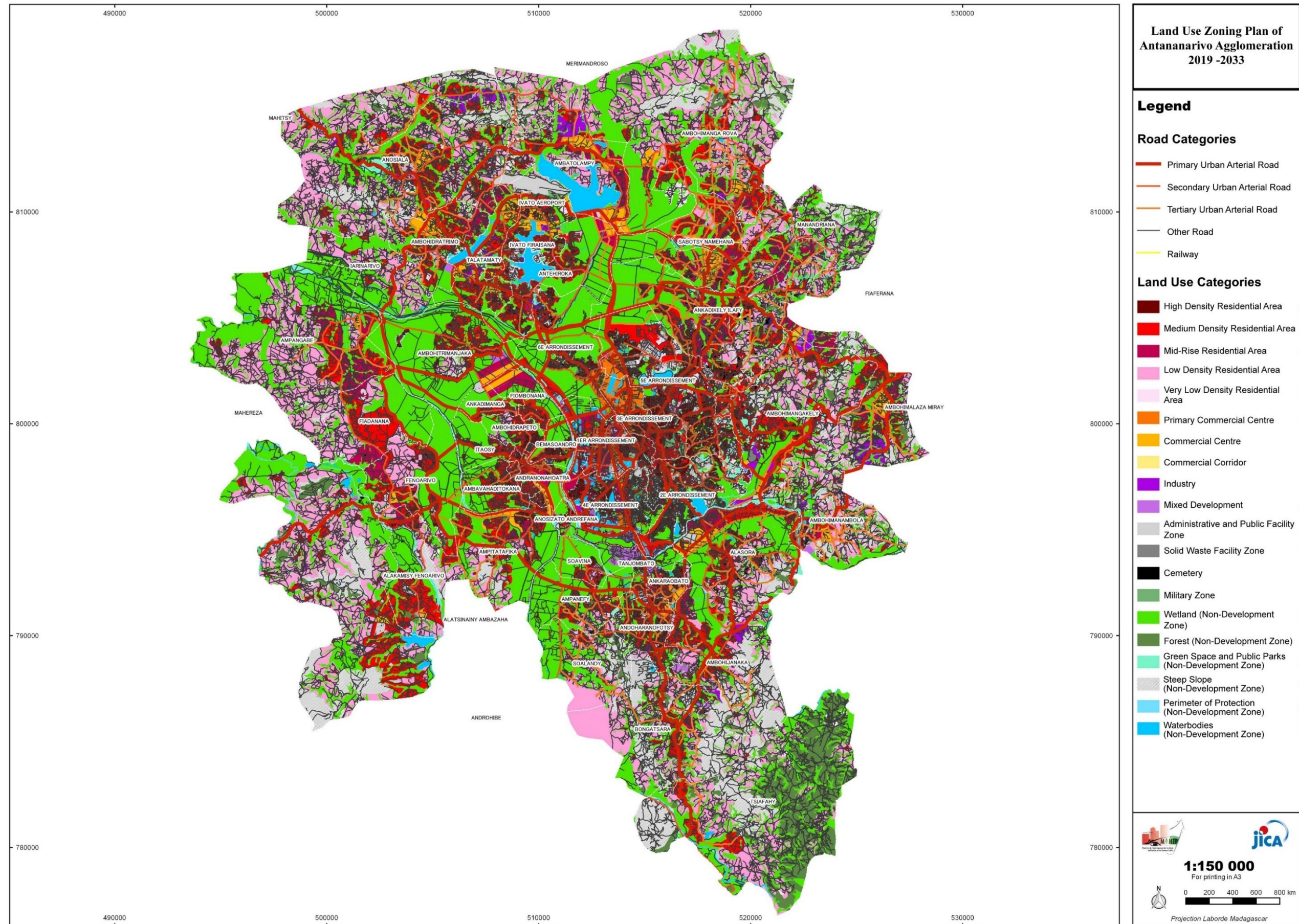
Outside CUA, there are wide areas under threats of inundation from heavy rainfall and flooding of rivers. In the future, land filling in wetlands outside CUA will be limited to the cases of high necessity, especially for development of urban sub-centres and construction of major roads.

(5) Policy on City Parks

Although the urban population has been rapidly increasing, there are few formal city parks and sports grounds in Antananarivo Agglomeration. At present, there are still many non-built-up lands, where people can enjoy playing. As the population increases and urban areas expand, these non-built-up lands would decrease rapidly. Moreover, it seems that there are no official development plans for city parks and sports grounds. In the future, the demand for city parks and sports grounds will increase largely. Therefore, potential lands for city parks and sports grounds are designated by the revised PUDi. Such potential lands include 1) areas surrounding water retention ponds, 2) unused lands in highly populated areas, and 3) forested lands in suburban areas.

7.2 Land Use Zoning Plan for Antananarivo Agglomeration

The land use zoning plan for Antananarivo Agglomeration 2019-2033 is shown in Figure 7.1.



Source: JICA Study Team

Figure 7.1 Land Use Zoning Plan for Antananarivo Agglomeration 2019-2033

Chapter 8 Antananarivo Agglomeration: Action Areas and High Priority Projects

8.1 Introduction

It is possible to achieve effective urban development when different types of actions are combined in a timely manner. For example, residential area development requires not only land development in accordance with land use regulations, but also provision of access roads and power supply and water supply. At the same time, in a wider view, drainage capacity needs to be rehabilitated for reducing inundation impact. Moreover, recycling factories and final disposal sites are also to be developed for solid waste management. That is, integrated development is essential for realizing a better urban agglomeration. Such integrated urban development is necessary not only at the local level, but also at the agglomeration level.

In order to implement the Revised PUDi for Antananarivo Agglomeration, an Action Plan is formulated by the following three sets of actions:

- Capacity Development for Promotion and Coordination for Implementing the PUDi (Urban Development Master Plan) of Antananarivo Agglomeration
- Action Areas of Urban Development and Management for Antananarivo Agglomeration
- Priority Projects and High Priority Projects of Various Sectors in Antananarivo Agglomeration.

8.2 Capacity Development for Promotion and Coordination for Implementing the PUDi (Urban Development Master Plan) of Antananarivo Agglomeration

One of the most important actions for implementing the PUDi is “Project for Capacity Development for Promotion and Coordination of Implementing the PUDi (Urban Development Master Plan) of Antananarivo Agglomeration.”

This Project is composed of the following two components:

- Capacity Development for Communes in Utilization of Land Use Zoning Regulations
- Implementation of Pilot Project for Development of Urban Centres

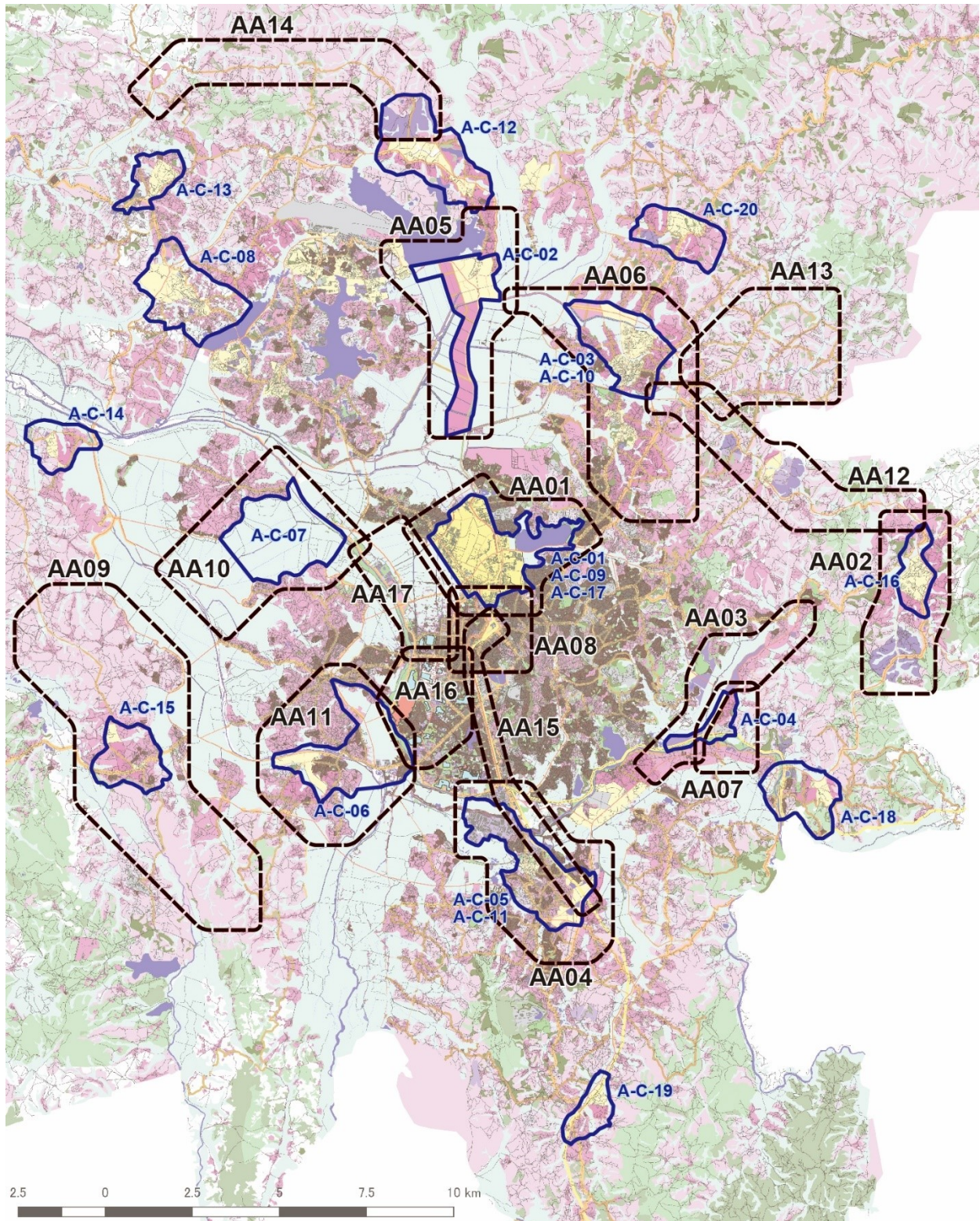
8.3 Action Areas of Urban Development and Management for Antananarivo Agglomeration

In order to promote integrated urban development described by the PUDi, it is necessary to take concerted actions at the local level, as well as at the agglomeration level.

In order to achieve the integrated urban development envisioned by the PUDi, the following different types of action areas are required:

- Action Areas for Development of Urban Centres and their Surrounding Areas
- Action Areas for Development of New Towns
- Action Areas for Development of Industrial Areas
- Action Areas for Transit-Oriented Development
- Action Areas for Securing of Water Retention Ponds

Therefore, a variety of priority action areas are designated, as shown in Table 8.1 and Figure 8.1. For each priority action area, actions are described for promoting integrated development.



Source: JICA Study Team

Figure 8.1 Location of Priority Action Areas for Integrated Development in Antananarivo Agglomeration

Table 8.1 Priority Action Areas for Antananarivo Agglomeration

No.	Title of Action Area	Type of Action Areas
A-AA-01	Integrated Urban Development in the Ankorondrano Primary Urban Centre and its Surrounding Areas	Urban Centre Water Retention Pond
A-AA-02	Development of Industrial and Logistics Areas in the South of Ambohimalaza near NR2	Industrial Area
A-AA-03	Establishment of Clean Light Industrial Zones along the Tokyo Boulevard	Industrial Area
A-AA-04	Development of Tanjombato Urban Sub-Centre and its Surrounding Areas	Urban Centre Transit-Oriented Development
A-AA-05	Development of Ambodifasina Urban Sub-Centre and its Surrounding Areas	Urban Centre
A-AA-06	Development of Namehana Urban Sub-Centre and its Surrounding Areas	Urban Centre
A-AA-07	Development of Amoronakona Urban Sub-Centre and its Surrounding Areas along Tokyo Boulevard	Urban Centre Industrial Area
A-AA-08	Reconstruction of Central Railway Station Area of Antananarivo	Urban Centre Transit-Oriented Development
A-AA-09	Development of Suburban Centre of Alakamisy Fenoarivo and New Towns in Surrounding of Alakamisy Fenoarivo	Urban Centre New Town
A-AA-10	Development of Tana-Masoandro Urban Sub-Centre	Urban Centre
A-AA-11	Development of Ampitatafika Sub-Centre and its Surrounding Areas	Urban Centre
A-AA-12	Development of Industrial Areas along North-East Section of Outer Ring Road	Industrial Area
A-AA-13	Development of Western New Towns in Suburban Areas	New Town
A-AA-14	Development of Ivato North Industrial Area along the Outer Ring Road	Industrial Area
A-AA-15	Development of TOD Corridor between Central Station and Tanjombato	Transit-Oriented Development
A-AA-16	Development Pole of Anosipatrana Digue together with Retention Ponds	Water Retention Pond
A-AA-17	Development and Management of Wetlands in Betsimitatatra Plain	Water Retention Pond

Source: JICA Study Team

8.4 High Priority Projects for Antananarivo Agglomeration

Priority projects identified for Antananarivo Agglomeration are listed in Table 8.2. The detail of each project can be found through Chapters 6 to 11 in the main text. Total budget necessary for implementing the high priority projects in Antananarivo accounts for US\$ 1,879 million.

Table 8.2 High Priority Projects of Antananarivo Agglomeration

Project No.	Project Name	Cost (million USD)	Organisation in Charge
A-DC-01	Project for Capacity Development for Promotion and Coordination of Implementing the PUDi (Urban Development Master Plan) of Antananarivo Agglomeration	4	MAHTP, MID
A-R-01	Project for Construction of 4-lane Road between Ankorondrano and Antsavatsava (Northern Road Section between NR4 and NR1) (Part of the Middle Ring Road including a Bridge crossing the Ikopa River)	60	MAHTP
A-R-02	Project for Construction of 4-lane Road between Ampitatafika and Antsavatsava (Southern Section between NR4 and NR1) (Part of the Middle Ring Road)	5	MAHTP
A-R-03	Project for Construction of Primary Arterial Road between NR4 and Tsarasaotra Road in Ankorondrano Primary Urban Centre	50	MAHTP
A-R-04	Project for Construction of a Flyover at Ankorondrano Intersection of Tsarasaotra Road and Marais Masay Road	40	MAHTP
A-R-05	Project for Construction of Ambodifasina – Sabotsy Namehana Section of the Outer Ring Road between Tsarasaotra Road and NR3	10	MAHTP
A-R-06	Project for Construction of Soanierana-Sabotsy Namehana Section of the Outer Ring Road between NR3 and NR2	20	MAHTP
A-R-07	Project for Construction of Bypass Road of Ambohidratrimo Urban Sub-Centre	5	MAHTP
A-R-08	Project for Construction of Primary Arterial Road between Tana Masoandro and Antsavatsava	10	MAHTP
A-R-09	Project for Construction of Flyover at Anosizato Intersection of NR4 and NR1	30	MAHTP
A-C-01	Project for Promotion of Development of Ankorondrano Primary Urban Centre Phase 1	54	MAHTP, PPP
A-C-02	Project for Promotion of Development of Ambodifasina Urban Sub-Centre	86	MAHTP, PPP
A-C-03	Project for Promotion of Development of Namehana Urban Sub-Centre	35	MAHTP, PPP
A-C-04	Project for Promotion of Development of Amoronakona Urban Sub-Centre	38	MAHTP, PPP
A-C-05	Project for Promotion of Development of Tanjombato Urban Sub-Centre	30	MAHTP, PPP
A-C-06	Project for Promotion of Development of Ampitatafika Urban Sub-Centre	57	MAHTP, PPP

The Project on Master Plan Formulation for Economic Axis of TaToM (Antananarivo-Toamasina, Madagasikara)
Summary, Final Report

A-C-07	Project for Promotion of Development of Tana Masoandro Urban Sub-Centre	199	MAHTP, PPP
A-C-08	Project for Promotion of Development of Ambohidratrimo Urban Sub-Centre	16	MAHTP, PPP
A-I-01	Project for Rezoning to Mixed Development Areas which allow Clean Light Industries along the Tokyo Boulevard	63	MAHTP, MICA, PPP
A-I-02	Project for Development of Industrial and Logistics Areas in the Southern Area of Ambohimalaza	84	MAHTP, MICA, PPP
A-I-03	Project for Development of Industrial and Logistics Areas along Ambohimalaza - Sabotsy Namehana Section of the Outer Ring Road by Providing Access Roads, Water and Electricity	70	MAHTP, MICA, PPP
A-F-01	Project for Development of Multi-Modal Cargo Transport Terminal in Amoronakona for Antananarivo Agglomeration	20	MAHTP, MTTM, PPP
A-H-01	Project for Development of Social Housing Area in Ivato East	-	MAHTP
A-H-02	Project for Development of Fenoarivo South New Town	42	MAHTP, PPP
A-E-01	Project for Doubling the Capacity of Mandrozeza 2 Water Treatment Plant		JIRAMA
A-E-02	Project for Construction of Two Water Treatment Plants using Groundwater from Tana Plain	68	JIRAMA
A-E-03	Project for Construction of Water Treatment Plant in Laniera		JIRAMA
A-E-04	Project for Master Plan Formulation of Water Resources Development and Water Supply for Antananarivo Agglomeration	3	JIRAMA
A-E-05	Project for Construction of New Retention Dam in Miadanandriana	42	JIRAMA
A-P-01	Installation of New Transmission Lines <ul style="list-style-type: none"> • 225kV transmission line (Sahofika hydropower station to Behenjy Substation) • 225kV transmission line (Antetezambato hydropower station to Behenjy Substation) • 225kV transmission line (Tana Sud 2 Substation to Behenjy Substation) • 225kV transmission line (Tana Nord 2 Substation to New Substation in Moramanga) • 138kV transmission line (Ranomafana hydropower station to Tana Sud 2 Substation) • 138kV transmission line (Mahitsy hydropower station to Tana Sud 2 Substation) • 63kV transmission line (Tana Sud 2 Substation to Tana Sud Substation) 	445	JIRAMA
A-P-02	Installation of New Substations <ul style="list-style-type: none"> • 225kV/63kV Behenjy Substation • 225kV/138kV/63kV Tana Sud 2 Substation 	-	JIRAMA
A-P-03	Reinforcement of Existing Transmission Lines	14	JIRAMA
A-P-04	Reinforcement of Existing Substations		JIRAMA
A-P-05	Project for Rehabilitation and Upgrade of Distribution Network including Establishment of New Distribution Control Centre for Expansion and Rehabilitation of the Power Distribution System	19	JIRAMA
A-G-01	Project for Development of Ankorondrano Lake and Waterfront Park	5	MAHTP, APIPA, CUA
A-G-02	Project for Development of Ankazomanga Atsimo Lake and Waterfront Park	5	MAHTP, APIPA, CUA
A-G-03	Project for Development of Andavamamba Anatihazo II Lake and Waterfront Park	1	MAHTP, APIPA, CUA
A-W-01	Project for Development of Recycling Factory and Sanitary Final Disposal Site in Manandriana	7	SAMVA, PPP
A-W-02	Project for Development of Recycling Factory and Sanitary Final Disposal Site in Andoharanofotsy	7	SAMVA, PPP
A-W-03	Project for Formulation of Implementation Plan for Other Recycling Factories and Sanitary Final Disposal Sites	3	SAMVA
A-R-10	Project for Construction of Over Canal Road between Tanjombato and Ankorondrano	150	MAHTP
A-R-11	Project for Construction of Bypass Road of NR3 (between the Outer Ring Road and the Middle Ring Road)	30	MAHTP
A-R-13	Project for Construction of Extension of Tsarasaotra Road between Ambodifasina Urban Sub-Centre and Ambatolampy Tsimahafotsy Suburban Centre	7	MAHTP
A-R-15	Project for Construction of Primary Arterial Road between Andranonahoatra and the Outer Ring Road	10	MAHTP
A-R-16	Project for Construction of Primary Arterial Road between Bypass Road of NR4 and Ampangabe Suburban Centre (through Tana Masoandro)	80	MAHTP
A-R-12	Project for Construction of Anosiala - Ambatolampy Tsimahafotsy Section of the Outer Ring Road (Northern Part)	15	MAHTP
A-R-14	Project for Construction of East-West Primary Arterial Road between NR3 and Bypass Road of NR4	25	MAHTP
A-R-17	Project for Construction of Alakamisy Fenoarivo - Ampangabe Section of the Outer Ring Road (Western Part)	20	MAHTP
	TOTAL	1,879	-

Source: JICA Study Team

Chapter 9 Toamasina Agglomeration: Present Situation and Challenges of Urban Development

9.1 Present Situation of Urban Development in Toamasina Agglomeration

(1) Present Spatial Characteristics of Toamasina Agglomeration

1) City Centre and Sub-Centres of Toamasina Agglomeration

The Toamasina Port is located on the east edge of the city, and near it is the urban centre. The urban centre is organised by a grid system, and in the middle of it is the Independence Avenue. The city hall of CUT is located in the avenue, at the west end, and there is the Toamasina Railway Station just behind the city hall. Length of the Independence Avenue is 800 m toward east up to the coast. The commercial, business, administrative, and public functions are concentrated in this area.

The urbanised areas are still compact and these have developed around the port within approximately 5-7 km distance. Within the urbanised areas, there are no other urban centres, although some commercial activities are found along the National Roads 2 and 5 where the density of the residential area is high.



Source: Google Earth

Figure 9.1 City Centre of Toamasina Agglomeration

2) Urban Expansion and Sub-urbanisation in Toamasina Agglomeration

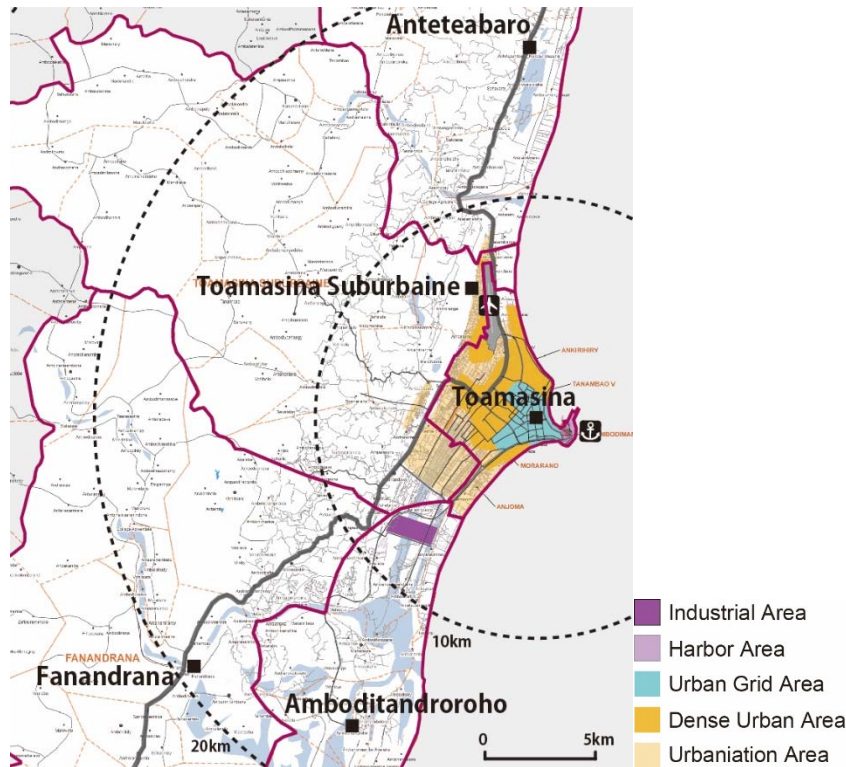
Although urban growth in Toamasina Agglomeration is not as rapid as in Antananarivo Agglomeration, the population in the former has been continuously increasing. Urbanised areas are expanding toward the surrounding areas of the centre of Toamasina. Figure 9.2 shows the present urbanised areas in Toamasina Agglomeration.

Dense residential areas have been built around the centre, and urbanised areas have developed in undulating plain land in the east of the NR2, but both do not extend to the west of the NR2. In the south, the factory of Ambatovy is located. Urbanised areas are developing towards this direction, but not reaching the factory site. In the north, Toamasina Airport is located, and urbanisation can be seen around it.

Due to land ownership, urbanisation has been happening randomly. Reason is not only due to unclear land ownership, but also it is said that there are land owners who own large plots of lands, hence residential buildings cannot be built on those lands. Consequently, many residential

buildings have been built illegally on public lands. These land issues result in unorganised urbanisation.

At present, the port expansion project is ongoing and more urbanisation of residential areas as well as industrial development are expected. Expansion of urbanised areas is foreseen to be an issue, and suitable land for this imminent expansion should be found with the proper arrangement of installations of roads and infrastructure.



Source: JICA Study Team

Figure 9.2 Urbanised Areas in Toamasina Agglomeration in 2017

3) Mono-Centric Urban Structure and Poorly Developed Suburban Centres in Toamasina Agglomeration

Toamasina Agglomeration is composed of five communes that include Toamasina Urban Commune (CUT). While most areas within CUT are urbanised already, urbanised areas of the other communes are found only around CUT. And although these communes have communal capital towns, they cannot be considered as suburban centres of the agglomeration; they are still small towns and no urban activities are concentrated. In other words, there are gaps between CUA and the other communal capital towns.

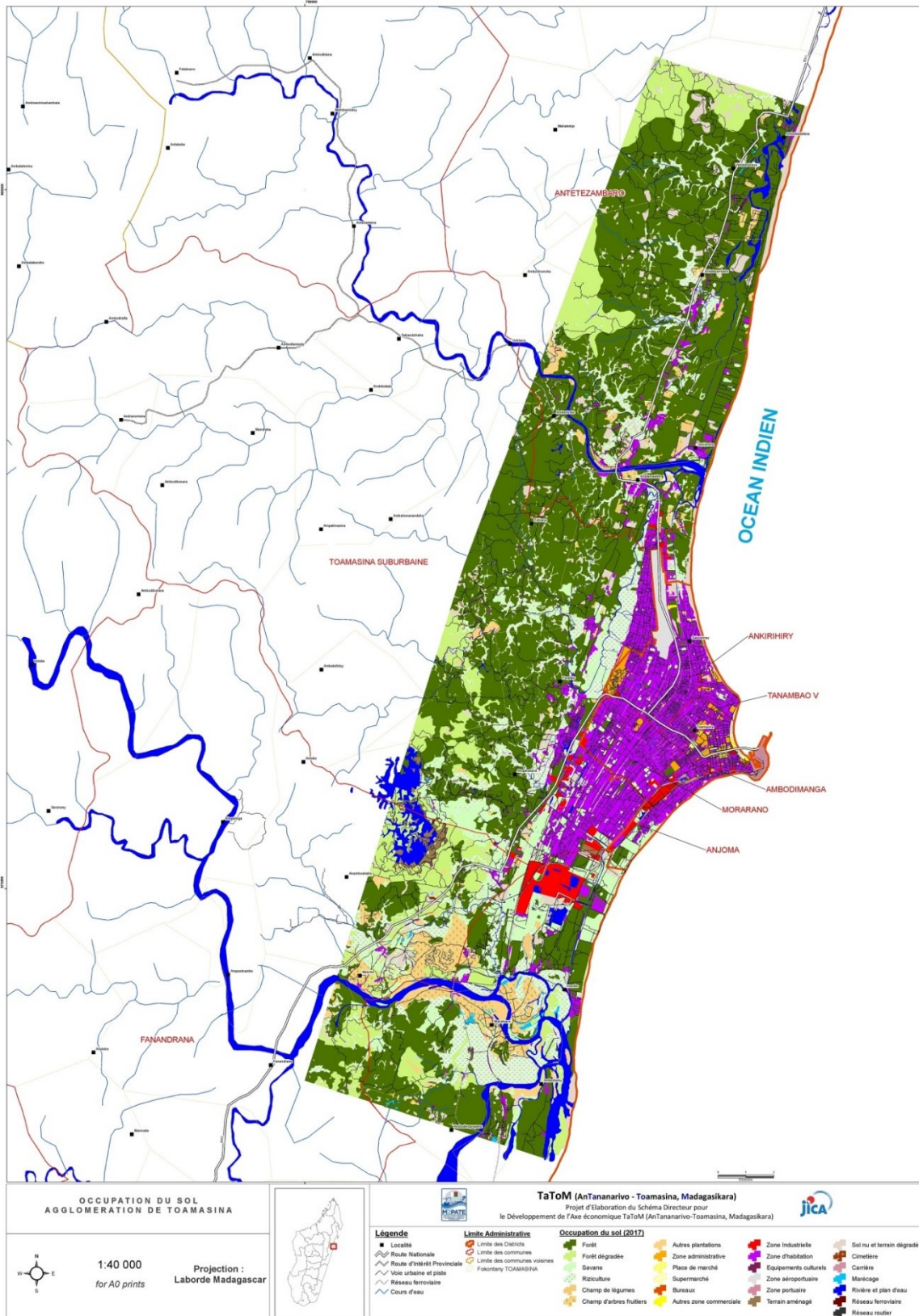
The port and the refinery of Ambatovy are remarkable in the urban condition of Toamasina. In consideration of future expansion of industrial activities, urban structure should be organised with those industries.

In order to maximise the potential of the port expansion, a new urban structure should be introduced for the agglomeration with considered suburban centres, industrial or logistic areas, and road networks. This will be a good opportunity to set up a new urban structure before actual urban expansion happens.

(2) Existing Land Use Distribution in Toamasina Agglomeration

Urbanised areas are compact and concentrated within CUT and some parts of Toamasina Suburbaine Commune. The port is located at the eastern edge, and the urbanised areas are developed from the area around the port to north, west, and south. While the urbanised areas within CUT is 22 km², which is 72% of the total CUT area, only 10% of lands are used for urbanisation

in the land use survey area. Lands outside the urbanised area are composed of grasslands, forest, and few cultivated lands. Even lands beyond the land use survey area are also occupied by forests. There are 400 ha of lands utilised for industrial purposes, and they are found in the southern part of the urbanised area.



Source: JICA Study Team by Interpreting Satellite Imageries taken in 2016
Figure 9.3 Present Land Use Map of Toamasina Agglomeration in 2016

9.2 Challenges on Urban Development for Toamasina Agglomeration

(1) Characteristics and Problems on Infrastructures and Services to Support People's Life

1) Lack of Basic Infrastructure and Services in CUT

CUT is already overpopulated and the population densities in some fokontany are extremely high, reaching 500 to 800 persons per hectare. The concentration of urban functions further accelerates the population growth in CUT. On the other hand, development of basic infrastructure and services (e.g., power and water supply) cannot catch up with the population growth. As a result, basic infrastructure, and services such as garbage collection, education facilities are significantly lacking while population and urban functions are over concentrated in this area.

2) Insufficient Maintenance of Drainage Infrastructure

Toamasina Agglomeration is located in a frequent cyclone route. The urbanisation has been progressing in low-lying areas, drainage is filled by sedimentation and solid waste; it is not also functioning well due to lack of maintenance. As a result, Toamasina Agglomeration suffers from damages caused by rainwater flooding almost every year.

3) Undeveloped Public Transport

Public transport, such as a bus system, is not operational in Toamasina. Only rickshaws and tricycles are the available public transport for daily movement within the city. The mobility in the city is constrained by a lack of public transport, and these vehicles become one of causes of traffic congestion in busy streets.

(2) Characteristics and Problems on Economic Sectors in Toamasina Agglomeration

1) Difficulty in Promoting Development of Economic Sectors

It is difficult to promote the development of economic sectors because of inadequate infrastructure, such as for power and water supply. The shortage of infrastructure not only affects people's quality of life, but also impedes the development of economic sectors, since it discourages the coming in of new investments and industries in Toamasina Agglomeration. The provision of such infrastructure is indispensable to develop economic sectors in Toamasina Agglomeration.

2) Lack of Facilities to Attract International Corporations

In Toamasina Agglomeration, international corporations (e.g., Ambatovy) which employ expatriates and professionals are already located. However, there are no facilities offering services to these middle-income people, such as hospitals for advanced medical services, international schools, or leisure and entertainment facilities in Toamasina. The professionals and management class working for those firms are more likely to choose staying in Antananarivo, not in Toamasina.

3) Long Travelling Hours from Antananarivo

Currently, traveling 350 km distance on NR No. 2 from Toamasina to Antananarivo, the capital of the country as well as the centre of the economy takes 8 hours by passenger car or 2 days by cargo freight. This traveling time should be shortened to strengthen economic activities in Toamasina.

4) Unutilized Function of Toamasina Port

The expansion of the Port of Toamasina can bring about a significant opportunity to develop industries and other economic sectors in Toamasina Agglomeration. However, the issues mentioned above would hinder Toamasina Agglomeration from taking advantage of the expansion of Toamasina Port. As a result, the function of Toamasina Port (the primary major port of Madagascar), is not fully utilised for the development of economic sectors in Toamasina Agglomeration.

Chapter 10 Toamasina Agglomeration: Future Vision, Growth Scenarios and Socio-Economic Framework

10.1 Future Vision for Toamasina Agglomeration

A future vision for Toamasina Agglomeration in 2033 is set as follows:

Statement of Future Vision:

Based on its enhanced gateway function connecting sea transport and land transport, Toamasina Agglomeration will be a thriving industrial hub and major tourist destination in the Indian Ocean, around the international Port of Toamasina, with a healthy lifestyle and beauty of Pangalanes Canal along with coastal and mountainous landscapes enjoyed by residents and tourists as well.

This vision statement corresponds to the selected scenario for the overall TaToM, which aims for the development not only of existing economic sectors (e.g., primary commodities production and textile industry) but also of new economic sectors (light industries among others) in both Toamasina and Antananarivo Agglomerations, as discussed in Section 3.4. The development of economic sectors of both agglomerations would drive not only the economies of the two agglomerations, but also Madagascar's economy as a whole.

10.2 Growth Scenario for Toamasina Agglomeration

The growth scenario for Toamasina Agglomeration has the following features:

- Toamasina Port is the largest gateway of Madagascar to the sea connecting to African coastal areas and Indian Ocean countries. Seizing the opportunity of Toamasina Port's expansion, Toamasina City (CUT) and its peripheral area will be developed not only as a logistics centre to provide logistics services to Antananarivo Agglomeration and other areas, but also as a thriving industrial city.
- By taking advantage of its strategic location and expanded port functions, and by attracting investments, Toamasina Agglomeration will be able to develop potential economic sectors targeting markets of member countries of regional economic communities (RECs), such as COMESA, SADC, and IORA, of which Madagascar is a member.
- In order to make a thriving and attractive agglomeration out of the stagnant port city of Toamasina, it is also necessary for Toamasina Agglomeration to utilise its own development potentiality for international tourism, such as sun-and-beach tourism and nature tourism.
- In the early stages of economic sector development in Toamasina Agglomeration, the existing and newly emerging problems would appear as obstacles; however, by following this Growth Scenario with the expansion of Toamasina Port, it is possible to resolve the problematic situation and grow into a prosperous industrial city.

The following five conditions should be satisfied to realise the selected Growth Scenario aiming at developing Toamasina Agglomeration as an industrial city:

- Strengthening of logistics functions centering on the expansion of Toamasina Port
- Development of economic infrastructure to support the development of economic sectors in Toamasina Agglomeration
- Development of basic infrastructure to support the people's everyday needs and amenities in Toamasina Agglomeration

- Enhancement of transport capacity along the TaToM Economic Axis between Antananarivo and Toamasina (strengthening of connectivity, especially the improvement of speed of passenger transport)
- Strengthening of business headquarters' functions of Antananarivo Agglomeration to manage business operation in Toamasina Agglomeration, as well as to attract investments to economic sectors in Toamasina Agglomeration

Among the five conditions mentioned above, the first three are the ones to be met for Toamasina Agglomeration. The remaining two conditions are critical because the management of business operations and decision-making on investments are made in Antananarivo.

Toamasina is located more than 350 km away from Antananarivo. Currently, air, road, and railway transport between Toamasina and Antananarivo do not function well in terms of both passenger and cargo transport, creating difficult conditions for investment promotion. It is essential to improve, especially the speed of passenger transport in addition to the enhancement of capacity of cargo transport, in order to promote investments to economic sectors in Toamasina Agglomeration.

By strengthening the business functions and promoting economic activities in Antananarivo Agglomeration, investments to the economic sectors in Antananarivo Agglomeration will increase and support the economic activities in other regions in Madagascar. This situation will eventually enable the investment promotion for the development of economic sectors and efficient business operations in Toamasina Agglomeration.

10.3 Future Socio-Economic Framework for Toamasina Agglomeration

The socio-economic framework is prepared for the whole study area of Toamasina Agglomeration, which is Toamasina Sub-Region covering the whole five communes. .

10.3.1 Population Framework for Toamasina Agglomeration

The population framework for Toamasina Agglomeration for 2033 is set based on the past population growth in each commune.

Table 10.1 shows the future population by commune for Toamasina Agglomeration in short-, medium- and long-term.

Table 10.1 Population Framework for Toamasina Agglomeration

Commune	District	Area ha	Population				Annual Population Growth Rate 2018-2033	Population Density (2033) Pop/ha
			2018	2023	2028	2033		
Toamasina	Toamasina I	28	326,286	379,373	440,170	506,111	2.97%	180.8
Toamasina Suburbaine	Toamasina II	290	50,571	72,338	105,396	158,342	7.91%	5.5
Antetезambaro	Toamasina II	219	19,625	22,383	26,001	31,145	3.13%	1.4
Fanandrana	Toamasina II	336	26,029	29,787	34,720	41,730	3.20%	1.2
Amboditandreroho	Toamasina II	184	14,493	17,110	20,574	25,511	3.84%	1.4
Outside CUT	Toamasina Sub-Region	1,029	110,718	141,618	186,691	256,728	5.77%	2.5
TOTAL	Toamasina Sub-Region	1,057	437,004	520,991	626,861	762,839	3.78%	7.2

Source: JICA Study Team

10.3.2 Economic Framework for Toamasina Agglomeration

The indicators of the economic growth are shown in Table 10.2. The indicators are mainly based on the growth rates of GDP by National Development Plan (PND), INSTAT statistics (Tableau de Bord Economique, Avril 2017), and above-mentioned plans. Moreover, in the case of the projections in the region, the following potentials are considered:

- Existence of the largest sea port, which will be expanded by the Japanese Government's support, may become a driving force to boost the tertiary sector, including logistic industry and trade;
- Existence of Ambatovy's nickel and cobalt mining factories may be one of the important factors for the development of the secondary and tertiary sectors in the regions. If the global commodities market will expand, it may lead to employment creation in these sectors.

Table 10.2 Real Growth Rates of GDP and GRDP for Toamasina Agglomeration as Indicators of Economic Framework

	2016-2023	2024-2028	2029-2033
Madagascar	5.6	7.7	7.9
Antananarivo Agglomeration	6.9	8.6	9.5
Toamasina Agglomeration	6.1	8.2	9.5

Source: JICA Study Team

Table 10.3 illustrates the change of share of economic sector and growth rates by economic sector for Toamasina Agglomeration.

Table 10.3 Change of Economic Structure in Toamasina Agglomeration

(a) Change of Share of Economic Sector

	GDP (MGA Billion, at 2007 constant prices)	GDP (USD million, at 2010 constant prices)	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)
2014 (Actual)	330	203	19.2	28.2	52.6
2023 (Projected)	554	341	16.1	27.8	56.1
2028 (Projected)	822	506	14.5	28.0	57.5
2033 (Projected)	1,297	798	12.3	28.1	59.6

(b) Growth Rates by Economic Sector

	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)	Total (%)
2016-2023 (Projected)	4.5	5.6	6.9	6.1
2024-2028 (Projected)	6.0	8.4	8.8	8.2
2029-2033 (Projected)	6.0	9.6	10.3	9.5

Source: JICA Study Team

Table 10.4 shows the changes of share of GRDP for Toamasina Agglomeration to GDP for Madagascar.

Table 10.4 Change of Share of GRDP for Toamasina Agglomeration

	Unit	2014 (Actual)	2023 (Projected)	2028 (Projected)	2033 (Projected)
Share of Toamasina Agglomeration's GDP against Madagascar's Total GDP	%	1.9%	2.0%	2.1%	2.2%
GRDP of Toamasina Agglomeration	MGA Billion, at 2007 constant prices	330	554	822	1,297
GDP of Madagascar	MGA Billion, at 2007 constant prices	17,368	27,642	39,966	58,455

Source: JICA Study Team

Table 10.5 Change of GDP per Capita for Toamasina Agglomeration

	Unit	2014	2023	2028	2033
Population of Toamasina Agglomeration	-	374,111	520,991	626,861	762,839
GRDP of Toamasina Agglomeration	MGA Billion, at 2007 constant prices	330	554	822	1,297
	USD Million, at 2010 constant prices	203	341	506	798
GDP per Capita for Toamasina Agglomeration	MGA, at 2007 constant prices	882,091	1,063,358	1,311,295	1,700,228
	USD, at 2010 constant prices	543	655	807	1,046
Annual Growth Rate of GDP per Capita at 2007 constant prices	-	-	2.11%	4.26%	5.33%

Source: JICA Study Team

Chapter 11 Toamasina Agglomeration: Strategies for Urban Development

11.1 Overall Issues on Urban Development of Toamasina Agglomeration

The overall issues on urban development for Toamasina Agglomeration are as follows:

- In CUT, basic infrastructure (e.g., for power and water supply), and life services are insufficient while population and urban functions are over concentrated in CUT.
- It is difficult to promote the development of economic sectors because of inadequate infrastructure, such as for power and water supply.
- Because urbanisation has been progressing in low-lying areas and maintenance of the drainage infrastructure has been insufficient, rainwater flooding occurs almost every year.
- Public transport is not well developed.
- There are not enough hospitals, educational facilities, and recreation facilities for middle-income people.
- It takes 8 hours by passenger car or 2 days by cargo freight to travel 350 km distance on NR2 from Antananarivo, the capital of the country as well as the centre of the economy.

As a result, the function of the Port of Toamasina (the primary major port of Madagascar), is not fully utilised for the development of economic sectors in Toamasina Agglomeration.

11.2 Overall Strategies for Urban Development of Toamasina Agglomeration

The following overall strategies are formulated for Toamasina Agglomeration:

- To implement necessary strategies to efficient logistics system
- To implement a set of development strategies focusing on the promotion of economic sectors, specifically light industries and agro-processing industries targeting regional consumer markets, in order to transform Toamasina Agglomeration into a thriving industry city
- To set up Economic Development Zones and develop industrial parks, together with providing economic infrastructure including access roads, electricity supply and water supply, for attracting investments to light industries targeting the markets of Free Trade Areas of the Regional Economic Organizations with which Madagascar is affiliated
- To promote international and domestic tourism by setting up Tourism Development Zones and hotel zones for purposes of attracting investment to hotels, based on the existing infrastructure. The results of this measure on tourism development will be also effective eventually in attracting investments to industries.

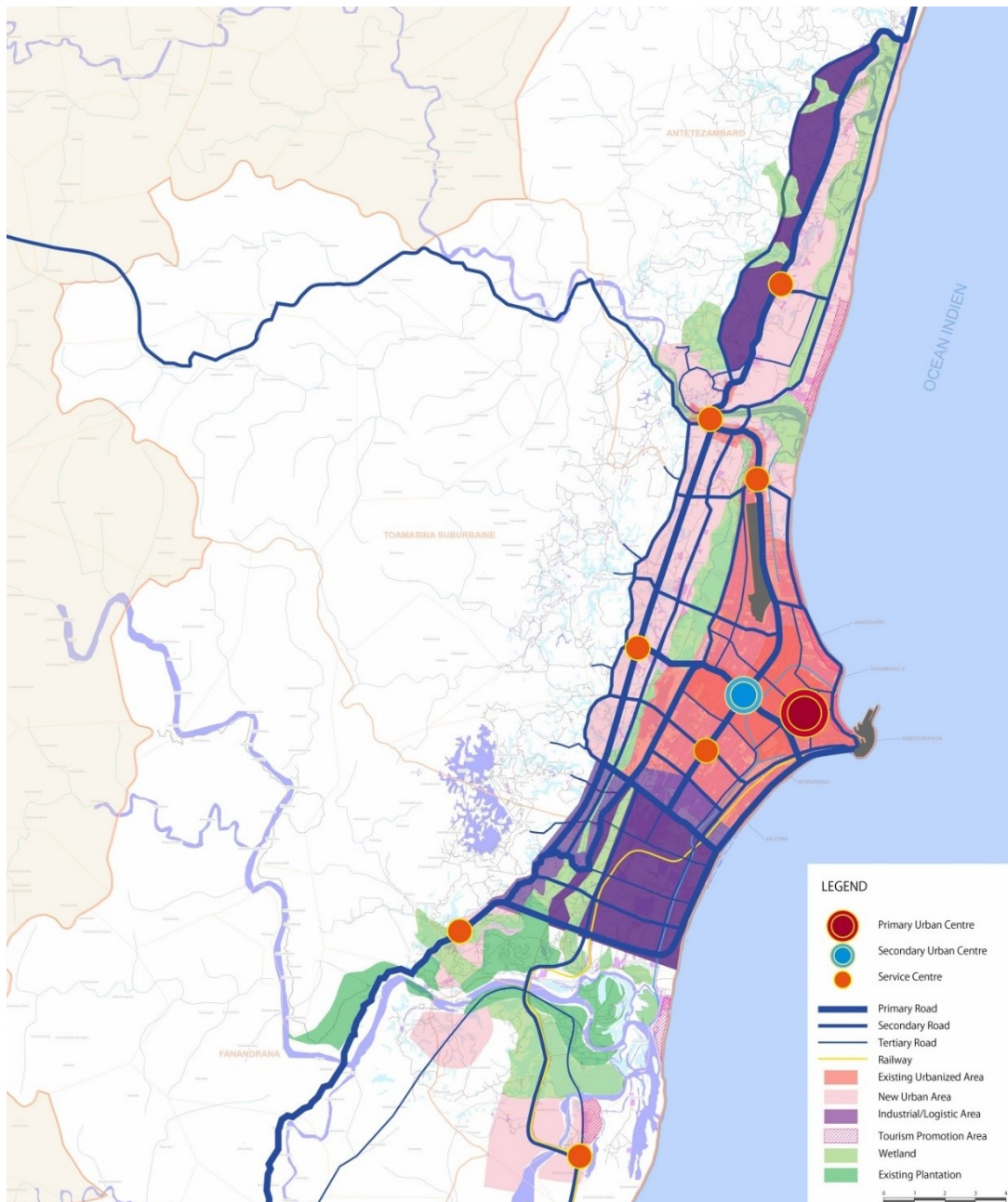
11.3 Future Urban Structure for Toamasina Agglomeration

11.3.1 Future Urban Structure for Toamasina Agglomeration

Source: JICA Study Team

Figure 11.1 illustrates the selected future urban structure for the Toamasina Agglomeration for 2038, five years beyond the target year of 2033. It reflects the above mentioned overall strategies for Toamasina Agglomeration.

The urban structure is composed by different types of urban centres, roads, and railway lines. It also shows general land use direction containing urbanised areas, wetlands, and industrial areas.



Source: JICA Study Team

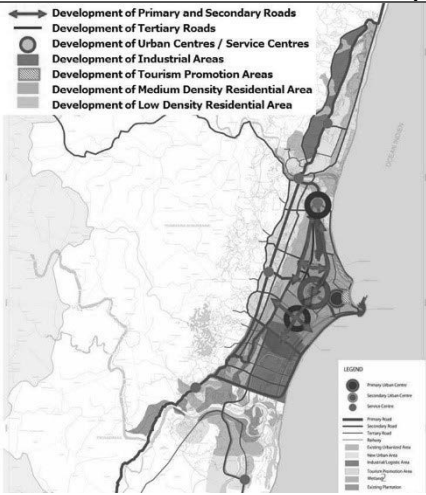
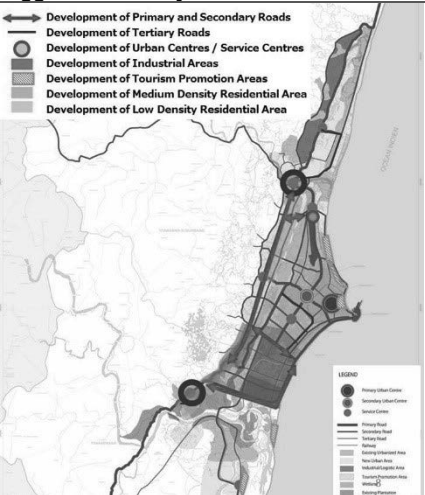
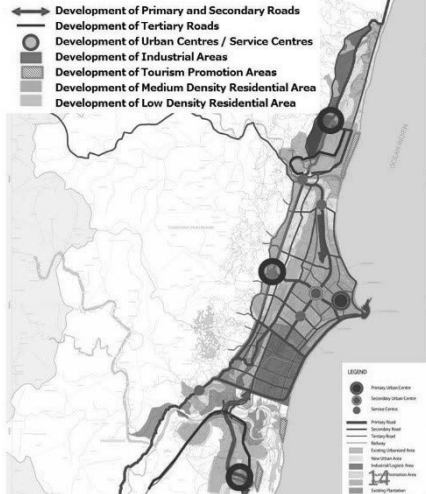
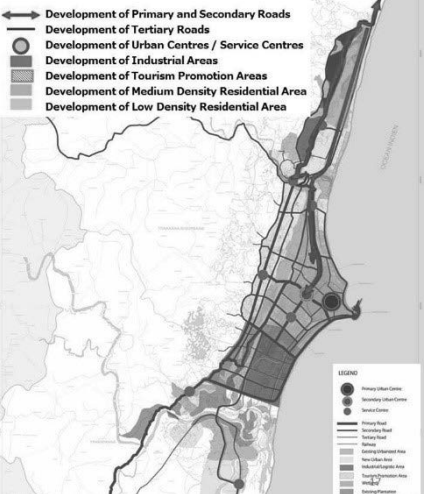
Figure 11.1 Future Urban Structure of Toamasina Agglomeration for 2038

The Future Urban Structure is composed of the following different elements:

- Primary Urban Centre
- Secondary Urban Centres
- Service Centres
- Port Access Roads
- Western Bypass Road
- Residential Areas
- Industrial Areas
- Hotel Zones
- Railway Line

11.3.2 Phased Urban Development for Toamasina Agglomeration

Table 11.1 Development of Toamasina Agglomeration by Phases

	
<ul style="list-style-type: none"> To attract investment in industries and tourism, “economic development zones” will be designated in Toamasina Agglomeration, and investments in these zones will be promoted by utilising existing infrastructure. To develop roads for enabling access to lands for housing development, as well as for development of economic sectors in Toamasina Agglomeration. These roads will not only promote the development of residential areas to accommodate increasing population, but also function as access roads to the port and industrial areas. To develop a new Secondary Urban Centre in Magarivotra to enhance commercial and business function of Toamasina Agglomeration. To make efforts to develop Service Centres in the outskirts of CUT for providing services to suburban areas, by taking advantage of prospective road construction. 	<ul style="list-style-type: none"> To construct the Third Access Road to Toamasina Port for strengthening the logistics, by taking advantage of Toamasina Port Expansion, which is to be completed by 2028. At the same time, along this road, industrial areas will be developed. To develop Volobe Hydropower Station II, by taking advantage of the new transmission line between Antananarivo and Toamasina which is to be constructed by 2021. The electricity generated by Volobe II will support the development of industries in the south of Toamasina Agglomeration, as well as in the agglomeration as a whole. To further attract investment in tourism, and to construct additional roads for accessing designated areas for tourism promotion outside CUT. To promote suburban development by improving the connectivity between CUT and outside CUT by constructing bypass roads, and developing service centres.
	
<ul style="list-style-type: none"> To develop industrial areas on the north side of the Ivoloïna River, by increasing the capacity of power supply and water supply. The construction of the new bypass road will also connect the industrial area in the north of Toamasina to National Road No.2. To develop Toamasina Agglomeration as an international tourism centre by attracting further investments to tourism investment promotion areas targeting international tourists. To promote suburban development further outside for the increasing population of Toamasina Agglomeration by improving the connectivity within Toamasina Agglomeration by constructing bypass roads, and developing service centres. 	<ul style="list-style-type: none"> To further develop industrial areas on the northern side of the Ivoloïna River, by constructing a new bridge over the Ivoloïna River and upgrading National Road No.5. To promote suburban development further to the north for the increasing population of Toamasina Agglomeration by improving the connectivity to CUT. To develop power and water supply infrastructure to provide services to new residential areas and industrial areas to be located on the northern side of the Ivoloïna River.

Source: JICA Study Team

Chapter 12 Toamasina Agglomeration: Land Use Policies and Land Use Zoning Plan

12.1 Land Use Policies by Land Use for Toamasina Agglomeration

(1) Policy on Residential Land Use

- At present, inside CUT, high-density and middle-density residential areas are concentrated. In the future, high and mid-density residential areas will be further expanded and the height of residential buildings will be increased.
- At present, outside CUT, low-density residential areas are widely spreading in Toamasina Suburban Commune and towards the fringe of other surrounding communes of CUT. In the future, outside CUT, the development of low-density residential areas, will be promoted along the north and south of CUT in the surrounding of urban sub-centres.

(2) Policy on Commercial Land Use

- At present, within CUT, commercial areas including office areas are mostly located in the centre of CUT, Ambodimanga. In the future, within CUT, commercial areas including office areas will be expanded along major roads, as well as in existing commercial centres, such as Ankirihiry. More height of commercial buildings will be allowed in commercial areas.
- At present, commercial areas outside CUT is limited. Small commercial accumulation can be found along NR2 and NR5. In the future, the commercial function of these existing commercial areas will be upgraded to be “Service Centres.” Service centres will be developed to accommodate not only commercial/office areas, but also other urban functions.

(3) Policy on Industrial Land Use

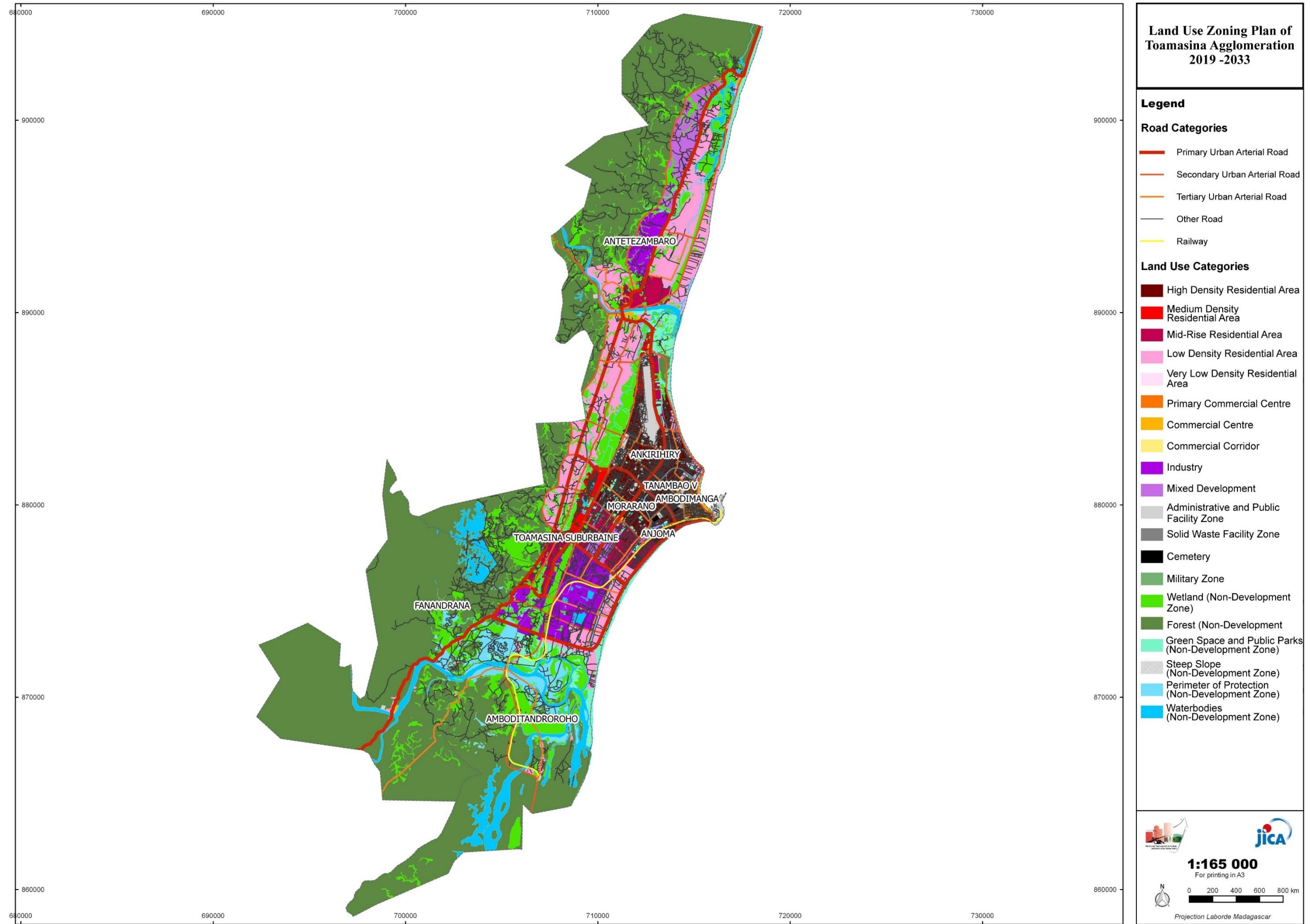
- At present, industrial areas are located in the southern area of CUT along the railway and in the southern area of Toamasina Suburban Commune. In CUT, urbanization is beginning to expand so as to surround those existing industrial areas. In the future, those existing industrial areas in CUT will be transformed to commercial/office and residential areas under a mixed land use category.
- In the future, industrial areas will be largely expanded in suburban areas in the south and north of Toamasina Agglomeration along the existing and new arterial road, which could have good connection to Toamasina Port.

(4) Policy on Conservation Areas (Non-Development Areas)

- The coastal area in CUT has risk of erosion. It is necessary to protect these areas from development. However, such areas are also potential tourism areas. In the future, it is necessary to limit certain development to protect the coastal area and also avoid effects from coastal erosion.
- There are still large areas with unspoiled environment outside CUT which has mangroves. In the future, only limited development for tourism promotion to certain extent will be allowed.

12.2 Land Use Zoning Plan for Toamasina Agglomeration

The land use zoning plan for Toamasina Agglomeration 2019-2033 is shown in Figure 12.1.



Source: JICA Study Team

Figure 12.1 Land Use Zoning Plan for Toamasina Agglomeration 2019-2033

Chapter 13 Toamasina Agglomeration: Action Areas and High Priority Projects

13.1 Introduction

It is possible to achieve effective urban development when different types of actions are combined in a timely manner. For example, residential area development requires not only land development in accordance with land use regulations, but also provision of access roads and power supply and water supply. At the same time, in a wider view, drainage capacity needs to be rehabilitated for reducing inundation impact. Moreover, recycling factories and final disposal sites are also to be developed for solid waste management. That is, integrated development is essential for realizing a better urban agglomeration. Such integrated urban development is necessary not only at the local level, but also at the agglomeration level.

In order to implement the Revised PUDi for Toamasina Agglomeration, an Action Plan is formulated by the following three sets of actions:

- Capacity Development for Communes in Utilization of Land Use Zoning Regulations in Toamasina Agglomeration,
- Action Areas to Promote Integrated Urban Development in Toamasina Agglomeration, and
- Priority Projects and High Priority Projects of Various Sectors in Toamasina Agglomeration.

13.2 Action Areas to Promote Integrated Urban Development in Toamasina Agglomeration

In order to promote integrated urban development described by the PUDi, it is necessary to take concerted actions at the local level, as well as at the agglomeration level.

In order to achieve the integrated urban development envisioned by the PUDi, the following different types of action areas are required:

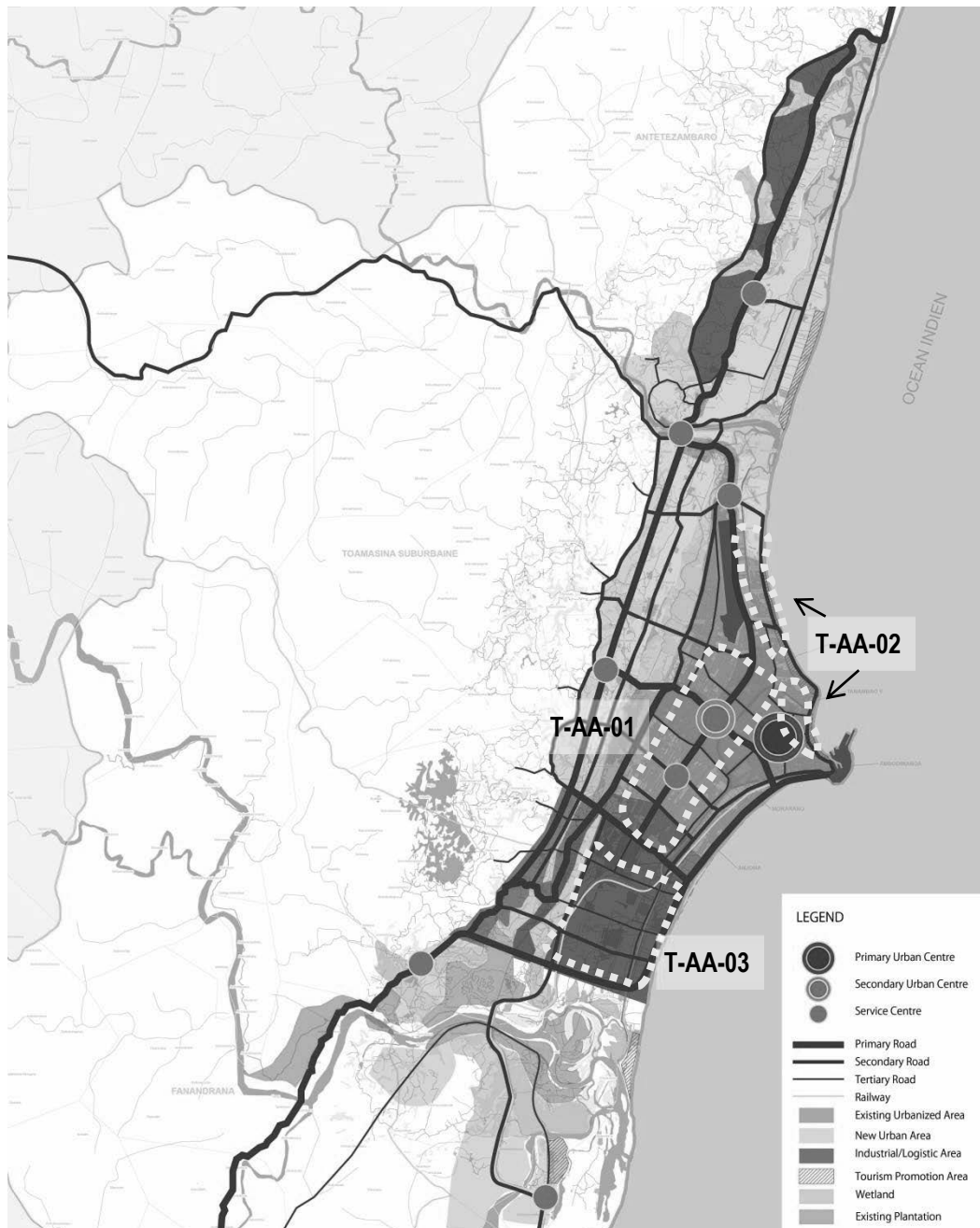
- Action Areas for Development of Urban Centres and their Surrounding Areas
- Action Areas for Development of Industrial Areas
- Action Areas for Development of Tourism Areas

Therefore, a variety of priority action areas are designated, as shown in Table 13.1 and Figure 13.1. For each priority action area, actions are described for promoting integrated development.

Table 13.1 Priority Action Areas for Toamasina Agglomeration

No.	Title of Action Area	Type of Action Areas
T-AA-01	Development of Tourism Zones along Toamasina Bay	Tourism Area
T-AA-02	Integrated Development of Ankirihiry-Mangarivotra Secondary Urban Centre, its Surrounding Residential Areas and Industrial Areas	Urban Centre
T-AA-03	Development of Industrial Areas in the South of Toamasina Agglomeration	Industrial Area

Source: JICA Study Team



Source: JICA Study Team

Figure 13.1 Location of Priority Action Areas for Integrated Development in Toamasina Agglomeration

13.3 High Priority Projects for Toamasina Agglomeration

Priority projects identified for Toamasina Agglomeration are listed in Table 13.2. The detail of each project can be found through Chapters 16 to 21 in the main text. Total budget necessary for implementing the high priority projects in Toamasina Agglomeration accounts for US\$ 421 million.

Table 13.2 Necessary Budget for Implementing High Priority Projects of Toamasina Agglomeration

Project No.	Project Name	Cost (million USD)	Organisation in charge
T-DC-01	Project for Capacity Development for Promotion and Coordination of Implementing the PUDI of Toamasina Agglomeration	1	MAHTP, MID
T-R-01	Project for Construction of Port Access Road for Construction for Toamasina Port Expansion	9	MAHTP
T-R-02	Project for Construction of Urban Arterial Road in Toamasina West	20	MAHTP
T-R-03	Project for Construction of Urban Arterial Roads in Toamasina South	40	MAHTP
T-R-04	Project for Widening of NR5 to 4-Lane Road between Toamasina Airport and the Junction of NR2 & NR5	20	MAHTP
T-B-01	Project for Construction of Bus Terminal in Toamasina Central	2	MTTM, PPP
T-B-02	Project for Establishment of Bus Terminal in Toamasina North	2	MTTM, PPP
T-B-03	Project for Establishment of Bust Terminal in Toamasina South	2	MTTM, PPP
T-C-01	Project for Promotion of Development of Toamasina Primary Urban Centre Phase 1	10	MAHTP, PPP
T-C-02	Project for Promotion of Development of Ankirihiry-Mangarivotra Secondary Urban Centre	5	MAHTP, PPP
T-C-03	Project for Promotion of Development of Toamasina South Service Centre	3	MAHTP, PPP
T-C-04	Project for Promotion of Development of Toamasina North Service Centre	2	MAHTP, PPP
T-I-01	Project for Designation of Industrial Development Zones and Investment Promotion for Industry in Toamasina Agglomeration Phase 1	1	MAHTP, MICE EDBM
T-T-01	Project for Toamasina (Miami) Sea Waterfront Development along the Toamasina Bay)	9	MAHTP, MTTM
T-T-02	Project for Designation of Tourism Development Zones and Investment Promotion for Tourism in Toamasina Agglomeration Phase 1	1	MAHTP, MTTM, EDBM
T-T-03	Project for Construction of Toamasina Canal Waterfront Promenade along Pangalanes Canal	4	MAHTP, CUT, PPP
T-E-01	Project for Construction of Second Toamasina Water Treatment Plant by In-Taking of Ivoloina River Water	68	JIRAMA
T-P-01	Project for Installation of Transmission Line between Antananarivo and Toamasina	80	JIRAMA
T-R-10	Project for Construction of Third Access Road to Toamasina Port	30	MAHTP
T-R-11	Project for Construction of Toamasina Western Bypass	35	MAHTP
T-I-02	Project for Promotion of Development of Industrial Areas in the South of Toamasina Agglomeration Phase 1	35	MAHTP, MICA, EDBM, PPP
T-I-03	Project for Designation of Industrial Development Zones and Investment Promotion for Industry in Toamasina Agglomeration Phase 2	1	MAHTP, MICA, EDBM
T-T-03	Project for Designation of Tourism Development Zones and Investment Promotion for Tourism in Toamasina Agglomeration Phase 2	1	MAHTP, PPP
T-E-02	Project for Construction of Water Treatment Plant by In-taking of Ivondro River Water	68	JIRAMA
T-P-02	Project for Volobe Hydropower Station II	-	JIRAMA, PPP
T-P-03	Project for Strengthening of Power Distribution Network to Toamasina Southern Industrial Area	1	JIRAMA
	TOTAL	431	

Source: JICA Study Team

Chapter 14 Common Land Use Zoning System for Madagascar

14.1 Land Use Zoning System for Madagascar's Urban Areas

14.1.1 Proposal of a Common Land Use Zoning System for Urban Areas in Madagascar

In CUA and CUT, construction permission has not been well utilized. This might be partly because the existing Land Use Zoning System is not easy to use, not only for applicants to prepare and submit construction permission applications, but also for Communes and MAHTP to check and issue construction permits.

In most PUDi, the description of land use zoning regulations is lengthy to read and difficult to understand. There are some differences in land use zoning regulations between one PUDi and another PUDi, although those differences are not so large and meaningful. If each PUDi always uses the same land use zoning system, it would be convenient for both applicants and communes.

Therefore, considering the land use zoning regulations which have been used for various PUDi, and also considering physical features of urban areas and social characteristics of urban communities in Madagascar, one land use zoning system was created as a Common Land Use Zoning System. It was used for formulating PUDi for Antananarivo Agglomeration and Toamasina Agglomeration.

14.1.2 Major Changes of Land Use Zoning System

Major changes proposed for creating the Common Land Use Zoning System is as follows:

(1) No Use of Extension Zone

In most cases, PUDi of Madagascar largely divide the planning area of PUDi into “developed zones” and “extension zones.” Different land use zoning categories are put to “developed zones” and “extension zones.”

However, in “developed zones,” reconstruction of existing buildings and construction of buildings in vacant lands could happen, and such construction also needs to comply with proper land use zoning regulations.

Therefore, it is necessary to apply the same land use zoning regulations for guiding both developed zones and extension zones.

(2) Allowing of Smaller “Minimum Lot Sizes”

It is considered that toward the future, land parcels available for many households are becoming smaller and smaller, especially in CUA and CUT. It is necessary to reduce “minimum lot sizes” as much as possible within the range where the residential environment does not deteriorate, so that many could construct houses and buildings in compliance with the official land use zoning regulations.

When many obtain construction permits for their houses and buildings in compliance with the land use zoning regulations, PUDi becomes able to guide many houses and buildings for the purpose of creating a better built environment in the city.

(3) Provision of Larger “Height Regulations”

In PUDi2004 for Antananarivo Agglomeration, G+2 for high-density residential areas, G+3 for suburban residential areas, and G+5 for special cases are usual height regulations. In PUDi2004 for Toamasina Agglomeration, G+3 for high-density residential areas, G+4 for suburban

residential areas. Like this, a larger height of buildings is not allowed. Moreover, the new urban planning and housing law limits the maximum building height (H) to the width (L) of the road where the building is located.

In the future, more 4-lane arterial roads will be constructed and urban centres will therefore be established. It is necessary to allow higher buildings for commercial use and apartment use than before.

It is recommended that the maximum building height should be 2 times higher than the road width where the building is located, especially in commercial use zones in Primary Urban Centre and Secondary Urban Centre.

(4) Detailed Categories for Residential Zones

Land use zoning regulations are a useful tool to guide land use and built environment of certain areas to desirable situation.

Three different types of density (height density, mid density, and low density) residential zones are set for the Common Land Use Zoning System. For each density type, two categories are set for guiding different features of built environment.

(5) Two Different Types of Commercial Zones

In the Common Land Use Zoning System, two different types of commercial zones are set. The first is “Commercial Corridor Zone.” The second is “Commercial Centre Zone.”

Commercial Corridor Zones are applied along 2-lane and 4-lane Urban Arterial Roads for accommodating large commercial buildings. The height of the buildings will be regulated by the road width, based on the Urban Planning and Housing Law 2015.

The Commercial Centre Zone has two different types of land use zone depending on characteristics of urban centres. The one is “Primary Commercial Centre Zone” to be applied to Primary Urban Centres and Secondary Urban Centres. The other is “Commercial Centre Zone” to be applied to Urban Sub-Centres and Suburban Centres.

14.2 Land Use Zoning Regulations

14.2.1 Land Use Zoning System

(1) Large Categories of Land Use Zones

The Common Land Use Zoning System is composed of the following land use zones:

- Residential Zone
- Commercial Zone
- Industrial Zone
- Facility Zone
- Non-Development Zone

For each land use zone, different detailed categories of land use zones are set for guiding land use and built environment toward better situation.

(2) Detailed Categories of Land Use Zones

For each detailed category of land use zones, the following features are specified for guiding land use and built environment:

- Minimum Lot Size
- Building Coverage Ratio (BCR)
- Building Height, and

- Permissible Use and Non-Permissible Uses

14.2.2 Minimum Lot Size, Building Coverage Ratio and Building Height Regulated by Land Use Zoning Categories for Development

(1) Residential Zones

Table 14.1 Detail of Categories for Residential Zone

Residential Zones	Minimum Lot Size, Building Coverage Ratio (BCR), Maximum Building Height	Major Features of the Zone and Remark for Application
Very Low-Density Residential	<ul style="list-style-type: none"> • Minimum Lot Size: 500 m² • BCR: 40% • Maximum Height: G+2 (10m) 	<ul style="list-style-type: none"> • Very low density and well developed residential areas • 500 m² of “minimum lot size” as specified in PUDI2004 is maintained for “Very Low-Density Residential Zone.”
Low-Density Residential	<ul style="list-style-type: none"> • Minimum Lot Size: 300 m² • BCR: 50% • Maximum Height: G+2 (10m) 	<ul style="list-style-type: none"> • Low density residential areas, which are mostly located in suburban areas • A smaller “minimum lot size” of 300 m² is applied for “Low-Density Residential Zone.”
Mid-Density Residential	<ul style="list-style-type: none"> • Minimum Lot Size: 150 m² • BCR: 50% • Maximum Height: G+3 (13m) 	<ul style="list-style-type: none"> • Mid-density residential areas, where middle-sized houses are located • 150 m² of “minimum lot size” is applied for “Mid-Density Residential Zone.”
Mid-Rise Residential	<ul style="list-style-type: none"> • Minimum Lot Size: 150 m² • BCR: 60% • Maximum Height: G+3 (13m) • Minimum Lot Size: 300 m² • BCR: 40% • Maximum Height: G+6 (23m) 	<ul style="list-style-type: none"> • Mid-density and mid-rise residential areas, where the construction of mid-rise residential buildings including apartments is promoted • “Mid-Rise Residential Zone” is set for enabling the construction of apartment buildings.
High-Density Residential	<ul style="list-style-type: none"> • Minimum Lot Size: 150 m² • BCR: 70% • Maximum Height: G+3 (13m) 	<ul style="list-style-type: none"> • High density residential areas, where small-sized buildings are densely located • “High-Density Residential Zones” are applied to areas that are of extremely high density. Most of these areas require project-based residential environmental improvement, for example, putting small walkways and drainage.

Source: JICA Study Team

(2) Commercial Zones

Table 14.2 Details of Categories for Commercial Zones

Commercial Zones	Minimum Lot Size, Building Coverage Ratio (BCR), Maximum Building Height	Major Features of the Zone and Remark for Application
Commercial Corridor	<ul style="list-style-type: none"> • Minimum Lot Size: 200 m² • BCR: 70% • Maximum Height: G+4 (16m) 	<ul style="list-style-type: none"> • Commercial corridors to be developed along Urban Arterial Roads • “Commercial Corridor Zones” are applied along 2-lane and 4-lane Urban Arterial Roads for accommodating large commercial buildings. Although the Commercial Corridor Zone stipulates that the maximum height of the buildings is G+6 or 23 m, the height of the buildings (H) will be regulated by the road width (L), based on the Urban Planning and Housing Law 2015.
	<ul style="list-style-type: none"> • Minimum Lot Size: 300 m² • BCR: 50% • Maximum Height: G+6 (23m) 	

Commercial Centre (before the requirement for urban centres is satisfied)	<ul style="list-style-type: none"> • Minimum Lot Size: 200 m² • BCR: 70% • Maximum Height: G+4 (16m) 	<ul style="list-style-type: none"> • Commercial areas to be developed in Urban Sub-Centres and Suburban Centres • Commercial Centre Zones are applied to Urban Sub-Centres and Suburban Centres. • The regulations of Commercial Centre Zones are fully applied when the requirement for urban centres is satisfied.
Commercial Centre	<ul style="list-style-type: none"> • Min. Lot Size: 200 m² • BCR: 70% • Maximum Height: G+4 (16m) • Minimum Lot Size: 300 m² • BCR: 50% • Maximum Height: G+6 (23m) 	
Primary Commercial Centre (before the requirement for urban centres is fulfilled) *	<ul style="list-style-type: none"> • Minimum Lot Size: 200 m² • BCR: 70% • Maximum Height: G+6 (23m) 	<ul style="list-style-type: none"> • Commercial areas to be developed in Primary Urban Centres and Secondary Urban Centres • Primary Commercial Centre Zones are applied to Primary Urban Centres and Secondary Urban Centres. • The regulations of Primary Commercial Centre Zones are fully applied when the requirement for urban centres is satisfied.
Primary Commercial Centre*	<ul style="list-style-type: none"> • Minimum Lot Size: 200 m² • BCR: 70% • Maximum Height: G+6 (23m) • Minimum Lot Size: 500 m² • BCR: 50% • Maximum Height: G+9 (33m) • * When Development Permission is obtained, Maximum Height : G+19 (66m) 	

Notes: The regulations of “Primary Commercial Area Zone” and “Commercial Area Zone” will be fully applied when necessary requirements for certain urban centres are fulfilled. Details of the requirements are described in Chapter 17 in the Main Text.

Source: JICA Study Team

(3) Industrial Zones

Table 14.3 Details of Categories for Industrial Zones

<u>Industrial Zones</u>	Minimum Lot Size, Building Coverage Ratio (BCR), Maximum Building Height	Major Features of the Zone and Remark for Zoning Application
Mixed Development	<ul style="list-style-type: none"> • Min. Lot: 700 m² • BCR: 50% • Max. Height: G+9 (33m) • When Development Permission is obtained, Maximum Height: G+19 (66m). 	<ul style="list-style-type: none"> • “Mixed Development Zone” is applied to existing industrial areas and industrial parks for accommodating commercial and office land use. • The application of “Mixed Development Zone” enables the transformation of existing industrial areas and industrial parks to mixed use areas of commercial-office buildings and industrial factories.
Industry	<ul style="list-style-type: none"> • Min. Lot: 900 m² • BCR: 50% • Max. Height: G+3 (13m) 	<ul style="list-style-type: none"> • Industrial Zones are new development areas for relatively large-scale industries. • The Industrial Zones are to be designated for dedicated use for industries.

Source: JICA Study Team

14.2.3 Facility Zones

Facility Zones have the following 4 categories of land use zones:

- Administrative and Public Facility Zone
- Solid Waste Facility Zone
- Cemetery
- Military Zone

In the Administrative and Public Facility Zones, the construction of facilities, such as administrative facilities, sports facilities, airport and ports, logistic facilities, educational facilities and municipal facilities, is allowed.

14.2.4 Non-Development Zones

In Non-Development Zones, there are the following seven categories of land use zones:

- Wetland
- Forest
- Green Space and Public Parks
- Steep Land (more than 20 degrees)
- Perimeter of Protection (Coastal Strips and Reserves along Rivers)
- Waterbodies

In these categories of Non-Development Zones, the construction of buildings is not allowed.

Since neither development nor buildings are allowed in Non-Development Zones, no Minimum Lot Sizes, no Building Coverage Ratios, no Building Heights and no Permissible Use and Non-Permissible Use are designated for Non-Development zones.

In the designated wetlands including paddy fields, no land filling is allowed and no construction of buildings are allowed.

14.2.5 Permissible Use and Non-Permissible Uses for Land Use Zones

Permissible use and non-permissible use are designated for each land use zone.

Chapter 15 TaToM Economic Axis: Present Situation and Challenges

15.1 Overview of TaToM Economic Axis

The TaToM Economic Axis, which is composed by NR2 and the railway connecting Antananarivo and Toamasina, is the most important transport axis in Madagascar. This transport axis not only plays the role of connecting the national capital city and the largest international port of Madagascar, but also an enormous role in the national spatial structure due to the locations of the two cities and the axis.

As shown in Figure 15.1, the capital city Antananarivo is located as the intersection of north-south national roads and east-west national roads. Located in the centre of the country, all cities in Madagascar are within 800 km from Antananarivo. Antananarivo is also connected to major cities of Madagascar, such as Toamasina, Toliara, Mahajanga, Atsiranana and Tolagnaro, and major tourist destinations, such as Nosy Be, Sainte-Marie and Morondava with flights. Other major cities, such as Antsirabe (170 km from Antananarivo), Fianarantsoa (405 km) and Moramanga (115 km) are accessible with national roads from Antananarivo.

NR4 connecting to northern parts of the country

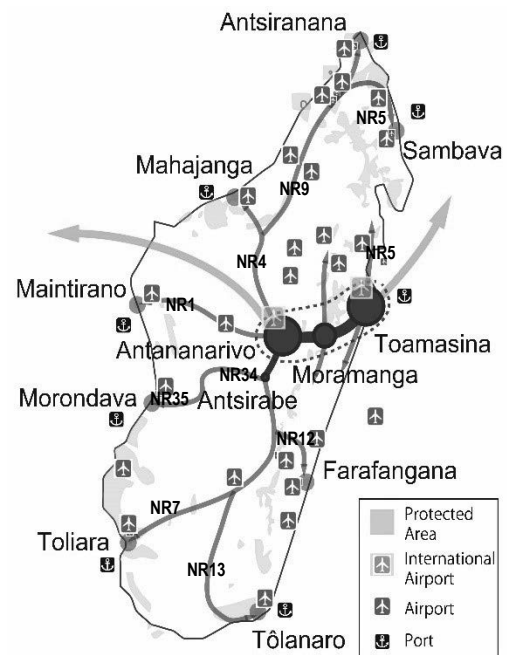
- Mahajanga
- Atsiranana via NR9
- Sambava via NR9 and NR5

NR1 connecting to western cities

- Maintirano

NR 7 connecting to southern parts of the country

- Antsirabe
- Toliara
- Tolanaro via NR13
- Manakara and Farangana via NR12 and/or NR 27
- Morondava via NR34/35



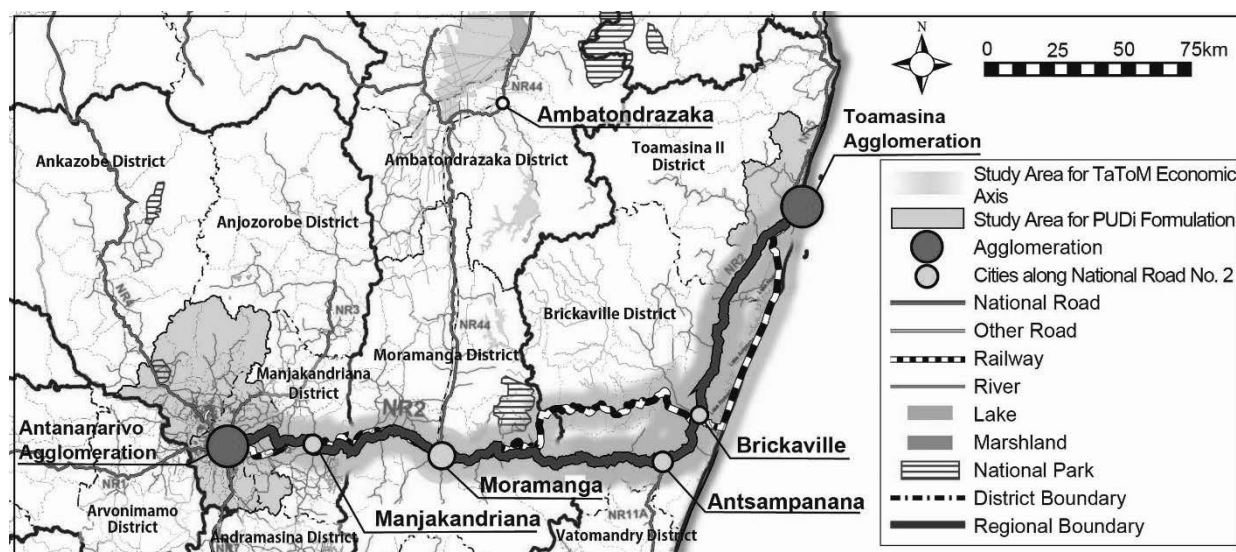
Source: JICA Study Team

Figure 15.1 Strategic Location of Antananarivo, Toamasina and TaToM Economic Axis in Madagascar

Most of imported goods arrive in Toamasina Port which is the largest sea port. They are transported to Antananarivo, and then distributed to the all over the country. In the opposite direction, goods which are produced in the country are transported to Toamasina Port via Antananarivo, and then exported. Other national roads connecting to rural areas are very weak. Those rural areas rely on the limited national road network.

The main international airport is Ivato Airport in Antananarivo Agglomeration, while Toamasina Airport also has international flight to Reunion.

There are five cities (urban commune and its surrounding urbanized areas) in TaToM Economic Axis, which are Antananarivo Agglomeration (including CUA and 37 surrounding communes), Manjakandriana, Moramanga, Brickville and Toamasina Agglomeration (including CUT and four surrounding communes).



Source: JICA Study Team

Figure 15.2 Strategic Location of Antananarivo, Toamasina and TaToM Economic Axis in Madagascar

15.2 Present Situation and Challenges of TaToM Economic Axis

15.2.1 Characteristics and Problems on Economic Sectors in TaToM Economic Axis

The Overall TaToM Area covering Analamanga, Atsinanana and Alaotora-Mangoro Regions generates approximately half of the national GDP. Most of this GRDP is generated in Antananarivo Agglomeration which contributes to approximately 80% of the GRDP generated in the Overall TaToM Area or otherwise 40% of GDP generated in Madagascar. Antananarivo Agglomeration has been the economic engine of the country. Therefore, although economic sectors in Antananarivo Agglomeration may have not been sufficiently developed to generate enough employment opportunities for the large number of population, compared with other areas of Madagascar, economic activities, job opportunities and workforce are concentrated in Antananarivo.

Toamasina Agglomeration, although much smaller compared to Antananarivo Agglomeration, contributes 3.7% of the GRDP generated in the Overall TaToM Area. The major economic activities in Toamasina Agglomeration besides Ambatovy are industries, such as agro-processing, textile, logistics and tourism.

The cities and villages in TaToM Economic Axis connecting these two agglomerations have locational advantage for economic development compared with other cities and villages in Madagascar. However, economic activities have not yet been facilitated and are limited. In some of the cities and villages, the main source of income for the residents are small business on trade and car repairing for road users of NR2.

In 2019, the government of Mauritius agreed to develop an industrial park for textile industry in Moramanga. However, at present, there is no skilled labour for such industry in Moramanga and it will be a challenge to attract necessary workforce to Moramanga, as well as to develop existing human resources of Moramanga.

There is also a plan to construct a new 4-lane motorway between Antananarivo and Toamasina. The planned route of this motorway goes towards west of Toamasina accessing Antananarivo from

north east. Therefore, it is important for the cities and villages along NR2 to develop various types of economic activities.

15.2.2 Characteristics and Problems on Transportation System along TaToM Economic Axis

Although NR2 and railway between Antananarivo and Toamasina composed an essential transport corridor for Madagascar, the traffic volume of NR2 was limited to around 1,700 vehicles per day (2018) and the cargo volume of the railway was around 96,000 tonne per year (2017).

Antananarivo and Toamasina has approximately 1,400m difference of elevation. NR2 has to go through mountainous areas. Therefore, NR2's horizontal and vertical alignments are so bad that it is very costly to improve the horizontal and vertical alignments for the purpose of increasing transport volume and travel speed on NR2.

The railway for cargo runs between Antananarivo and Toamasina, transporting mainly fuel. However, the passenger train only runs between Moramanga and Toamasina once or twice a week. The railway infrastructure has been degraded due to heavy rainfall and shortage of maintenance and rehabilitation budgets. It is also necessary to improve the alignment partly to ensure its sufficient functioning.

For the economic development of Madagascar, it is important for Antananarivo Agglomeration and Toamasina Agglomeration to promote economic sectors development. However, the current transportation system of TaToM Economic Axis does not have sufficient safety to support the two economic hubs. Furthermore, the capacity of the transportation system will not be sufficient to satisfy the future demand of Antananarivo Agglomeration.

Chapter 16 TaToM Economic Axis: Future Vision, Growth Scenario and Socio-Economic Framework

16.1 Future Vision for TaToM Economic Axis

A vision statement expressing aspiration for TaToM Economic Axis in 2033 is proposed below.

[Future Vision for TaToM Economic Axis]

Economic Sectors Development for Antananarivo and Toamasina Agglomeration by Strengthening of the Connectivity between Antananarivo and Toamasina

“TaToM Economic Axis will continue to be the most important national transport axis for Madagascar because its connectivity between Antananarivo and Toamasina through NR2 and railway would be the basis for sustainable development of economic sectors of both Antananarivo Agglomeration and Toamasina Agglomeration. Since the two agglomerations are expected to grow their economic sectors, the importance of the transport function of TaToM Economic Axis will become much larger than that at present.”

Economic Sectors Development for Other Regions by Strengthening of the Connectivity with Other Regions

“The improved transport system between Antananarivo and Toamasina would contribute to the enhancement of the connectivity between Antananarivo and other regions and the connectivity between Toamasina Port and other regions within Madagascar. This could support the development of economic sectors of other regions.”

Development of Economic Sectors along the TaToM Economic Axis

“Based on an upgraded connectivity through the TaToM Economic Axis, urban and rural economies of Moramanga, Brickaville, Manjakandriana and Antsampenana will flourish not only by expansion of trade and vehicle repairing services for passengers and cargo trucks, but also by investment to economic sectors taking advantage of proximity to Toamasina Port.”

16.2 Growth Scenario for TaToM Economic Axis

Along with the rapid population growth of the entire Madagascar, the influx of migration to Antananarivo Agglomeration has been continued, due to its relatively good conditions of the economy and infrastructure. This trend is expected to continue in the future.

In order to continuously create employment opportunities for the increasing population in the agglomeration and to revitalize the urban economy, Antananarivo Agglomeration needs new export-oriented industries which can lead not only its own urban economy, but also Madagascar’s national economy. The export-oriented industry should target the growing regional markets of recently developing “Free Trade Areas” in African and the Indian Ocean countries. Madagascar is a member country of SADC, COMESA and IORA, as well as AfCFTA.

In the more than last two decades, low-cost manufacturing has been dominated by countries endowed with a low-wage and hard-working labour force, such as China, South-east Asia and South Asian countries. However, low-cost manufacturing companies are looking for countries suitable for their locations in the next China because of the increase in their wage levels. Madagascar is a good candidate for such low-cost manufacturing industries.

Both Antananarivo Agglomeration and Toamasina Agglomeration have developmental potentialities as the location of such industries. However, these two agglomerations have the following different characteristics in terms of industrial location:

- Toamasina Agglomeration has a higher advantage than Antananarivo Agglomeration as the industry location from the aspects of the proximity and connectivity to the regional markets, because Antananarivo is 350 km away from the Port of Toamasina and the transportation capacities (volume, speed, cost, safety and resilience of transportation for passengers and cargo) of National Road No. 2 and the existing railway are limited.
- A cheap and abundant labour force is already available and infrastructure is relatively developed in Antananarivo Agglomeration.

By responding to these different characteristics of the two agglomerations, selected growth scenario will make the following two different efforts at developing the transportation system of TaToM Economic Axis for the economic development of two agglomeration:

- Upgrade the cargo transport volume for the development of economic sectors of Antananarivo Agglomeration
- Increase the speed of transport for the development of economic sectors of Toamasina Agglomeration

For the development of each agglomeration, the development of a transportation system for TaToM Economic Axis is essential. However, the cost of the necessary measures to develop the transportation system of TaToM Economic Axis is not cheap. Therefore, it is important that each measure brings benefit to not only one agglomeration but to both agglomerations for sustainable development of the TaToM Economic Axis.

This growth scenario aims to develop the economic sectors in both Antananarivo and Toamasina Agglomeration, it will enhance the development of the transportation system of TaToM Economic Axis.

16.3 Future Socio-Economic Framework for TaToM Economic Axis

16.3.1 Population Framework for TaToM Economic Axis

The population framework for TaToM Economic Axis for 2033 is set based on the following factors:

- Past trend of population growth in each district between 1993 and 2018
- Selected growth scenario in Section 16.2

Table 16.1 shows the future population framework for TaToM Economic Axis by short, medium and long term.

Table 16.1 Future Population Framework for TaToM Economic Axis

Districts	Population				Population Growth Rate		
	2018	2023	2028	2033	2018-23	2023-28	2028-33
Brickaville	212,572	233,553	253,040	271,484	1.90%	1.62%	1.42%
Moramanga	352,874	405,284	470,187	549,464	2.81%	3.02%	3.17%
Ambatondrazaka	359,614	404,333	448,296	492,203	2.37%	2.09%	1.89%
Manjakandriana	220,079	231,026	239,149	245,147	0.98%	0.69%	0.50%
Anjozorobe	225,792	254,624	283,149	311,805	2.43%	2.15%	1.95%
TaToM Economic Axis	1,370,931	1,528,820	1,693,821	1,870,103	2.20%	2.07%	2.00%
Antananarivo Agglomeration	2,558,245	3,022,647	3,547,471	4,151,467	3.39%	3.25%	3.19%
Toamasina Agglomeration	437,004	520,991	626,861	762,839	3.58%	3.77%	4.01%
Overall TaToM Area	4,366,180	5,072,458	5,868,153	6,784,409	3.04%	2.96%	2.94%
Madagascar	25,734,342	29,545,200	33,547,418	37,829,461	2.80%	2.57%	2.43%

Source: JICA Study Team

16.3.2 Economic Framework for TaToM Economic Axis

The indicators of the economic growth are shown in Table 16.2. The indicators are mainly based on the growth rates of GDP by National Development Plan (PND), INSTAT statistics (Tableau de Bord Économique, Avril 2017), and sectors' plans.

It is assumed that GRDP of Overall TaToM Area is the total amount of GRDP of the three regions (Analamanga, Atsinanana and Alaotra-Mangoro) in Project TaToM.

Table 16.2 Real Growth Rates of GRDP of the Overall TaToM Area as Indicators of Economic Framework

Country / Regions	2016-2023	2024-2028	2029-2033
Madagascar	5.6	7.7	7.9
The Overall TaToM Area	6.8	8.5	9.5
Analamanga	6.9	8.6	9.5
Atsinanana	6.1	8.2	9.5
Alaotra-Mangoro	5.6	7.6	8.7

Source: JICA Study Team

Table 16.3 illustrates the change of share of economic sector and growth rates by economic sector.

Table 16.3 Future Economic Framework for the Overall TaToM Area

(a) Change of Share of Economic Sector

	GRDP (MGA Billion, at 2007 constant prices)	GDP (USD Million, at 2010 constant prices)	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)
2014 (Actual)	8,154	5,018	6.5	19.8	73.7
2023 (Projected)	14,503	8,925	5.1	19.4	75.4
2028 (Projected)	21,812	13,423	4.6	20.1	75.3
2033 (Projected)	34,308	21,113	3.9	21.0	75.1

(b) Growth Rates by Economic Sector

	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)	Total (%)
2016-2023 (Projected)	4.5	6.2	7.1	6.8
2024-2028 (Projected)	6.0	9.3	8.5	8.5
2029-2033 (Projected)	6.0	10.5	9.4	9.5

Source: JICA Study Team

17.2 Future Traffic Volume on National Road No. 2

The daily average traffic volume between Mangora and Moramanda on NR2 in 2033 was estimated based on the future total traffic demand in consideration of mode shares. As a result, the daily traffic volume in 2033 is estimated at 6,240 vehicles/day. As for two-wheeled vehicles and others, the average daily traffic volume in 2033 will be at around 300 vehicles.

Table 17.1 Future Traffic Volumes between Mangora and Moramanda in 2033

Vehicle Type	Daily Traffic Volume 2033	Share
Passenger car	1,830	29%
Bus (Taxi Brousse, etc.)	730	12%
Large Truck	3,680	59%
Total	6,240	100%

Source: JICA Study Team

17.3 Overall Issues of Transportation System of TaToM Economic Axis

The overall issues on the development of TaToM Economic Axis are identified considering the current condition of the economic sectors of Antananarivo Agglomeration, Toamasina Agglomeration, and TaToM Economic Axis. These are as follows:

- Insufficient safety is observable in the transport system between Antananarivo and Toamasina.
- Insufficient resilience is evident in the transport system between Antananarivo and Toamasina.
- Insufficient transport capacity is observable in the transport system between Antananarivo and Toamasina.
- Insufficient transport speed impedes travel between Antananarivo and Toamasina

As a result, the development of economic sectors in the TaToM Economic Axis will face the following challenges:

- Further development of economic sectors in Antananarivo Agglomeration could not be possible.
- Promotion of economic sectors in Toamasina Agglomeration would be difficult.
- Promotion of economic sectors in the economic axis between Antananarivo and Toamasina would be a challenge.

17.4 Growth Scenario for Transport System of TaToM Economic Axis

In the selected growth Scenario, the improvement of the transportation function of TaToM Economic Axis is required for promoting industrial development in both Antananarivo Agglomeration and Toamasina Agglomeration. Therefore, the upgrading of both passenger cars' speed and cargo volume is required. However, due to limited financial resources, the installation of climbing lanes on the priority sections between Antananarivo and Brickaville, and the rehabilitation of railway infrastructure should be prioritized. The development of the motorway between Antananarivo and Toamasina will come in Phase 3.

1) Phase 1 (2019-2023)

A safe and resilient connectivity between Antananarivo and Toamasina is ensured through installation of safety devices and implementation of work for resilience on NR2.

2) Phase 2 (2024-2028)

Passenger cars' higher speed is ensured through the construction of climbing lanes on the prioritized sections of NR2 between Antananarivo and Moramanga. This construction work will start in the middle of Phase 1, and continue throughout Phase 2.

passenger transport between Toamasina and Antananarivo Agglomerations.

- In order to develop economic sectors in Toamasina Agglomeration, it is imperative to improve passenger transport between Toamasina and Antananarivo Agglomerations considering, firstly, safety and resilience; secondly, travel speed; and thirdly, transport capacity in the TaToM Economic Axis.

3) Expectations from Economic Sectors of TaToM Economic Axis, Especially Moramanga

- It is necessary to strengthen the transport capacity for basic materials (e.g., fuel, industrial raw materials, and intermediate goods) from Toamasina Port to Moramanga.
- It is imperative to create a conducive environment to attract investments to economic sectors in Moramanga by improving passenger transport between Moramanga and Antananarivo Agglomeration.

17.5.2 Strategies for Phased Development of Transportation System of TaToM Economic Axis

Strategies for National Road No.2 (NR2) development considering the selected scenario are described by phases in Table 17.2.

Table 17.2 Strategies for Phased Development of TaToM Economic Axis

Phase	Development Strategies	
Phase 1: 2019~2023	By taking measures to substantially improve transport safety of trucks traveling on NR2, the night hours in which they can be driven safely between Toamasina and Antananarivo will be extended, and their gross transport time (including the night resting time) will be reduced. Although these transport safety measures cannot reduce the net travel time required for passenger cars and taxis-brousses, they can be driven more safely.	
Phase 2: 2024~2028	NR2 will be improved by taking measures to increase its resilience to natural disasters so that the reliability of road transport will also increase. Climbing lanes will be constructed on steep slopes of NR2. Since it is difficult to improve vertical and horizontal alignments of the road, the net travel speed of large trucks will not be reduced. However, by adding climbing lanes to steep road sections, cars and taxi-brousses can overtake large trucks. As a result, the speed of passenger transport can be improved.	
Phase 3: 2029~2033	NR2 will be upgraded so that passenger cars and taxi brousses can travel between Toamasina and Antananarivo Agglomerations in 6.5 hours in any weather condition. NR2 will be upgraded so that trucks can travel between Toamasina and Antananarivo in 10 hours in any weather condition. If construction of a motorway between Toamasina and NR44 is completed, it will allow passenger cars and taxi-brousses to travel between Toamasina and Antananarivo Agglomerations in 5.5 hours and trucks in 8.5 hours.	
Phase 4: 2034~2038	Depending on the situation of fundraising and degree of economic sector development in Toamasina and Antananarivo Agglomerations, a motorway between Toamasina and Antananarivo will be fully developed to allow passenger cars, taxi-brousses, large buses, and trucks to travel between the Agglomerations in 3 to 3.5 hours.	



Source: JICA Study Team

Chapter 18 TaToM Economic Axis: Development Strategies for Moramanga Urban Area

18.1 SWOT Analysis of Moramanga Urban Area

SWOT analyses for Moramanga Urban Area was conducted in order to see the possibilities to attract investments to economic sectors and to manage the development of economic sectors as shown in Table 18.1.

Table 18.1 SWOT Analysis of Moramanga Urban Area

Strengths	Weaknesses
<ul style="list-style-type: none"> Moramanga area has tree plantations and natural forests for timber production. Ambatovy mining site of nickel and cobalt is located near Moramanga. Moramanga is a junction between NR2 and NR44. NR44 connects with Alaotra Lake Area, which is a good rice-producing area. Moramanga is accessible to Toamasina Port by both road and rail. The climate of Moramanga is mild and more comfortable compared to Toamasina 	<ul style="list-style-type: none"> The condition of economic infrastructure (such as those for power supply, water supply and access roads) is poor. As a result, it is difficult to attract investments to economic sectors. Development of the economic sectors is not well promoted. With an economically active population of less than 200 thousand existing in Moramanga District, there are not enough workforces, nor have most people received any training to work in the manufacturing industries. Therefore, it is necessary for Moramanga to accommodate an influx of migrant people with training and skills, while it is also important train local people for incoming industries. The two-lane NR2 currently functions as a major urban road for the residents. However, many heavy vehicles use the same road to travel between Antananarivo and Toamasina, disturbing the city function.
Opportunities	Threats
<ul style="list-style-type: none"> Moramanga has good access with some of the major tourist destinations in Madagascar, such as Andasibe and Alaotra Lake, which are accessible from Moramanga by both rail and road. The Mauritius Government has agreed to develop a Textile Industrial Park in Moramanga, which can benefit the local people. Private Chinese companies also have a plan to develop an industrial park in Moramanga. These possibilities of development by economic sectors in Moramanga will be enhanced by the prospective expansion of Toamasina Port. There is a large area in the north of Moramanga where potential of agriculture production in various crops is not yet fully exploited. A new power substation will be constructed in Moramanga so as to connect a power transmission line between Antananarivo and Toamasina. Then the increased power supply will be available in Moramanga. Because of the relative proximity to Toamasina Port and the availability of improved power, Moramanga will be able to attract investments to its economic sectors. 	<ul style="list-style-type: none"> There is a possibility that more funds for infrastructure development will be used intensively for Antananarivo Agglomeration and Toamasina Agglomeration, and not for Moramanga, partly because of development policies, and partly because of Madagascar's limited financial budgets for development.

Source: JICA Study Team

18.2 Future Vision for Moramanga Urban Area

A future vision for Moramanga in 2033 is set as follows:

Statement of Future Vision

Based on its function to be enhanced as a major urban centre and its strategic location between Antananarivo and Toamasina, Moramanga will be an industrial and tourist city endowed with rich nature and mountainous landscape.

18.3 Population Framework for Moramanga Urban Area

Table 18.2 shows the future population framework of Moramanga Urban Area consisting of Moramanga Urban Commune and Ambohibary Rural Commune, for the short, medium and long terms. The population framework is prepared based on past trend of population growth in each

commune, as well as taking in consideration of the planned development related to Textile Industrial Park in Ambohibary Rural Commune.

Table 18.2 Future Population Framework for Moramanga Urban Area

	Population				Average Annual Growth Rate of Population		
	2018	2023	2028	2033	2018-23	2023-28	2028-33
Moramanga Urban Commune	58,753	72,693	90,092	111,731	4.35%	4.39%	4.40%
Ambohibary Rural Commune	40,800	50,096	62,562	79,010	4.19%	4.54%	4.78%
Moramanga Urban Area	99,553	122,789	152,654	190,741	4.28%	4.45%	4.56%
Urban Areas Outside Moramanga	253,321	282,495	317,533	358,723	2.20%	2.37%	2.47%
Moramanga District	352,874	405,284	470,187	549,464	2.81%	3.02%	3.17%

Source: JICA Study Team

18.4 Development Scenario for Moramanga Urban Area

Development efforts at economic sectors for Moramanga will take advantage of NR2 to be upgraded and railway to be rehabilitated for the purpose of economic sectors development in both Antananarivo Agglomeration and Toamasina Agglomeration.

Target economic sectors for Moramanga includes textile and agro-processing industries to be newly developed, as well as wood industry and tourism industry existing in Moramanga and its surrounding areas.

1) Phase 1: 2019-2023

Existing industries such as the wood industry, which has been one of the major economic activities in Moramanga as well as tourism industry utilising the existing railway to Andasibe will be promoted. The first phase of the construction work for Moramanga Industrial Park in Fokontany Ampitambe is planned to start by 2020. To prepare for the operation of the industrial park, human resources of the local personnel should be developed. Moramanga will also be connected with national grid by 2022 and will be able to not only provide power supply for industry but also for improving the living standard of the residents in Moramanga Urban Area. In addition, the construction of Moramanga Bypass will not only benefit the through traffic of Moramanga but also improve the urban mobility and safety in Moramanga.

2) Phase 2: 2024-2028

The operation of Moramanga Industrial Park will start in 2025, while the construction of Phase 2 will continue. Textile industries will be promoted in Moramanga. For local SMEs to benefit from the industrial park, a linkage between textile companies in the industrial park and local SMEs should be promoted.

3) Phase 3: 2029-2033

Agro-processing industries will be promoted as new industries. Development of Moramanga Industrial Park is planned to be completed by 2035.

Table 18.3 Phased Development Scenario for Economic Sectors of Moramanga Urban Area

Phase	Phased Development of Moramanga's Economic Sector	Infrastructures to be Implemented for Economic Sectors
Phase 1 (2019-2023)	<ul style="list-style-type: none"> Human Resources Development of Local Personnel for Tourism, Wood and Textile Industries Tourist Promotion for Moramanga by taking advantage of Mantadia National Park and by operating Tourism Railway connecting Moramanga and Andasibe Reviving of Tree Plantations and Wood Processing Industries 	<p><u>Projects to be Completed</u></p> <ul style="list-style-type: none"> Development of Hotels for Business and Tourism in Moramanga Urban Area Rehabilitation of Railway Section between Moramanga and Andasibe New Substation in Moramanga Transmission Line between Antananarivo and Toamasina via Moramanga <p><u>Projects Under Construction</u></p> <ul style="list-style-type: none"> Moramanga Bypass Road Moramanga Industrial Park (Textile City in

		Moramanga)
Phase 2 (2024-2028)	<ul style="list-style-type: none"> Continuation of Tourism Development Continuation of Tree Plantations and Wood Industries Promotion of Investment to Textile Industries in Moramanga Industrial Park Promotion of Linkage between Textile Companies and Local SMEs/ Local Personnel 	<p><u>Projects Under Construction</u></p> <ul style="list-style-type: none"> Expansion of Moramanga Industrial Park (Textile City in Moramanga)
Phase 3 (2029-2033)	<ul style="list-style-type: none"> Continuation of Tourism Development Continuation of Tree Plantations and Wood Industries Promotion of Textile Industries in Moramanga Industrial Park Promotion of Agro-processing Industries in Moramanga Industrial Park Promotion of Linkage between Textile Companies and Local SMEs/ Local Personnel 	<p><u>Projects Under Construction</u></p> <ul style="list-style-type: none"> Expansion of Moramanga Industrial Park (Textile City in Moramanga)

Source: JICA Study Team

18.5 Strategies for Supporting the Development of Economic Sectors in Moramanga Urban Area

The strategies for the development of economic sector in Moramanga are as follows:

(1) Manufacturing and its Related Service Sector

- To prepare necessary water and electricity for manufacturing development
- To prepare necessary social infrastructure for the future increasing population
- To develop bypass road which will shorten the travel time not only between Antananarivo and Toamasina, but also between the industrial areas of Moramanga and both Antananarivo and Toamasina
- To support Technical and Vocational Education and Training (TVET) institutes for providing opportunities to the residents of Moramanga to work as skilled labour force
- To promote linkage between large-scale incoming investment projects and local industries by creating company database of local SMEs and by matching both of these

(2) Agriculture and Agro-processing Sector

- To intensify supervisory and support action for agriculture and agro-processing
- To promote and revitalize farmers organizations
- To promote linkage with existing research and training centers for agriculture and forestry in the region
- To promote major agriculture sector programmes (CASEF, PROSPERE, DEFIS, etc.) to be extended to the region
- To enhance the function as a logistics hub for rice and agriproducts distribution

(3) Tourism Sector

- To develop and upgrade necessary accommodations for tourists and visitors for research and training in Moramanga Urban Area
- To promote linkage between the tourism industry and local providers of food, linen, transportation and other services in Moramanga Urban Area
- To collaborate with reforestation and forest conservation activities by forestry and mining industries (FANALAMANGA and Ambatovy) in promotion of ecotourism in Andasibe and Aloatra Lake.

Chapter 19 TaToM Economic Axis: High Priority Projects

High priority projects identified for TaToM Economic Axis are listed in Table 19.1. The detail of each project can be found through Chapters 25 to 26 in the main text. Total budget necessary for implementing the high priority projects in TaToM Economic Axis accounts for US\$ 443.5 million.

Table 19.1 High Priority Projects of TaToM Economic Axis

Project No.	Project Name	Cost (million USD)	Organisation in Charge
E-DC-01	Capacity Development for Commune Officers along TaToM Economic Axis for Promoting TaToM Development Strategies	1.5	MAHTP, MID
E-R-01	Project on Replacement of Two Bridges along National Road No. 2	30	MAHTP
E-R-02	Project for Improvement of Traffic Safety on National Road No. 2	20	MAHTP
E-R-04	Project for Construction of Climbing Lane in Steep Slope Sections between Moramanga and Brickaville on National Road No.2	200	MAHTP
E-R-05	Project for Construction of Climbing Lane in Steep Slope Sections between Antananarivo and Moramanga of National Road No.2	75	MAHTP
E-R-06	Project for Construction of Moramanga Bypass Road	20	MAHTP, PPP
E-F-01	Project for Rehabilitation of Antananarivo - Toamasina Railway	105	MAHTP, PPP
	TOTAL	443.5	

Source: JICA Study Team

Chapter 20 Implementation Framework for TaToM

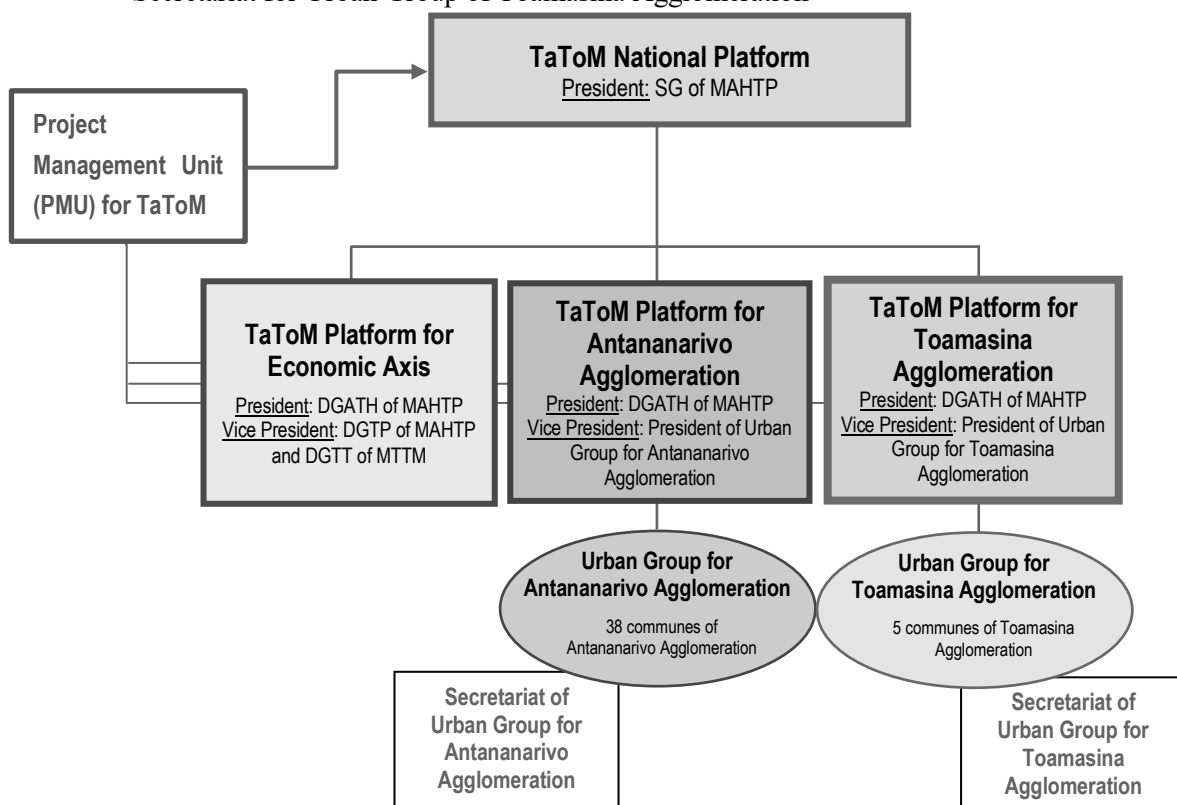
An implementation framework for TaToM is proposed as presented in Figure 20.1, based on the framework for formulating the plans under Project TaToM. The National Steering Committee and the three Local Steering Committees for the planning phase should be transformed into TaToM National Platform and three TaToM Platforms for each plan. The general design of the implementation framework for TaToM presented in Figure 20.1 is accepted by MAHTP.

This recommended implementation framework of TaToM has the following characteristics:

- Multi-sectoral coordination is possible.
- Participation of communes is strong.
- Knowledge and information obtained through the Project for formulating plans for TaToM can be utilised at the stage of implementation of TaToM.
- Promotion of integrated development is possible.

In order to make the implementation framework operational and effective, the following elements are to be added to the four platforms:

- Project Management Unit (PMU) for TaToM
- Secretariat for Urban Group of Antananarivo Agglomeration
- Secretariat for Urban Group of Toamasina Agglomeration



Source: JICA Study Team

Figure 20.1 Implementation Framework for TaToM

The responsibilities of the elements composing the Implementing Framework for TaToM are as below.

1) TaToM National Platform

TaToM National Platform has the following roles and responsibilities:

- To make decision makings on mobilization of financial resources in implementation of projects of the three components
- To make decision makings on major strategies in integrated development for TaToM
- To make decision makings on priorities in implementation of projects of the three components of TaToM
- To make decision makings on modification of land use zoning plans of Antananarivo Agglomeration and Toamasina Agglomeration
- To promote coordination among the three components of TaToM
- To monitor situation of implementation of projects of the three components of TaToM by receiving regular and non-regular reports from TaToM Local Platforms

2) TaToM Local Platforms

TaToM Local Platform for Antananarivo Agglomeration, TaToM Local Platform for Toamasina Agglomeration and TaToM Local Platform for Economic Axis have the following roles and responsibilities:

- To monitor activities related to each component of TaToM
- To coordinate with related ministries and agencies for implementation of priority projects
- To promote the implementation of priority projects
- To report results of discussions at TaToM Local Platforms to TaToM National Platform

3) Project Management Unit for TaToM

A Project Management Unit (PMU) should be established for the implementation of development plans of TaToM.

Under the supervision of MAHTP in coordination with MTTM, the PMU will be responsible for the coordination and promotion of implementation of land use zoning plans and priority projects of PUDi. The PMU will not directly implement the priority projects. However, different ministries and agencies will be responsible for implementing actual priority projects under the technical assistance of the PMU.

The PMU will provide technical assistance to the secretariats for urban groups to support implementation of the projects by communes. The projects and programmes for the Economic Axis will be directly implemented by the PMU or relevant ministries.

The preparation for the establishment of the PMU should be started before the completion of TaToM Master Planning Study. The implementation mechanism and basic design of the PMU (such as organisational structure, budget, and staff) need to be approved by the Steering Committees and the Urban Groups.

4) Secretariat for Urban Group for Antananarivo Agglomeration

With the support of MAHTP, the urban group of Antananarivo Agglomeration should form a secretariat for promotion and coordination of implementation of PUDi and priority projects. The Urban Agency for Antananarivo Agglomeration, which has been established by MAHTP and communes with assistance of AFD, could play a role of the Secretariat for Urban Group for Antananarivo Agglomeration.

5) Secretariat for Urban Group for Toamasina Agglomeration

With the support of MAHTP, the urban group of Toamasina Agglomeration should form a secretariat for promotion and coordination of implementation of PUDi and priority projects. At the moment, no Secretariat for Urban Group for Toamasina Agglomeration has been established yet. However, MAHTP is interested in creating a Secretariat for Urban Group for Toamasina Agglomeration.

6) Urban Agency for Antananarivo Agglomeration

The Urban Agency is a kind of think tank which has been formed with financial input from communes of Antananarivo Agglomeration, with the assistance of AFD. The Urban Agency for Antananarivo Agglomeration is to provide technical support to the urban group for Antananarivo Agglomeration.

7) Urban Agency for Toamasina Agglomeration

It is necessary to establish an Urban Agency for Toamasina Agglomeration to be functional as a Secretariat for Urban Group for Toamasina Agglomeration. The financial mechanism for establish and operationalize this Urban Group for Toamasina Agglomeration is the same as the Urban Agency for Antananarivo Agglomeration.

Chapter 21 Conclusions and Recommendations

21.1 Conclusions

(1) Integrated Development Master Plan for the Overall TaToM Area

Project TaToM formulated the following three development plans:

- Urban Development Master Plan (PUDi) for Antananarivo Agglomeration
- Urban Development Master Plan (PUDi) for Toamasina Agglomeration
- Transport and Territorial Development Plan for TaToM Economic Axis

These development plans were prepared to promote development of these three areas in an integrated manner under a future vision of the Overall TaToM Area. That is, these three development plans composed an integrated development master plan for the Overall TaToM Area.

(2) Establishment of Implementation Framework for TaToM

Since Project TaToM identified the necessity to promote integrated development for the Overall TaToM Area, and prepared the integrated development master plan consisting of three development plans, it is concluded that an implementation framework should be established for promotion and coordination for implementation of the integrated development master plan for the Overall TaToM Area.

The implementation of integrated development master plan requires an institutional framework similar to the framework used for formulating the three development plans in an integrated manner.

(3) Necessity of Transformation of Economic Structures and Spatial Structures of the Overall TaToM Area

Having suffered from political crises in the last 25 years or more, Madagascar could not have attracted much private investment in its economic sectors and much official government assistance for its infrastructure sectors. As a result, Madagascar has not been able to spend enough money for maintenance and new construction of infrastructure not only for supporting people's life but also for promoting economic development.

Now, it is time for Madagascar to re-start its country's territorial and economic development by utilising external development assistance and private investments. Taking advantage of these opportunities, it is important for Madagascar to strategically promote infrastructure development in order to transform economic structures and spatial structures of Antananarivo Agglomeration, Toamasina Agglomeration and TaToM Economic Axis, rather than simply concentrating on maintenance and rehabilitation of infrastructure.

(4) Importance of Economic Sector Development in Toamasina Agglomeration and Upgrading of Transport System of TaToM Economic Axis

Project TaToM selected a growth scenario for the Overall TaToM which emphasises the importance of economic sector development in Toamasina Agglomeration, especially light industry and tourism, taking advantage of development of logistics infrastructure centring on Toamasina Port. For realising this growth scenario of the Overall TaToM, it is concluded that the upgrading of transport system of TaToM Economic Axis, including the construction of a climbing lane for NR 2 in selected sections and rehabilitation of railway between Antananarivo and Toamasina, is essential, rather than simply doing road maintenance.

These upgrading interventions for NR 2 and railway of the Economic Axis are particularly important for promoting Project TaToM.

(5) Formulation of Urban Development Master Plan (PUDi) for Antananarivo Agglomeration covering 38 communes and Urban Development Master Plan (PUDi) for Toamasina Agglomeration covering 5 communes

Project TaToM has completed the formulation of two Urban Development Master Plans (PUDi) through a series of steering committee meetings and stakeholder meetings in a coordinated and participatory manner.

Each of the two master plans was prepared for an urban agglomeration consisting of a central commune (central city) and their surrounding communes, while communes are entitled to formulate their own urban development master plans (PUDi) under the decentralisation system of Madagascar and the Urban Planning and Housing Law of Madagascar (Law No.2015-052). An urban planning group was officially composed of member communes for the urban agglomeration on the basis of the issuance of a ministerial decree by the minister in charge of territorial development. This method of forming urban groups is effective to prepare PUDi for urban agglomerations covering more than two communes.

(6) Development Master Plans for Creation of Sustainable and Resilient Areas

Antananarivo Agglomeration, Toamasina Agglomeration and TaToM Economic Axis are water-related disaster-prone areas. Project TaToM pays attention not only to social, economic and environmental sustainability, but also to resilience against water-related disasters of the Overall TaToM Area.

The transformation of spatial structures by development of outer ring roads/ bypass roads and urban centres will strengthen the resilience of Antananarivo Agglomeration and Toamasina Agglomeration in the following aspects:

- Redundancy can be improved by providing outer ring roads and bypass roads, and also by developing additional hydropower stations and substations.
- Diversity can be enhanced by developing multi-nucleus urban structure in an urban agglomeration.
- Strength is being developed against inundation by implementing the drainage master plan of PIAA.
- Collaboration is possible to respond to disasters in partnership with stakeholders under the Implementation Framework for TaToM

(7) Selection of High Priority Projects

TaToM Project identified 78 high priority projects. The total cost of implementing these projects is approximately 3 billion USD which is equivalent to 25%-30% of Madagascar's development budget in the next 10 years, and this excludes the projects which should be implemented through PPP. Since the Overall TaToM Area is estimated to generate 60% of national GDP by 2028, and to further increase to 65% by 2033, it is important for the government to allocate enough budget to these high priority projects of TaToM.

21.2 Recommendations

(1) Necessity to Use a Set of Common Land Use Zoning Categories and Regulations for Madagascar's Cities

Project TaToM proposed a set of common land use zoning categories and regulations to be utilised for both Antananarivo Agglomeration and Toamasina Agglomeration. The land use zoning categories and regulations were formulated to enable more people to easily apply for construction permits and to enable government officers to easily check and issue construction permits. The

proposed land use zoning categories and regulations are recommended to be utilised for all other cities in Madagascar.

(2) Necessity to Revise the Present Law on Urban Planning and Housing Law (Law No.2015-052)

Urban development and related activities are strongly influenced by regulations provided by the Urban Planning and Housing Law. Some of such existing regulations are not realistic to guide urban development in the present days.

Article 19 of Law No.2015-052 related to Urban Planning and Housing says that construction permits may be granted only for construction in the following cases:

- It is built on a land of more than 150 m². (Minimum lot size for buildings should be 150 m².)
- The lot width should not be less than ten meters in order to be buildable.
- The height of buildings (H) should not exceed the width of road (L) in front of the buildings.
- The built-up area should not exceed 70% of one subdivision. (Building coverage ratio should not exceed 70 %.)

We strongly recommend that all of these regulations should be revised or amended, considering the following:

- In high-density residential areas, it is difficult for most land owners to comply with the minimum lot size of 150 m² and the minimum lot width of 10 m, when they want to reconstruct their residential buildings. In high-density residential zones, the minimum lot size of 100 m² should be allowed. In high-density residential zones, the regulation on minimum lot width should be abolished.
- Within urban centres, commercial zones should allow a larger height of buildings than their road width. It is recommended to allow that the building height (H) should be shorter than 2L (2 times of the road width).
- Building coverage ratio should be increased to 80% in high-density residential areas.

(3) Relationship between Urban Development Master Plan (PUDi) and Detailed Urban Development Plan (PUDé)

The PUDi should guide the preparation of PUDé within a city or an urban agglomeration. When a PUDi is revised, the revision of existing PUDé should be considered accordingly at the same time.

Under a revised PUDi, the adjustment or partial revision of a PUDé should be easier than the case of full revision of a PUDé. Therefore, it is necessary to establish a system of relatively easy revision of PUDé in case when PUDi is revised.

(4) Tertiary Arterial Roads

The network of tertiary arterial roads is the basic foundation for the urban structure at the commune level. Each commune (represented by the technical officer and mayor) should examine and revise, if needed, the tertiary roads shown in the revised PUDi of Antananarivo Agglomeration and Toamasina Agglomeration, so that government budget can be properly allocated for improvement of designated tertiary roads.

(5) Promotion of Investments to Establish “Economic Development Zones”

Currently, a law is being created for designation of “Economic Development Zones” in undeveloped lands. In such designated Economic Development Zones, incentives are to be given to investments for estate development for economic sectors. However, it is recommended to establish a law by which to designate “Economic Development Zones” in either developed or undeveloped lands.

(6) Limited Utilisation of Wetlands for Urban Development

Since Antananarivo Agglomeration is surrounded by wetlands and it is prone to inundation due to heavy rainfall and river flooding, it is necessary to carefully utilise wetlands by land filling for infrastructure provision and urban centre development.

For Antananarivo City, a Sanitation Master Plan was prepared by PIAA. Project TaToM utilised the analysis and proposals of the Sanitation Master Plan for determining the extent of land filling in wetlands within CUA. However, since a Sanitation Master Plan for the area outside Antananarivo City has not been finished yet, it is recommended to determine which wetlands to allow for land filling in the area outside CUA by utilising the result of PIAA Phase 2 (for outside Antananarivo City).

(7) Involvement of Six More Communes outside the 38 Communes of Antananarivo Agglomeration

Considering the future population and land availability in Antananarivo Agglomeration, the future urbanization is expected to take place beyond the boundaries of the 38 communes of the current Urban Group for Antananarivo Agglomeration. Therefore, the land use zoning plan prepared by Project TaToM covers parts of the following six communes located surrounding Antananarivo Agglomeration.

- Merimandroso Commune
- Mahitsy Commune
- Iarinarivo Commune
- Fiadanana Commune
- Ambohimalaza Commune
- Fieferana Commune

In the implementation phase, these six communes should also become members (or observers) of the Urban Group for Antananarivo Agglomeration. At the same time, these communes also should be involved in the approval process of the revision of the PUDi for Antananarivo Agglomeration.

(8) Careful Determination of the Timing for Expressway Construction between Antananarivo and Toamasina

Although the construction of a 4-lane expressway between Antananarivo and Toamasina is considered based on a financial assistance by the Chinese government, the future forecast traffic volume might not be large enough to support a necessary cost of construction of the expressway. As a result, the expressway construction might generate a large negative impact on Malagasy government's financial situation as well as to the Malagasy economy, if it is done at a too early phase. Therefore, it is strongly recommended not to start the construction of the expressway at an earlier period until 2028, when the Toamasina Port expansion project is to be completed.

(9) Development Permission System

Madagascar does not have such a development permission system, in which the government examines and gives approval to a development plan over a certain size, including high-rise buildings of 20 storeys within primary urban centres. It is recommended to establish such development permission system for those whose developments are over certain sizes.

(10) People's Participation

During the period of master plan formulation for Project TaToM, a continuing coordination and participation among stakeholders have been promoted. Although the master planning process involved a variety of government ministries, agencies and communes, it did not involve so many nongovernmental institutions and community organisations. At the stage of implementation of the

master plans of Project TaToM, it is necessary to promote wide participation of people in various activities.