

Appendix 3-4
Workbook for the Delineation of Growth Boundary

Attachment A

Workbook for the Delineation of Growth Boundary

The Study on Comprehensive Flood Mitigation for Cavite Lowland Area
in the Republic of the Philippines

JICA Study Team

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1. How to Use this Workbook

- Purpose of this Workbook

This workbook was prepared for assistance to the land use planner for the preparation of provincial physical framework plan and land use plan of the CLUP of city/municipality for their review. The important guidelines are already published for the land use planning of the province and city/ municipality by NEDA and HLURB. This workbook is supplement to those guidelines.

- Practical Method

The planning procedure and methods of the delineation of urban growth boundary is exactly same as those applied in the JICA Study for flood mitigation project. The proposed urban growth boundary is delineated based on the data and information available at the present. This workbook will be very practical for the land use planning. However, more comprehensive approach and data/information will be required for better land use planning. This workbook also suggests to find other important data and information to involve in the planning process.

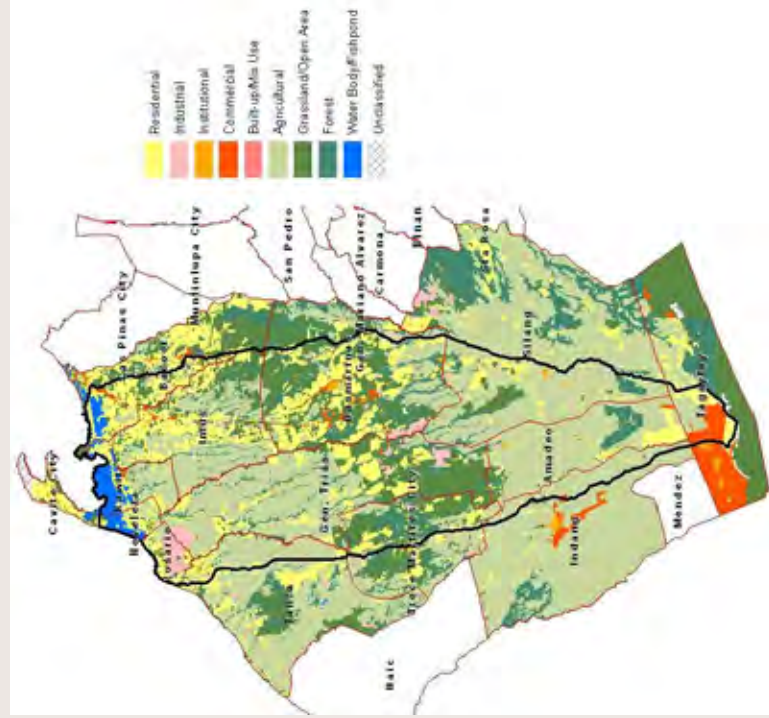
- Flood Study Area Only

The study area is watershed area of 3 rivers (Imus River, San Juan River and Canas River) and not covers all of the cities and municipalities in the Cavite Province. The cities/ municipalities which are not covered by this study, shall examined delineation of urban growth boundary by using the methods described in this workbook.

2. Need of Urban Growth Management

Map 1 shows the existing land use conditions of the Study Area. From the 1980's to the present time, the land primarily cultivated for agricultural production has been converted very rapidly into agro-industrial, industrial and real estate housing development. This urbanization causes flood damage bigger year by year.

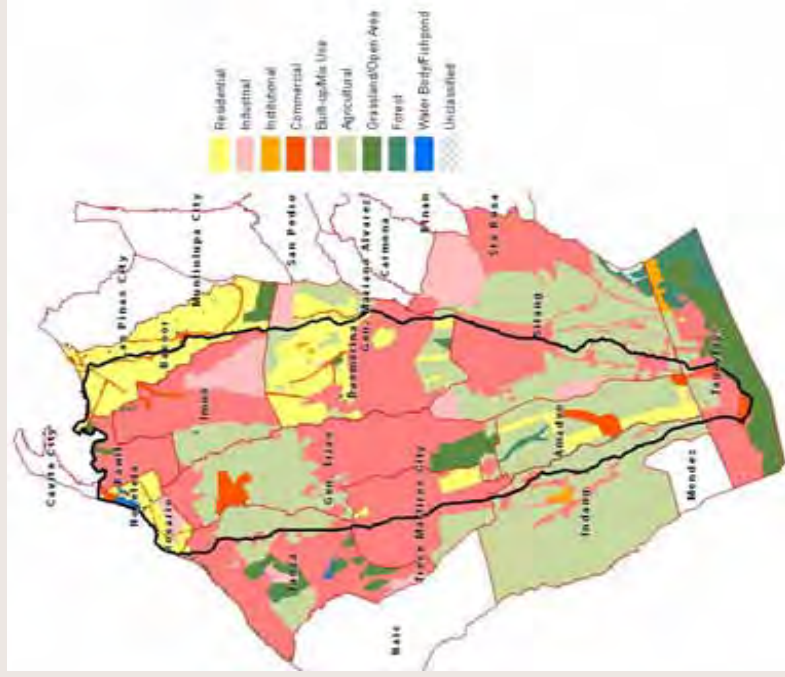
Map 1: Existing Land Use (2003)



Source; Satellite image 2003, JICA CALA Study

Map 2 shows the land use plans, proposed by the respective LGUs (cities and municipalities), of the Study Area. The target years of the land use plans are varied depend on the LGUs. As you can see, the quite large area is delineate as future mixed use / built-up area.

Map 2: Future Land Use Plan (various target years)

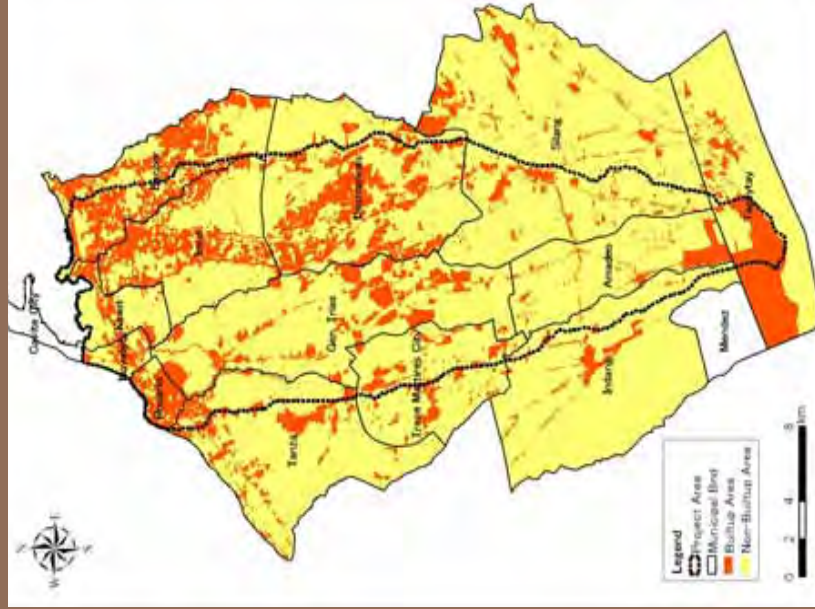


Source; CLUP of each city/municipality

Built-up Area / Openspace = Key Indicator for Flood Mitigation Planning

Map 3 shows the existing built-up area. The built-up area in the year 2003 covers 24.6% of the total Study Area.

Map 3: Existing B/U Area (2003)

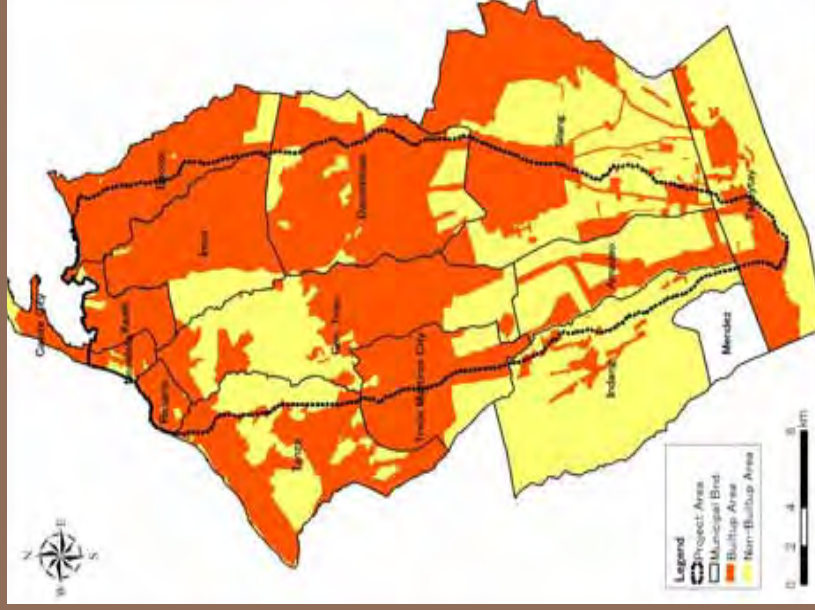


Built-up Area Ratio : 24.6%

Source; Satellite image 2003, JICA CALA Study

Map 4 shows the future built-up area (or urban expansion area) proposed by land use plans of cities and municipalities. The built-up area in the future covers 64.6% of the total Study Area.

Map 4: Future B/U Area (when ?)



Built-up Area Ratio : 65.2%

Source; CLUP of each city/municipality

Promotion and Control of Land Use Into Compact City

Fig. 1 shows the predictable land use patterns caused by the current mixed use land use policy, which allows "Any Land Use in Any Where". The developers or market initiative land development tends to create fragmented land use patterns.

Fig. 1: Current CLUP

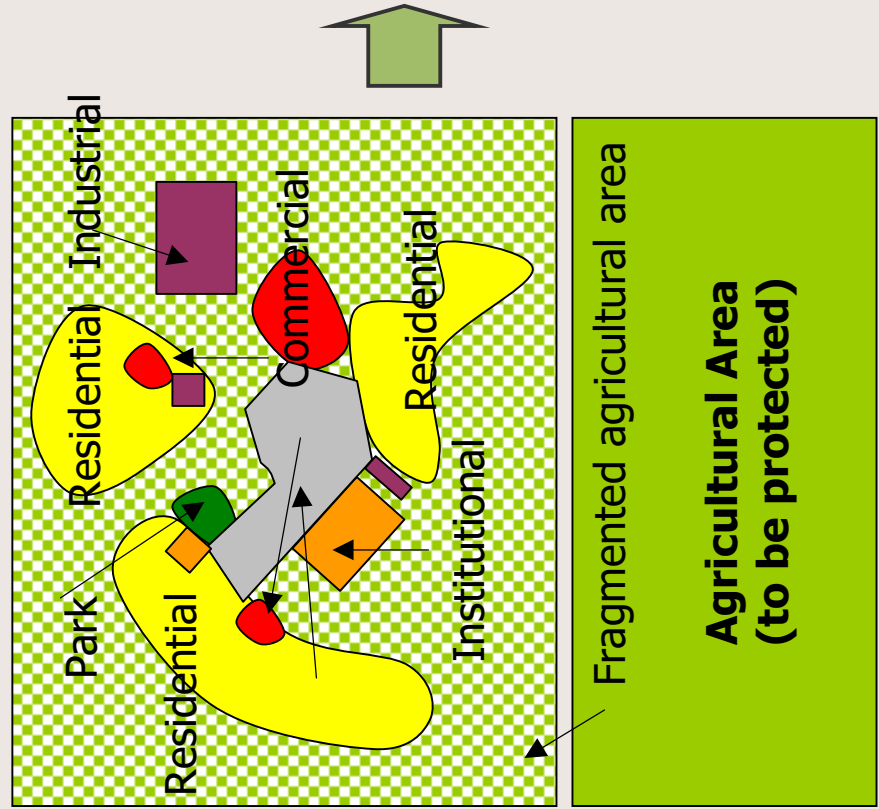
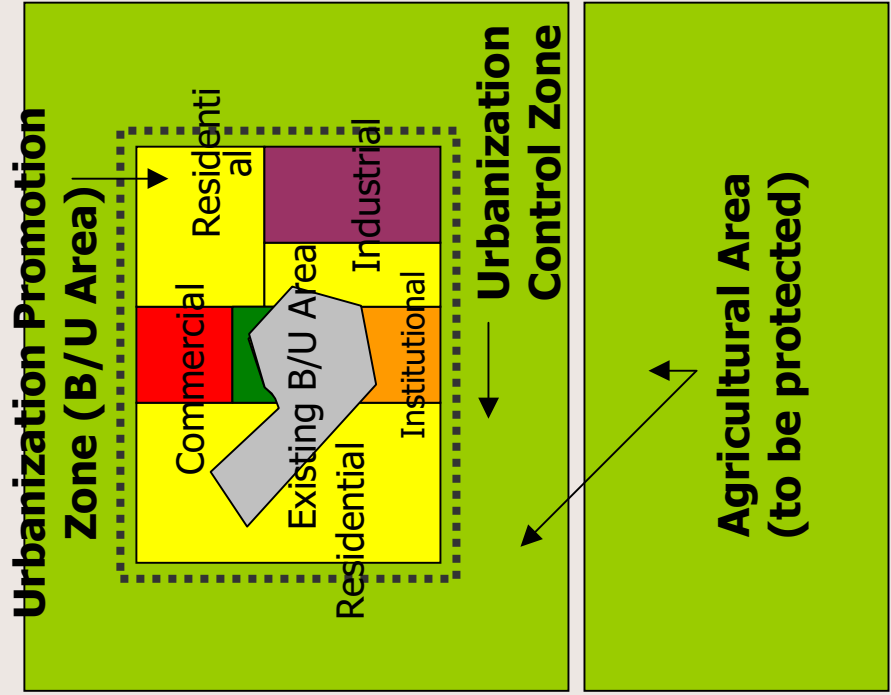


Fig. 2 shows the proposal land use concept by JICA Study Team. The future urban expansion activities is allowed only in certain zone (urbanization promotion zone), according to the designated land use zoning. Outside UPZ, the development activities are strictly controlled

Fig. 2: JICA Proposal



Why compact city ?

Current CLUP :

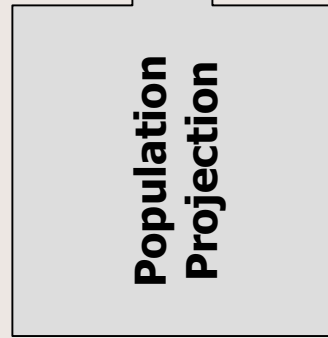
- Efficient public investment hardly take place (reactive method)
- Existing farmland would be fragmented, which would lead to difficulty in developing the large-scale subdivision in the remaining farmland. At the same time, it also causes difficulty in effectively using the farmland and attaining the high agricultural production
- Natural landscape would be marred
- Serious traffic congestion would occur
- Foment excessive land development

JICA Proposal:

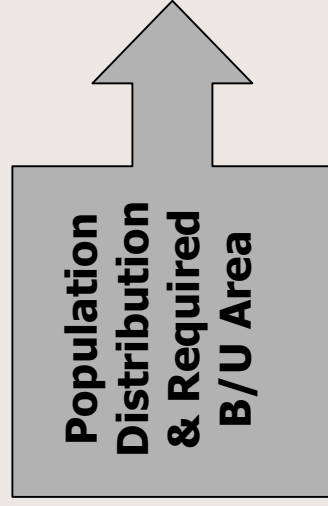
- To ensure economic benefits from urban activities by preventing urban sprawl and by controlling the shapes and sizes of land use allocation
- To ensure efficiency in public investments through clear prioritization of public investments and urban infrastructure development
- To prioritize and concentrate major urban infrastructure developments in the limited zone within a specified time frame

3. Planning Flow of Delineation of Urban Growth Boundary (Fig. 3)

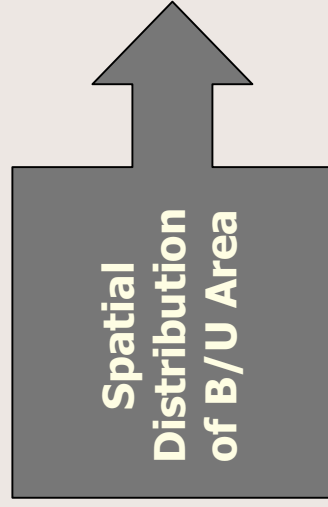
- Project Area: Study Area (13 cities/municipalities)
- Target Year: 2020



- Available sources;
- National, Calabarzon, Province (NSO, NEDA)
 - Cavite (Provincial Framework)
 - City/ Municipality (each LGU)
 - Related Studies (Cala, Water supply, Busway, etc.)
 - JICA Study Team(flood)



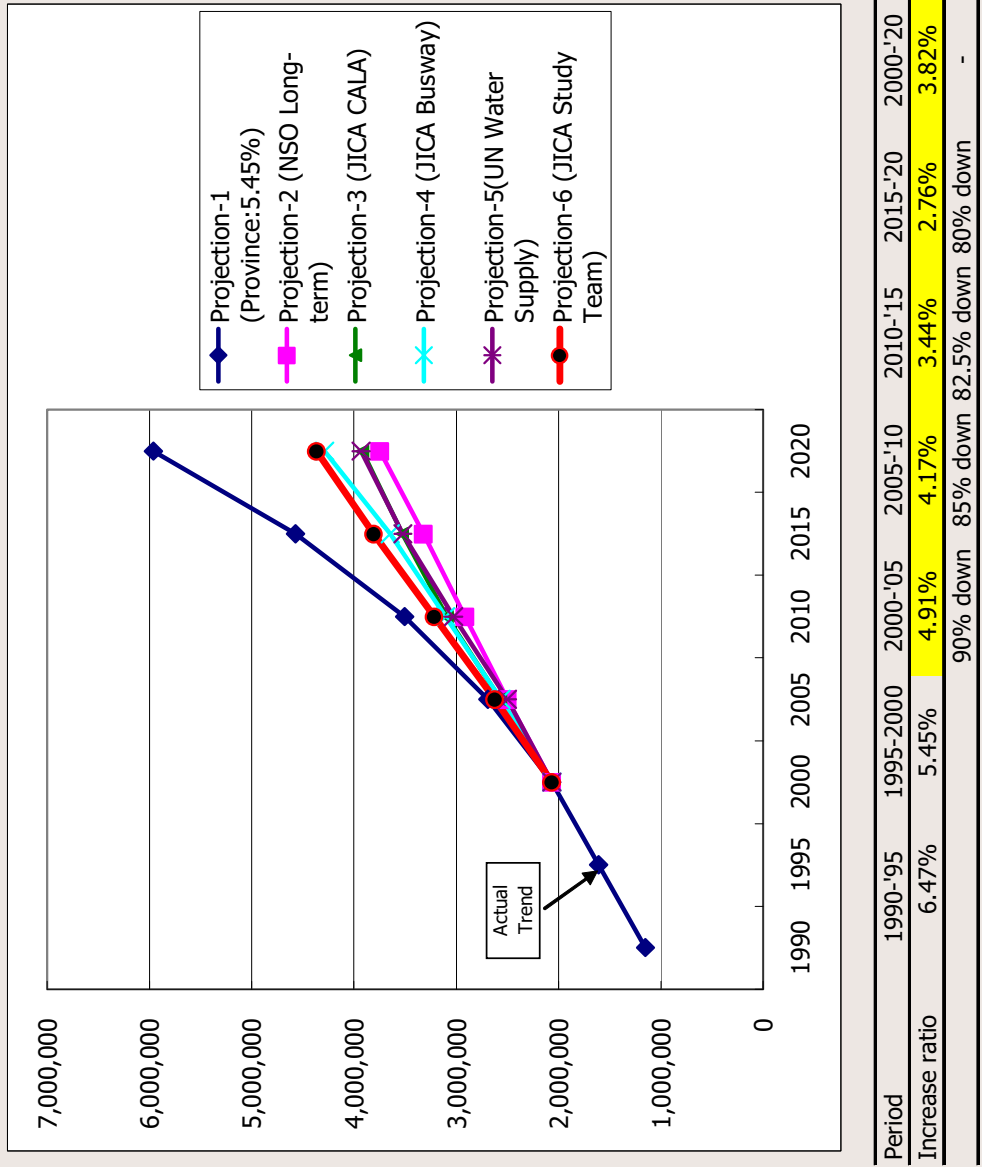
- FAO
- NEDA
- HLURB
- Existing
- Provincial Framework
- Cities/Municipalities
- JICA Study Team(Flood)



- Provincial Framework
- CLUP(City/Municipality)
- Delineation of Urban Growth Boundary by JICA Study Team(flood)

4. Population Projection (Fig.4)

Fig.4 shows the population projections for the Cavite province in the relevant studies, made by NSO, Cavite Province, JICA CALA and Bus Way Study, UN Water Supply Study and JICA Study Team. The projection-6 shows the population projection for this study.



Major Factors of the population Projection

In the Past:

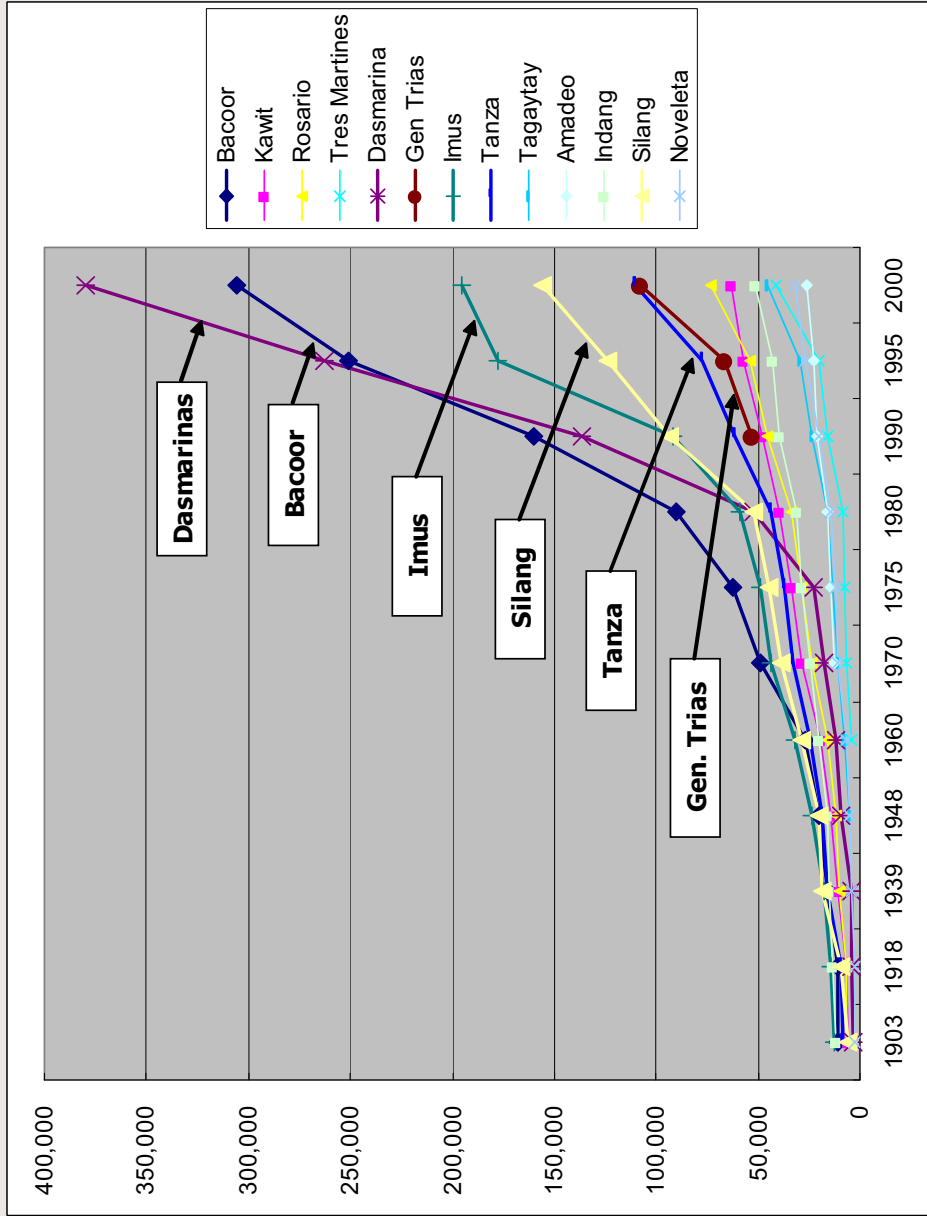
- 50-km Radius Ban Policy of Metro Manila on Industries and Large-scale Industrial Subdivision Development
- Squatter relocation program of Metro Manila
- Large-scale Residential Subdivision Development
- Tourist Hotel, Resort and Golf Course Development
- South Super Highway, Cavite Coastal Road, Aguinaldo Highway, Governor's Drive

From Now On:

- Priority on fulfillment in the existing industrial estates and moratorium on golf course development in the highland area
- Control subdivision development in the highland area, recently stated by the present Provincial Governor
- Decrease of natural growth rate
- Delay on planned infrastructure development such as R1 Extension, C-5 Expressway, MMS Extension Stage 2, Molino Boulevard, Southern Tagalong Arterial Road Phase II, LRT 1 Extension, etc.

Population Evolution of the City/ Municipality (Fig. 5)

Fig. 5 shows the population increase of each city and municipality in the Study Area. The high increase ratios of population (1990-2000) can be seen in Dasmariñas (10.8%), Trece Martines City (10.3%), Imus (7.8%) and Gen. Trias.



Source; NSO and CLUP of each city/ municipality

5. Analysis of Urban Development Trend and Population Increase

Fig. 6 shows the characteristics of population density and built-up ratio of cities/ municipalities. The most of the municipalities in the northern Cavite cluster is characterized by high density with higher built-up ratio, while the municipalities in the central Cavite cluster is low density with lower built-up ratio.

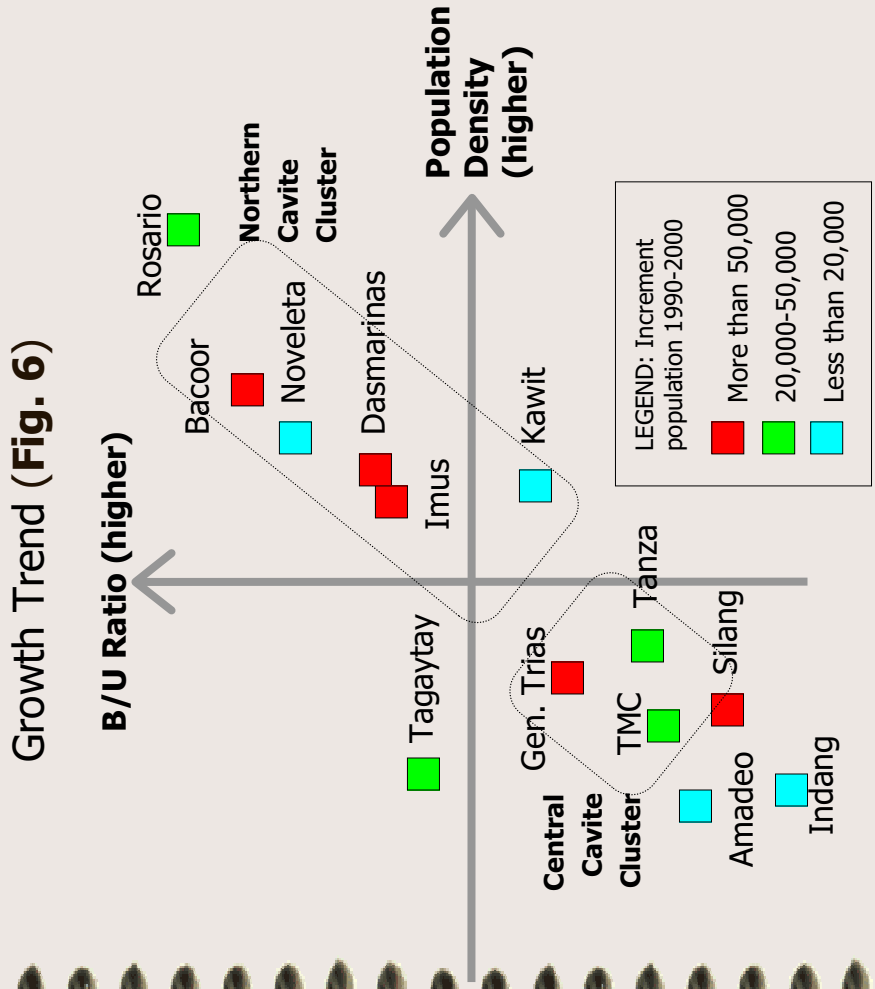


Fig. 7 shows the hierarchy setting by provincial framework plan and development orientation identified by JICA CALA Study. Those identifications and orientations also should take into account for the population forecast and distribution study.

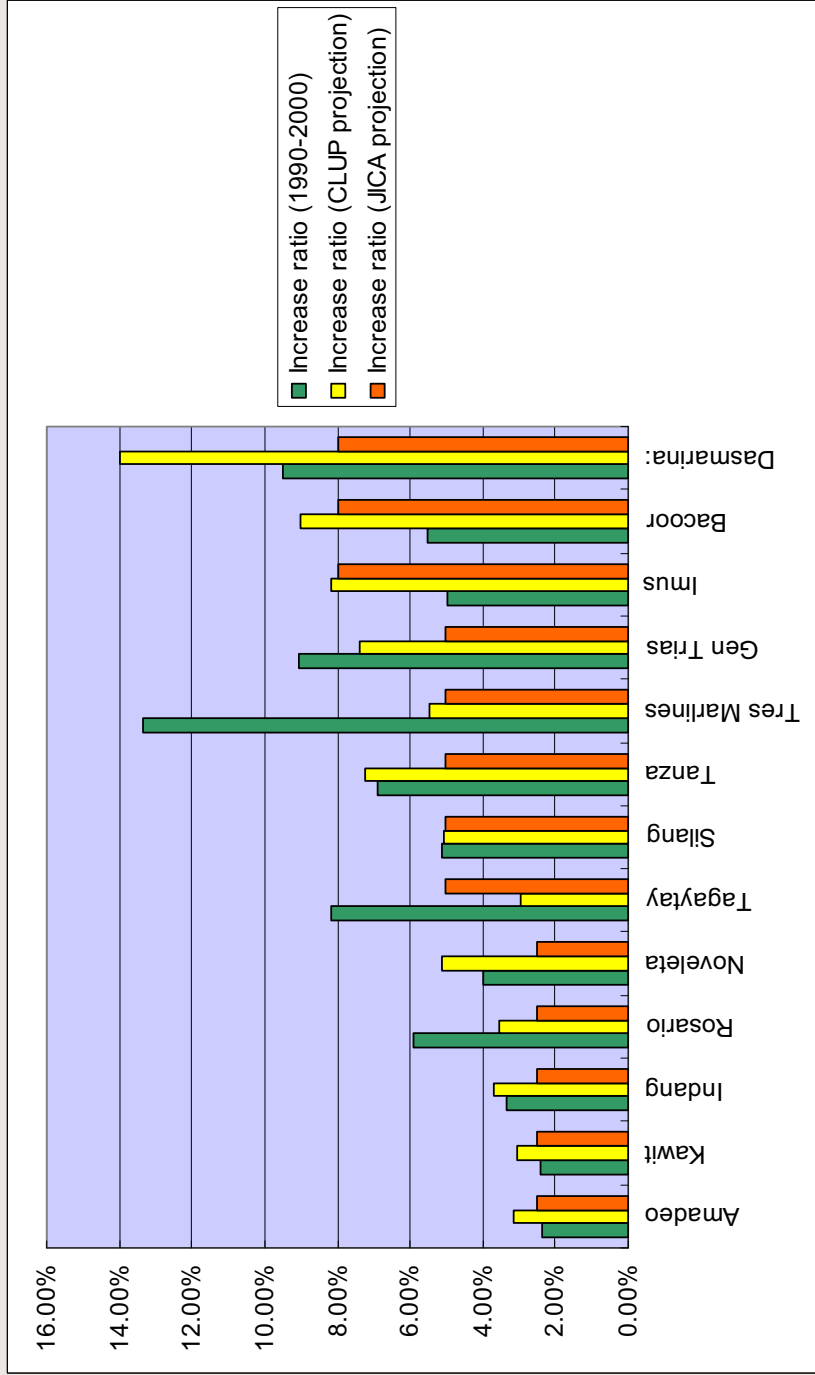
Hierarchy (Fig. 7)

City/municipality	Provincial Framework		Cala Study	
	Present	Future	Present	Future
Amadeo	ST	ST	AAC	AAC
Bacoor	SC	SC	UD-residential	UD-residential
Dasmariñas	SC	MC	Regional growth pole	Regional growth pole
Gen. Trias	LT	SC	UD-residential	UD-residential
Imus	SC	SC	UD-residential	UD-residential
Indang	ST	ST	AAC	AAC
Kawit	LT	LT	CG-residential	CG-residential
Noveleta	MT	MT	CG-residential	CG-residential
Rosario	LT	LT	CG-residential	CG-residential
Silang	LT	LT	AAC	AAC
Tagaytay	MT	LT	Resort	Resort
Tanza	LT	LT	UD-residential	UD-residential
Trece Martires	MT	LT	Administration	Administration

Note: ST: Small town, MT: Middle town, LT: Large town, SC: Small city, MC: Middle city
 UD: Urban Development, CG: Control Growth, AAC: Agricultural Center

Population Increase Ratios of Cities/ Municipalities - Actual, CLUP, JICA (Fig. 8)

Fig. 8 shows the population increase ratios in 1990-2000 and assumed ratios of each city and municipality by the respective city/ municipality and JICA Study Team. The JICA Study Team assumed that high increase ratio in Dasmariñas, Bacoor and Imus, middle increase ratio in Gen. Trias, Trece Martines, Tanza, Silang and Tagaytay, and low increase ratio in the rest of municipalities



Source; NSO, CLUP of each city/ municipality and JICA Study Team

6. Land Availability Analysis

JICA Study Team applied the following area requirement for the estimation of required land for built-up area, which is an average of UN-FAO and NEDA standards. The existing built-up area per existing population is 90 m²/person in this connection. The HLURB also has various standards for required land for residential, commercial, etc. The area requirement will be varied depending on the characteristics and urban policy of each city and municipality.

JICA Study Team applied:

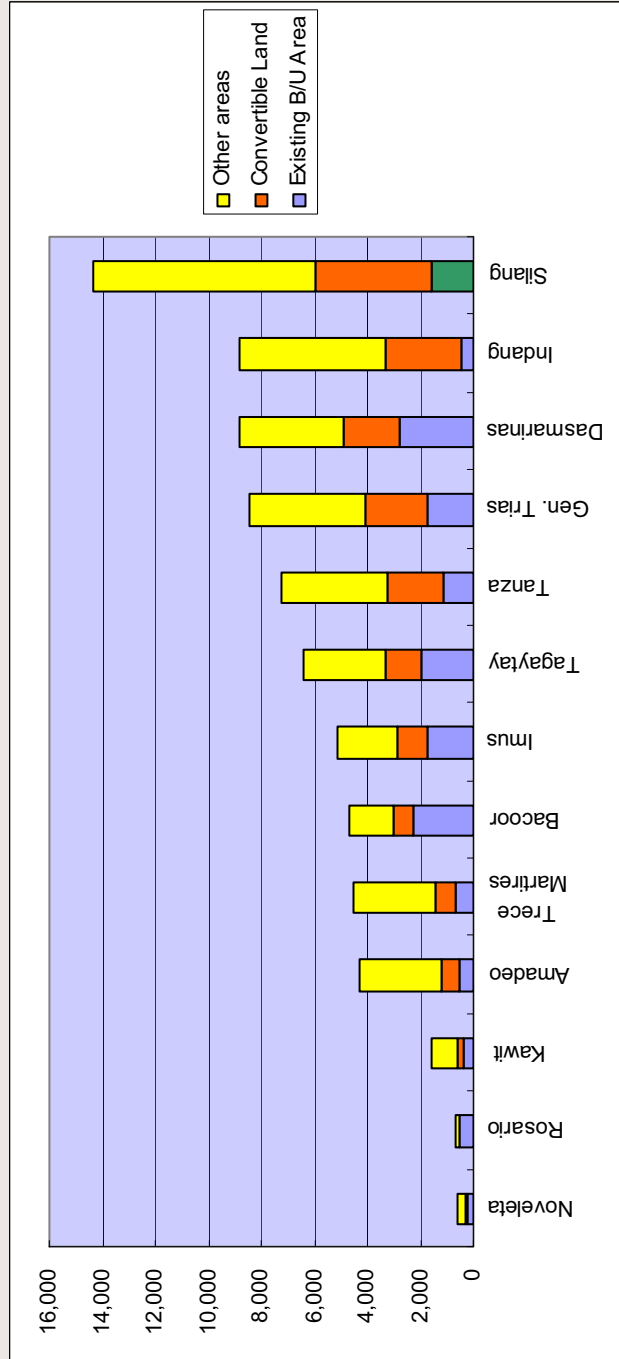
$$\text{Required Land for Built-up Area} = \text{Incremental Population} \times 75 \text{ m}^2$$

- UN-FAO Standard: 90 m²/person
- NEDA Standard: 60 m²/person
- Existing Conditions: 90 m²/person (13 C/M)
- HLURB: Standard for residential, commercial, etc.

Available Land for B/U Area (Fig. 9)

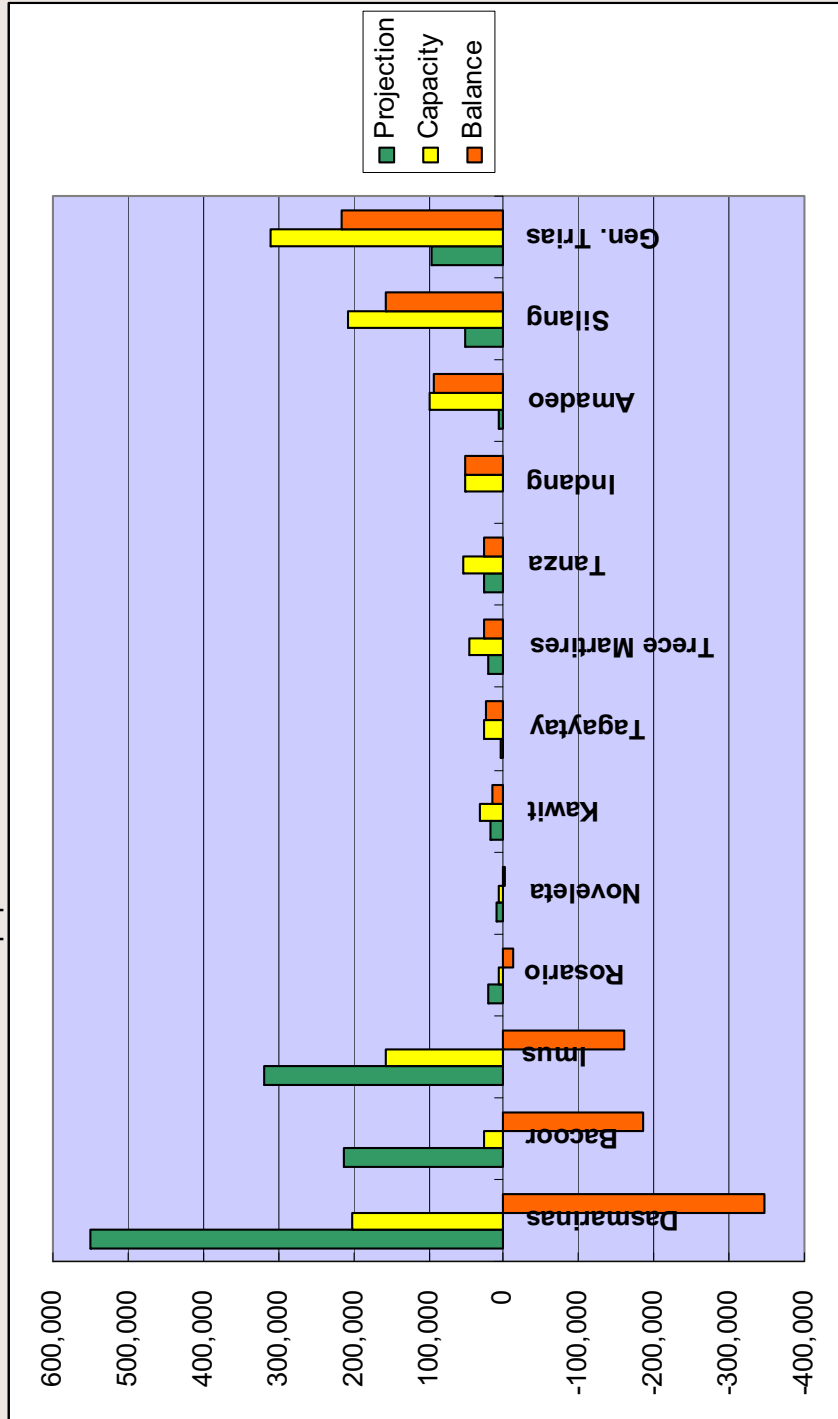
The area can be converted from agricultural land to B/U area is only **18,846** ha in 13 Cities/Municipalities, and **9,212** ha in the Study Area up to the year 2020, The estimation was done according to the regulations of MC No.54, HLURB. i.e. the reclassification is however limited to a maximum percentage of total agricultural land of a city or a municipality as follows:

- For highly urbanized and independent component cities, fifteen percent (15%);
- For component cities and first to third class municipalities, ten percent (10%);
- For fourth to sixth class municipalities, five percent (5%)



Absorption Capacity of the Population (Fig. 10)

Fig. 10 shows the absorption capacity of the population of each city/ municipality. The green bar is the projected number of population, yellow one is number of population can be absorbed in the available land, and orange one is its balance. The municipalities such as Dasmariñas, Bacoor, Imus have shortage of land for the future built-up area because of high population increase, while Gen. Trias, Amadeo, Indang, for instance, have sufficient available land for the future increased population.

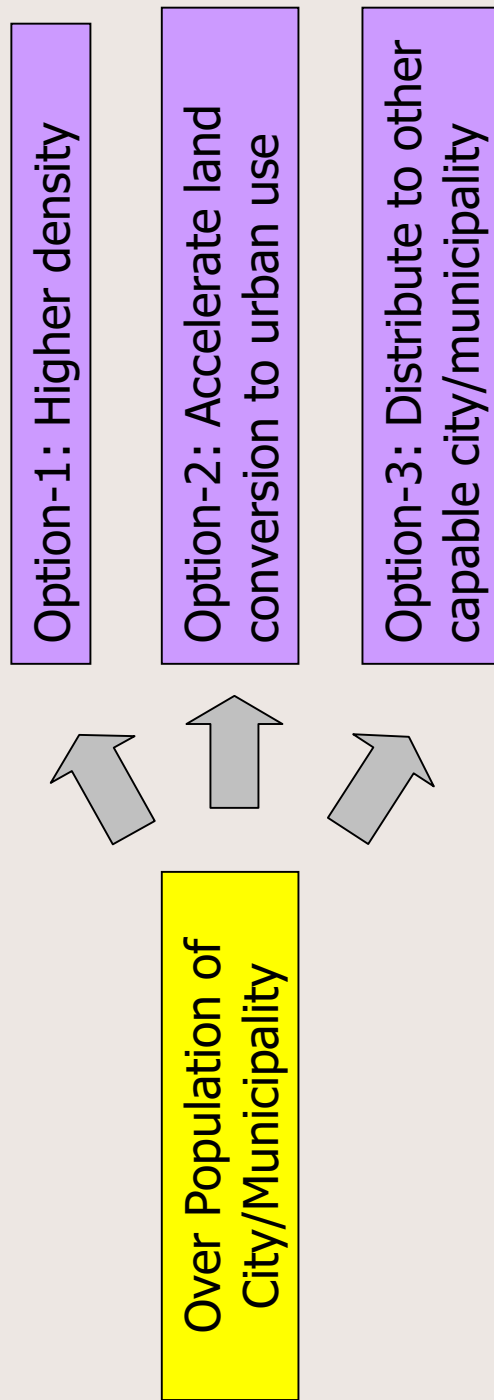


Shortage of land for B/U Area

Sufficient land

7. Distribution of Population – Policy Options (Fig. 11)

Fig. 11 shows policy options for the city/ municipality where there is a shortage of available land for future urban expansion. The option-1 is increasing population density by effective land use and high rise of housing/buildings (from single to multi-stories). The option-2 is accelerating land conversion of agricultural land into urban use. This policy option will be against the regulation of the MC No.54, HLURB, however, there are large idle lands left as non- or very low production land, especially along the major roads. Those lands can be converted as an option. The option-3 is distributing to other cities/ municipalities with sufficient land for built-up area. This is relating to out-migration and in-migration policy in the province.

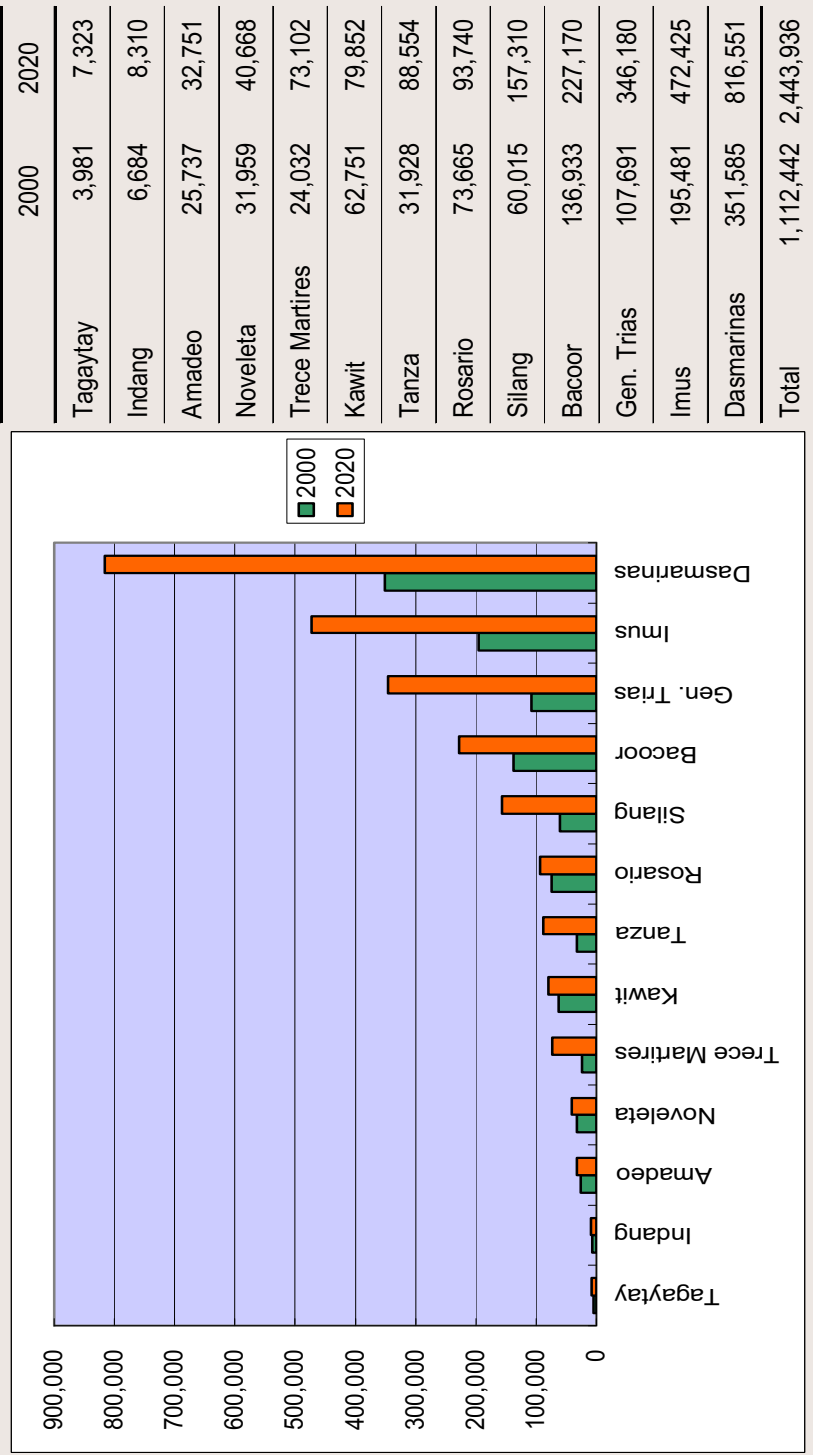


Distribution of Over Population (Fig. 12)

City/ Municipality ⁴	Option-1	Option-2	Option-3	
	Higher Density	Additional Land Conv.	Out- Migration	In- Migration
Bacoor	●	●	●	-
Dasmariñas	●	●	●	-
Imus	●	●	●	-
Noveleta	●	-	-	-
Rosario	●	-	-	-
Gen. Trias	-	-	-	●
Silang	-	-	-	●
Tanza	-	-	-	●
Trece Matrires	-	-	-	●

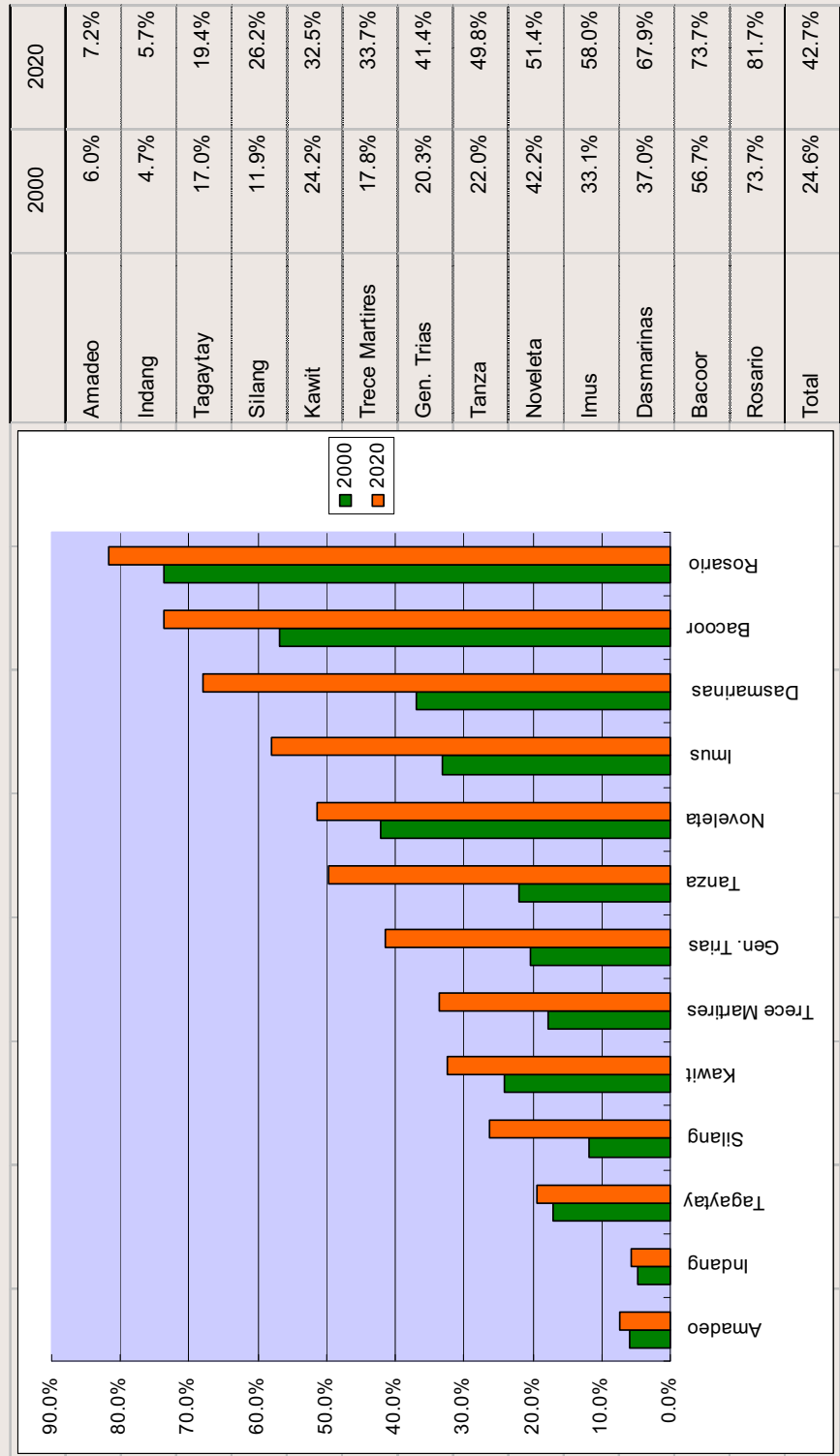
Population Distribution by Cities/Municipalities 2000-2020 (Fig. 13)

Fig.13 shows the existing and future population distribution by cities/ municipalities in the Study Area. The number of population of each city/municipality is adjusted through various examinations as mentioned in the process of population projection, absorption capacity analysis, policy options for the population distribution, etc.



Built-up Ratio by Cities/Municipalities 2000-2020 (Fig. 14)

Fig.14 shows the existing and future built-up ratios by cities/ municipalities in the Study Area. The built-up ratios of the municipalities in the northern Cavite cluster, such as Rosario, Bacoor, Dasmariñas, Imus and Noveleta will be more than 50% in 2020.

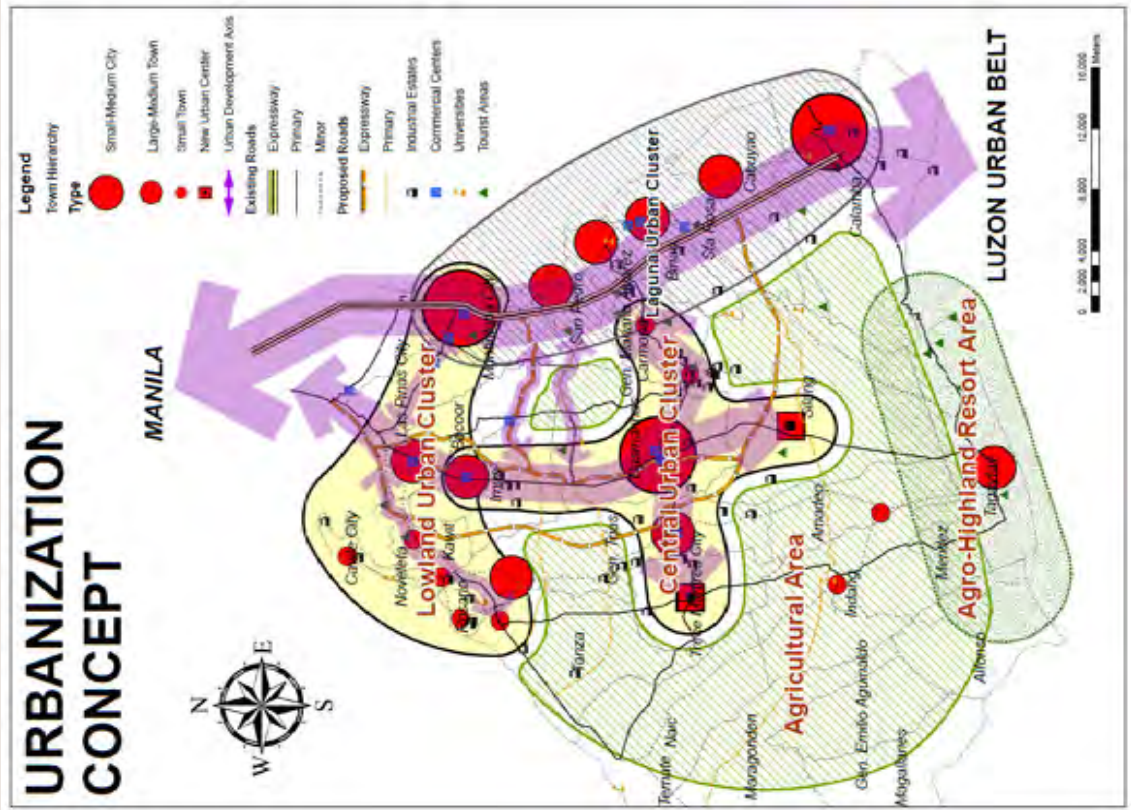


8. Spatial Distribution of Required Built-up Area (Fig.15)

Fig.15 shows the major criteria for spatial distribution of required built-up area (future urban expansion area), and reference maps.

①	Areas along establishment urban growth directions	See Map 5
②	Areas that can be provided with basic services and utilities, including roads, transportation, water, electricity, health, education and other public services	See Map 12 for existing and planned roads
③	Reasonably accessible from existing built-up areas and other employment centers	-
④	Ideally within 0-3% (or 0-8%) slope	See Map 6
⑤	Not in environmentally critical areas	See Map 7-11
⑥	Not in other protection areas	-
⑦	Consistency with City/Municipal Land Use Plan	-
⑧	Conformity with National/Regional Development Plan	-

Map 5 : Urbanization Concept (Urban Growth Directions)



Map 5 shows the urbanization concept of the Study Area in regional context of urban growth. The main contexts are;

- Development wave from Metro Manila, firstly reaches along the South Luzon Expressway. Laguna Urban Cluster will be provides workplaces for the Cavite residents.
- Lowland Urban Cluster will be integrated with Alabang Area, where will be a northern regional growth center. As conurbation.
- Dasmariñas will be a regional growth center, similar to Alabang and Calamba, and forms cross urban development axis along the Aguinaldo Highway and Governor's Drive.
- Trece martires and Silang will grow and become a new urban center.
- Tagaytay and highland area will further grow as Agro-highland Resort Area.
- The open space areas along the existing and planned major roads will be built-up due to high potential for urban use.

Areas not suitable for Built-up Area

Environmentally Critical Area

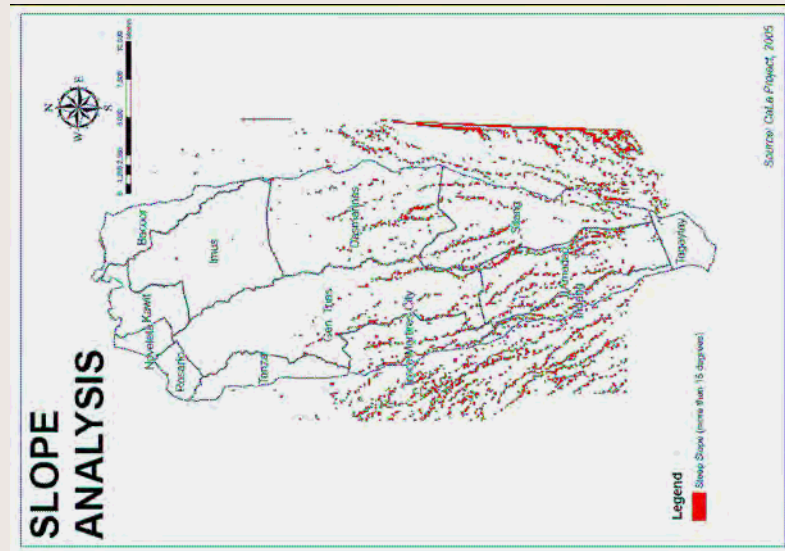
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Not Suitable for Urbanization(B/U Area)

- ◆ Steep slope (more than 15%)
- ◆ SAFDS(Strategic agricultural and fishery development zone)
- ◆ CARP(Agrarian reform)
- ◆ NIA(Irrigated area)
- ◆ Inundation area (2-yr, depth: > 25cm)

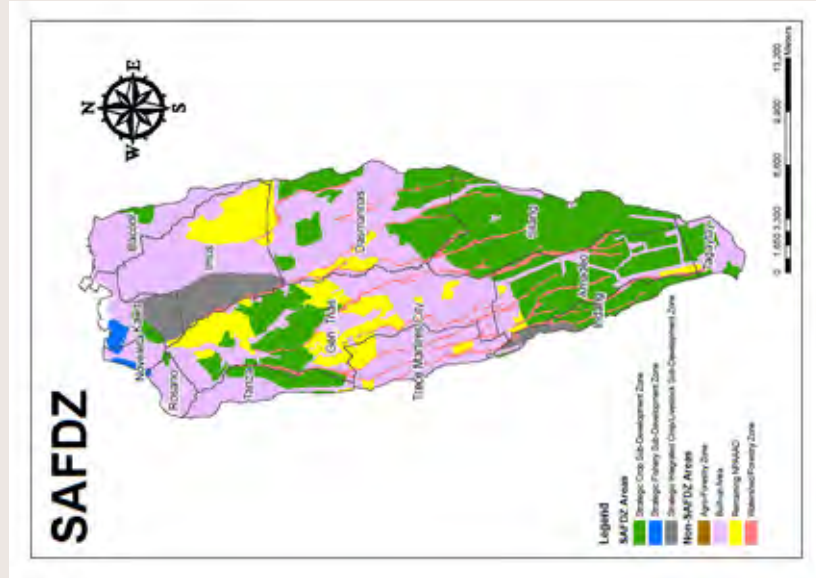
Spatial Distribution of Built-up Area Base Maps - 1

Map 6: Slope Analysis



Source: NAMRIA 1:50,000 Topographic map

Map 7 : SAFDS

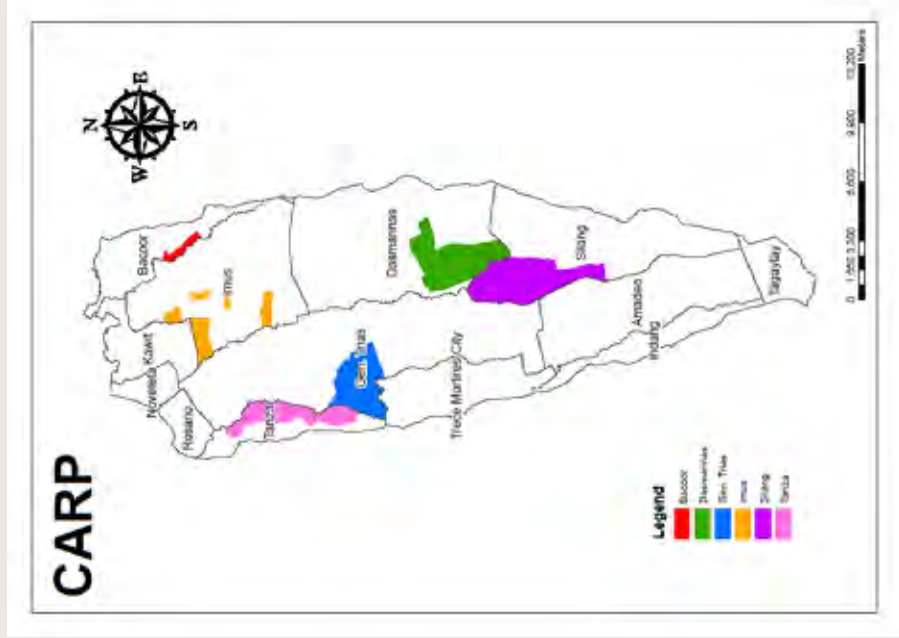


Source: Bureau of Soil and Water Management

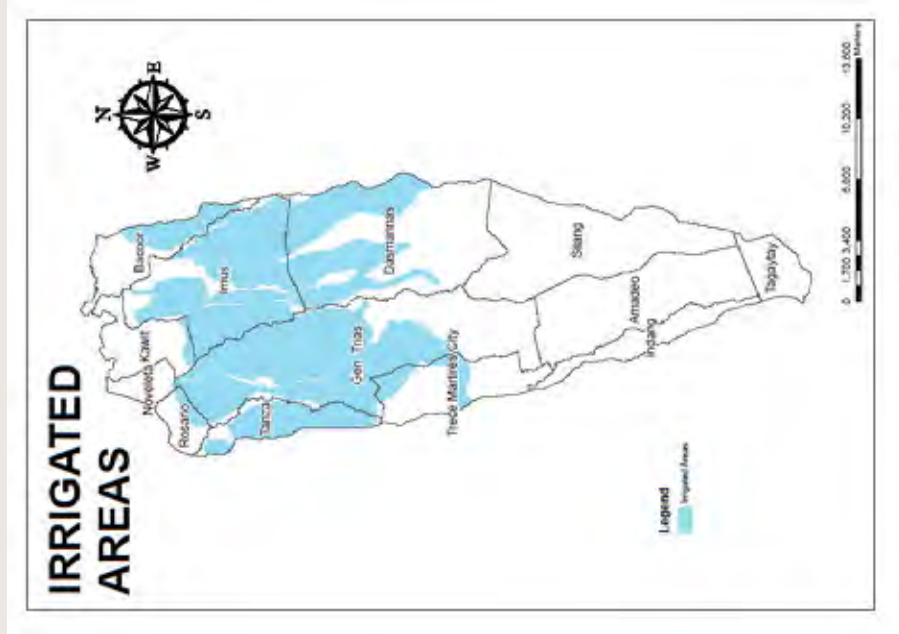
Spatial Distribution of Built-up Area Base Maps - 2

Map 8 : CARP(Comprehensive Agrarian Reform Program)

Map 9 : NIA (National Irrigation Authority)



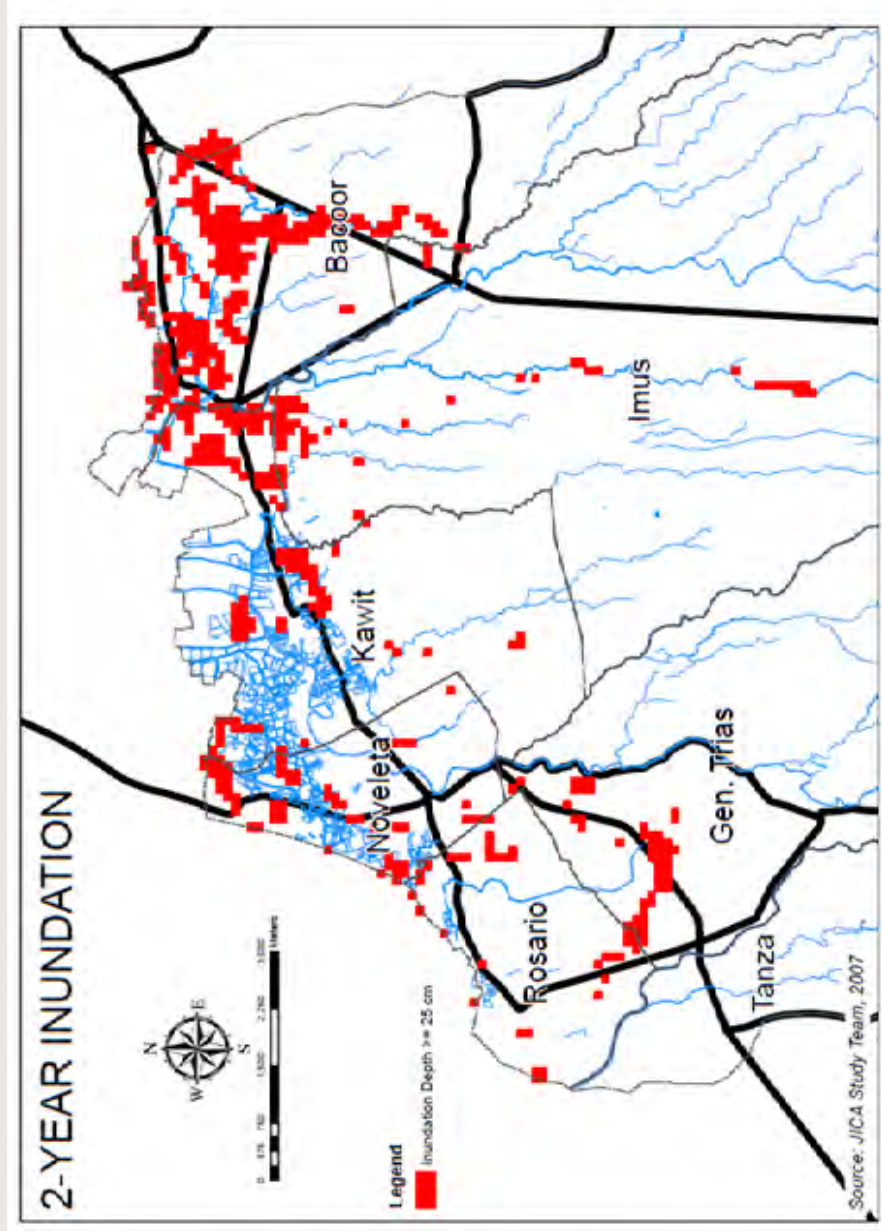
Source: Provincial Office of Agrarian Reform



Source: NIA

Spatial Distribution of Built-up Area Base Maps - 3

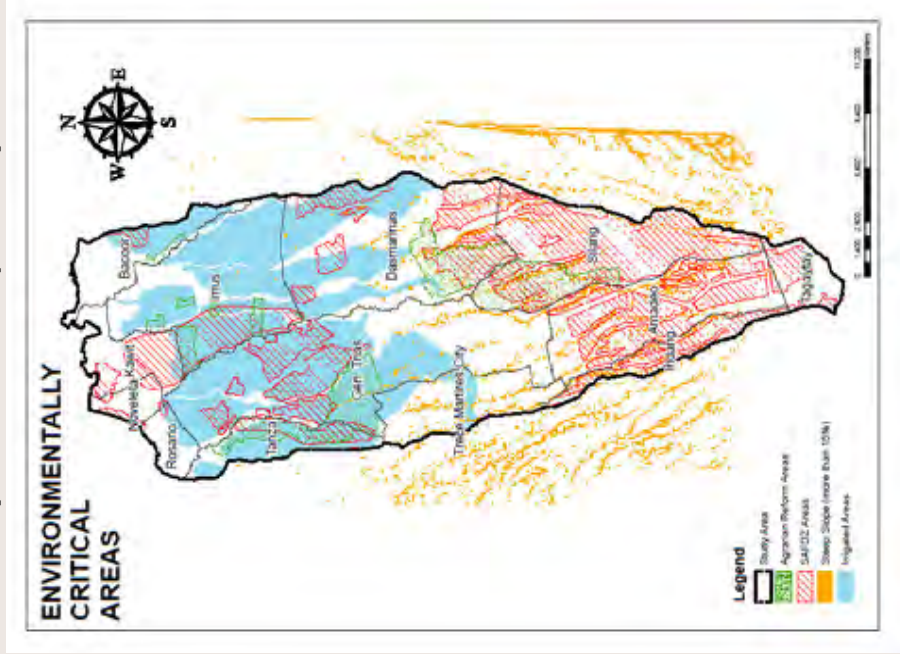
Map 10 : Inundation Map-2 yr



Source: JICA Study Team

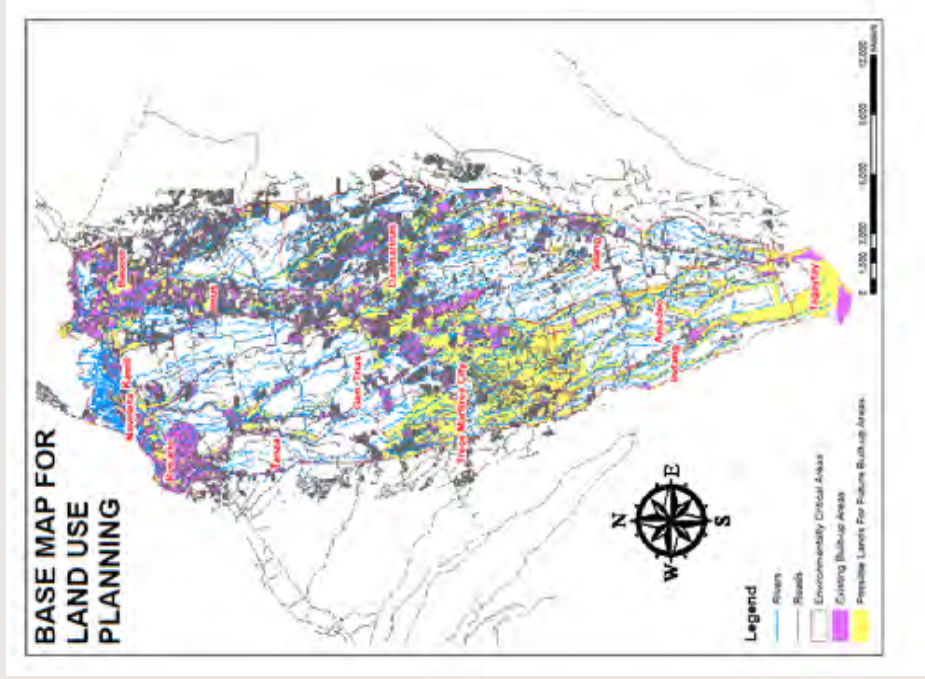
Spatial Distribution of Built-up Area Compiled Map

Map 11 : Environmentally Critical Areas (Overlaid Map 6-10)



Source: Combined by the JICA Study Team

Map 12 : Base Map for B/U Area Distribution

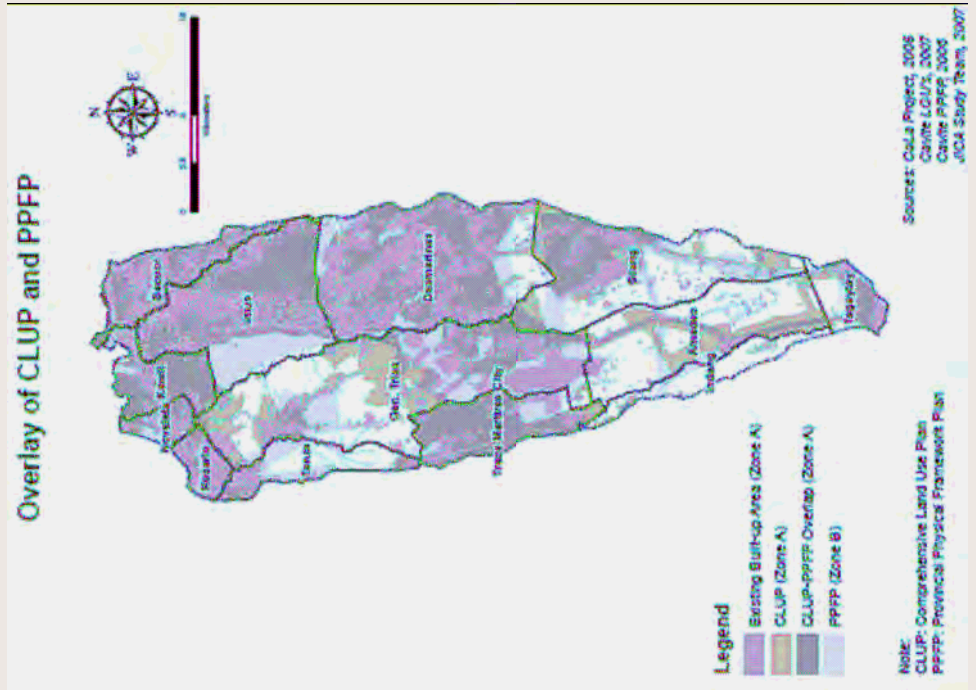


Source: Compiled by the JICA Study Team

Needs of Consistency and Accountability

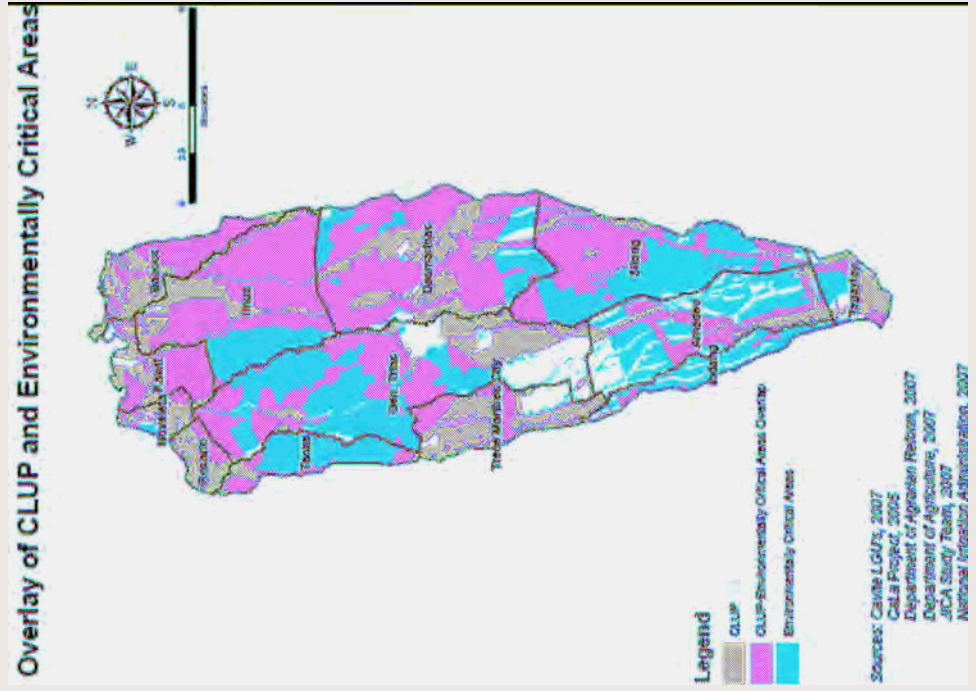
Map 13 : Overlay of CLUP and PPF

Map 13 is the map overlaid with the future expansion area of CLUP and the environmental critical areas, such as NIA, CARP, SAFDZ, steep slope area, and flood hazard area, which are account for the areas not suitable for urban expansion.

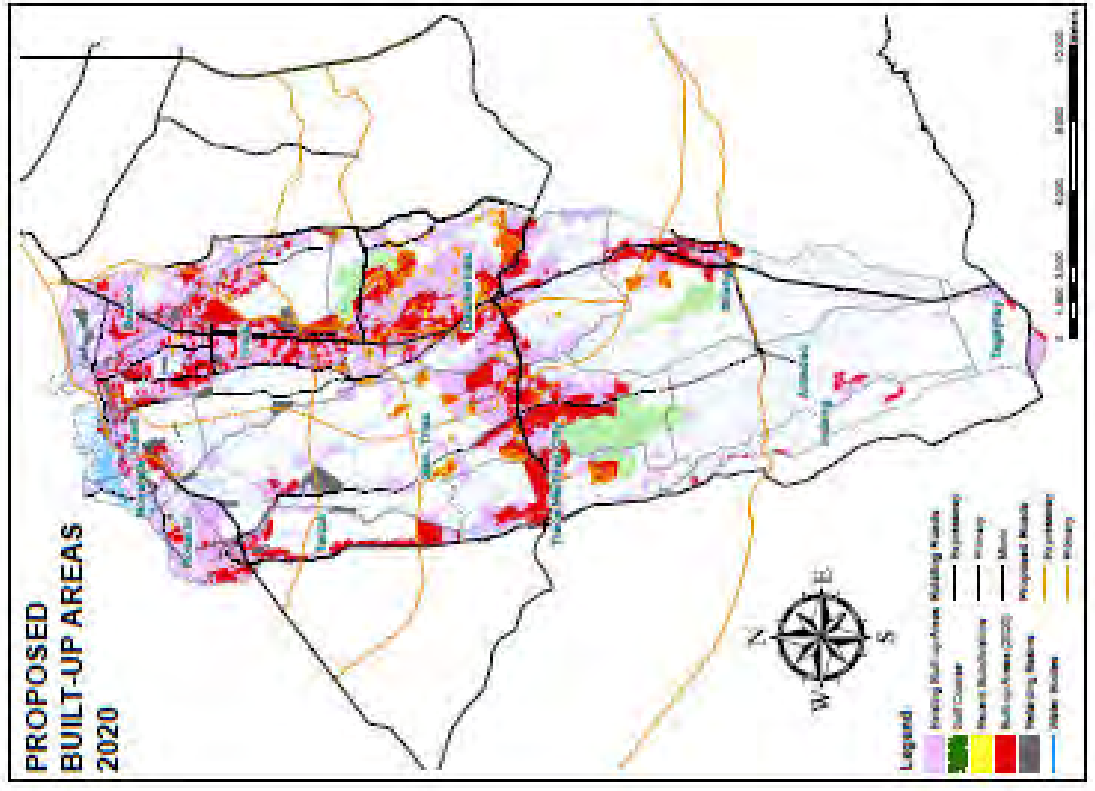


Map 14 : Overlay of CLUP and ECA

Map 14 is the map overlaid with land use plan of PPF, which performs as indicator of land use plan of each city/municipality, and the current land use plan of CLUP.



9. Proposed Urban Growth Area (Map 15)



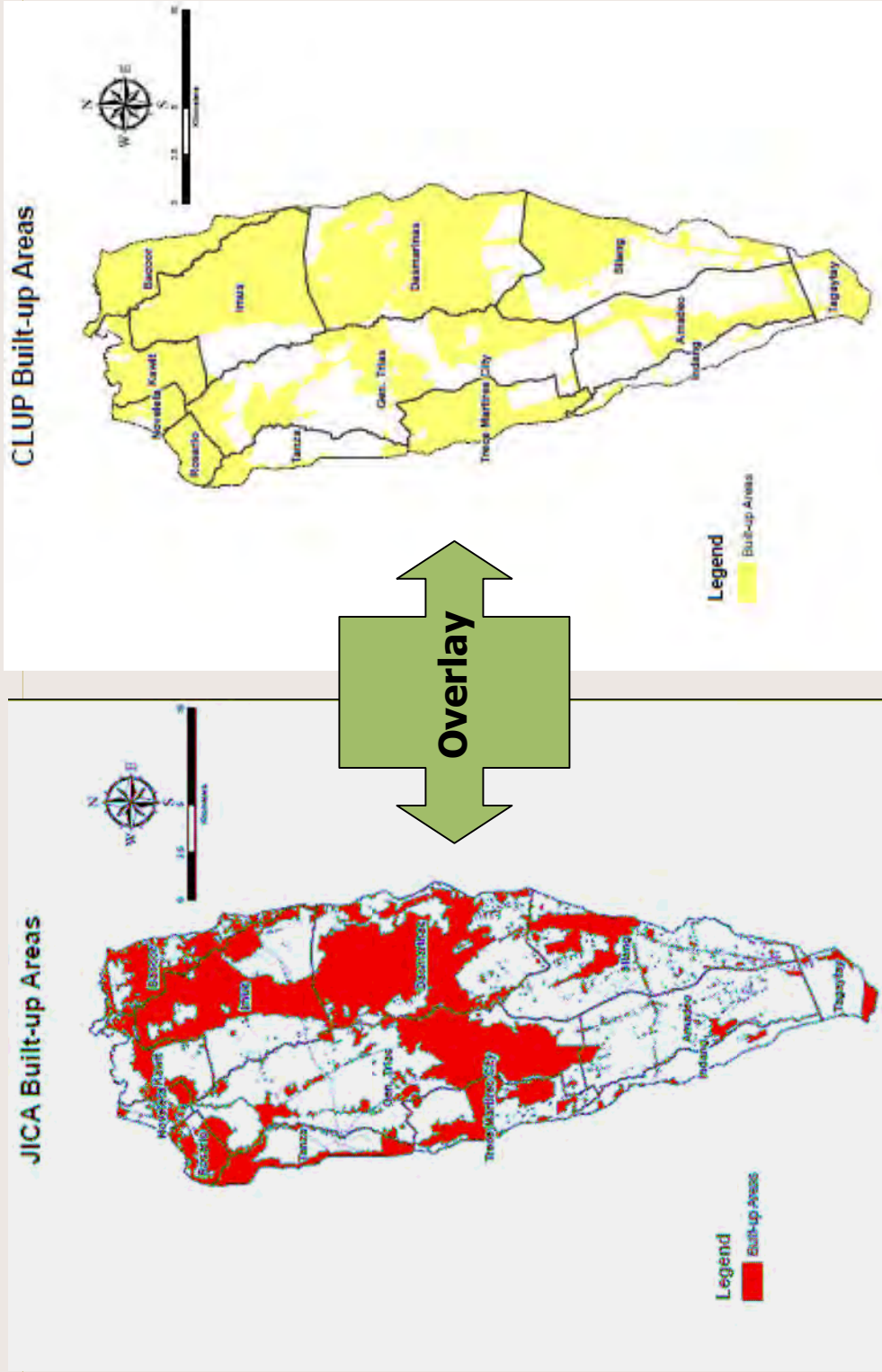
Map 15 shows the urban growth boundary of the Study Area, proposed by the JICA Study Team. The map shows the existing built-up areas and golf course, recent subdivisions, and built-up areas 2020 (proposed future urban expansion area up to 2020). The map also indicates existing and proposed major roads.

The JICA proposal intends to minimize the future urban expansion area within the areas along the existing and planned major roads, where can be provided with basic services and utilities, including transportation, water, electricity, health, education and other public service and areas accessible from existing built-up areas and other employment centers.

On contrary, steep slope area and environmentally critical areas including irrigated area, CARP area, SAFDZ area, and inundation area are excluded from the future urban expansion (built-up) area.

Overlay Map of JICA and CLUP Land Use Plan

Map 16 : Urban Growth Area (JICA) **Map 17** : Urban Growth Area (CLUP)



B/U Area Ratio:42.7%

B/U Area Ratio:65.2%

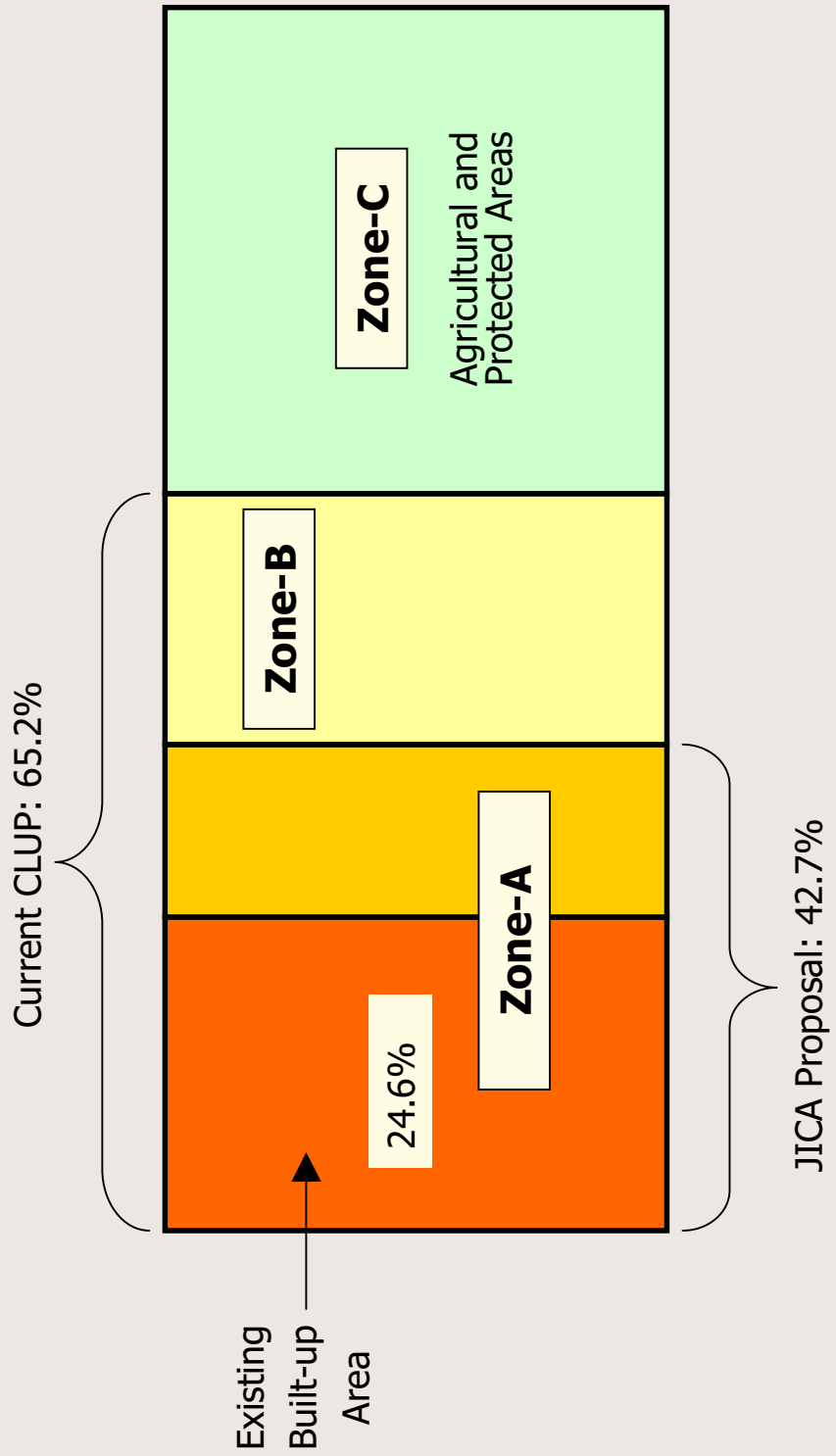
10. Recommended Growth Boundary Plan (Map 18)

Map 18 is the urban growth boundary plan, which shows UPZ(Urbanization Promotion Zone), UCZ(Urbanization Control Zone), and PPZ(Production and Protection Zone), proposed and recommended by the JICA Study Team.

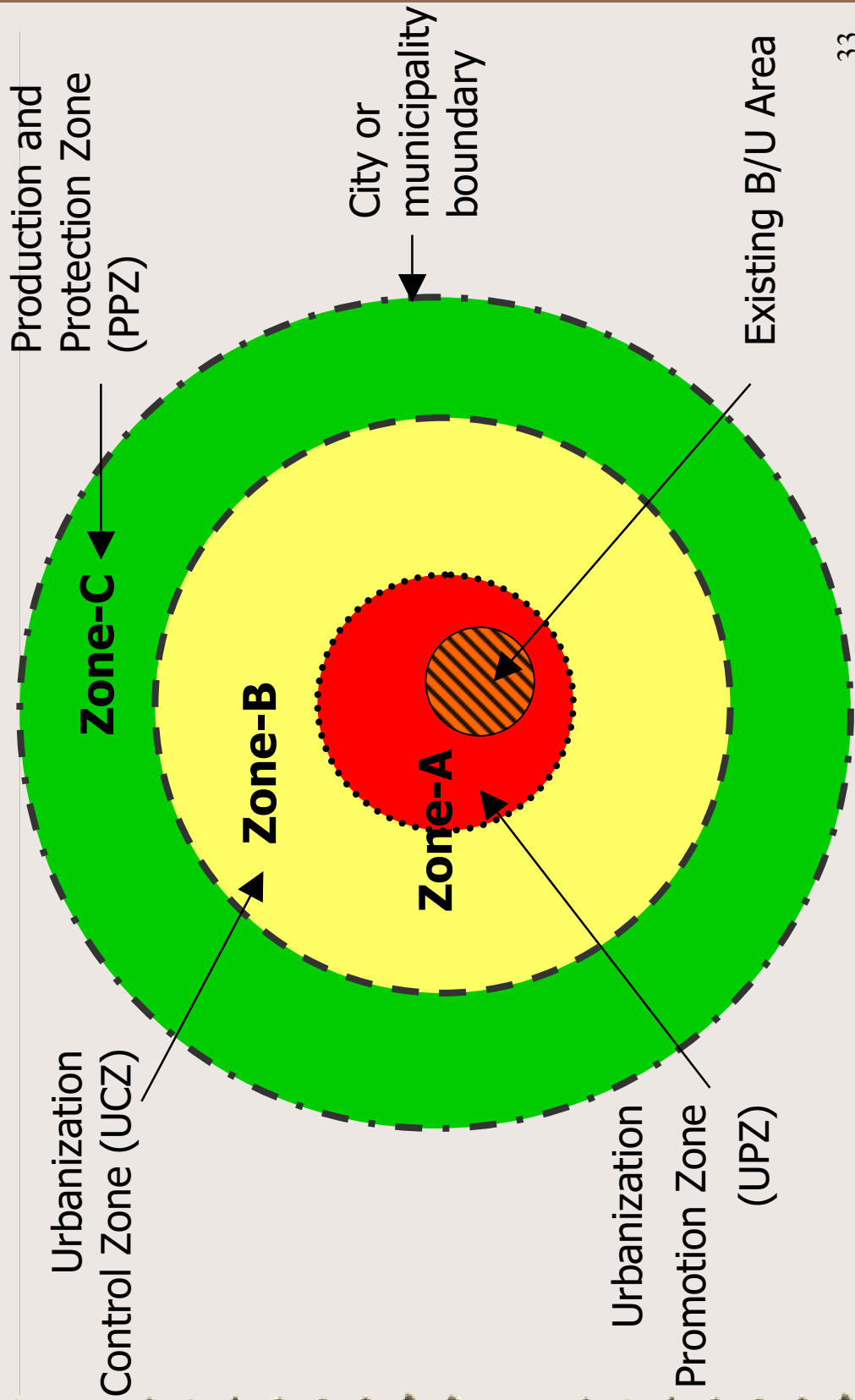


Policy for Urban Growth Control (Fig. 16)

Fig.16 shows the difference of the proposed future built-up area (urban expansion area) proposed by the current CLUP and JICA Study Team. The almost all of the future built-up areas proposed by the JICA Study Team, is within the future built-up areas proposed by the current CLUP basically. The existing built-up area + the future built-up area proposed by the JICA Study Team is called Zone-A, while the future built-up area proposed by the current CLUP without or outside the Zone-A is called Zone-B. The rest of those proposed built-up area is called Zone-C, where mostly for agricultural production area and protection areas.



Recommended Urban Growth Boundary System (Fig. 17)



Proposed Urban Growth Management Ordinance (Fig. 18)

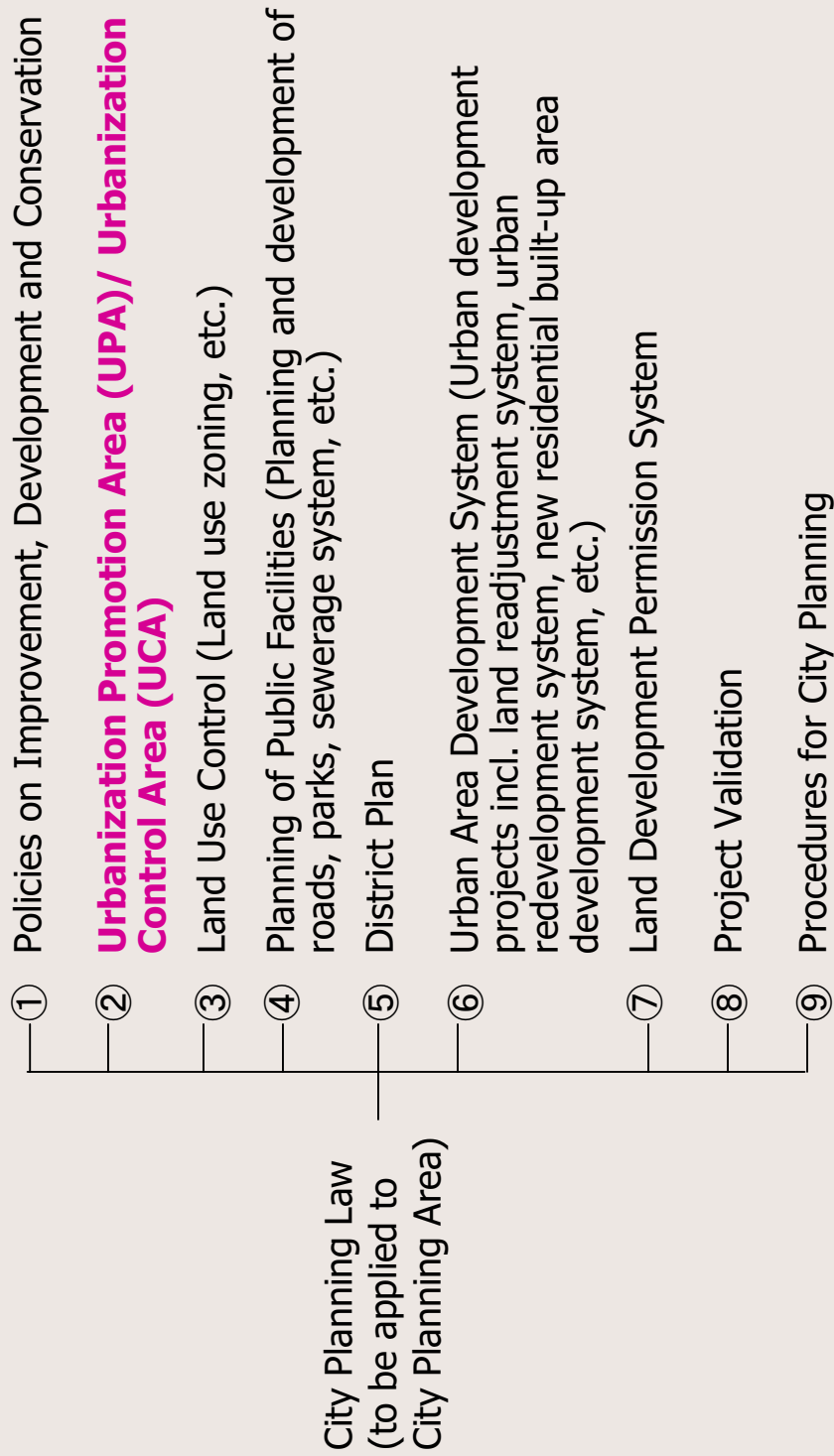
Fig.18 shows the proposed urban growth management measures for the realization of urbanization control policy in Cavite Province. The draft of the new provincial ordinance regarding urban growth management is prepared by the JICA Study Team.

Zone	Name	Growth management policy	Development control measures
Zone A	Urbanization Promotion Zone (UPZ)	Existing urbanized area and urbanization should be positively implemented within 10 years or so.	Under current development permission system With new requirement of on-site flood regulation pond (> 5ha)
Zone B	Urbanization Control Zone (UCZ)	The following use of land is given priority and urbanization should not be promoted. 1) Agriculture and fishery 2) Conservation of natural hazard areas 3) Conservation of natural resources However, a development which satisfy the requirements, mentioned in the right row is allowed;	Required conditions; 1) More than 10ha (on-site f.r. pond, EIA) 2) Public Works 3) Small structure belong to agricultural production 4) Restriction of building on flood hazard area
Zone C	Production and Protection Zone (PPZ)	Agricultural and fishery production and conservation of natural resources are promoted and no urbanization is allowed.	

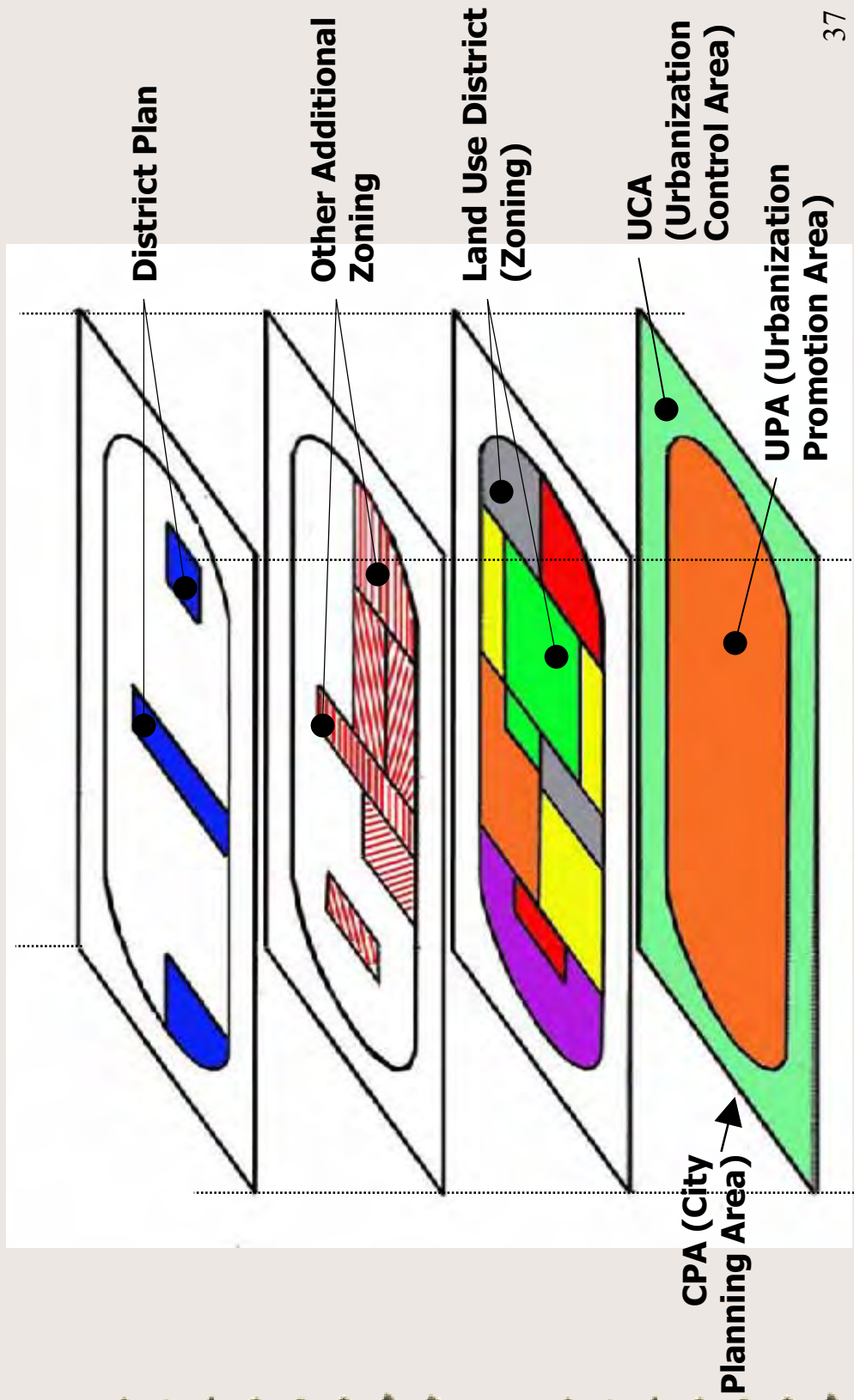
**Appendix:
Reference information on
Growth Boundary:**

Urban Land Use Planning System in Japan

Composition of City Planning Law (Fig. A1)



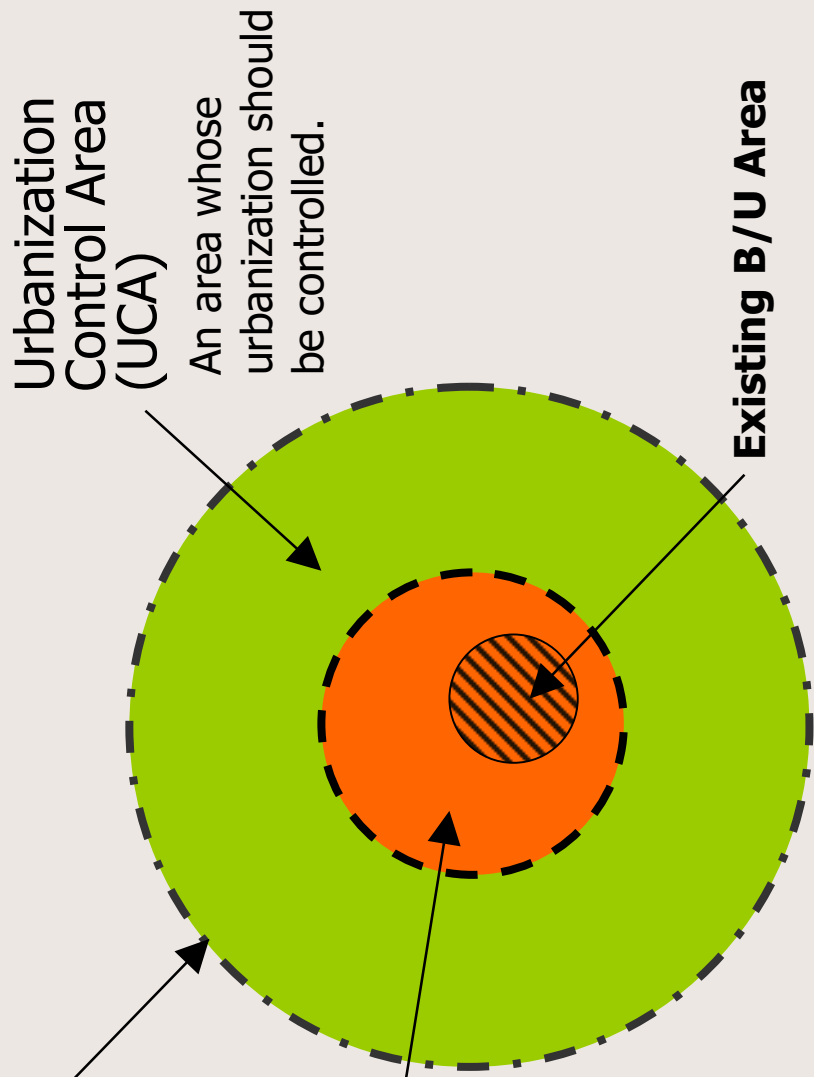
Urban Land Use Regulation System (Fig. A2)



City Planning Area composed by UPA and UCA (Fig. A3)

City Planning Area
An area that needs integrated urban development and conservation

Urbanization Promotion Area (UCA)
An area that is already urbanized and wherein a planned and prioritized area that should be developed within 10 years or so.



Area Division System (Fig. A4)

Area division	Where	Effect
City Planning Area (CPA)	City, municipality or cluster of municipality/village where needs integrated urban development and conservation ✓ > 10,000 total population (within 10 years) ✓ > 50% of employees belong to commercial/ service/ industrial sectors (within 10 years)	Managed according to the city planning law
Urbanization Promotion Area (UPA)	1) Existing built-up area ✓ Population density >40 p/ha ✓ >3,000 inhabitants (DID district) ✓ Building sites cover >1/3 2) Planned and prioritized area that should be developed within 10 years	1) Building is allowable according to the designated land use district(zoning) 2) Approval is required for the development, with an area more than 1,000 m ² .
Urbanization Control Area (UCA)	1) Good agricultural land 2) Inappropriate land for urbanization 3) Conserve natural landscape 4) Hazardous area	Any buildings are strictly prohibited except; ✓ Buildings/ houses for agricultural activities ✓ Public facilities incl. school, station, clinic, etc.

Briefs of the System

Aim of the System

Area Division System is laid down which provides a basic framework to promote planned urban development and to prevent unsystematic urbanization. The system decides the framework of city planning, size and form of urban areas.

Framework of the System

There are 2 basic area divisions;

- Division of City Planning Area into Urbanization Promotion Area (UPA) and the Urbanization Control Area (UCA).
- Formulation of future image of city (Policies on Development, Improvement and Conservation).

Policies on Improvement, Development and Conservation – Future Image of the City Planning Area

- Goals of Area (population, industry, size of urban area, etc.)
- Long-term objectives and the realization policies on land use, urban development and redevelopment and transportation system and other public facilities, etc.
- Method and procedure for urban area development
- Policies on the prevention of urban disasters and pollution

The master plan is composed of a plan text describing relevant items and a map showing the contents (scale 1:10,000 – 1:25,000).

Purpose of the Area Division System

- To ensure economic benefits from urban activities by preventing urban sprawl and by controlling the shapes and sizes of land use allocation
- To ensure efficiency in public investments through clear prioritization of public investments and urban infrastructure development
- To prioritize and concentrate major urban infrastructure developments in the UPA within a specified time frame
- In UCAs, large public investments are, in principle, not allowed
- Land development or area subdivision for building construction in UCA is prohibited

Negative Impacts of Urban Sprawl

- Roads and waterworks facilities which require networking, becomes difficult, and efficient public investment cannot take place (reactive method)
- Cause a fragmented land development in a farmlands. Also, contaminated run-off from disorderly land development becomes critical for rice production
- Lost of natural landscape
- Traffic congestion

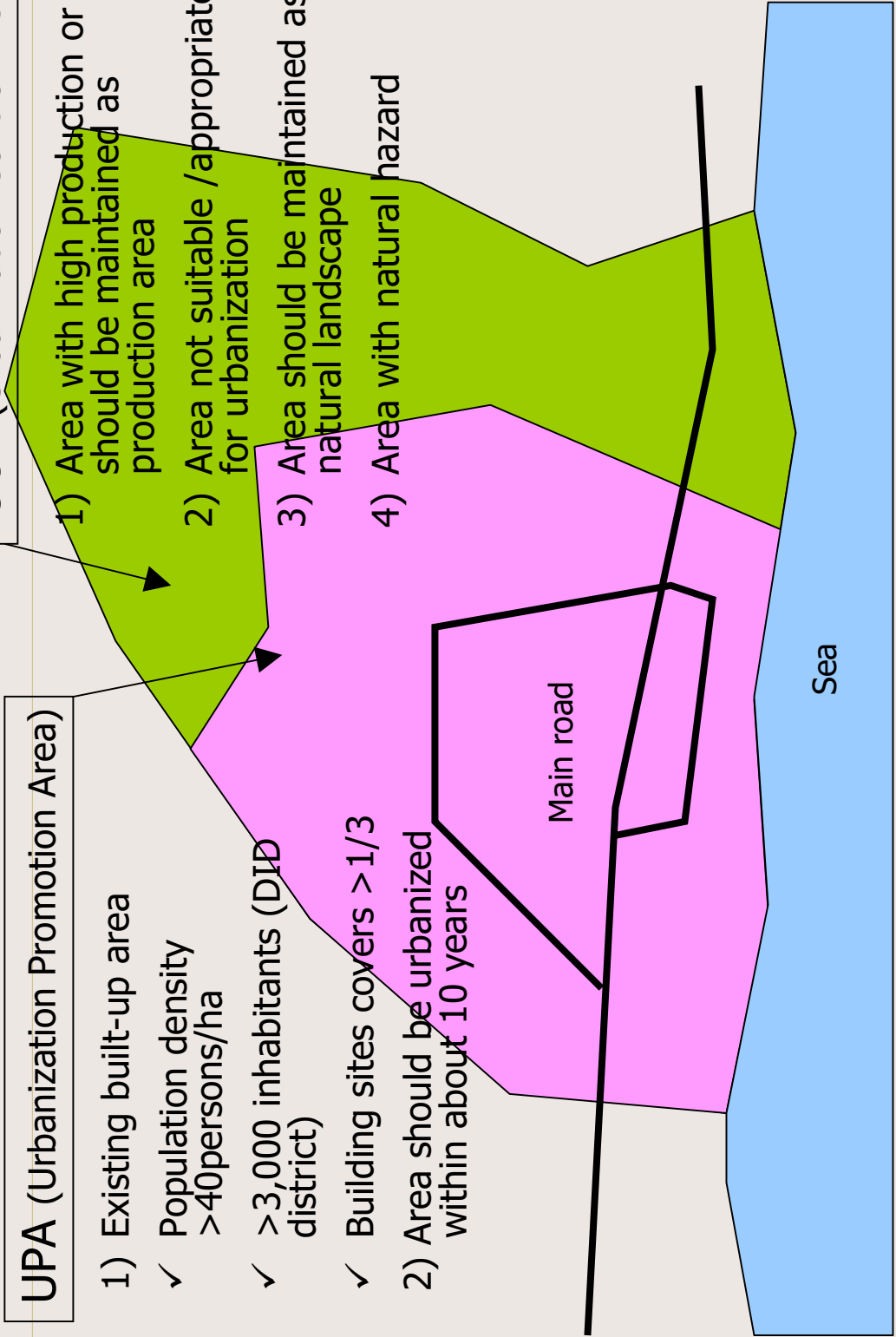
Area Division Criteria (Fig. A6)

UPA (Urbanization Promotion Area)

- 1) Existing built-up area
 - ✓ Population density >40persons/ha
 - ✓ >3,000 inhabitants (DID district)
 - ✓ Building sites covers >1/3
- 2) Area should be urbanized within about 10 years

UCA (Urbanization Control Area)

- 1) Area with high production or should be maintained as production area
- 2) Area not suitable / appropriate for urbanization
- 3) Area should be maintained as natural landscape
- 4) Area with natural hazard



UPA and UCA (Fig. A7)

	UPA (Urbanization Promotion Area)	UCA (Urbanization Control Area)
Policy	Areas which already form built-up area and which should be priority area for development in a planned manner, within an approx. period of 10-years.	Area where urbanization should be restrained
Purpose	Clear distinction of the built-up area and would-be built-up to facilitate efficient development	Prevention of uncontrolled development in forest and farmlands adjoining the existing built-up areas.
Administration	City planning administrations undertake the regulation of land use for urban purpose, the approval and development of public facilities, and implementation of urban development projects in the UPA, and control land development activities in the UCA.	Agricultural administration control conversion of farmland for other purposes and invest for agricultural promotion in the UCA.

Legal Effects of Area Division (Fig. A8)

	UPA (Urbanization Promotion Area)	UCA (Urbanization Control Area)
Land use control	Land use is controlled in accordance to Land Use District (zoning), etc. for orderly use of urban lands.	Land use is regulated by plans from the agricultural side. Land Use District (zoning) is not determined.
Public investment	Public facilities such as roads, parks, sewerage, etc. are approved and public investment will be actively carried out.	Public investment for the promotion of agriculture will be actively carried out.
Urban development project	Will be actively done.	Will not be done.
Land development permission	Approval for development project with an area of more than 1,000m is made by prefecture governor.	Except for large-scale developments, which are approved in exceptional cases, the development activities are strictly controlled.
Conversion of farmland	Mere report on the conversion is necessary.	Approval from the prefecture governor is necessary.
City planning tax	May be collected to generate revenue to fund city planning projects.	Can not be levied.

Basic Principles in the Approval of Area Division (Fig. A9)

①	Integrated Decision with Transportation Network Plan, etc.	Transportation network plan is made to correspond to traffic demand, and plans for necessary public facilities should be decided at the same time.
②	Securing Planned Urbanization	An area in UPA is only included when planned urbanization is ensured through the definitive projects .
③	Coordination with Agricultural Administration	<p>Following areas should not included in the UPA;</p> <ul style="list-style-type: none"> ● A large-scale agricultural use of high productivity with a consolidated area of 20ha. ● Areas where agricultural infrastructure projects are implemented or 8 years have not yet passed since completion of the project.