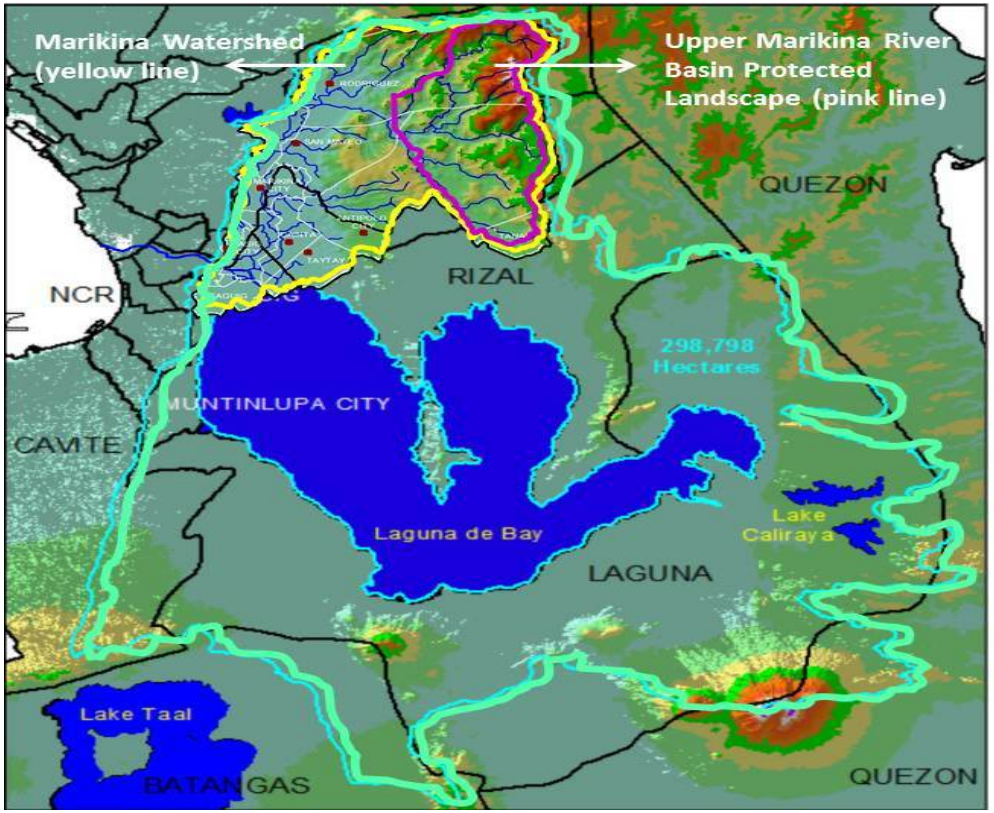
Climate Risk and Vulnerability Assessment (CRVA) in the Philippine Agriculture Sector Through the Ecotown Framework as Demonstrated in Upper Marikina River Basin Protected Landscape



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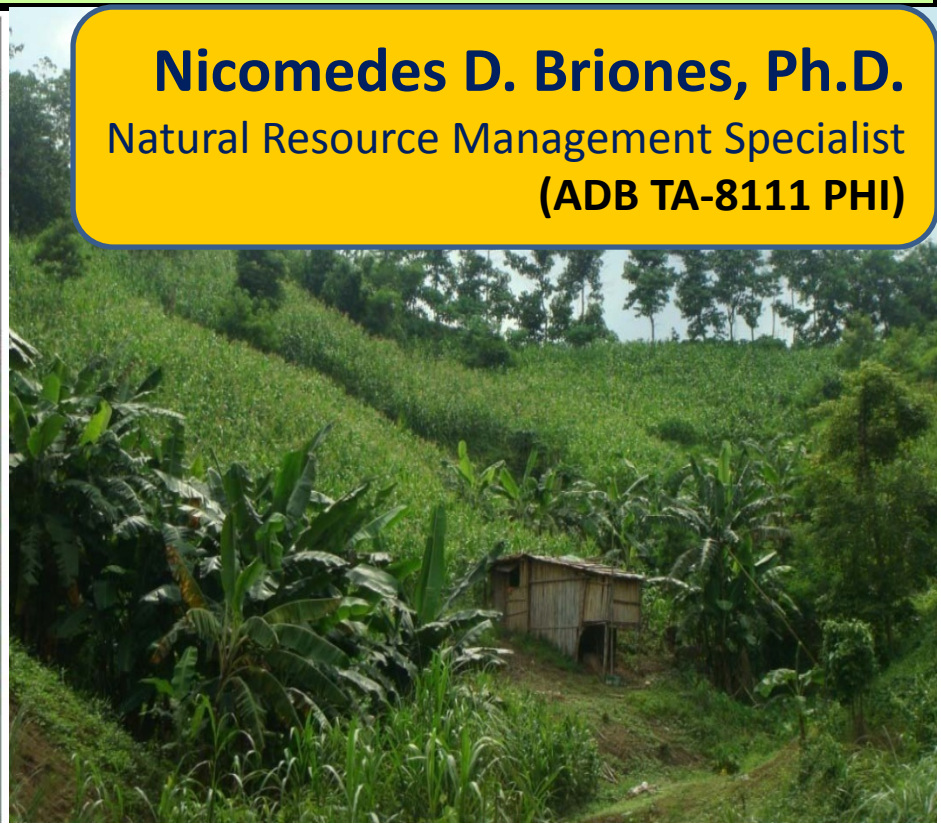
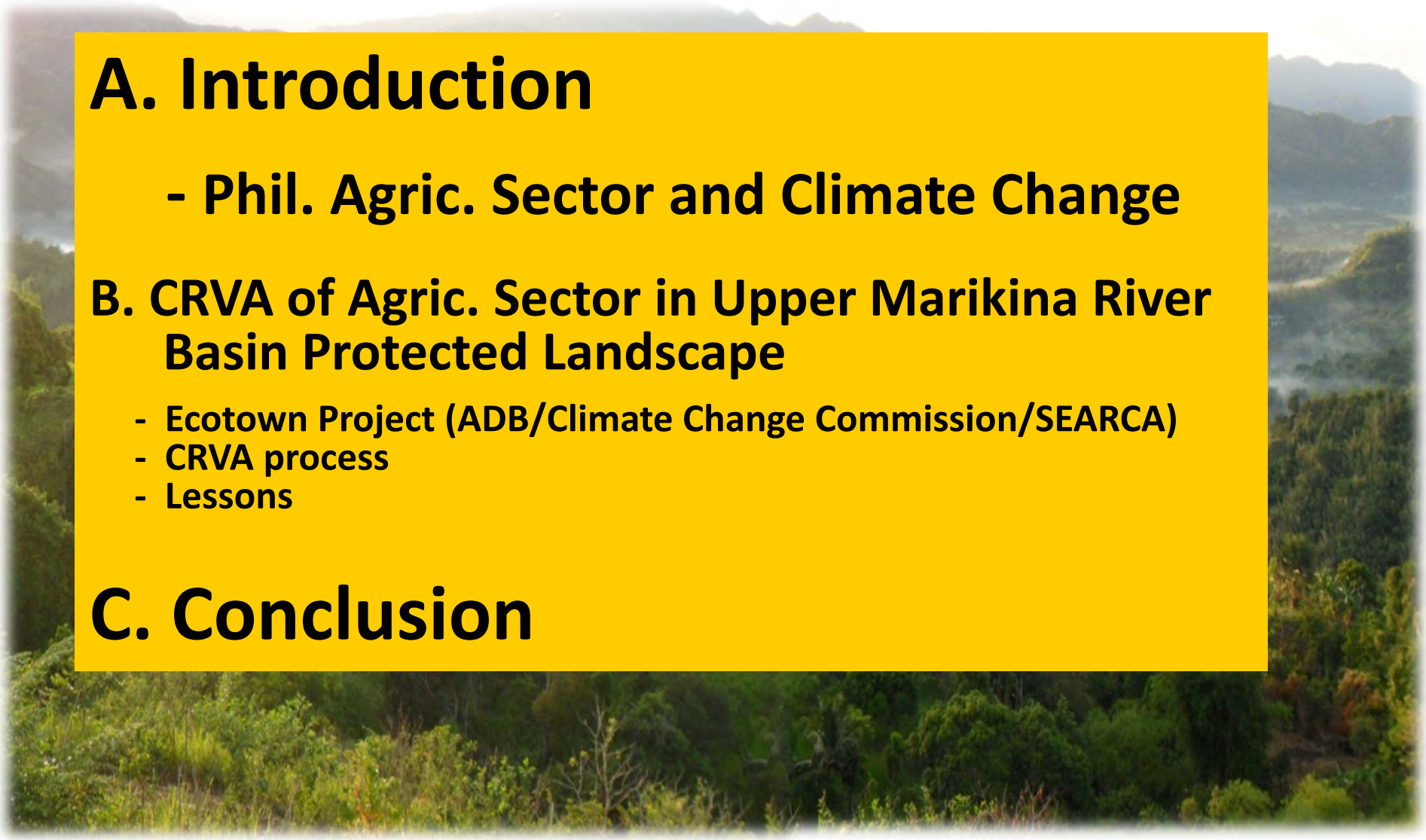
(ADB TA-8111 PHI)



Presentation Outline



A. Introduction

- Phil. Agric. Sector and Climate Change

B. CRVA of Agric. Sector in Upper Marikina River Basin Protected Landscape

- Ecotown Project (ADB/Climate Change Commission/SEARCA)
- CRVA process
- Lessons

C. Conclusion

Philippine Agriculture Sector (2014)

- **14% of Gross Domestic Product (GDP)**
- **32% (13 million workers) of the labor force**

3 Subsectors:

- **Crop (51.71% of total agric. production)**
- **Livestock (16.10%) and Poultry (14.54%)**
- **Fisheries (17.65%)**

Philippine Agriculture Sector

- **Major agricultural crops:** ***rice, corn, coconut, sugar cane, banana, pineapple, and mango.***
  Exports: coconut oil, banana, pineapple
- **Livestock & Poultry:** ***cattle, carabao (water buffalo), goat, swine, chicken, duck, dairy***
- **Fisheries :** ***Commercial, Municipal, and Aquaculture***

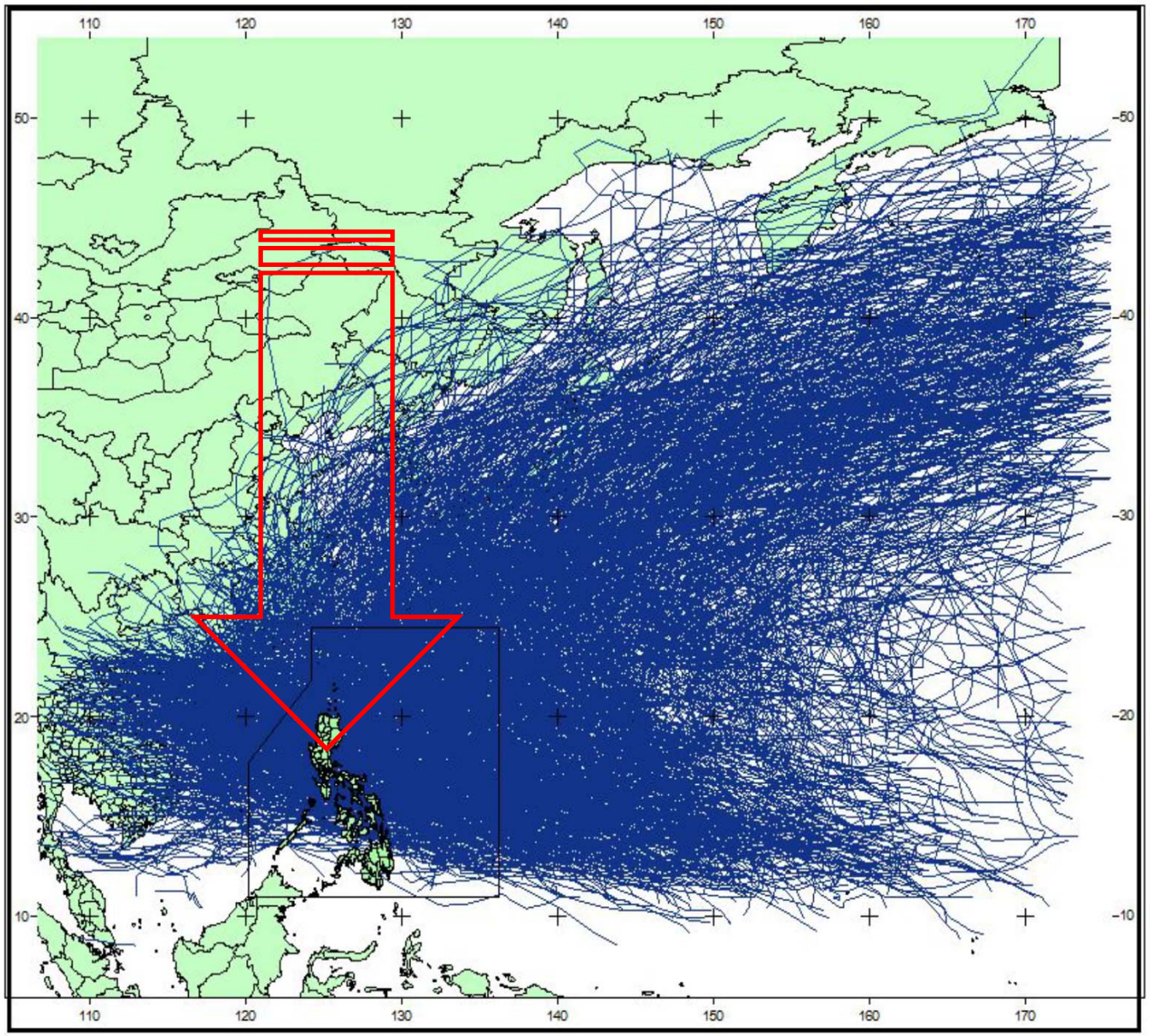
Phil. Agriculture and Climate Change

The Philippines is ranked highest in the world in terms of vulnerability to tropical cyclones.

and, third in terms of the population's exposure to floods and droughts.

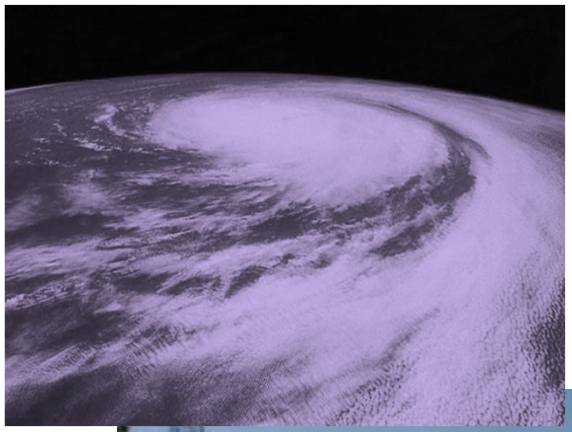
Tracks of Tropical Cyclones in the Western North Pacific from 1948 to 2010.

Source:
Japan Meteorological Agency:
http://www.jma.go.jp/).



Damage Values Due to Strong Typhoons, 1993-2013, Phils.

Year	Typhoon	Total Value of Damage (PhP Billion)
1993	Kadiang	8.75
1995	Rosing	10.80
1998	Loleng	6.79
2008	Frank	13.50
2009	Ondoy	11.00
2009	Pepeng	27.30
2010	Juan	8.49
2011	Pedring	15.00
2011	Sendong	2.07
2012	Pablo	36.95
2013	Yolanda	65.00
Total		205.65
Average (PhP billion/year)		18.70
Average (US$ billion/year)		.42



http://news.pia.gov.ph/index.php?article=1141391685813\

Value of Damages Due to Strong Typhoons, 1993-2013

Year	Typhoon	Total Value of Damage (PhP B)	Agriculture	
			Value (PhP B)	Percent (of total damage)
1993	Kadiang	8.75	7.19	82.2
1995	Rosing	10.80	9.04	83.7
1998	Loleng	6.79	3.70	54.5
2008	Frank	13.50	3.20	23.7
2009	Ondoy	11.00	6.77	61.5
2009	Pepeng	27.30	6.53	23.9
2010	Juan	8.49	7.55	88.9
2011	Pedring	15.00	4.19	27.9
2011	Sendong	2.07	1.00	48.3
2012	Pablo	36.95	26.53	71.8
2013	Yolanda	65.00	20.22	31.2
Total		205.65	95.92	54.3
Average (PhP billion/year)		18.70	8.72	
Average (US$ billion/year)		.42	.20	

http://news.pia.gov.ph/index.php?article=1141391685813\

Climate Risk and Vulnerability Assessment (CRVA) of the Agriculture Sector Through the Ecotown Framework as Demonstrated in Upper Marikina River Basin Protected Landscape, Rizal Province, Philippines

ADB TA-8111PHI

Climate Resilience and Green Growth in the Upper Marikina River Basin Protected Landscape: Demonstrating the Eco-town Framework (46225-001)

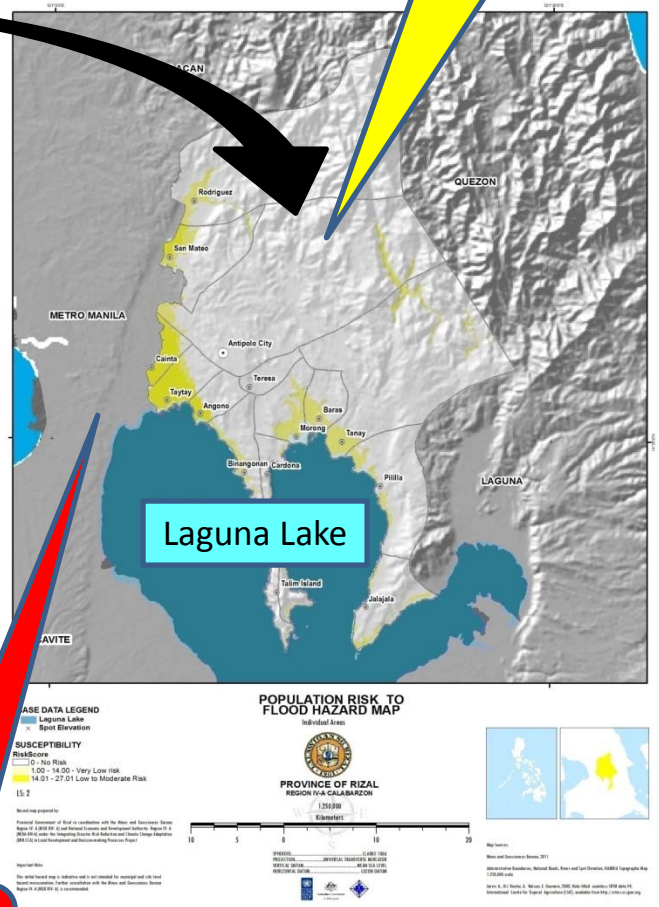
October 2012 – June 2015

Southeast Asia Department
Environment, Natural Resources & Agriculture Division, SERD

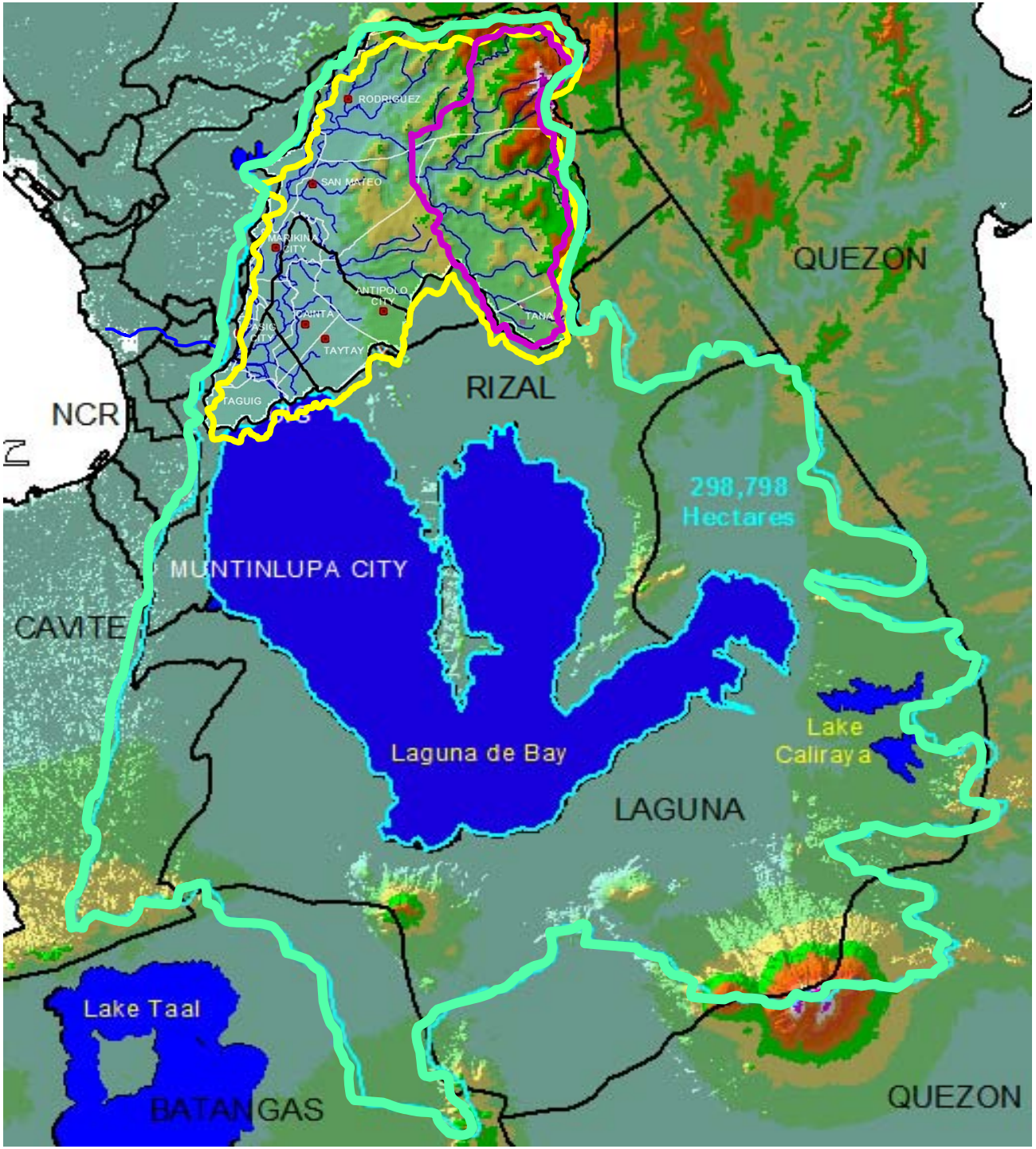
Responsible ADB Officer:
Ancha Srinivasan

PROJECT LOCATION

Upper Marikina River Basin



Metro Manila



Project Location

LEGEND:

Laguna De Bay Watershed (298,798 Hectares)

Marikina River Basin (57,409 hectares)

Upper Marikina River Basin Protected Landscape (26,125 ha)

a newly declared protected area under the category of protected landscape by virtue of Presidential Proclamation No. 296 (24 November 2011).

Project Objective

To enhance of the natural resource base of UMRBPL that would complement the ecotown's objective –

to develop economically prosperous and climate-resilient communities --

[5 on-site LGUs].

Figure 1 Satellite image of the town of Rodrigues, Rizal as published by Google-based open sources 2012

National Climate Change Action Program (NCCAP), Implementation at the Field Level:

Build adaptive capacities of communities and ecosystems

ECONOMICALLY RESILIENT

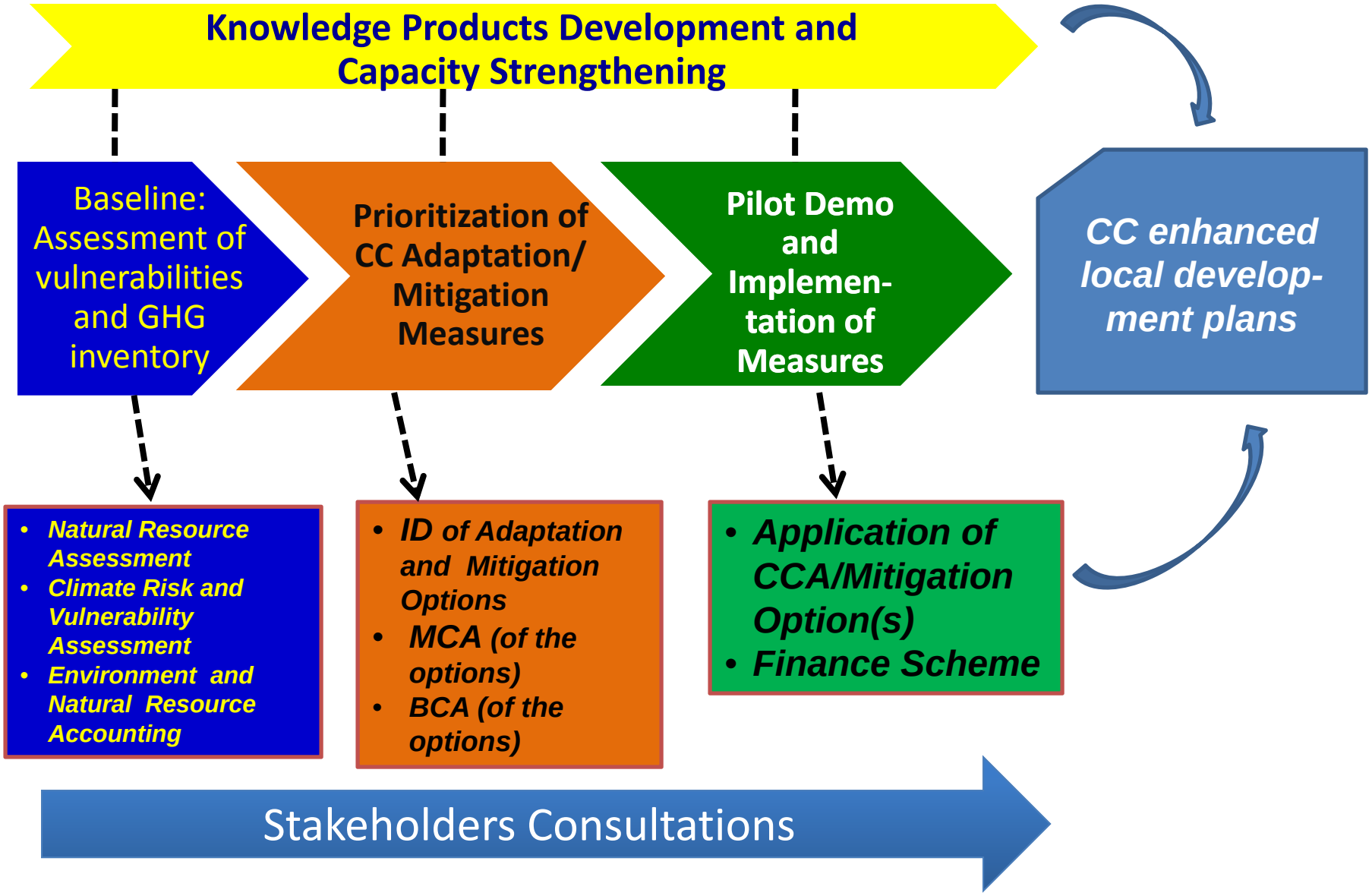
+

ECOLOGICALLY STABLE

→

ECO-TOWN

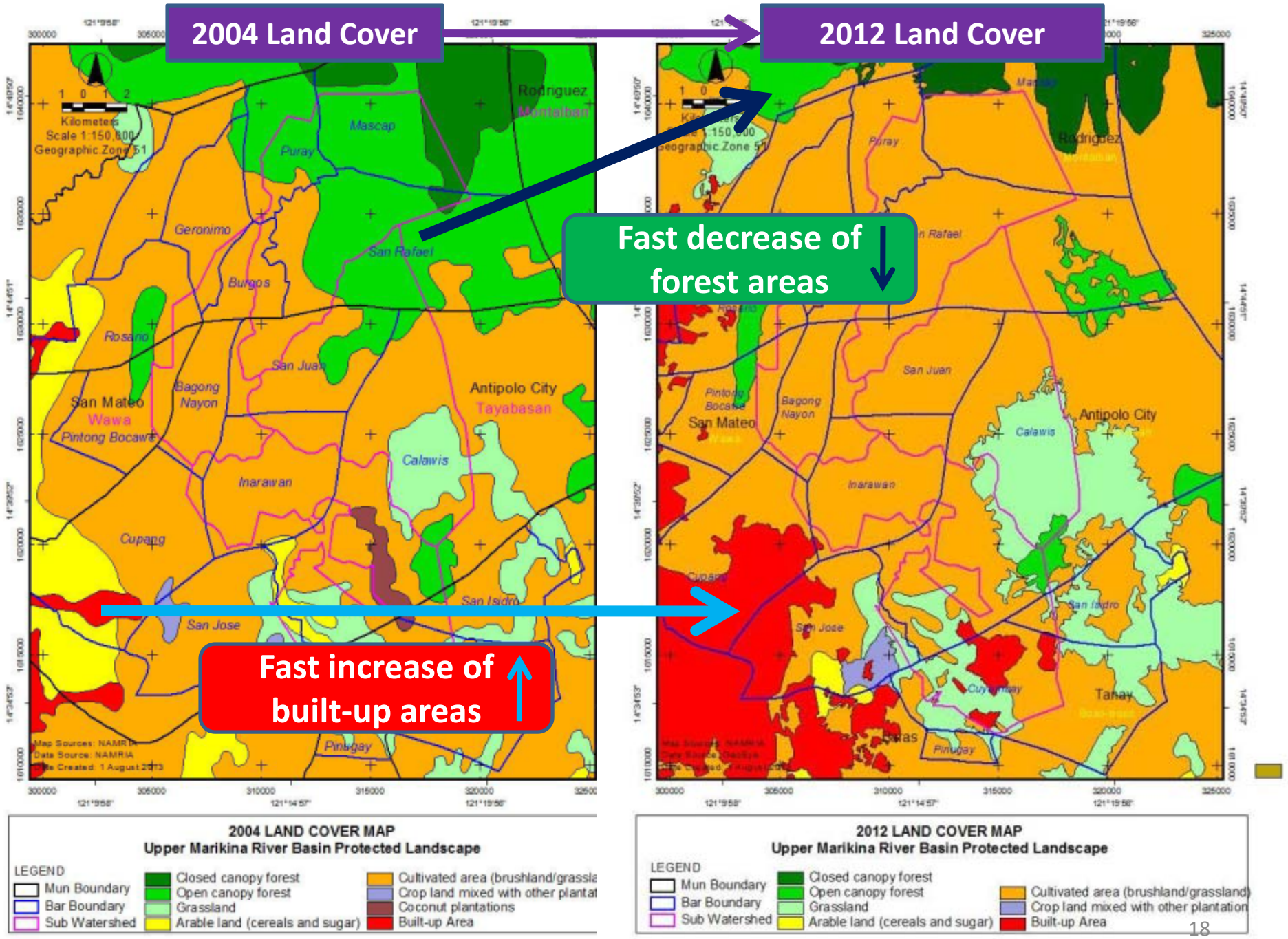
Project Components



The vulnerability assessment was conducted for the following UMRBPL's sectors:

- Water
- Forest
- Agriculture
- Social
- Transport

Baseline Conditions of *UMRBPL's Agricultural Resources*


2004 Land Cover
2012 Land Cover
Fast decrease of forest areas
Fast increase of built-up areas
Kilometers
Scale 1:150,000
Geographic Zone 51
Rodriguez
Montalban
Mascap
Puray
Geronimo
San Rafael
Burgos
Rosario
San Juan
Bagong Nayon
San Mateo
Wawa
Pintong Bocawe
Antipolo City
Tayabasan
Calawis
Inarawan
Cupang
San Isidro
San Jose
Pinugay
Tanay
Map Sources: NAMRIA
Data Source: NAMRIA
Date Created: 1 August 2013
2004 LAND COVER MAP
Upper Marikina River Basin Protected Landscape
LEGEND
Mun Boundary
Bar Boundary
Sub Watershed
Closed canopy forest
Open canopy forest
Grassland
Arable land (cereals and sugar)
Cultivated area (brushland/grassla
Crop land mixed with other plantat
Coconut plantations
Built-up Area
2012 LAND COVER MAP
Upper Marikina River Basin Protected Landscape
LEGEND
Mun Boundary
Bar Boundary
Sub Watershed
Closed canopy forest
Open canopy forest
Grassland
Arable land (cereals and sugar)
Cultivated area (brushland/grassland)
Crop land mixed with other plantation
Built-up Area

Baseline: Agricultural Resources

Generally, due to its rugged terrain, UMRBPL has limited areas for largescale crop production

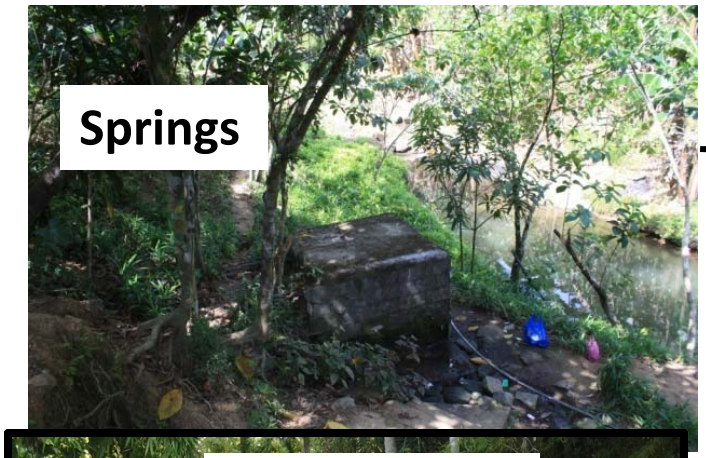
Around 14% (4,216.7 ha) of UMRBPL's total area is devoted to agriculture.

Baseline: Agricultural Resources

Slash and burn farming system (kaingin) is a common agricultural practice in the UMRBPL.

Charcoal making is prevalent in the kaingin areas.

Patches of farmlands in the floodpains are irrigated with water from springs & checkdams:



VULNERABILITY ASSESSMENT (VA) of *UMRBPL's Agricultural Resources*

VA of UMRBPL's Agriculture Sector

Climate change variables affecting UMRBPL's agricultural sector:

- ***Floods due to intense rainfall***
- ***Droughts***
- ***Rain-induced landslides***

UMRBPL's Agriculture VA to Drought:

Indicators	Weights
1. Sensitivity	0.30
2. Exposure	0.30
3. Adaptive Capacity	0.40
Total	100.00

UMRBPL's Agriculture VA to Drought: Sensitivity Indicators

Sensitivity Indicators (Weight = .30)	Weights
• Presence of river and streams	0.30
• Watershed conditions in terms of forest cover	0.30
• Dependence on irrigation	0.20
• Duration of drought	0.20

UMRBPL's Agriculture VA to Drought: Exposure Indicators

Exposure Indicators (Weight = .30)	Weights
• Extent of production areas affected by the last two occurrences of drought (in hectares)	0.30
• Quantity (MT) and value of yield losses (million pesos) due to drought in the last two occurrences of drought	0.35
• Extent of prime agricultural lands or SAFDZs affected (in hectares)	0.35

UMRBPL's Agriculture VA to Drought: Adaptive Capacity Indicators

Adaptive Capacity Indicators (Weight = .40)	Weights
• Small-scale irrigation program	0.30
• Crop diversification practices	0.25
• Livelihood diversification	0.25
• Cloud seeding program	0.20

Overall Vulnerability of UMRBPL's Agriculture Sector to Drought (by LGU)

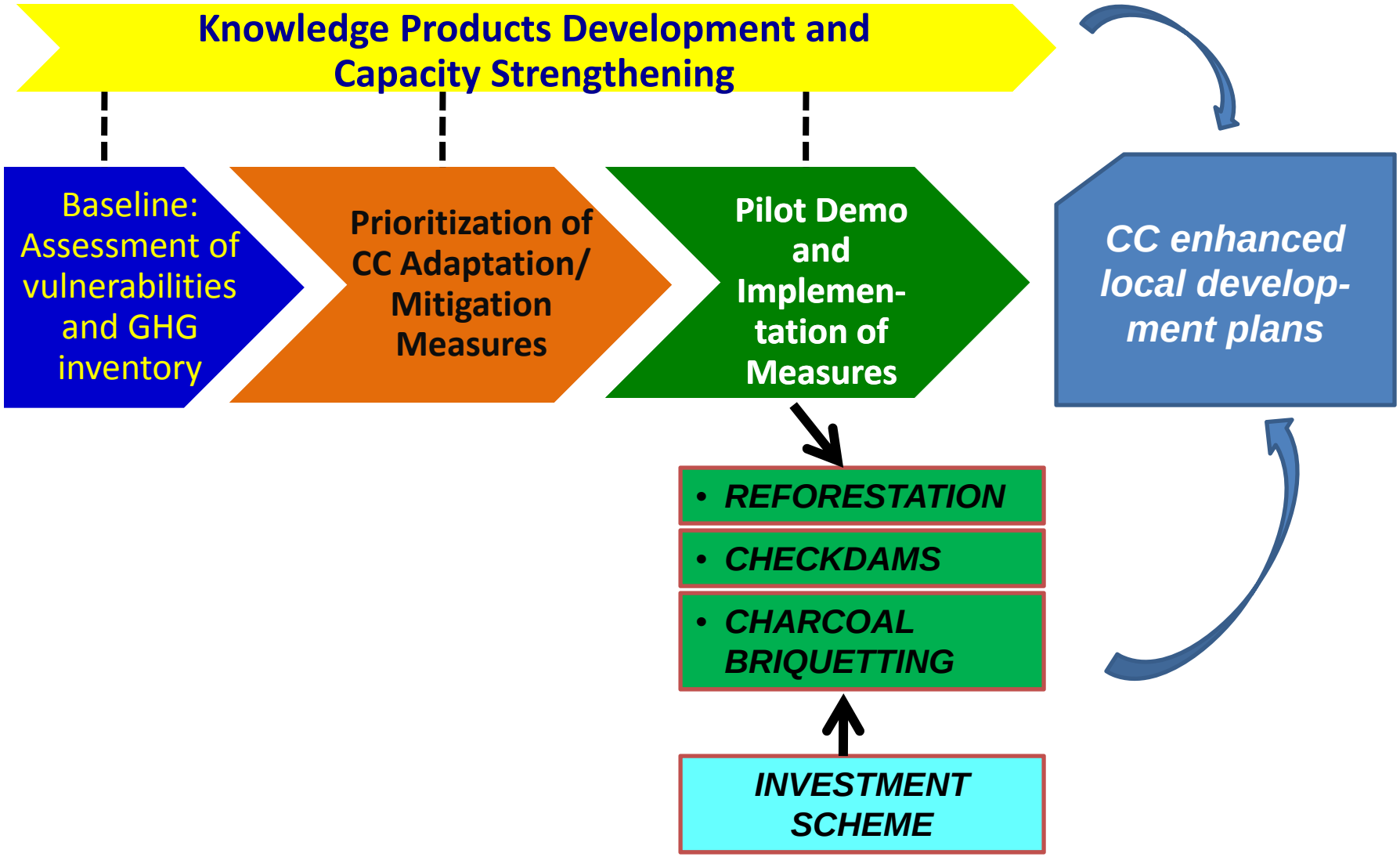
LGU	Vulnerability Type
Antipolo City	Type 1* (Less or not vulnerable)
Baras	Type 3*** (Medium vulnerable)
Rodriguez	Type 3*** (Medium vulnerable)
San Mateo	Type 2** (Quite vulnerable)
Tanay	Type 3*** (Medium vulnerable)

Overall Vulnerability of UMRBPL's Agriculture Sector to Drought (by LGU)

LGU	Vulnerability Type	Sensitivity Index	Exposure Index	Adaptive Capacity Index (ACI)
Antipolo City	Type 1*	Low	Low	High
Baras	Type 3***	Low	Medium	Medium
Rodriguez	Type 3***	Medium	High	Medium
San Mateo	Type 2**	Low	Medium	High
Tanay	Type 3***	Medium	Medium	Medium

* Type 1 (Less or not vulnerable)
** Type 2 (Quite Vulnerable)
*** Type 3 (Medium Vulnerable)

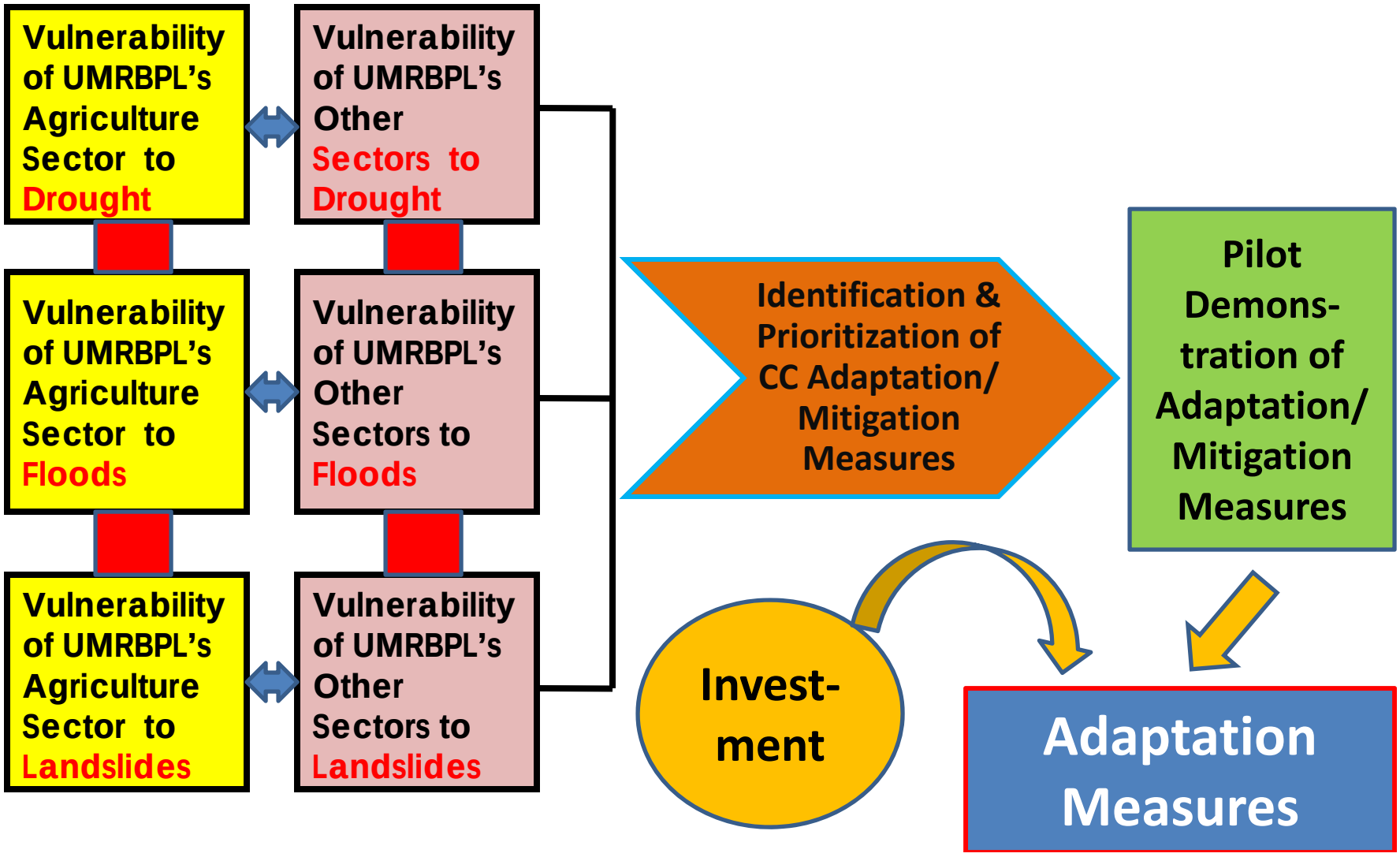
RESULTS

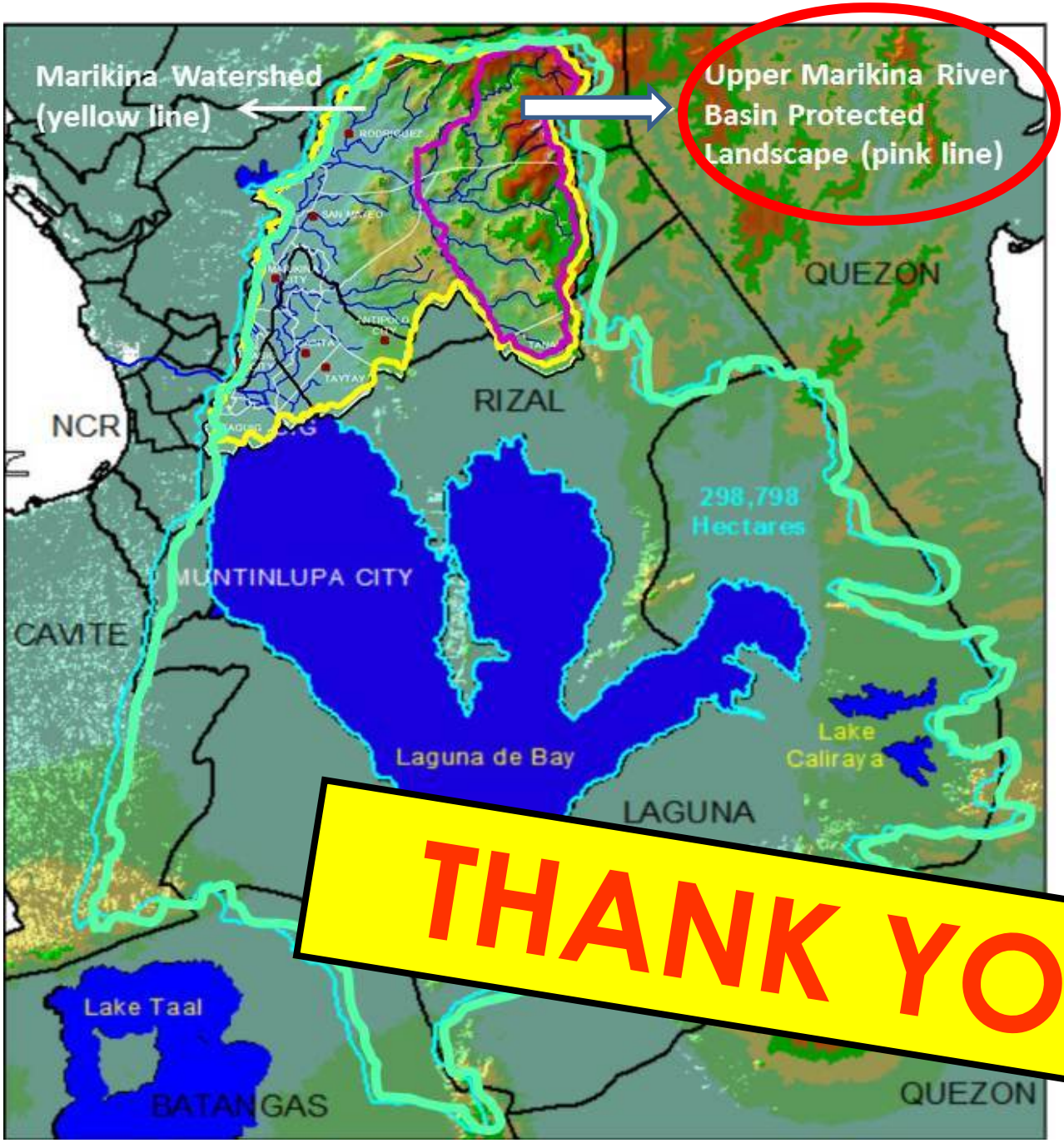

Knowledge Products Development and Capacity Strengthening
Baseline: Assessment of vulnerabilities and GHG inventory
Prioritization of CC Adaptation/ Mitigation Measures
Pilot Demo and Implemen-tation of Measures
CC enhanced local develop-ment plans
• REFORESTATION
• CHECKDAMS
• CHARCOAL BRIQUETTING
INVESTMENT SCHEME

Conclusion:

In the context of the ecotown framework, the climate risk and vulnerability assessment of the agriculture sector should be integrated with those of the other sectors for a holistic, watershed approach.

Integrating VA of Agriculture with VA of Other Sectors (Water, Forestry, Health, etc.) to come up with Adaptation/Mitigation Measures

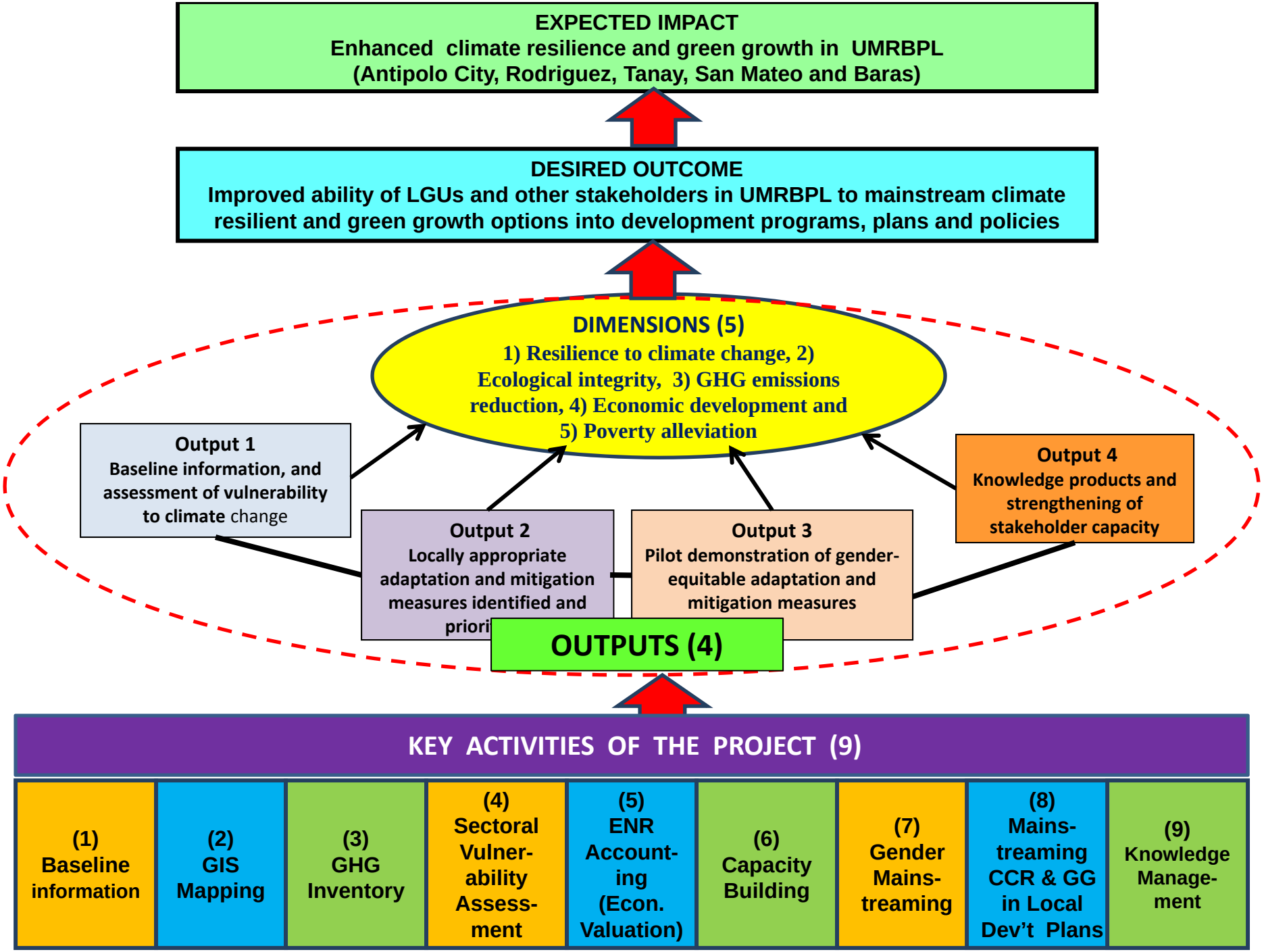




Ecotown UMRBPL

- Rodriguez
- Antipolo City
- San Mateo
- Baras
- Tanay

THANK YOU.


EXPECTED IMPACT
Enhanced climate resilience and green growth in UMRBPL
(Antipolo City, Rodriguez, Tanay, San Mateo and Baras)
DESIRED OUTCOME
Improved ability of LGUs and other stakeholders in UMRBPL to mainstream climate resilient and green growth options into development programs, plans and policies
DIMENSIONS (5)
1) Resilience to climate change, 2) Ecological integrity, 3) GHG emissions reduction, 4) Economic development and 5) Poverty alleviation
Output 1
Baseline information, and assessment of vulnerability to climate change
Output 2
Locally appropriate adaptation and mitigation measures identified and priori
Output 3
Pilot demonstration of gender-equitable adaptation and mitigation measures
Output 4
Knowledge products and strengthening of stakeholder capacity
OUTPUTS (4)
KEY ACTIVITIES OF THE PROJECT (9)
(1) Baseline information
(2) GIS Mapping
(3) GHG Inventory
(4) Sectoral Vulner-ability Assess-ment
(5) ENR Account-ing (Econ. Valuation)
(6) Capacity Building
(7) Gender Mains-treaming
(8) Mains-treaming CCR & GG in Local Dev't Plans
(9) Knowledge Manage-ment

VA of UMRBPL's Agriculture Sector

UMRBPL's agricultural sector VA identified the most vulnerable agricultural areas, how these areas are affected, the determination of adaptation strategies and interventions that will enhance their resilience.

VA example-Drought: Sensitivity Indicators

Biophysical, socio-economic Aspects	Weights	Description of the indicators
Sensitivity Indicators (Weight = .30)		
Presence of river and streams	0.30	The extensive network of rivers and streams could help mitigate the adverse impacts of droughts. These water bodies can serve as additional source of irrigation water for crop and livestock production in times of severe droughts.
Watershed conditions in terms of forest cover	0.30	Watersheds with good vegetative cover act as regulators of water release in times of droughts. Such watersheds would provide agricultural communities with ample water supply during droughts.
Dependence on irrigation	0.20	The presence of operational and efficient irrigation facilities addresses the crop's water requirements during droughts.
Duration of drought	0.20	The length of period of drought occurrence would affect the crops' growth and productivity. Long drought periods may wilt the crops permanently.

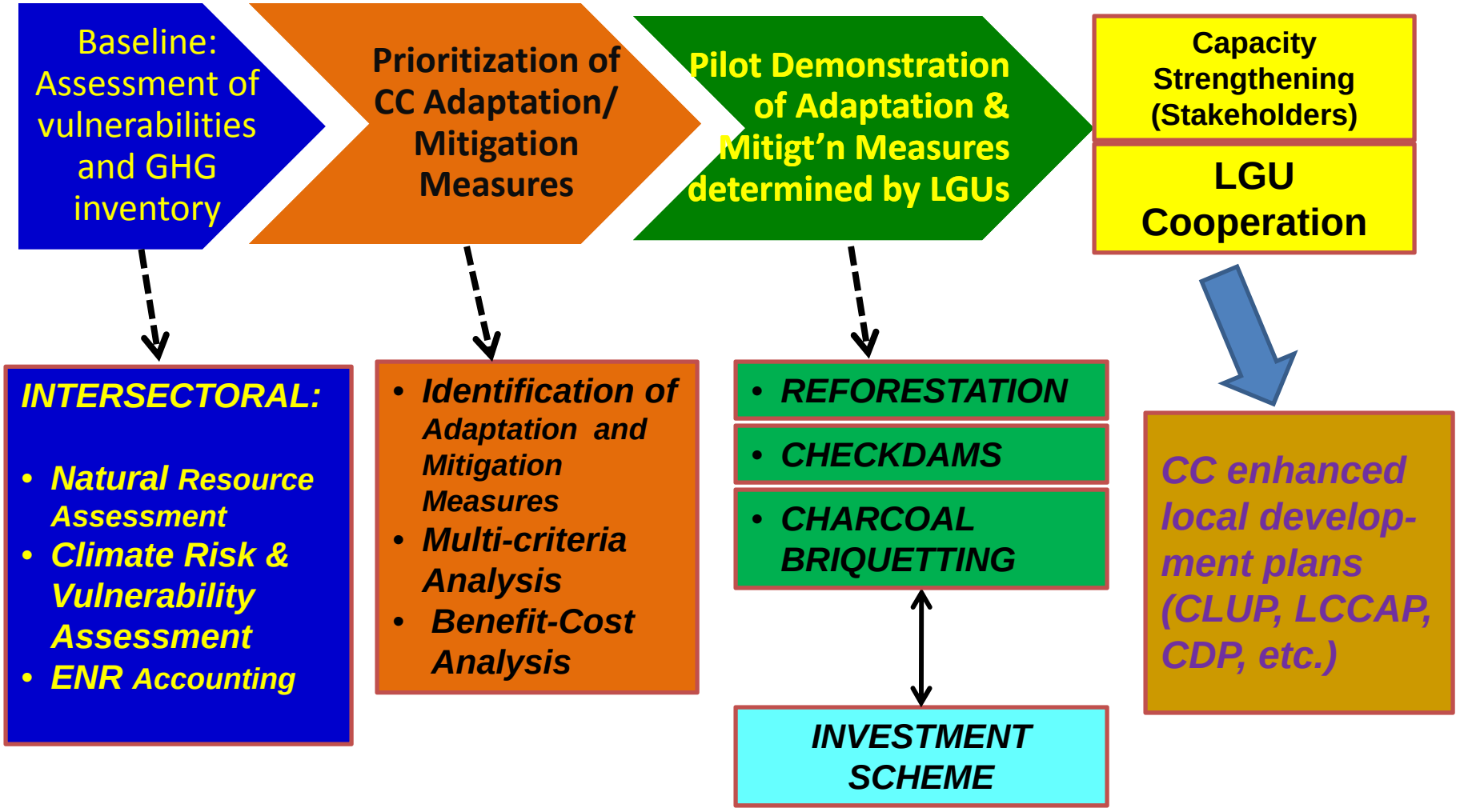
VA example-Drought: Exposure Indicators

Biophysical, socio-economic data	Weights	Description of the indicators
B. Exposure Indicators (Weight = .30)		
Extent of production areas affected by the last two occurrences of drought (in hectares)	0.35	The average area of crop production affected by two occurrences of droughts (such as the 1998 El Niño phenomenon and the 2005 drought). The basis would be the percentage of the affected area in relation to the total crop production area in the LGU or community.
Quantity (MT) and value of yield losses (million pesos) due to drought in the last two occurrences of drought	0.35	The average yield loss and the corresponding average value should be estimated. Both the total and per hectare figures should be relfected.
Extent of prime agricultural lands or SAFDZs affected (in hectares)	0.30	The identified Strategic Agriculre and Fisheries Development Zones (SFDZ) within the locality should be assessed in terms of the effects of droughts areawise.

VA example-Drought: Adaptive Capacity Indicators

Biophysical, socio-economic data	Weights	Description of the indicators
C. Adaptive Capacity Indicators (Weight = .40)		
Small-scale irrigation program	0.30	Availability of small water impoundments in rivers and streams and shallow tubewell and deepwell pumps.
Crop diversification practices	0.25	Growing of drought tolerant crops as well as mixed cropping.
Livelihood diversification	0.25	Additional livelihood activities in times of droughts such off-farm and non-farm employment.
Cloud seeding program	0.20	Provision of the government's improved cloud-seeding programs during prolonged droughts.

CONCLUSION


Baseline: Assessment of vulnerabilities and GHG inventory
Prioritization of CC Adaptation/ Mitigation Measures
Pilot Demonstration of Adaptation & Mitigt'n Measures determined by LGUs
Capacity Strengthening (Stakeholders)
LGU Cooperation
INTERSECTORAL:
• Natural Resource Assessment
• Climate Risk & Vulnerability Assessment
• ENR Accounting
• Identification of Adaptation and Mitigation Measures
• Multi-criteria Analysis
• Benefit-Cost Analysis
• REFORESTATION
• CHECKDAMS
• CHARCOAL BRIQUETTING
INVESTMENT SCHEME
CC enhanced local develop-ment plans (CLUP, LCCAP, CDP, etc.)

Conclusion:

UMRBPL's agriculture sector reacts to climate change factors such as droughts, floods and rain-induced landslides. The agricultural sector of some LGUs are more resilient than those of the others. As a case in point, Antipolo City's agricultural sector, despite its diminished role in the City's economy, can withstand droughts, floods and rain-induced landslides. This is a result of the many interacting factors, both biophysical and socioeconomic support systems.

Conclusion:

The following adaptation measures to address CC impacts for the LGUS to adapt in UMRBPL are the results of all the sectoral CRVAs:

- **reforestation,**
- **construction of check dams, and**
- **charcoal briquetting**