ANNEX C DAY 1 PRESENTATIONS

Annex C1

CLIMATE CHANGE
Challenge and Opportunities in the Philippine

Esteban C. Godilano, Ph.D.
and
Eliseo R. Ponce, Ph.D.
International Consultants
GIS/RS Expert and Institutional Development Expert

Presented to the Seminar-Workshop on Mainstreaming Climate Change: Adaptation and Mitigation Initiative in Agriculture. October 22-24, 2013. Holiday Inn Hotel. Makati City, Philippines.

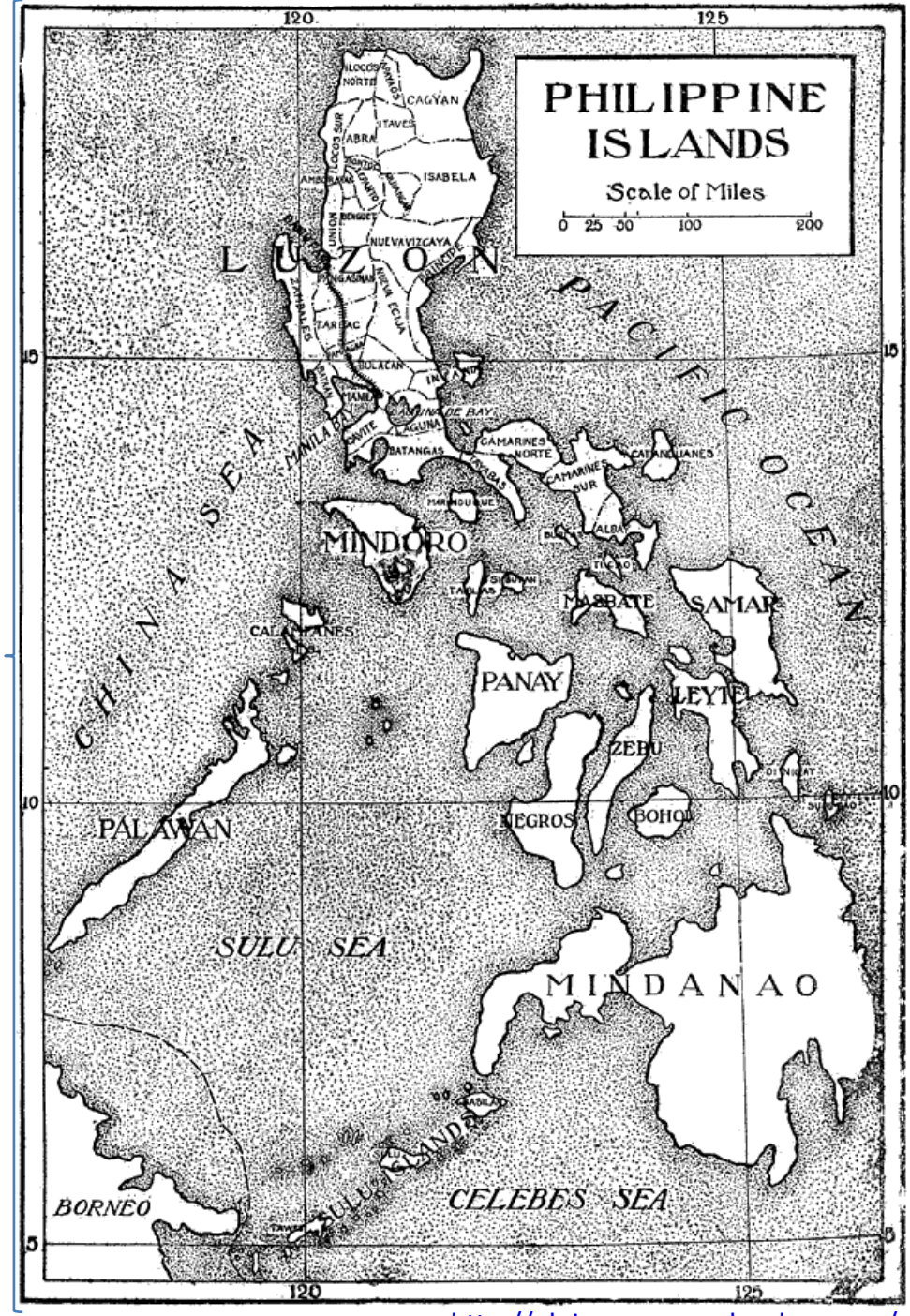
LIFE IN THE FOREST
1st Prize UN School Children Painting Contest 2011 Out of 4M paintings, 99 countries Painted by: Trisha Reyes: 13 Years Old Gagalanging Tondo, Manila Philippines St. Stephens High School

Presentation Outline

1. Where we are, the challenge
2. Philippine Agriculture and Fisheries
3. Impacts of climate change to agriculture and the DA climate smart agriculture (CSA) initiatives
4. The AMIA way
5. Conclusion

CALAGUAS ISLAND. Camarines Norte, Philippines by Dean Ignacio (philippinegems.com)

- 300,000 sq km land area
- 32,400 km discontinuous coastline
- 17,000 km vulnerable to tidal surges due to high population density
- 66% of typhoon originate In the Western North Pacific Basin
- 20 average typhoon events per year;
  - 5-7 of which can be very destructive
- Lies along the Western Pacific Ring Rim of Fire
- One of the world's most natural disaster-prone countries due to a combination of high incidence typhoons, floods, landslides, drough ts, volcanoes, and earthquakes.



http://ph.images.search.yahoo.com/

THE CHALLENGE

(WB, FAO, UNDP 2012)

How to feed 9 billion people in 2050

- Global food production must rise by at least 70% by 2050.
- Climate change in South and South-east Asia is expected to reduce agricultural productivity by as much as 50% during the next three decades.
- Impacts in Southeast Asia (ADB 2009)
  - increased frequency and intensity of extreme weather events;
  - declining crop yields;
  - loss of rich forests;
  - damage to coastal resources;
  - increased outbreaks of diseases; and
  - economic losses and human suffering
- "The poor who have had very little to do with causing global warming will suffer the most" (WB 2013)

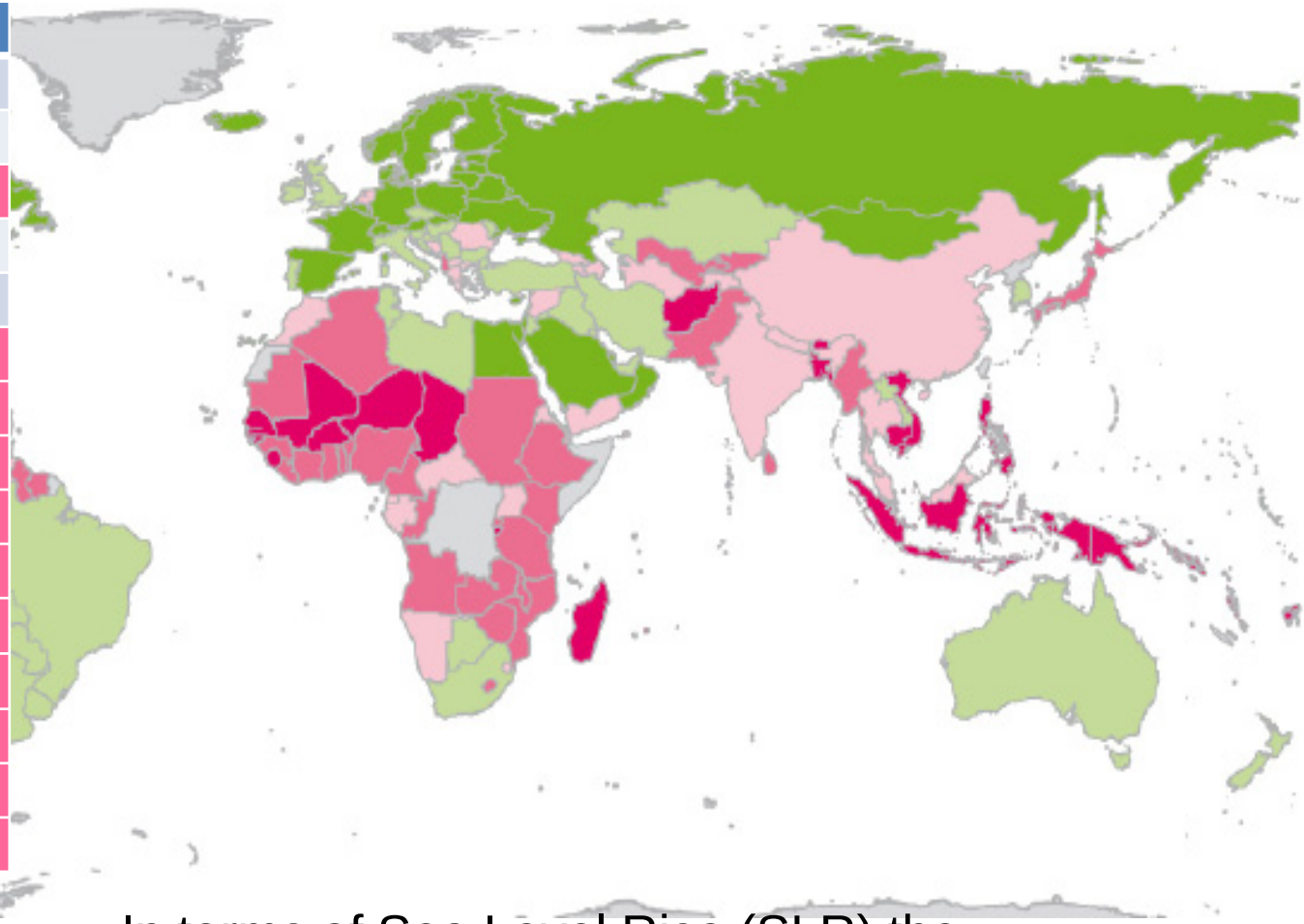
9th in 2009
6th in 2010

World Risk Index Report 2011

Source: UNU IEHS (Sept 26,2011)

http://ihrrblog.org/2011/09/26/2011-un-world-risk-index/

Rank	Country	Risk (%)
1	Vanuatu	32.00
2	Tonga	29.08
3	Philippines	24.32
4	Solomon Islands	23.51
5	Guatemala	20.88
7	Timor-Leste	17.45
9	Cambodia	16.58
14	Brunei Darussalam	14.08
28	Indonesia	11.69
34	Vietnam	11.21
57	Myanmar	8.54
85	Thailand	6.86
91	Malaysia	6.69
104	Lao PDR	5.80
153	Singapore	2.85



- In terms of disaster the Philippines is No.1
- In terms of Sea Level Rise (SLR) the Philippines is No.5 affecting 14 M people

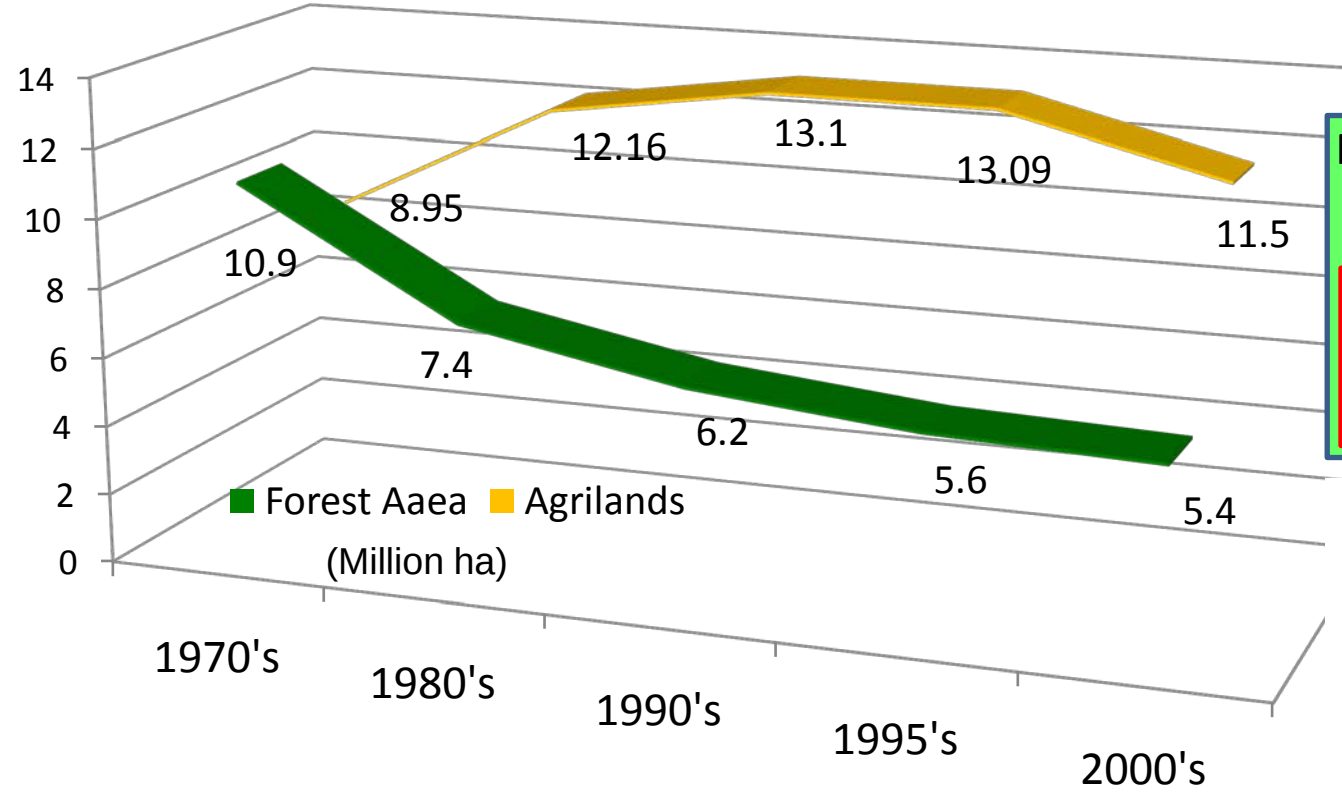
Philippine Agriculture and Fisheries

- Accounted for 11% of the 2012 GDP, at constant prices
- Employs 12.27 million persons, representing 33% of the country's total employment (the biggest employer in the country)
- If the whole agriculture value chain is considered, A and F contribution to GDP and total employment would be 35% and 50%.

Land Conversion in the Philippines

Changes in forest and agricultural lands, Philippines, 1970–2000

(Source: *DENR-EMB* 2002)



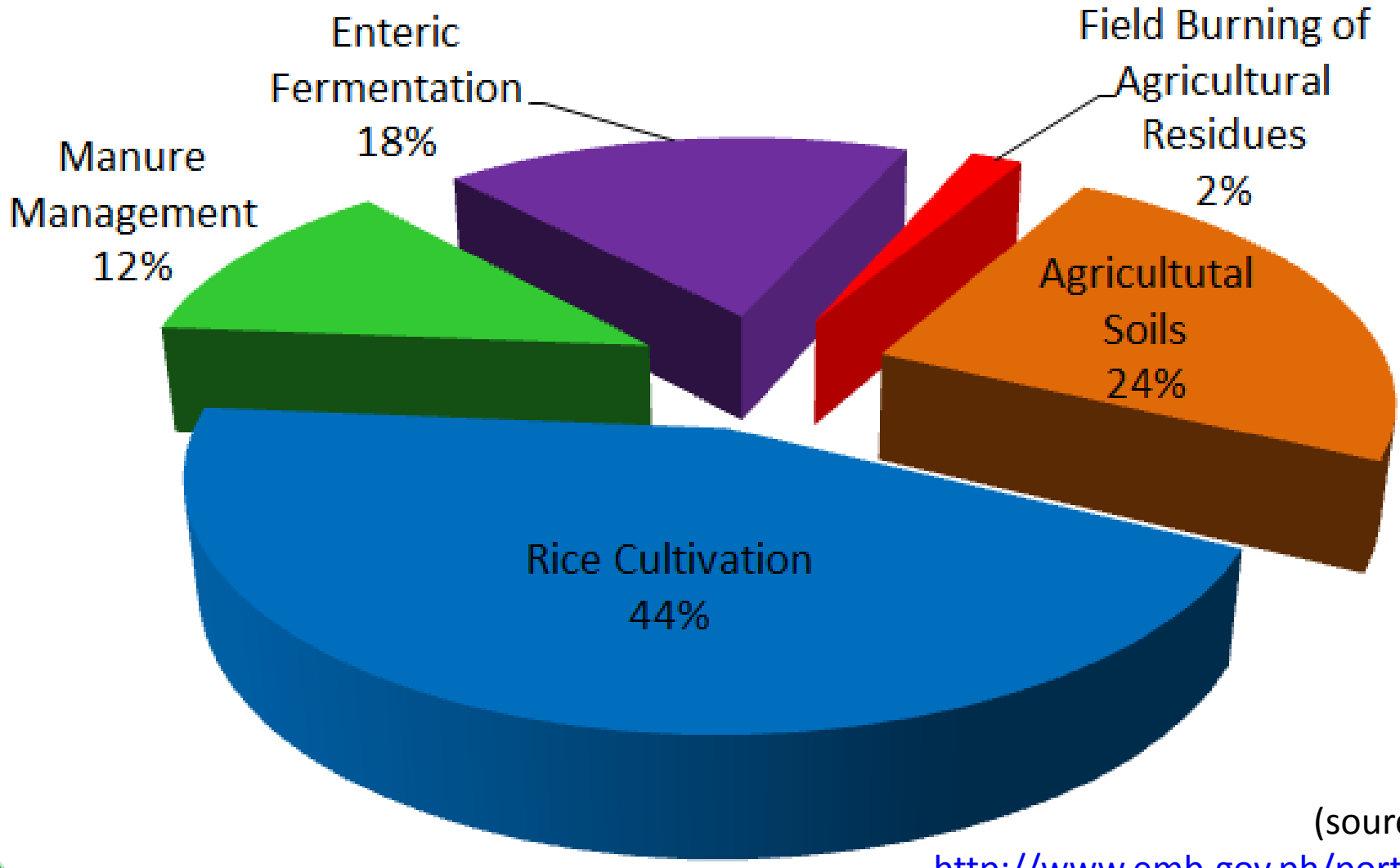
Production Function

1. Area (ha)
2. Yield/unit area
3. Cropping intensity

Anchored on a 1.8% annual population growth target, by 2050 we would have grown to **180 M.**

Forest cover in the country has been continually decreasing over the years, from 26% in 1970 to only 18% in 2000. This implies that forest land conversion into other land uses such as agricultural, residential, commercial, and industrial uses have been very rapid in the last three decades.

Philippine Agriculture GHG Emission (2000)

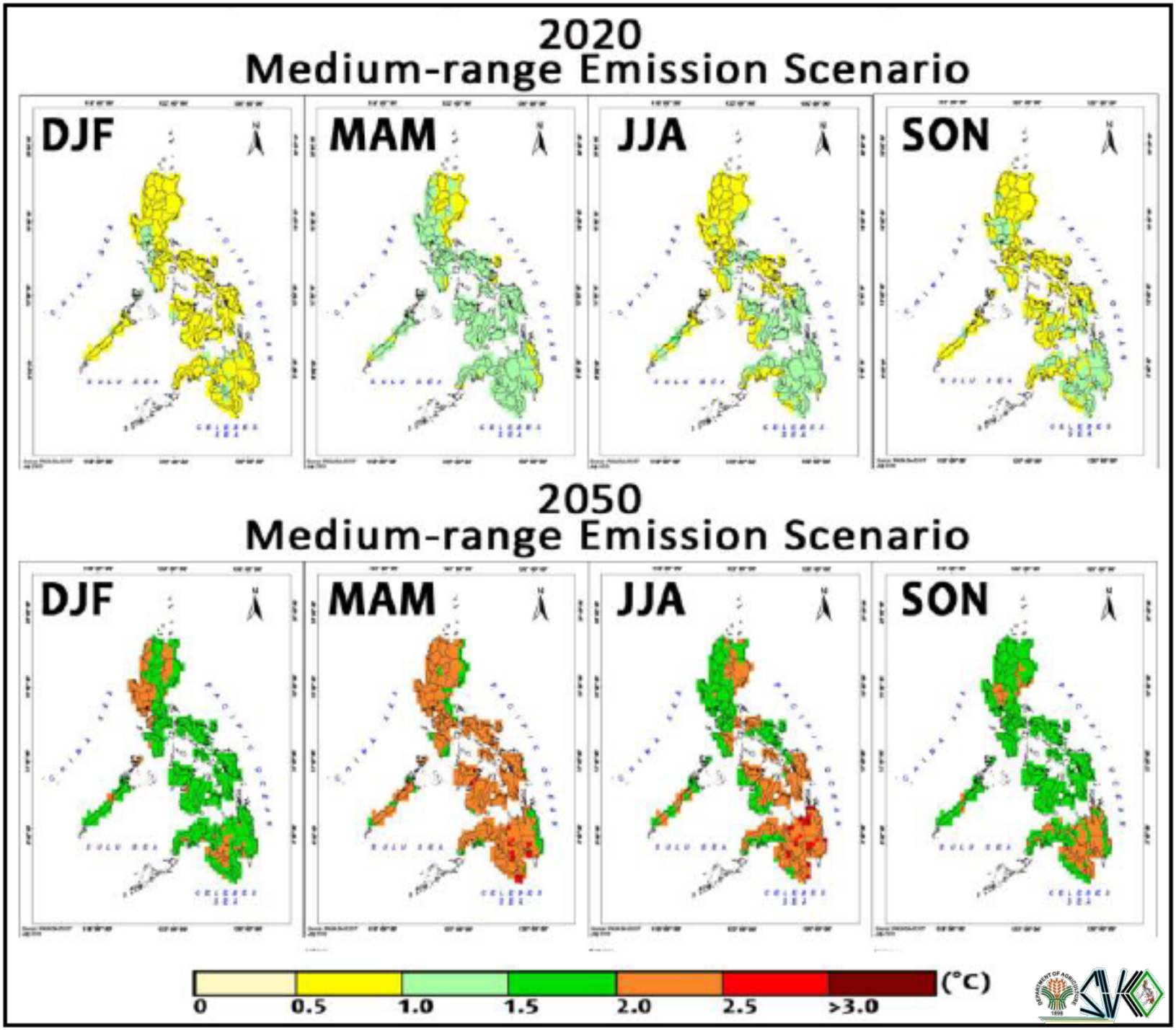


(source: http://www.emb.gov.ph/portal)

Slow Onset Temperature Change Scenarios

All areas of the Philippines **will get warmer**, more so in the relatively warmer summer months.

Largest temperature increase is projected during the MAM.



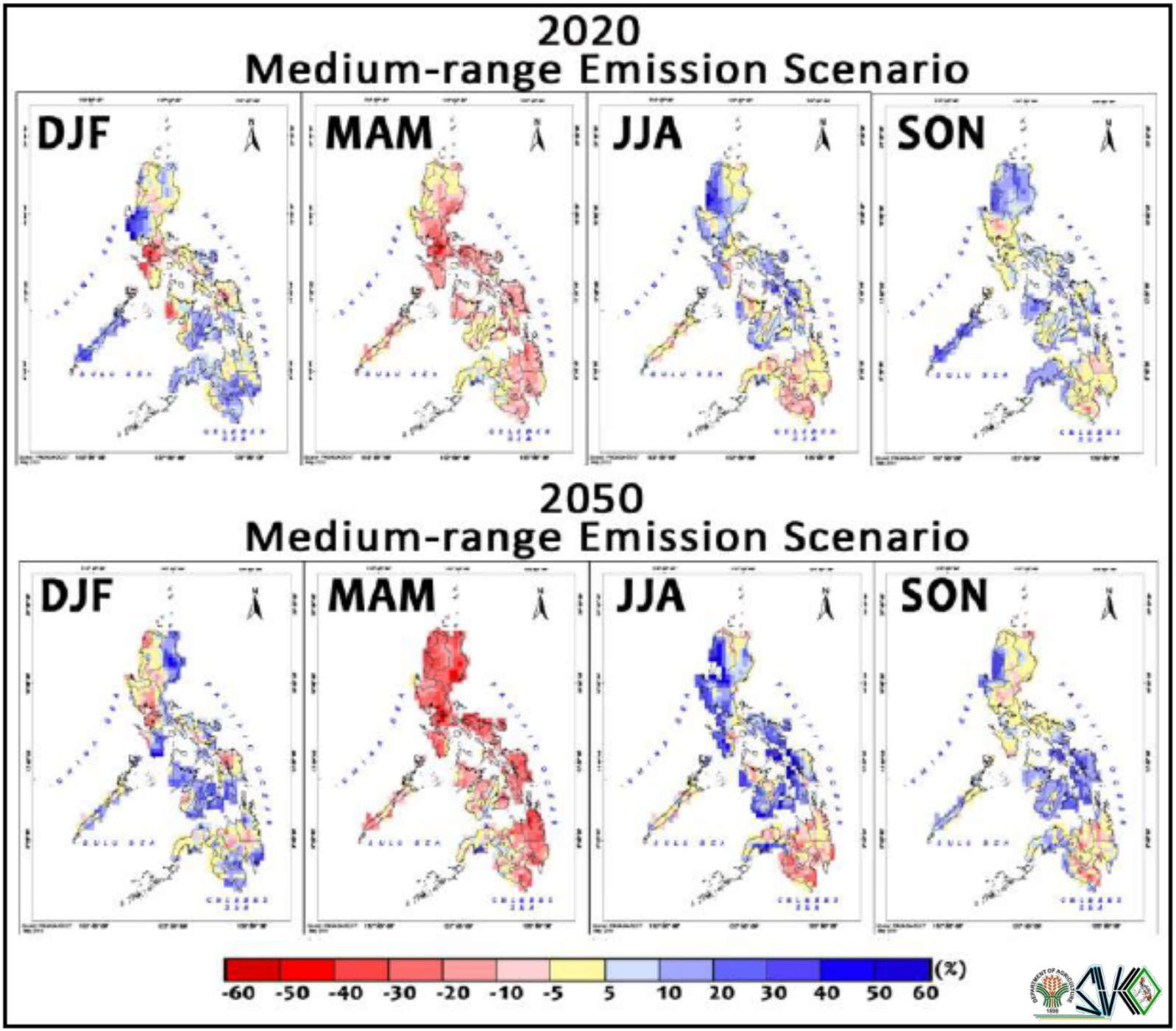
Source: PAGASA 2011

Slow Onset Rainfall Change Scenarios

Rainfall decrease in most parts of the country during the MAM season.

Rainfall increase is likely during JJA until SON in Luzon and Visayas, and during DJF

Generally decreasing trend in rainfall in Mindanao, especi ally by 2050.

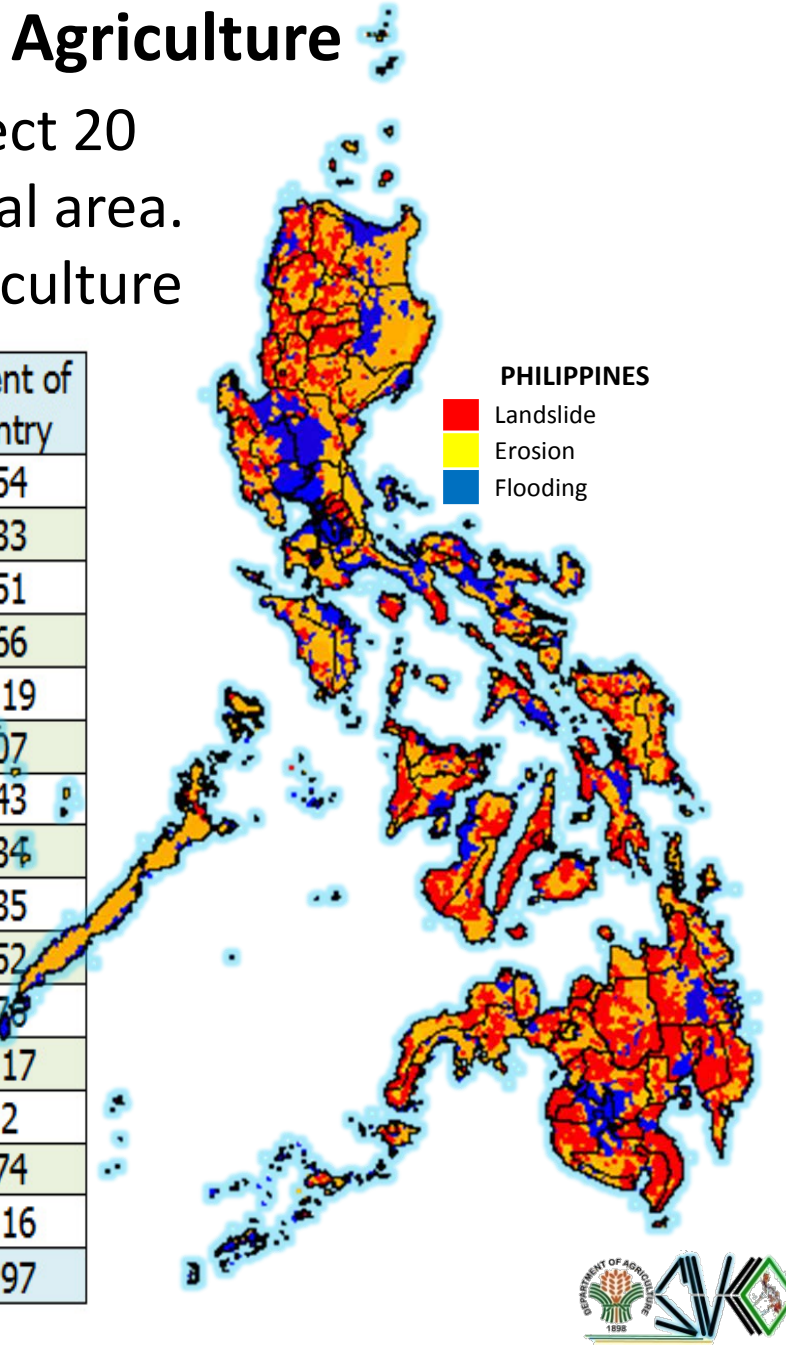


Source: PAGASA 2011

Extreme Impacts of climate change to Agriculture

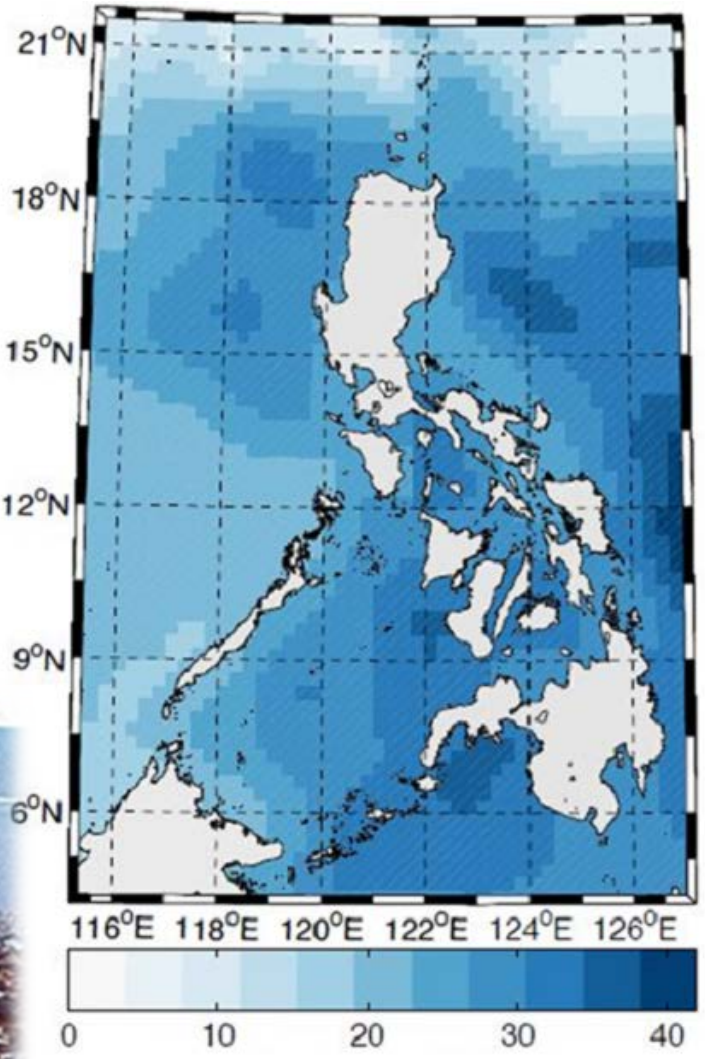
- Landslides, drought and flooding will affect 20 million hectares (67%) of the country total area.
- Approximately 10.2 m ha or 80% are agriculture

Code	Description	Hectares	Percent of Country
1	Drought + Flooding + Landslide + SAFDZ	162,098.58	0.54
2	Drought + Landslide + SAFDZ	397,715.25	1.33
3	Flooding + Landslide + SAFDZ	151,605.21	0.51
4	Drought + Flooding + SAFDZ	2,597,893.53	8.66
5	Drought + SAFDZ	3,358,360.89	11.19
6	Flooding + SAFDZ	2,720,264.80	9.07
7	Landslide + SAFDZ	729,550.58	2.43
8	Drought + Flooding + Landslide	101,732.60	0.34
9	Drought + Landslide	703,825.30	2.35
10	Flooding + Landslide	155,947.01	0.52
11	Drought + Flooding	1,129,297.76	3.76
12	Dry Land Only	4,549,601.28	15.17
13	Flooding Only	1,560,165.01	5.2
14	Landslide Only	1,723,463.33	5.74
15	SAFDZ only (not affected)	4,248,134.32	14.16
	Total	24,289,655.44	80.97

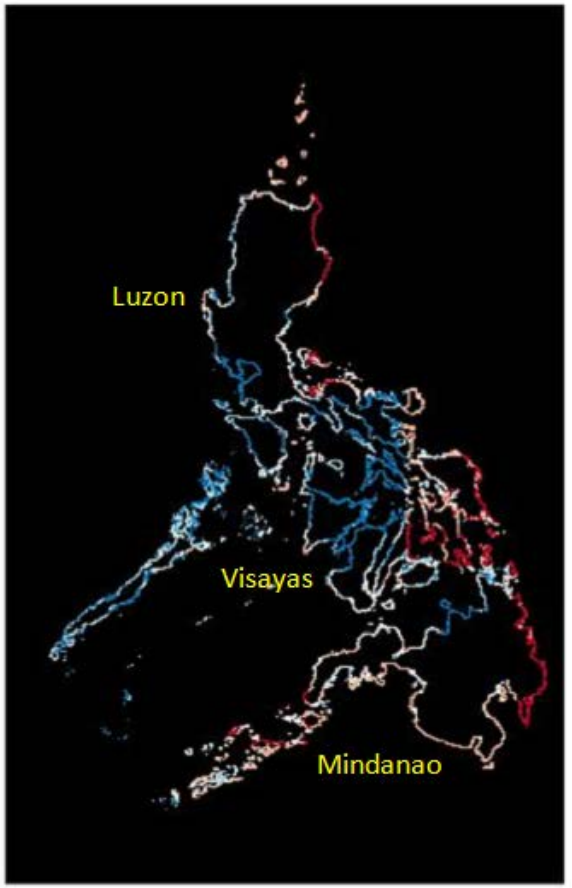


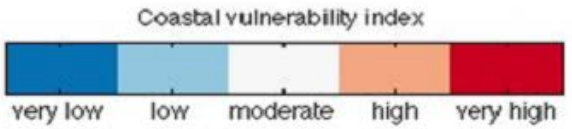
Coastal Vulnerability Due to Sea Level Rise

- 70% of the country's 1,500 municipalities are along the coast
- Storm surges are projected to affect about 14 % of the total population and 42 % of coastal populations
- Highest expected sea level rise are along the Pacific seaboard



Sea level rise by 2050





Coastal vulnerability index

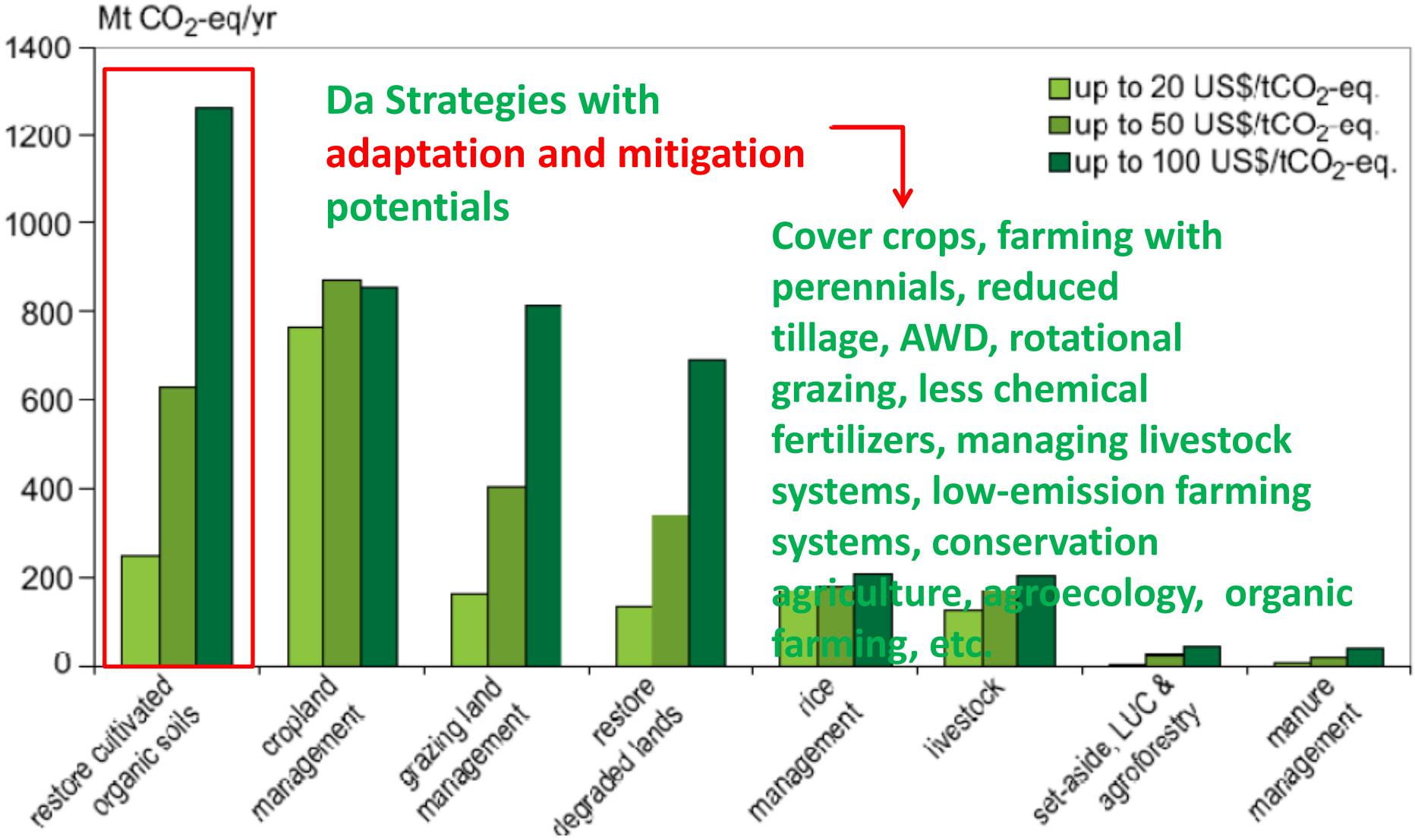
source: http://ecojesuit.com/changing-sea-levels-the-global-context-and-philippine-coastal-vulnerability/2521/).

Destructive typhoons > 1 B Php (25 M US$) **annual total damage**

No	Months/Dates	Year	Name	Damage (B PhP)		Affected Regions
				Total	Agri	
1	Oct 2 to 6	1993	Kadiang	8.75	7.19	NCR, CAR, regions I to IV
2	Oct 30 to Nov 4	1995	Rosing	10.80	9.04	NCR, CAR, Regions I to V and VIII
3	Oct 20 to 23	1998	Loleng	6.79	3.70	CAR, Regions I to VI and VIII
4	Jun 20 to 23	2008	Frank	13.50	3.20	NCR, Samar, Bicol, Mindoro, and Iloilo
5	Sep 25 to 27	2009	Ondoy	11.00	6.77	NCR, Central Luzon, Calabarzon
6	Oct 2 to 10	2009	Pepeng	27.30	6.53	CAR, Pangasinan, Tarlac, Ilocos
7	Oct 18 to 21	2010	Juan	8.49	7.55	NCR, CAR, Regions 1, 2, 3, Rizal, Cavite
8	Sep 26 to 28	2011	Pedring	15.00	4.19	NCR,CAR, Regions 3, 4, 5
9	Dec 16 to 17	2011	Sendong	2.07	1.00	Cagayan de Oro, Iligan, Dumaguete, Negros Or.
10	Dec 2 to 9	2012	Pablo	36.95	26.53	Davao Or., Compostela, CARAGA, Palawan
Total (PhP)				140.65	75.7	Exchange rate: 1 USD to 40 Pesos
Average (PhP)				14.065	7.57	
Total (USD) Billion				3.52	1.89	
Average (USD) Million				**351.63**	**189.3**	

For the last 20 years NO distractive typhoons passes through Mindanao

Economic potential for GHG agricultural mitigation by 2030 at a range of prices of CO_2-eq (Source: Hari Bansha Dulal & Gernot Brodnig The World Bank, 2009)



CCCP

AMIA in the Philippine

To further strengthen AMIA, the DA Secretary Hon. Proceso J. Alcala issued a Memorandum Order dated 25 January 2013 on

"Mainstreaming Climate Change in the DA Programs, Plans and Budget"

The Secretary approved **four strategic objectives** and **seven systems-wide programs** to make DA's plans and programs climate change compliant .

Changing Planning Domain

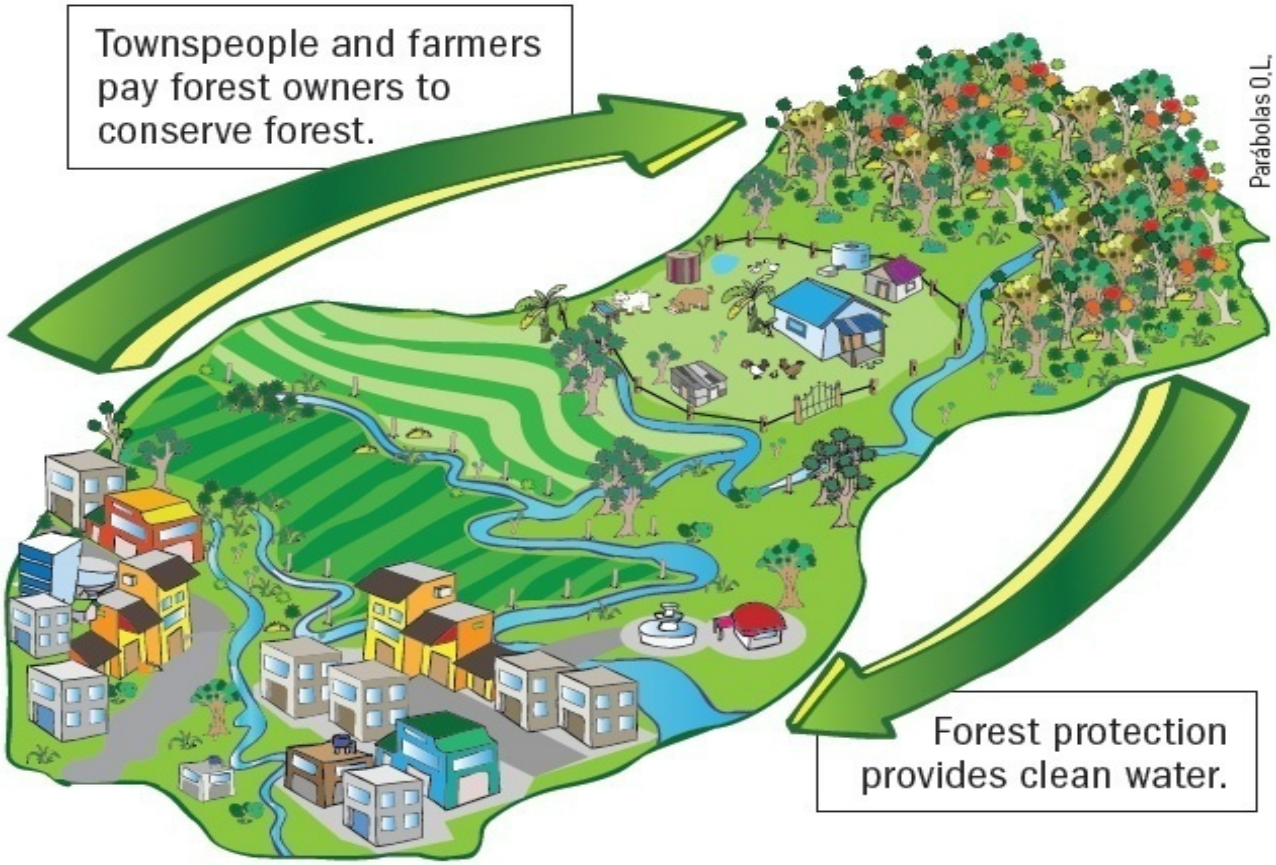
With climate change as the **New Normal**, uncertainty is becoming the norm rather than the exception. Attaining food security and sustainable development needs **geographically targeted interventions and information**.

A concerted and integrated effort using the **watershed as the planning domain is necessary**. Landslide and flooding do not respect political boundaries or local jurisdictions.

Ridge-River-Reef

Benefits of upland and lowland watershed interactions.

(Adapted from: Susan Stone. 2010: ww.conservation.org)



Payment for Ecosystems Service

The community benefits for the clean water, forest dwellers get the income they badly needed; the ecosystem stays healthy; the watershed is protected and provides many other services, e.g., carbon sink to mitigate climate change.

Conclusion and Recommendations

We can no longer look at food security, poverty, population growth, social justice, environmental protection, and climate change separately. We need a form of growth that is socially and environmentally sustainable that takes resource limits and climate change into account.

The DA in on the right track in fully adopting the AMIA Framework:

"I fully understand that the move to make DA plans and programs wholly climate-change responsive requires new skills and additional resources. But I know that you understand and appreciate that there is no other way to better address the needs of our people and the country today and in the future. Therefore, I look forward to your full cooperation and support on this matter".

(Hon. SPJA Memorandum dated 25 January 2013)

Thank You

Annex C2

Adaptation & Mitigation Initiative in Agriculture (AMIA)

THE PHILIPPINE FRAMEWORK FOR ACTION

by Segfredo Serrano & Alicia Ilaga
Department of Agriculture
Systems-Wide Climate Change Office
(DASW-CCO)

PRESENTATION OUTLINE

1. What is AMIA in the Philippines?
2. What are the legal bases for AMIA in the Philippines?
3. Mainstreaming AMIA: strategic & operational
4. The AMIA Traffic Light System in Mainstreaming
5. The AMIA Systems- Wide Programs (SWPs)
6. Key AMIA Outputs and Outcomes

WHAT IS AMIA IN THE PHILIPPINES?

1. AMIA is a national initiative and a communication strategy to provide focus on the two core issues of CC in agriculture: adaptation & mitigation
2. Main objective: to provide an efficient yet resilient agriculture support services to enable the country's agriculture sector to effectively address CC as it pursues its goals of development.
3. AMIA is a multi-sector partnerships of national & local governments, private sector, & civil society.

WHAT ARE THE LEGAL BASES OF CLIMATE CHANGE PROGRAM

1. Agriculture and Fisheries & Modernization Act of 1997 Republic Act 8435
2. Climate Change Act of 2009 Republic Act 9729
3. Disaster Risk Reduction Act of 2010 Republic Act 10121

Climate Change in President Aquino's Social Contract - E.O. 43, 13 May 2011

1. Transparent, accountable and participatory governance
2. Poverty reduction and empowerment of the poor and vulnerable
3. Rapid, inclusive and sustained economic growth
4. Just and lasting peace and the rule of law
5. Integrity of the environment and climate change adaptation and mitigation

The DA Secretary issued: 25 Jan 2013 Memo to operationalize government policies on climate change:

"Mainstreaming Climate Change in the DA Programs, Plans, & Budget"

KEY COMPONENTS OF THE SECRETARY'S 25 JAN 2013 MEMO

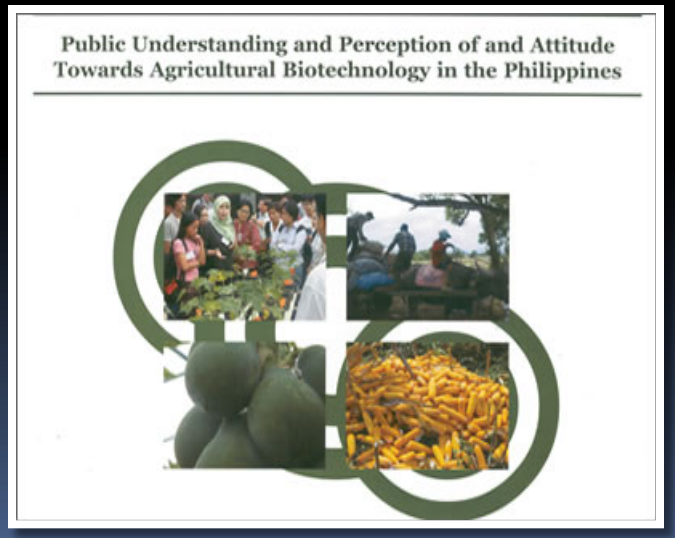
1. Approving AMIA as a national initiative and defining its strategic goals
2. List of the Department's Systems-Wide Programs (SWPs)
3. Creation of the DA Systems-Wide Climate Change Office (DASW-CCO) under the Office of the Undersecretary for Policy & Planning

AMIA's STRATEGIC OBJECTIVES

1. To increase the adaptive capacity and productivity potentials of agriculture and fisheries livelihood by modifying commodity combinations to better meet weather issues and natural resource endowments.
2. To redefine or remap Strategic Agricultural Fisheries Development Zone (SAFDZ) by including climate change vulnerabilities as part of mapping variables.

AMIA's STRATEGIC OBJECTIVES

3. **To redefine the agriculture development planning framework** as basis for agricultural planning by including key factors associated with CC.
4. **To develop a new framework and plan for the provision of "new" government agriculture services** towards the accelerated development of climate smart agriculture and fisheries industries



AMIA'S MAINSTREAMING STRATEGY

1. Mainstream first at the strategic level
2. Followed by mainstreaming at the operational level

STRATEGIC MAINSTREAMING: THE CRITICAL FEW

1. Addresses first the knowledge, attitudes, and skills (KAS) of people in the organization (DA)
2. Develops an organizational culture that has deep appreciation of climate change & sustainable development
3. Incorporates CC system's wide i.e., in all departmental policies across functions and agencies

Traffic Light System of Rating Mainstreaming among DA Agencies and Partners

Level 1: RED

- Low level institutional knowledge & awareness of CC; no definite policies/plans to mainstream CC at all levels

Traffic Light System of Rating Mainstreaming among DA Agencies and Partners

Level 2: YELLOW

- Moderate level of institutional knowledge & awareness; definite plans for mainstreaming; CC is mainstreamed at least at the operational level

Level 3: GREEN

- High level of institutional knowledge & awareness; mainstreamed at both strategic and operational levels; operational mainstreaming guidelines fully active

SEVEN SYSTEMS-WIDE MAINSTREAMING PROGRAMS

1. Mainstreaming Climate Change Adaptation And Mitigation Initiative In Agriculture (AMIA)
2. Climate Information System (CIS)
3. Philippine Adaptation & Mitigation in Agriculture Knowledge Toolbox
4. Climate-Smart Agriculture Infrastructure
5. Financing and Risk Transfer Instruments on Climate Change
6. Climate –Smart Agriculture & Fisheries Regulations
7. Climate-Smart Agriculture Extension System

DA SYSTEMS-WIDE PROGRAMS (SWPS): OBJECTIVES

1. To provide an efficient mechanism for the various DA agencies and functions to *collectively work together* towards achieving common goals on addressing climate change in agriculture

2. To give substance to effective compliance to the three laws that mandate mainstreaming of CC in agriculture development of the country across DA functions and agencies

SWPS KEY OUTPUTS & OUTCOMES

1. Policy Studies

2. Increased policy implementation efficiency & accountability

3. "All weather" and client responsive AF support services

AMIA OVER-ALL OUTPUTS: POLICY STUDIES

Objective: To increase understanding on strategies, impact, problems and issues on mainstreaming climate change across functions and agencies in the DA

AMIA OVER-ALL OUTCOME: INCREASED POLICY IMPLEMENTATION EFFICIENCY

Key Activities

1. Development of systems, procedures, and protocols
2. Enhancing DA mgt. capacities
3. Assessing policy impact

AMIA OVER-ALL OUTCOME: "All weather" and client responsive AF support services

Key Activities

1. LGU Mgt. Training on CC
2. "Climate proofing" of AF infrastructure
3. Stakeholders' education
4. Partnership activities

FOR MORE INFORMATION . . .

Contact

AMIA Philippines
(amiaphilippines@gmail.com)
2nd Floor, Department of Agriculture
Elliptical Road, Diliman, Quezon City
Philippines

Annex C3

* Mainstreaming CC in Research & Development

The Philippine Framework for Action in AMIA

Eliseo R. Ponce: eliseoponce@gmail.com

1. Introduction
   - CC in the Philippines & Agriculture
   - R&D & Climate Change Challenge
2. R&D & Philippine AF Development Goals: the connections
3. The Mainstreaming CC in Philippine R&D
4. The R&D dichotomy in the Philippines
5. Building the foundation of robust & climate resilient National Upstream Program in AF
6. The Philippines: Way Forward

*Presentation Outline

1. The Philippines faces serious threat from climate change that:
   - Could radically alter agriculture ecosystems of the country
   - Has imperilled efforts to reduce poverty and hunger and threaten the stability of country.
2. Filipino agriculture producers specially the small farmers have to:
   - **Adapt** their production system to increase productivity while at the same time
   - Help **mitigate** carbon emissions

*CC in the Philippines & Agriculture . . .

*R&D Central to Adaptation & Mitigation

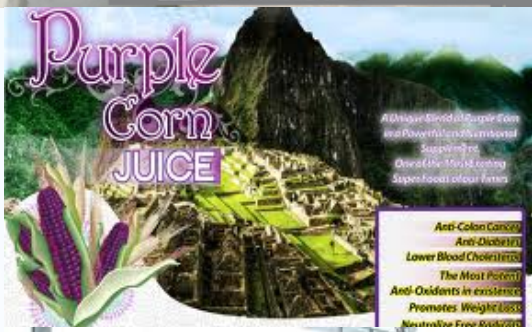
*Objective: to "provide farmers and policy makers with the means to support sustainable food production in a world where climate change could radically alter agriculture ecosystems and where farmers will be under pressure to simultaneously increase yields and reduce carbon emissions."

*The Consultative Group on International Agricultural Research (CGIAR) and the Earth System Science Partnership (ESSP).

* The connections: R&D & development goals

R & D

1. Generates new information & knowledge
2. Enables more precise predictions
3. Increased preparedness; reduced risks
4. Increases resilience of the agriculture industry
5. Increases productivity & income & consequently reduced poverty
6. Among policy instruments: protects and provides highest return on investment



1. Integrating CC in the “ideas, attitudes, or activities that are regarded as normal or conventional” in the national R&D system of the country
2. Targeting at two tactical levels: (1) strategic level: organizational structure & culture and policy (2) operational level: planning, budgeting, monitoring, & evaluation
3. Assessing compliance & providing rewards and recognition to DA agencies & partners

*Mainstreaming CC in R&D Means. . .

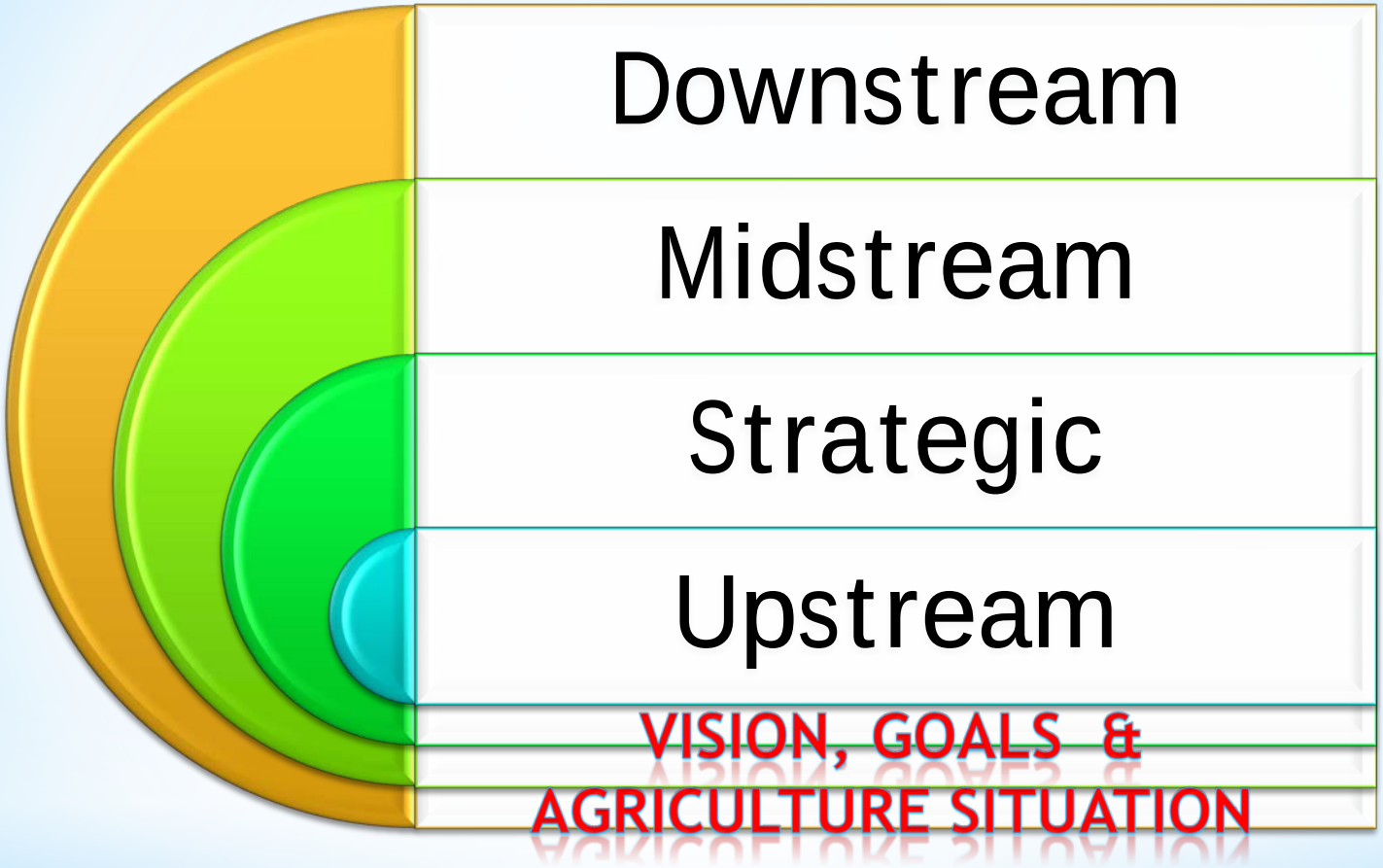
Basic & Strategic

1. Essentially public; serves as a foundation for robust technology generation
2. Strategic, basic research as a tactical move towards the attainment of the goals of agri. development
3. In the Philippines, basic research, essentially the SCUs

Midstream & Downstream

1. Essentially private in character for commercial technologies
2. Essentially public for technologies that do not yet have commercial applications
3. Downstream research or technology refinement; interface between research and extension

*The R&D Dichotomy in the Philippines



*The R&D Dichotomy: Graphical

1. “Climate proof” R&D infrastructure (human & physical)
2. Efficiency issues:
   a. System’s integration towards greater efficiency
   b. Deep bench: critical mass of well trained scientists
   c. Nurturing environment: salaries, benefits, academic freedom, minimal red tape
   d. Continues improvement of the quality of science
   e. Clear accountability system: individual and agency
   f. Stability of budget support from government

*The Foundation of Robust, Climate Resilient R&D

Assumption :

* ***Effective Mainstreaming of CC in R&D depends on organizational . . .***

1. **Reliability & stability of the R&D infrastructure**
2. **Knowledge, Attitudes, skills**
3. **Culture**
4. **Good governance Accountability**
5. **Widespread CC practice across functions and agencies**

Critical Areas	Traffic Light	Current Situation
1. **"Climate Proofing" R&D Infrastructure**		
▪ Human infrastructure	Yellow	
▪ Physical infrastructure	Red	At the discussion stage

*The Philippine Situation

Efficiency Issues	Traffic Light	Current Situation
i. System's Integration	Yellow	Three loosely coordinated systems: DA-BAR; DOST-PCAARD; CHED. Reforms under discussion
ii. Deep bench of highly trained scientists	Green	Not so much of numbers of scientists as heavy teaching loads; inbreeding; R&D seen as residual functions in SCUs
iii. Attractive salary scale	Green	Current pay structure competitive with private sector in lower and middle levels

The Philippine Situation

Efficiency Issues	Traffic Light	Current Situation
iv. Continues improvement of the quality of science	Green	Shallow bench; higher probability of conflict of interest
v. Clear accountability system: individual and agency	Yellow	Mainly timely report submission; absence of External Program & Management Review & Institutional Impact Studies

*The Philippine Situation

Critical Areas	Traffic Light	Current Situation
vi. Stability and level of budget support from government (public investment)	Red on stability; Yellow on level of funding support	Unstable funding structure; level of funding support moving towards 1% of GVA in AF under this administration.

*The Philippine Situation

*R&D Philippines: Way Forward

*The Philippines: Way Forward 1

1. "Climate proof" R&D infrastructure: increased investment in for Upstream & Strategic Research
   * **Human**
   * **Physical**

*Efficiency Issues: Way Forward 1

- System's integration towards greater efficiency: **One Council System**
  - One Governing Council
  - One Science Council

*The Philippines: Way Forward 1

- System's integration towards greater efficiency: One Council System
  - One Governing Council
  - One Science Council

*Efficiency Issues: Way Forward 2-ii & 2- iii

- **Deepen the bench: set standards for staffing "Centres of Excellence in Basic & Strategic Research"**
  - **Scientists and research in plantilla positions**
  - **Institute horizontal promotion system**
- **Mandatory application of the Scientific Career System across all agencies & functions**
  - **Upgrade benefit system**

*Efficiency Issues: Way Forward 2-iv

- **Continues improvement of the quality of science**
  - Improve the quality of the collegial review system
  - Institutionalize support to professional scientific journals
  - Develop a national system of rewards and incentives

*The Philippines: Way Forward 5

- **Clear accountability systems at both individual and agency level**
  - Operational efficiency: clear guidelines (timeliness and cost-efficiency)
  - M&E System: setting up of a participatory system
  - Institutionalization of EPMR & impact evaluation
  - Dissemination of R&D results accountability

*The Philippines: Way Forward 5


MOA Signing

- **Budget stability**
  - * Institutionalization of Strategic Planning & Setting Budget Commitment
  - * Institutionalization of multi-year budget (mandated by AFMA)
  - * Implementation of the AFMA mandate of 1% of the GVA for R&D

* Mainstreaming CC in R&D in AF Philippines

For more information or questions, you may contact:

Eliseo R. Ponce: eliseoponce@gmail.com or amiaphilippines@gmail.com

Annex C4

The Climate Change Challenge in Agriculture & Opportunities for Midstream & Downstream Research in the Philippines*

BEATRIZ P. DEL ROSARIO, Ph.D.
International Consultant

**Prepared for the APEC Conference*
21-24 October 2013, Manila

OUTLINE

I. **Role of Technology** in Addressing Climate Change in Agriculture
II. **Challenges and Opportunities**
    a. Adaptation
    b. **Mitigation**
IV. **Efficiency Issues vis a vis mainstreaming**
    a. Human resource development (HRD)
    b. Organizational
    c. Methodological (research prioritization)
    d. Funding
V. **Way Forward**

ROLE of TECHNOLOGY in ADDRESSING CLIMATE CHANGE : Summary

CATEGORY	PURPOSE
Varieties, breeds	drought, saline , submergence tolerant
Practices (production to by –product utilization and management)	Soil fertility, water management, grain quality and safety
Agric tools and equipment	Nutrient diagnosis, quality and safety
Infrastructure	Water harvesting, quality and safety
Source: BAR (2013)	

ROLE of TECHNOLOGY in ADDRESSING CLIMATE CHANGE : some examples

CATEGORY	PURPOSE/EXAMPLES
1. Varieties, breeds	a. Drought- tolerant: rice (18)- IR 68, etc b. submergence-tolerant: rice (9); carrots (1), cabbage (1) c. Saline- tolerant: rice (15)
2. Practices (production, management, post harvest, by-product and waste utilization)	a. Soil fertility mgt: Vermi-composting b. Multi-story cropping, intercropping c. Provision of adequate irrigation: AWTD d. Safety and quality: maize aflatoxin control e. Coco waste for fuel
Source: BAR (2013)	

ROLE of TECHNOLOGY in ADDRESSING CLIMATE CHANGE :some examples (cont'd)

CATEGORY	PURPOSE/EXAMPLES
3. Agri tools / equipment	a. Soil test kit b. Grain moisture meter c. storage technologies: rice, peanut d. Improved hand stripping device for abaca
4. Infrastructure	a. Rain water harvesting: small farm reservoirs b. Marketing platforms: Bagsakan centers
Source: BAR (2013)	

ADAPTATION CHALLENGES and OPPORTUNITIES for MIDSTREAM and DOWNSTREAM R & D

CHALLENGES	OPPORTUNITIES
1. Access to reliable, updated weather, soil, etc data and information	1. Intensified, systematic and collaborative weather data collection (PAG-ASA, DOST, others)
2. Traditional knowledge and practices – how relevant	2. A concerted effort to document- as baseline for science-based solutions
3. Scaling up	3.Planning domain defined - AEZ
4. Collaborative, trans-disciplinary , yet localized solutions*	4. Long history of participatory , community based research –FSR, CPAR, Farmers field school

MITIGATION CHALLENGES and OPPORTUNITIES for MIDSTREAM and DOWNSTREAM R & D

CHALLENGES	OPPORTUNITIES
1. Access to reliable, updated weather, soil, etc data and information	1. Intensified, systematic and collaborative weather data collection
2. Need for sophisticated equipment and sensors	2. Available forecasting tools , maps
3. knowledge and understanding Of ecosystem interaction	3.Planning domain defined – AEZ 4. Long history of participatory , community based research –FSR, CPAR 5. Growing appreciation of Inter-sectoral collaboration (agriculture, forestry)

MAINSTREAMING and EFFICIENCY ISSUES

- **Human Resource Development**
- Core capacity for climate science and ecosystems literacy;
- Traditional production and commodity focused perspective

- **Organizational issues**
- Strategic plan
- Systems and procedures

MAINSTREAMING and EFFICIENCY ISSUES (cont'd)

- **Methodological issues** (research prioritization)
- Qualitative vs more Formal approach
- Experts advice vs more participatory
- National vs regional priorities

- **Funding issues**
- At least 1% of institutional budget for research planning and priority setting (ISNAR)

WAY FORWARD

- **SENSITIZATION** all levels- to deepen knowledge and understanding
- **FAST TRACK generation of AEZ maps**
- **INVENTORY , UPDATE, DOCUMENT, SHARE** available planning, monitoring tools ; adaptive technologies, tools, practices
- **ALLOCATE RESOURCES-** capacity development, research priority setting, strategic planning
- **PROVIDE PLATFORMS for more trans-disciplinary interaction**(agriculture, forestry, climate science)

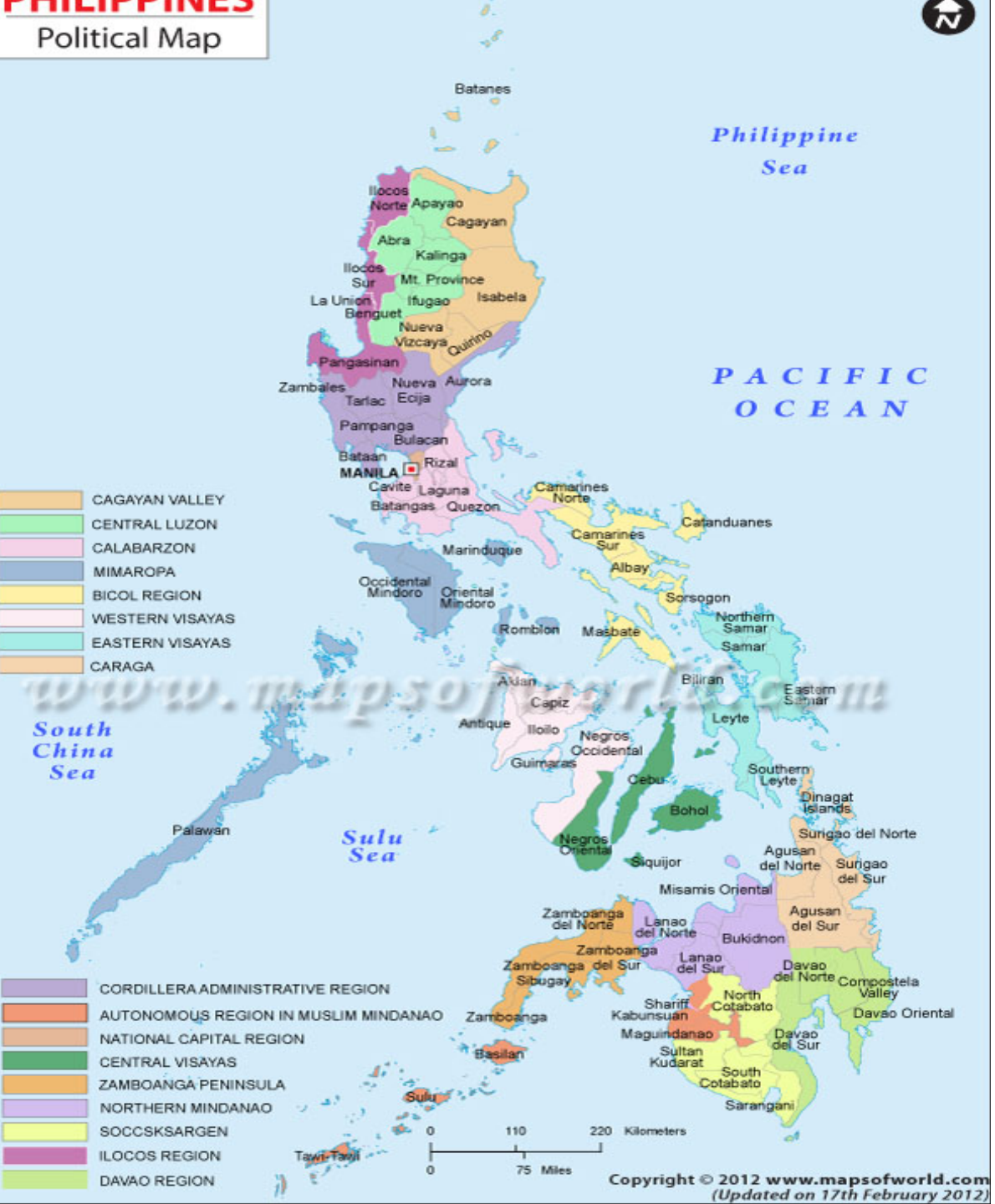
THANK YOU

Annex C5

MAINSTREAMING CLIMATE CHANGE IN AGRICULTURAL EXTENSION

Dr. Rowena Baconguis, Associate Professor

WHY WE NEED TO MAINSTREAM CLIMATE CHANGE IN THE EXTENSION SYSTEM



It's more fun in the Philippines

3rd
Most vulnerable to disaster risks and natural hazard

10th
Most vulnerable to climate-related disasters for the period 1991-2010

5th
Most vulnerable country in terms of forecasted global sea level rise

http://www.gov.ph/government-information

Flooding due to Southwest Monsoon: around Bulacan and North of Manila, Philippines, 2012

www.radioaustralia.

http://www.trust.org

Quirino Province, 2010

Total Natural* Disasters in the Philippines for the period 1980-2009			
Type of natural disaster	*Total no of events*	*Total no of people affected*	*Total damage 000 US$*
Storm	192	90,765,856	5,045,830
Drought	7	6,549,542	64,453
Flood	84	10,546,024	981,557

UNEP, 2010

Agriculture and Climate Change

- Major water user
- Major user of fossil fuel
- Contributor to changes in landscape
- Contributor to green house gas emission
  - Carbon dioxide: use of fossil fuels, burning of forests
  - Methane: also fossil fuel burning, decomposition of vegetation
  - Nitrous oxide: also fossil fuel burning, emission from machineries

Climate change and Agriculture: Some examples (Lansigan, 2000)

Longer term weather variability

- Narrower dry season
- Unnecessary water stress during wet season

Short term weather episodes

- High temperature leading to sterility in rice
- Decrease variety of pollen grains

PHILIPPINE AGRICULTURE EXTENSION SYSTEM

Agriculture and Fisheries Goal

Poverty Alleviation and Social Equity	• poorer sectors of society have equitable access to resources, income opportunities, basic and support services and infrastructure
Food Security	• available, adequate, accessible and affordable food at all times
Global Competitiveness	• competitiveness in both domestic and foreign markets
Sustainable Development	• promote development that is compatible with the preservation of the ecosystem

Characteristics of Vulnerable Farms

(Ponce, 2012) ha

- Fragmented small farms that are in difficult and hard to reach areas
- Small farmers with low educational levels, do not have access to new technologies or financial support

Resilient Farms and Farming Households

- Resilient and Robust Agriculture and Fisheries Industry
  1. Sustainable natural resource base
  2. Economically profitable
  3. Globally competitive agricultural products

- Prosperous and Healthy Farm Households
  1. Capable of accessing science based information and other support services needed in production and processing functions
  2. Able to use appropriate new technologies, apply appropriate measures and technologies adaptive to climate change
  3. Able to earn sufficiently for family
  4. Able to eat safe and nutritious food

Agricultural Extension

An educational and information service aimed at capacitating the agriculture and fishery stakeholders (producers, consumers, workers, investors, policy makers and professionals) about policies, issues, new knowledge, technology so these stakeholders may be able to make informed decisions

Agricultural Extension

- Information dissemination through personal, interpersonal, mass media, web base and social media
- Organizing, mobilization, linking and networking, lobbying
- Training, technical meetings, techo -demonstration, study tours

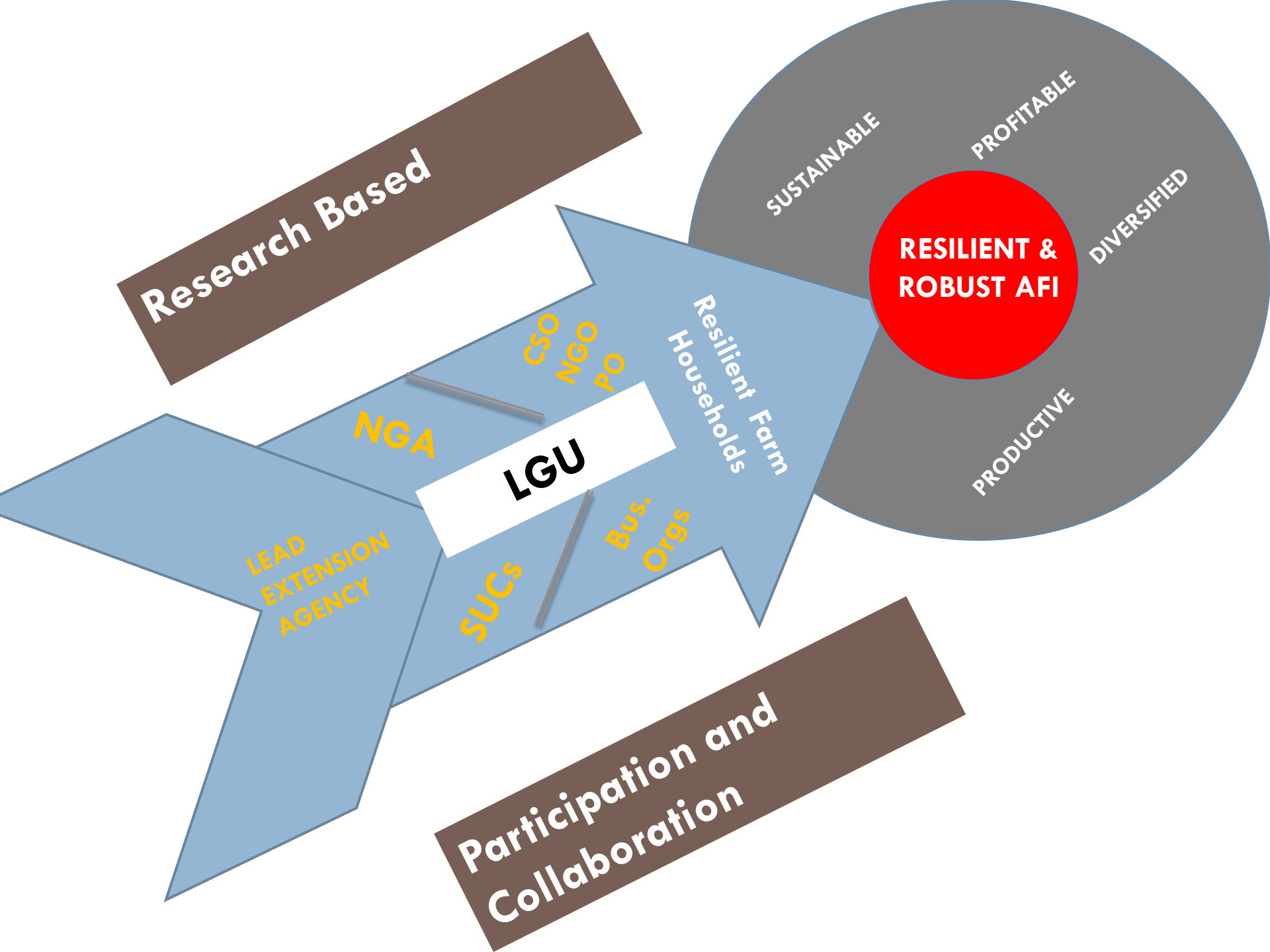
Agricultural Extension and Resilient Farming households and Farms

- Knowledgeable farming households
  - Farming households have access to organized, science based information and critical support system
  - Farmers and youth that have access to formal and non-formal agricultural programs
  - Farmers that have capability to efficiently produce and market healthy food and food products
  - Organized farmers that have a platform to discuss agricultural issues
  - Farms that have a sustainable, resilient natural resource base
  - Farms that are integrated to the market

Problems in Agricultural Extension System

- Poor linkages in the extension system
- Poor linkages between research and extension system
- Agricultural extension workers focused more on production techniques and distribution of private goods
- Main government messages among municipalities depend on national government priorities and funding

KEY PRINCIPLES AND STRATEGIES IN MAINSTREAMING CLIMATE CHANGE IN THE EXTENSION SYSTEM


Research Based
SUSTAINABLE
PROFITABLE
DIVERSIFIED
PRODUCTIVE
RESILIENT &
ROBUST AFI
Resilient Farm
Households
CSO
NGO
PO
NGA
LGU
LEAD
EXTENSION
AGENCY
SUCs
Bus.
Orgs
Participation and
Collaboration

Key Principles

- Participatory
- Collaborative
- Research based

Key strategies

- Develop capable extension managers, partner institutions, stakeholders in promoting and mainstreaming climate
- Institute necessary policies and procedures for mainstreaming climate change
- Foster pluralism and collaboration among various stakeholders in the planning, delivery, monitoring and evaluation of climate change mainstreaming
- Provide necessary vulnerability maps and other information needs climate change adaptation and mitigation strategies and technologies
- Actively promote resilience among the rural and urban poor and vulnerable sectors
- Provide institutional grant system that mainstream evidence-based climate change concepts and technologies along the value chain

Training Interventions of the Agriculture Training Institute on Climate Change Adaptation Jan – May 2013

112 Training programs on Technology on Organic Agriculture

- Climate change
- Rice
- Livestock
- Vegetable production
- Fertilizer production
- Internal Control System

Operationalizing strategies

Extension personnel in national and local governments knowledgeable in climate change issues, mitigation and adaptation strategies and technologies

- Training needs assessment
- Conduct of training in partnership with other development organizations

Climate smart extension personnel

Extension personnel at both national and local governments able to develop policies, plans and procedures to mainstream climate change in their systems

- Assessment workshops
- Planning workshops

Strategies to mainstream climate change in their organizations

Policies and procedures in planning, budgeting, monitoring and evaluation in place

- Workshops
- Writeshops

Policies and Handbook in mainstreaming CC

Data base on Information and data needs identified

- Lead agency to coordinate research on informational needs such as maps, adaptation and mitigation strategies and technologies for various ecosystems

Educational interventions and materials for slow on set and extreme weather events

Extension system able to effectively implement programs on adaptation and emergency response to climate change

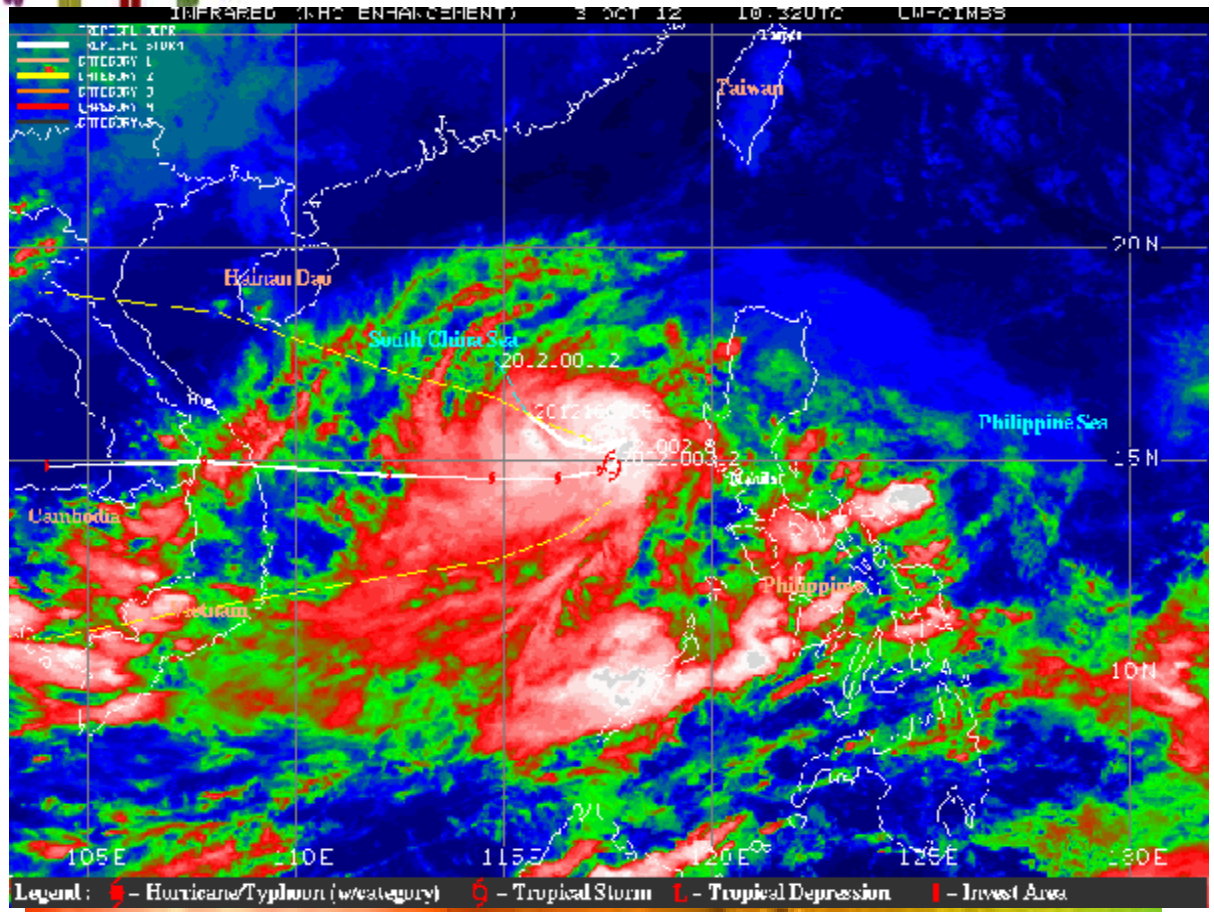
Establishing working relationships with various stakeholders

Climate change responsive extension system

Agricultural households able to implement appropriate adaptation and mitigation strategies

Testing, evaluating and sharing workable package of technologies for various ecosystems and climate change situations

Resilient farmers and farmers


Taiwan
Hainan Dao
South China Sea
Philippine Sea
Cambodia
Philippines
20 N
15 N
10 N
105 E
110 E
115 E
120 E
125 E
130 E
Legend : – Hurricane/Typhoon (w/category) – Tropical Storm – Tropical Depression – Invest Area

Annex C6

Mainstreaming climate change initiatives in agricultural regulation

Saturnina C. Halos PhD
International Expert Biotechnology & Biosafety

Paper presented at the Workshop on APEC Adaptation with Mitigation Initiative in Agriculture , Makati City, Metromanila, Philippines Oct 22-24,2013

Why agricultural regulation?

A climate change measure is effective only if implemented in a massive scale.

Among the various agricultural policy instruments, only regulation has the authority to implement a climate change measure in a massive scale.

Topics:

Regulation in agricultural development: its goals

Considerations in mainstreaming climate change initiatives in agricultural regulations

Steps in mainstreaming climate change initiatives in agricultural regulations

Regulation in agricultural development

Goals:

Protect agricultural & fisheries production

Ensure consumer safety

Protect market for producers

Protect infrastructure investments

Regulatory tools:

Standards, specifications, volume restrictions for imports/exports

Implementing tools: Permits, contracts

Considerations in mainstreaming climate change initiatives in agricultural regulations

1. Designation/creation of one responsible office/r
2. Clear understanding of climate change as basis for possible climate change initiatives
3. Strategic climate change initiatives
4. Clear understanding of the agricultural regulatory system
5. Good match between the regulatory agency & strategic climate change initiative
6. Involvement of regulatory agencies, stakeholders & the general public in policy formulation

7. Formulation of clear specific regulatory policies

8. Measures to ensure transparency and accountability

9. Resources for the adoption & implementation of regulatory policy

10. System of monitoring, review and evaluation of regulatory policy as a climate change initiative

11. Policy revisions based on new information & experience

Steps in mainstreaming climate change initiatives in agricultural regulation

1. **Designation of one official or officer** – responsible for the climate change program such as directing/monitoring all climate change initiatives across functions, programs and/or agencies within the ministry/department, negotiations, etc.

2. Formulate possible climate change initiatives, each with clearly defined goal for agriculture

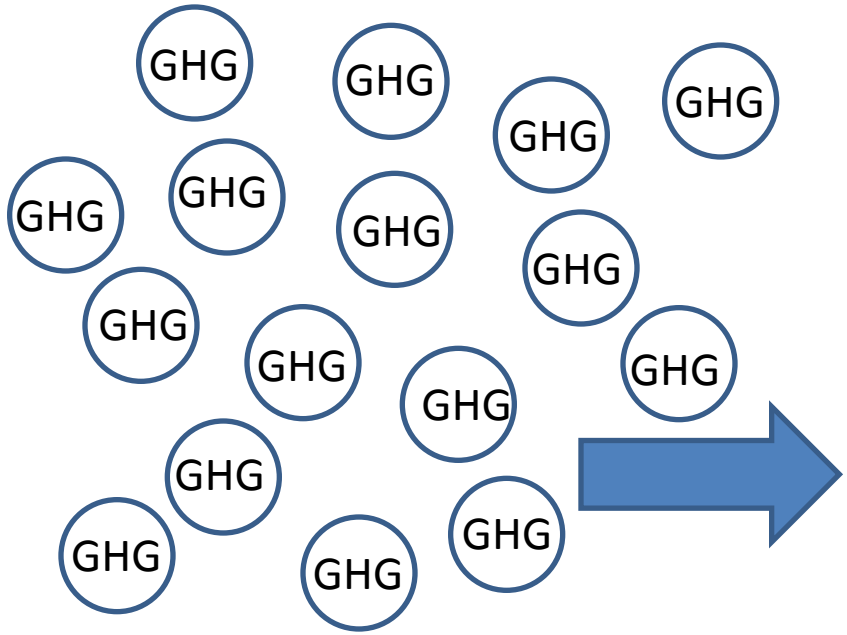
Clear understanding of the relationship between climate change & agriculture

Cause of climate change

Agriculture major source of greenhouse gas emissions

Consequences of climate change

Damage to agriculture and fishery infrastructure & production



14%

1. Higher temperature
2. More frequent & more severe droughts, typhoons, heavy rains, floods & landslides
3. Changed weather patterns
4. Changing pest patterns
5. Ocean acidification
6. Rising sea levels

Agriculture

1. Paddy or wet-culture rice
2. Ruminants metabolism
3. Agri-waste disposal/decay
4. Soil cultivation
5. Use of fossil fuels

Mitigation strategy

Can agricultural regulation help reduce GHG emission ?

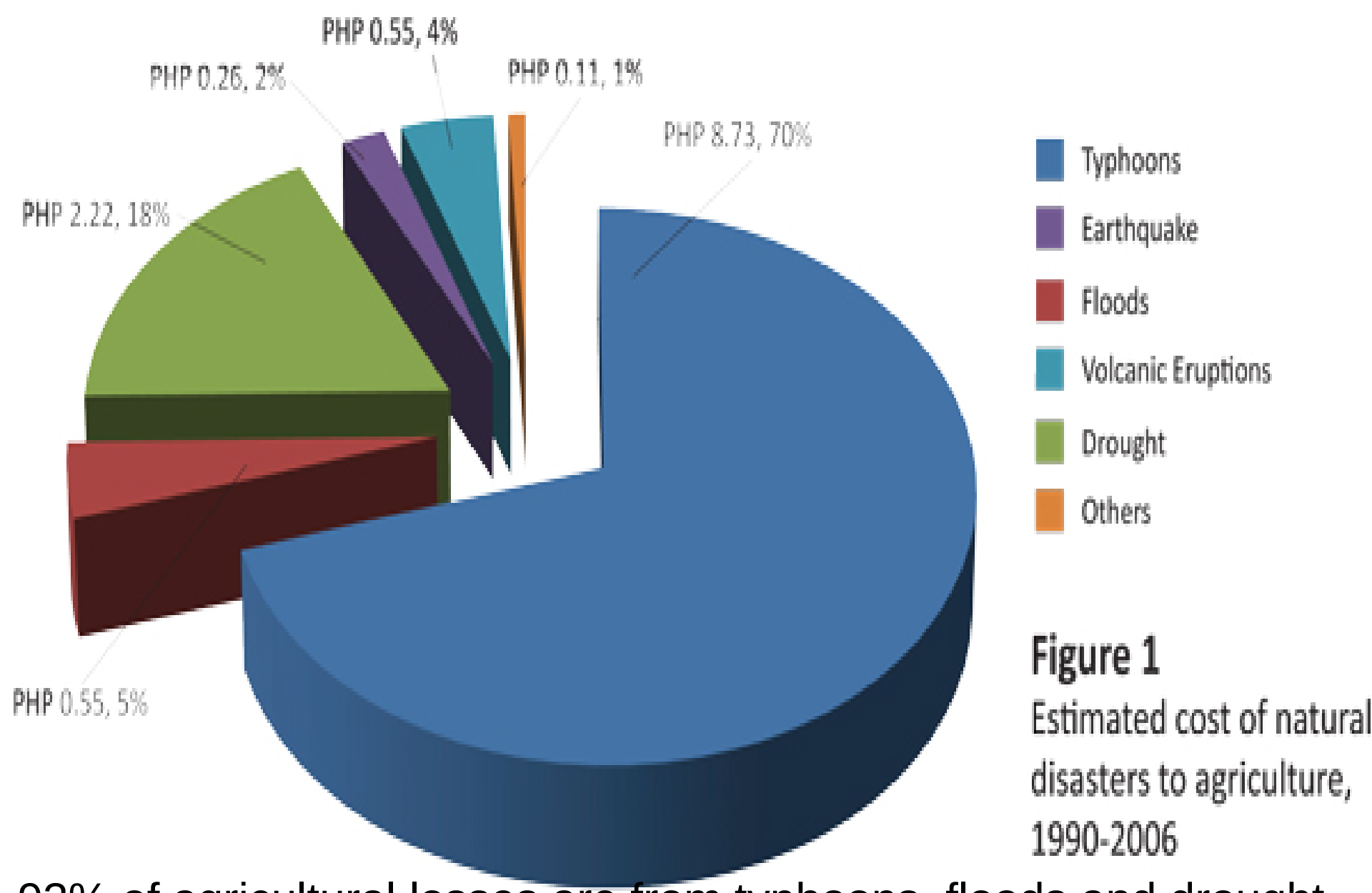


Figure 1
Estimated cost of natural disasters to agriculture, 1990-2006

93% of agricultural losses are from typhoons, floods and drought - consequences of climate change

http://climate.gov.ph/index.php/adaptation/food-security

Agricultural damages from other climate change consequences

1. Higher land temperatures = reduced crop yields, reduced livestock growth including egg laying, more energy needed to cool down poultry houses, more water needed to cool down hogs, etc.
2 Heavy rains - lost crops, more costly feeds, loss of top soil, landslides, etc.
3. Higher ocean temperatures – reduced yields of seaweeds, reduced fish catch, etc.
4. Ocean acidification – lower fish catch, decreased seaweed farming productivity, etc.

5. Rising sea levels – salt water intrusion to coastal farms = low – zero yields, relocation of fish farms

6. Changes in frequency & volume of precipitation = loss of cropping season, reduced yields, etc.

Adaptation strategy

Can we use regulation to avoid/reduce damage from disasters due to climate change?

d. Identifying possible climate change initiatives

Climate change initiative

- an action designed to adapt or mitigate climate change
- specific to a particular source of GHG emission or to a particular agricultural damage
- science-based
- provide details for the National Climate Change Action Plan of a country

e.g. Cause of climate change – excessive CH_4 from paddy rice production

Possible climate change initiative –

reduce CH_4 from paddy rice production

use less water (As per scientific literature; less water = less CH_4 emission)

Approaches to using less water in paddy rice

- develop/plant water-use efficient varieties (R &D)
- suitable water management e.g. intermittent irrigation, draining water midseason (Regulation)

3. Prioritizing climate change initiatives
High priority for strategic interventions

Considerations:

- ✓ The gravity/cost of the damage from a particular climate change consequence
- ✓ The frequency of the occurrence of the climate change consequence
- ✓ The area affected by that particular climate change consequence
- ✓ The robustness of the technical & scientific bases of the climate change initiative
- ✓ The resources necessary to implement the climate change initiative
- ✓ Manageability of the regulatory system
- ✓ Acceptability to stakeholders
- ✓ Other benefits

4. Understanding the agricultural regulatory system

a. Specific goals of current various regulations
b. The regulatory agencies, their legal mandates, how they function

2.1 Review laws & other regulatory policies for each agency

2.2 Consult with each regulatory agency (8 agencies under PHL Dept of Agriculture)

5. Match the regulatory agency with each strategic climate change initiative

Identify existing regulations:

a. Support CC initiative - reiterate
b. Counteract CC initiative – revise/repeal
c. Necessary to support CC initiative - formulate

Weigh in alternatives – regulation vs. regulation plus incentives vs. incentives

Identify resources needed for implementation

6. Formulate clear specific regulatory policy – clear, transparent, manageable, predictable, science-based

6.1 Authority – law, presidential issuance, department/ministry issuance, agency issuance

6.2 Content

a. Objectives stated in relation to climate change
b. Rules and procedures, decision flow with timelines, authorities
c. Monitoring system
d. Fees, fines & damages
e. Resources & capacity building necessary, funding source

7. **Formulate guidelines** for monitoring & review & evaluation as a climate change initiative for each regulatory policy

   Generate a checklist of critical parameters for each regulatory policy

   Indicate responsible body for monitoring

   Mode of monitoring – ensuring independence - contract out the activity to independent body

8. Consultations with stakeholders & general public for each regulatory policy & guidelines for its monitoring and review, revise policy accordingly

9. Adopt , inform public & implement regulatory policy

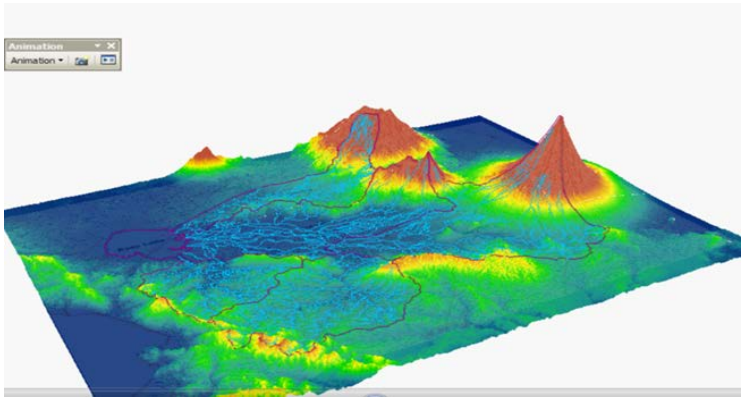
10. Monitor, review implementation, identify problems implementation, modify and/or evaluate its effectiveness as a climate change initiative

11. Revise if necessary


Thank you
SHOWER FIRST
BEFORE
SWIMMING
30/08/2011 09:34

Annex C7

Mainstreaming CC-Adaptation and Mitigation Initiatives in Agriculture with Integrated Ecosystems Management



ES Guiang

Story Line

- ✓ Dominance of highly diverse ridge to reef watershed landscapes
- ✓ The emerging integrated ecosystem management approach (IEM)
- ✓ The need to mainstream agriculture – especially rice production and fisheries – with IEM
- ✓ Moving forward with mainstreaming adaptation and mitigation of agriculture in the context of the IEM approach

The Integrated Ecosystems Management

- A **strategy** for the holistic management of **land, water, and living resources**;
- Employs **science-based analyses** of biophysical, socio-economic factors in planning & implementation;
- **Recognizes humans**, with their cultural diversity, as integral component of ecosystems;
- **Employs** conservation and sustainable uses and management practices:
  - That are environmentally, socially, and economically sound, and
  - That generate and maintain equitable benefits for both the present and future generations.

Source: Adopted from CBD, 1995.

The Emerging IEM Approach and Strategy in the Philippines

- **A holistic and integrated approach** in the governance and management of ecosystems for conservation, socio-cultural preservation and economic development.

- A process by which **political and resource management units in a certain ecosystem jointly recognize the benefits** of collective efforts in planning and implementing individual programs to achieve common goals.

- Serves as a **guide to investments** that will enhance the **resiliencies of ecosystems, communities, livelihoods and enterprises** by focusing on comparative advantages that render goods and services competitive through higher value chains.

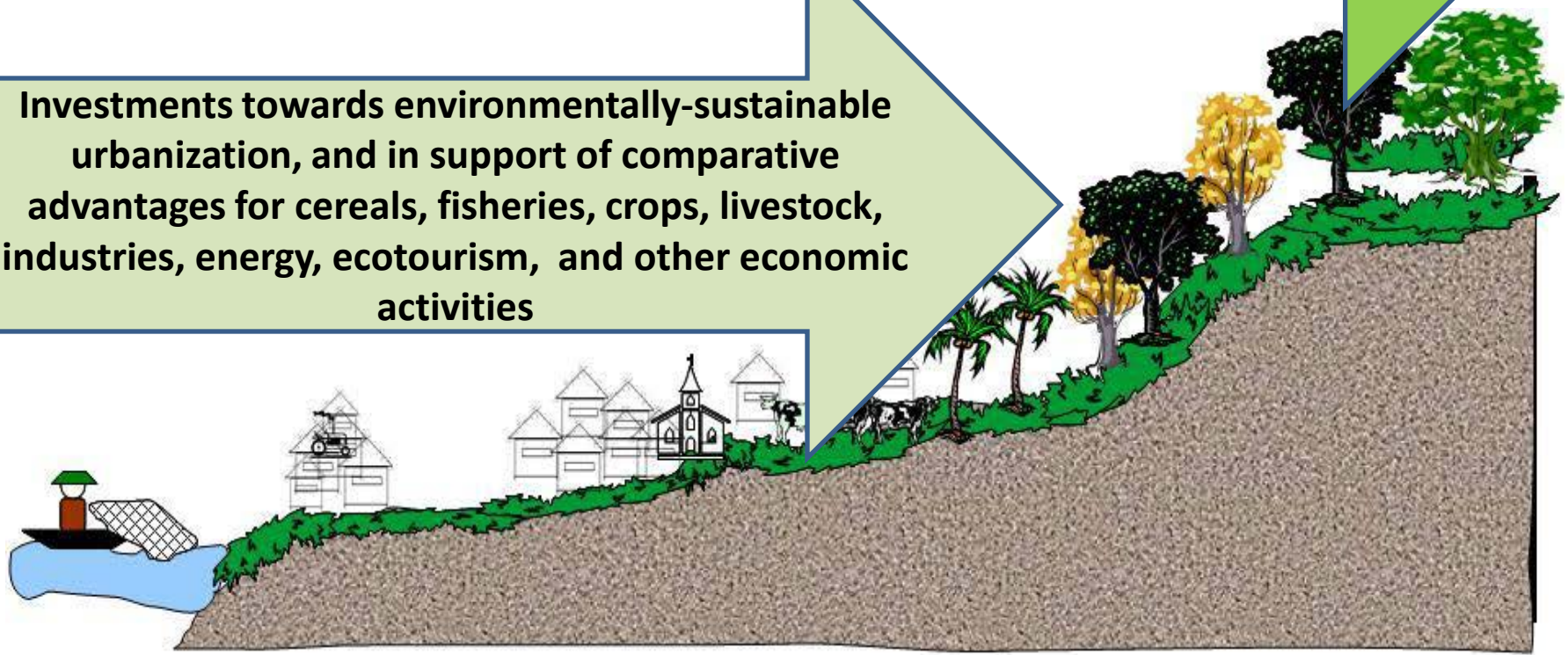
Other Similar Concepts and Approaches

1. **Integrated Watershed Management (IWM) or Watershed-Ecosystem Management (WEM**) -Integrated planning for a watershed as basis of investments in upper watershed
2. **River basin integrated development** – similar to IWM but covers a larger area and would have multi-sectoral coordinated investments
3. **Forest Landscape Restoration (FLR**) – Forest restoration with the view and understanding of the broader landscapes (uplands, lowlands, and coastal areas)
4. **Integrated Coastal Management (ICM)** – watershed as the planning unit in planning for investments in coastal areas
5. **Integrated Area Development** – all investments in a given area (watershed, political unit, coastal areas) are coordinated and directed for complementation, synergy, and greater impact

IEM Provides a Framework for Coordinating and Regulating Investments, Zoning, and Land Uses Over a Landscape

Investments in conservation, rehabilitation, agroforestry, low impact ecotourism , high value crops, ENR-friendly infra and services

Investments towards environmentally-sustainable urbanization, and in support of comparative advantages for cereals, fisheries, crops, livestock, industries, energy, ecotourism, and other economic activities

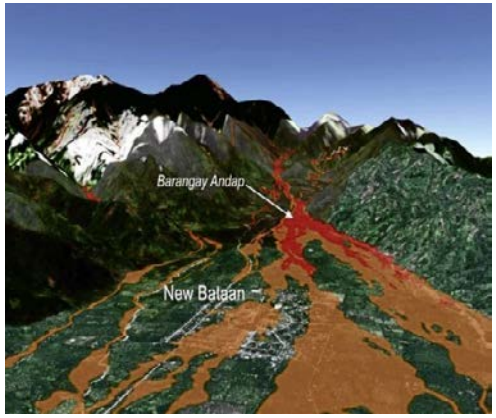


IEM as an Agro-Ecosystem Framework for MAINSTREAMING CLIMATE CHANGE Adaptation & Mitigation Initiative in Agriculture

- Maybe used as an appropriate framework for cooperation, collaboration, and complementation of individual and collective measures for adaptation and mitigation;
- Provides a “rallying point” for determining programs and activities for translating policies into CC-consistent initiatives; and

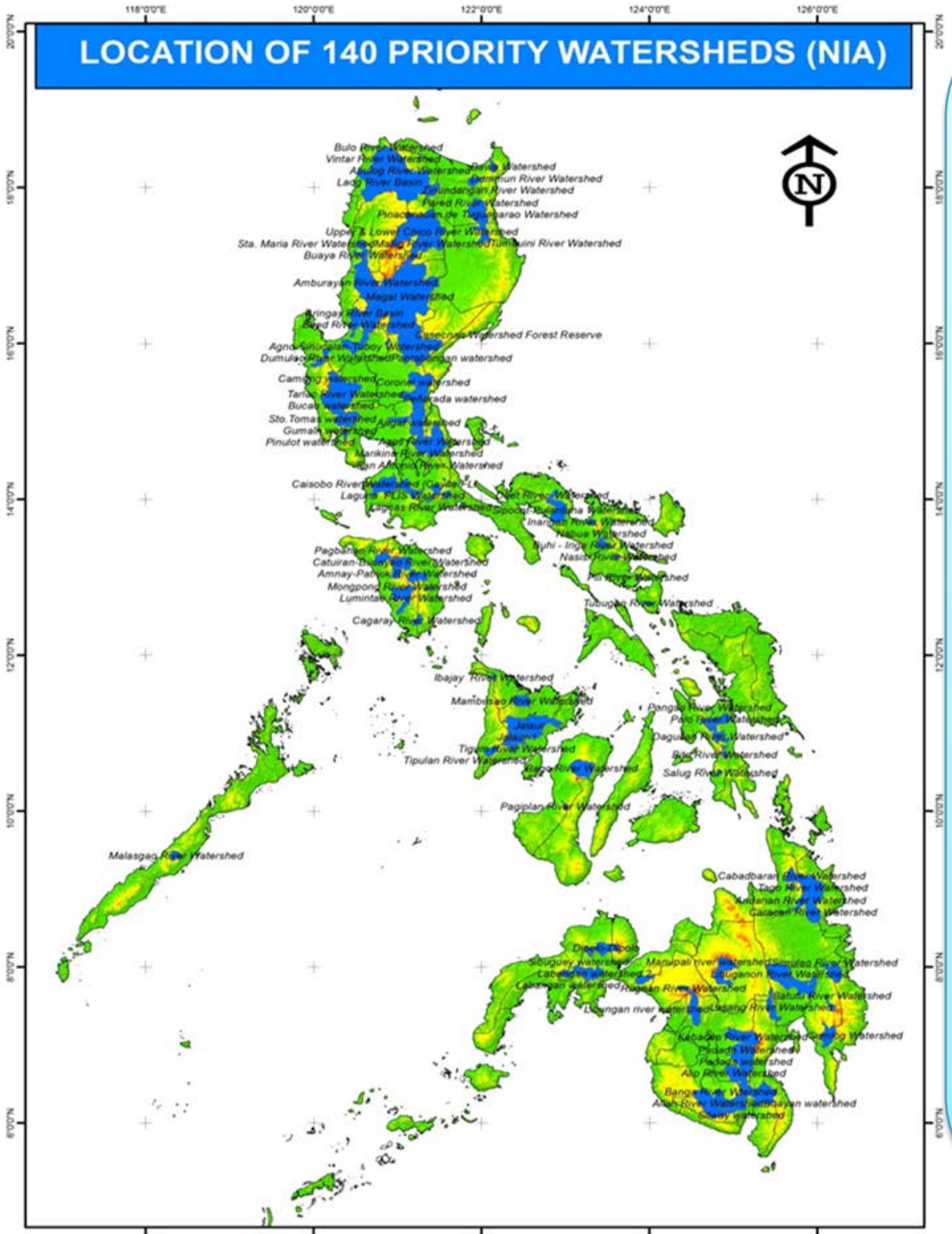
Why IEM for the Philippines

- At least **70%** of country's land area is within watersheds
- More than **20 million lives in the** uplands (upper watersheds)
- More than **60% of population** lives in coastal zone areas
- More than 4**.5 million ha of irrigated areas largely** depend on watersheds
- Key **ENR-dependent industries and facilities** for supplying water and energy
- One of the 17 mega-diverse countries in the world
- Increasing **threats from** land conversion, pollutants and mining & quarrying
- **The need for aligning land uses** –uplands, lowlands, coastal areas

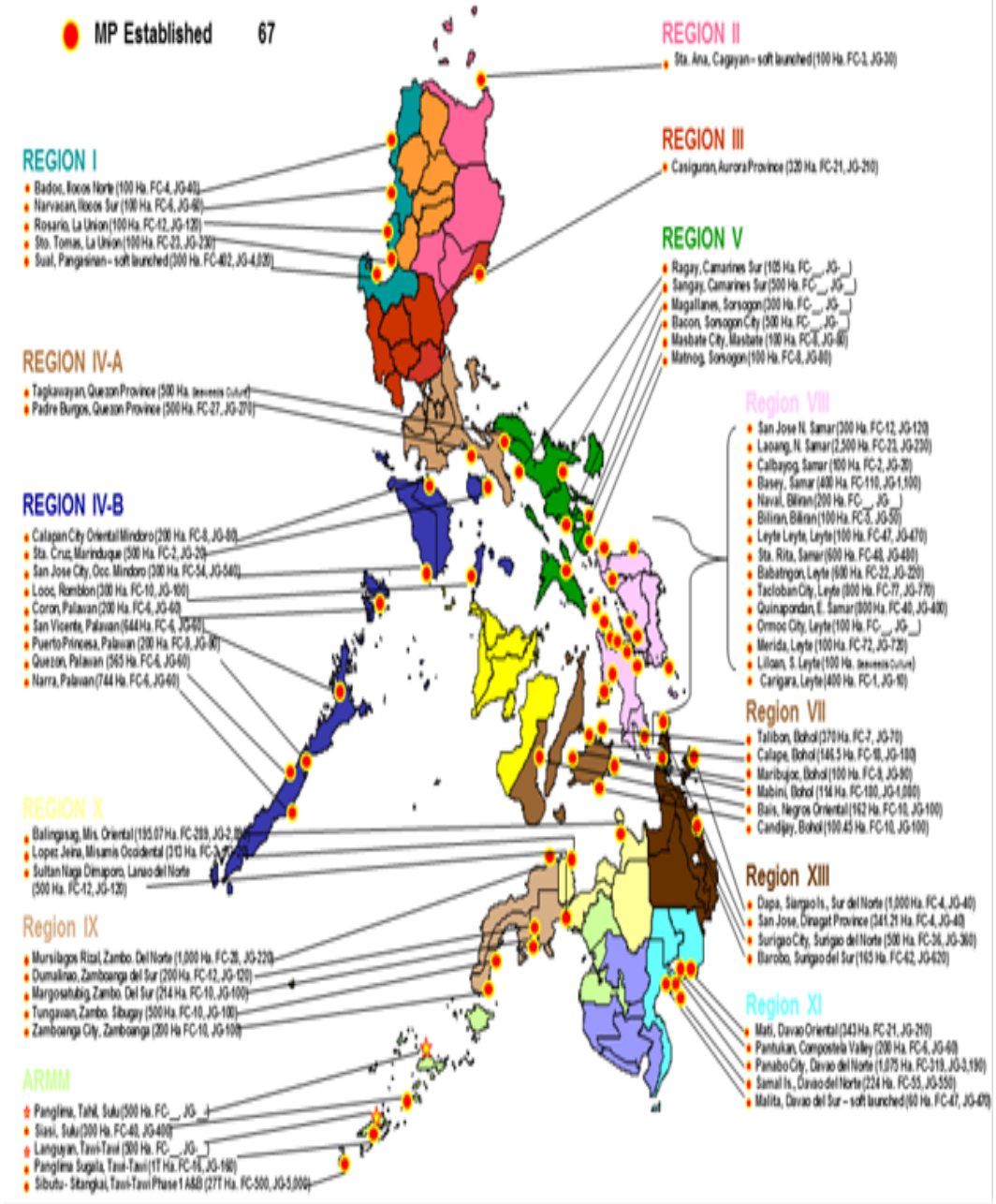


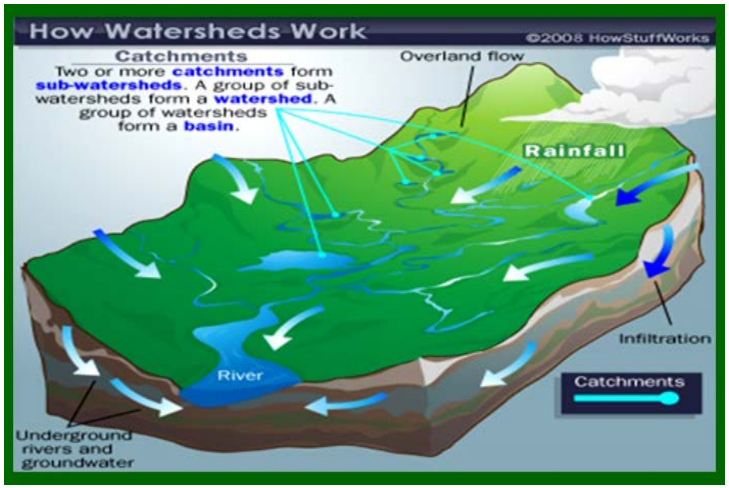
IEM in Support of Agriculture in the Philippines

- **PhP 19.7 billion (0.45 billion US $)** as average annual damage from mostly landslides and floodings from 1990-2008
- Damage to agriculture was about PhP 12 billion per annum (**61%)**
- At least **35 million** were affected from typhoons, storms, and floods with an average annual death of 1,008 people for the same period
- **Santi typhoon-** reported total agriculture damage of 2.9 billion pesos to rice production

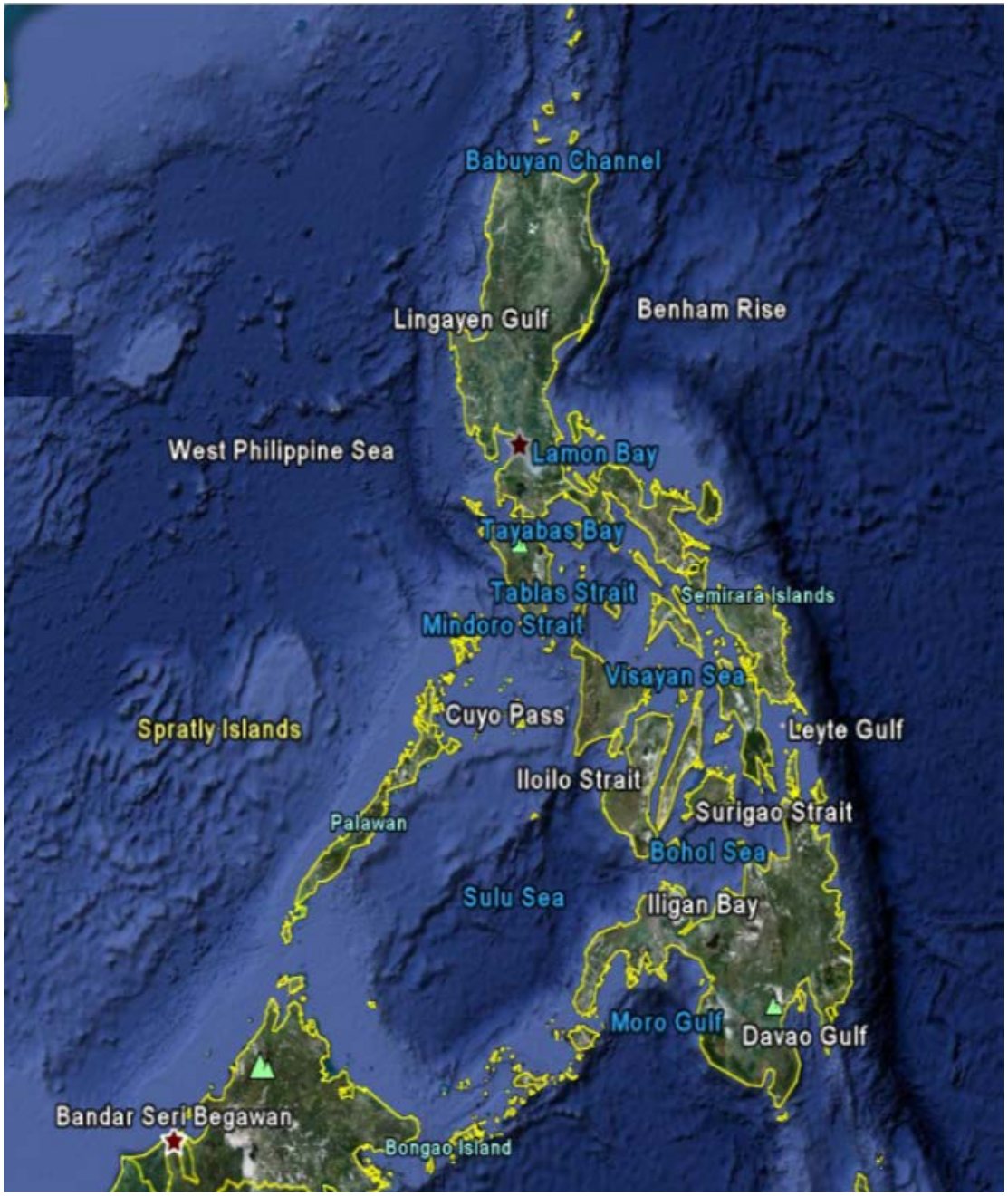


- Highly diverse ecosystems in watershed-dominated landscapes
- 18 river basins, 140 priority watersheds, and 240 protected areas
- Providing ecosystems goods and services e.g. water for 4.5 million ha of rice production areas in 2011 (irrigated and rainfed)





- Highly diverse ecosystems in watershed-dominated landscapes
- Contributing to the productivity and resiliencies of coastal fisheries, mariculture, and aquaculture



Productivity of municipal fishing grounds, wetlands, lakes, and rivers is partly supported by various ecosystems

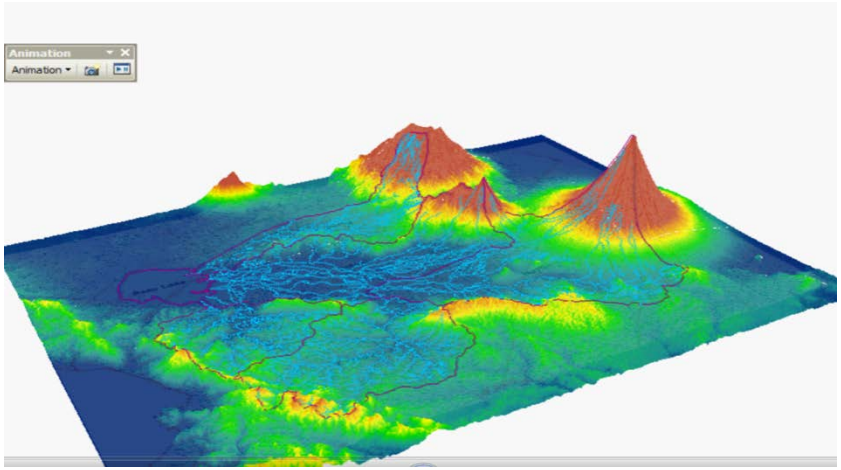
The KEY to Making IEM work…..

- **Inter-connectedness**
- **Inter-dependence**
- **Inter-generational**

- biophysical,
- social,
- economic,
- governance,
- Environmental
- temporal

Most organisms and humans are interdependent and interconnected through various links:

- Water flows & direction,
- Ridge to reef landscape,
- Food chain,
- Nutrient cycles,
- Reproductive cycles
- Land and resource uses
- Infrastructures
- Markets
- Social
- Economic



Externalities – "Unintended results, sometimes with collateral damages"

Table 2. Environmental and Socio-Economic Impacts of Investments

Investments	Some Examples	On-Site	Off-Site	Net Impact
Any investments on the following will have **ON- and OFF-SITE** impacts: • **Zoning, managing, and enforcing the** NNs • **Enhancing the CAs** for scarce and highly valuable CGSs • **Improving governance** at the ecosystem and LGU levels • **Use** of ENR asset or services	Trekking & climbing		0	0
	Perennial -based agro-forestry	+	+	+
	Nurseries & gardens	0	+	+
	Spring-based resorts	0	-	-
	Livestock farms	-	+ or 0	-
	Reforestation	+	0	+
	Mining without ECC enforcement, road construction	-	-	-
	Restricting use rights of communities in poverty-stricken areas	-	+	+ or -
	Sub-watershed–based CLUP zoning	+	-	+ or -

DENR Focus for IEM – Largely in Support of Agriculture, Ecotourism, Disaster Risk Reduction, and Climate Change Mitigation and Adaptation

1. A river basin, sub-river basin or large watershed, the topographic divides of which, can be determined on the ground and may include the total area from ridge to reef, ridge to lake, or ridge to wetlands;
2. A sub-watershed, cluster of sub-watersheds, or portion of sub-watershed based on topographic divides such as the upper portion of a watershed or sub-watershed;
3. A total area of a delineated key biodiversity area (**KBA) or an identified area within a KBA** where concentrations and distribution of vulnerable, irreplaceable trigger species are found or reside e.g. wetland habitats;
4. A protected area under the NIPAS or a watershed reservation (based on the technical descriptions of the issuance or legislation);
5. An ancestral domain with unique socio-ethno-ecosystem characteristics that have evolved over time with the communities;
6. An island or group of islands ecosystem with similar and unique ecological processes;
7. Mineral reservation; and
8. Other ecosystems as maybe identified for management

Moving Forward in Mainstreaming Agriculture with IEM Planning and Implementation

Jointly **assess** assets, do SWOTs, prioritize needs, issues & problems; and
Determine the following:

- **Non-Negotiables** (**NNs**) on land & resources uses
- **Comparative advantage** (geography, location, natural features, local governance, capacities)
- **Competitive goods & services**

- Agree on **Common Vision, Mission & Objectives (CVMOs)**
- Agree on **NNs**

Develop and Adopt NNs-based IEM Framework in support of *comparative & competitive* advantages

Develop IEM-consistent Investment programs **&** assist in incorporating these into the the LGU **PDPs, CDPs and zones** for individual & joint efforts

Set up Local Governance Bodies for oversight and support from other national agencies

- **Establish M&E systems**
- **Set up Sustainable Financing Schemes**

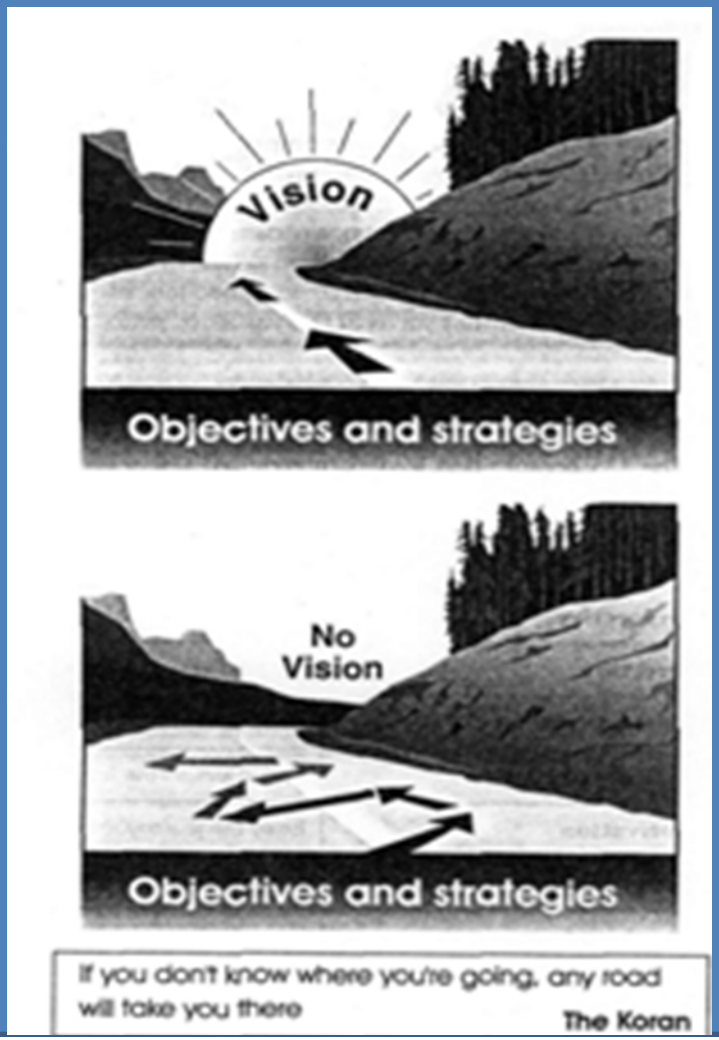
Non-Negotiables – Designated land and resource allocations whose intended uses and purposes cannot be compromised or modified

1. NIPAS-Protected areas covered by Republic Act No. 7586 or the National Integrated Protected Areas System Act of 1992 (NIPAS Act).
2. Protection forests and forest lands
3. High hazard zones
4. Prime agricultural lands
5. Disallowed investments, land and resource uses outside the Non-Negotiable Areas (Items 1-4 above)

IEM to ACHIEVE ENVISIONED FUTURE

"If you don't know where you are going, any road will take you there"

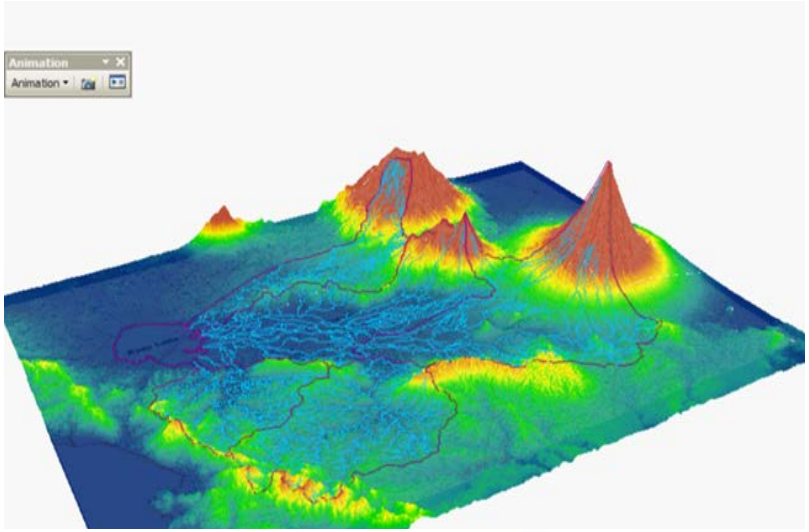
1. **Adopting Common Vision, Mission and Objectives**
2. Reaching agreement on **Non-Negotiables** to ensure resiliencies of ecosystems, communities, livelihoods, and enterprises
3. **Reaching agreement on Individual and collective strategies** for public and private investments based on comparative advantages and potentials of competitive goods and services
4. **Adopting common outputs and outcomes** as basis of governance-oriented results-based monitoring system (RBME)
5. **Sustainable financing** in place

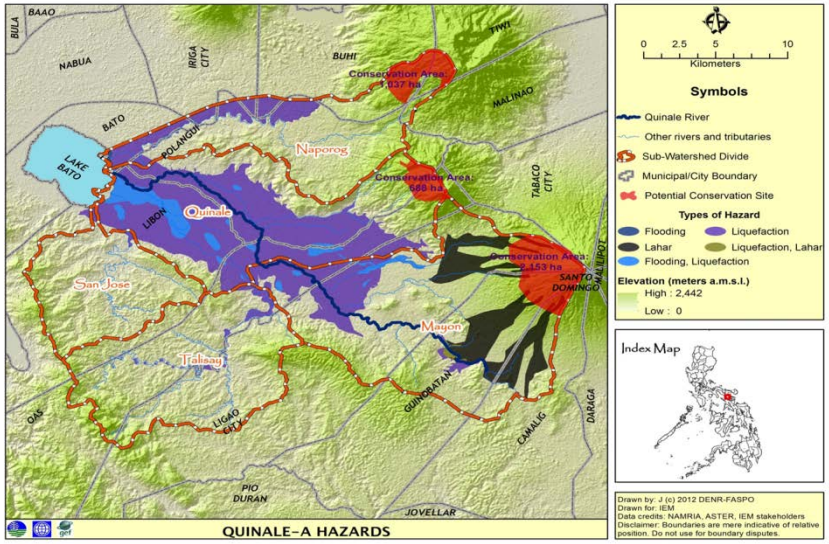


IEM Requires Governance-Based Collaborative Management and Implementation

<u>Several Entities with Responsibility, Accountability, and Authority (RAA) in an Ecosystem</u>

- Field offices of several national agencies – DA, DENR, DAR, DILG, DOE
- Local Government Units
- Resource management units
- Landowners and fishing communities



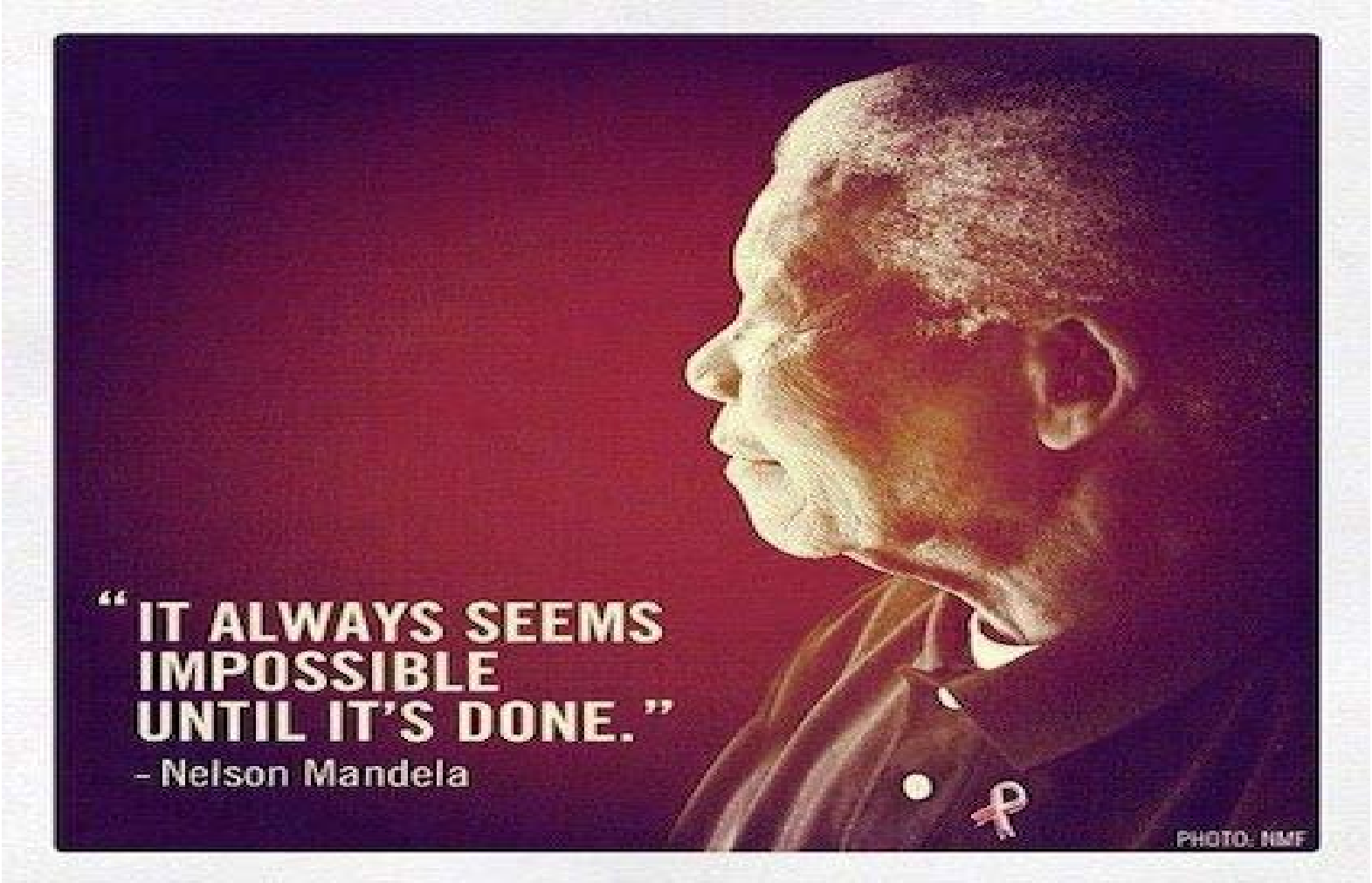


IEM is simply capturing the SYNERGIES from complementation of national, sectoral, sub-sectoral , and local programs in highly diverse watershed-dominated landscapes

"the working together of two or more people, organizations, or things that may result in a SUM that is greater than the sum of their individual effects or capabilities"

(Adapted from Encarta Encyclopedia)

Working Individually and Collectively for the Common Good in an ECOSYSTEM….



Annex C8

MAINSTREAMING STRATEGIES ON CLIMATE CHANGE ADAPTATION AND MITIGATION IN AGRICULTURE: Malaysia's Experience

Mohd Fairuz, M.S., Mohd Safarul Izmi, S., Mohamad Zabawi, A.G., Amir Hamzah, J., Shaidatul Azdawiyah A.T., and Mohammad Hariz, A.R.

Seminar-Workshop on Mainstreaming Climate Change Adaptation & Mitigation Initiative in Agriculture (AMIA)
October 22-24, 2013
Manila, Philippines

PRESENTATION OUTLINE

- INTRODUCTION
- GHG INVENTORY
- MALAYSIA'S NATIONAL POLICY ON CLIMATE CHANGE
- MITIGATION MEASURES
- ADAPTATION STRATEGIES
- GAPS & RESEARCH NEEDS
- CONCLUSION

INTRODUCTION - MALAYSIA

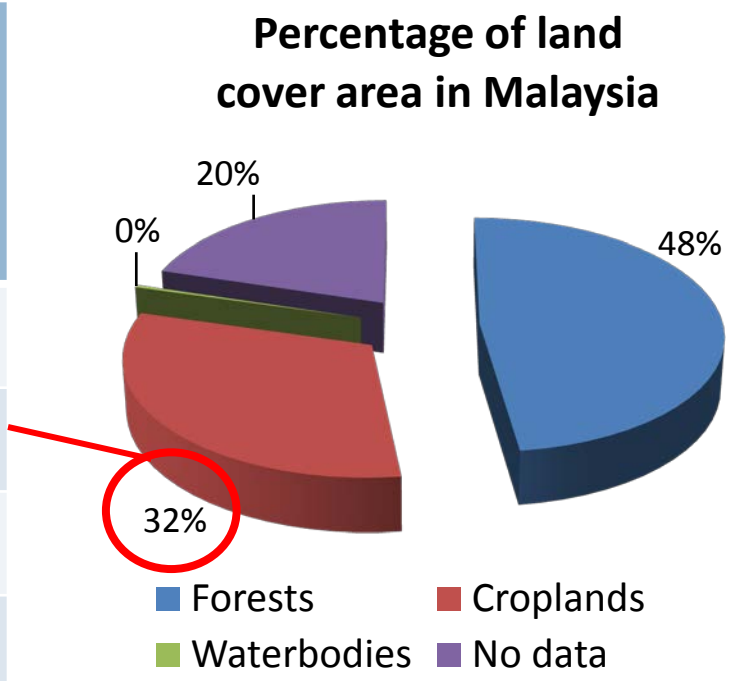
- Location - South East Asia (between 2 & 7 degrees north of the Equator)
- Consisting - Peninsular Malaysia, Sabah & Sarawak
- Total area - 329,750 km^2
- Federal territories – Kuala Lumpur & Putrajaya
- Total population – 29.3 mil in 2012 (Department of Statistics, Malaysia)

CLIMATE OF MALAYSIA

- Tropical, hot & humid throughout the year
- Average temperature - 27 °C (80.6 °F)
- Rainfall - averaging 2,000mm to 4,000mm
- Rainwater - 990 billion m^3 annually.
- Two monsoon wind seasons - the Southwest Monsoon (May - September) and the Northeast Monsoon (November - March).

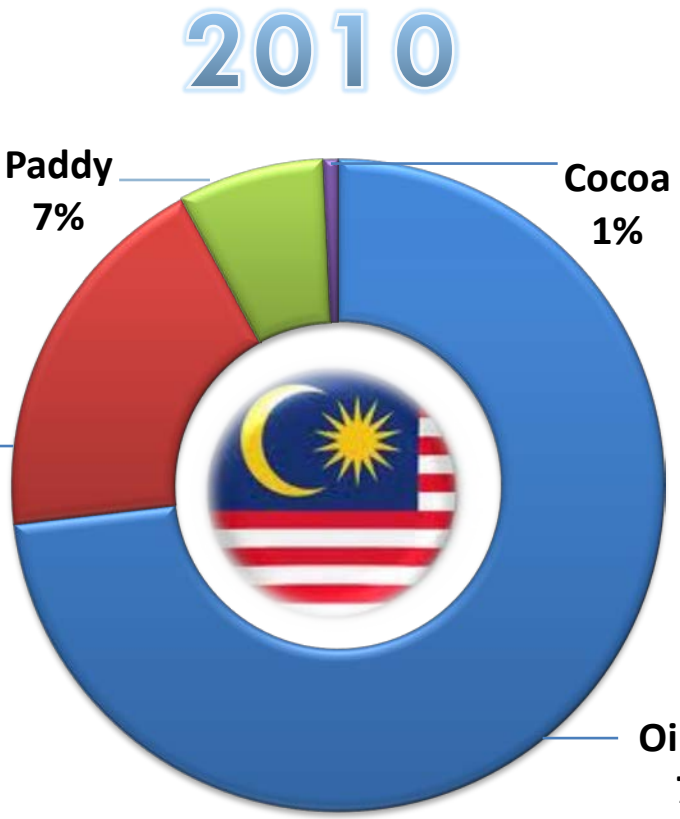
Malaysia's Land Cover

Land cover	Area (ha)		Total Area (ha)
	Peninsular Malaysia	Sabah / Sarawak	
Forest	5,800,540	10,050,900	15,851,440
Croplands	5,255,930	5,156,420	10,382,350
Waterbodies	83,794	30,335	114,129
No Data	2,058,540	4,630,530	6,689,070



- Forest is the dominant land cover type covering 48% of the country followed by croplands and waterbodies.

Land Use Percentage of Main Crops in Malaysia



Source: Ministry of Agriculture & Agro-Based Industry and Ministry of Plantation Industries and Commodities.

VULNERABILITY IN AGRICULTURE

Oil palm yields could ▼ by ≈ 30 % when temperatures ▲ 2°C above optimum levels and rainfall ▼10 %

Temp. ▲ of 2°C will reduce rice yield by 13 %. Occurrence of floods could ▼ yields by as much as 80 %.

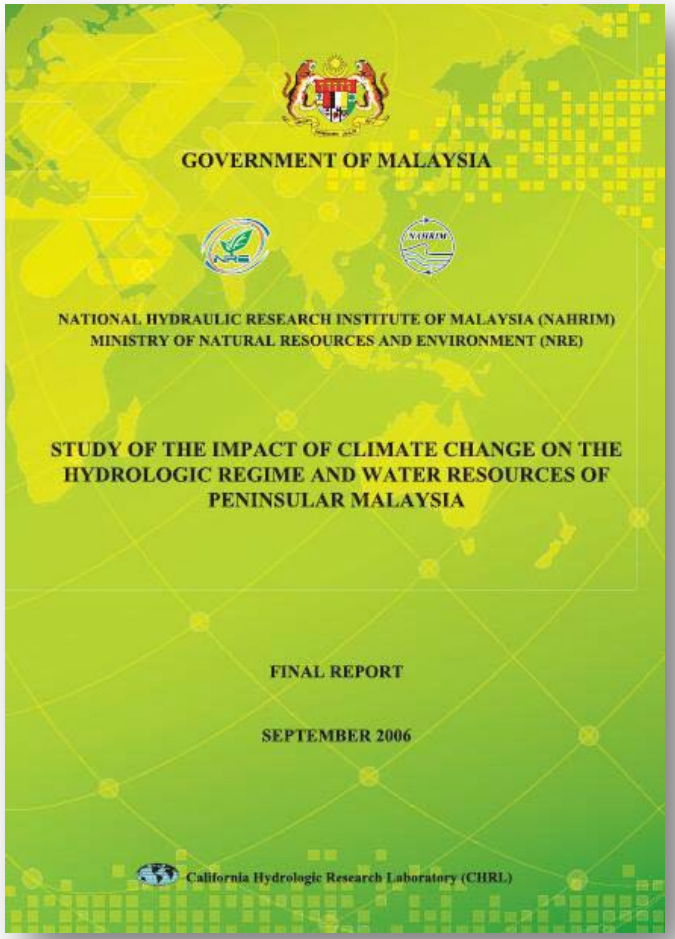
▲ in annual temp. above 30°C coupled with a reduction in rainfall < 1,500mm will resulting in up to a 10 % ▼ in yields.

An annual rainfall exceeding 2,500 mm will ▼ yields due to higher fungus incidence.

CLIMATE CHANGE SCENARIO (by 2050)

Climate projection study - NAHRIM (2006)

- Annual rainfall in East coast and N-W coast : increase up to 10%
- Annual Rainfall in Central and Southern Peninsular : decrease by 5%
- Overall mean air temperature: increase by 1.2 - 1.4°C
- Minimum temperature : increase by 0.7 - 1.4°C
- Maximum temperature : increase by 1.6 - 2.0°C



MALAYSIA's COMMITMENT ON GHG EMISSIONS REDUCTION

- In July 1994, Malaysia ratified the UNFCCC and Kyoto Protocol in September 2002.

- As a developing country, Malaysia has no quantitative commitments under the Kyoto Protocol at present.

- However, together with all other countries, Malaysia is already committed under the UNFCCC to formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases.

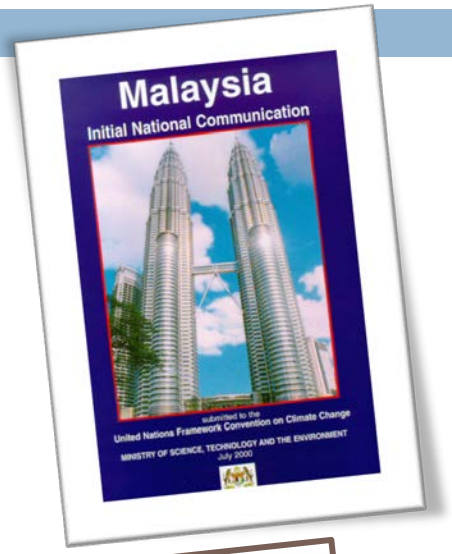
Malaysia's National Steering Committee on Climate Change (NSCCC)

- **Established in 1994 –** Chaired by the Secretary General of the Ministry of Natural Resources and the Environment (NRE), which also acts as the focal point for the UNFCCC
- **Role of NSCCC**
  To formulate and implement climate change policies including mitigation of GHG emissions and adaptation to climate change.
- The Committee consists of representatives from relevant ministries and agencies, the private sector, and NGOs.

Malaysia's National Communications

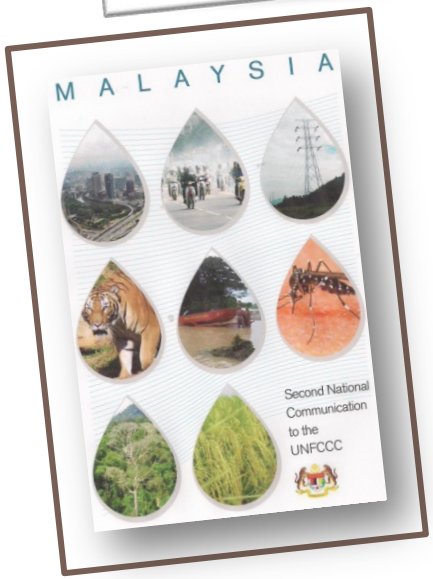
Initial National Communication (INC)

- Base year: 1994
- Status: SUBMITTED to the UNFCCC (2000)



Second National Communication (NC2)

- Base year: 2000
- Status: SUBMITTED to the UNFCCC (2011)



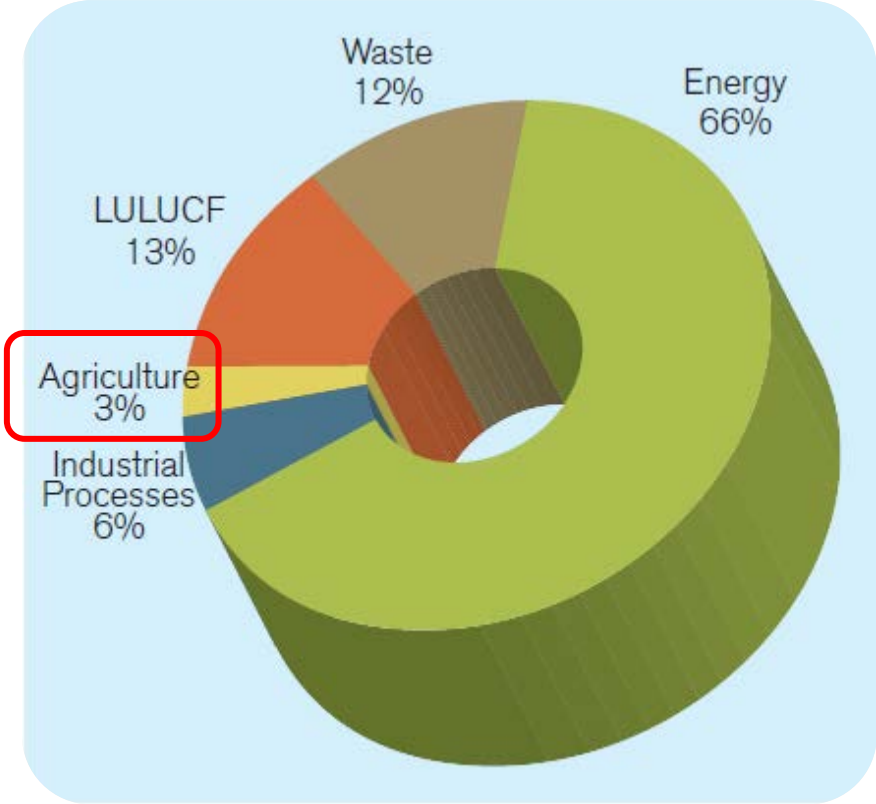
Malaysia's GHG Inventory, 2000

Sector	Emissions (Mt CO_2 eq)	Sinks (Mt CO_2 eq)
Energy	147.00	
Industrial Processes	14.13	
Agriculture	**5.91**	
LULUCF	29.59	-249.78
Waste	26.36	
Total	222.99	-249.78
Net Total (after subtracting sink)	**-26.79**	

Source: Malaysia's Second National Communication; NC2 (2011)

GHG Emission by Sectors in 2000

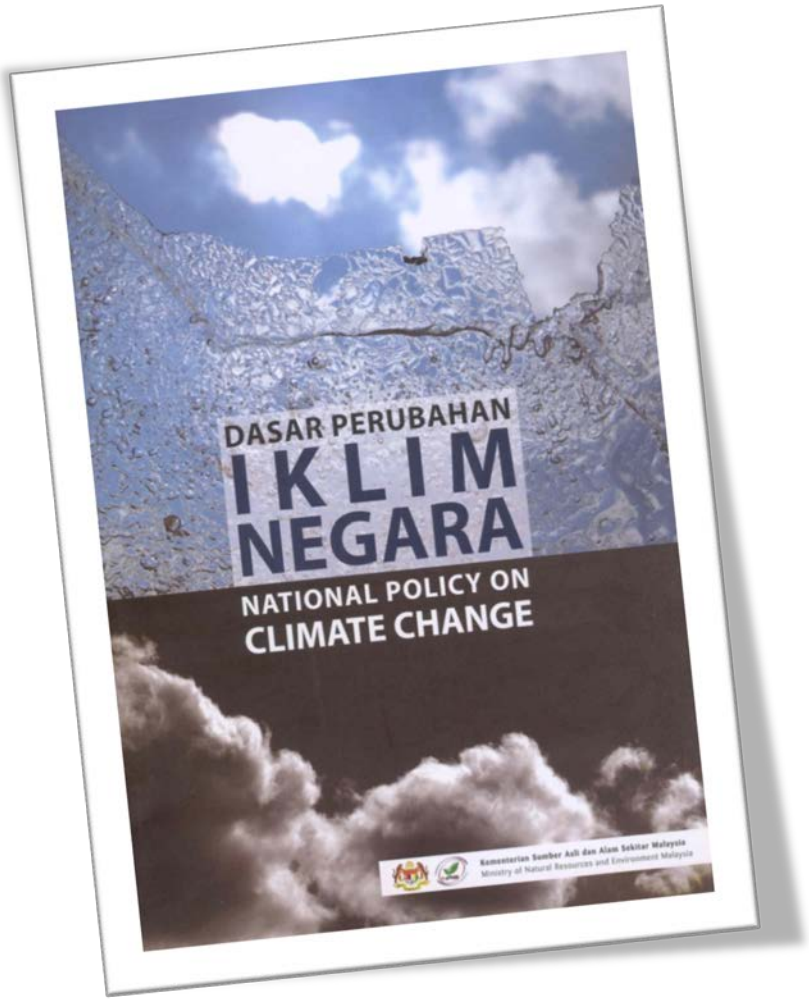
- The contribution of agriculture sector of the total GHG emission in Malaysia for the year 2000 is relatively low at about 3 %.
- The contributions were dominated by the Energy sector (66 %), followed by LULUCF sector (13 %), Waste sector (12 %) and Industrial processes (6 %)



Source: Malaysia's Second National Communication; NC2 (2011)

MALAYSIA'S NATIONAL POLICY ON CLIMATE CHANGE

- Approved by Cabinet on 20 November 2009
- Aims to ensure climate resilient development to fulfill national aspirations for sustainability
- Provide framework to mobilise and guide government agencies, industry, community and other stakeholders
- Addressing the challenges of climate change in a holistic manner



Objectives

1. **Mainstreaming climate change** through wise management of resources and enhanced environmental conservation resulting in strengthened economic competitiveness and improved quality of live
2. **Integration of responses into national policies, plans and programmes** to strengthen the resilience of development from arising and potential impact of climate change
3. **Strengthening of institutional and implementation capacity** to better harness opportunities to reduce negative impacts of climate change

Principles

P1: Development on a Sustainable Path

P2: Conservation of Environment and Natural Resources

P3: Coordinated Implementation

P4: Effective Participation

P5: Common but Differentiated Responsibilities and Respective Capabilities

MITIGATION MEASURES IN AGRICULTURE

- Emissions reductions in the agriculture sector can be achieved through (3) sustainable management :

Irrigated Rice Water Management

Nitrogenous Fertiliser Management

Manure Management

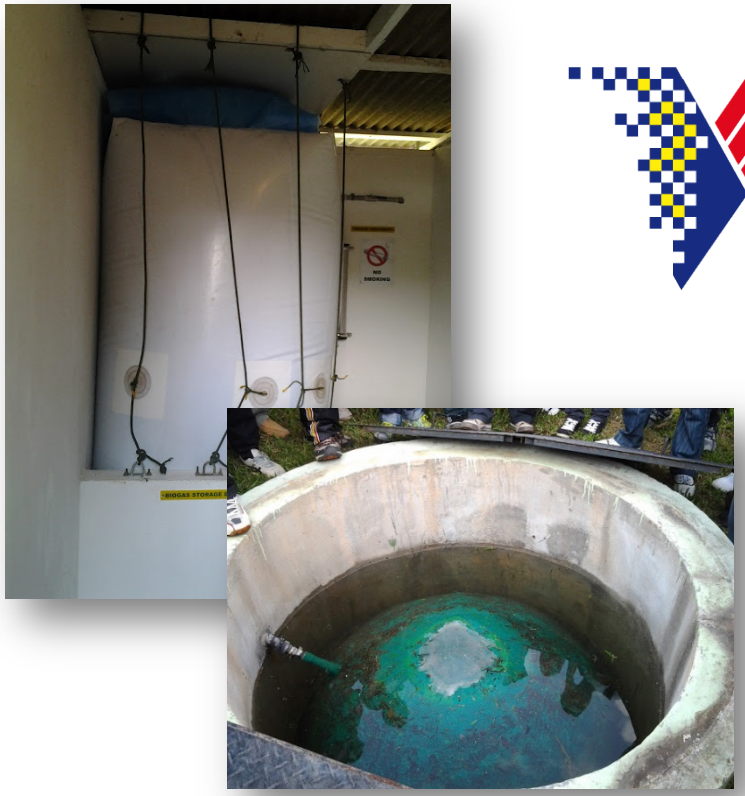
MITIGATION MEASURES IN AGRICULTURE

- ***Management of water in irrigated rice*** - Draining of paddy fields (single mid-season and multiple drainage could reduce greenhouse gas emissions by 50 and 80 percent respectively) and proper set up of water control infrastructures and good water management especially in the main granary areas to support the drainage activities.

- **Management of nitrogenous fertilizer** - using alternative natural sources of nitrogen especially bio-fertilisers or soil microbes.

- **Management of domestic livestock manure –** Aerobic composting of the manure and capturing biogas or methane from livestock manure which can be used as an alternative energy source.

Biogas Captured from Livestock Waste



Biogas Captured at Selangor

Biogas Captured at Kelantan

ADAPTATION STRATEGIES

CROP MANAGEMENT

- Plant trees on the onset of raining season to ensure water is constantly supplied at optimum rate
- Dividing the crop zones by climatic requirement
- Strengthen development of breeding program - (drought, flood & disease tolerance clones)

WATER RESOURCE MANAGEMENT

- Optimize water use efficiency
- Improved irrigation techniques
- ✓ Reduce water loss and wastage

ADAPTATION STRATEGIES

LIVESTOCK MANAGEMENT

- Improve livestock productivity – less animals but higher animal produce
- Develop heat-resistant animals through breed improvement
- Use land resources optimally
- Integrating cattle with tree crops (areas are cooler due to tree cover)
- Use animal housing systems with improved ventilation and lowered temperatures

Heat-resistant Crop Variety Developed

- The Malaysian Agricultural Research and Development Institute (MARDI) has officially launched new **aerobic paddy** variant named **MRIA 1** on August 22, 2013 by the Minister of Agriculture & Agro-based industry.
- Produced via mutation in a collaboration with the International Rice Research Institute (IRRI).
- Taking into account the threat of climate change and water shortage, the variant is **heat resistant**, **does not require much water** and **can be planted off season**.

Heat-resistant Livestock Developed

Kedah-Kelantan cattle

Brakmas cattle

Brahman cattle

- **A new breed of beef cattle** (crossbred between K-K & Brahman cattle) developed after extensive research and development by MARDI.
- Good adaptability, **highly tolerance to heat stress**, tick and parasites, and are easy to manage with minimum health problems.
- The most suitable for beef production under oil palm plantations.

GAPS

- Lack of data (crop parameters & soil properties) for climate projections.
- Limited of experiment data on the impact of climate change on agricultural activities.
- Need funding for further research activities including the development of baseline information

RESEARCH NEEDS

- Agricultural research
  - Effects of temperature and rainfall under field conditions
  - Developing environmental friendly mitigation and adaptation options
  - Development of new cultivars with more resistant to extreme weathers

- Climate modeling
  - Improved hydrological cycle model
  - Understanding link between local climate with global warming

CONCLUSION

- Agriculture is the major land use across the globe and highly sensitive to climate variation or changes.
- The changes will exact a major consequence on food availability and security.
- A recent policy, the National Policy on Climate Change were formulated to collectively guide the nation towards addressing climate change holistically and ensuring climate-resilient development.
- Specific strategies and R&D on mitigation and adaptation to manage climate change were necessary in addressing the adverse effects of climate change on agriculture.


^ THANK YOU^
~ TERIMA KASIH ~

Annex C9

SAGARPA
SECRETARÍA DE AGRICULTURA, GANADERÍA, DESARROLLO RURAL, PESCA Y ALIMENTACIÓN

ESTADOS UNIDOS MEXICANOS

inifap
Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias

National Strategy of Climate Change in Mexico

Adaptation and Mitigation Actions in Agriculture

Dr. Sergio Gómez Rosales
National Institute of Research in Agriculture, Forestry and Livestock

and

Dr. Mario Cobos Peralta
Posgraduate College

CONTENT

REGULATIONS

- GENERAL LOW OF CLIMATE CHANGE

✓ National Policy of Climate Change

✓ National Strategy of Climate Change

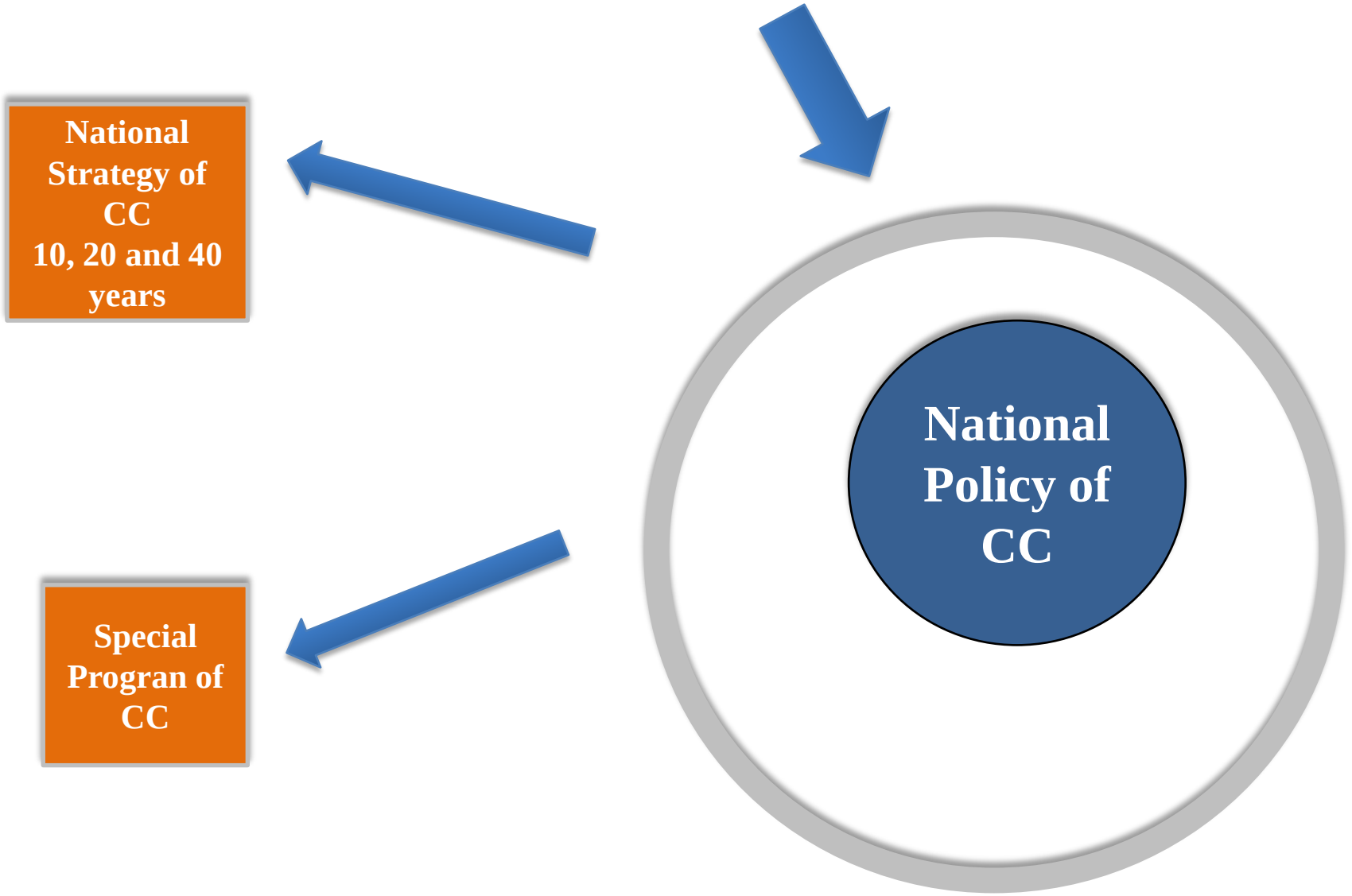
✓ National Program of Climate Change

- Pillars and axes of A&M
- Vision 10, 20 and 40

RESEARCH, DEVELOPMENT AND ADOPTION OF TECHNOLOGIES IN AGRICULTURE

- Mitigation actions during the period 2006-2012
- Research, innovations, technology transfer
- Seeding and disemination of knowledge
- Services for innovation and scientific cooperation

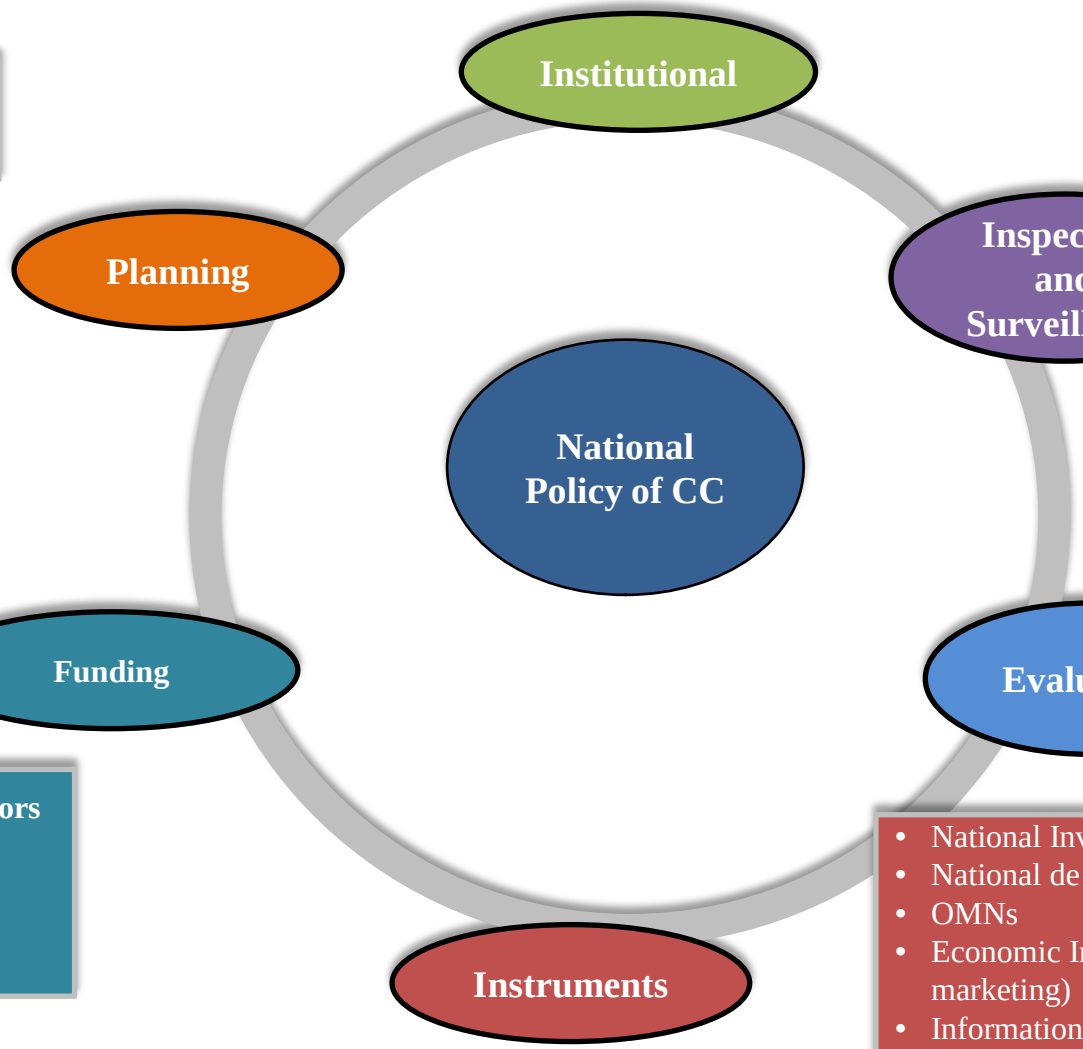
General Low of Climate Change



GLCC

NATIONAL SYSTEM OF CLIMATE CHANGE

ICCC | INECC | CCC | Federal States | Municipal Authorities | Union Congress



National Strategy of CC 10, 20 and 40 ys

SPCC

State Programs

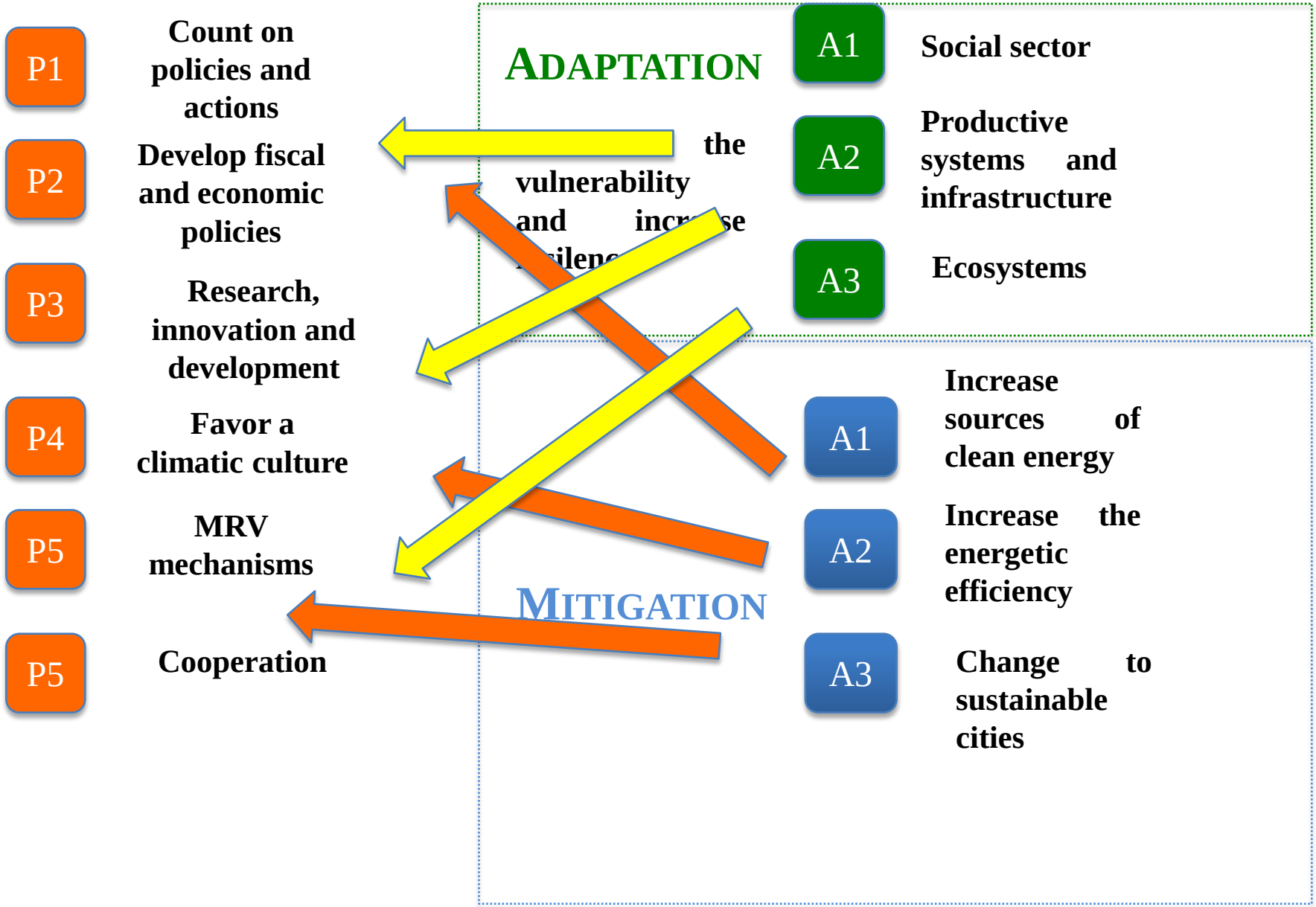
Sanctions

Coordination of Evaluación of NIECC

Fund for CC - Favors the Adaptation and the most vulnerable municipalities

- National Inventory of Emissions
- National de Registration of Emissions
- OMNs
- Economic Instruments (fiscals, funding, marketing)
- Information System of CC
- Atlas of Risks
- State Risks Atlas

STRATEGIC PILLARS AND AXES OF THE NATIONAL STRATEGY OF CC



Vision 10-20-40

Society / population

- ✓ It serves to the most vulnerable to climate change effects.
- ✓ The Society is involved and active in the climate change issue.

Ecosystems (water, forests, biodiversity)

- ✓ It protects the most vulnerable ecosystems and receive attention and cash flow.

  The ecosystem management and sustainable management are cornerstones for the conservation strategy.
- ✓ Actions of conservation and sustainable use of the country implemented ecosystem.
- ✓ Implementation of territorial integrated management schemes.
- ✓ Appropriate financing schemes to promote sustainable landscapes.
- ✓ Technical and technological tools exist and are used for local adaptation.
- ✓ Strategies are implemented for moving to a zero percent rate of carbon loss in the original ecosystems.

Energy

Clean technologies integrated national productive development.

- Socioeconomic schemes encourage the use of clean energy.
- Incentive system promotes the greatest advantages of using fossil fuels, energy efficiency, energy saving and sustainable public transport in relation the use of fossil fuels.
- Close to reach 35% of electricity generation from clean sources.

Emissions

- 30% reduction of emissions compared to baseline.
- Mexico substantially reduced emissions of Short-Lived Climate Pollutants.
- Parastate industries implement energy efficiency schemes in all its operations and increase the use of renewable energy.
- Urban centers with more than fifty thousand people have infrastructure for waste management that avoids methane (CH4) to the atmosphere.

Productive Systems

- Environmental impacts in the production sector are understood, known, monitored and faced.
- Productive technologies and practices help to reduce climate change risks.

Vision 10-20-40 years

Private Sector /industry

- The companies incorporate climate change criteria in their production projects .
  The main sources of GHG emissions report their component in the National Registry of Emissions.
- Companies reduce their emissions of gases and compounds and seize opportunities of energy efficacy, energy saving and use of renewable and clean energy.

Mobility

The public and private sectors adopt sustainable mobility systems.

- Socioeconomic schemes encourage sustainable transport use.
- Common use of electric vehicles in public transport.

Research, development and adoption of technologies in Agriculture

Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA)

M.19	Implementation of 1,090 actions for efficient and renewable energy use in agricultural projects, livestock and fisheries
M.34	Removing 400 shrimp fishing boats with an abatement of overfishing and savings of 77.3 million liters of diesel annually.
M.35	Supporting the replacement of 15,500 old fishing boats engines for new engines, which means an annual savings of 53.3 million liters of petrol
M.43	Instalation of 600 thousand efficient firewood stoves, in the mainframe of the Project of substitution of open fires to ecological stoves
M.54	Reconverting 298,200 ha of degraded agricultural, low-productive potential and in constant risk lands, to perennial and diversified crops

Research, development and adoption of technologies in Agriculture

Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA)

M.57	Implementation of ecological projects on 61,995 ha on farms registered in the catalog of Procampo
M.58	Green harvesting of 188,000 ha of the industrializable sugar cane surface
M.60	Production of biofertilizers to apply in an area of 2 mill ha, with a 15% saving in chemical fertilizers
M.61	Introduction of soil management conservation practices on 250,000 ha of agricultural lands, through the economic support to adquire the required machinery specialized in conservation tillage
M.62	Protect, reforest o revegetate 30 plants (shade trees, foliage trees, fodders, etc) per Animal Unit in grasslands
M.63	Appying plannified foraging in 5 mill ha of grasslands

SAGARPA
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INIFAP plays a strategic role in public policies aimed at the agriculture sector, this institution provides technical support in science and technology for improved food production and sustainable management of natural resources. In this sense, INIFAP is the Federal Government's principal institution dedicated to the research and technological development for the forestry, agriculture and livestock subsectors, it serves by developing research projects, products and services which generate knowledge and technology.

National Institute for Research in Forestry, Agriculture and Livestock

National Institute for Research in Forestry, Agriculture and Livestock

- **INIFAP conducts research on issues related to vulnerability assessment and adaptation measures, mitigation of CC and its impact using cutting-edge tools such as the use of real-time weather information, generated by agroclimatic automated monitoring stations and information systems for the Dynamic modeling of physical and biological processes.**

- **During the last six years, regional models predicting sugarcane crops were developed and the National Network of Agroclimatic stations INIFAP-COFUPRO began to operate, which counts with more than 900 automated stations, that allowed the issuance of agrometeorological bulletins in some States of the Federation.**

- **INIFAP also developed innovations on carbon capture and expert systems of crop management, as well as models for decision-making in areas under uncertain climatic conditions.**

- **Likewise, dynamic maps of rain and temperatures were developed and a methodology for decision making based on prevention and mitigation under conditions of climate variability and socio-environmental vulnerability.**

- **Other topics of interest were the studies of biodiversity along the country including the caracterization of more than 5 400 native corns and the rescue of the traditional and herbal medicine in indigenous communities.**

National Institute for Research in Forestry, Agriculture and Livestock

- **In biotechnology, research has been carried out in two ways: 1) In molecular markers for genetic characterization of germplasm for disease diagnosis, and 2) In plant tissue cultures, for the production of outstanding genetic characteristics and disease free vegetative materials.**

- **In the year 2012, the National Center of Genetic Resources was established, is the first center of its kind in Mexico and is set to become one of the most important world's germoplasm banks with a mission to conserve and preserve the country's genetic resources in order to ensure the well being of present and future generations.**

Some achievements of INIFAP during the last six years

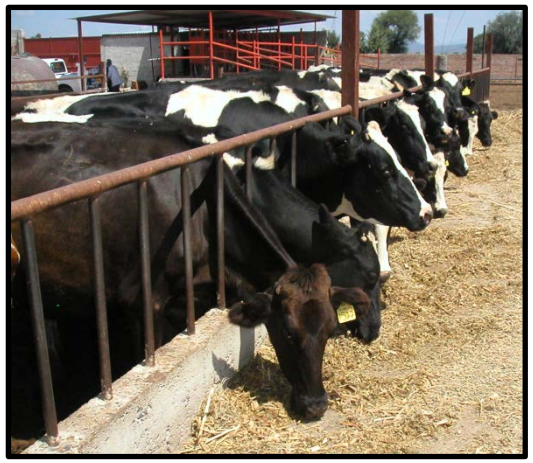
- ✓ **Generation of new varieties of basic and animal feeding grains (rice, beans, corn, wheat, sorghum, canola, soybean) tolerant to diferent environmental contitions along the country.**
- ✓ **Improving the agroforestal production systems by the association of cacao with ornamenthal plants and wood species favoring the soil and water conservation and biodiversity.**
- ✓ **Technology to improve the germination of seed from forest species such as Bursera linanoe**
- ✓ **Methodology to estimate the carbon capture in mezquite (Prosopis laevigata), important to value the benefits of environmental services by the owners.**

Technologies validated and transferred to producers in the year 2012

- **Sustainable production of seasonal forage in family dairy farms and modelling to better use the irrigation water in dairy farms.**
- **Methodology for the assessment of hydric stress in seasonal crops (beans, sorghum, forage oat, wheat, barley)**
- **Fostering the adoption of traditional composting and worm composting of animal manures and the use of worm leachate as foliar and water fertilizar in small livestock producers.**
- **Improving the carbon sequestration in agricultural lands through increased quality and production of winter forages.**

Reduction of methane production from enteric fermentation, the main activities are

- **Evaluation of the relationship between methane emissions with nutritional and genetic factors and development of mitigation strategies in different production systems in dairy cattle.**
- **Assessment of the methane production of feed ingredients under *in vitro* conditions and development of prediction equation to formulate low methane emitting diets for ruminants.**
- **Evaluation of different methods of processing (green, hay, silage) of traditional (winter crops, corn and sorghum forages) and non-traditional feed ingredients (opuntia leaves, mesquite pod) to reduce the enteric methane production**



Reduction of methane production from enteric fermentation, the main activities are

PROJECTS IN THE AREA OF RUMINANTS	
PROJECT	**GOAL**
Development of an feed inoculum based on acetogenic ruminal bacteria	**Diminish between 30-50%the methane production**
Estimation of the potential methane production of feed ingredients.	**Identify the capacity to stimulate the methane production in grasses, legumes, oil meals, crop residues andcereal grains used in the feeding of ruminants** **To balance diets with ingredients with lower methane producing potential**
Laboratory technique por predicting the methane production	**To count on efficient and reliable lab techniques to measure methsne production *in vitro*.**
Removing protozoa from rthe rumen	**Diminish between 30-50%the methane production in**

Some of the research activities currently in place in the area of animal manure are as follows

- **Validation of storage, treatment and recycling technologies of animal manure to be used as organic fertilizers.**
- **Evaluation of techniques for the microbiological acceleration of composting and worm composting with minimal losses of nitrogen and carbon in manure.**
- **Evaluation of the content and availability of nutrients in the short and medium term for forage production in composts with different fermentation processes.**

Research activities currently in place in the area of animal manure

- **Biogas production by anaerobic digestion and the treatment of solid and liquid waste.**
- **Characterization of contaminants in the wastewater of swine farms located in Central Mexico.**
- **Adaptation and evaluation of the efficiency of diferent aerobic biological processes for the treatment of wastewater generated in anaerobic digestion plantas in swine farms, including a cost-benefit analysis.**

Seeding the knoledge

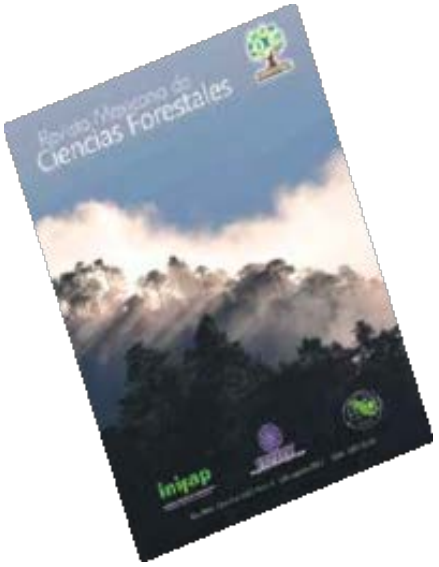
- **INIFAP performs daily technology transfer activities through different mechanisms, such as training and dissemination events for producers,technical advisors and the general public;**

- **Training through practice to technical agents and**

- **The participation of researchers in training to extension agents involved in development programs.**

Dissemination of knowledge

- **To disseminate the results of research, INIFAP publishes three scientific journals, that are indexed in international recognized catalogs, the National Council of Science and Technology (CONACYT):**
- ✓ **Journal of Forestry Science,**
- ✓ **Journal of Agricultural Science and**
- ✓ **Journal of Animal Science.**



Scientific and technological events (Seminars, congresses, workshops).

- **INIFAP participates and organizes relevant scientific and technological events at the local, regional and national levels in order to raise awareness of the progress and results of research, and promote their products and services and strengthen its Institutional image.**

Services for the innovation

- **INIFAP provides other services to the productive chains, such as laboratory work, advice, diagnosis, training, certifications and evaluations of agrochemicals.**

- **Contribution in the formation of human resources, through diploma courses and the participation of researches as advisors in bachelor, master and PhD tesis.**

Exchanges and scientific cooperation

- **In terms of trade and international scientific and technological cooperation, researcher staff participated in 1018 events, such as conferences, symposia, workshops, meetings, courses and technological missions, in response to demands of research support and training through bilateral and trilateral agreements between Latin America and the Caribbean, which were managed by the Coordination of International Affairs of SAGARPA and the Ministry of Foreign Affairss.**

Exchanges and scientific cooperation

- **To strengthen the exchange of knowledge, the Institute received 398 experts and foreign researchers, who also provided technical assistance in various issues of agricultural and forestry subsectors. As part of the strategy to strengthen ties of cooperation with international agencies - related to the fundamental tasks of INIFAP – 26 international agreements were signed and were follow up by the Institute.**

Muchas gracias!!!!!

APEC Seminar-Workshop on Mainstreaming Climate Change Adaptation & Mitigation Initiative in Agriculture (AMIA)

Mainstreaming Strategies on Climate Change Adaptation and Mitigation in Agriculture in Chinese Taipei

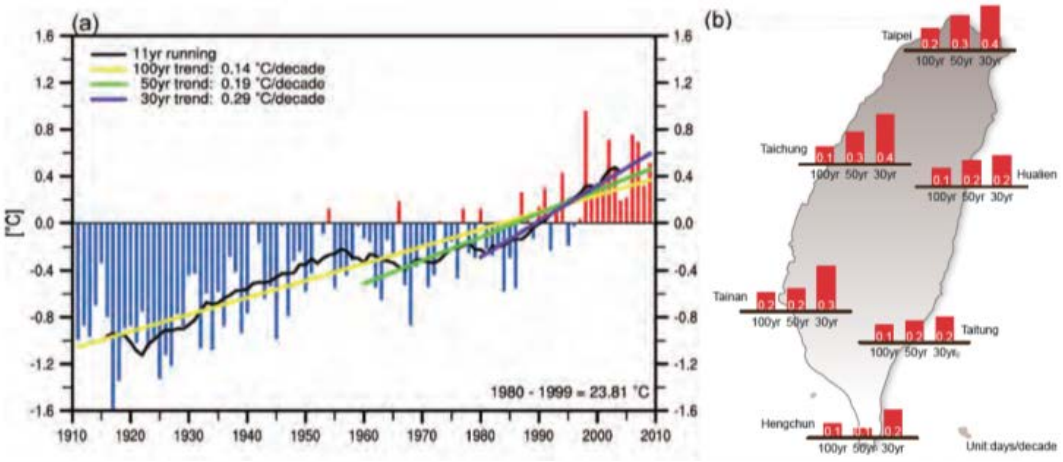
Livestock Research Institute, Council of Agriculture, Taiwan, Chinese Taipei
Mei-Ping Cheng

Outline

- Impacts of Climate Change in Taiwan
- Greenhouse Gas Emission in Taiwan
- Nationally Appropriate Mitigation Actions (NAMAs) in Taiwan
- Adaptation Strategy to Climate Change in Taiwan
- Action Plan in Agriculture

Impacts of Climate Change in Taiwan

- Global-IPCC AR4
- Temperature ↑0.74℃/century
- Increase in antropogenic GHG conc.
- Global atmospheric composition changed continuously.



- Taiwan
- Temperature ↑0.8℃/century
  - Metropolitan area ↑1.4℃
  - Mountain area ↑0.8℃
  - Western ↑0.9℃
  - Eastern ↑1.3℃
- Rainfall
  - days of torrential rain (≧ 200 mm) significantly increase
  - light rain days (<1.0 mm) -4 days per decade in the past thirty years.

Greenhouse Gas Emission in Taiwan

Net GHG emission 264,707 kilotons of CO_2e

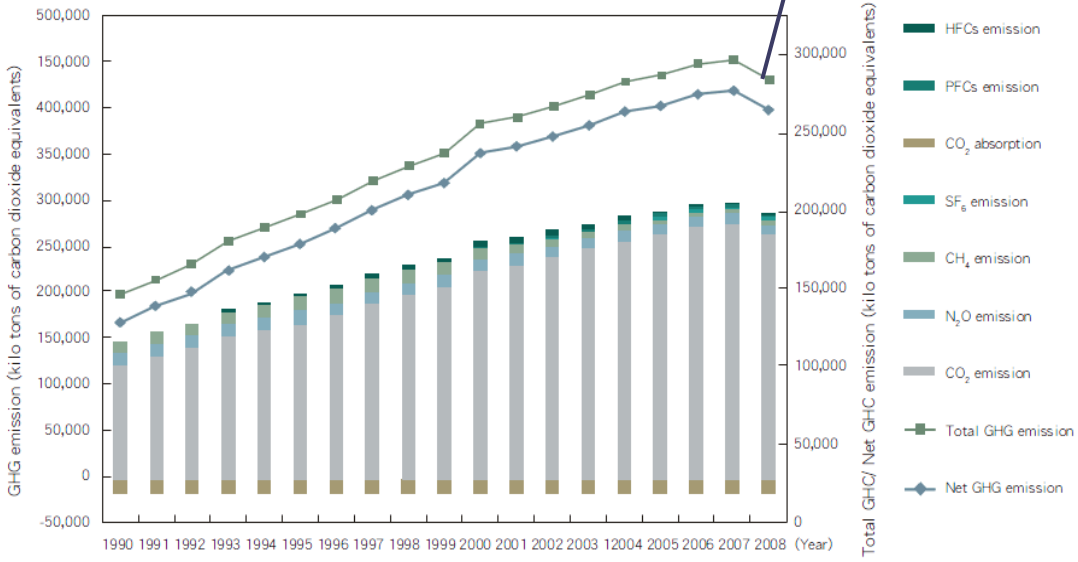
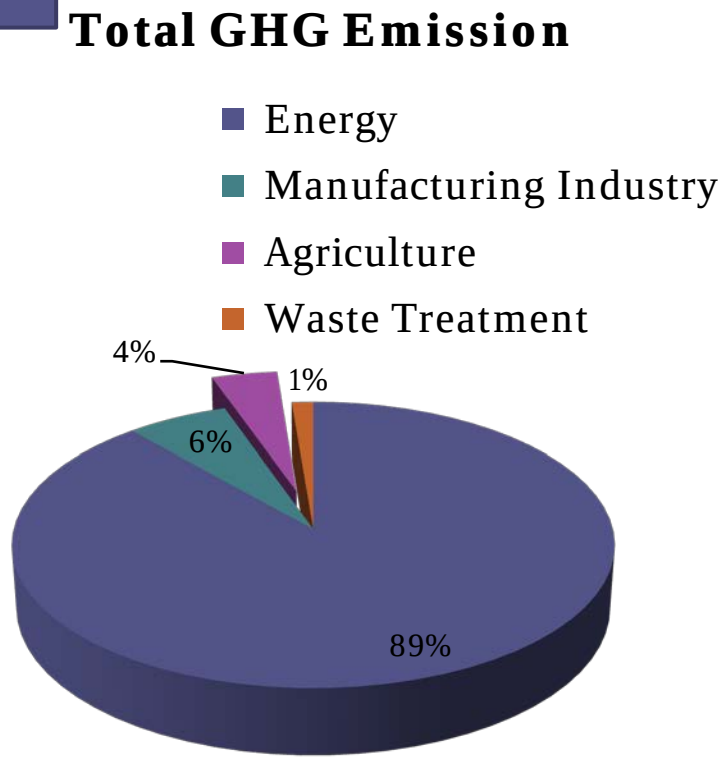


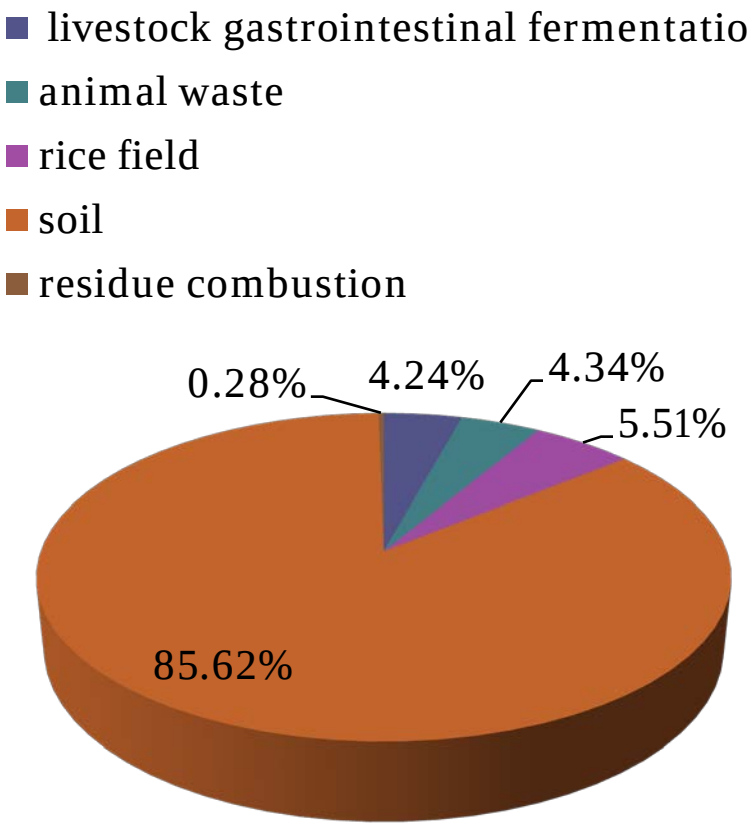
Figure 3. Taiwan Greenhouse Gas Emission Trend by Gas Type between 1990 and 2008
Data source: EPA Executive Yuan (except data of carbon dioxide emission due to fuel combustion by energy sector came from Bu reau of Energy Ministry of Economic Affairs).



Source:

Second National Communication of the Republic of China (Taiwan) under the United Nations Framework Convention on Climate Change

GHG Emission for Agriculture Sector



N2O emission mostly came from soil.
The emission reduction (-7.23%) was due to reduced usage of chemical fertilizers(-8.05%).

CH4 emission reduction (-2.6%) was mostly on livestock intestinal fermentation.

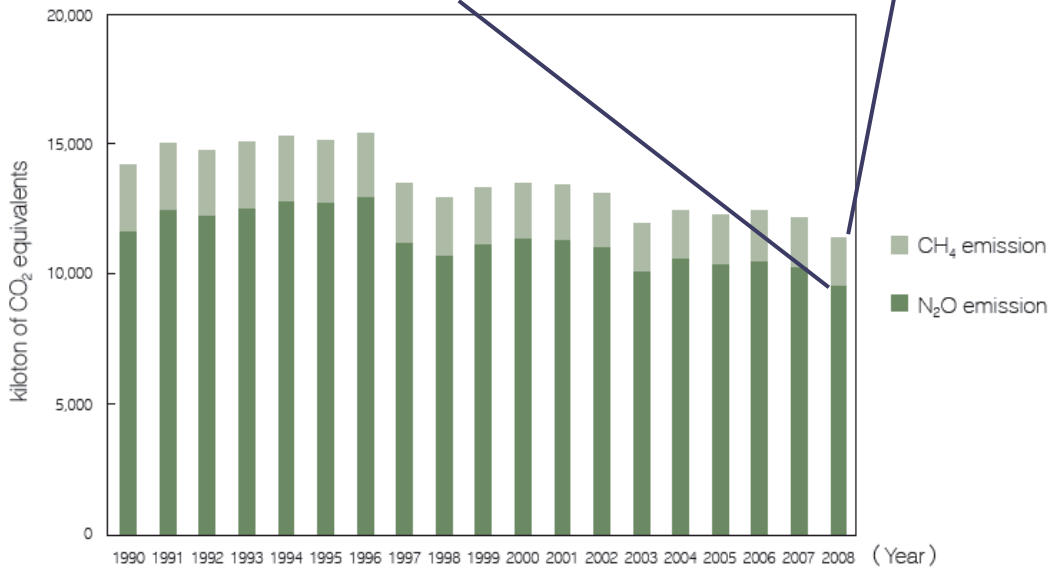
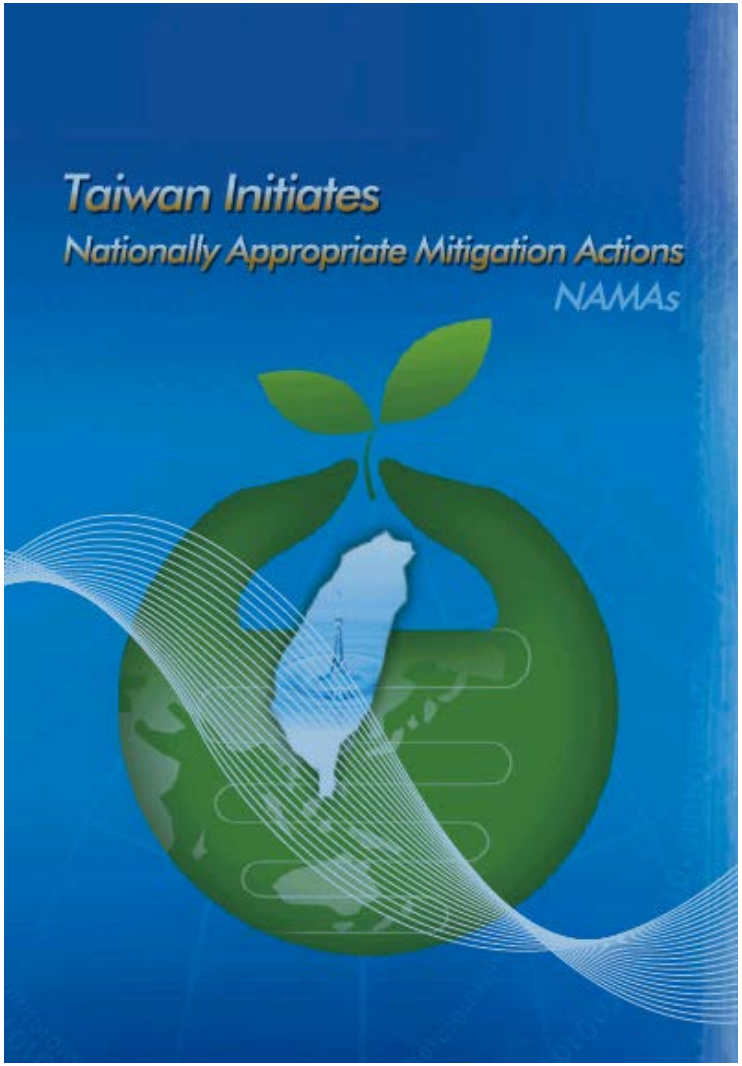


Figure 2.3.4 Greenhouse Gas Emission Trend for Agriculture Sector in Taiwan between 1990 and 2008[4]

Nationally Appropriate Mitigation Actions (NAMAs) in Taiwan

- Building Carbon Reduction Legal Foundation
- Fulfilling Sectoral Reduction
- Best Use of Market Mechanism
- Enhancing Environmental Education and Promotion
- Strengthening International Cooperation



- Energy Sector
- Industrial Sector
- Transport Sector
- Residential & Commercial Sector
- Agricultural Sector

NAMAs--Agricultural Sector

- **Energy-saving model –** lighting fixtures and lamps, drying, processing, and develop low energy consuming agricultural machinery
- **Rational fertilization-** soil fertility testing, diagnosis of crop nutrient requirement services
- **High efficiency feeding production model**
- **Improving structure of barns**
- **Implement forestation on plains and in hilly regions**
- **Enhancing the concepts** of energy conservation and carbon reduction on agriculture production facilities
- Media‘s special columns/interviews reporting for **extended promotion**.

Forage drying facility

Improved structure of swine house

LED in goose house

“Gold Corridor” Agricultural Programs

- **To build energy efficient agriculture:**
- COA planned to invest $3.1 billion for new “gold corridor” agricultural programs in 2013-2020, covering approximately 3 kilometers along the High Speed Rail area to forge a corridor for saving energy and water.
- **Expected benefits:**
- to cut the pumping of ground water by 28,006,700 tons per year,
- to bring in 12,000 visitors annually for agri-tourism.

- **Strategies:**
- Establishment of a water-saving agricultural production area
- Repurposing of agricultural resources use
- Strengthening the application of water-saving agriculture information and technology
- Expanding the scale of agricultural operations
- Introduction of a new generation of farmers
- Development of agri-tourism industry .

Gold Corridor- Example Strategies

- Introduction of new technologies and facilities
  - controlled environment greenhouse
  - plant factory
  - sophisticated water-saving greenhouses
  - solar-powered barns
- To cultivate new farmers
  - promote farmer colleges
  - small landowners and large tenants
  - farm loans.
- To cultivate new industries
  - expand the industry value chain
  - plan leisure and tourism
  - establish farmers' markets
  - create a feature agriculture

Solar panel on the swine house

Greenhouse for orchid cultivation

Adaptation Strategy to Climate Change in Taiwan

1. Preface

1.1 Climate Change

1.2 Mitigation and Adaptation

1.3 Nation's Adaptation Policy Framework

2. The Future Scenarios of Climate Change in Taiwan

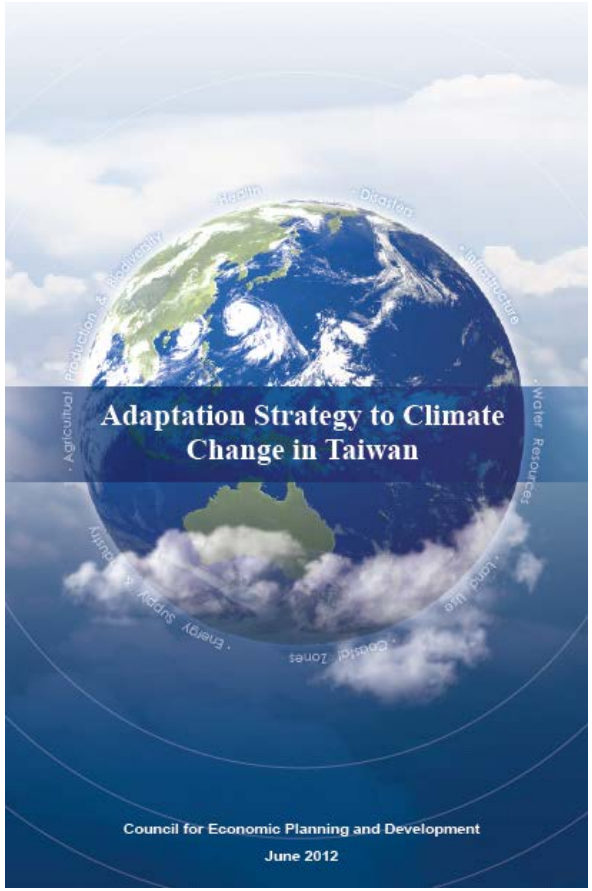
2.1 Climate Change in Taiwan

2.2 Future Climate Change Predictions

3. Impacts and Challenges

3.1 Overall Impacts and Challenges

3.2 Impacts and Challenges: Sector by Sector



4. Prospects and Objectives

4.1 Prospects and Principles

4.2 Policy Objectives

5. Adaptation Strategies

5.1 Structure

5.2 Overall Adaptation Strategies

5.3 Adaptation Strategies: Sector by Sector

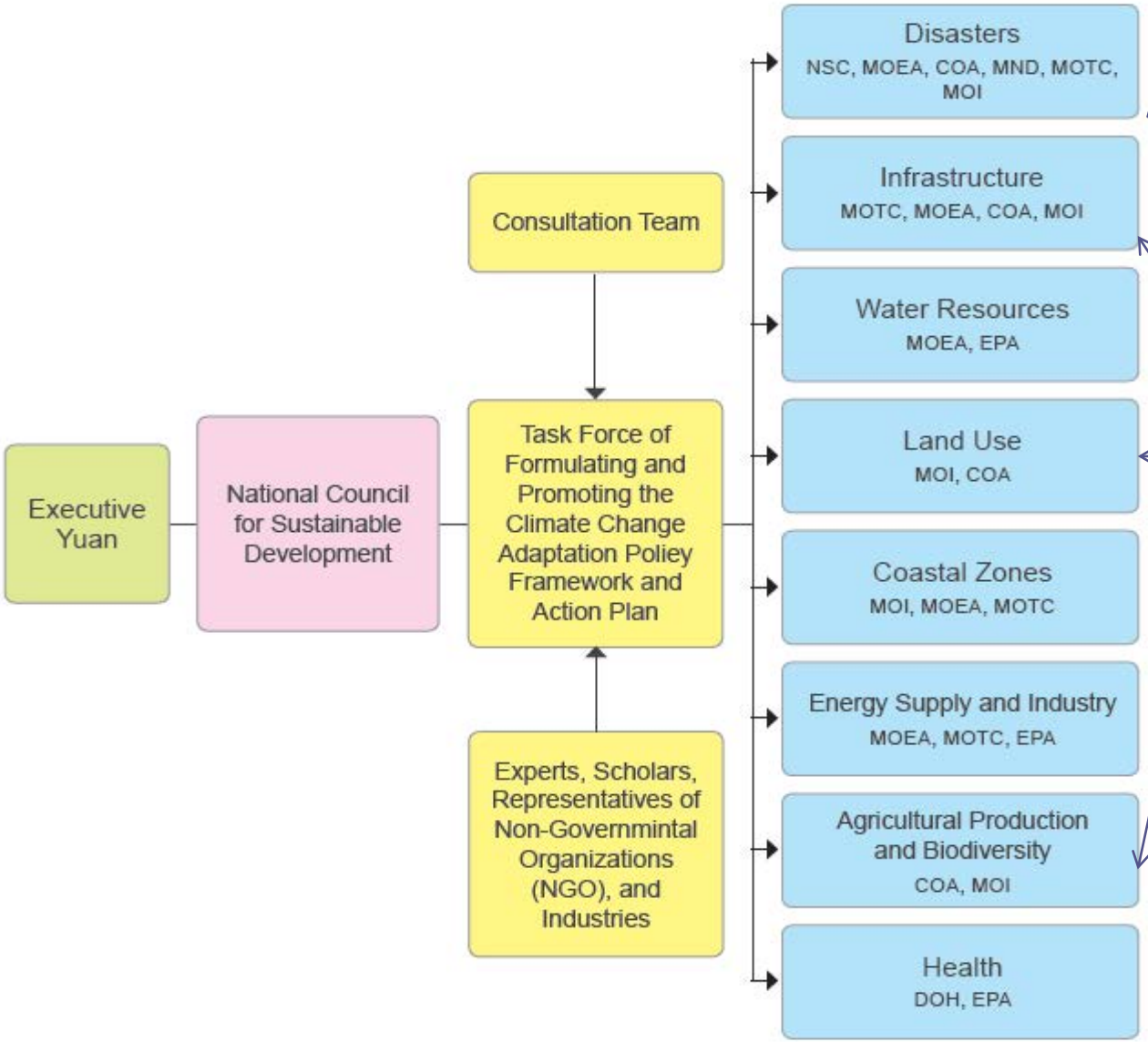
6. Implementation

6.1 Implementation Mechanism and Action Plan

6.2 Cooperative Measures

7. Conclusion and Outlooks


Experts, Scholars and Entrepreneurs
1. Participating formulation of the guidelines and action plan
2. Partnering the government in action
3. Providing advice
Citizens and NGOs
1. Participating formulation of the guidelines and action plan
2. Monitoring the government ‘s implement
3. Participating and adapting together
Citizen Participation: Dividing and Sharing Responsibility
Government
1. Establishing the guidelines and action plan
2. Implementing the action plan
3. Seeking advice from all quarters and making timely revisions to action programs needed



Council of Agriculture (COA)

- ✓ National Science Council (NSC)
- ✓ Ministry of Economic Affairs (MOEA)
- ✓ Coast Guard Administration (CGA)
- ✓ Ministry of National Defense (MND)
- ✓ Ministry of Transportation and Communications (MOTC)
- ✓ Ministry of the Interior (MOI)
- ✓ Environmental Protection Administration (EPA)
- ✓ Department of Health (DOH)

The Organization of the National Adaptation Policy Framework

National Climate Change Adaptation Action Plan (2013-2017)

- Every 5 years
- Rolling plan
  - Constructing enabling condition
  - Climate change risk assessment and planning
  - A demo project
    - North Taiwan metropolitan area
  - Sector action plan
    - Among 445 projects proposed by various ministries, 71 projects are selected as priority projects after a careful evaluation

Conference on Policy of Climate Change Adaptation in Agriculture Sector

Vision: Low risk
Low carbon emission
New business

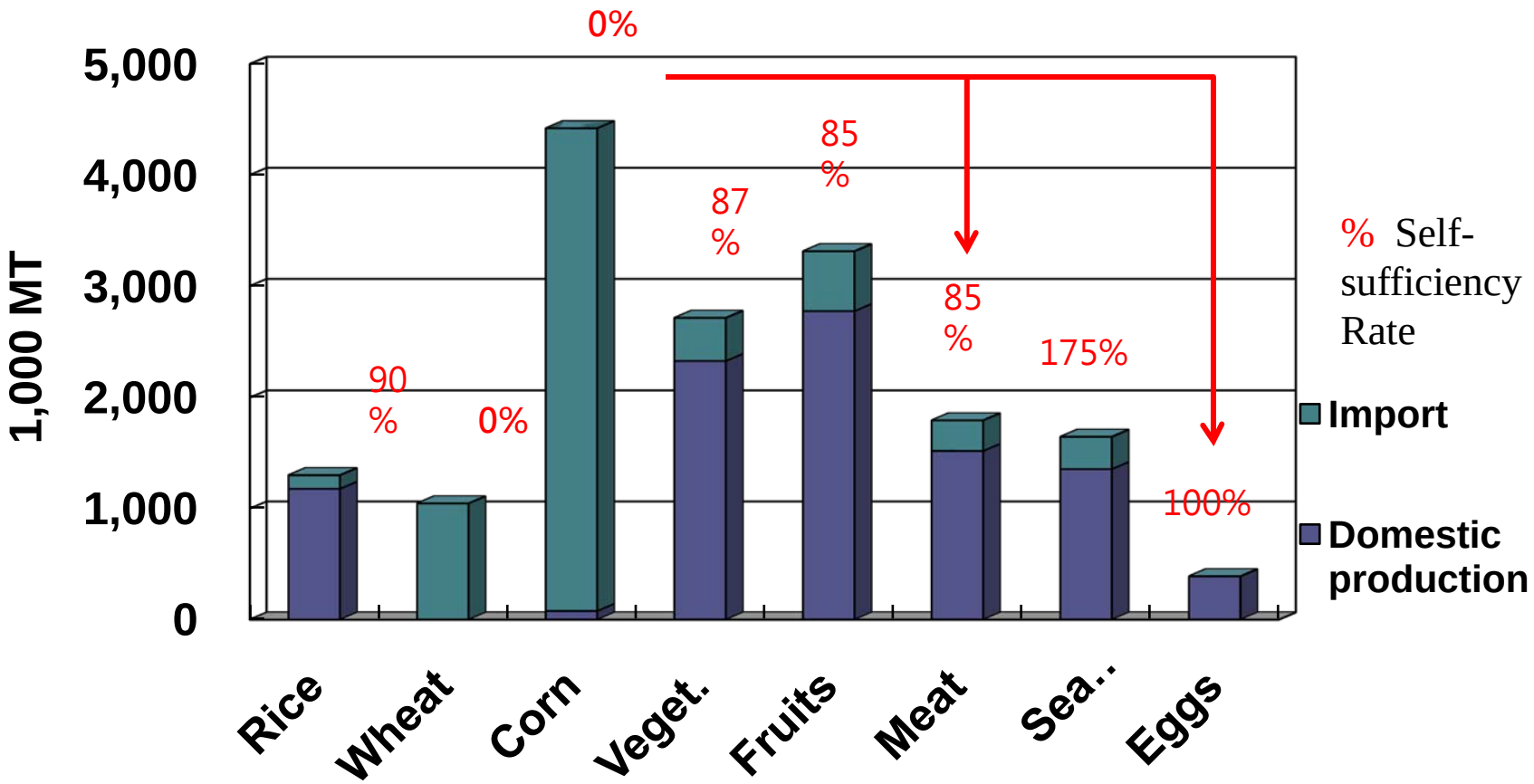
June 15, 2010

Key Strategies:

1. Constructing food security system according to the degree of risk
2. Integrating technology on promoting stress resistance capacity in agriculture production
3. Implementing low carbon agriculture
4. Using marginal lands as flood detention area with ecological function
5. Strengthening rural autonomous disaster prevention system
6. Creating low energy, low carbon “Green gold” of new business opportunities
7. Establishment of a risk management strategy on biological diversity.

Food self-sufficiency?

Average Food Self-sufficiency Rate **32.5% in 2008**
Almost the lowest among East-Asia economies



Mid-term Plan for Adjusting Land Farming System (2013-2016)

- **Objective:**
  - To adjust farming systems, reactivate fallow farmland , expand business scale, increase output and create jobs.
- **Expected Benefits:**
  - to improve food self-sufficiency rate by 1.4% to 34.9%
  - to increase repurposed land in 2016 by about 45,000 hectares, compared to that in 2011
  - to increase the overall production amount and benefits to $8.8 billion
  - to create 100,000 jobs and to stimulate the development of related industries.
- **Adjusted policies:**
  - To adjust the payment for fallow period times which encourages use of the same field area for at least a period of farming, to resume production (initially targeting 50,000 hectares of land)
  - To promote the cultivation of import substitution crops and organic crops with products having export potential.
  - To strengthen cooperation between central and local government, and to develop regional specialties

Institutional Arrangement (COA)

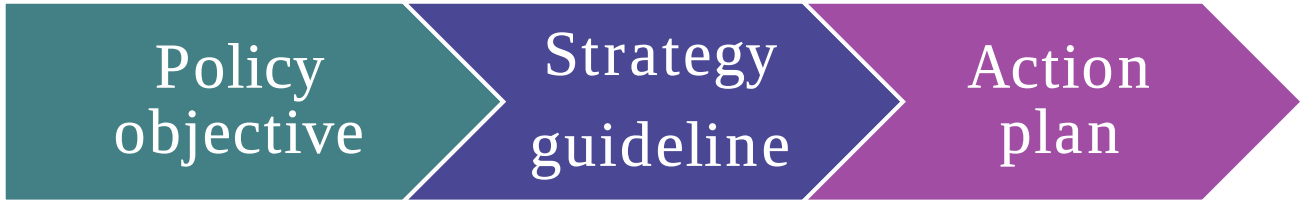
- Research and extension institutes: developing adaptive breeding and cropping/system, and conducting extension for farmers' groups
  - ✓Taiwan Agriculture Research Institute (TARI)
  - ✓ 7 regional district agriculture research & extension stations
  - ✓ Livestock Research Institute (LRI)
- Agriculture and Food Agency:

➔ formulating and providing financial programs (driving force, important)

Reactivated fallow farmland

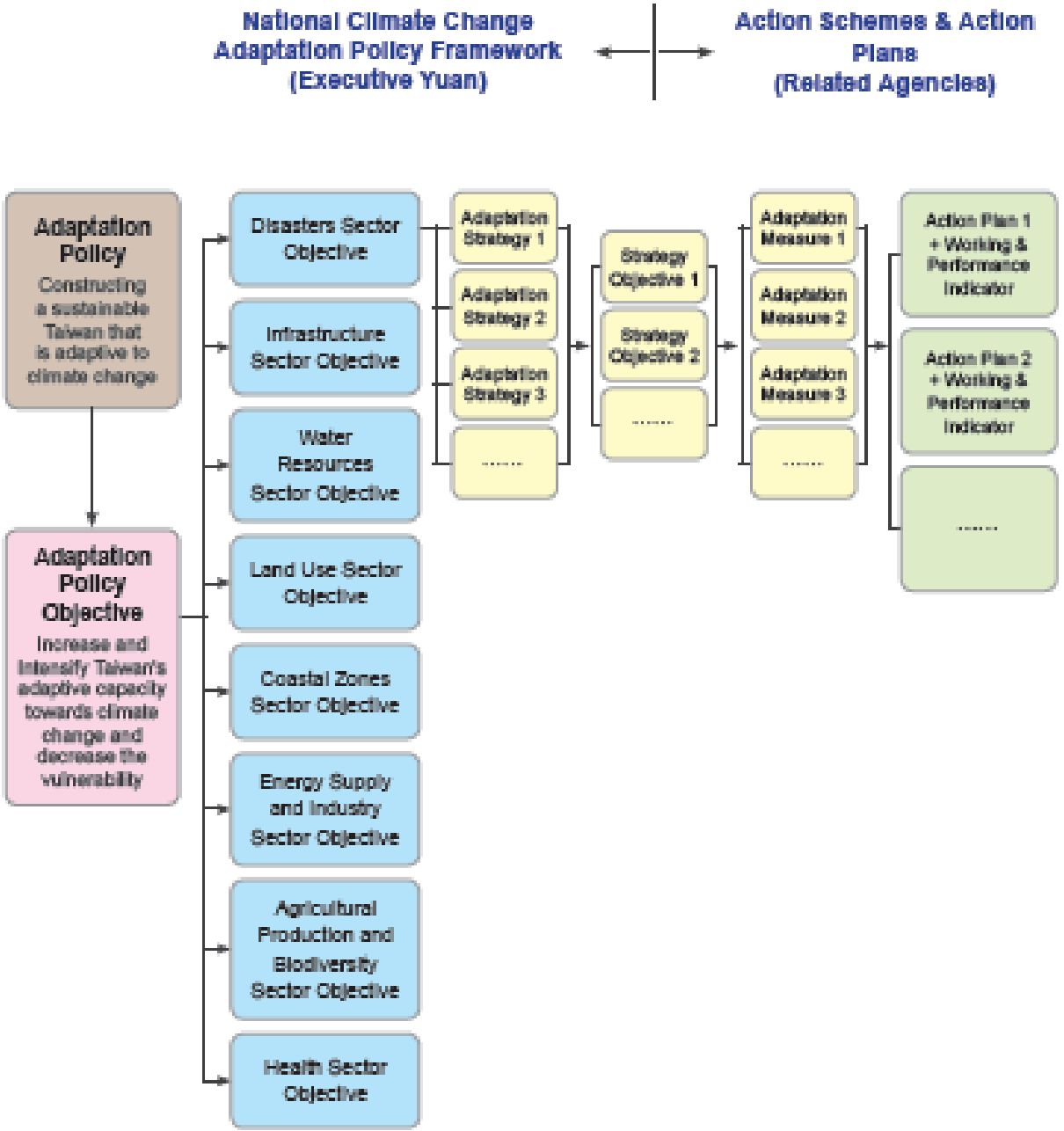
25% of fallow farmland (11896 ha) have been activated in 2013

Conclusion


Policy objective
Strategy guideline
Action plan


Research and Development
Policy Instrument
-subsidy & manpower
-regulation?
Implement ation

THANK YOU FOR LISTENING


National Climate Change Adaptation Policy Framework (Executive Yuan)
Action Schemes & Action Plans (Related Agencies)
Adaptation Policy
Constructing a sustainable Taiwan that is adaptive to climate change
Adaptation Policy Objective
Increase and intensify Taiwan's adaptive capacity towards climate change and decrease the vulnerability
Disasters Sector Objective
Infrastructure Sector Objective
Water Resources Sector Objective
Land Use Sector Objective
Coastal Zones Sector Objective
Energy Supply and Industry Sector Objective
Agricultural Production and Biodiversity Sector Objective
Health Sector Objective
Adaptation Strategy 1
Adaptation Strategy 2
Adaptation Strategy 3
.....
Strategy Objective 1
Strategy Objective 2
.....
Adaptation Measure 1
Adaptation Measure 2
Adaptation Measure 3
.....
Action Plan 1 + Working & Performance Indicator
Action Plan 2 + Working & Performance Indicator
.....

Annex C11

Ministry for Primary Industries
Manatū Ahu Matua

Climate Change Mitigation and Adaptation in New Zealand

Paul Melville

www.mpi.govt.nz

Overview of presentation

- Snap shot of New Zealand agriculture
- New Zealand policy matrix
  - Global
  - New Zealand Government Policy
  - Partnerships
- Outcomes and lessons learned

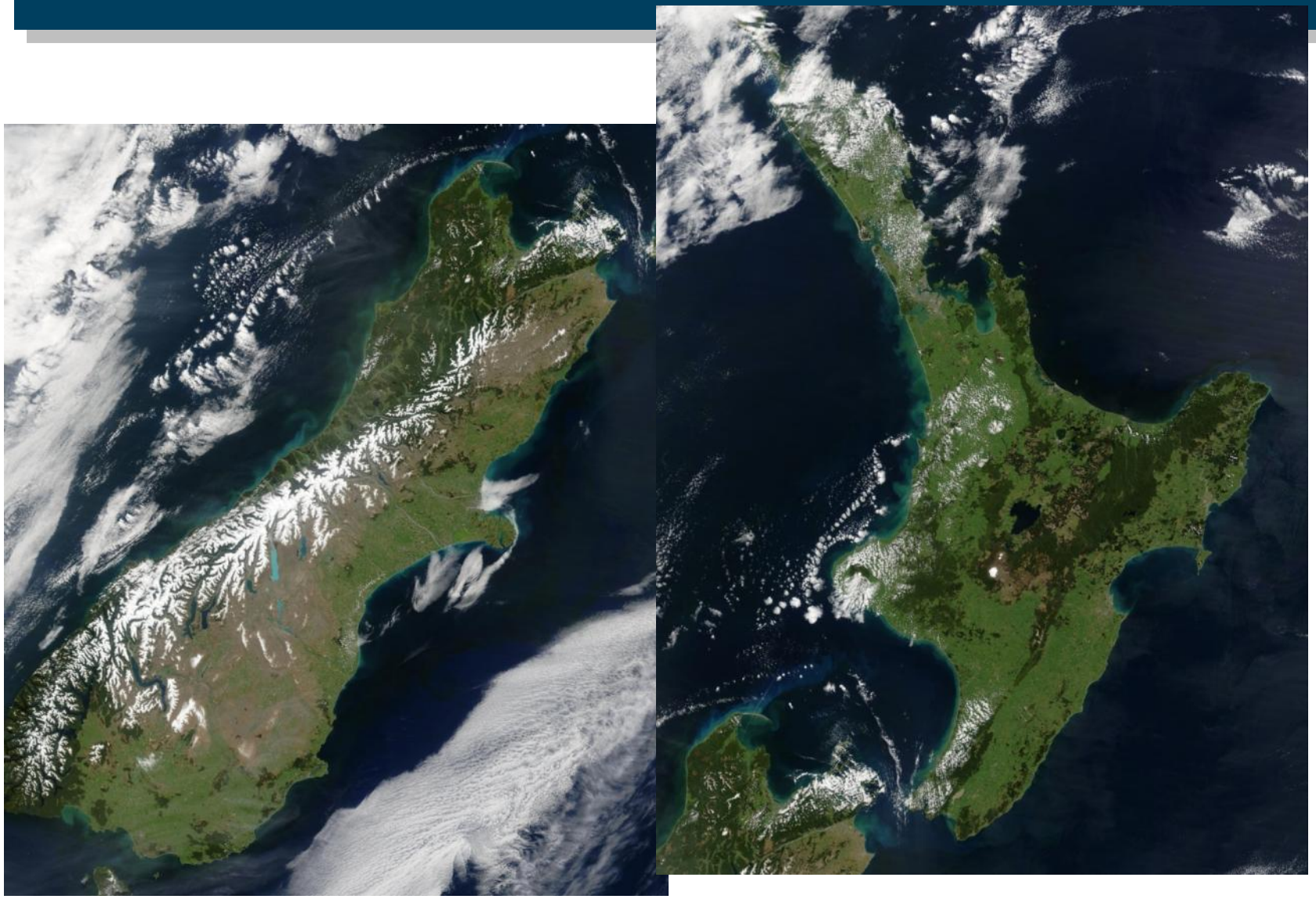
Snapshot of New Zealand

The importance of international trade to NZ:

- Accounts for around two-thirds of New Zealand's total economic activity
- Critical for New Zealand's economic well-being and growth prospects

Product	% of World Production	% of global trade
Dairy	3%	33%
Beef	1%	8%
Sheepmeat	6%	75%
Wool	14%	27%
Venison	n/a	50%
Kiwifruit	21%	32%
Pipfruit	1%	5%
Wine	0.46%	2%

Snapshot of New Zealand



Snapshot of New Zealand

Beef, sheep and dairy farming in Southland

Snapshot of New Zealand

Sheep farming in Canterbury

Snapshot of New Zealand

Irrigated dairy in Canterbury

Snapshot of New Zealand

West coast dairy farming

Snapshot of New Zealand

Wineries in Marlborough

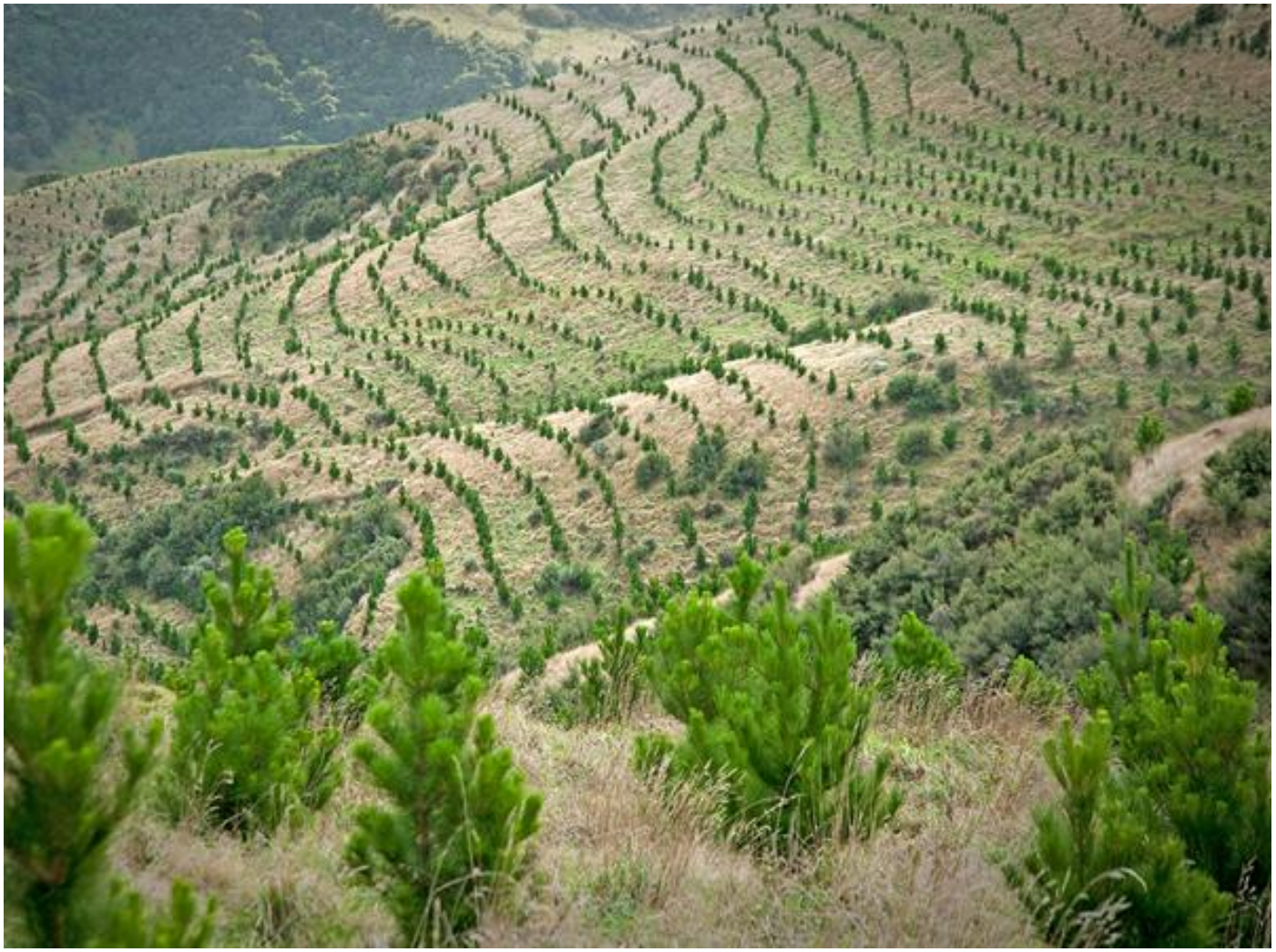
Snapshot of New Zealand

Beef farming in the Lower North Island

Snapshot of New Zealand

Hawkes Bay vinyard

Snapshot of New Zealand



Plantation forestry on the East Coast

Snapshot of New Zealand

Plantation forestry in the central North Island

Snapshot of New Zealand

Kiwifruit orchards in the Bay of Plenty

Snapshot of New Zealand

Dairy farming in Northland, Waikato, Taranaki

Snapshot of New Zealand

….So a very diverse agricultural country

Te Mata Peak, Hawkes Bay

Snapshot of New Zealand

- History is important
  - 1840: Our young nation founded
  - 1882: A world first: refrigerated exports
  - 1909: Herd Testing Service commenced
  - 1935: Artificial Insemination begins
  - 1950: 3rd Richest Country in World
  - 1973: UK joins EC
  - 1984: Removal of subsidies
  - 2008: New Zealand-China FTA

Snapshot of New Zealand

Change in policy approach

Support levels

1960s: almost non-existent → 1970s: increased to 'protect' NZ from overseas shocks → 1980-4: increased to compensate for high costs and low commodity prices → Post 1984 – most support withdrawn

Agricultural policy

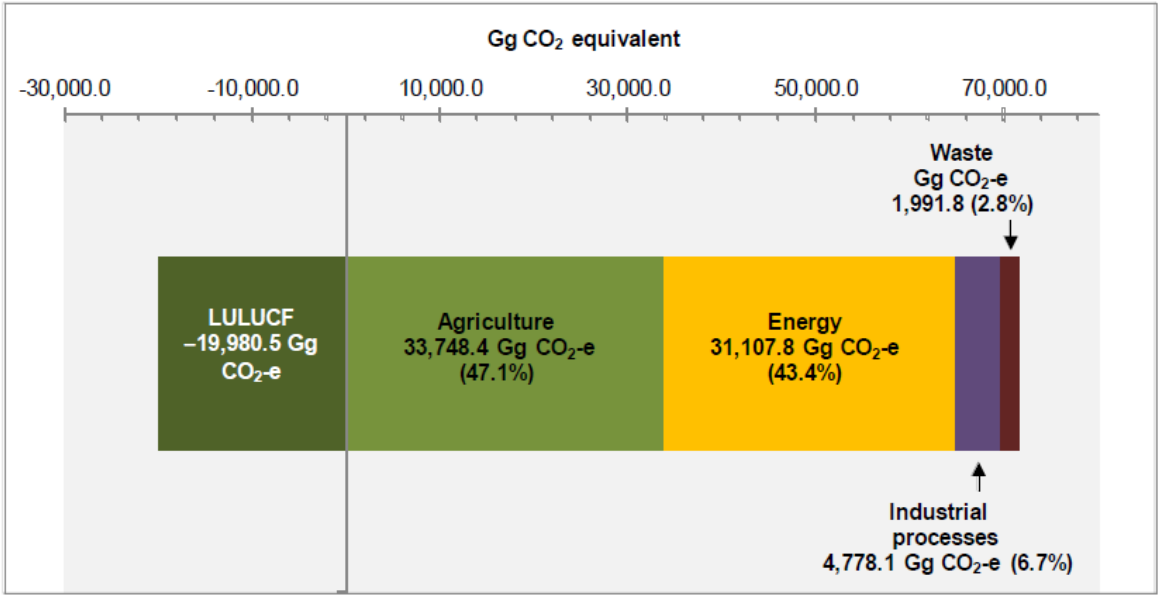
1970s – 1984 : Policy aimed to increase **production** → Post 1984 : Policy aimed to increase **efficiency** and allow sector to respond to market signals

A new challenge for agriculture

Agriculture in New Zealand's emissions profile

- Agricultural emissions 47% of New Zealand's total
- 9% increase in aggregate agricultural emissions since 1990

Figure ES 4.1.1 New Zealand's emissions by sector in 2010



A new challenge for agriculture

Sector emissions intensity improvement since 1990

	Production of Lamb (Tonnes)	CH4 & N2O emissions (Mt CO2e)	Emissions / unit of product*
1990	364,429	15.8	43.2
2010	378,912	10.4	27.4
% Change	4%	-34%	-37%

	Production of Beef (Tonnes)	CH4 & N2O emissions (Mt CO2e)	Emissions / unit of product*
1990	464,548	6.6	14.2
2010	638,014	6.6	10.3
% Change	37%	0%	-28%

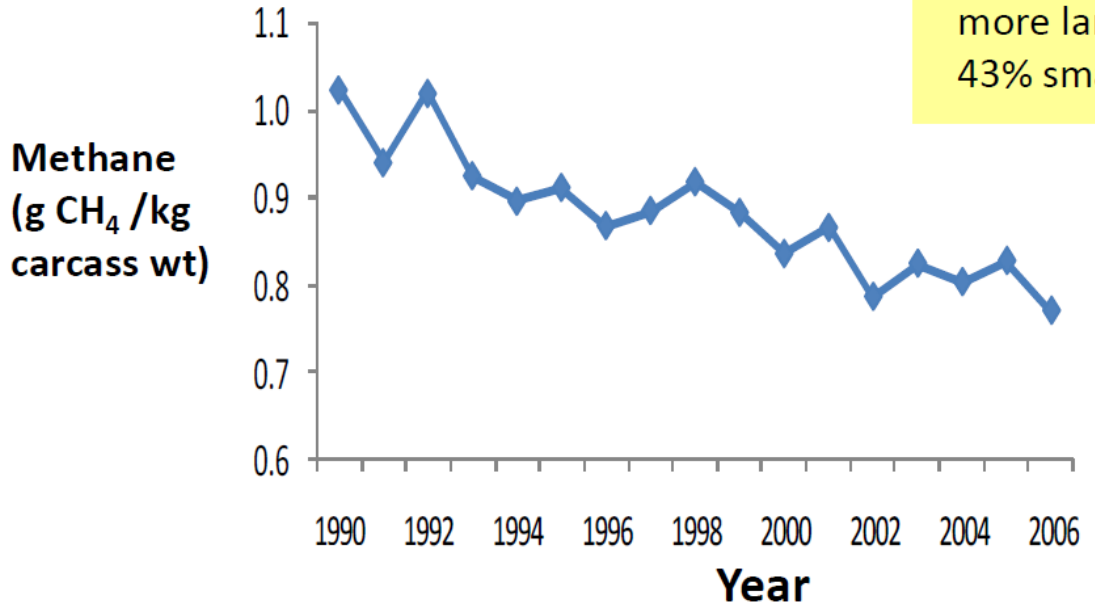
	Production of Milk (Tonnes Milk Solids)	CH4 & N2O emissions (Mt CO2e)	Emissions / unit of product*
1990	598,963	7.1	11.9
2010	1,438,497	13.9	9.7
% Change	140%	95%	-19%

** Simple method to compare emissions intensity that does not represent a full LCA carbon footprint study as no removal of emissions for co-products and no allowance for CO2 emissions*

Case study: Reduction in ewe flock

- Since 1990, lambing percentage has increase from 100% to 119%

NZ sheep meat average:



Compared to 1990, NZ sheep farms in 2009 produced slightly more lamb meat, but from a 43% smaller flock

Holistic and collaborative policy approach

International Policy

The Global Research Alliance on Agricultural Greenhouse Gases

- Brings countries together to find ways to grow more food without growing greenhouse gas emissions

GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

New Zealand has:

- Initiated the concept
- First Chair of Alliance Council – Canada from July 1 2012
- Hosts the Secretariat – foreseeable future
- FONTAGRO
- LEARN / GRASS fellowships and awards
- New Zealand Fund for Global Partnerships in Livestock Emissions Research ($25 million)
- Regional Workshops

International Policy

UNFCCC

- New Zealand is a strong advocate for holistic work on agriculture work in the UNFCCC's SBSTA

National Policy

Mitigation Policy

Emissions Trading Scheme

- Provides long-term signal to economy
- Agricultural gases must be reported
- Investigating farm-level reporting
- No obligations at present

Resource Management Act

- Enables local government policy
- Taupo Nutrient Trading
- Horizon's One Plan

National Policy

Training and education

- All sectors public-private funded
- Strong agricultural presence throughout tertiary institutions
- In 2010 6% of tertiary graduates were in agricultural or veterinary courses
- Many agricultural centres of learning: Lincoln, Massey, Taratahi
- Nutrient management “Short Courses”
- Estimated that one rural professional employed for every 23 farms

The New Zealand Agricultural Greenhouse Gas Research Centre

Mission: *"To provide knowledge, technologies and practices which enable agricultural activities to continue to create wealth from agriculture for New Zealand in a carbon constrained world."*

- Opened 3 March 2010 by Prime Minister John Key
- 100% Government funded (via PGP / MPI): $48.5 million over 10 years

Industry Partnerships

Pastoral Greenhouse Gas Research Consortium (PGGRC)

- Consortium of Government and industry (50:50 funding)
- Invested $45m into developing Methane and Nitrous Oxide mitigation developments 2002- 2012
- Most comprehensive pastoral livestock approach taken globally
- First organisation to map rumen methanogen genomic sequence

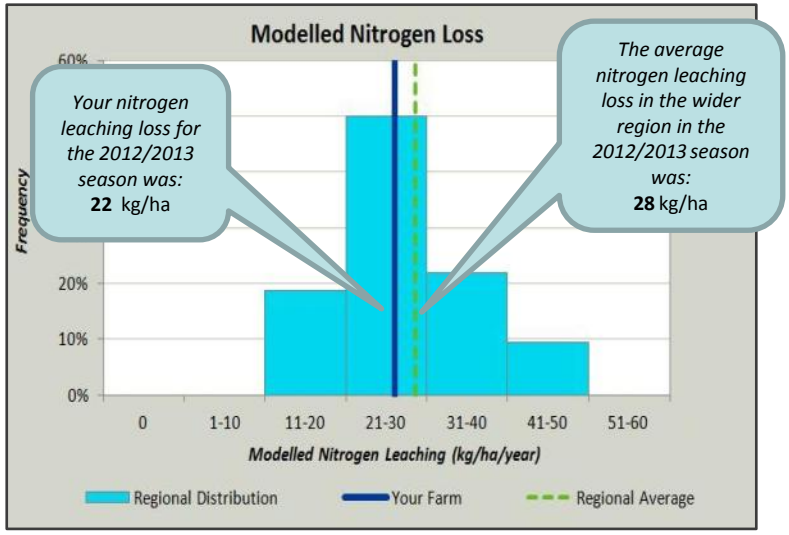
Industry Partnerships

Primary Growth Partnership

- Programme to invest in research and innovation to boost the economic growth and sustainability of New Zealand's primary sectors
- Investment is 50:50 government-industry
- Some projects:
  - Transforming the Dairy Value Chain
  - Integrated value chain for red meat
  - Steep-land plantation harvesting

Case study: Dairy nutrient budgeting

- PGP funded programme to develop an environmental assessment tool
- Tested on >200 farms
- Fonterra is now implementing (>90% of New Zealand dairy supply)
- Fonterra now employees over 20 Sustainable Dairy Advisors
- Will result in reduced nutrient leaching and GHG emissions



Industry Partnerships

Pastoral 21

- Government industry partnership (50:50 funded)
- 5 demonstration farms spread through NZ
- Farms are run using 2020 genetics
- Demonstration farms will:
  - Demonstrate increased profitability of NZ$110/ha
  - Lift production by 20% (per ha)
  - Reduce N and P loss by 30% (per unit of output)
- Farmer field days transfers knowledge to public

Adaptation

- 2007-08 drought economic cost NZ$2.8 billion (1.5% of GDP)

Adaptation

- 2004 Manawatu Floods, 2005 Bay of Plenty floods, 2006 Wairarapa, 2007 Hawkes Bay, Clutha and Northland, 2008 Huranui and 2010 Southland

National Policy

Adverse Event Policy

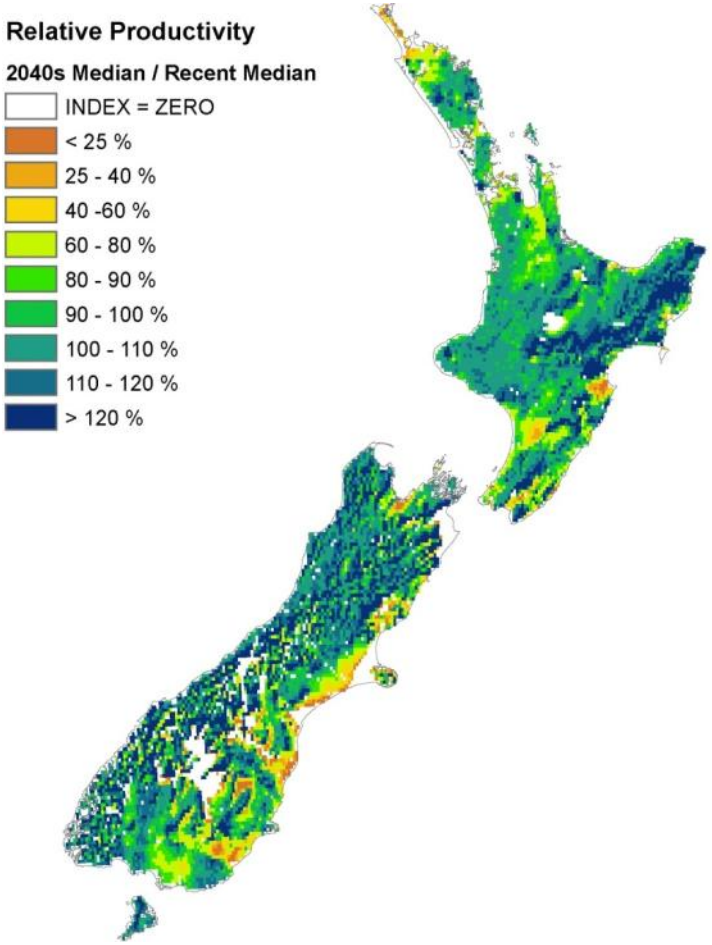
Scale of Adverse Event		Small-scale (The majority of the criteria sit within this column)	Medium-scale (The majority of the criteria sit within this column)	Large-scale (The majority of the criteria sit within this column)
Themes	**Criteria**	**Assessment/classification of the event**		
Risk management options	Availability of options	Readily available	Moderately available	No practical options available
Magnitude of event	Likelihood of the event	Frequent	Infrequent	Rare
	Scale of physical impact	Local level	District level/ multi-district level	Regional/ national level
Capacity of community to cope	Degree of economic impact	Local level	District level/ multi-district level	Regional/ national level
	Degree of social impact	Local level	District level/ multi-district level	Regional/ national level
Examples		2006 Whangaehu Valley flood 2005 Gisborne flood	2007 Northland storm 2007 North Island East Coast drought 2006 Canterbury snow 2004 Eastern Bay of Plenty flood	2008 National drought 2004 Lower North Island floods 1988 Cyclone Bola
Possible government assistance		Localised event recovery measures	Localised event recovery measures + Medium-scale event recovery measures	Localised event recovery measures + Medium-scale event recovery measures + Special recovery measure

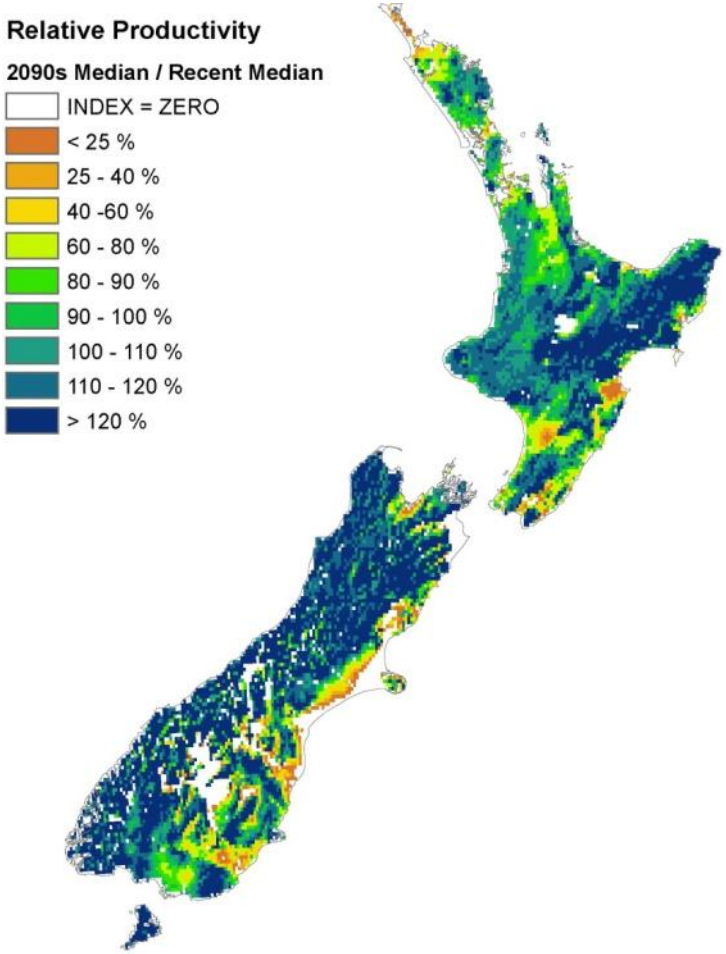
Localised event measures	Medium-scale event measures	Special recovery measures
Delayed tax payment from forced sale of stock, Task Force Green labour assistance, normal welfare assistance for farm employees.	Welfare payments for farm owners (75% of unemployment benefit), financial advice and drought management workshops, co-ordination of disaster recovery, counselling.	50% reimbursement for: restoration of uninsurable infrastructure, re-establishment of pasture and forestry, clean up of silt and debris. Aerial reconnaissance. Humane livestock disposal.

Adaption - EcoClimate Report

- Study completed in 2008
- UK Hadley Centre climate model version 2 (HadCM2)
- Derived impacts on pastoral production in New Zealand
- Starting point for further analysis

Production projections – average year

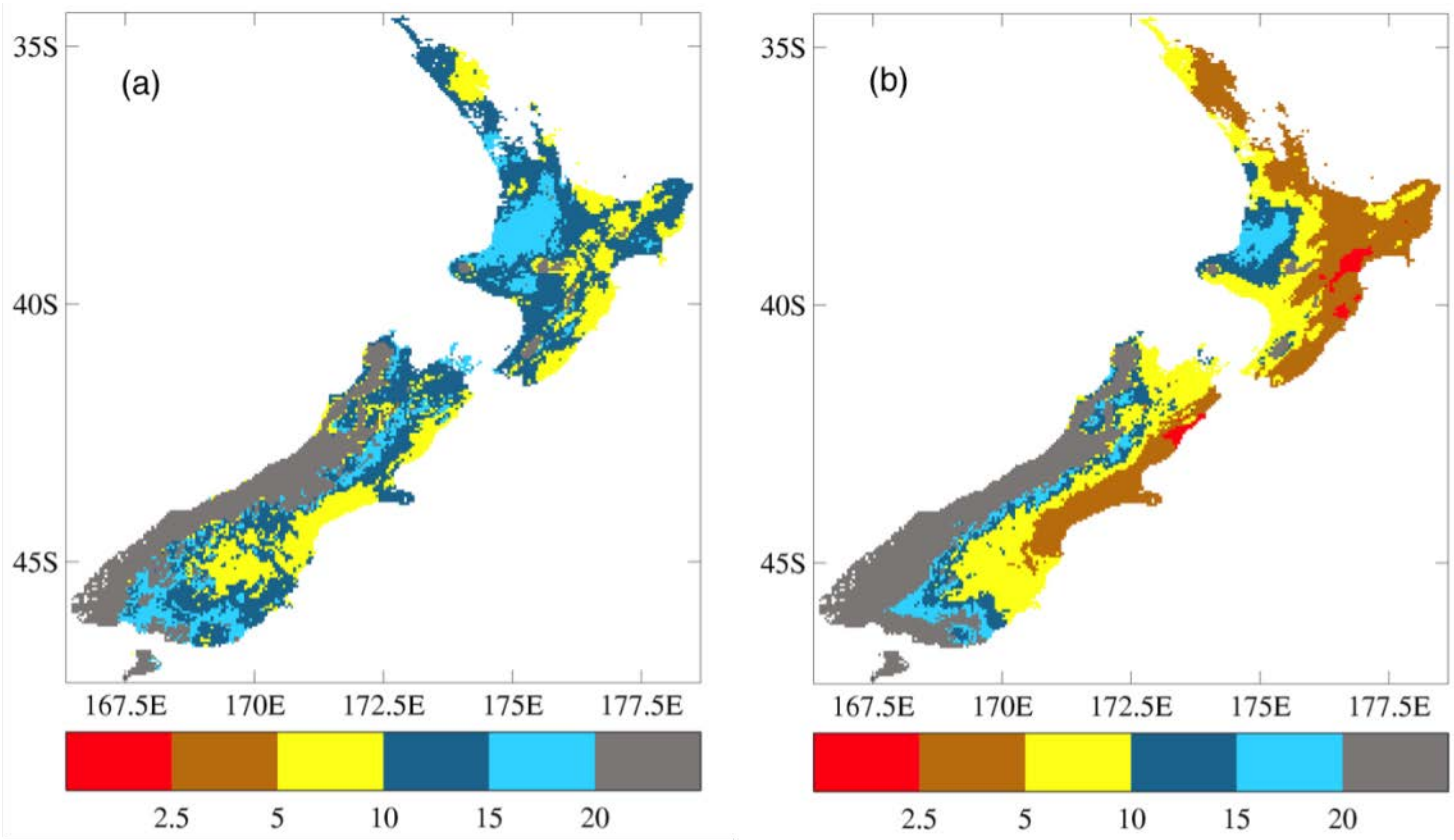




EcoClimate Report, 2008

Droughts become more frequent

Projected Driest Annual Conditions 2080s



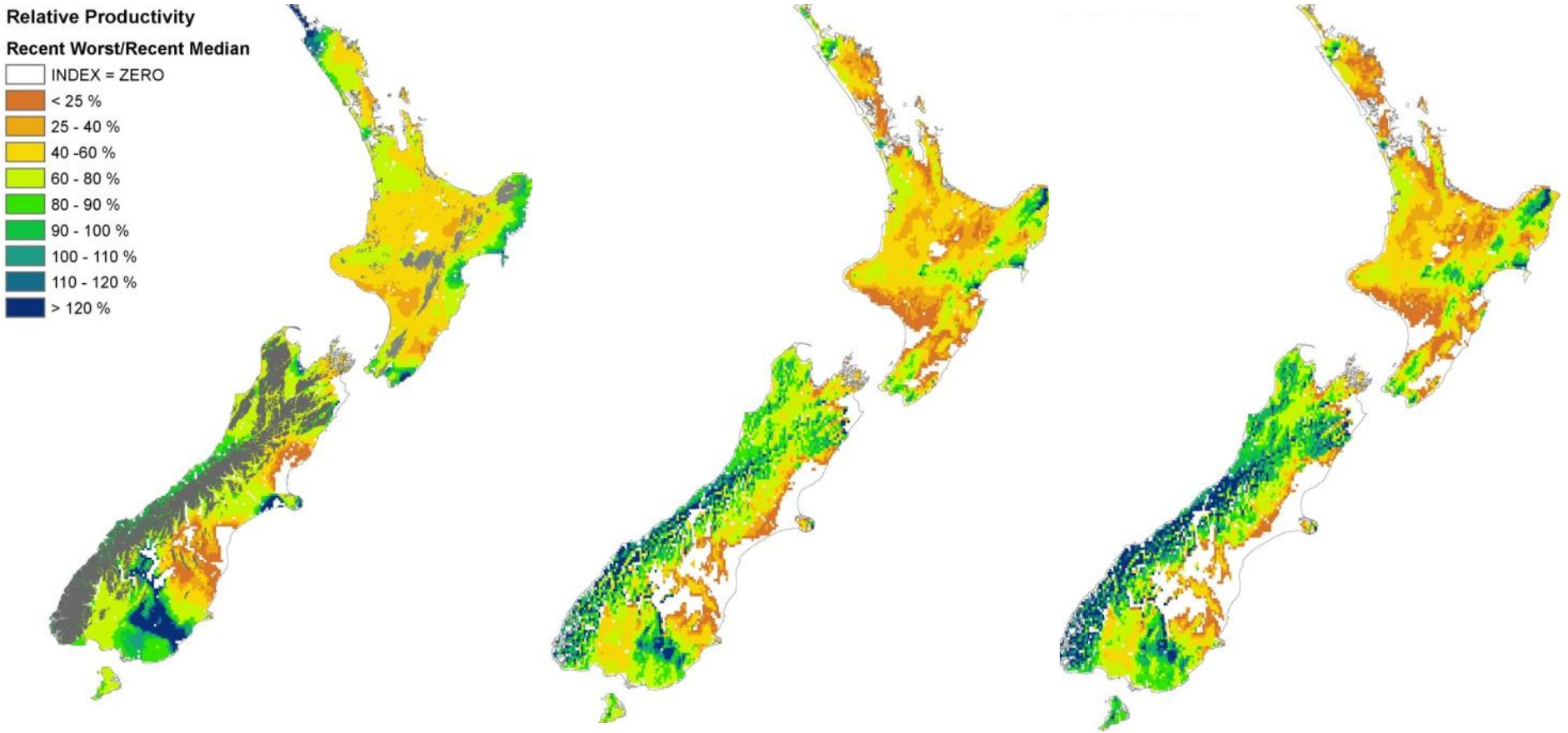
low medium scenario

medium high scenario

Source: The EcoClimate Report, 2008

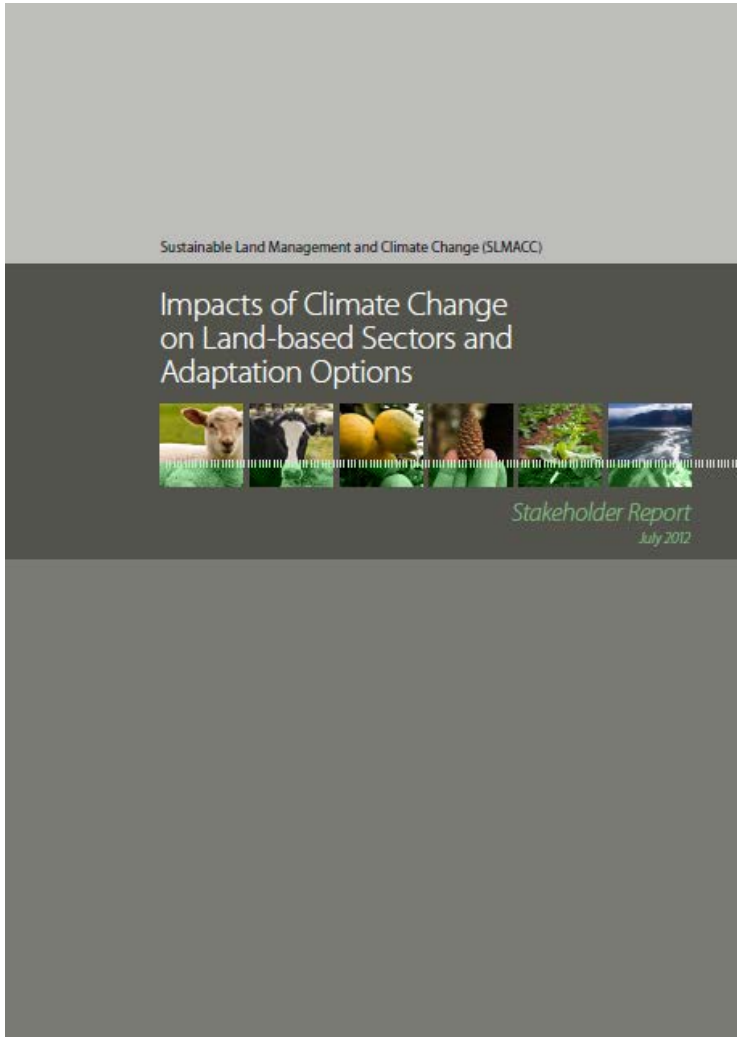
Production projections – worst year

1977/78 2040s 2090s



EcoClimate Report, 2008

“Impacts of Climate Change on Land-based Sectors and Adaptation Options” - 2012



- Study in final draft stage
- Looks at possible farmer responses to a changing climate
- Modelled a representative selection of farms

Case study: Hawkes Bay sheep and beef farm

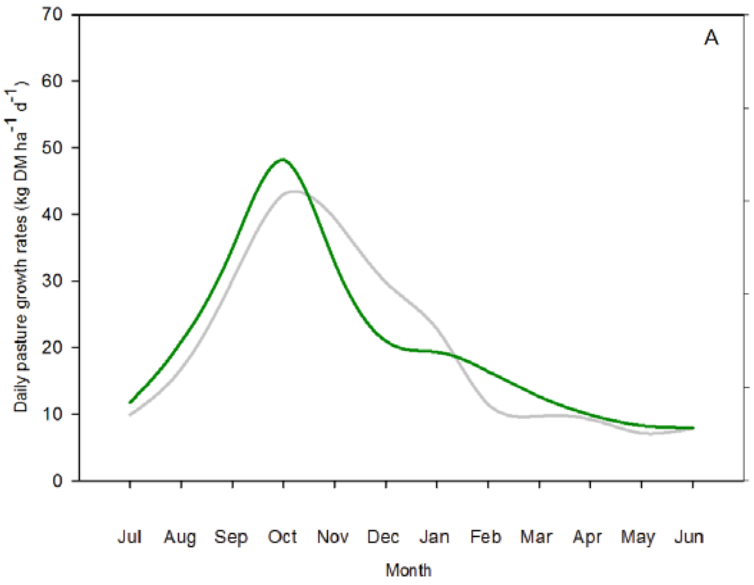
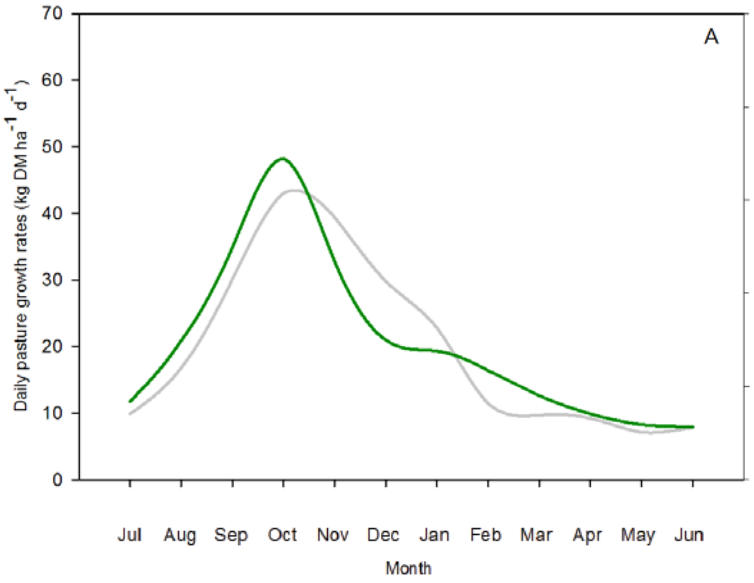
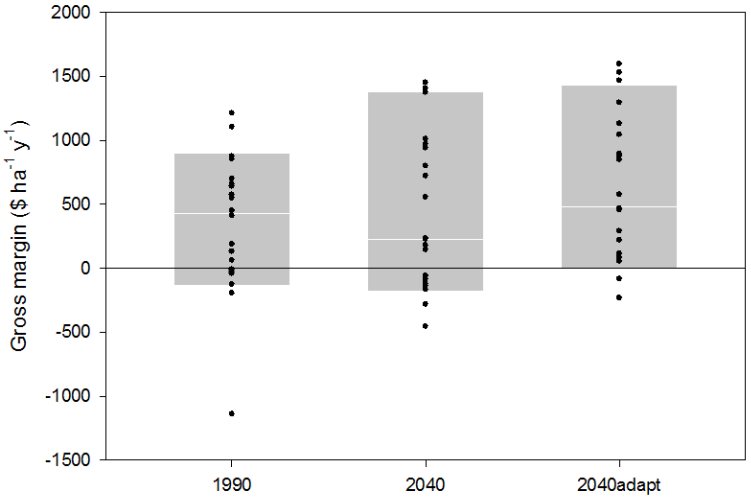


Figure 5. Projections of monthly pasture growth rates under the high climate change scenario for the 1990 (grey) and 2040 (green) time periods in Hawke's Bay. (A) Average monthly pasture growth rates. (B) Variability in the 20-year monthly growth rates (B; calculated based on the 90th, 50th and 10th percentiles).

- Change in **annual** pasture growth modest
- Decrease in summer growth (Dec-Feb)
- Increase in autumn growth (March – May)
- Increase in spring peak (Sept-Nov)

Case study: Hawkes Bay sheep and beef farm





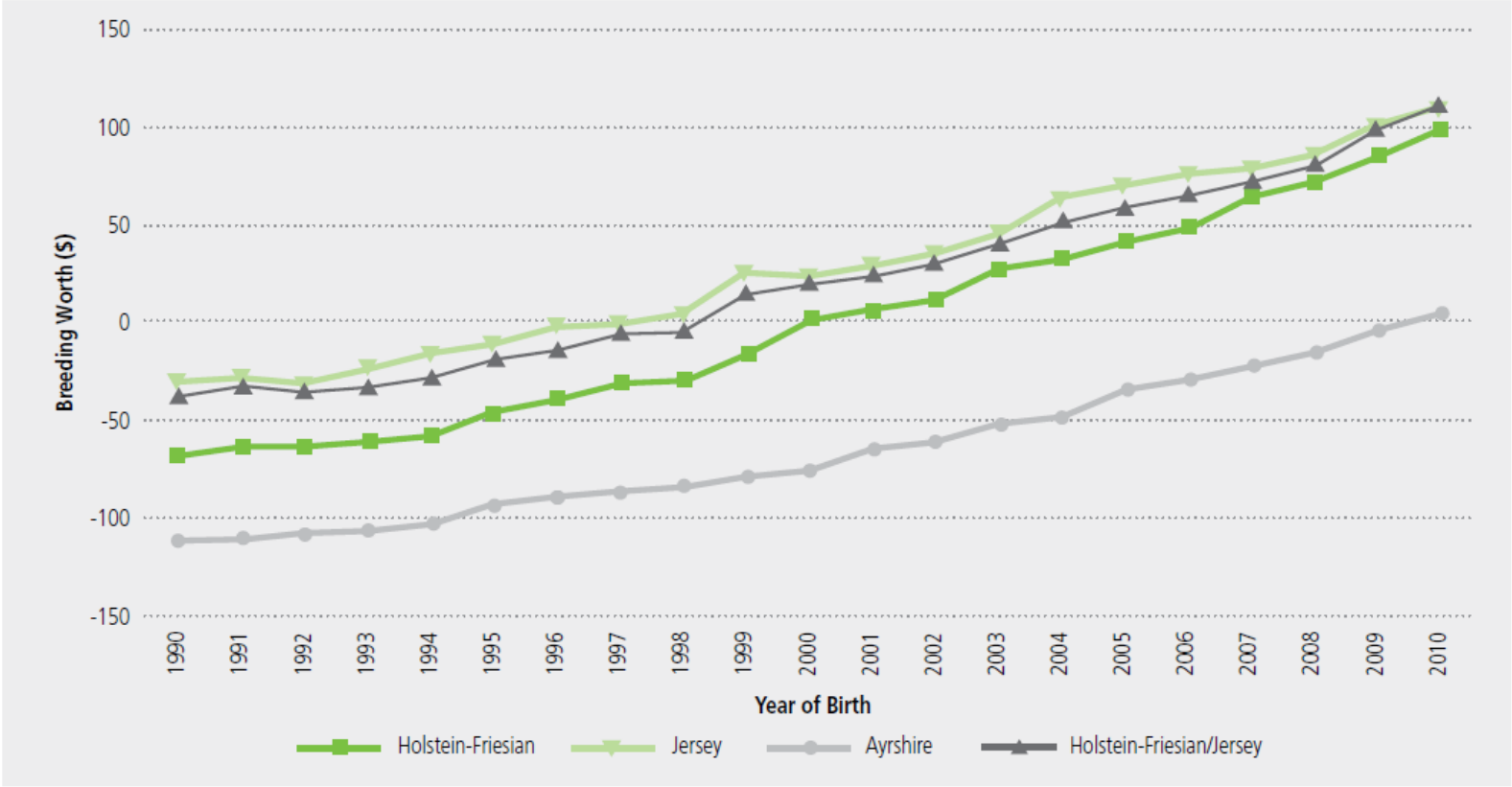
- Without adaptation, gross margin decreases
- Adaptation: earlier lambing
- With adaptation, marginal increase in gross margin
- Unavoidable increase in future variability

Outcomes and lessons learned

- Evolved over decades
- Continuous process
- Holistic approach
  - Economic and environmental goals
- Partnership with sector vital
  - Capacity building
  - Investment directed by sector


Thank you

Graph 4.16: Trend in Breeding Worth for all cows



(Evaluation date: 14 May 2011)