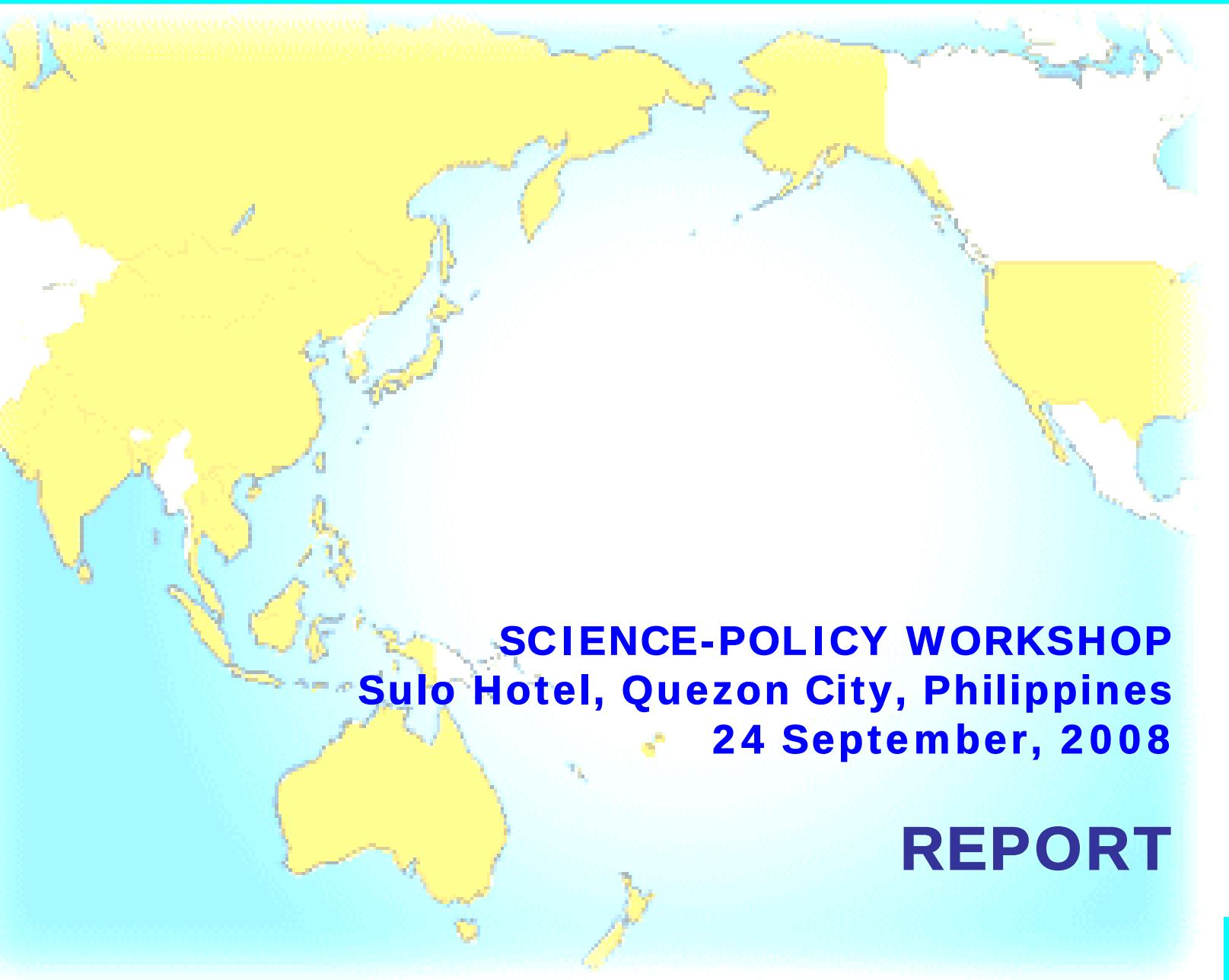
Linking Climate Change Adaptation to Sustainable Development in Southeast Asia



SCIENCE-POLICY WORKSHOP
Sulo Hotel, Quezon City, Philippines
24 September, 2008

REPORT

APN
Asia-Pacific Network for Global Change Research

World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES

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TABLE OF CONTENTS

1. Introduction

The project entitled: "Linking Climate Change Adaptation and Sustainable Development in Southeast Asia" is a two-year collaborative project of the World Agroforestry Centre (ICRAF), Asia Pacific Network for Global Change Research (APN) and Global Change System for Analysis, Research and Training (START). Its general objective is to clarify the links between climate change adaptation and sustainable development. Specifically it aims to: (1) synthesize research on adaptation strategies for climate change and climate variability in SE Asian countries; (2) analyse the links of adaptation strategies to the sustainable development goals of the respective countries; (3) hold a science-policy workshop to disseminate results and solicit recommendations; and (4) publish the results of the study in a format that is useful to policy makers and other stakeholders. The project is participated by four SE Asian countries: Indonesia, Lao PDR, the Philippines and Vietnam.

The science-policy workshop was held at Sulo Hotel, Quezon City, Philippines on September 24, 2008. The workshop was conducted to: (1) disseminate results of the project; (2) solicit comments and recommendations; (3) identify potential points of entry, strategies/activities to be undertaken and responsible agencies.

This document contains the report of the Science-Policy Workshop on Linking Climate Change Adaptation in Sustainable Development. It provides a summary of the presentations, discussions and outputs of the workshop. This section is an introduction for the document. Section 2 shows the brief description of the program and agenda. Section 3 includes the synthesis of the country presentations. Section 4 contains the issues and concerns raised during the workshop and Section 5 presents the outputs of the workshop.

2. Design of Program

Dr. Rodel Lasco, the project leader, opened the meeting by welcoming the participants. Right after the "Welcome Remarks", Dr. Lasco provided an overview of the project. He presented the rationale of the project, objectives, relevance to APN science and policy agenda, the framework of analysis, and the methods used.

After the project overview, a background paper was presented by Dr. Juan M. Pulhin, Professor of the College of Forestry and Natural Resources, University of the Philippines Los Banos and one of the IPCC-AR4 lead authors. Titled "Climate Change and Sustainable Development" Dr. Pulhin's presentation covered the following: (1) overview of climate change; (2) impacts of climate change in Asia; (3) climate change and sustainable development; and (4) conclusion.

After the paper presentation, an open forum was held to provide a venue for discussion.

Following the background paper, synthesis papers were presented by the country collaborators from Indonesia, the Philippines and Vietnam. The synthesis papers contain the results of the studies conducted in each country The paper from the Philippines focused on water and sustainable development while the papers from Indonesia and Vietnam linked agriculture with sustainable development.

After the presentations of the country papers, an open forum was undertaken to solicit comments and recommendations.

In the afternoon, a workshop was held to identify potential points of entry, strategies/ activities to be undertaken and responsible agencies in the three sectors: (1) agriculture and natural resources; (2) infrastructure; and (3) policy. Each group was asked to report during the plenary session to solicit comments/suggestions/critique on the outputs presented.

3. Synopsis of Presentations

3.1 Project Overview

The paper by Dr. Lasco provided an overview of the project. His paper emphasized that adaptation will be necessary to address impacts resulting from the warming which is already unavoidable due to past emissions. A wide array of adaptation options is available, but more extensive adaptation than is currently occurring is required. To attain sustainable development amidst the new climate regime, adaptation needs to be mainstreamed. He stressed that the project hopes to contribute to the mainstreaming of climate change adaptation to the sustainable development agenda of SE Asian countries. Specific objectives of the project were also mentioned which include:

- Synthesize research on adaptation strategies for climate change and climate variability in SE Asian countries;
- Analyze the links of adaptation strategies to the sustainable development goals of the respective countries;
- Hold a science-policy workshop to disseminate results and solicit recommendations; and
- Publish the results of the study in a format that is useful to policy makers and other stakeholders

He further mentioned that the main hypothesis of the project is that climate change adaptation strategies and policies are consistent with and promote sustainable development at various scales (farms to watersheds to nations). Other things considered in the project were:

- How to mainstream climate change to (sustainable) development
- What are the entry points in mainstreaming
- Cases where there is conflict between climate change adaptation and sustainable development

3.2 Climate Change and Sustainable Development

Dr. Juan Pulhin provided an overview of climate change by discussing the causes of climate change, the contribution of human activities to climate change and the increasing trend of global temperatures observed over time.

The second part of his paper dealt with the impacts of climate change in Asia. These include: (1) sea level rise: (70-90 cm in Huanghe; 50 to -70 cm in Changjiang; 40 to -60 cm in Zhujiang); (2) decrease in rice yields by up to 40% in irrigated lowland areas of central and southern Japan under doubled atmospheric CO_2; (3) decrease in cereal yields by 30% by 2050 in South Asia; (4) severe water stress in the 21st century in West Asia; (5) decline of gross per capita water availability in India from 1,820 m^3/yr in 2001 to as low as 1,140m^3/yr in 2050; (6) likely to lose around 30% of Asia's coral reefs in the next 30 years due to multiple stresses and climate change; (7) decline of net primary productivity of grassland in colder regions of Asia; (8) reduced milk yields and increased incidence of diseases in animals due to limited herbaceous production, heat stress and poor water intake; (9) increase in forest production in North Asia due to carbon fertilization but

combined effects of climate change, extreme weather events and human activities are likely to increase forest forest-fire frequency; (10) increase in coastal water temperatures would exacerbate abundance and / or toxicity of cholera in South Asia; (11) disappearance of Tibetan Plateau glaciers of <4 km with 3°C temp rise without change in precipitation; (12) decline of freshwater decline in Central, South, East, South East Asia; (13) 0.12 to 1.2 billion people will be under increased water stress by 2020 and 0.185 to 0.981 B by 2050; (14) additional 49 million people will be at risk of hunger by 2020 and it will increase by 132 million and 266 million by 2050 and 2080, respectively; (15) increase in maximum monthly flow (35-41%) by 2038 and decrease in minimum monthly flow (17-24%) of Mekong River; (16) increase in endemic morbidity and mortality due to diarrhoeal disease associated with floods and droughts in East, South and South East Asia; (17) in Bangladesh 1,000 km^2 of cultivated land and sea product culturing area could become salt marsh; and (18) 5,000 km^2 of Red River delta, and 15,000-20,000 km^2 of Mekong River delta could be flooded

The third part of Dr. Pulhin's paper discussed the linkage between sustainable development and climate change. In his discussion, he emphasized that the bottom line is that climate change will drag the economy and sustainable development because there will be loss of lives, destruction of infrastructures, loss of income, more sickness, will make the poor people poorer and will threaten/degrade ecosystems.

The best way to address climate change according to him is to integrate climate change adaptation in development programs of the country. This can be done by: (1) making climate information more relevant and usable; (2) developing and applying climate risk screening tools; (3) using appropriate "entry points" for climate information; (4) shifting emphasis to implementation rather than developing new plans; and (5) encouraging meaningful coordination and the sharing of good practices

In conclusion, he mentioned that climate change poses challenge to social and economic development. Developing countries including most of South East Asian nations are particularly vulnerable because their economies are generally more dependent on climate-sensitive natural resources, and they are less able to cope with the impacts of climate change. Furthermore, he mentioned that how development occurs has in turn implications to climate change and for the vulnerability of societies to its impacts. Efforts to cope with the impacts of climate change and attempts to promote sustainable development share common goals and determinants which include: (1) access to resources (including information and technology); (2) equity in the distribution of resources, stocks of human and social capital; and (3) access to risk-sharing mechanisms and abilities of decision-support mechanisms to cope with uncertainty. Thus, alternative development pathways should be pursued that will address both climate change and unsustainable development

Photo 1. Dr. Rodel D. Lasco presenting the overview of the project

Photo 2. Dr. Juan M. Pulhin presenting his paper on climate change and sustainable development

3.3 Synthesis Papers

3.3.1 Indonesia

The paper by Perdinan, Boer and Kartikasari was presented by Ms. Kiki Kartikasari of the Climatology Laboratory, Department of Geophysics and Meteorology, Bogor Agricultural University. It centered on linking climate change adaptation options for rice production and sustainable development goals in Indonesia. They pointed out that rice, being a staple food for Indonesians is a very important commodity. However, amount of production has been observed to decrease because of the impacts of current climate variability and extremes. With climate change, it is expected that rice production will be further affected.

Ms. Kartikasari mentioned that the Indonesian government through the Ministry of Environment proposed that adaptation to climate change should be undertaken through a number of ways: (1) integrate the climate change adaptation agenda into national development plans such as Medium and Long Term Development Plans; (2) review and adjust the existing initiatives or programs, so they will be resilient to climate change; (3) institutionalize the use of climate information in order to have capability to manage climate risk; (4) encourage local autonomy to integrate consideration of climate risk into local development plans; (5) strengthen the information and knowledge to reduce present and future climate risk; (6) ensure the availability of domestic resources and funding for adaptation activity and maximize the use, probably with the international support; (7) choose no regret option, which is conducting adaptation action with or without climate change so the benefit received could be used to reduce the vulnerability to climate change, but also could be used for national development benefit; and (8) encourage a national dialogue to accelerate implementation process of adaptation agenda to climate change in Indonesia.

In terms of adaptation options proposed by the researches conducted in Indonesia, Ms Kartikasari enumerated the adaptation options offered by Boer (2007) and (GOI 2007) for rice production in the country. These include: (1) change in cropping pattern; (2) use of cropping calendar; (3) efficiency of water use; (4) rain fed rice development; (5) pest and diseases control; (6) search for new variety tolerant to high temperature; (7) develop early warning system to flood and drought; and (8) integrated management of water use.

Moreover, programs by the RAN-MAPI (Rencana Aksi Nasional Menghadapi Perubahan Iklim - National Action Plan to Cope with Climate Change) for the agriculture sector was presented. Based on that document the government is decided to pursue the program on “Revitalized Agriculture” for the period 2005-2009 The three major programs focused on food supply, agribusiness development and farmers’ income. Thus, in the context of climate change adaptation for rice production, the proposed adaptations should be directed not only to increase the production but also to increase the farmers’ income and agribusiness development. Achievement to these three focused programs will lead to improved economy of livelihoods in the rural region in Indonesia.

The next section of the paper established the link between climate change adaptation for rice production and sustainable development. According to the paper, by implementing climate change adaptation strategies, sustainable development is also achieved. Adaptation programs that would be useful to stabilize and increase the rice production in Indonesia as well as to cope with climate change risks include: (1) mapping of vulnerable regions to drought/flood; (2) modified cropping pattern and institutional development; (3) insurance

system to secure the yield or revenue from cultivating rice; and (4) come up with the real action by establishing “Rice Information and Distribution Center”

In conclusion, the paper made four points: Firstly, the inclusion of climate change adaptation strategies to rice development will secure and enhance the implementation of the rice production increasing strategies to meet its demand. This expected achievement will lead directly to economic development in the rural regions and alleviate the poverty which is related to the first target of the Millenium Development Goals. Secondly, the two major programs devoted to increase the rice production (intensification and extensification) have also been addressed well by the inclusion of climate change adaptation strategies. Thirdly, adaptation options for the agriculture sector are already formulated by the Indonesian government through the Ministry of Environment within the RAN-MAPI document. In addition, the State Ministry of Government Planning attempted to incorporate the climate change issues including the adaptation options to Medium-term and Long-term National Development Plan. Finally, further research on developing reliable projected climate change data for conducting real assessment of possible impacts of climate change on Indonesia rice production is a key challenge that should be addressed seriously.

3.3.2 Philippines

The paper from the Philippines was presented by Dr. Florencia B. Pulhin, Researcher of the Forestry Development Center, College of Forestry and Natural Resources, University of the Philippines Los Banos. The paper was divided into nine sections: (1) introduction; (2) review of climate change adaptation studies in the Philippines; (3) method used; (4) climate change and sustainable development; (5) water and sustainable development; (6) analysis of policies, sustainable development plans and programs; (7) mainstreaming climate change adaptation in sustainable development agenda of the water resources as viewed by the stakeholders; and (8) conclusion

The first part of the paper discussed the evidences of climate change in the Philippines and the vulnerability of the poor people to climate related events. According to the paper, records show that temperature in the country had increased from 1951 to 2006. Aside from rising temperatures, it has been observed that amount of precipitation decreased by 6% during the turn of the century. In the same manner, occurrence of ENSO events was observed to become more frequent since 1980. For instance from 1982 onwards, strong El Nino event occurred every five years (1982-1983, 1987-1988, 1992-1993, 1997-1998). Number of strong typhoons (> 185 kph wind speed) hitting the Philippines from 1980 to 2006 also follow an increasing trend. Rising sea levels, one of the indicators that climate change is occurring, have been observed to happen from five major stations (Manila, Legazpi, Cebu, Davao and Jolo). Annual mean sea level is observed to increase in Manila since 1960s while for the rest of the stations, sea level rise occurred in 1970s. In the Manila, Legazpi and Davao stations, an increase of almost 15 cm was observed from 1980-1989. This value is the lowest expected sea level rise set by the IPCC (Perez, 1998).

At current climate variability and extremes, such as flooding, drought, delay and early onset of rainy season, the poor sectors are already vulnerable because most often, sources of their livelihood are limited and are mostly based on natural resources. During floods or drought, their sources of livelihood fail to provide them with crops to eat and cash to meet the needs of their families.

The second part of the paper discussed the researches undertaken in climate change adaptation where she emphasized that currently, there are limited studies conducted on this

aspect. These include study undertaken by Jose and Cruz (1999) who assessed the impacts of climate change on water resources using hydrological model, Acosta-Michlick (2005) who assessed vulnerability of the farmers to globalization and climate change using the agent based model and Lasco *et al* (2006) who conducted the first integrated assessment of climate change impacts, vulnerability and adaptation in watershed areas and communities in the Pantabangan-Carranglan watershed (PCW).

The third section described the methodology used in the study conducted which includes one on one interview with stakeholders and analysis of water policies and sustainable development plans and programs.

Part 4 of the paper discussed the concept of sustainable development as espoused by the 1987 Brundtland Commission Report. According to that report, sustainable development is the "development that meets the needs of the present generation without compromising the ability of the future generation to meet their own needs". Also, the three pillars of sustainable development: ecology, economy and social were elaborated.

The next section established the link between sustainable development and climate change. According to the paper, sustainable development and climate change are closely linked with each other since climate change is a significant factor that can influence sustainable development. To attain sustainable development amidst the climate change regime, development activities to be undertaken must contribute to the country's overall efforts of poverty reduction among the rural poor.

Section 6 discussed the water resources of the Philippines, problems faced by such sector and its link to sustainable development. According to the paper, insufficient water supply, low water quality and degradation of watersheds decrease productivity of the poor people, decrease crop yield of small farmers and limits the growth of the industry sector. This in turn affects attainment of sustainable development goals of the country.

Section 7 provides an analysis of the policies in the water sector, and sustainable development plans and programs of the country. Dr. Pulhin stressed that although existing policies already deal with the regulation of water quantity and quality, there was no mention of the issue of climate change. Likewise, in all the sustainable development plans (Medium Term Development Plan, Millenium Development Goals progress report, and the Agenda 21), climate change adaptation has not been mainstreamed. However in PA 21, climate change was cited once. According to the document, there is a need to promote and adopt methods for impact assessment of climate change on water resources.

The next section provided the views of the stakeholders on mainstreaming climate change adaptation in the water sector in the Philippines. According to the paper, there is high recognition that mainstreaming climate change adaptation in water sector is important. Various reasons cited for this include: (1) will speed up the formulation of measures/programs that will reduce the impacts of climate change on water quality and quantity; (2) will increase awareness of the different sectors on climate change and its impacts; (3) will ensure funding for adaptation activities and hence will help reduce climate change impacts; (4) will promote more integrated efforts to address climate change; (5) will encourage participation of all sectors of society; (6) will help in proper land use planning; and (7) will support sustainable development.

Likewise, barriers to mainstreaming climate change adaptation to policies, plans and programs were identified by the stakeholders. These include: (1) lack of information on

climate change among the policy makers and heads of agencies; (2) climate change is considered as an emerging issue only; (3) not a priority program of the government; (4) No single agency responsible for water; (5) reactive attitude of the heads of agencies; (6) matters regarding climate change are the concern of PAGASA only; (7) no ensured funds to implement programs related to climate change; and (8) direct relationship between climate change and water sector not fully established

Mainstreaming climate change adaptation can be enhanced through: (1) building the capacity of all sectors (2) providing funds for climate change programs; (3) creation of a single body that will coordinate climate change activities; (4) presence of a strong political will; (5) uplifting the socio-economic conditions of the poor; (6) presence of strong commitment of all sectors and (7) coordination among institutions concerned with water resources.

In conclusion, Dr. Pulhin mentioned that all the stakeholders believe that mainstreaming climate change adaptation in the policies, plans and programs of the water sector are important to cope with the adverse impacts of climate change. She offered potential points of entry in three areas: infrastructure, policy and plans. For infrastructure, points of entry could be adjustment of size of drainage canals to accommodate possible strong flows and adjustment of the design of the dams. For policy, potential points of entry include: (1) mandatory for new buildings/homes to install rainwater harvesting facility; (2) provide incentives i.e reduction on property tax; (3) construction of harvesting ponds; and (4) regulation of shallow tube wells. For plans, potential points of entry are the incorporation in reforestation plan, the use of drought resistant species and incorporation in land use plan of vulnerable areas.

3.3.3 Vietnam

The third synthesis paper was presented by Dr. Nguyen Thi Hien Thuan of the Sub-Institute of Hydrometeorology & Environment of South Viet Nam. She divided her presentation into six parts. The first part provided a brief background about Vietnam. The second part discussed the disasters faced by Vietnam which include tropical monsoon, typhoons, landslides and forest fires and its impacts to different sectors including agriculture. According to Dr. Thuan, climate related events affect the growth and productivity of plants, cropping seasons, and may enhance occurrence of pest and diseases.

The third part stressed the key role that agriculture play in Vietnam's economy. According to the paper, it contributes 21% to the country's gross domestic product (GDP) and 30% of total export earnings in 2006. Rice is the single most important crop. However, with climate change, it is feared that production of rice will be affected.

Section 4 of Dr. Thuan's paper dealt on the inventory of researches on climate change in Vietnam. She reported that one of the high priority areas for research is on the impacts of climate related events on agriculture. Results of researches undertaken indicate that a rice yield will be reduced by 10-20% in Northern Delta. To reduce the impacts of these climate related events, a number of measures have been suggested. These include: change of crop calendars, change in crop patterns, and change in crop rotations.

Part 5 of the paper discussed the sustainable development plans of Vietnam as well as the policies for the agriculture sector in the country. The sustainable development plans include: (1) National Rural Clean Water Supply and Sanitation Strategy to 2020 (RWSS Strategy, 2000); (2) Strategic Socio-Economic Development 2001 – 2010 (SSED, 2001);

(3) Vietnam Development Goals (MDG/VDG, 2001); (4) Strategy and Action Plan for Disaster Mitigation and Management in Viet Nam 2001-2020; (5) Comprehensive Poverty Reduction and Growth Strategies (CPRGS, 2003); (6) National Strategy for Environmental Protection until 2010 and vision toward 2020 (NSEP, 2003); (7) Strategic orientation for sustainable development in Vietnam (Agenda 21 Vietnam, 2004); (8) 5-year Plan for the Agricultural and Rural Development 2006 -2010 (2004) (9) Targets of Socio-economic Development 2006-2010 (TSED, 2006); and (10) Five-year plan for natural resources and environment 2006-2010.

The succeeding section discussed the results of the analysis made by Dr. Thuan as regards the link between sustainable development and climate change. She mentioned that more attention has been put on natural disasters, climate change mitigation rather than climate change adaptation. As in other developing countries, the mainstreaming process in Vietnam is also in its early stages. In the past, many solutions responded to climate variability with a range of isolated structural and non-structural responses.

Furthermore, she discussed that there are main approaches which need to be adopted for considering adaptation to climate change in development policies, plans and programs: (1) addressing adaptation challenges for climate change within various stages of preparing the development plans, programs or policies; and (2) incorporating climate change adaptation into assessment tools. With regards to entry points to mainstream climate change, NTP workshops and consultations revealed the following:

- The policy framework
- Institutional arrangements
- Consultation and coordination processes
- Financing and budgeting
- Tools and methods for adaptation
- Awareness raising

In conclusion, she stressed that climate change is a very real threat to Viet Nam's continued socio-economic development because of the projected impacts of climate change in agriculture. Viet Nam is now underway to set up a national climate change adaptation strategies, and national and local capacity building is urgently needed to ensure that policy responses are adequate and effective. Coordination between line ministries also needs to be urgently improved, and cooperation with international agencies and NGOs enhanced so that climate change can be addressed in an integrated way with long-term socio-economic and poverty reduction efforts.

Photo 3. Dr. Florencia Pulhin presenting the synthesis paper of the Philippines

Photo 4. Dr. Nguyen Hien Thuan presenting the synthesis paper for Vietnam.

4.0 Issues/Concerns

After the paper presentations, an open forum was undertaken to provide a venue to discuss issues/concerns. The following provides the highlight of issues/concerns raised:

1. Data availability
   Currently, PAG-ASA does not provide historical data to those who are interested to acquire climate data. They give climate data for 5 years only.

2. Limitations on equipment of PAG-ASA
   Currently, there is limited climate information available in some areas because climate radar is limited. Through the MDG adaptation project, the IACCC whose secretariat seats at DENR is working with PAG-ASA on projection and climate scenario. The project aims to capacitate PAGASA in developing climate scenario with projection and identification of vulnerable areas

3. Irreversibility of climate change
   Climate change is irreversible so there is a need to mitigate and prepare for adaptation

4. Mainstreaming strategies in the full context of sustainable development must be outlined. The manner by which mainstreaming can be undertaken and the timeline must also be indicated.

5. Lack of holistic approach in improving water supply. Fragmented dealing of the problem is a nagging problem in the Philippines. There should be a holistic approach to solve the problem of water supply through improved watersheds.

6. The Philippine government must pursue with law on organic farming although it is not very easy to implement.

7. The use of varieties resistant to floods and drought must be promoted as adaptation strategies.

8. Climate field school similar to the one in Indonesia must be promoted to help farmers cope with the adverse impacts of climate change.

9. To mainstream climate change adaptation, the policy makers must be informed of the impacts of climate change.

10. Women should be taken in consideration in the issue of climate change because aside from children, they are highly affected by climate change

11. Current efforts of the Philippines government in addressing climate change include the creation of a climate change commission under the Office of the President, and the appointment of a Presidential Adviser for Global Warming and Climate Change.

5.0 Workshop

The whole afternoon was devoted to workshop proper where the participants were divided into three groups: agriculture and natural resources, policy and infrastructure. Each group identified the potential points of entry, corresponding strategies/activities and the responsible agencies.

Photo 5. Participants during the workshop.

5.1 Outputs:

5.1.1 Agriculture and natural resources

Points of Entry	Strategies/Approaches	Responsible Institutions
Technology/sustainable practices	Incorporate Sustainable Agriculture as framework/technology; institutionalize framework Irrigation scheme should be managed properly; utility should not be limited to agriculture but also for industry and domestic Optimization of warning device – disaster mitigation Compatibility of farming practices e.g. adjusting cropping calendar, irrigation management, etc. Greening: Massive restoration and rehabilitation of watershed areas Coastal: wetland restoration Establish a monitoring body -- sea level rise	Inter-agency (through ministries/regional government for Vietnam)

Points of Entry	Strategies / Approaches	Responsible Institutions
Policy	Proclamation of watershed areas Policy change – every major project should have to present a cost and benefit analysis including environmental cost and benefit analysis Provide mandate for local communities to manage and control resources within their area Water User's Fee: Payment for environmental services Should adopt stewardship concept/contract – paying proper tax to appropriate agency Policy should be legislated and institutionalized Capacitate local communities to properly utilize the fees Taxation of Green House Gas Emission; Incentives should be given to pro-envi technology	Congress, DENR No one to take the lead –
Economic	Provide alternative livelihood	
Institutional support	Participatory approach in convening various stakeholders for CC adaptation Task Force on Climate Change (communication plan 2 in the works)	EMB (secretariat of the Inter-Agency Commission on Climate Change)
	Importation of agricultural crops – subsidy of government Review existing bilateral agreements; review of existing policies on importation Alternative food e.g. to rice	
Policy compliance	Review of policies	

Points of Entry	Strategies / Approaches	Responsible Institutions
	Integrate climate change in existing policies Identify laws that require	
Poverty reduction	NRM should adhere to poverty reduction	
Biodiversity	Sustainable agriculture should be followed	

5.1.2 Policy Development

Points of Entry	Strategies / Approaches	Responsible Institutions
1. Legislation	a. coming up with the EO that will integrate climate change in various levels of planning (national to local) as well as sectoral planning (agriculture, forestry, environment, health, etc) b. review the existing structures and mandates of institutions c. Drum up support on Climate change bill (Sen. Legarda's Bill, etc)	SEPO, CPBO, DENR, PMS/OP, academic institutions
2. Medium-term Philippine Development Plan (MTPDP)	Inserting explicit statements on climate change in the appropriate Chapters of the MTPDP	NEDA
A. Planning and Implementation		
1. Revisiting existing sectoral plans/programs	Review the governing laws/codes/technical guidelines including sectoral plans, policies and programs and make them climate change proof and link them towards SD, including among others biodiversity and natural resource conservation a. Review of EIA – inclusion of climate change as one of the factors or criteria	NEDA, DENR , academic institutions and concerned civil society groups

Points of Entry	Strategies / Approaches	Responsible Institutions
	for conducting EIA b. Examine conflicting laws or policies on ENR c. Upscale SD programs of line agencies to link up with CC	
2. Building information management system on Climate change	Develop Climate profile and standards a. Climate change profiling on each political governance unit (regional, provincial and municipal level) b. Set up common climate change indicators/standards for planning, implementation and monitoring purposes	DENR, NSCB/NSO, media and academic institutions
3. Strengthening IEC/Advocacy on climate change	Mobilizing civil society and private sector participation on climate change advocacy	Media, DENR
4. Curriculum development on Climate change	Integration of climate change in the curriculum of academic institutions	DepED, CHED
5. Creation of Advisory Council/TWG on climate change(provide technical inputs to policy development)	Tap professional s in having scientific based planning and implementation of CC	DENR, OP, NEDA, DBM

5.1.3 Infrastructure

Points of Entry	Strategies/Approaches	Responsible Institutions
1) Drainage design	• Enforcement of PD 705 on forestry and other related laws pertaining to easement • Inclusion of extreme events related to climate change in the design of flood mitigation infrastructures	Lead: DPWH Partner: DENR, MMDA, NIA, etc.
2) Building design/water harvesting	• Inclusion of design for ground water recharge in subdivisions and buildings for water harvesting. • Water impoundment for induced infiltration	Lead: HLURB/DA Partner: DPWH, etc.
3) Judicial reform	• Enforce environmental laws so appropriate infrastructure designs are followed	Lead: DOJ Partner: DENR, DA, DPWH
4) National body for climate change adaptation	• incorporating infrastructure concerns into the agenda of the national body	Lead: Office of the President
5) Data accessibility	• make data accessible to enable better forecasting and design by participating agencies for climate change adaptation	Lead: NSCB Partner: PAGASA, other govt data holding agencies
6) Rationalization and harmonization of existing laws and policies	Attune current laws and policies (e.g., EO318, land use, MTPDP) to climate change adaptation	Lead: NEDA and Congress

Annex 1. Programme

8:30 - 9:00	REGISTRATION	
9:01 – 9:11	Opening Remarks	Dr. Rodel D. Lasco *Country Coordinator, ICRAF-Phils and Principal Investigator, APN Project*
9:12 – 9:22	Overview of the Project	Dr. Rodel D. Lasco
9:23 – 9:43	Climate Change and Sustainable Development	Dr. Juan M. Pulhin *Professor and Scientist II, UPLB*
9:44 – 9:59	OPEN FORUM	
10:00 – 10:20	Linking Climate Change Adaptation Options for Rice Production and Sustainable Development Goals in Indonesia	Ms. Kiki Kartikasari *Research Assistant* *Bogor Agriculture University, Indonesia*
10:21 – 10:41	Linking Adaptation Strategies for Water Resources to Sustainable Development in the Philippines	Dr. Florencia B. Pulhin *Researcher* *ICRAF-Phils and UPLB*
10: 42 – 11:02	Linking Climate Change Adaptation Options for Agriculture in the Mekong River Delta to Vietnam's Sustainable Development	Dr. Nguyen Thi Hien Thuan, *Institute of Meteorology and Hydrology, Ministry of Natural Resources and Environment, Vietnam*
11:03 – 11:50	OPEN FORUM	
11:51 – 12:00	Workshop Mechanics	Dr. Florencia B. Pulhin
12:01 – 1:00	LUNCH BREAK	
1:01 – 3:00	WORKSHOP	
3:01 –4:01	PLENARY	
4:02 – 4:30	Next Steps	Dr. Rodel D. Lasco
4:31 –4:51	Closing Remarks	Dr. Thuong Van Hieu *Vice Director, Department of Science and Technology, Vietnam* Dr. Haris Syahbuddin, *Head of Evaluation Section Research and Development Center of Plantation Ministry of Agriculture, Indonesia*

EMCEE/MODERATOR
Dr. Enrique L. Tolentino Jr.

Annex 2. List of Participants

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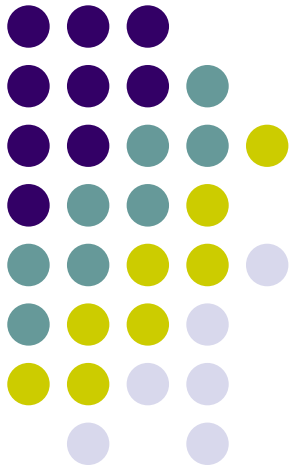
Annex 3. Power Point Presentations (Please attached files)

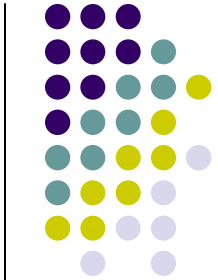
Linking Climate Change Adaptation to Sustainable Development in Southeast Asia

Rodel D. Lasco, Florencia B. Pulhin, and R Jane Delfino

World Agroforestry Centre (ICRAF)

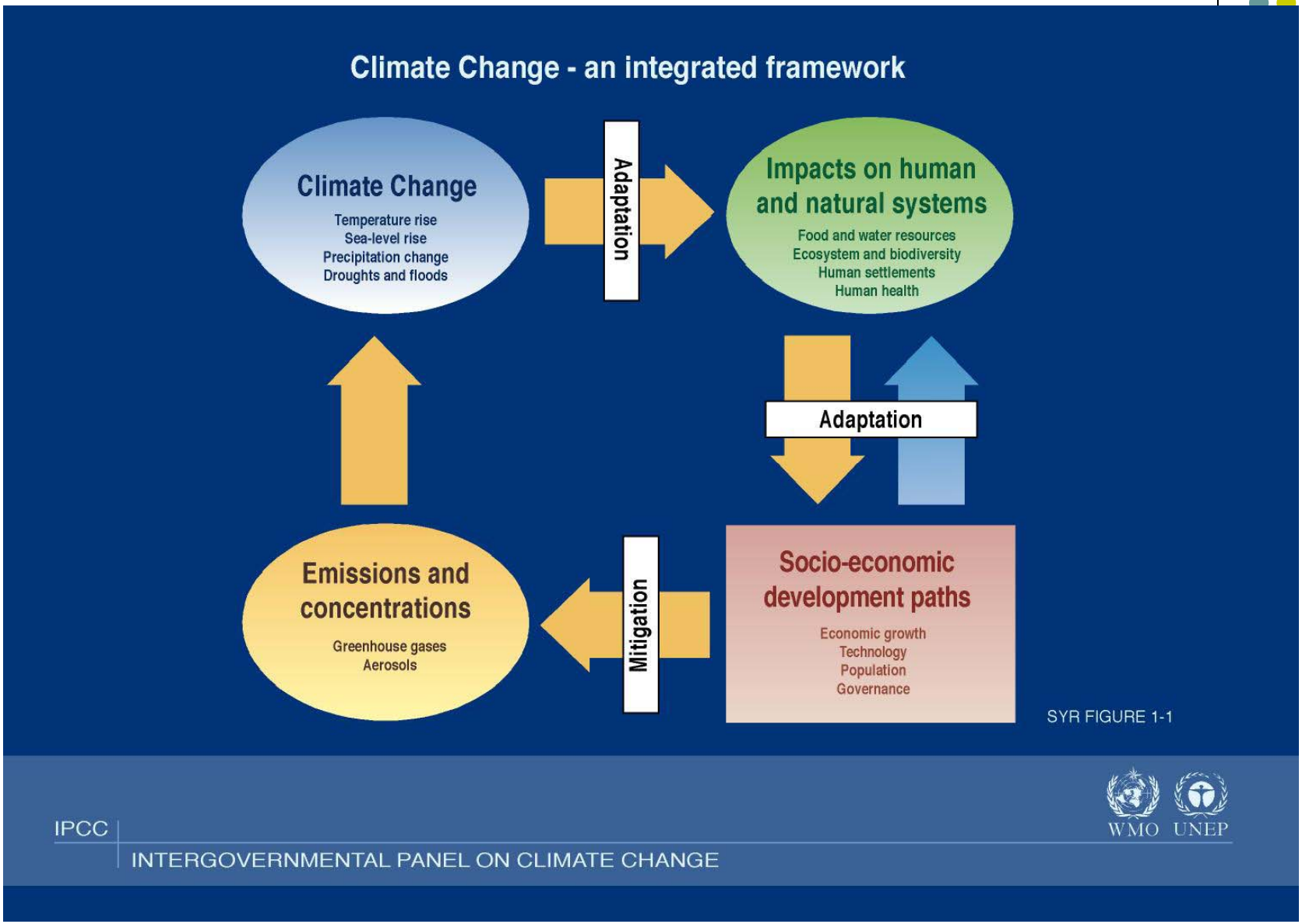


IPCC 2007 messages…



- Adaptation will be necessary to address impacts resulting from the warming which is already unavoidable due to past emissions.
- A wide array of adaptation options is available, but more extensive adaptation than is currently occurring is required
- There is a need for mainstreaming CC adaptation

Basic Concepts (IPCC, 2007)



Project Description

Principal Investigator: Dr. Rodel D. Lasco/World Agroforestry Centre (ICRAF) Philippines

Collaborating Countries: Indonesia, Vietnam and Lao PDR

Fund Amount/Source: US$ 35,000/Asia Pacific Network (APN) for Global Change Research

Project Duration: 2 years (December 2006 – December 2008)

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Project Background

- Climate change is one of the primary concerns of humanity.
- Increasing attention is given to how societies and natural systems can adapt to a new climate regime.
- One of the factors that could hinder sustainable development efforts is climate change.
- Link between climate change adaptation and sustainable development is not explicitly recognized.

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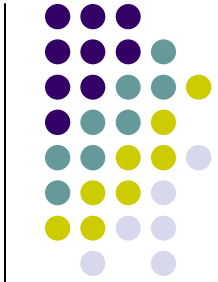
Project Background



- Mainstreaming of climate change adaptation in development efforts is making little headway.
- This proposal aims to help clarify the links between climate change adaptation and sustainable development.
- The project hopes to contribute to the mainstreaming of climate change adaptation to the sustainable development agenda of SE Asian countries.

Project Objectives

The general objective of the project is to clarify the links between climate change adaptation and sustainable development.

Specifically, the project aims to:

- Synthesize research on adaptation strategies for climate change and climate variability in SE Asian countries;
- Analyze the links of adaptation strategies to the sustainable development goals of the respective countries;
- Hold a science-policy workshop to disseminate results and solicit recommendations; and
- Publish the results of the study in a format that is useful to policy makers and other stakeholders

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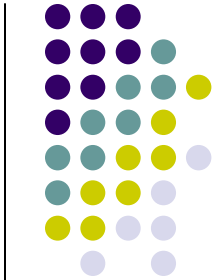
Relevance to APN Science and Policy Agenda



- The project is highly relevant to the APN's current Science Agenda with focus on climate change adaptation and sustainable development.
- The project will identify the most appropriate climate change adaptation strategies for the natural resources and agriculture sector as well as rural communities.
- The link of these adaptation strategies to the sustainable development agenda of each country will be analyzed.
- The project will synthesize recent climate change adaptation and related research in the region.
- The results will be used to build the capacity of decision makers in a science-policy workshop.

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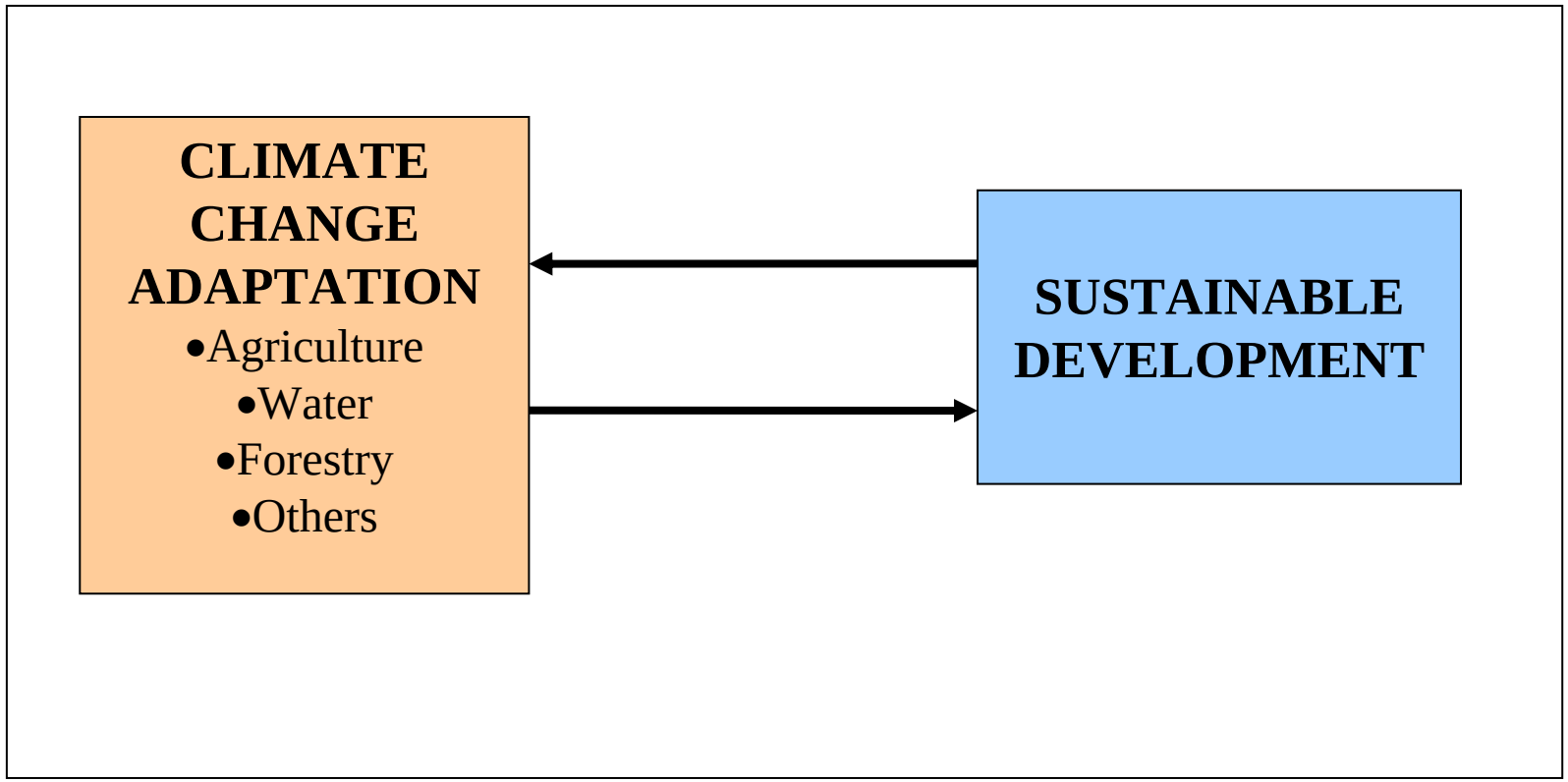
Figure 1 Framework of analysis



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IPCC 2007: SD and Climate Change

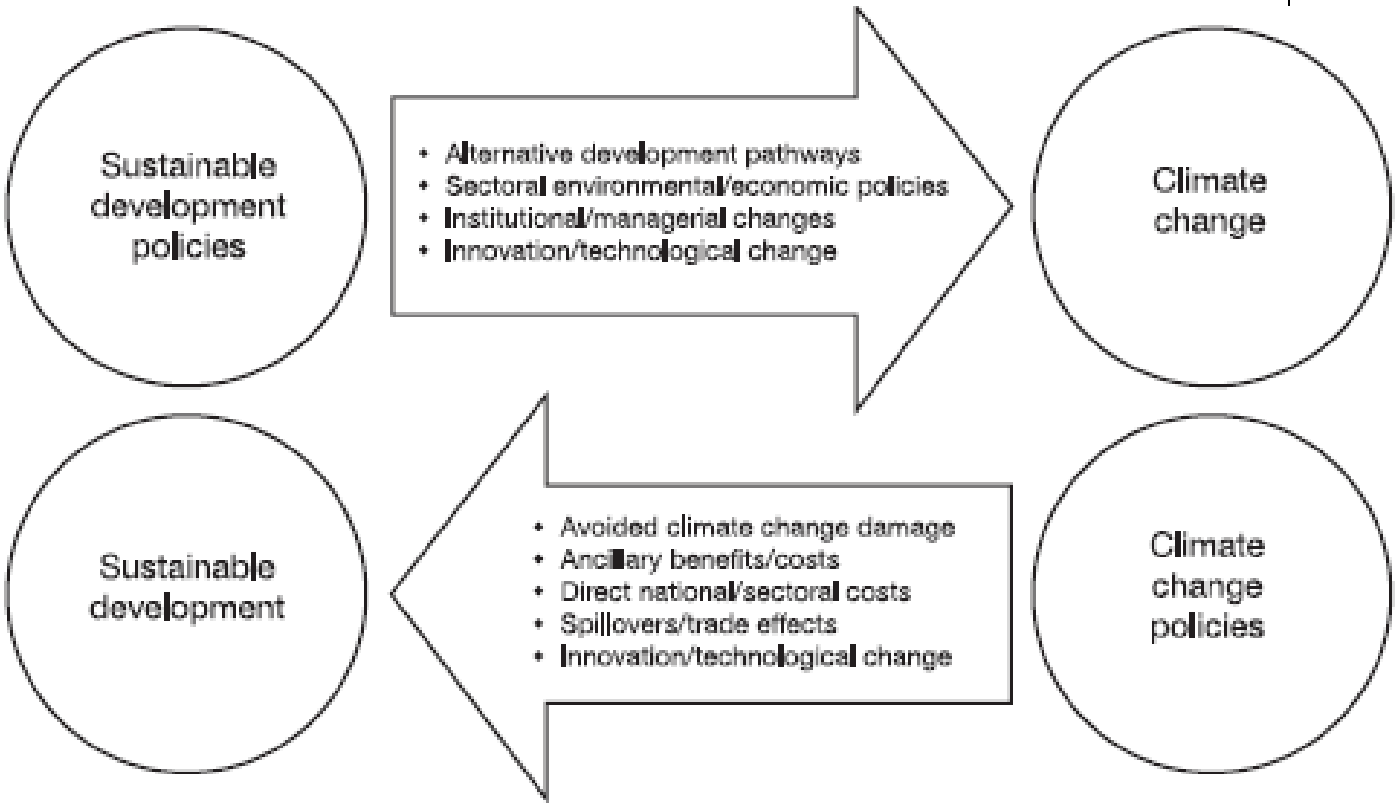

Figure 20.2. *Two-way linkages between climate and sustainable development. Source: Swart et al. (2003).*

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- we want to provide evidence that show how climate change adaptation can promote sustainable development.
- The basis will be previous research on climate change adaptation that have been conducted preferably in each of our respective countries.
- main hypothesis is that climate change adaptation strategies and policies are consistent with and promote sustainable development at various scales (farms to watersheds to nations).

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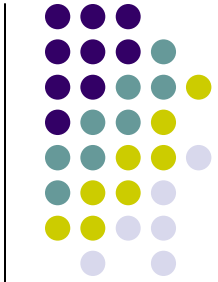
Scales



- Climate change adaptation can be done at various scales from farms to watersheds to nations.
- Similarly, sustainable development can occur at different scales.
- Previous researches on climate change adaptation have been conducted on any or all of these scales.
- We must be able to show the links with sustainable development on any or all of these scales.

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Methods

- This was the most challenging part of the research.
- One possible approach is to analyze how specific adaptation strategy can promote sustainable development.
- For example, one adaptation strategy in watersheds is tree planting.
- This activity could enhance water availability for irrigation and power which in turn are necessary for sustainable development.
- Another approach is to look at indicators of sustainable development and see how adaptation strategies and policies will help attain those indicators.

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Other things we considered were:

- How to mainstream climate change to (sustainable) development
- What are the entry points in mainstreaming
- Are there cases where there is conflict between CC adaptation and SD?

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For today…

- We are ready to share our results to policy makers and researchers
- Indonesia, Vietnam, and the Philippines
- We welcome your comments!

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Thank you!

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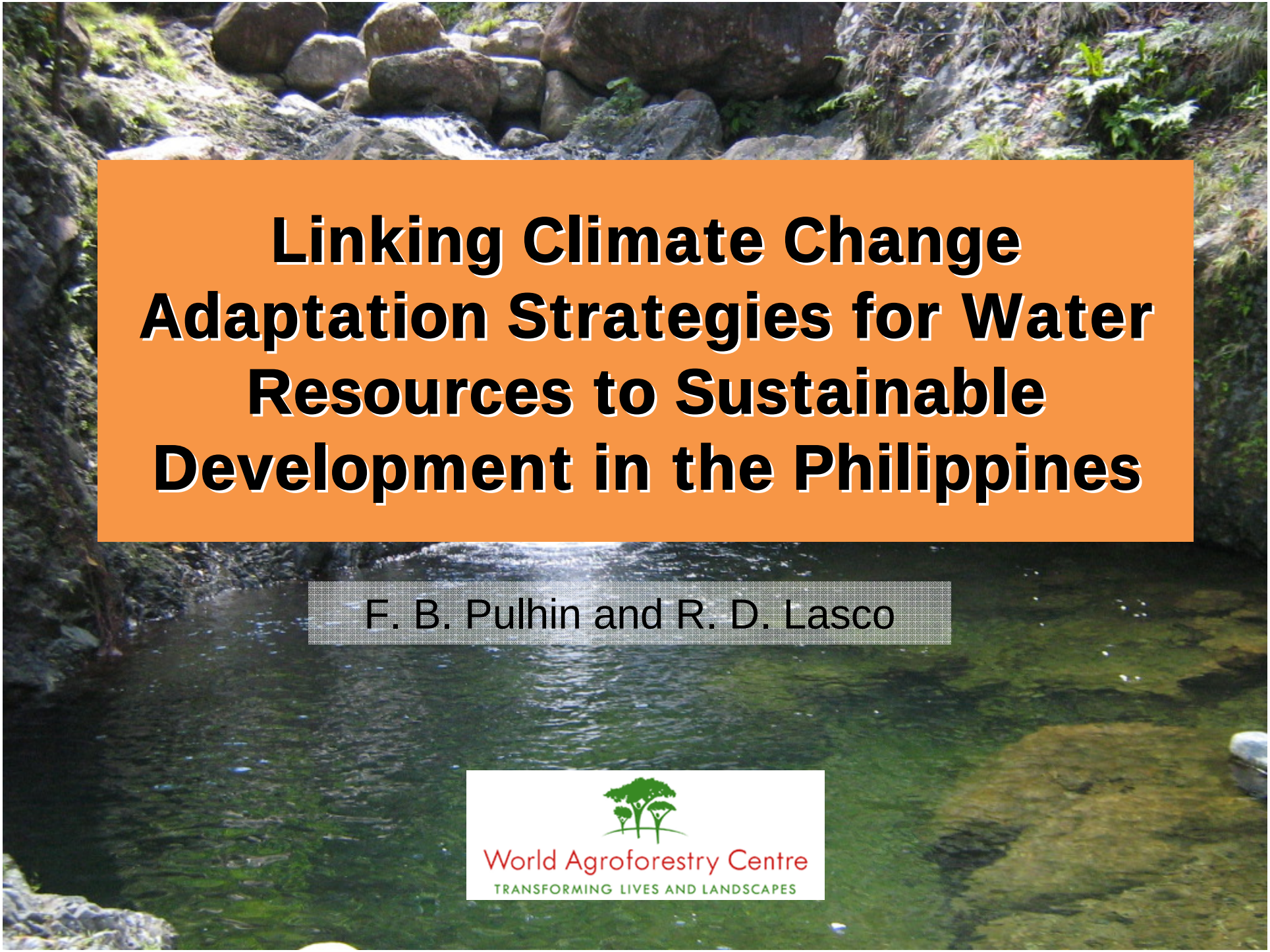

Linking Climate Change Adaptation Strategies for Water Resources to Sustainable Development in the Philippines

F. B. Pulhin and R. D. Lasco

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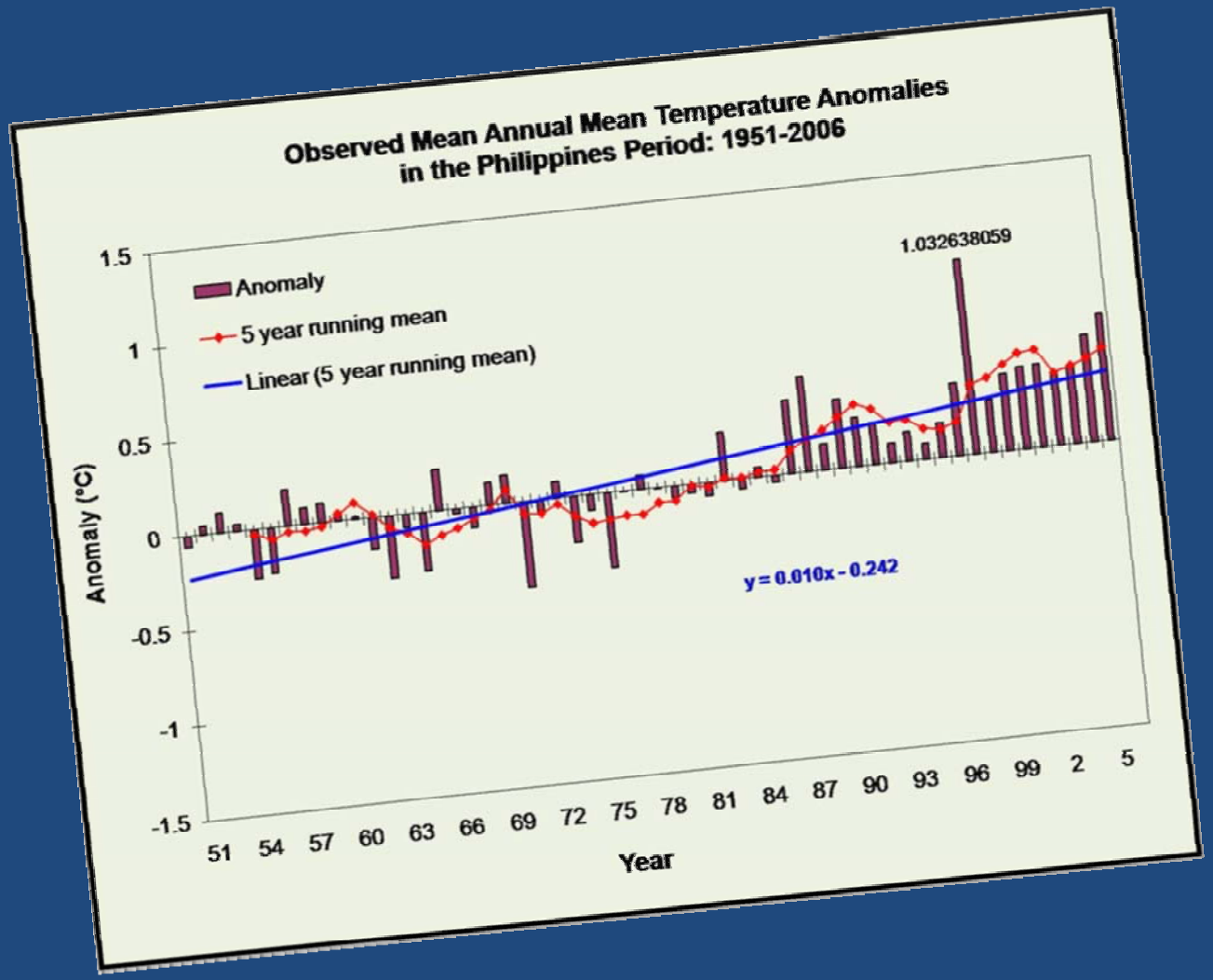
Outline of Presentation

- Philippines and Climate Change
- Water and Sustainable Development
- Water Resources and Climate Change
- Climate Change Adaptation Strategies for the Water Sector
- Mainstreaming Climate Change Adaptation
- Conclusion

Philippines and Climate Change



From 1951 to 2006, records show that warming has occurred in the country

Figure 1. Observed mean annual temperature anomalies in the Philippines (1951-2006).

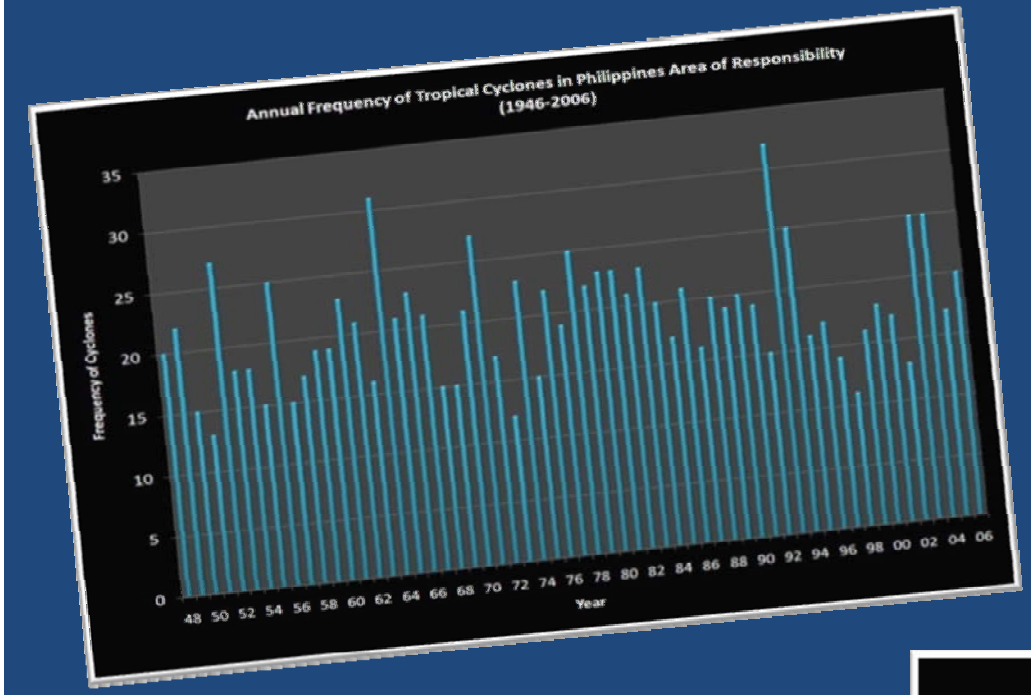
Philippines and Climate Change

YEAR	JFM	AMJ	JAS	OND		YEAR	JFM	AMJ	JAS	OND
1950	C	C	C	C		1978	W-			
1951	C			W-		1979				
1952						1980	W-			
1953		W-	W-			1981				
1954			C-	C		1982		W-	C	W+
1955	C	C-	C-	C+		1983	W+	W		C-
1956	C	C	C	C-		1984	C-	C-		C-
1957		W-	W-	W		1985	C-	C-		
1958	W+	W	W-	W-		1986			W-	W
1959	W-					1987	W	W	W+	W
1960						1988	W-		C-	C+
1961						1989	C+	C-		
1962						1990			W-	W-
1963			W-	W		1991	W-	W-	W	W
1964			C-	C		1992	W+	W+	W-	W-
1965	C-		W	W+		1993	W-	W	W	W-
1966	W	W-	W-			1994			W	W
1967						1995	W			C-
1968				W-		1996	C-			
1969	W	W-	W-	W-		1997		W	W+	W+
1970	W-					1998	W+	W	C-	C
1971	C	C-	C-	C-		1999	C+	C	C-	C+
1972		W-	W	W+		2000	C	C	C-	C
1973	W		C-	C+		2001	C			
1974	C+	C	C-	C-		2002		W-	W	W
1975	C-	C-	C	C+		2003	W-		W-	W-
1976	C			W-		2004			W	W
1977				W-		2005	W-			

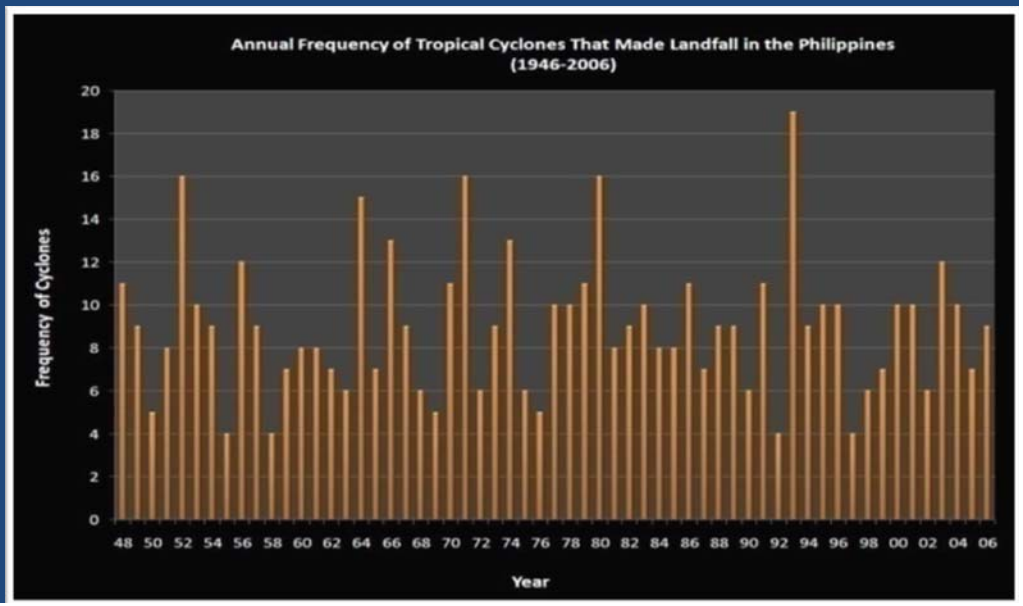
Occurrence of ENSO events observed to become more frequent since 1980

Legend:
C- weak La Nina **C** moderate La Nina
C+ strong La Nina **W-** weak El Nin
W moderate El Nino **W+** Strong El Nino

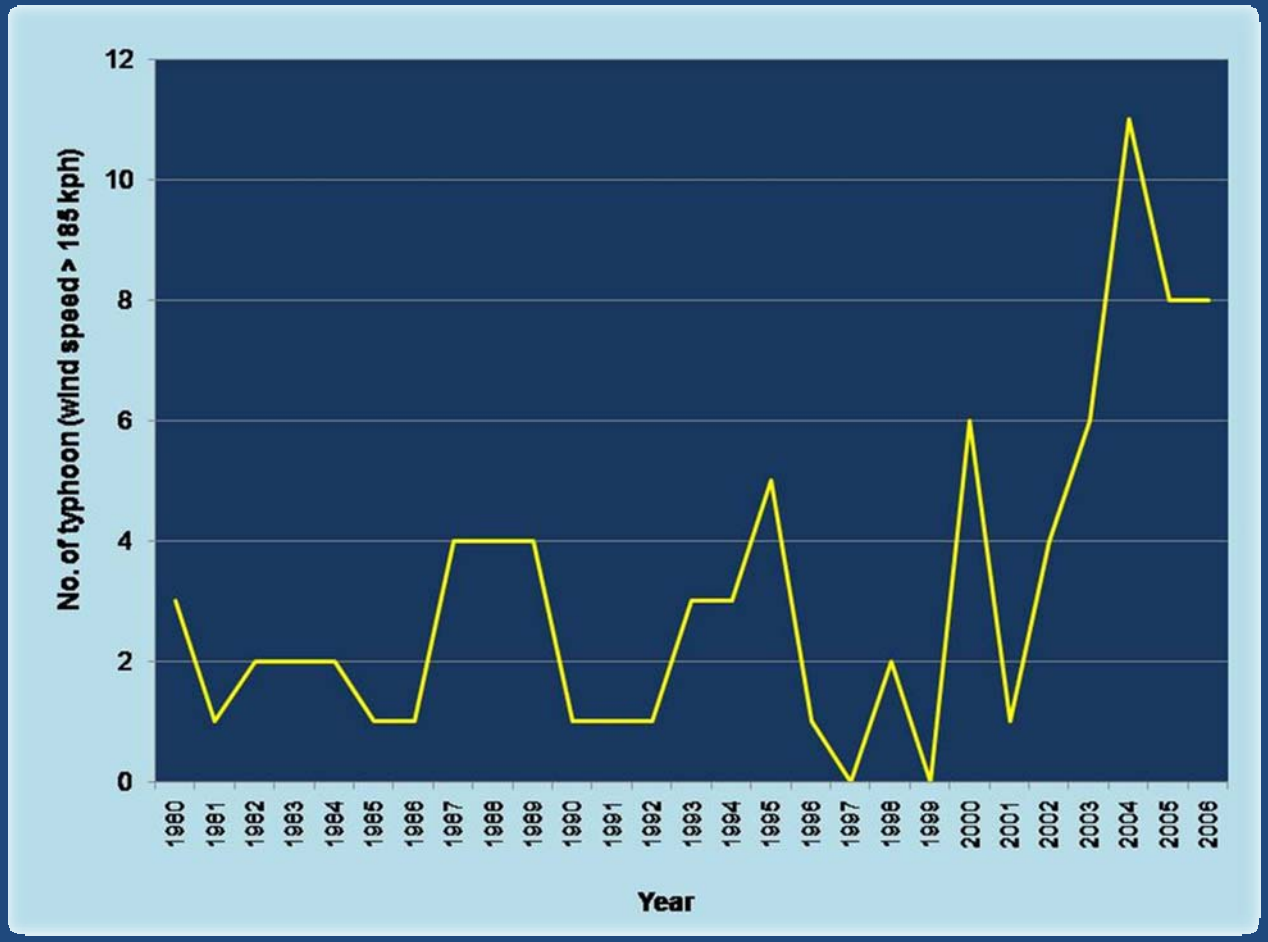
Philippines and Climate Change



Annual average number of tropical cyclones occurring around 19 to 20



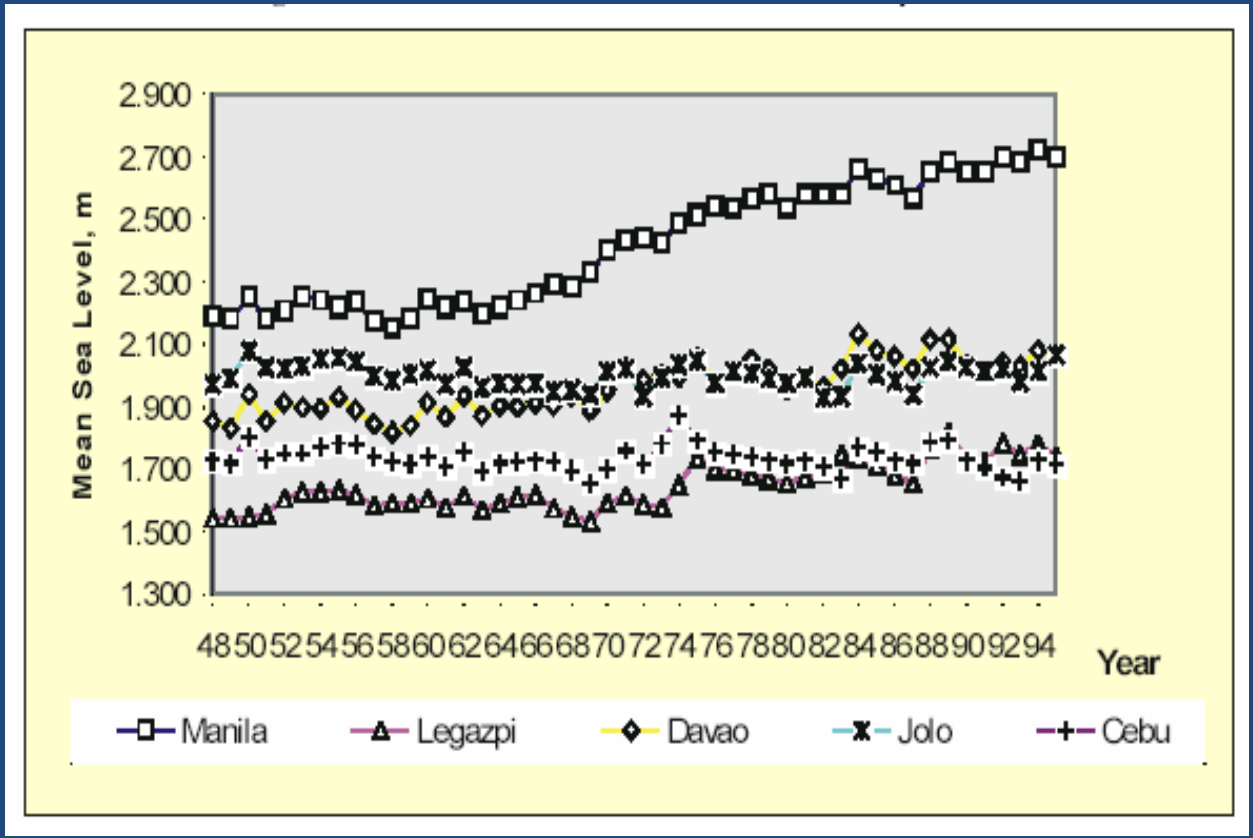
Philippines and Climate Change



An increasing trend on the number of strong typhoons (> 185 kph wind speed) hitting the Philippines

Philippines and Climate Change

- Annual mean sea level observed to increase in Manila since 1960s while for Legazpi, Davao, Jolo and Cebu, SLR occurred in 1970s



Projections for the Philippines

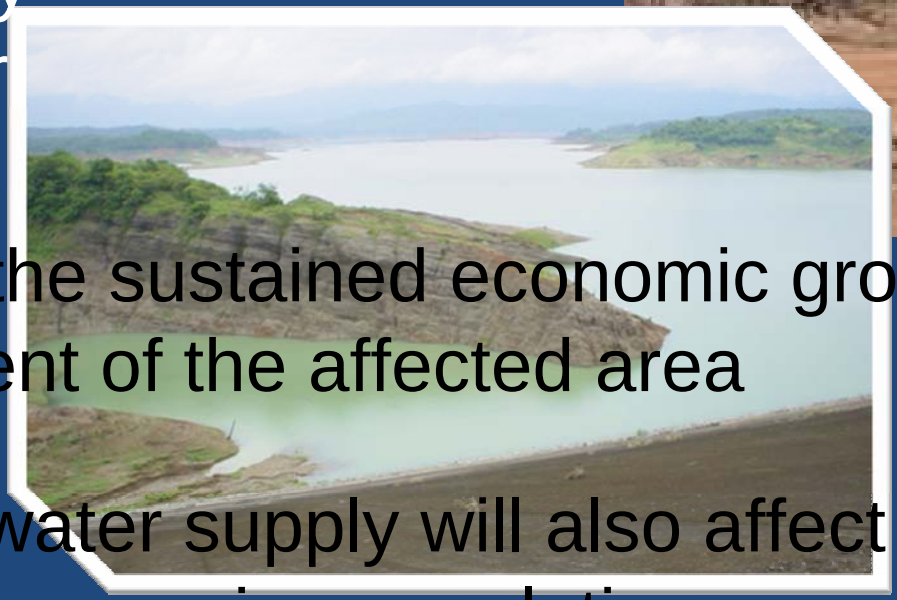
Table 3.1 Temperature Change and Rainfall Ratio by Water Resource Region Based on the Canadian Climate Center Model (2 x CO_2 Scenario)

Name of Water Resource Regions		Temperature Change (^oC)	Rainfall Ratio
I	Ilocos	<2	1.0-1.5
II	Cagayan Valley	<2	1.0-1.5
III	Central Luzon	2-3	1.0-2.0
IV	Southern Tagalog	2-3	1.6-2.0
V	Bicol	2-3	1.0-1.5
VI	Western Visayas	2-3	1.6-2.0
VII	Central Visayas	2-3	1.6-2.0
VIII	Eastern Visayas	2-3	1.0-2.0
IX	Western Mindanao	2-3	1.0-1.5
X	Northern Mindanao	2-3	<1.0-1.5
XI	Eastern Mindanao	>3	<1.0
XII	Southern Mindanao	2-3	1.0-1.5

Water and Sustainable Development

Plays key role in attainment of SD

Insufficient water supply, low water quality and degradation
of watersheds decrease productivity
of the poor people



Weakens the sustained economic growth and social development of the affected area

Declining water supply will also affect the production of food for a growing population

Greatly affect the small farmers

Water Resources and Climate Change

- Philippines endowed with rich water resources
- Rainfall, one of the major sources of water in the country, ranges from 1000 to 4000 mm annually
- About 1000 to 2000 mm are collected as runoff by about 421 principal river basins, 59 natural lakes and a number of streams
- Total annual available freshwater supply around 145,900 million cu. m. and groundwater recharge of 20,000 million cu. m. (NWRB, 2003)
- Water quantity and quality declining

Reasons for declining water quantity and quality

- Difference between the supply of and demand for water.
- Lack of water allocation formula
- Competition between corporations and people for the control and use of available freshwater resources
- Weak water use regulation and enforcement

- Inefficient water use
- Depletion of groundwater resources caused by establishment of too many groundwater wells
- Management of water resources fragmented
- Deterioration of watersheds

Water Resources and Climate Change

Streamflow

- Increase average annual runoff and water availability in some wet areas by 10-40%
- 10-30% decrease in dry areas which are already water stressed
- Exacerbate water pollution (thermal, bacterial, organic, nitrates, organic carbon)
- Exacerbate water stress due to increasing demand

Water Resources and Climate Change

(Adapted from Cruz and Pulhin, 2007)

Water Resources and Climate Change

(Adapted from Cruz and Pulhin, 2007)

Water Resources and Climate Change

Sea level rise will:

- Extend salt water intrusion and affect groundwater
- Affect mangroves
- Inundate coastal farms
- Increase flood risks for settlement areas and infrastructure

Adaptation strategies existing

Drought

- ❑ Construction of shallow tube wells
- ❑ Go to nearby river
- ❑ Rotation in receiving water

Floods

- ❑ Construction of fishponds in flooded area
- ❑ Improved watershed management
- ❑ Reforestation
- ❑ Soil erosion control

With climate change, these adaptation strategies not enough!

Potential Adaptation Strategies

1. Risk and Vulnerability Assessment
   Identification of areas at risk to flooding

2. Enhancing Forest Management to Reduce Risk and Vulnerability
   i. Protection of the remaining forests
   ii. Rehabilitation of degraded forestlands

3. Secure Sustainable Financing

Potential Adaptation Strategies

4. Mainstreaming Climate Change Adaptation

i. Policies and Programs

- Current policies need to be re-assessed and updated to focus more on how water resources management be improved
- Current and proposed programs must already integrate climate change strategies

ii. Planning

CC incorporated in the management plans for water resources to enhance adaptation

Mainstreaming Climate Change Adaptation Study

Method used:

A combination of key informant interview and review of documents discussing sustainable development agenda reviewed

Policies on water resources

•PD 1067 (1976) - National Water Code of the Philippines Provides the framework in water appropriation, control, conservation and protection of water resources, privatization of state-run water facilities, protection and conservation of watersheds and the waste and pilferage of water.

•RA 198 (1973) – Creation of the provincial water utilities
Local water districts authorized to operate and administer water supply and waste water disposal systems in the provinces

Policies on water resources

PD 424 – Creation of National Water Resource Council to ensure that a body will look into the problems of water resources

RA 7160 - Local Government Code provides power to the local government units (LGUs) to enforce laws on water sanitation and to provide basic services such as water supply, sanitation and flood control

PD 1151 - Philippine Environment Code defines the necessary components of a regulatory program along with its functions.

Policies on water resources

RA 9275 - Clean Water Act
Provides a program and regulations for the abatement and management of water pollution from point and non-point sources
- Promotes the use of market based instrument in imposing fees on polluters of water

Commonwealth Act 383 - Anti-Dumping Law (1938) prohibits dumping of waste and other substances into rivers

Policies on water resources

PD 984 (1976) provides guidelines for the control of water pollution from industrial sources through imposition of penalties or charges to violators.

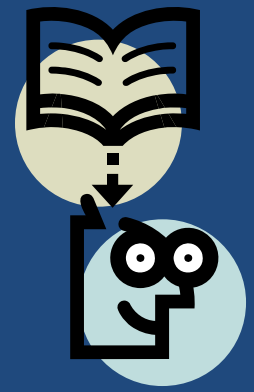
RA 9003 - Ecological Solid Waste Management Act of 2000 institutionalize a national program that will manage the transfer, transport, processing and disposal of solid waste. This law would like to ensure that landfills to be established would not affect the water quality of the water resources.

Policies on water resources

RA 6969 (Toxic Substances and Hazardous and Nuclear Wastes Control Act) was issued to control and manage the import, manufacturing, processing, distribution, use, transport, storage, treatment and disposal of toxic substances and hazardous and nuclear wastes.

RA 4850 (1966) issued to regulate pollution in Laguna de Bay Region. Amended by PD 813 to address growing problem of water pollution in Laguna Lake which includes sewage works and industrial waste disposal system.

Policies on water resources



RA 6234 (1971) issued to create the Metro Waterworks and Sewerage System (MWSS). MWSS constructs, operates and maintains water systems, sewerage and sanitation facilities in the Metro Manila area.

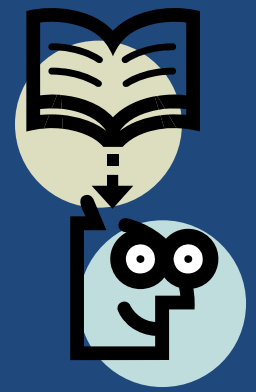
PD 281 (1973) issued to create Pasig River Development Council. This Council regulates and controls pollution of the Pasig River.

DAO 90-34 - Revised Water Usage and Classification/Water Quality Criteria classified the water bodies according to their best usage.

Policies on water resources

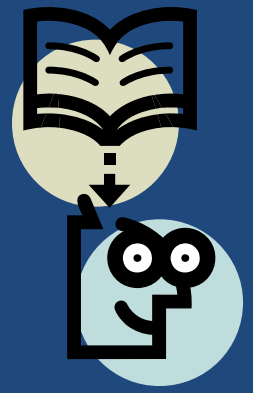
DAO 90-35 (1990) provided revision of the effluent regulations. This administrative order prescribes the standards for discharge of effluents to the different classifications of water bodies.

DAO 94-26A - Philippine National Standards for Drinking Water provides the different parameters and value for drinking water quality. Also it defines guidelines for assessing water quality for drinking water.

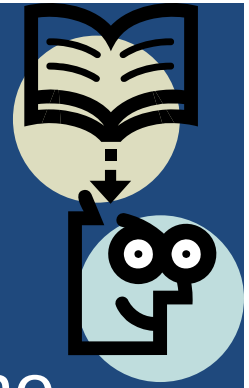


Policies on water resources

PD 856 - Sanitation Code of the Philippines prescribes standards for sewage collection and refuse and excreta disposal. It also assigns to cities and municipalities the responsibilities to provide for efficient and proper disposal and to handle nuisance and offensive trades and occupations



Policies on water resources

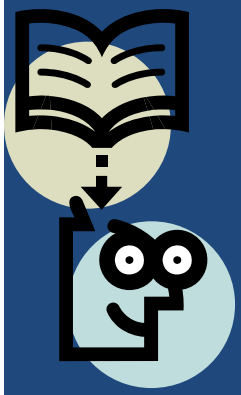


DAO 97-39 - Chemical Control Order for Mercury and Mercury Compounds regulates the importation, manufacture, distribution and use of mercury and mercury compounds and the storage, transport, and disposal of their wastes.

DAO 2000-18 To identify requirements and procedures pertaining to the importation, manufacture, distribution, and use of cyanide and cyanide compounds and the storage, transport and disposal of their wastes or the Chemical Control Order for Cyanide and Cyanide Compounds was issued.

Policies on water resources

DAO 98-58 or the Priority Chemical List identifies existing and new chemicals that can potentially pose unreasonable risk to public health, workplace, and the environment. Requires all manufacturers, distributors, users, and importers of chemicals included in the PCL to submit bi-annual reports.



Although these policies already deal with the regulation of water quantity and quality, there was no mention of the issue of climate change

Plans and programs

•Medium Term Development Plan (MTDP) for 2004-2010. Contains the ten point agenda of the administration of the current President Gloria Macapagal-Arroyo

The primary mission of the MTDP is to alleviate poverty among the Filipino people through creation of jobs and opening up of economic opportunities

Plans and programs

- Philippines Millenium Development Goals (MDGs) Progress Report
-Prepared by NEDA to describe efforts of Philippine government in attaining poverty reduction targets

The Philippine Agenda (PA) 21 was crafted in response to the Philippines' commitment in the Earth Summit in 1992.

In all sustainable development plans, climate change adaptation has not been mainstreamed (Lasco *et al*. 2007).

MTDP - adaptation measures mentioned pertain to cope with natural disasters such as typhoons, flooding and landslides and not to foreseen climate change.

Plans and programs

Philippines MDG progress report indicated the need to address the increasing trend of carbon dioxide emissions

- Also emphasized the need to improve flood control and drainage facilities to cope with the damage caused by flooding and typhoons in the urban areas (Lasco et al, 2007).

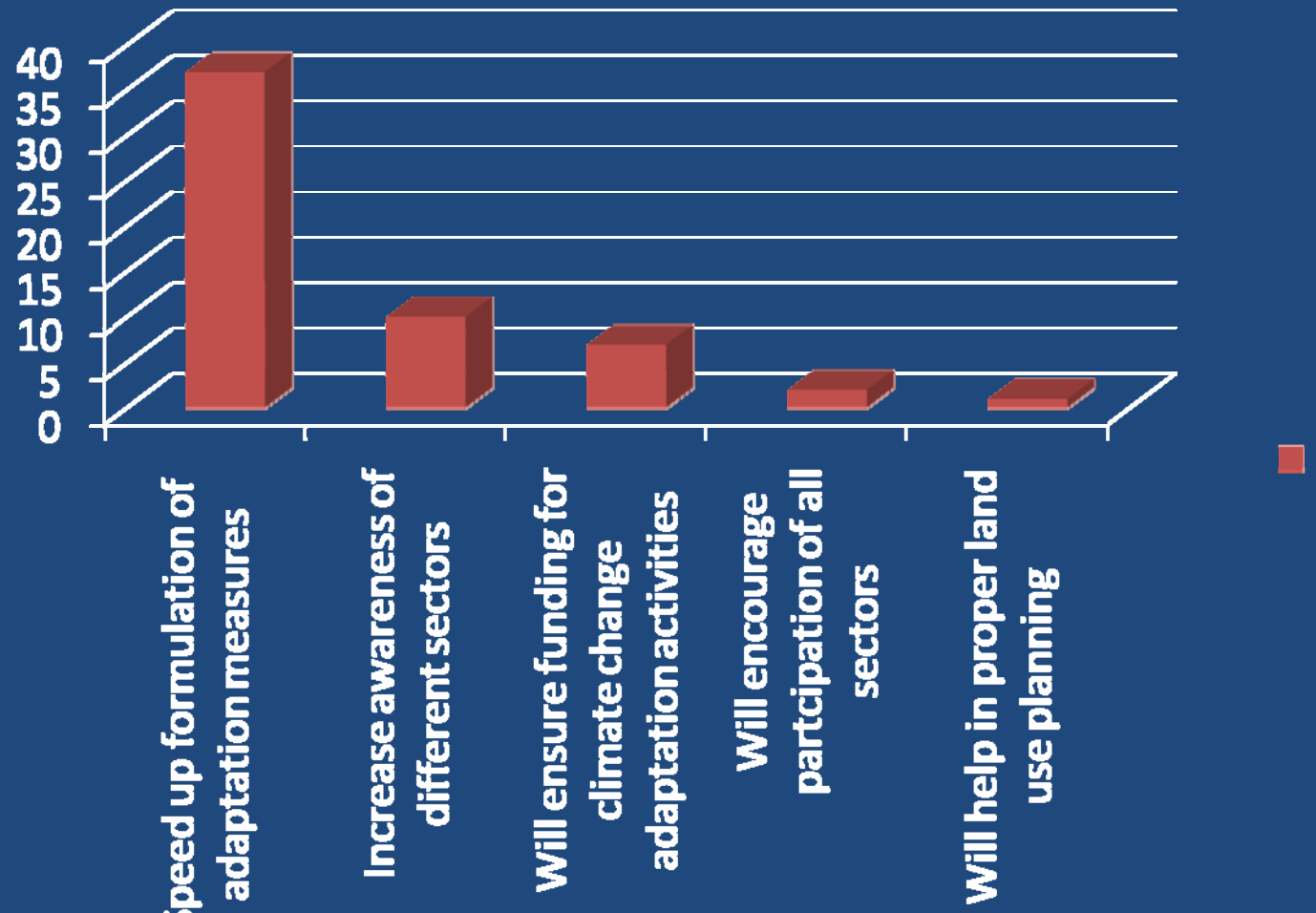
Plans and programs

PA 21 mentioned about climate change once and refers only to water resources

- Points the need to promote and adopt methods for impact assessment of climate change on water resources
- Emphasized the need to adapt to problems posed by climate related events such as flooding and drought
- Recommends that flood monitoring and forecasting be undertaken (Lasco et al 2007).

Views of the Stakeholders

All respondents believe that mainstreaming climate change in policies, plans and programs of the water sector **is important** .



Reasons why mainstreaming climate change adaptation is important

Factors that can enhance mainstreaming climate change adaptation

- Building the capacity of all sectors
- Providing funds for climate change programs
- Creation of a single body that will coordinate climate change activities
- Presence of a strong political will
- Uplifting the socio-economic conditions of the poor
- Presence of strong commitment of all sectors
- Coordination among institutions concerned with water resources.

Barriers to mainstreaming

- Lack of information on the impacts of climate change among the policy makers and heads of agencies
- Climate change just an emerging issue
- Climate change not a priority program of the government
- No single agency that consolidates the plans and programs and issue policies on water thus, mainstreaming climate change in the water sector can be a difficult thing to do.

Barriers to mainstreaming

- Heads of agencies have reactive attitudes (wait and see), thus they are not lifting a finger to address projected climate change
- Matters regarding climate change are the concern of PAG-ASA only
- No ensured funds to implement programs related to climate change.

Potential Points of Entry

Infrastructure

- Adjustment of size of drainage canals to accommodate possible strong flows
- Adjustment of size of dams?

Policy

- Mandatory for new buildings/homes to install rainwater harvesting facility
- Provide incentives i.e reduction on property tax
- Construction of harvesting ponds
- Regulation of shallow tube wells

Potential Points of Entry

Plans

- Incorporate in reforestation plan, use of drought resistant species
- Incorporate in land use plan, vulnerable areas

Thank You

Linking Climate Change Adaptation Options and Sustainable Development for Rice Production in Indonesia

Prepared by Perdinan, Rizaldi Boer and Kiki Kartikasari
Department of Geophysics and Meteorology,
Bogor Agricultural University - Indonesia

Introduction

- Rice is a strategic commodity in Indonesia
- Climate strongly influence rice production

  Data from Ministry of Agriculture

  - about 546,487 hectares of rice field area were inundated by flood which associated with La Nina in 2004
  - about 1,036,641 hectares of rice field area were exposed to drought which associated with El Nino in 2003

Introduction

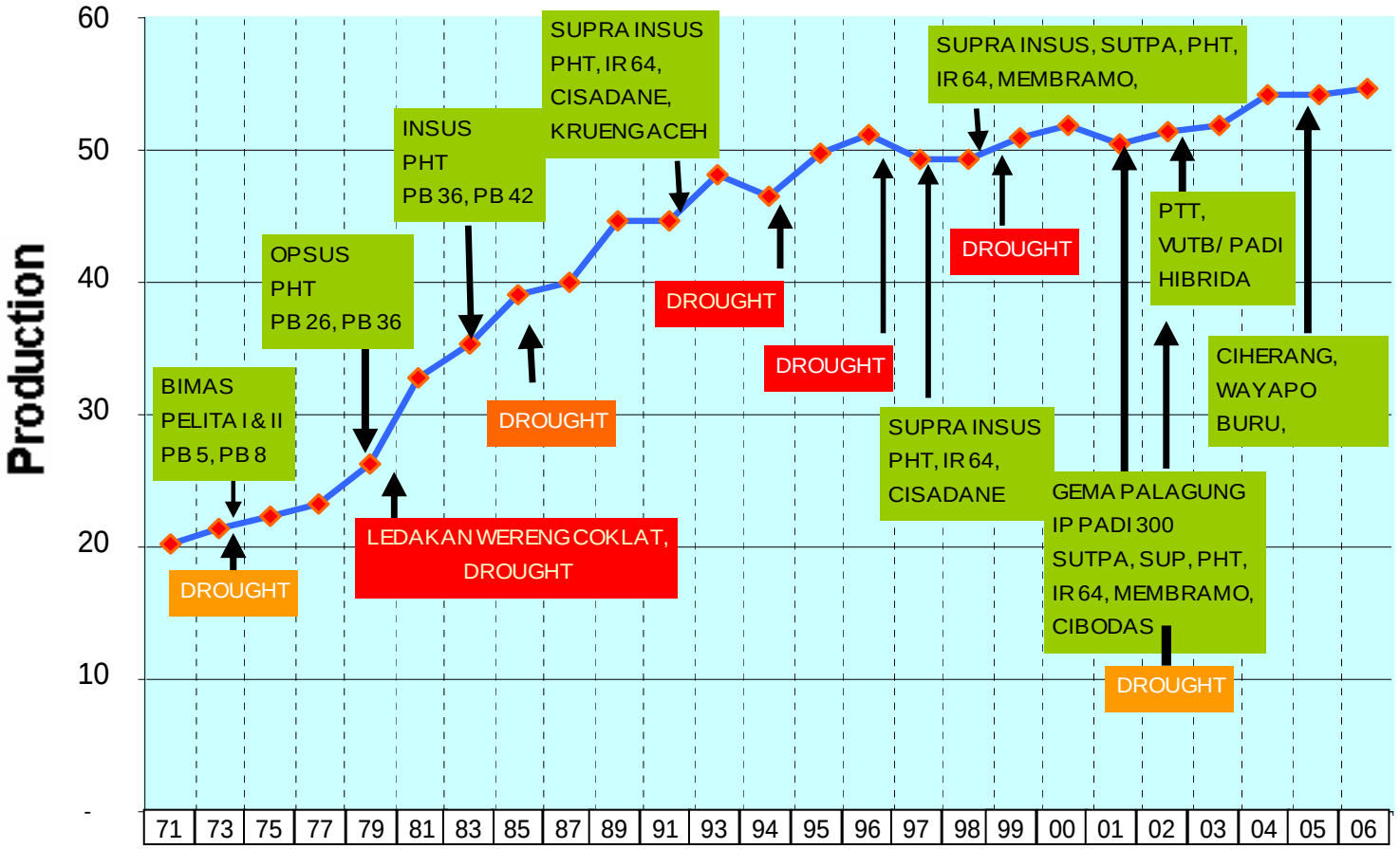
- Climate extreme events in Indonesia
  - More than 75% of 46 massive drought events in Indonesia during
    1844 – 2005 were associated with El Nino (Boer and Subbiah 2005)

- Indonesia Climate Change Strategy
  - National Action Plan to Cope with Climate Change
    (State Ministry of Environment, 2007)
  - National Development Planning Response to Climate Change
    (State Ministry of Development Planning, 2007)
  - Prospect and Direction for Agribusiness Paddy Development
    (Ministry of Agriculture, 2005)

Objectives

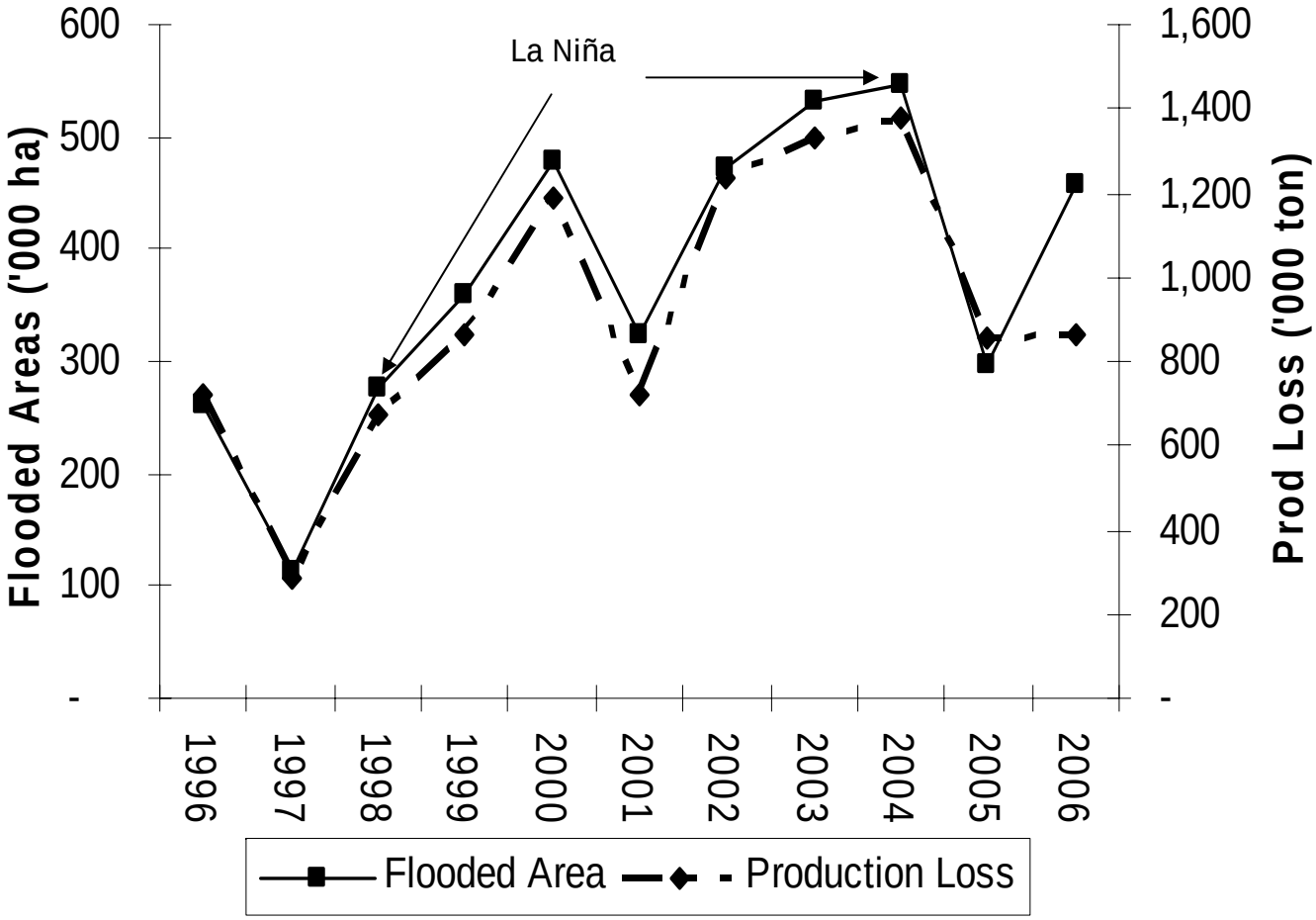
- To discover linkage of climate change adaptation option and sustainable development plan
- Propose potential adaptation option to be implemented to sustain domestic rice production

Climate Variability and Rice Production



Historical Paddy Production in Indonesia (million tons)
Source: Directorate of Plant Protection, 2007

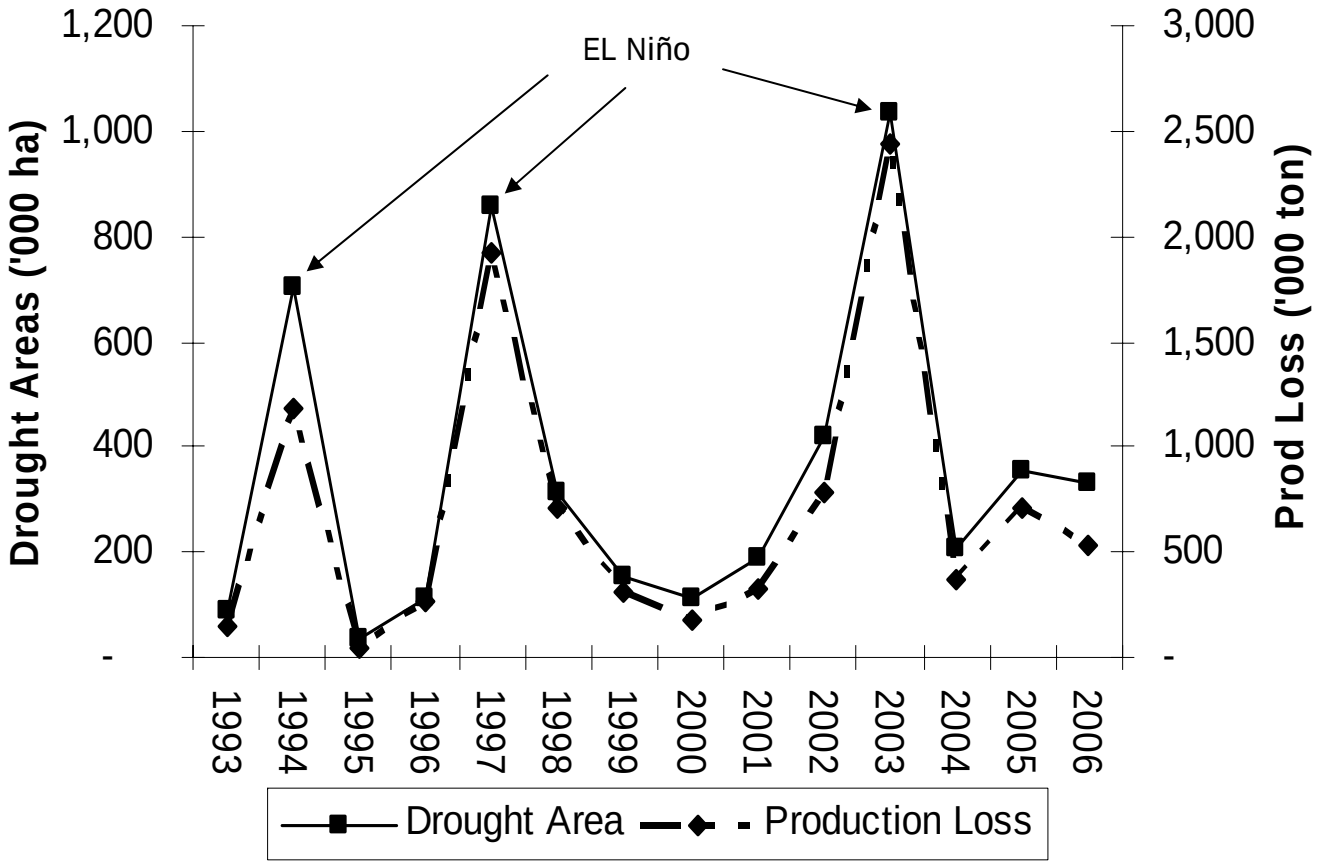
Climate Variability and Rice Production



Total Flooded Area of Wet Rice Field and Production Loss

Source: Department of Agriculture, 2007

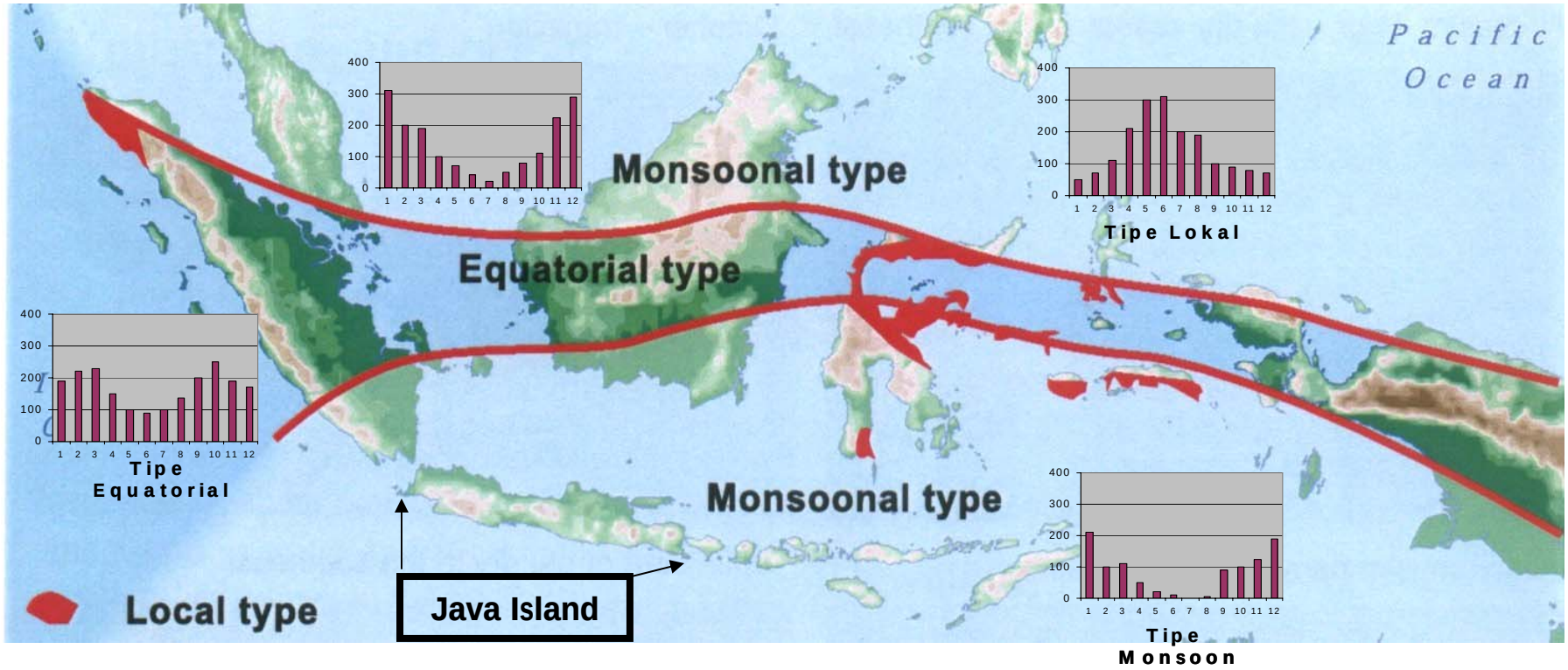
Climate Variability and Rice Production



Total Dried Up Area of Wet Rice Field and Production Loss

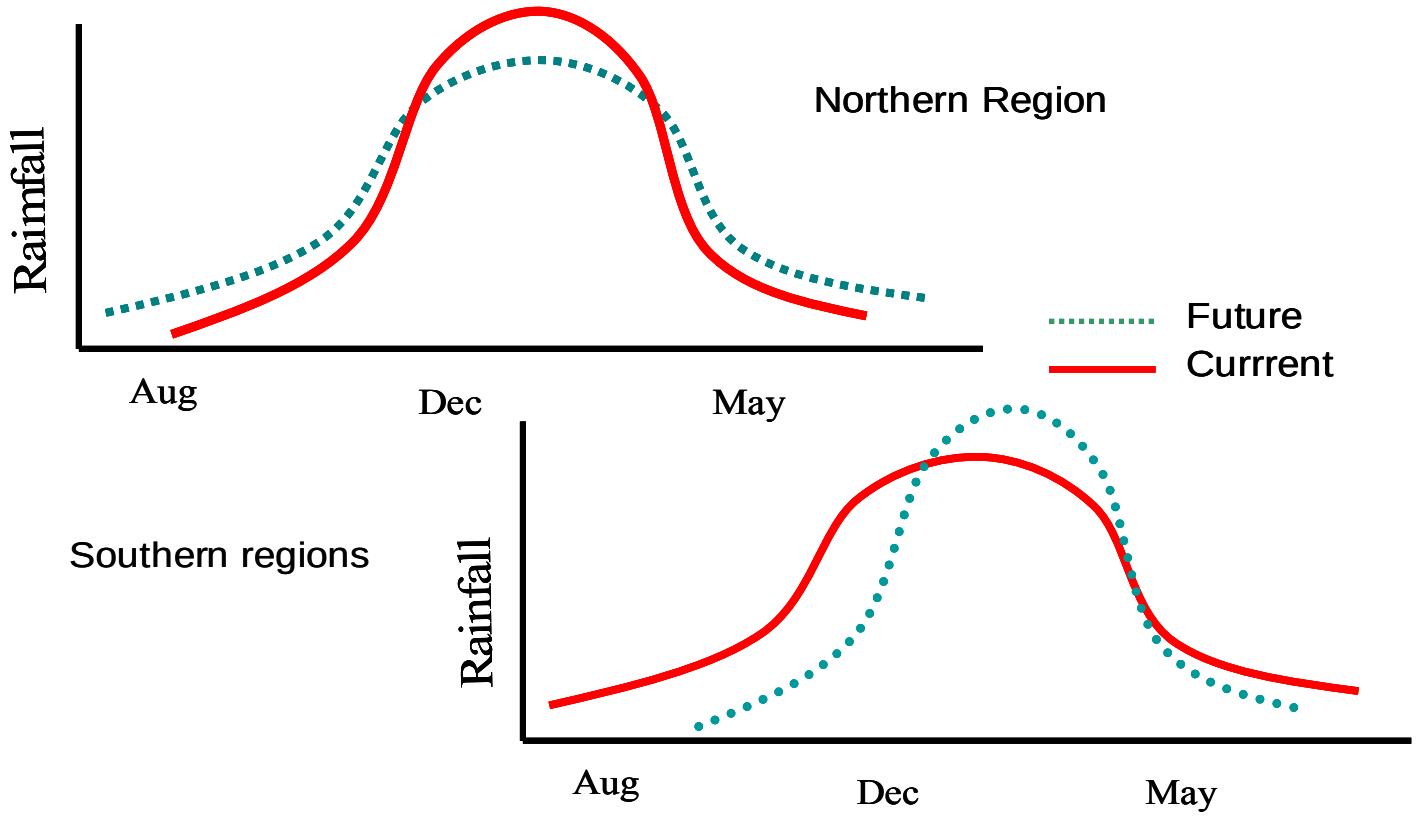
Source: Department of Agriculture, 2007

Major Climate Type in Indonesia



Source: Modified from DPI Australia, 2002

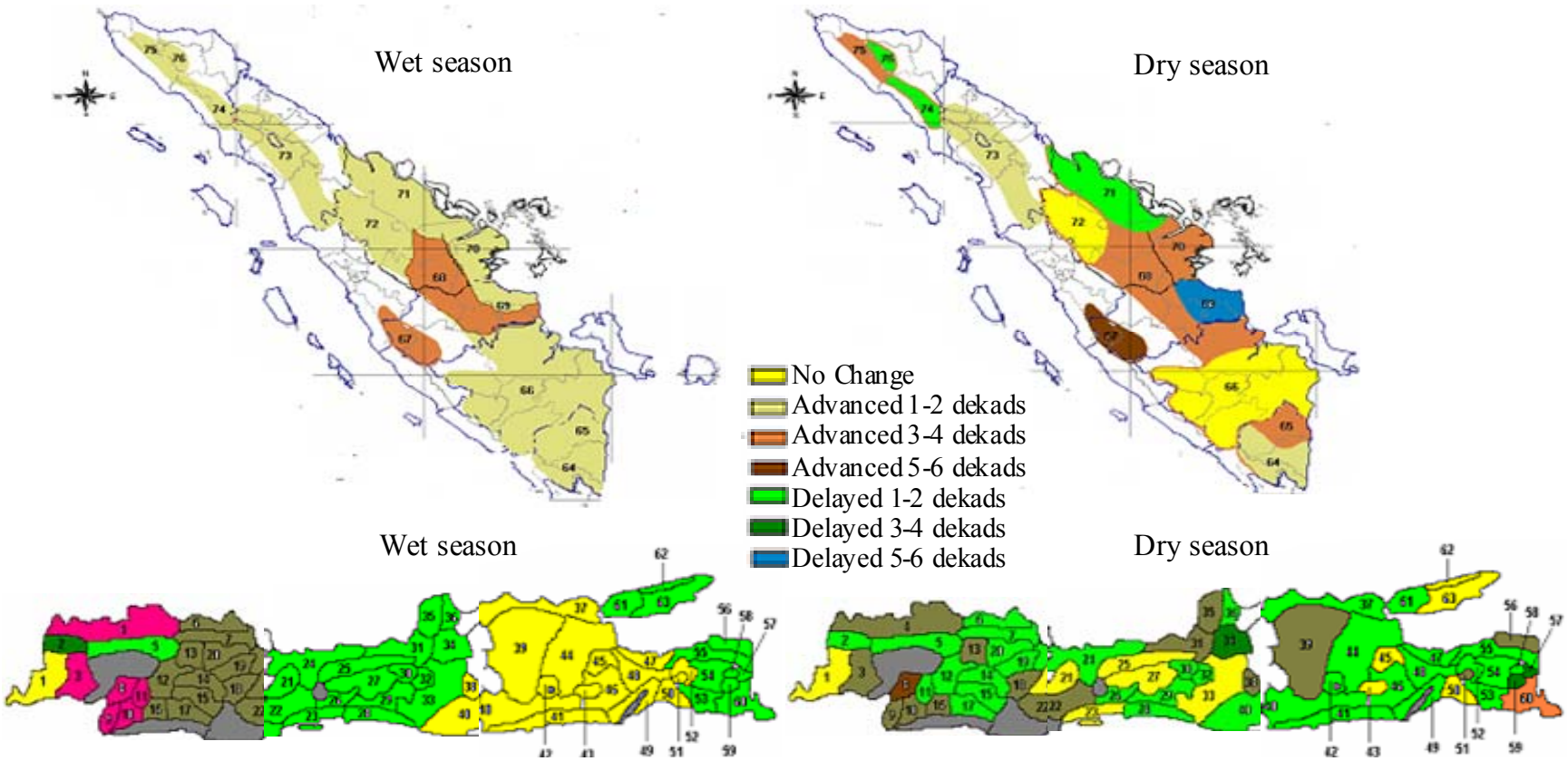
Existence of Climate Change in Indonesia



Likely pattern in Northern and Southern regions of Indonesia

Source: GOI, 2007

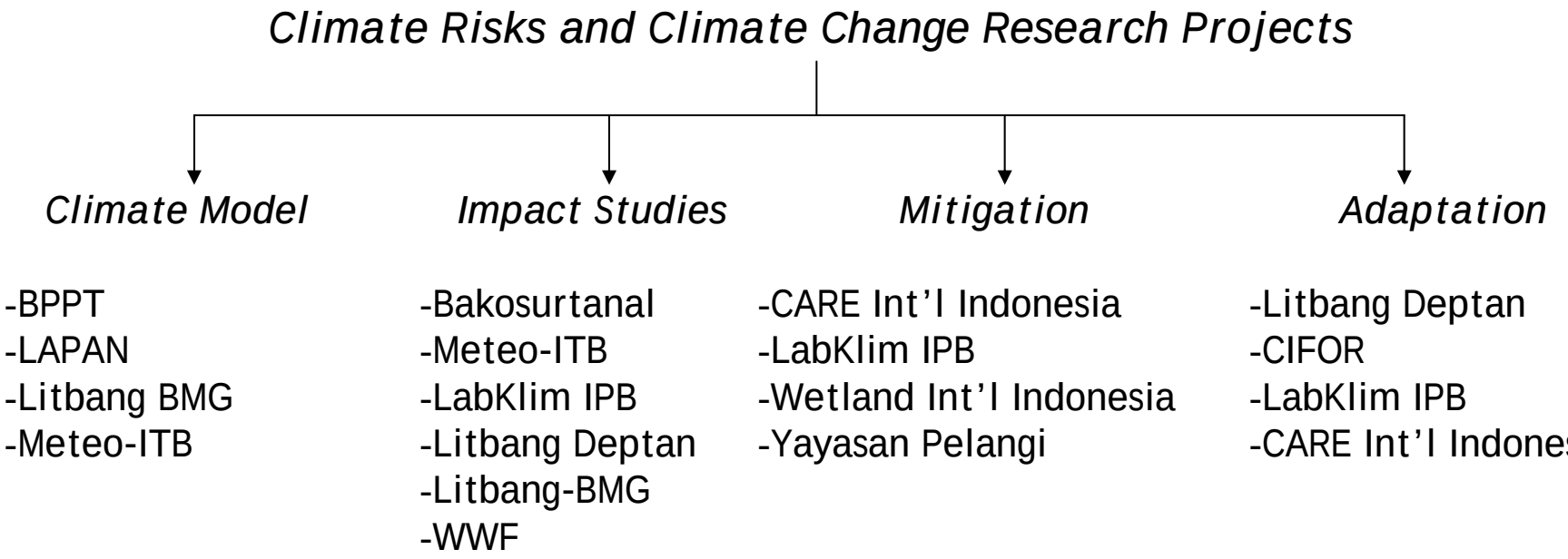
Existence of Climate Change in Indonesia



The changes in dry/wet season onset of Sumatra (above) and Java (below) [1 decade = 10 days]

Source: BMG, 2007

Synthesis of Climate Studies in Indonesia



Most of the climate research in Indonesia is addressed to utilize climate information in order to alleviate the negative impacts of the extreme climate events

Source: Boer and Kartikasari, 2007

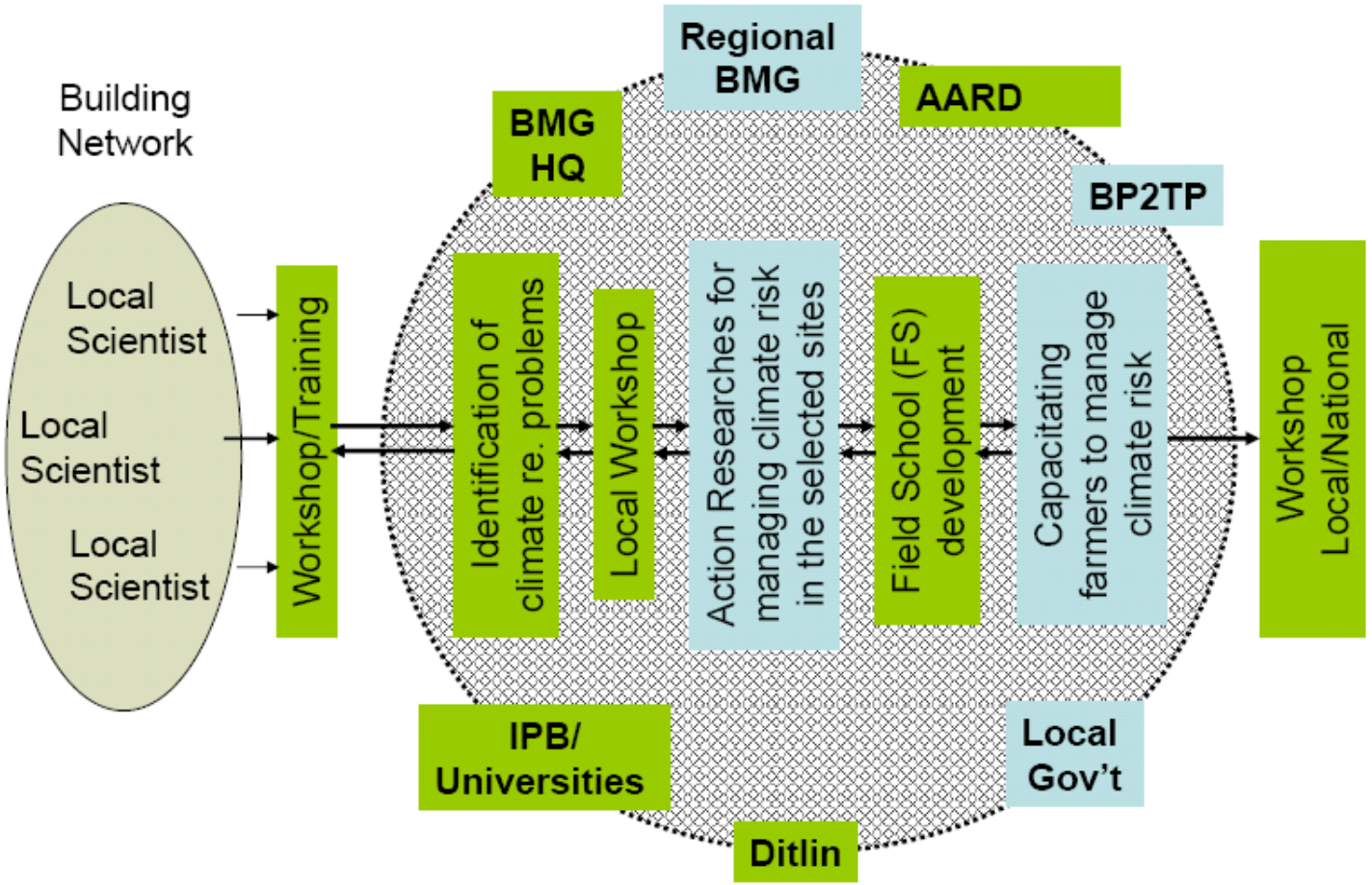
Synthesis of Climate Studies in Indonesia

Climate researches in Indonesia has moved from science into practice

Authors/ Research Project	Classification of the Research Project				
	Tool/Model	Risk	Management	Capacity Building	Policy
(APN 2003)	√	√	√		
(AIACC 2003)	√	√			
(ADPC 2003)			√	√	
(Boer 2004)			√		
(Mardawilis 2004)	√	√	√		
(Aser 2004)		√	√		
(Leemhuis 2005)	√	√			
(Elsa 2006)	√	√	√		
(LAPAN 2006)	√	√			
(APN 2007)				√	
(Boer 2007)	√	√			
(LAPAN 2008)	√	√			

Synthesis of Climate Studies in Indonesia

Climate researches in Indonesia has moved from science into practice i.e. The process of APN CAPaBLE research in Indonesia



Indonesia Rice Demand Projection and Its Development Strategy

Demand for rice in the period of 2010 – 2025 (in thousand tons)

Note: Paddy production is paddy produced to meet the rice demand (paddy to rice conversion of 63%)

Regions	2010	2015	2020	2025
Demand for Rice				
Sumatra	8,037	8,499	8,987	9,504
Java	20,081	21,202	22,386	23,637
Bali and Nusa Tenggara	212	2,242	2,371	2,507
Kalimantan	1,944	2,055	2,173	2,298
Sulawesi	2,556	2,704	2,862	3,028
Maluku and Papua	432	457	484	512
Indonesia	35,170	37,160	39,263	41,487
Paddy Production				
Indonesia	55,825	58,984	62,323	65,852

Indonesia Rice Demand Projection and Its Development Strategy

Agricultural land conversion in Indonesia

Types of Land Conversion	Units	Areas	Source
A. Irrigated paddy field conversion to non-agricultural uses	ha/year	15,000-20,000	1
B. Irrigation channel conversion to other uses	ha/year	15,000	2
C. Conversion of irrigation area to settlement and industry indicated by the expansion of cities' area	ha/year	15,000	3
D. Conversion of wet paddy field with irrigation to non-irrigation	ha/year	10,000-20,000	3

Source:

1. Ministry of Settlement and Regional Infrastructure, 2003
2. Ditjen SDA, 2003. The Policy for Water Resources Development and Conservation to support the National Food Security Program.
3. Ditjen SDA, 2003. Water Resources Condition in Indonesia.

Indonesia Rice Demand Projection and Its Development Strategy

Indonesian Government through the Ministry of Agriculture has develop scenarios to meet the projected demand of rice

Scenarios	Harvesting Areas	Productivity
Scenario 1 (pessimistic)	Increase by 0.4% per year	Increase by 1.0% per year
Scenario 2 (optimistic)	Constant	Increase by 1.5% per year
Scenario 3 (realistic)	Constant	Increase by 1.0% per year
Scenario 4 (resources)	Increase by 0.37% per year	Increase by 0.48% per year

How the scenarios could be successfully achieved without concerning the problem on climate side?

Indonesia Rice Demand Projection and Its Development Strategy

The high demand for rice forced Indonesia to devise an appropriate development strategy to fulfill the demand

The rice development strategy is directed into two pathways:

1. Increase the productivity of about 1 – 1.5% annually (intensification)
2. Increase the planting area or planting intensity (extensification)

Indonesia Climate Change Adaptation Option for Rice Production

Climate change adaptation options for agricultural sector

Problems /Impacts	Proposed General Adaptation Program	
	Short term	Long Term
Drought • Limit of irrigation water • Reduce of the planting areas • Lost of crops yield • Felt of harvesting • Reduce of farmers income	• Water conservation • Water harvesting • Controlled groundwater exploitation • Efficient of water uses • Prioritize of water uses • Introducing crops tolerance varieties to drought • Introducing the early mature crops varieties • Crops calendar • Rainfed rice development • Farmers' capacity in understanding drought behavior	• Early warning system to drought hazard • Integrated irrigation water management for food crops

Indonesia Climate Change Adaptation Option for Rice Production

Climate change adaptation options for agricultural sector

Problems /Impacts	Proposed General Adaptation Program	
	Short term	Long Term
Flood/standing water • Physical damages of crops growth • Lost of crops yield • Felt of harvesting • Reduce of farmers income	• Flood mitigation • Drainage improvement • Raise bed system • Introducing crops tolerance to deep water • Crops calendar	• Early warning system to flood hazard • Integrated drainage water management for farming system
Increase of humidity during La-Niña • Pest and diseases outbreaks	• Crops environment improvement • Pest and diseases control • Introducing the crops tolerance varieties to pest and diseases • Jointly planting time	• Integrated crops pest and diseases control
Increase of temperature • Increase of transpiration and respiration • Crops early mature with low yield	• Breeding of tolerance crops varieties to high temperature	

Indonesia Climate Change Adaptation Option for Rice Production

Responsible Institutions	Proposed adaptations 2007-2009
Dept. of Marine Affairs and Fisheries, State Ministry of Environment, Dept. of Public Works and Local Government.	1. Increase the utilization of drought prone map. 2. Conduct water saving agriculture activities. 3. Implement good agriculture practices. 4. Implement the acceleration planting with appropriate technology. 5. Rehabilitate and increase irrigation network. 6. Optimize alternate system in water irrigation distribution. 7. Form working group on climate anomaly and climate change in Department of Agriculture. 8. Form commanding post to control flood and drought in Department of Agriculture. 9. Advocate and socialize the right understanding of climate change and its impact to the agriculture sector as well as government policy in mitigation and adaptation effort.
	Proposed adaptations 2009-2012
State Ministry of Environment, Dept. of Public Works and Local Government.	1. Develop drought early warning system. 2. Increase the utilization of alternative water resource potential. 3. Empowered the P3A institution. 4. Strengthened the institution of water use farmer. 5. Empower the farmer group to arrange the planting schedule and decide the beginning of planting season. 6. Develop food diversification policy. 7. Develop agriculture climate information system and network in various level and region including the development of Agriculture Field School as a development of SLPHT and SLI (Climate Field School)

Indonesia Climate Change Adaptation Option for Rice Production

	Proposed adaptations 2012-2025
Ministry of Environment, Dept. of Public Works and Local Government.	1. Conduct climate anomaly impact analysis toward seasonal shift to decide the beginning of planting season 2. Conduct research on superior seeds that resistance to climate change. 3. Development of adaptive track husbandry. 4. Research program on government strategy and policy to address climate change in agriculture sector. 5. Formulate detail planning regarding agriculture development policy. 6. Development program to increase farmer income.
	Proposed adaptations 2025-2050
Dept. of Agriculture, KMNRT, State Ministry of Environment, Dept. of Public Works and Local Government.	1. Improve various existing step and strategy based on evaluation to various concepts, strategy, efforts and technology that have been implemented in previous period. 2. Develop various innovative technology, particularly for superior adaptive variation and technology for management of land and water that have been produced in previous period. 3. Continue the food diversification policy that has been evaluated. 4. Increase the minimum income of farmer equivalent to average income of worker in Indonesia through various implementation of innovative technology and institution and development of various commercial commodities.

Linking Climate Change Adaptation Options for Rice Production and Indonesian Sustainable Development

Matrix of program for rice strategy and climate change adaptation and climate research in Indonesia

	Focussed Programs	Rice Strategies			Climate Change Adaptation						Climate Research
					Country Report		RAN-MAPI				
		09	15	25	15	30	09	12	25	50	
Extensification-Intensification	**A. Intensification**										
	• New Variety		√	√	√				√	√	TM
	• Technology Invention	√		√			√			√	TM
	• Farming System/ Management	√	√	√	√		√		√	√	TM/R/M
	• Water Management		√	√	√	√	√	√		√	TM/R/M
	• Planting Index	√	√	√		√					TM/R
	B. Pest and Diseases Control				√	√					TM/M
	C. Change Cropping pattern/ Modified Planting Season				√			√	√		TM
	D. Creating new rice field areas	√	√	√	√						TM/R/M
	E. Infrastructure/Irrigation*	√	√	√	√	√	√				TM/M

Linking Climate Change Adaptation Options for Rice Production and Indonesian Sustainable Development

Matrix of program for rice strategy and climate change adaptation and climate research in Indonesia

	Focussed Programs	Rice Strategies			Climate Change Adaptation						Climate Research
					Country Report		RAN-MAPI				
		09	15	25	15	30	09	12	25	50	
Capacity	F. Capacity Building/ Awareness Increasing	√	√	√	√		√	√			CB
	G. Community/Research/		√				√	√	√		CB
	H. Institutional Network						√				TM/R
	I. Drought and Flood Map										
	J. Dissemination Information/ Early Warning System	√	√					√			TM/CB
Economic	K. Alternative Activities				√				√	√	TM/R/M
	L. Farmers' income										TM/R/M
	M. Incentive System										
	• Credit scheme programs*	√	√	√							TM/R
	• Insurance										TM/R/M
Policy	16. Land Conversion Policy				√						TM/M
	17. Conservation Program				√						TM/M
	18. Institutional Development/ Empowerment						√	√			TM

Linking Climate Change Adaptation Options for Rice Production and Indonesian Sustainable Development

Adaptation programs that would be useful to stabilize and increase the rice production in Indonesia as well as to cope with climate change risks:

- Mapping vulnerable regions to drought/flood
- Modified cropping pattern and institutional development
- In addition, the insurance system is worthy to be considered in order to secure the yield or revenue from cultivating rice
- Come up with the real action by establishing Rice Information and Distribution Center

Linking Climate Change Adaptation Options for Rice Production and Indonesian Sustainable Development

Recent studies so far is an initial point and the gaps are:

- The climate models work at large scale and can not be used to study the impact of climate change at local scale
- The direction of climate change can not be always predicted, different model give different prediction
- The more plausible climate models for impact assessment, regional climate models are not fully developed
- The availability of long historical climate data required for validating the climate models is very low, except in Java (GOI 2007)

Conclusion

- The inclusion of climate change adaptation strategies to rice development will secure and enhance the implementation of the rice production increasing strategies to meet its demand. This expected achievement will lead directly to economic development in the rural regions and alleviate the poverty which is related to the MDGs – 1

- The two major programs devoted to increase the rice production (intensification and extensification) have also been addressed well by the inclusion of climate change adaptation strategies

- The Indonesian government through the Ministry of Environment had listed the climate change adaptation options within the RAN-MAPI document. In addition to this, the State Ministry of Government Planning attempted to incorporate the climate change issues including the adaptation options to Medium-term and Long-term National Development Plan

- Finally, discussion from this paper revealed that further research on developing reliable projected climate change data for conducting real assessment of possible impacts of climate change on Indonesia rice production is a key challenge that should be addressed seriously

thank you

Linking Climate Change Adaptation Options in Agriculture in the Mekong River Delta to Vietnam Sustainable Development

Nguyen Thi Hien Thuan

Sub- Institute of HydroMeteorology and Environment of South Vietnam

Manila, September - 2008

Outline

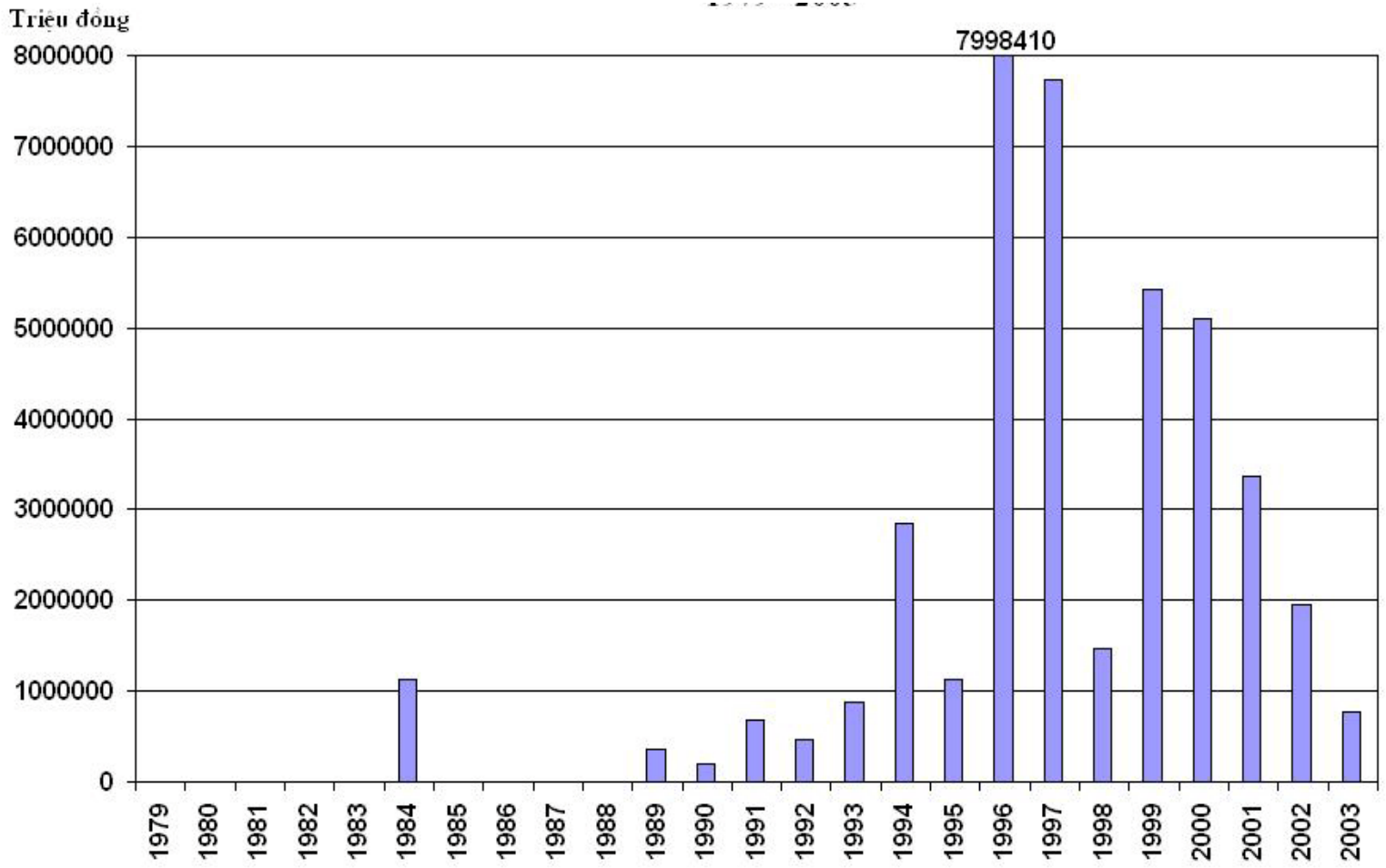
- Introduction
- Climate Change in Vietnam
- Agriculture in the Mekong River Delta – Rice production
- Research on Climate Change Adaptation
- Climate Change and Sustainable Development
- Linking Climate Change and Sustainable Development

Introduction

- Vietnam is located in the southeastern most edge of Indochina peninsula.
- >330,000 km^2, 3260km coastline
- Population: ~ 83 mil, of which about 70% live in rural areas and earn living by rice farming.
- Economic development: GDP increase of 7.4%/year.
- Remarkable poverty reduction: 58% in 1993 to 18% in 2006.
- Heavily depends on natural resources

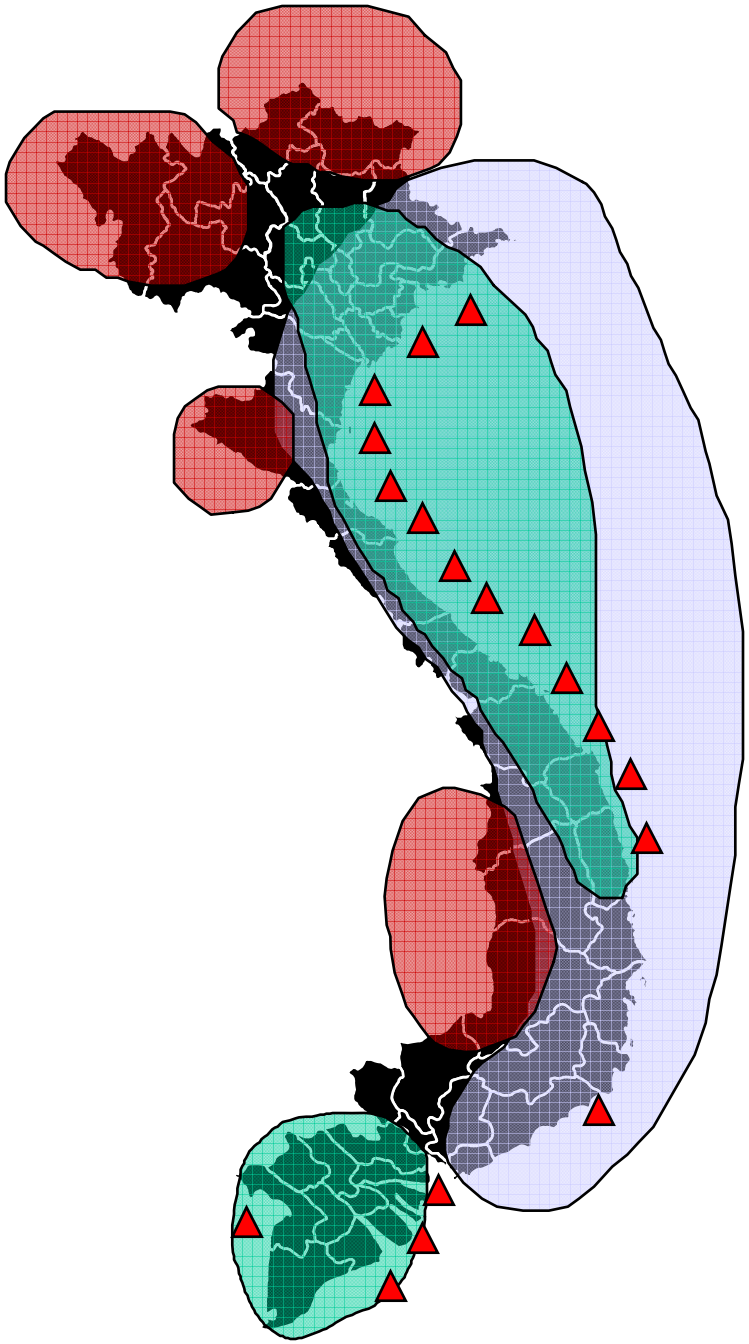
Climate & Natural disasters:

- Tropical monsoon + topography makes VN one of the most disaster prone countries
- Long coastline with low-lying river deltas - The impacts of climate change are very serious.
- Natural hazards include: tropical storms (typhoons), floods, drought, seawater intrusions, landslides and forest fires.



Nguồn số liệu: TT Quản lý và Giảm nhẹ thiên tai, Cục PCLBQLĐĐ, Bộ NN&PTNT

Economic loss by natural disasters (in VND)



Natural Disasters in Vietnam

River Flooding

Flash floods

Typhoons

Storm Surges

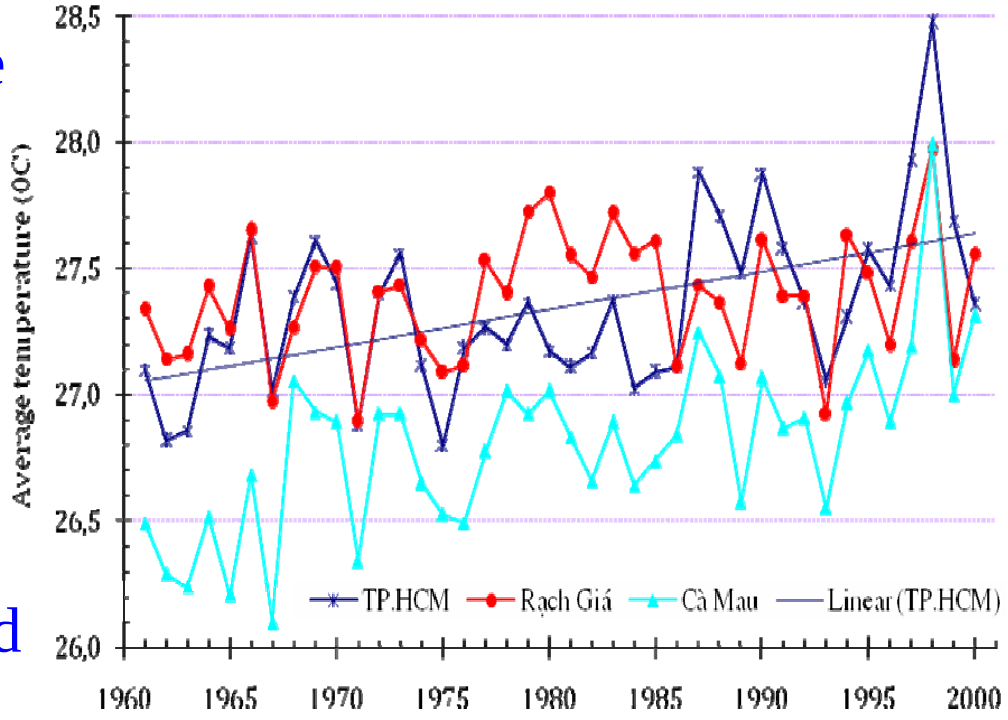
Not on map:

- Droughts
- Salt water intrusion
- Forest fire

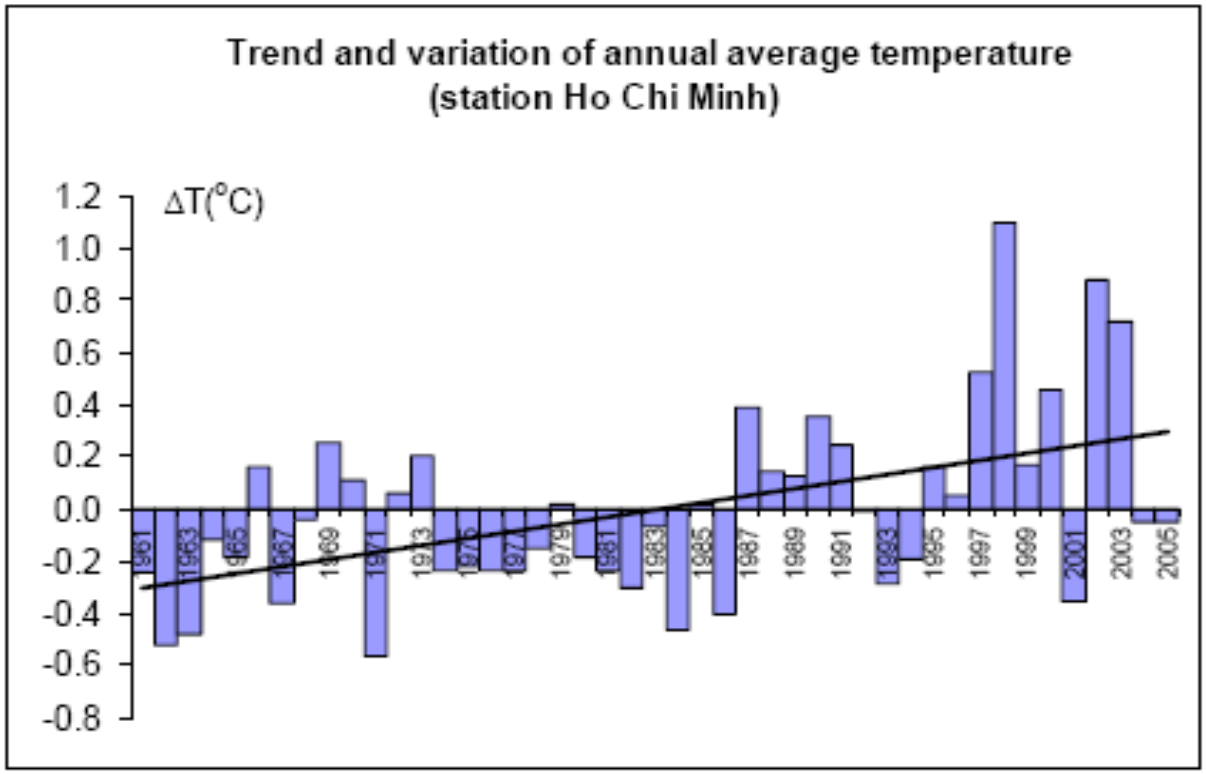
Synthesis on Climate Change Research

- *Current state of climate change*

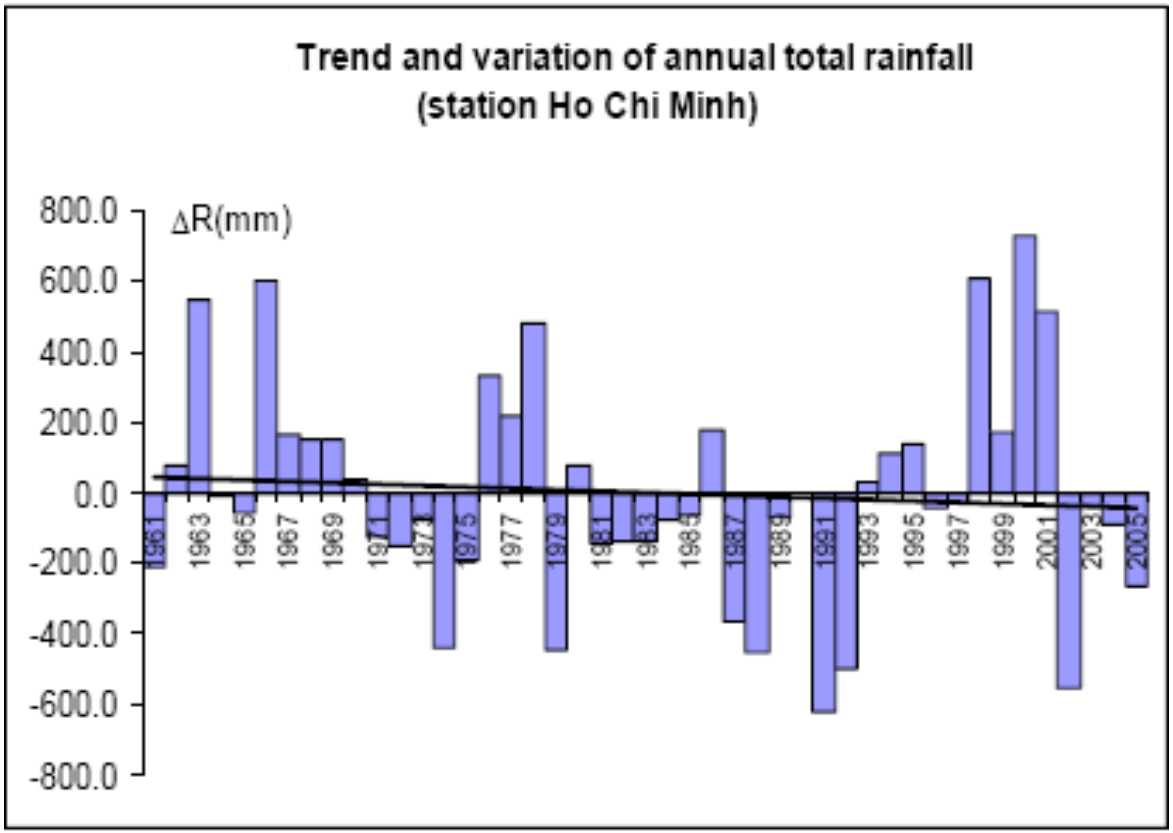
- Increase of 0.1°C/decade annually, in summer months, 0.1 – 0.3°C/decade, average: 0.7°C/50 years
- This trend appears not only in urban industrialized areas, but also in rural and mounted areas



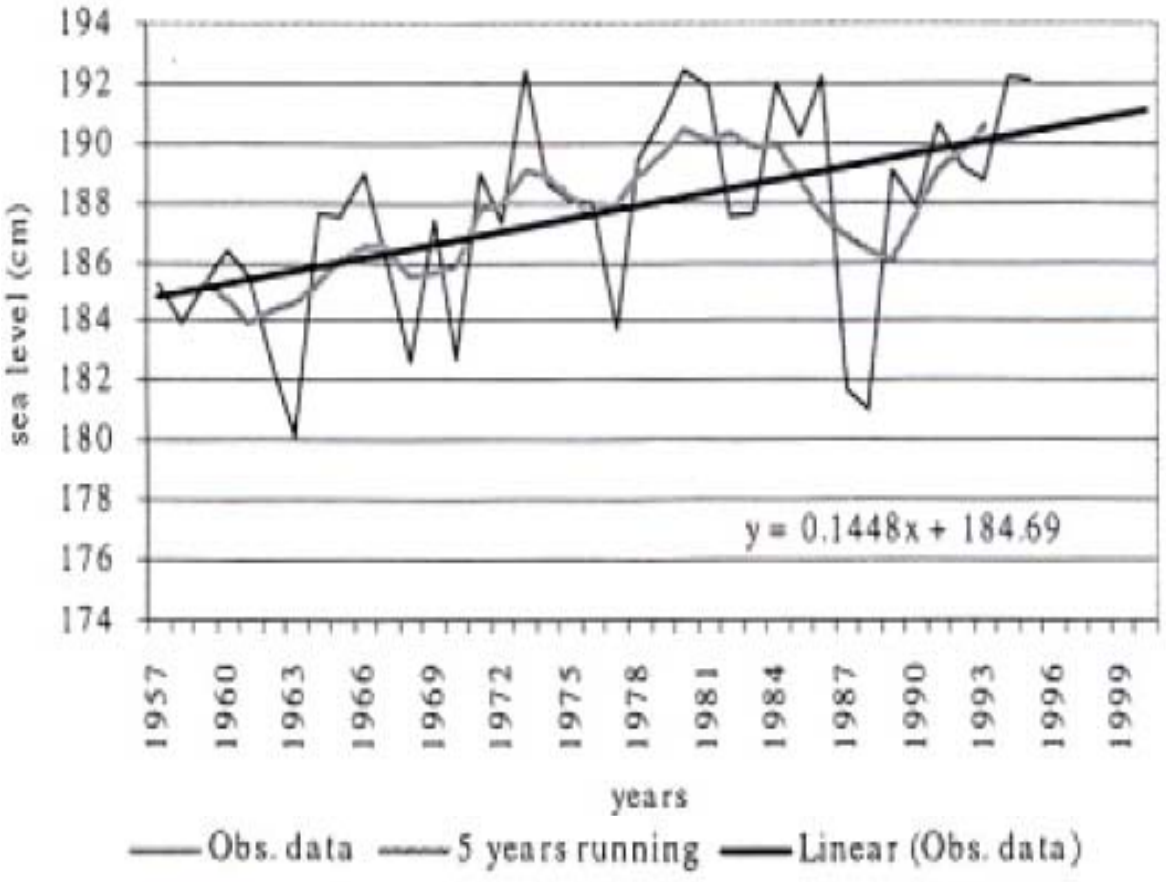
Temperature trend



Rainfall variation



Sea level rise: 20 cm /50 years



Mean Sea level at Hon Dau Station, Vietnam (Lien, 2002)

Adverse climate phenomena

- Tropical storms: higher intensity typhoons affecting Vietnam; tracks move southward.
- Water related hazards: severe floods and droughts happen almost every years
- El Nino/La Nina: stronger effects (historical drought in El Nino 1997-1998)

- ***Future climate change scenarios***

FACTORS	2050	2100
Temperature (^{0}C)	2	3
Sea level rise (cm)	40	100

Source: IMHEN, 2007

- *Impacts of Climate Change & Adaptations*

Major vulnerable sectors (Initial National Communications) include:

Water resources;
Agriculture;
Coastal zone;
Forestry and land use*;*
Energy and transport;
Aquaculture;
Human health.

Climate change impacts on water resources

Impacts:

- Less water in dry season, more water (flood, inundation) in wet season.
- Irrigation/drainage system are affected
- Water availability for different purposes in low-flow season (quantity and quality)

Climate change impacts on water resources

Adaptation measures:

- Building reservoirs to store flood/rain water to mitigate losses caused by floods; regulate water during low-flow season. Upgrading drainage system;
- Upgrading existing sea and river-mouth dykes, and building new sea dykes;
- Redistributing residential areas to avoid the effects of sea level rise (especially in coastal areas);
- Use water scientifically and effectively (during low-flow season).
- Improving seasonal, inter-annual predictions of water sources for planning rational and safe use of surface water sources.

Climate change impacts on Agriculture

Impacts:

- More drought, flood, and higher potential evapotranspiration would adversely affect agriculture yields and productivity
- The length of growing period will increase along with the increase in the annual average temperature and average minimum temperature
- The nation's fertile agricultural lands, located in river basins and dependent on irrigation, are highly vulnerable to fluctuations in water levels,
- Sea level rise would cause flood and inundation – less agricultural lands (most of areas is in major low low-lying of the Red River and Mekong River deltas and coastal areas).

Climate change impacts on Agriculture

Adaptation measures:

- Re-structure the Agriculture production plan and cropping patterns;
- Adjusting cropping calendars, crop varieties, cropping patterns, taking climate change into consideration. For example, adjusting the calendar for short season such as rice, maize, sweet potato, soybean, crops and others may allow more crops per year, due to the extension of the growing season;
- Using irrigation water more efficiently;
- Developing new crop varieties that can withstand severe environmental conditions (either drought or flood);
- Development of farming systems and techniques that are appropriate to climate change.

Climate change impacts on coastal zone

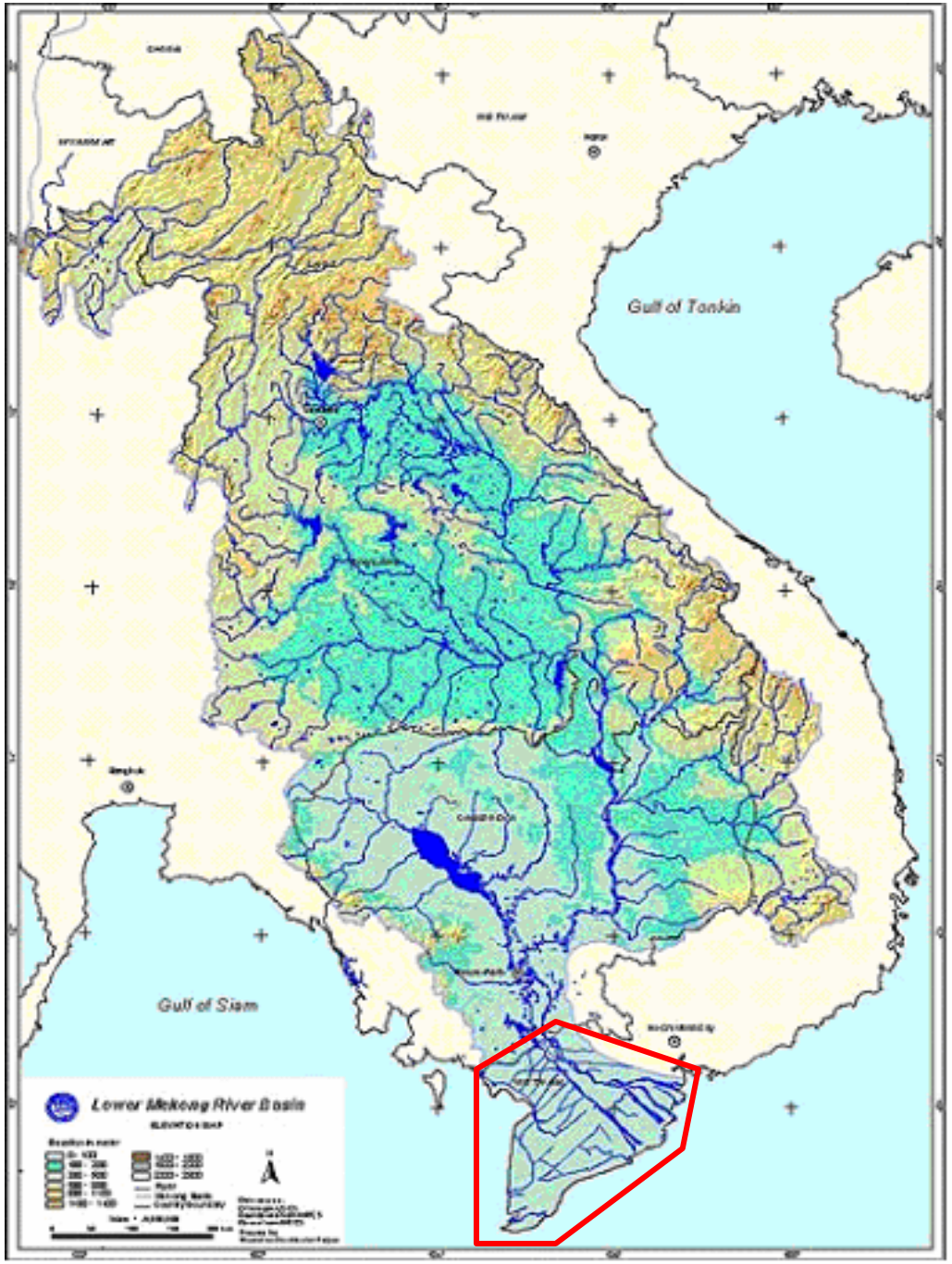
Impacts:

- Sea level rise would cause inundation – less place for living, mangrove forests
- Sea level rise would affect the wet land in coastal zone.
- The coastal population would be affected by annual flood and inundation, especially in the Mekong River Delta.
- Storm surges, waves would be stronger, threaten structures in the coastal zone and low lands.

Climate change impacts on coastal zone

Adaptation measures

- Implement protection measures, effectively response to sea level rise: maintaining and improving existing dykes, strengthening coastal management (salinity intrusion, drainage system)
- To build “adaptive” infrastructures and transfer to suitable farming techniques.
- Resettlement, moving houses, and infrastructures from threatened areas.



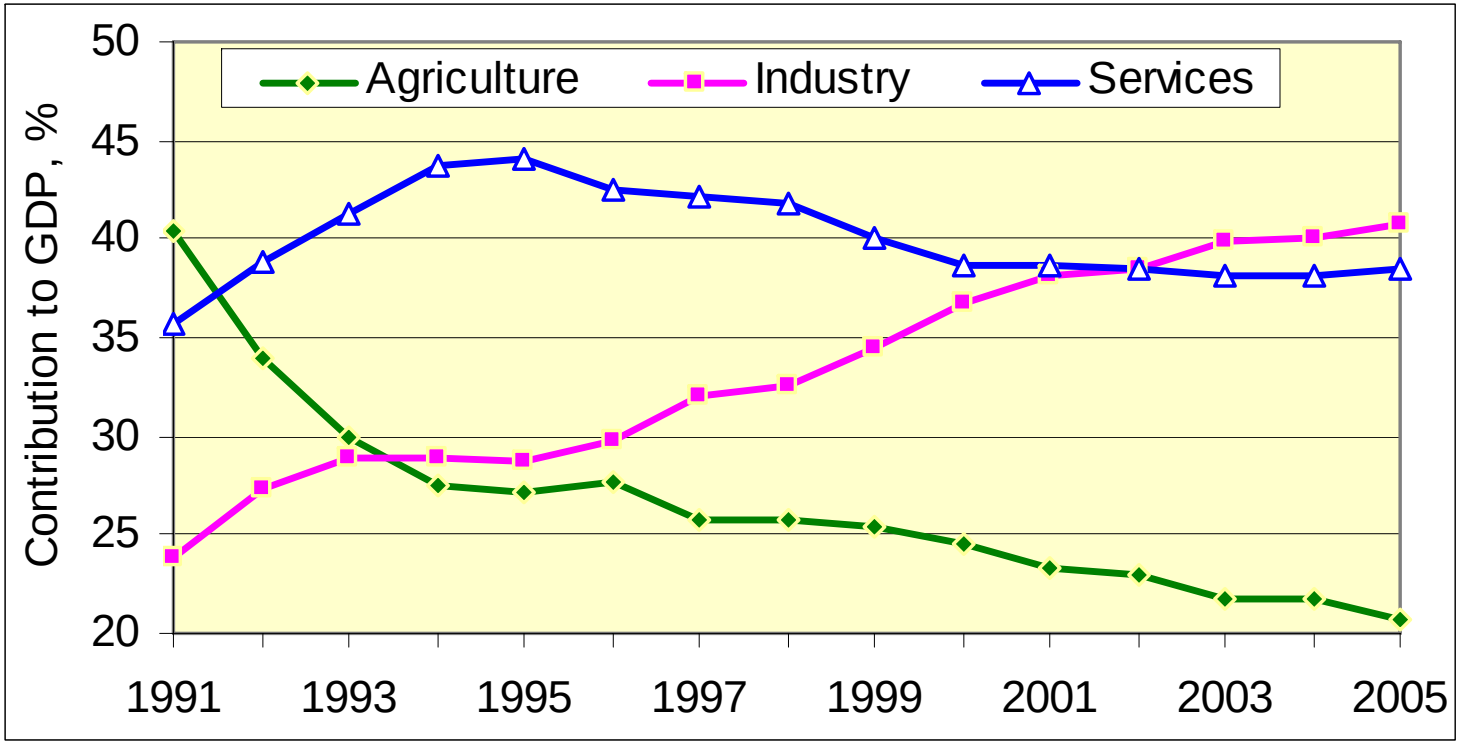
Mekong Delta

- **4 mil. ha most downstream of MR Basin (12% VN land area)**
- **18 million inhabitants (22% VN population)**
- **Contribution to the country:**
  - **> 50% rice production**
  - **> 80% fruit production**
  - **> 60% fish production**
  - **27% GDP**
- **3.21 million ha agricultural land**
  - **1.85 mil. ha for rice**
  - **0.22 mil. ha for fruit trees**
  - **0.22 mil. ha for annual industrial crops**
  - **0.63 mil. ha for aquaculture**
  - **0.39 mil. ha for forestry**

(Source: Tran T. Be, 2007)

Vietnam GDP structure

(Source: Tran T. Be, 2007)



Mekong Delta GDP structure

GDP %	1995	2000	2004
Agriculture – Fishery – Forestry	60.80	52.79	47.81
Industry – Construction	14.50	17.99	21.98
Services – Trade	24.70	29.22	30.21

Rice production in Mekong Delta

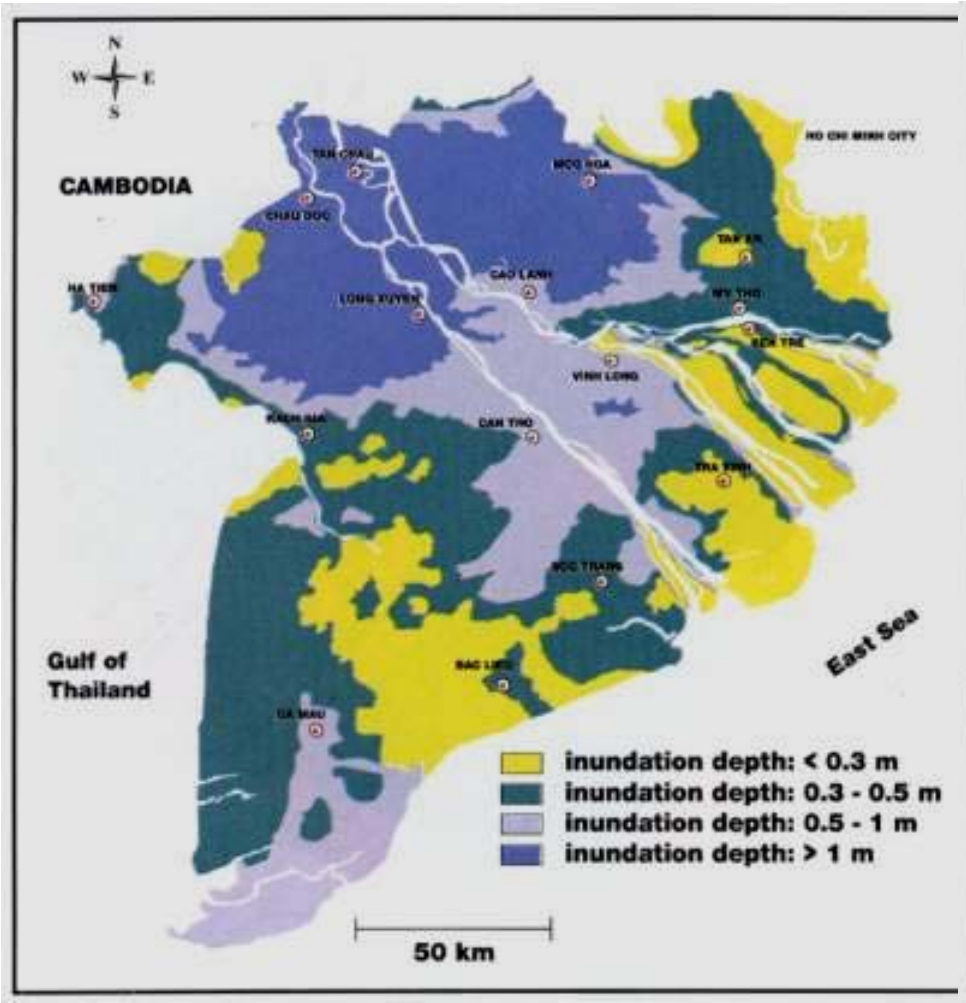
Paddy	1995	2000	2004
Area, mil. ha	3.191	3.946	3.813
Yield, Tons/ha	4.02	4.23	4.87
Production, mil. tons	12.832	16.703	18.569

Rainfall 1600mm 90% in rainy season (May-Dec)

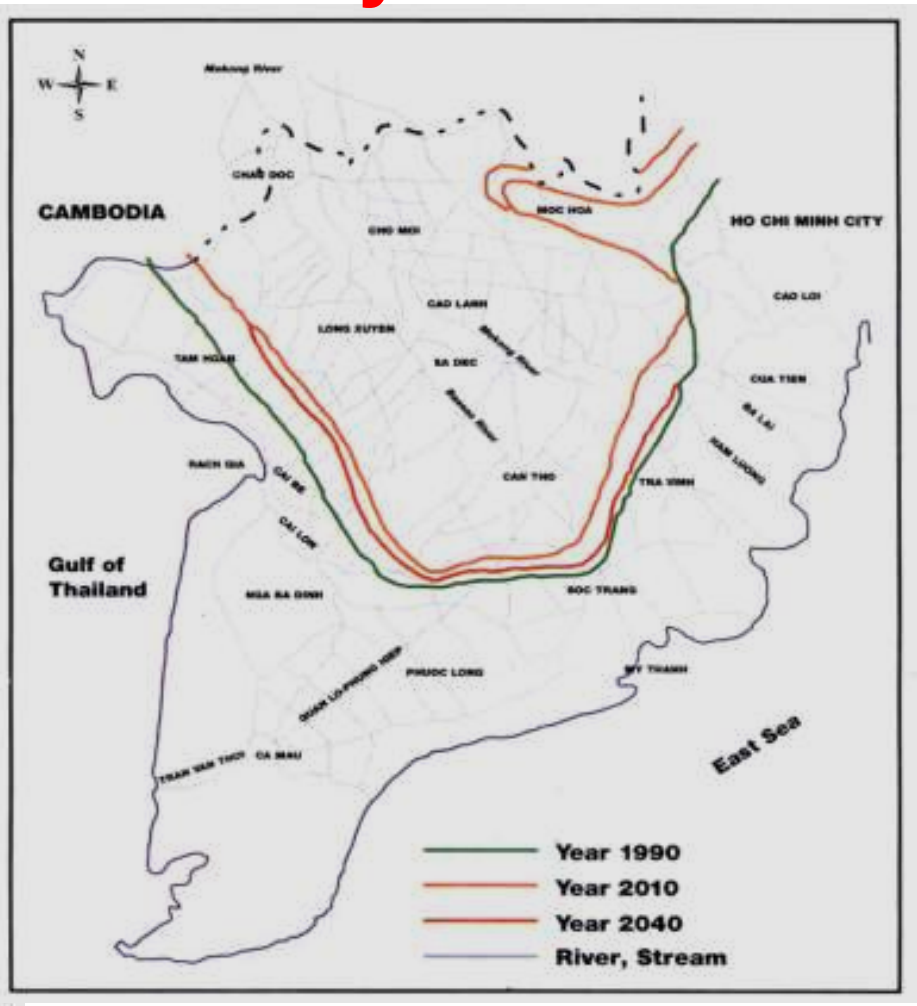
Mekong river

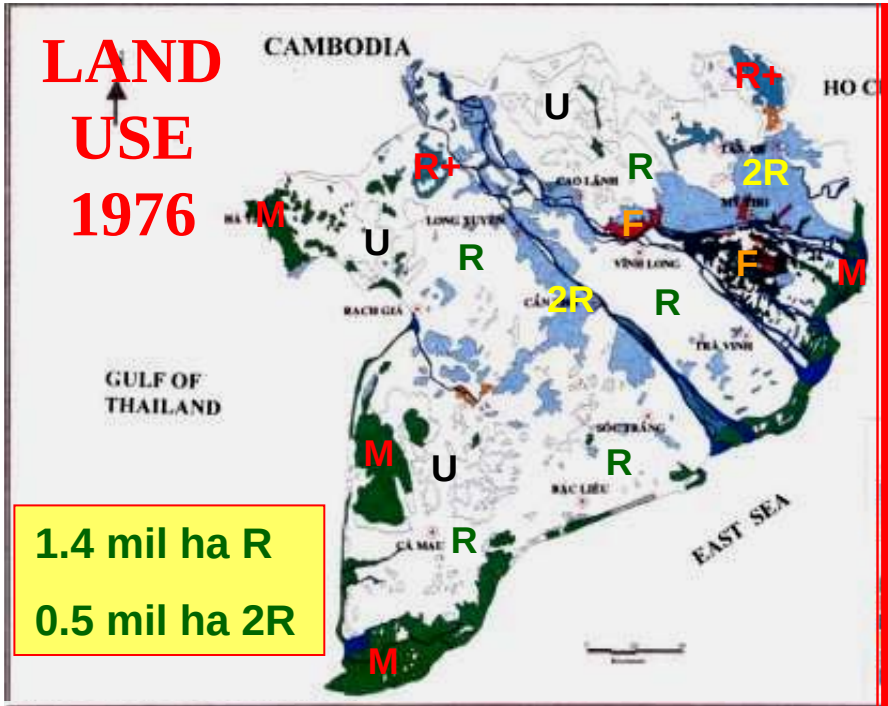
wet season 40,000m³/s dry season 1,800m³/s

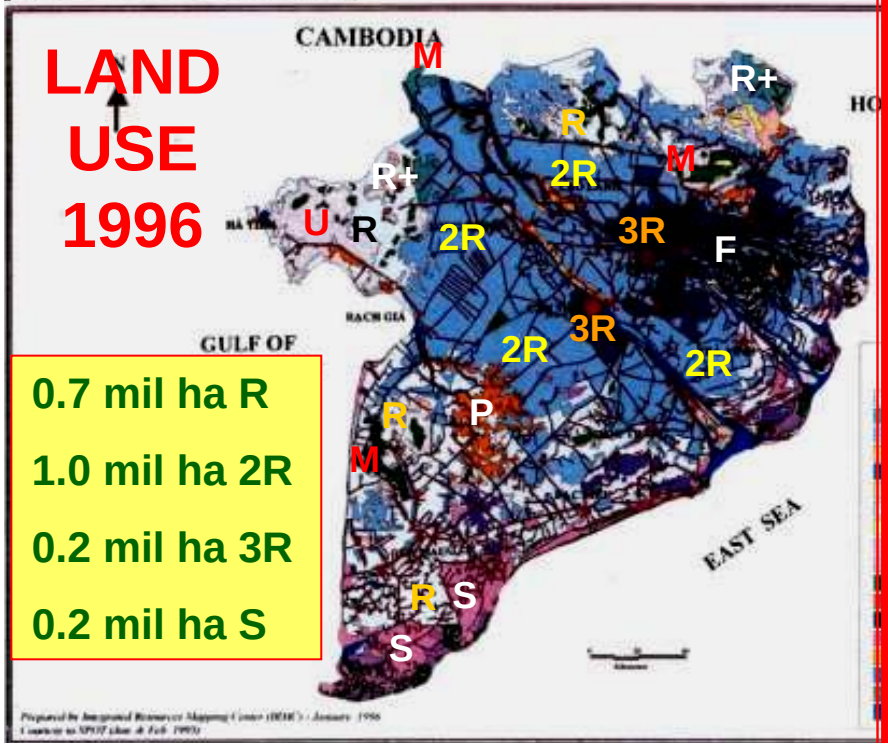
Flood

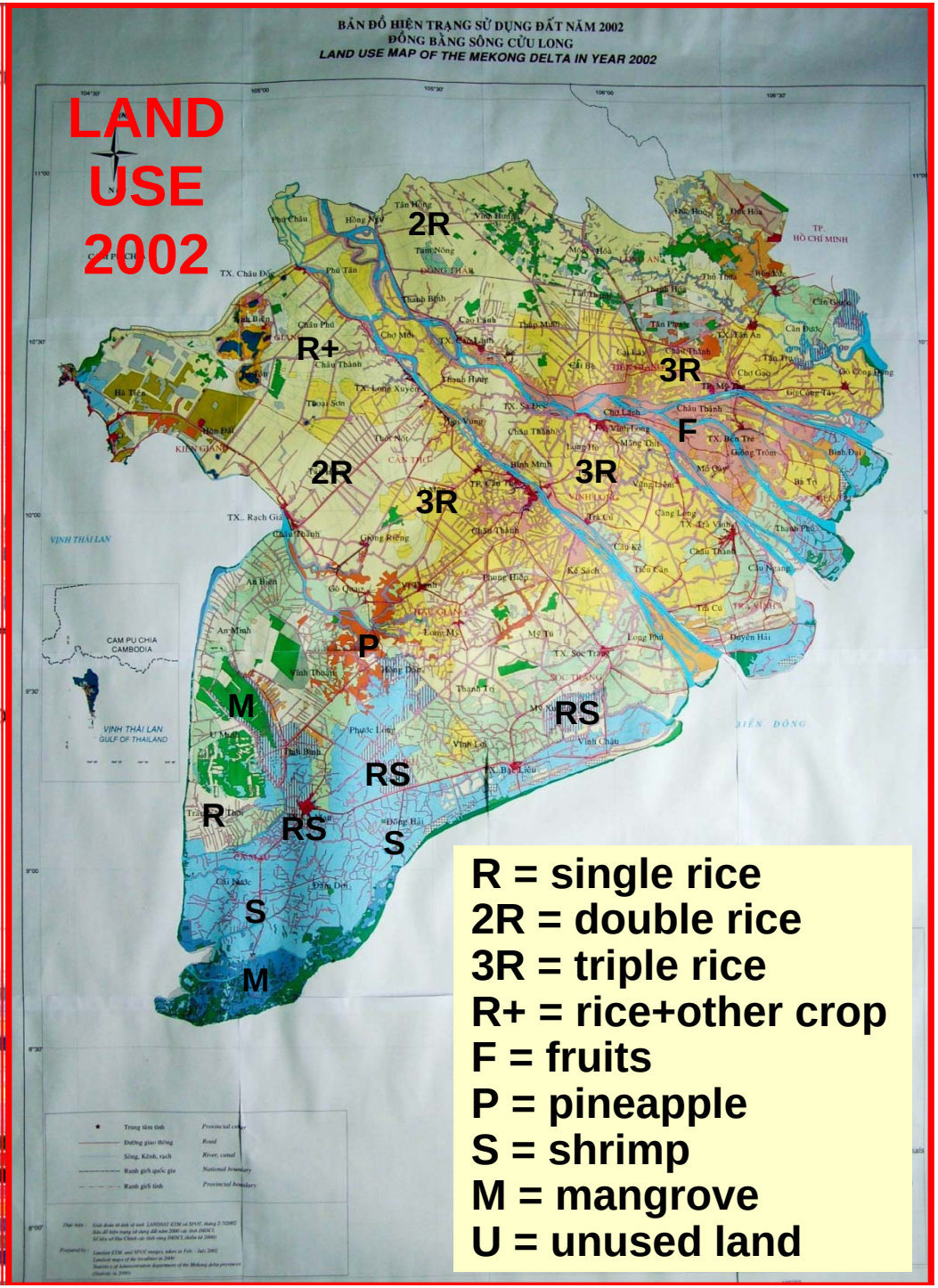


Salinity intrusion




LAND USE 1976
CAMBODIA
GULF OF THAILAND
EAST SEA
1.4 mil ha R
0.5 mil ha 2R


LAND USE 1996
CAMBODIA
GULF OF
EAST SEA
0.7 mil ha R
1.0 mil ha 2R
0.2 mil ha 3R
0.2 mil ha S


BẢN ĐỒ HIỆN TRẠNG SỬ DỤNG ĐẤT NĂM 2002
ĐỒNG BẰNG SÔNG CỬU LONG
LAND USE MAP OF THE MEKONG DELTA IN YEAR 2002
LAND USE 2002
R = single rice
2R = double rice
3R = triple rice
R+ = rice+other crop
F = fruits
P = pineapple
S = shrimp
M = mangrove
U = unused land

Research on Climate change

1994: Viet Nam Coastal Zone Vulnerability Assessment project (1994–1996)

Following years:

- Identifying/analyzing climate change in different geographical regions (temperature rising trend, change in rainfall patterns, the abnormal behaviour of tropical storms,...)
- Using climate models for assessing climate change and climate scenarios
- Application of climate forecast/information in related sectors (agriculture, water resources, ...)

Research on Climate change

More studies on climate variability and its impacts (El Nino/La Nina) on agriculture, water resources, forestry,...

Adaptation strategies to deal with climate variability have been proposed (rice planting scheme, crop restructuring, water utilization...)

Studies, development and assessment on climate change adaptation measures were conducted within climate change project, 1996 – present

Sustainable Development

- Great concern has been put on poverty reduction and hunger elimination (Millennium Development Goals 1).

-Sustainable development is to reduce poverty, to protect environment, to preserve natural resources, to raise people living standard.

- Viet Nam has adopted or revised a number of laws, decrees, and strategies to integrate the principles of sustainable development into country policies and programs.

Sustainable Development

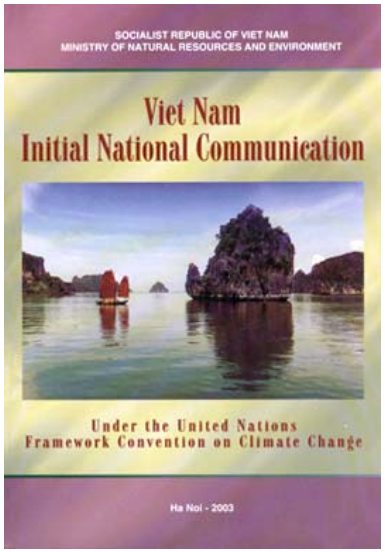
- Environmental Protection Law in 1993.
- Strategic Socio-Economic Development 2001 – 2010 (SSED, 2001);
- Vietnam Development Goals (MDG/VDG, 2001);
- Strategy and Action Plan for Disaster Mitigation and Management in Viet Nam 2001-2020.
- Comprehensive Poverty Reduction and Growth Strategies (CPRGS, 2003);
- National Strategy for Environmental Protection until 2010 and vision toward 2020 (NSEP, 2003);
- Strategic orientation for sustainable development in Vietnam (Agenda 21 Vietnam, 2004);
- Five-year plan for natural resources and environment 2006-2010
- 5-year Plan for the Agricultural and Rural Development 2006 -2010 (2004)

Climate change & **Sustainable Development**

- Viet Nam ratified the UNFCCC in 1994 and the Kyoto Protocol in 2002.
- The Ministry of Natural Resources and Environment (MONRE) has been assigned to be the National Focal Agency for implementing the UNFCCC and KP and is the government managing institution for all climate change activities.

Climate change & Sustainable Development

- Vietnam Initial National Communication to the UNFCCC (INC, 2003): assessment of potential impacts of climate change on major economic activities, overview of key vulnerable sectors and potential adaptation measures for water resources, agriculture, coastal zone, forestry, energy and transport, aquaculture, and human health.
- Preparation for Second National Communication (2010)



Linking Climate Change Adaptation and Sustainable Development

- Until recently, most Vietnam national polices, programs and development plans focus on poverty reduction and environment protection.
- With climate related issues, more attention has been put on natural disasters, climate change mitigation rather than climate change adaptation

Linking Climate Change Adaptation and Sustainable Development

- Existing policies, programs & plans: not directly mentioned about climate change adaptation (VN Agenda 21, 5 year Socio-economic Dev Plan, ...)
- In overall, inadequate attention to climate change adaptation until recent release of the Four Assessment Report (IPCC, 2007) and the World Bank Report on the consequences of climate change and sea level rise to the Asian countries.

Key points of concern

- Weak national capacity for comprehensive quantitative & qualitative Vulnerability and Adaptation (V&A);
- Lack of comprehensive implementation plans for adaptation;
- Limited staff capacity, particularly the analytical, planning, monitoring and evaluation skills for assessing trade offs between development decisions;
- Poor data on adaptation options and lack of mechanisms for information sharing and management across sectors;
- Limited awareness of stakeholders on climate change adaptation.

Future direction

- In Dec 2007, MONRE has been assigned to set up the National Target Program to cope with Climate change and Sea Level Rise (NTP).
- Strategic objectives of the NTP are to ***enhance the country's capacity and efficiency in response to climate change in specific periods*** to ensure sustainable development of Viet Nam

Future direction

- The NTP will be able to meet the country's immediate and long-term needs to respond to climate change;
- Climate change is related to agencies and departments of all levels. Therefore, the NTP and climate change elements should be mainstreamed in strategies, plans, and development planning of all levels (VN Agenda 21,National Strategy on Socio-economic Development Strategies, General Plans of Sectoral and Local Development .

Future direction

Ministry of Agriculture and Rural Development:

- Setting up an action plan for adaptation to climate change for the period of 2008-2020.
- Integrated program for agriculture development and water resource management in the Mekong river Delta to cope with climate change and sea level rise is on consultation.

Conclusions

- Climate change is happening in VN. Vietnam is one of the five countries most affected by climate change & sea level rise
- Agriculture is a sector and Mekong river Delta is an area - most threatened by climate change & sea level rise
- In the past, focus was on poverty reduction and environment protection.
- Climate change related issues are mostly on natural disasters, climate change mitigation rather than climate change adaptation

Conclusions

- National Target Program (NTP) to respond to climate change & sea level rise is on the way –

  is one of the Government's basic orientations and strategies to respond to climate change and is incorporated as part of national, sectoral and local socioeconomic development strategies and international commitments towards sustainable development.


Thank you for your attention!
7 2 2004