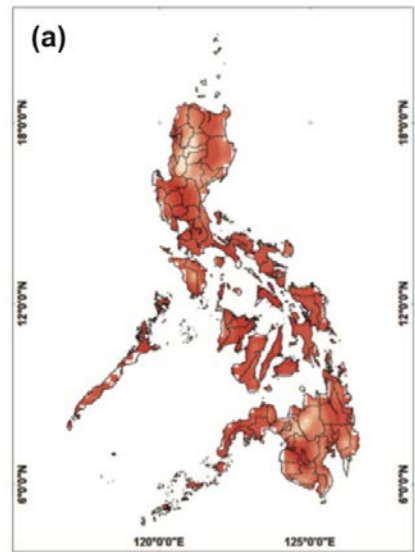
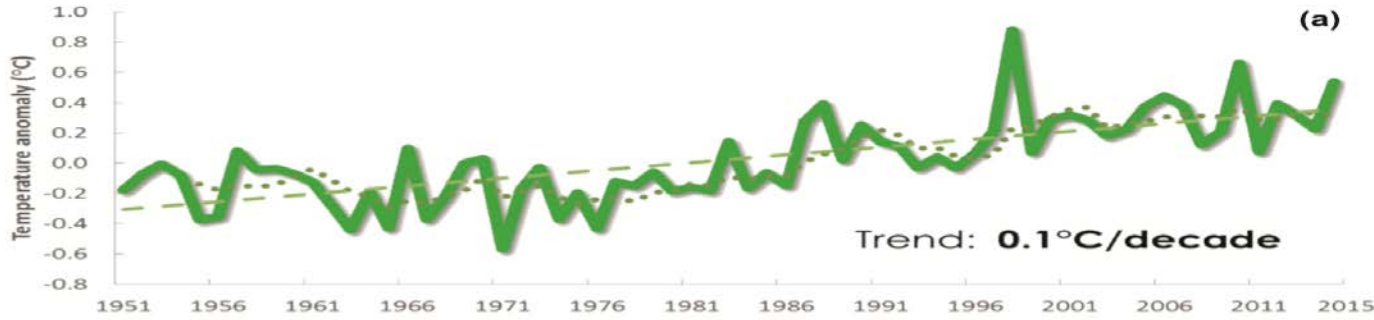


# Climate Change Policies in the Philippines and the Role of UPLB Research Community

**Damasa B. Magcale-Macandog**

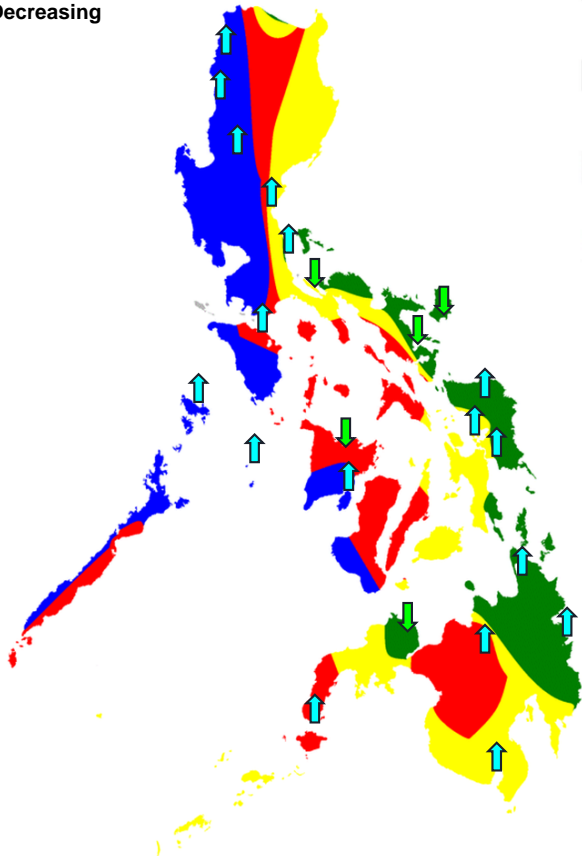
**Institute of Biological Sciences, University of the  
Philippines- Los Baños**

# Country Profile: Philippines (Temperature)



## Hot Days

↑ - Significantly Increasing  
↓ - Significantly Decreasing



**Fig 1:** Trends in the frequency of days with maximum temperature above the 1971-2000 mean 99<sup>th</sup> percentile.

## Cold Nights

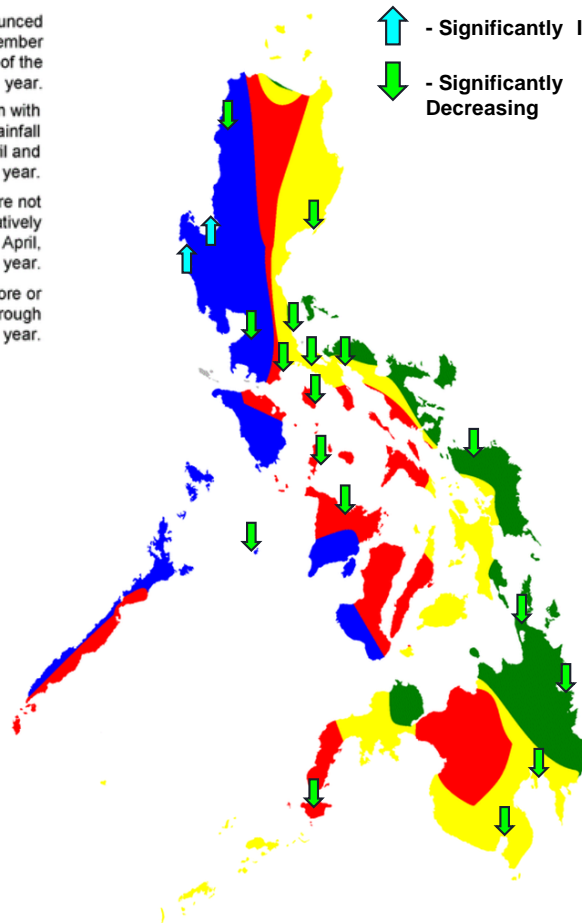
↑ - Significantly Increasing  
↓ - Significantly Decreasing

**Type I** – Two pronounced seasons: Dry from November to April, wet during rest of the year.

**Type II** – No dry season with a very pronounced rainfall from November to April and wet during rest of the year.

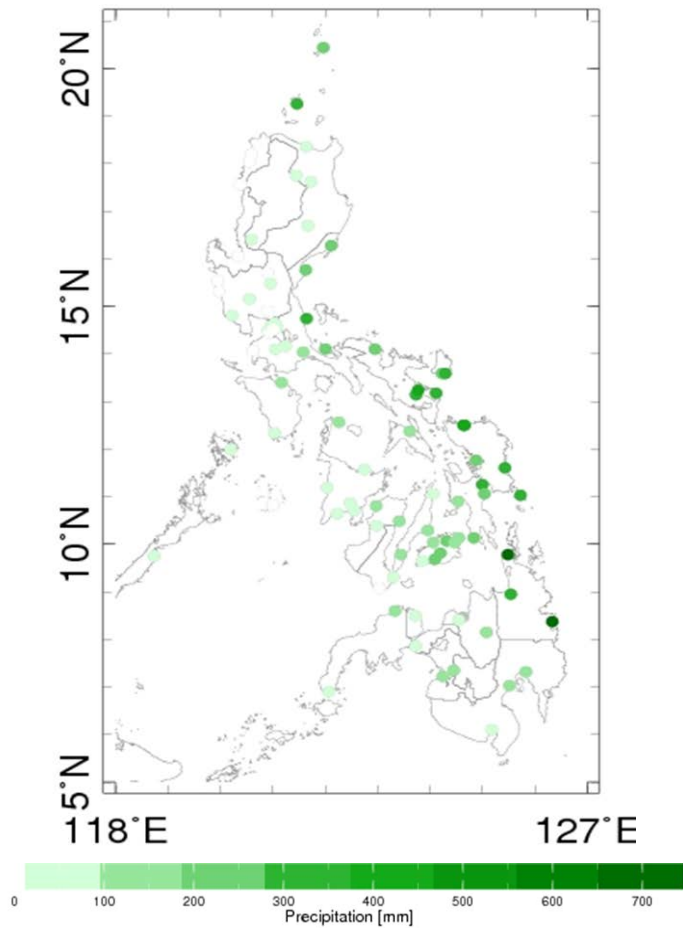
**Type III** – Seasons are not very pronounced; relatively dry from November to April, wet during rest of the year.

**Type IV** – Rainfall is more or less evenly distributed through the year.

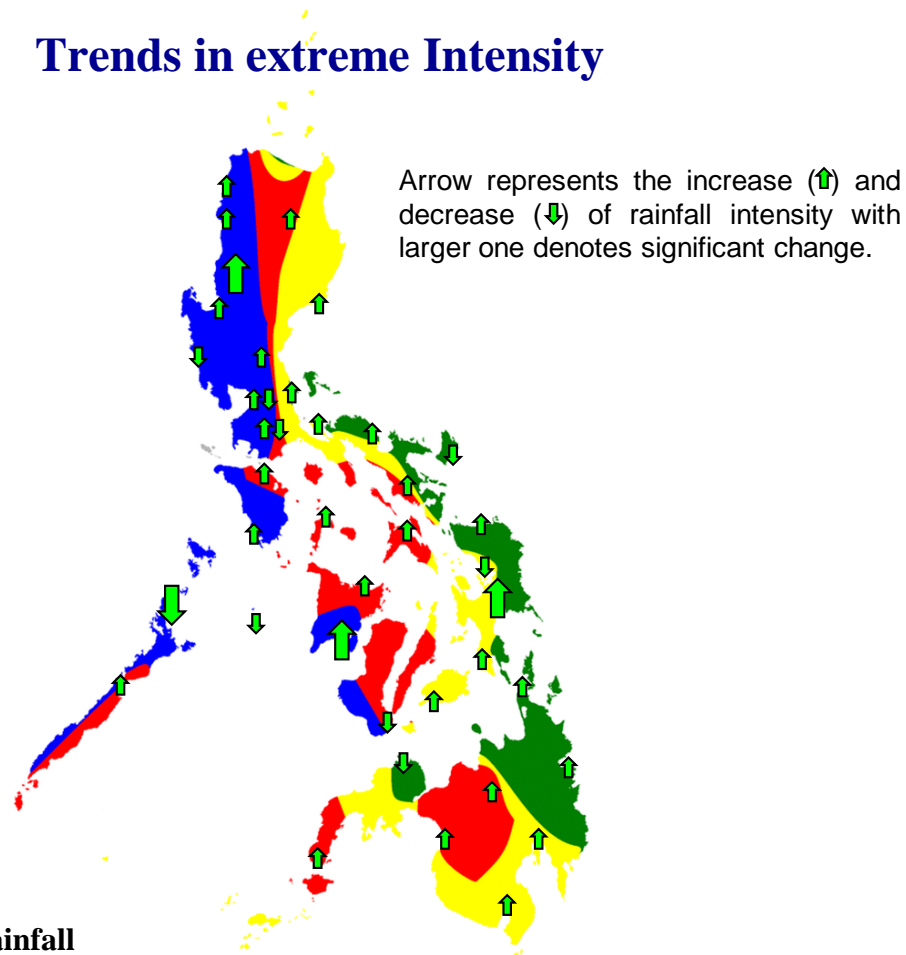


**Fig 2:** Trends in the frequency of days with minimum temperature below the 1971-2000 mean 1<sup>st</sup> percentile.

## Trends in extreme daily rainfall



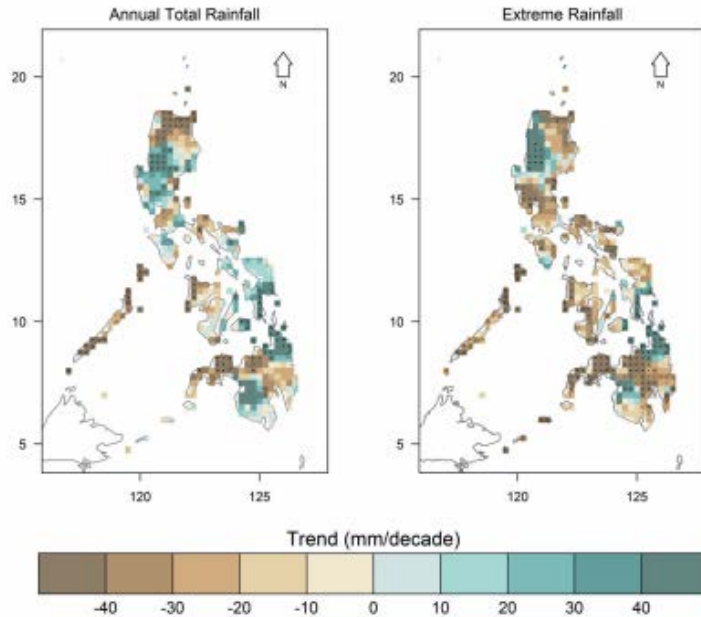
## Trends in extreme Intensity



### Rainfall

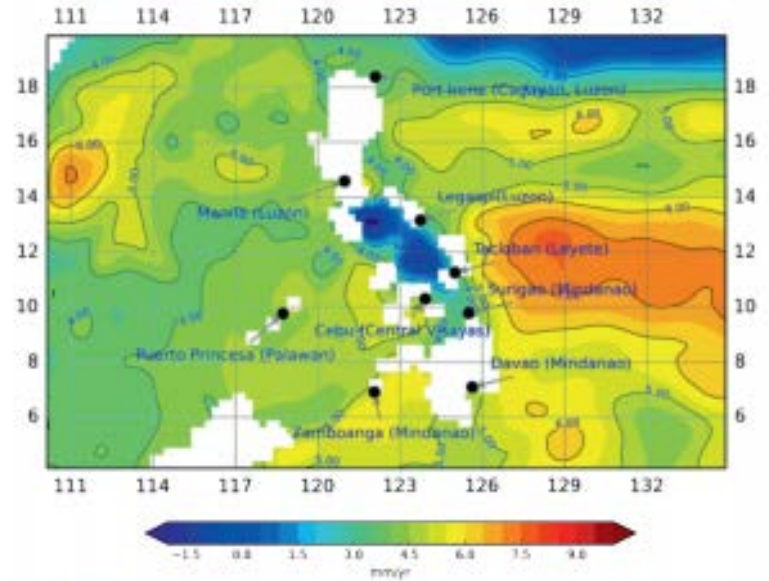
Increasing trend in annual and seasonal rainfall were observed many parts of the country

# Country Profile: Philippines

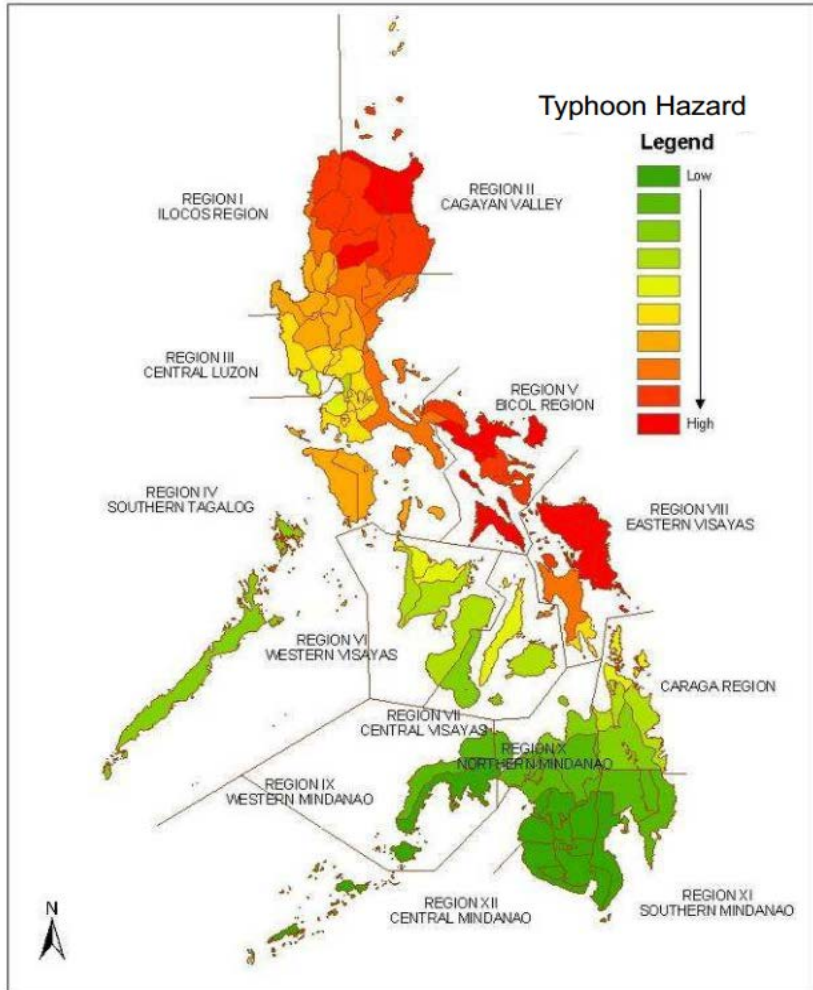


## Changes in sea level

Based on the satellite observation taken from 1993 to 2015, the sea level has risen by as much as 5.7-7.0 mm/year over the Philippine sea.

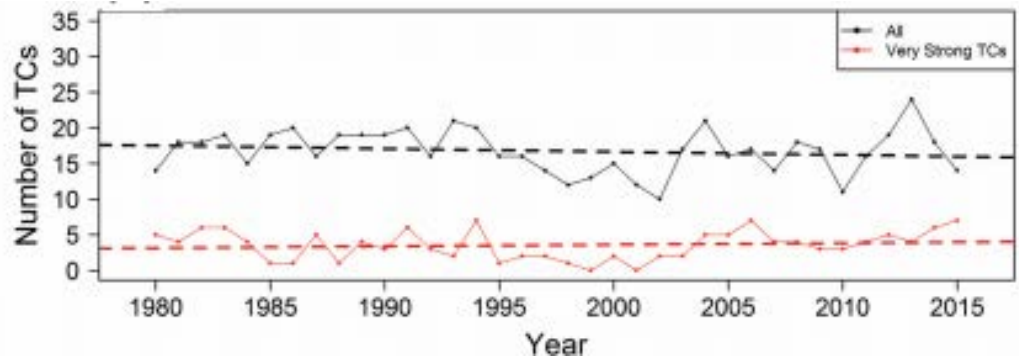


**Figure 9.** Sea level changes in the Philippines region from 1993-2015. Taken from [9].




## Tropical cyclones

In the past 65 years (1951-2015), a slight decrease in the number of tropical cyclones (TCs) and a minimal increase in the frequency of very strong TCs (exceeding 170 kph) were observed.



Pacheco, Benito & A. Rosaria, Nicetos & Aquino, Ronwaldo Emmanuel & Garciano, Lessandro. (2007). Historical review of wind speed maps in the Philippines: toward further development and use as wind hazard maps under the PICE-DMAPS program.

# The Philippine Climate Legislation

Annual loss from natural disasters (average percent of GDP) 

4.609%

GHG Emissions (MtCO<sub>2</sub>e, including LULUCF), 2013

111.29

Rank as emitter 

Below Top 50

Main groups

G77

Paris Agreement ratification status

Ratified (23/03/2017)

Federative/Unitary

Unitary

Number of climate laws

6

Number of climate policies

10

Number of climate litigation cases

2

## *The Goals of Philippine environmental policies.*

(a) To create, develop, maintain and improve conditions under which man and nature can thrive in productive and enjoyable harmony with each other.

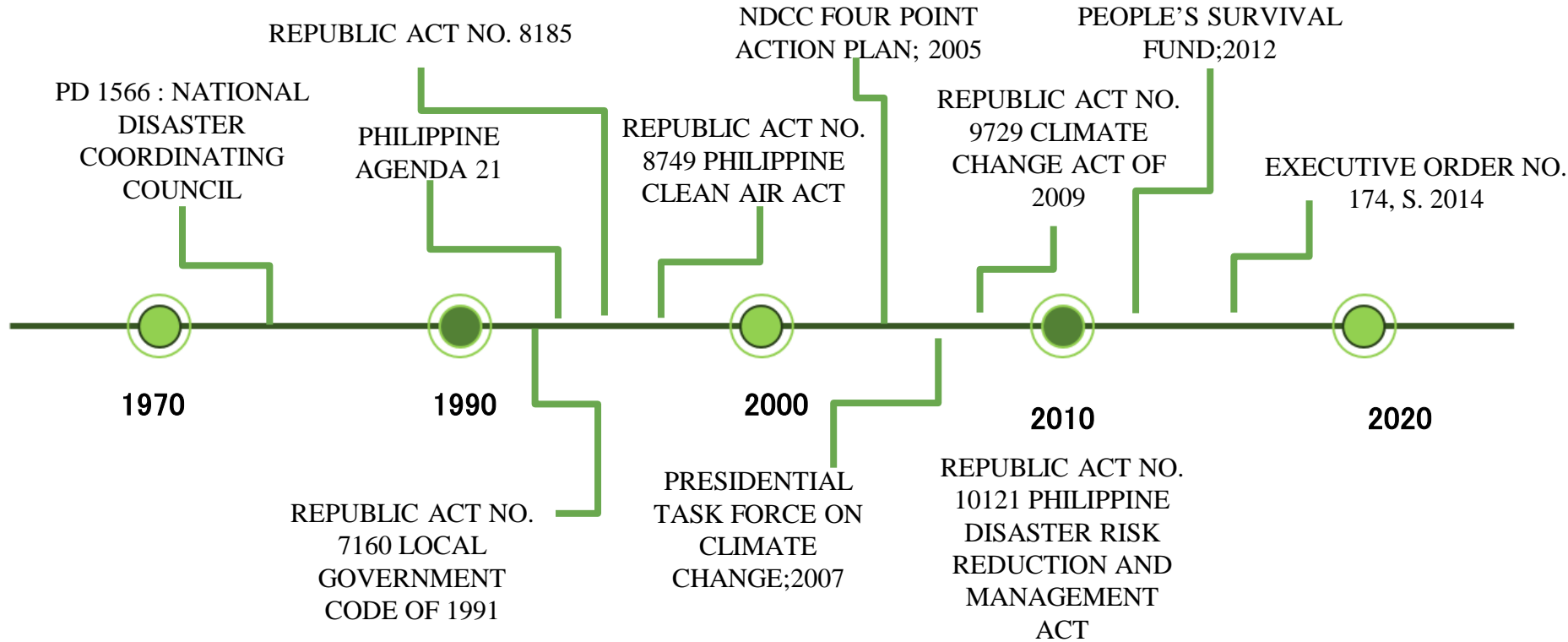
(b) Assure the people of a safe, decent, healthful, productive and aesthetic environment.

(c) Encourage the widest exploitation of the environment without degrading it, or endangering human life, health and safety or creating conditions adverse to agriculture, commerce and industry.

(d) Preserve important historic and cultural aspects of the Philippine heritage

(e) Attain a rational and orderly balance between population and resource use.

# Development of Climate change related policies





1978

*PD 1566 : NATIONAL DISASTER COORDINATING  
COUNCIL*

- President Ferdinand Marcos passed the PD 1566 (June 11, 1978)

***SALIENT PROVISIONS:***

- strengthened the country's disaster control and capability, and established the national program on community disaster preparedness without any reference to climate change or global warming
- law created the **National Disaster Coordinating Council** ([NDCC](#)) under the Office of Civil Defense (OCD) which was mandated to coordinate the activities on disaster preparedness emergency operations and recovery and rehabilitation, among others.

1991

*REPUBLIC ACT NO. 7160 LOCAL GOVERNMENT CODE OF  
1991*

*SALIENT PROVISIONS:*

**LGUs shall promote the establishment and operation of people's and nongovernmental organizations to become active partners in the pursuit of local autonomy**

1991

## *Mini-hydroelectric Power Incentive Act (RA 7156)*

### **SALIENT PROVISIONS:**

RA 7156 aims to strengthen and enhance the development of the country's indigenous and self-reliant scientific and technological resources and capabilities and their adaptation to the country in order to attain energy self-sufficiency and thereby minimize dependence on outside source of energy supply. To this end, mini-hydroelectric power developers shall be granted the necessary incentives and privileges to provide an environment conducive to the development of the country's hydroelectric power resources to their full potential.

1992

## *PHILIPPINE AGENDA 21*

### *SALIENT PROVISIONS:*

- **the Philippines pledged to pursue sustainable development as embodied in Agenda 21**
- **The global agenda attempted to find the balance between development fueled by the rapid integration of nations into the world economy and the impacts of the process on the environment and society.**



1996

***R.A. 8185. LOCAL GOVERNMENT AMENDMENT  
CODE***

**An act amending section 324 (d) of REPUBLIC ACT  
NO.7160, otherwise known as the local government code  
of 1991**

1997

## *KYOTO* PROTOCOL

- It is an international treaty that committed developed countries to emission reduction targets, commenced negotiations seeking for a more binding resolution.
- It was in 1998 when the Philippines signed the Protocol to the UNFCCC and ratified it in 2003.
- The country's ratification enabled it to participate in the Clean Development Mechanism (CDM).

1999

*REPUBLIC ACT NO. 8749 PHILIPPINE CLEAN AIR ACT*

**SALIENT PROVISIONS:**

- strengthened the country's disaster control and capability, and established the national program on community disaster preparedness without any reference to climate change or global warming
- law created the **National Disaster Coordinating Council (NDCC)** under the Office of Civil Defense (OCD) which was mandated to coordinate the activities on disaster preparedness emergency operations and recovery and rehabilitation, among others.

2007

## *PRESIDENTIAL TASK FORCE ON CLIMATE CHANGE*

- President Gloria Arroyo formed the Philippine Task Force on Climate Change (PTFCC) under AO No. 171 in 2007
- It aimed to conduct a rapid assessment of the impacts of climate change in the Philippines, ensure strict compliance with air emission standards, and combat deforestation and environmental degradation.
- The PTFCC is composed of the DENR which served as the chair of the task force, DOST, DA, and the Department of Interior and Local Government (DILG).



2007

## *R.A. NO. 9367 BIOFUELS ACT OF 2006*

### **SALIENT PROVISIONS:**

The Act introduces mandatory use of biofuels in the fuel mix, as follows: a minimum 5% of bioethanol in the gasoline mix sold and distributed within 2 years; a minimum of 10% within 4 years is required. There is priority for locally produced bioethanol, and only in the case of shortage may it be imported. The Act also requires a minimum of 1% of biodiesel in the diesel mix within 1 year, and a minimum of 2% within 2 years.

**2009**

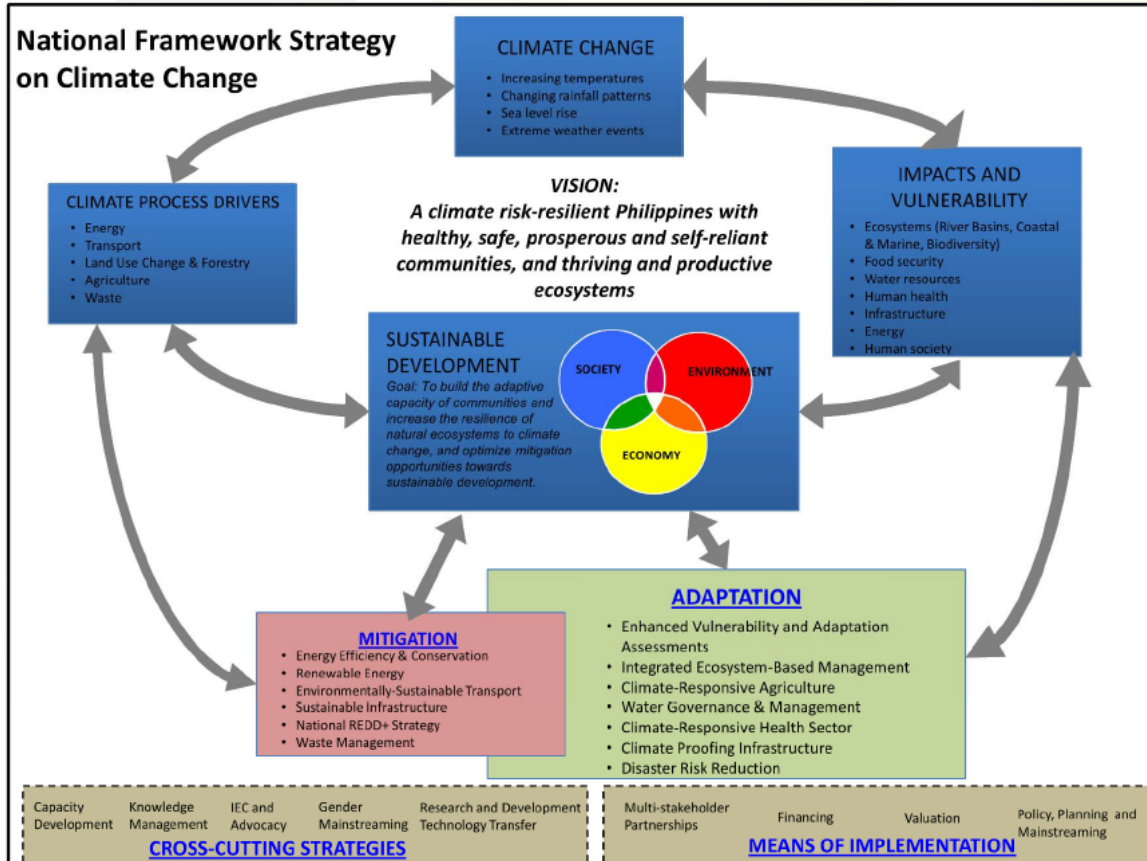
REPUBLIC ACT NO. 9729 CLIMATE CHANGE ACT  
OF 2009

***SALIENT PROVISIONS:***

An act mainstreaming climate change into government policy formulations, establishing the framework strategy and program on climate change, creating for this purpose the climate change commissions, and for other purposes.

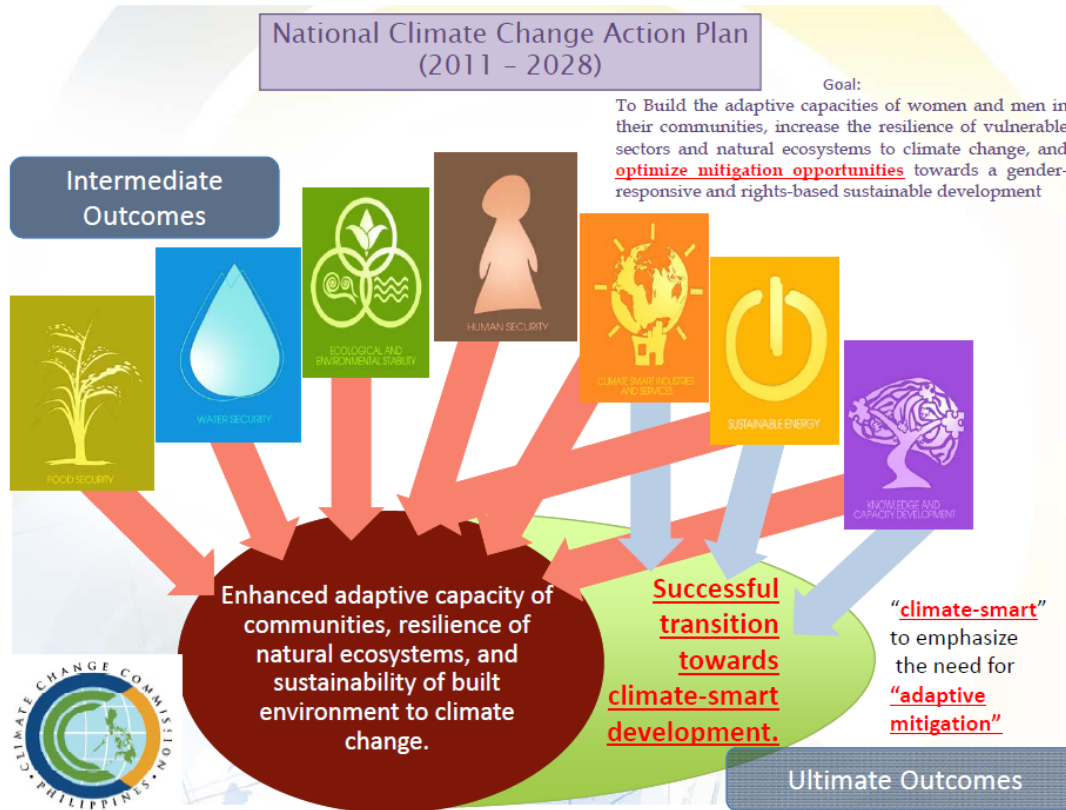
2010

# The formulation of the NFSCC 2010-2022



National framework strategy on climate change (CCC, 2010)

2011



**The National Climate Change Action Plan (CCC, 2011)**

2012

## R.A. 10174. PEOPLE'S SURVIVAL FUND

### *SALIENT PROVISIONS:*

An act establishing survival fund to provide long-term finance streams to enable the government to effectively address the problem of climate change amending for the purpose republic act no. 9729, otherwise known as the “Climate Change Act of 2009”, and for other purposes.

**2014**

## **R.A. 10639. THE FREE MOBILE DISASTER ALERTS ACT**

- **June, 2014**

### ***SALIENT PROVISIONS:***

mandates the telecommunications service providers (TELCOs) to “send free mobile alerts in the event of natural and man-made disasters and calamities”

**2015**

## **R.A. 10692. THE PAGASA MODERNIZATION ACT**

- **November, 2015**

### ***SALIENT PROVISIONS:***

mandates the DOST-PAGASA to modernize and strengthen its technological operations and delivery of weather-related information services as the national weather agency

**2016**

## **R.A. 10821. THE CHILDREN'S EMERGENCY AND PROTECTION ACT**

- **November, 2015**

### ***SALIENT PROVISIONS:***

- It aims to improve children's care and protection from disasters.
- This law increases the accountability to children in communities as it will document experiences and best practices during emergency responses.



# The Philippine Climate Legislation

## Climate Policies

<p><b>Executive Order No. 174, Institutionalizing Philippine Greenhouse Gas Inventory Management and Reporting System</b></p>	<p>The Philippine Greenhouse Gas Inventory Management and Reporting System was established to institutionalise the GHG inventory management and reporting system in relevant government agencies to enable the country to transition towards a climate-resilient pathway for sustainable development.</p>
<p><b>Executive Orders no. 43 and no. 24 , Cabinet Cluster on Climate Change Adaptation and Mitigation</b></p>	<p>The Order reorganised the Climate Change Adaptation and Mitigation Cluster to focus on the conservation, and protection of the environment and natural resources. It shall take the lead in pursuing measures to adapt to and mitigate the effects of climate change on the Philippine archipelago; and undertake all the necessary preparation for both natural and man-made disasters.</p>
<p><b>National Climate Change Action Plan</b></p>	<p>The National Climate Change Action Plan (NCCAP) assesses the current situation of the country with regard to climate change risk and outlines the NCCAP's agenda for adaptation and mitigation for 2011 to 2028 as a response to the current situation and projected impact. It also prioritises food security, water sufficiency, ecosystem and environmental stability, human security, climate-smart industries and services, sustainable energy, and capacity development as the strategic direction for 2011 to 2028.</p>

# The Philippine Climate Legislation

## Climate Policies

<p><b>Executive Order No. 881, Authorizing the Climate Change Commission to Coordinate Existing Climate Change Initiatives, Reducing Emissions from Deforestation and Forest Degradation</b></p>	<p>This law authorizes the Philippines' Climate Change Commission to include the coordination of actions and plans related to Reducing Emissions from Deforestation and Forest Degradation – Plus (REDD+) within the scope of its activities. It also designates the Department of Environment and Natural Resources (DENR) as the organization primarily responsible for implementing REDD+ plans and programs emanating from the Climate Change Commission.</p>
<p><b>Framework Strategy on Climate Change</b></p>	<p>The National Framework Strategy sketches a clean development path, and serves as a roadmap for national and sub-national development and investment programmes, physical and land use programmes. Acknowledging the Philippines' vulnerability to climate change, the Framework's vision is "to build the adaptive capacity of communities and increase resilience of natural eco-systems to climate change, and optimise mitigation opportunities towards sustainable development".</p>
<p><b>Philippine National REDD-plus Strategy</b></p>	<p>The Philippine National REDD+ Strategy (PNRPS) presents a broad range of strategies and corresponding activities over a 10-year time horizon (2010-2020), and seeks to prepare forestlands managers throughout the country to assume responsibility in implementing REDD+ programmes, research, projects and activities with the support of international, national and local agencies, NGOs and other support groups.</p>

# The Philippine Climate Legislation

<p><b>Philippine Strategy on Climate Change Adaptation</b></p>	<p>The formulation of the Philippine Strategy on Climate Change Adaptation builds on existing institutional processes but gives strong emphasis on collaboration among national agencies, the legislative branch, the academy, business and civil society.</p> <p>Eight technical working groups were organised to tackle needs and concerns in eight major sectors: Agriculture, Biodiversity; Coastal and Marine; Forestry; Water; Health; Energy; and Infrastructure.</p>
<p><b>Administrative Order 110, directing the Institutionalization of the Government Energy Management Program</b></p>	<p>The Order established that the government shall aim to reduce its monthly consumption of electricity and petroleum products by at least 10% for a minimum period of 3 years starting in January 2005.</p> <p>Each government entity is mandated to adopt and implement an electricity efficiency program to reduce electricity consumption by ten 10% of its average monthly consumption</p>
<p><b>Executive Order 472, institutionalizing the Committee on Fuel conservation and Efficiency in Road Transport</b></p>	<p>The aim is to promote the judicious and efficient use of fuel in the road transport sector through awareness campaigns in major cities and municipalities around the country. A regional, city or municipal chapter was established to provide continuity of the programme in the locality. The local chapter was headed by a representative from the transport association. The programme targets a 10% reduction in fuel consumption.</p>
<p><b>Executive Order 123, institutionalizing the Committee on Power Conservation and Demand Management</b></p>	<p>The major role of CPCDM is to promote power conservation and demand management through an information, education and communication campaign (IEC) in the commercial, industrial, residential and academic sectors.</p>

## Science-Policy Interface

Increasing awareness of the importance of effective interfaces between science and policy has initiated a range of measures from the research community to have a constructive contribution to policy formulation

Such initiative include:

### **Nationwide Operational Assessment of Hazards (Project NOAH) -**

The DOST collaborated with 21 government and private institutions to harness technologies and management services for DRRM activities. Essentially, it is a weather station, temperature, rain, flood, landslide, and typhoon monitoring and warning system all rolled into one website. Project NOAH was the response to the call of President Benigno S. Aquino III for a more accurate, integrated, and responsive disaster prevention and mitigation system in the Philippines.



## Science-Policy Interface



### **“Smarter Approaches to Reinvigorate Agriculture as an Industry in the Philippines” (SARAI)**

The DOST collaborated with 21 government and private institutions to harness technologies and management services for DRRM activities. Essentially, it is a weather station, temperature, rain, flood, landslide, and typhoon monitoring and warning system all rolled into one website. Project NOAH was the response to the call of President Benigno S. Aquino III for a more accurate, integrated, and responsive disaster prevention and mitigation system in the Philippines.

## Science-Policy Interface

### Phil-LiDAR 1 and Phil-LiDAR 2 Programs

The DOST, through the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) and in collaboration with 16 State universities and colleges and other higher education institutes is implementing the PHIL-LIDAR program which aims to address disaster risk reduction and climate change adaptation. The Phil-LIDAR 1 program is an expansion of the Disaster Risk and Exposure Assessment for Mitigation (DREAM) Program, which aims to produce 3-D flood and hazard maps for 2/3 of the Philippine river systems while Phil-LIDAR 2 aims to produce high quality maps of agricultural, coastal, forest, renewable energy and hydrologic resources of the country.



**6<sup>th</sup> Asia-Pacific Climate Change Adaptation Forum**  
October 17-19, 2018, Asian Development Bank, Ortigas, Mandaluyong City Philippines



# Linking Science and Policy for Climate change Adaptation & Disaster Risk Reduction in Laguna Lake Watershed



**Damasá B. Magcale-Macandog<sup>1\*</sup>, Brian A. Johnson<sup>2</sup>, Masayuki Kawai<sup>2</sup>, Milben A. Bragais<sup>1</sup>, Pankaj Kumar<sup>2</sup>, Isao Endo<sup>2</sup>, AKIO Onishi<sup>2</sup>**

<sup>1</sup>Institute of Biological Sciences, University of the Philippines Los Baños, College, Laguna 4031, Philippines

<sup>2</sup>Institute for Global Environmental Strategies, 2108-11 Kamiyamaguchi, Hayama, Kanagawa, 240-0115, Japan

\*Corresponding author's email: [dmmacandog@gmail.com](mailto:dmmacandog@gmail.com)

# About the project

**Study area: 5 subwatersheds around the Laguna de Bay lake of the Philippines.**

**Objectives:**

Help make local governments' Comprehensive Land Use Plans (CLUPs) more resilient to climate change.

Help local governments with the development of their Local Climate Change Action Plans (LCCAPs).

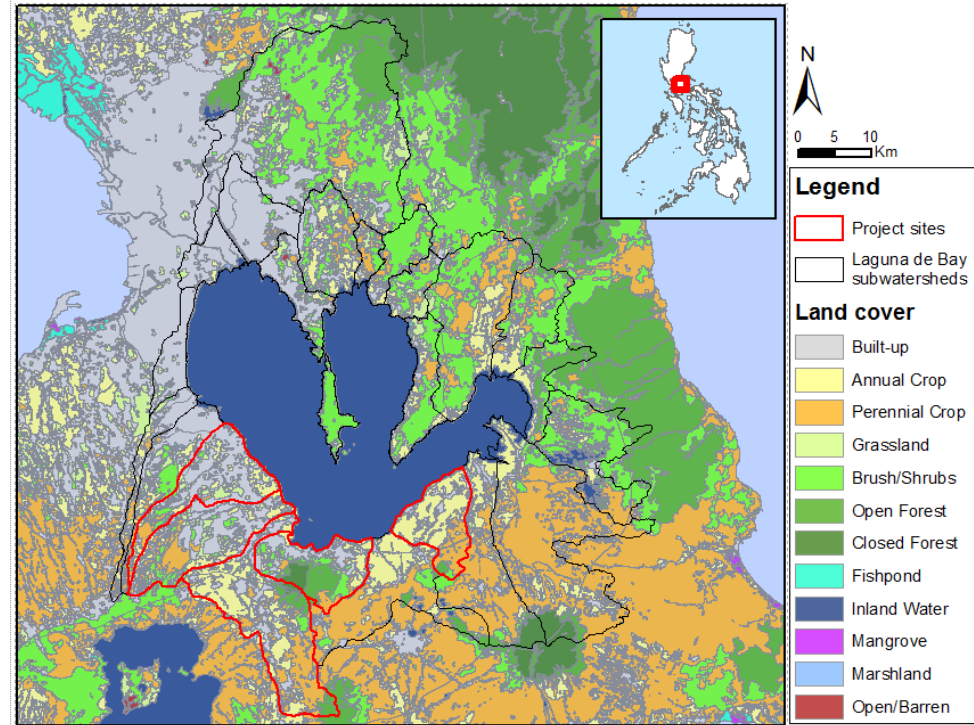
**Approach**

Perform land use change scenario analysis and risk assessment to understand the impacts of land use change and climate change on flood risk.

Expanding scope to include water quality in 2018–2019.

**Funding support**

Project funded by Japanese Ministry of Environment



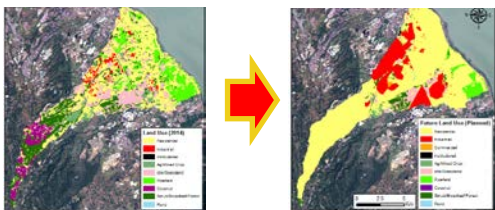


# Overview of Participatory Watershed Land-use Management (PWLM) model



- Participatory land-use mapping approach

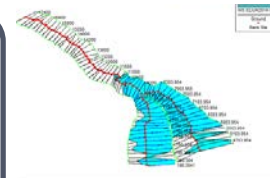
Land-use, 2014 Future land-use plans, 2025 (BAU)



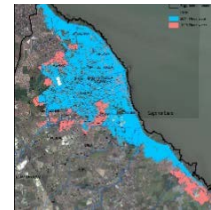
**Step 1:  
Scenario  
developme  
nt**

**Step 2:  
Risk  
assessme  
nt**

- Hydrological modeling
- Downscaling



Hazard mapping



Identifying countermeasures with local governments



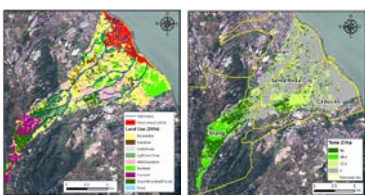
**Step 4:  
Climate-  
sensitive  
land-use  
planning**

**Step 3:  
Climate  
change  
measure  
developme  
nt**

- Expert meeting
- Stakeholder consultation



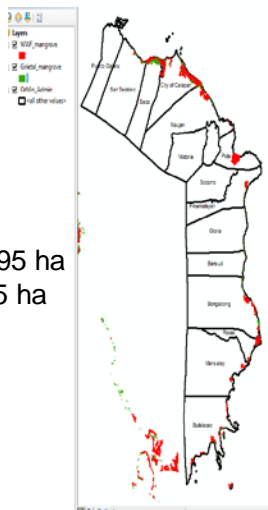
Identifying benefits of adaptation/mitigation actions, mainstreaming them into local policies



- Land-use plan
- Development plan
- Climate change plan

## Plausible alternative futures of Island mangroves in the Asia-Pacific

Mangrove  
Map in  
**Oriental  
Mindoro,**  
2010



Old stand: 2,210.95 ha  
Plantation: 181.05 ha

### Scenario Building:

- Stakeholder workshop
- Key drivers of change
- Impacts of change
- KII
- Participatory mapping
- Experiences on benefits of mangroves
- Role playing
- Predictions on trends
- Land Change modelling

### Mangrove Vegetation Survey

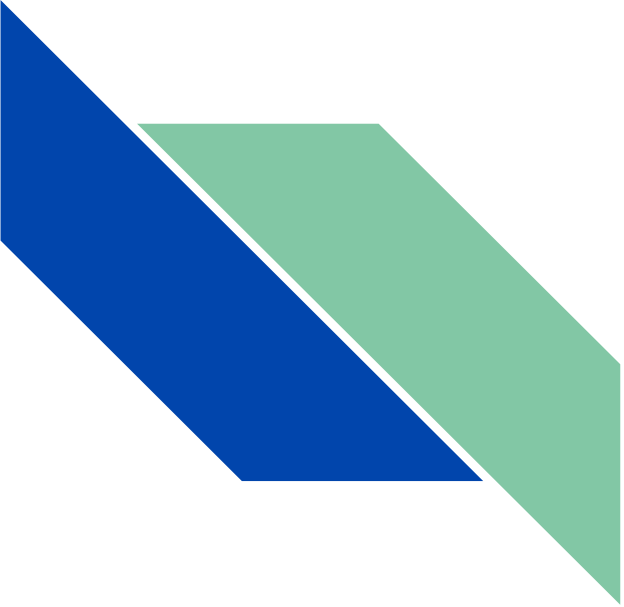


### Soil and Water Quality Analysis



### Stakeholder Consultation Meetings





**THANK YOU!**