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# Insights from the Climate Smart Disaster Risk Management Approach

Ways Forward for Agriculture



# Is Philippines doing enough?

Country	Risk Rank (out of 173)	World Risk Index (%) <sup>3</sup>	Exposure (%)	Vulnerability (%)	Susceptibility (%)	Lack of Coping Capacities(%)	Lack of Adaptive Capacities (%)
Brunei	14	14.08	36.28	38.83	13.48	66.06	36.93
Cambodia	9	16.58	26.66	62.18	48.28	86.43	51.81
Indonesia	28	11.68	20.49	57.06	37.66	83.31	50.20
Laos	104	5.80	9.70	59.78	47.38	84.77	47.20
Malaysia	91	6.69	15.59	42.88	20.12	69.45	49.06
Myanmar	57	8.54	14.47	59.02	41.67	79.75	55.62
Philippines	3	24.32	45.09	53.93	34.99	82.78	44.01
Singapore	153	2.85	9.21	30.97	14.60	47.37	30.94
Thailand	85	6.86	14.84	46.25	22.44	76.23	40.10
Vietnam	34	11.21	22.02	50.89	30.82	78.88	42.97
Timor-Leste	7	17.45	25.97	7.17	52.42	89.16	53.93



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# Lessons from



## Strengthening Climate Resilience

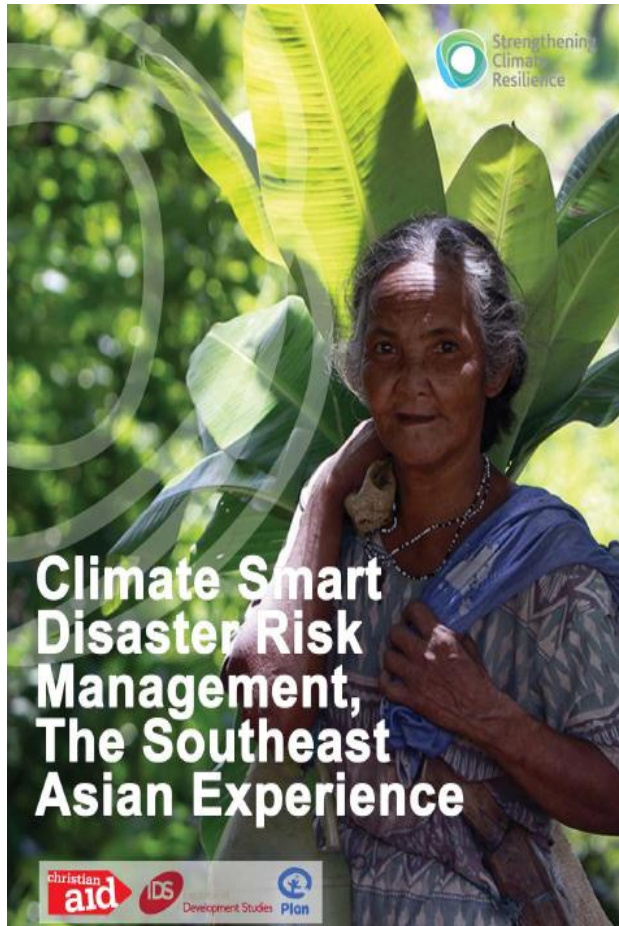
With inputs from the

**Climate Change Commission, National Disaster Risk Reduction and Management Council/OCD, PAGASA, Province of Albay/CIRCA, Municipality of Dumangas, Iloilo, City of Iloilo Coalition on Climate Change and Clean Air, Aksyon Klima, BDR Learning Circle, Tao Pilipinas, Manila Observatory, IRRI, UP in the Visayas School of Technology, Ateneo School of Government, Development Academy of the Philippines, NEDA, OPAPP, BFAR IV-A, Agri Aqua, IIRR, World Vision, DRRNet, MACEC, COPE, SAC Infanta, Sam Ipil Coastal Core Sorsogon, Oxfam GB, CDP, PhilRice., Adelina Sevilla Alvarez, Malu Cagay, Jesusa Grace Molina and Benigno Balgos of the Centre for Disaster Preparedness (CDP); Kaira Zoe Albuero of Research Group for Alternatives to Development (A2D); Dr. Sharon Taylor of Philippine Rural Reconstruction Movement (PRRM) with Plan Philippines and partners: the Municipal Government of San Francisco – Camotes Islands and the Alliance of Seven**





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Strengthening Climate Resilience (SCR) is a DfID funded programme that aims to enhance the ability of governments and civil-society organisations in developing countries to build the resilience of communities to disasters and climate change as part of their development work.

SCR, along with over 500 disaster risk practitioner have developed the **Climate Smart Disaster Risk Management (CSDRM)** approach to better integrate disaster risk reduction, climate change adaptation and development.



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# Strengthening Climate Resilience

## Philippines

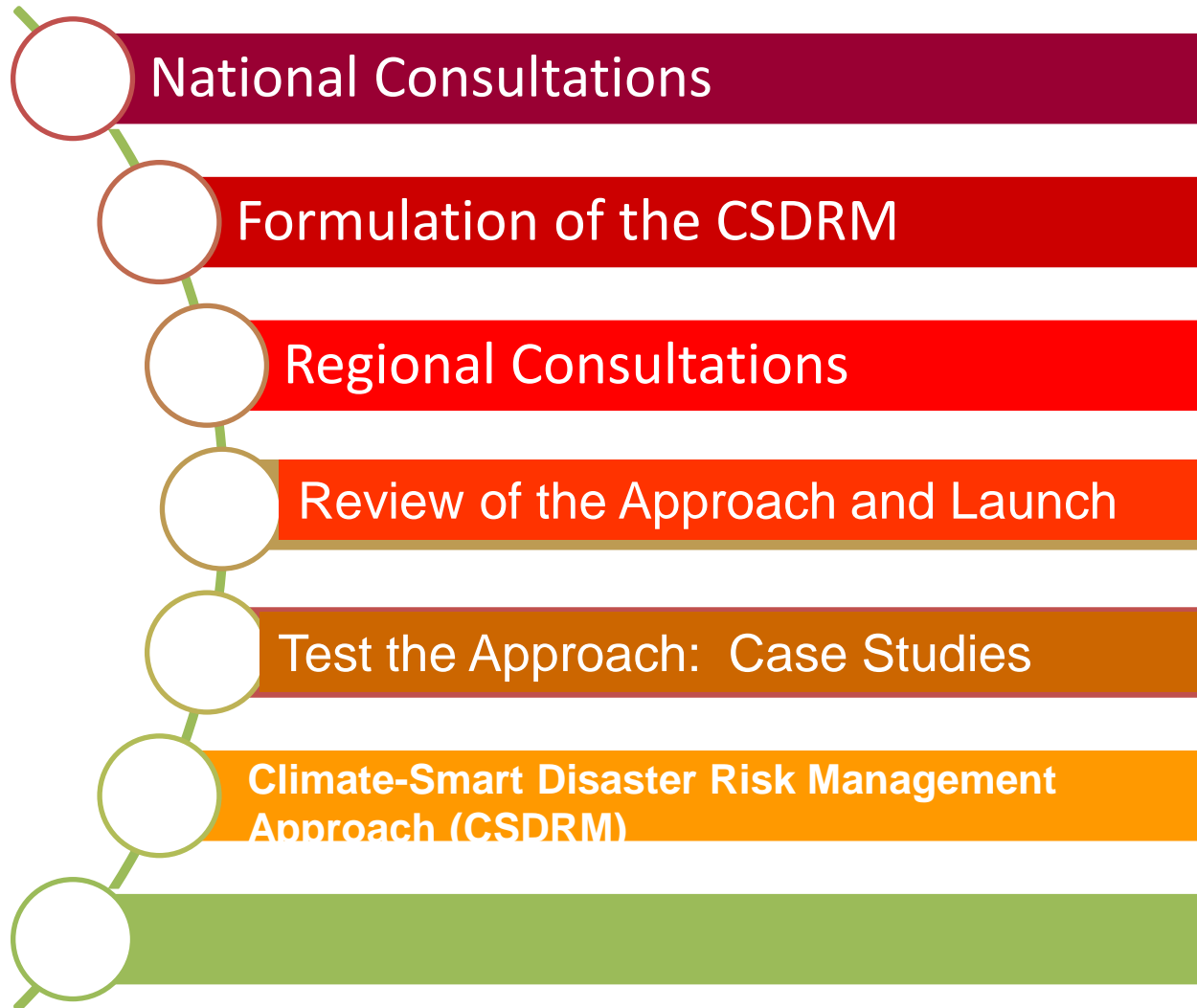
*Lead Agency:* Plan Philippines and Christian Aid Philippines  
*Partners:* National Climate Change Commission Philippines, Center for Disaster Preparedness (CDP), National Disaster Risk Reduction and Management Council (NDRRMC), CSO members of the Disaster Risk Reduction Network (DRRNetwork), selected provinces (Albay, Cebu, Camotes) and others.  
*Platforms:* DRRNetwork





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# The Process

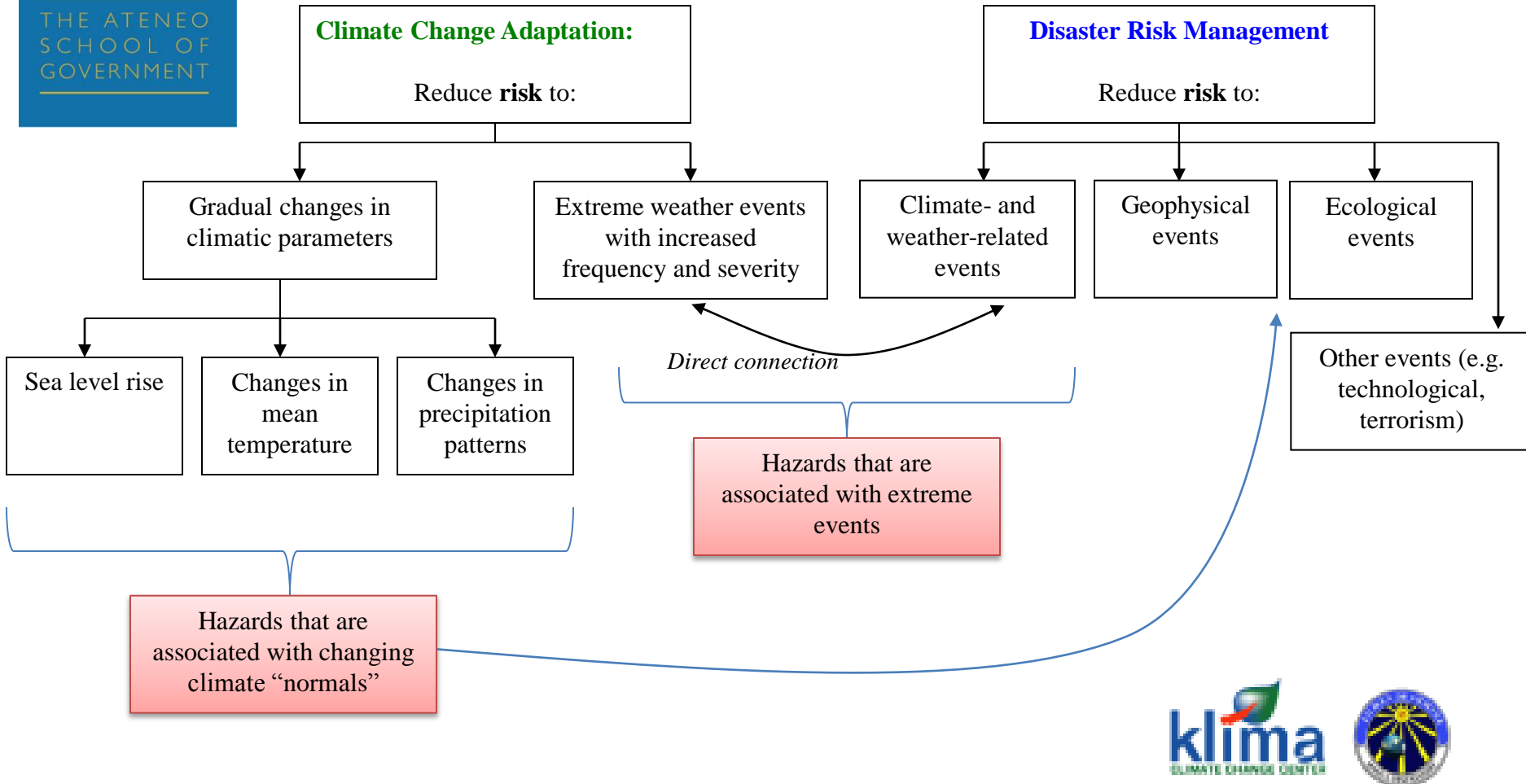


# DRM and CCA: Points of Convergence (1)

## Gotangco and Perez, 2012



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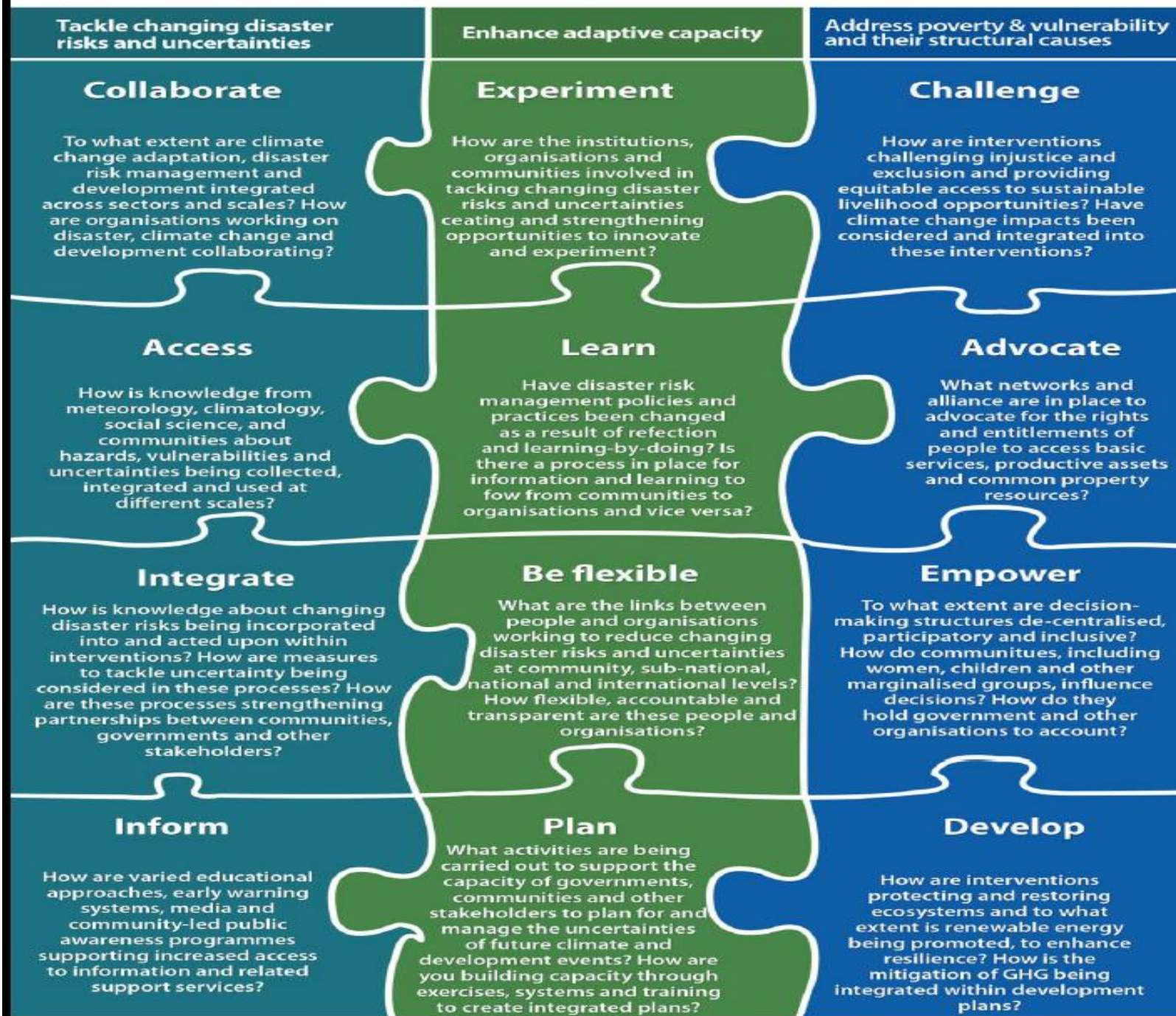




**Figure 1: The Climate Smart DRM Approach and its Action Points**



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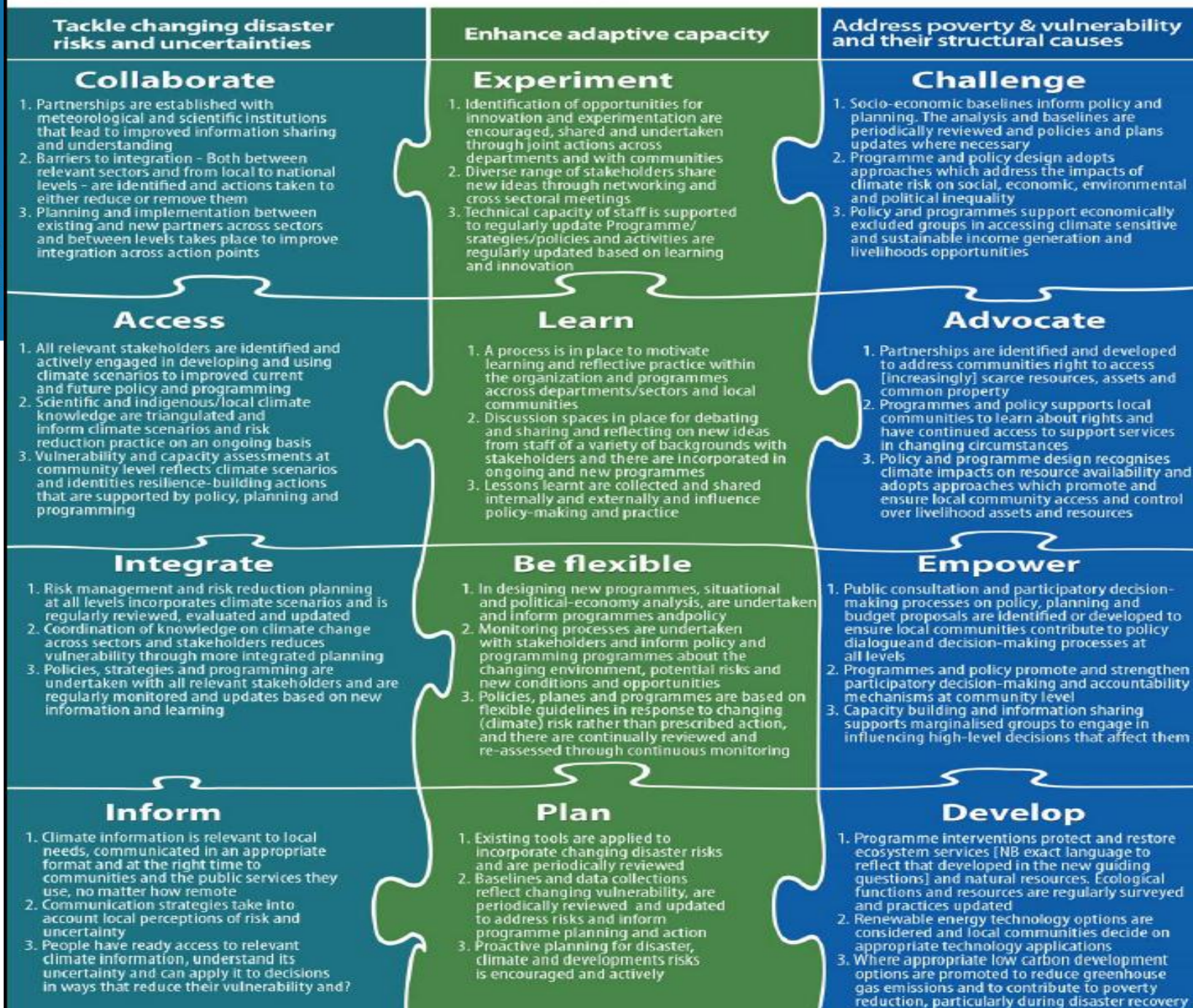




**Figure 2: The Climate Smart DRM Approach and its Process Indicators**



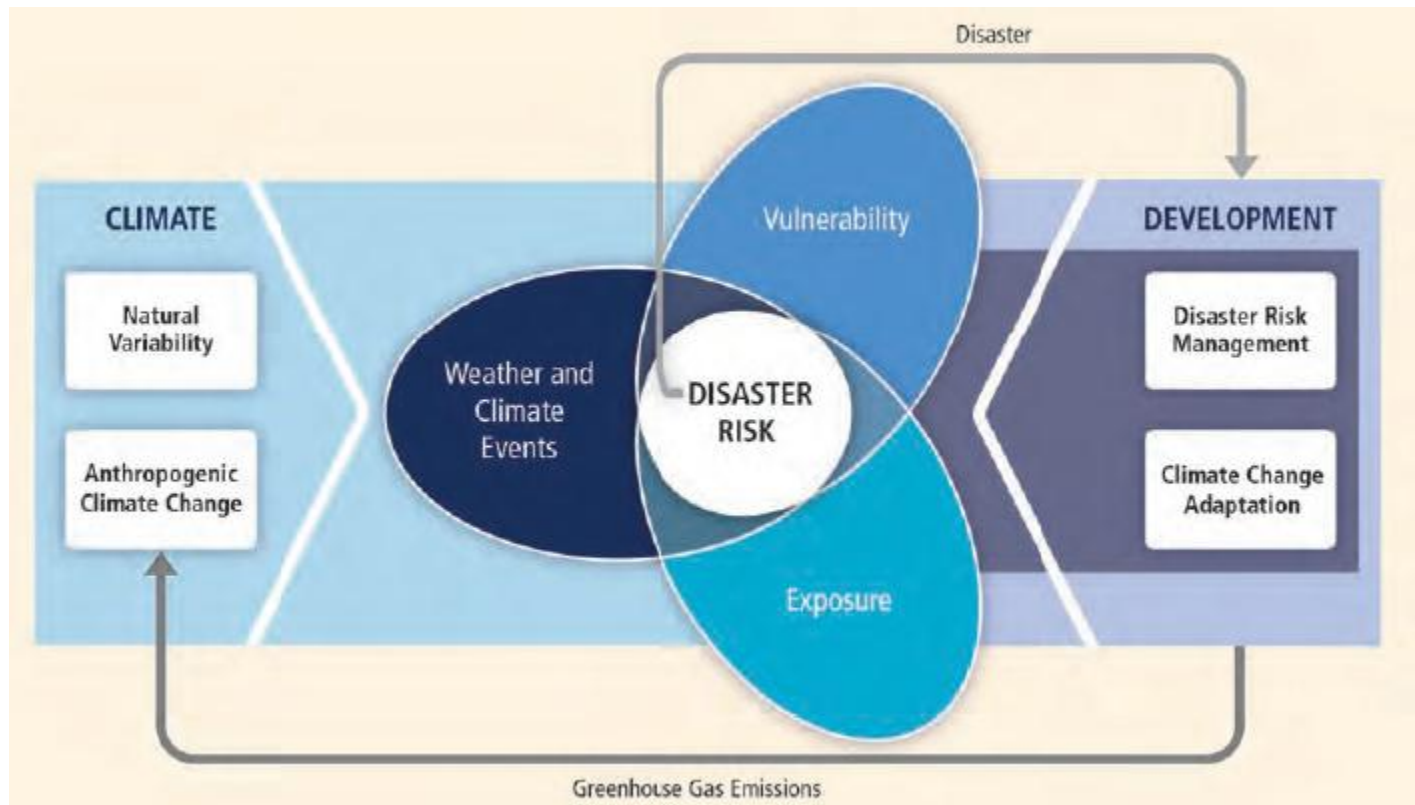
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# IPCC, SREX, 2012



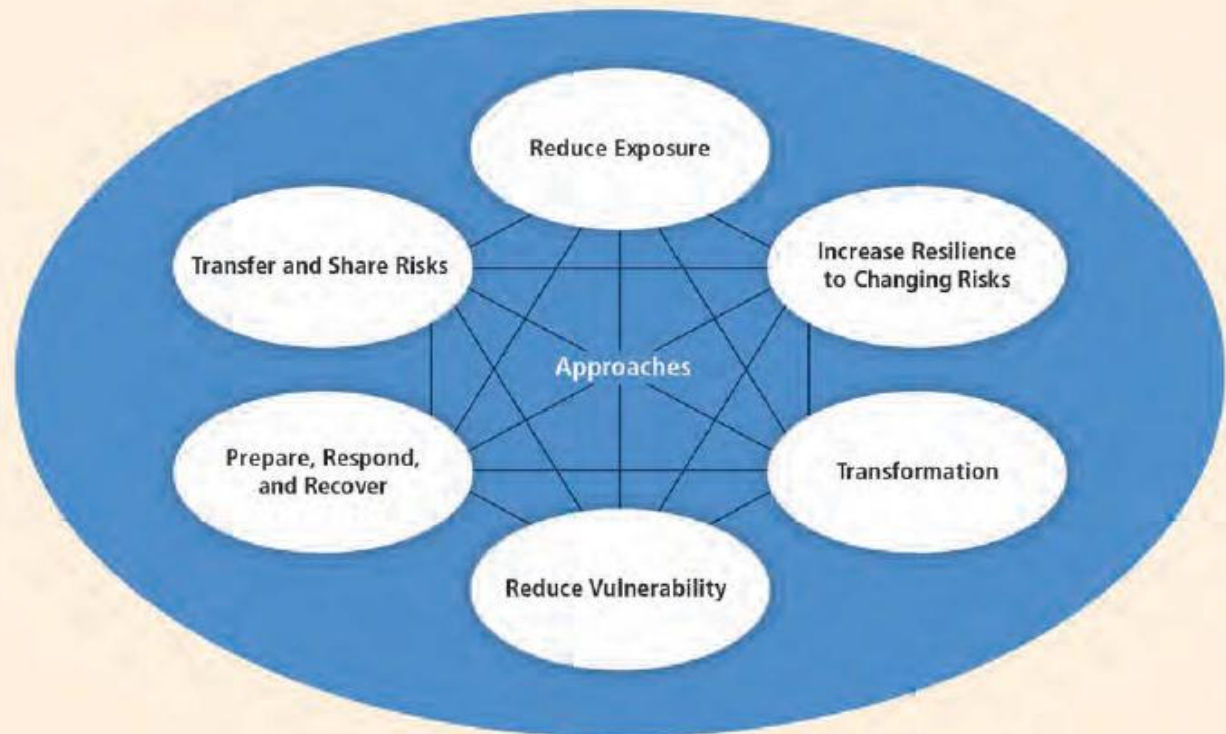




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# IPCC, SREX, 2012

## Adaptation and Disaster Risk Management Approaches for a Changing Climate



**Figure SPM.2** | Adaptation and disaster risk management approaches for reducing and managing disaster risk in a changing climate. This report assesses a wide range of complementary adaptation and disaster risk management approaches that can reduce the risks of climate extremes and disasters and increase resilience to remaining risks as they change over time. These approaches can be overlapping and can be pursued simultaneously. [6.5, Figure 6-3, 8.6]



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# Lessons learned

- **We are tackling disaster risks and uncertainties but not potential risks resulting from climate change**





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# Lessons learned

- **The need to strengthen adaptive capacities and not only coping capacities**







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# Lessons learned

- **We need to reclaim the power to experiment and to innovate**

- **We need to address poverty and vulnerability in a manner that contributes to adaptive and mitigation capacities**





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# Attempts by LGUs and other Stakeholders



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## Construction of Elevated School Bldg.



1. Construction of Appropriate/ needed  
Infrastructure Facilities



3. Setting-up of community based flood and  
Drought forecasting & warning system



2. Maintenance and Enhancement of Agro Met  
Station

# Dumangas, Iloilo



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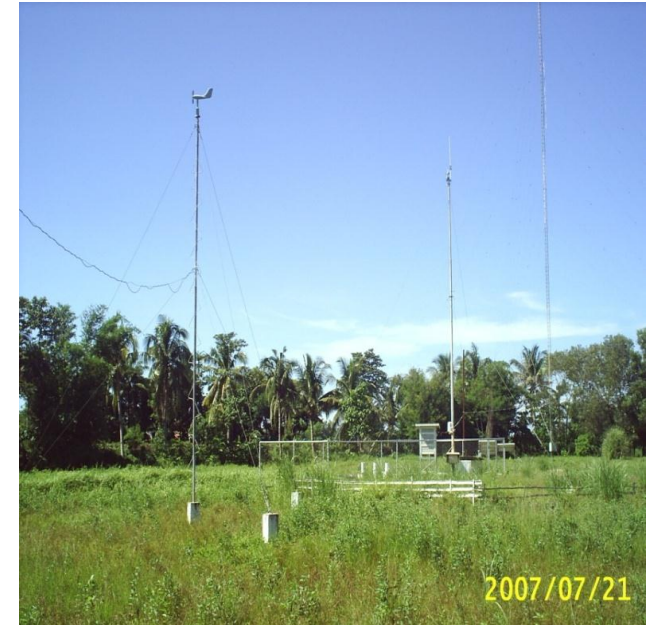
# LGU STRATEGIES & INITIATIVES

## CLIMATE FORECAST APPLICATION FOR AGRICULTURE



### Agro - Met Station

**Dumangas Agro-Met Station was established in November 2002 and it is supported by Asian Disaster Preparedness Center (ADPC) headed by Dr. Arjunapermal Subbiah. The Agro-Met station is the pilot project of PAGASA and ADPC in the entire Philippines**



### Facilities



# Summary climate risk management matrix for Dumangas: first cropping season

Rainfall season	Agricultural season	Climate risks, impacts, and opportunities	Management options	Forecast requirements	Other requirements in order to implement management options
Wet season (June-Sept)	April to September	Late August flooding may damage paddy during flowering stage	Early sowing by dry seeding in early April in order to allow harvest in early to mid-August	Climate information namely 1) seasonal rainfall characteristics in May-September; and 2) likelihood of flooding in August	Capital & farm inputs (seeds) for early planting
			Clearing of irrigation canals/ Repair of dikes		Mobilization of farmers' groups to undertake canal clearing/repair of dikes Support from municipal government/NIA Back hoe from municipal government
		Below normal rains	Go for dry seeding instead of transplanting	Climate information namely 1) seasonal rainfall characteristics and 2) onset of rains in June	





## Sample climate risk management matrix for Dumangas: second cropping season

Rainfall season	Agricultural season	Climate risks, impacts, and opportunities	Management options	Forecast requirements	Other requirements in order to implement management options
Dry season (October-May)	October-January	Typhoons in November may damage crop	Planting in late December to escape typhoon	Seasonal forecast 10-day forecast	
		Drought	Supplemental irrigation (thru pumping ground and surface water)		Money to rent water pumps/shallow tube wells and buy fuel
			Change to alternative crops/drought-resistant variety	Climate information namely 1) seasonal rainfall characteristics and 2) likelihood of dry spells throughout the season	Money to buy seeds
		Good rains	Go for transplanting	Climate information namely rainfall quantity	





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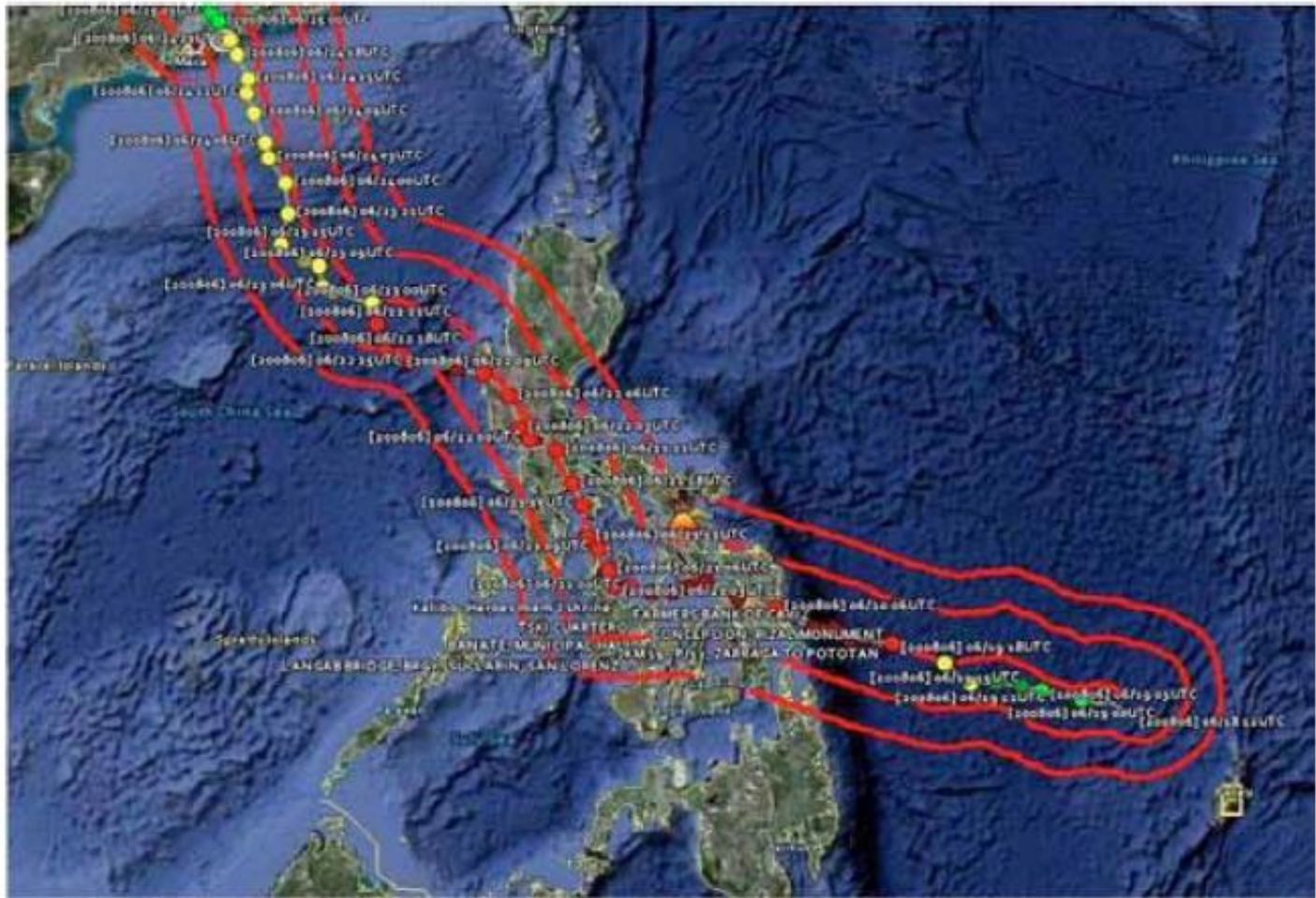
**Table 1: Weather index based insurance initiatives being piloted in the Philippines.**

Parametric insurance	Scale of application	Implementer and partner institutions	Weather indices used / weather risk covered
Crop-based WII	micro	MicroEnsure Philippines (private sector as provider) MFIs/ Rural banks	drought wet and dry day cover typhoon (windspeed)
Property-based WII (calamity insurance)	micro	MicroEnsure Philippines MFIs	Flood (excess rainfall), typhoon
Crop-based WII	micro	Philippine Crop Insurance Corporation (PCIC) as insurer; International Labor Organization (ILO), local government units (LGUs) of Ricaro T. Romaldez (RTR) and Buenavista, Agusan del Norte;	amount of rainfall (low, excess)
Natural catastrophe insurance (NatCat)	meso	CLIMBS General Life Insurance Coop (cooperatives, CBAs as partners) in partnership with GIZ, Munich Re and DHI	Typhoon/ windspeed Flooding as a result of excessive rainfall





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### Satellite image of Typhoon Frank as monitored by MicroEnsure Philippines

Source:

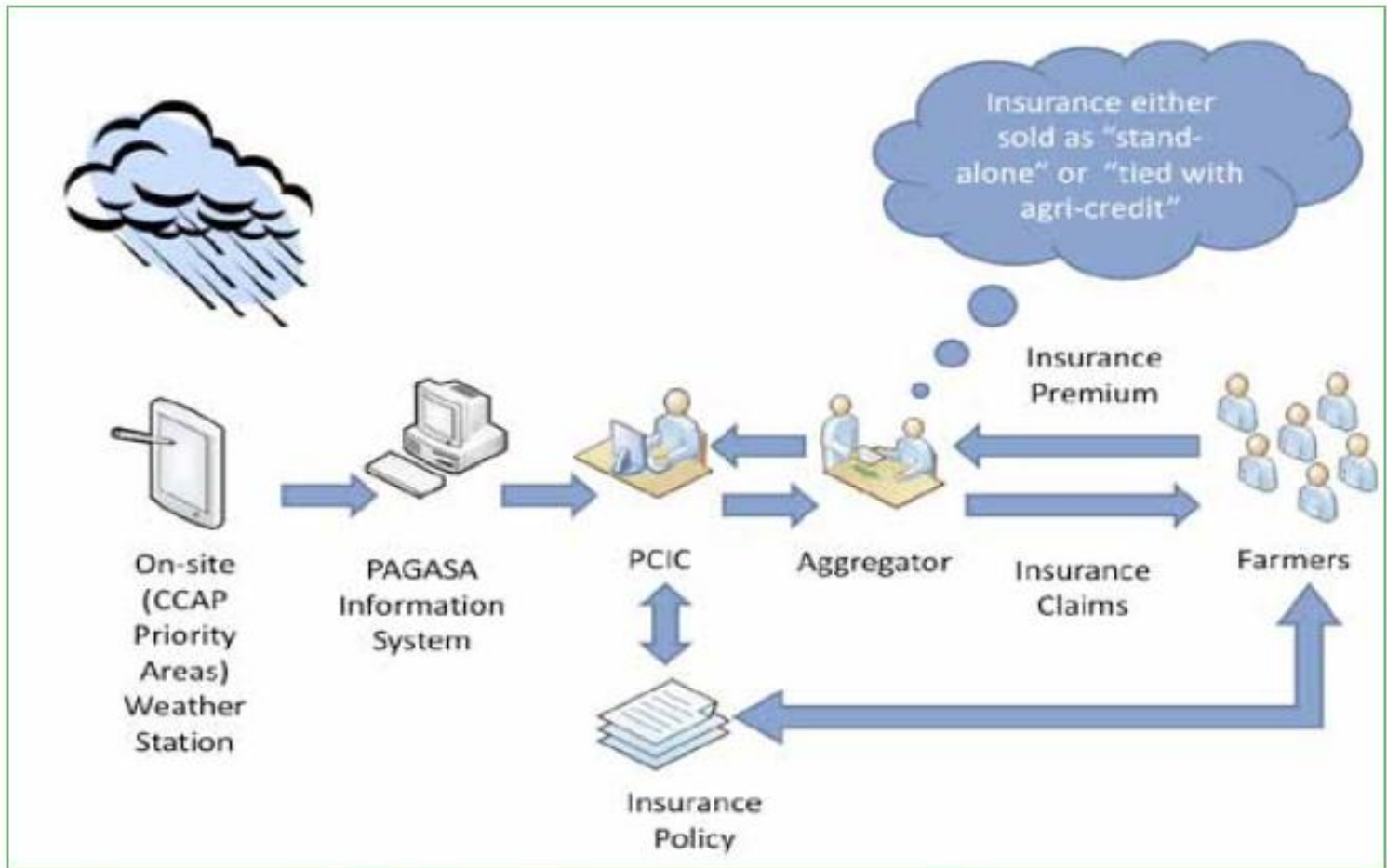
Armada, MJ (2011). *MicroEnsure's experience on piloting weather index based insurance schemes in the Philippines. Presentation during the 1st RTD on Developing Policy on Risk Financing and Insurance Mechanisms for Climate Change Adaptation and Risk Reduction in the Philippines. October 25, 2011. Richmond Hotel, Ortigas, Philippines.*







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### Flowchart of how ILO-CCAP's weather index insurance works

Source:

Villacorta, LB (2011). *Weather Index-Based Insurance (WIBI) Experience. Climate resilient farming communities in Agusan del norte through Innovative Risk Transfer Mechanisms (MDG-F 1656 Climate Change Adaptation Project (CCAP))*. Presentation during the 1st RTD on Developing Policy on Risk Financing and Insurance Mechanisms for Climate Change Adaptation and Risk Reduction in the Philippines. October 25, 2011. Richmond Hotel, Ortigas, Philippines





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**Table 2. Risks covered and product features of WIBI products**

Crop	Trigger / indices	Crop growth stage	Premium cost
Corn (open pollinated) (Buenavista)	Low rainfall	planting and establishment, vegetative stage, flowering (inflorescence/ heading, anthesis)	6.18% of the insured value (per hectare)
	Excess rainfall	Maturity (development of fruit and ripening stage)	
Upland rice	Low rainfall	Vegetative stage	3.04% of the insured value (per hectare)
Lowland rice	Continuous dry days	Vegetative stage, reproductive stage	
	Continuous rainy days	Reproductive stage, maturity	
	Excess rainfall	Vegetative stage, maturity	
	Low rainfall		3.04% of the insured value (per hectare)
	Continuous dry days	Vegetative stage	
	Continuous rainy days	Vegetative, reproductive, maturity	
	Excess rainfall	Vegetative, maturity	

**Sources:**

Villacorta, LB (2011). *Weather Index-Based Insurance (WIBI) Experience. Climate resilient farming communities in Agusan del norte through Innovative Risk Transfer Mechanisms (MDG-F 1656 Climate Change Adaptation Project (CCAP))*. Presentation during the 1st RTD on Developing Policy on Risk Financing and Insurance Mechanisms for Climate Change Adaptation and Risk Reduction in the Philippines. October 25, 2011. Richmond Hotel, Ortigas, Philippines.

ILO MDG-F 1656 (undated). *Establishment of Innovative Insurance Package for Climate Change Adaptation (CCA) Weather Index Based Insurance (WIBI)*.







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**CCAP**



## Agusan del Norte

**“Agasan-where water flows”  
allusion to the mighty  
Agusan River**

**1 city, 10 municipalities  
167 barangays, 126 rural  
273,024 hectares  
314,027 population  
57 % or 31,913 households  
live below poverty line.  
Majority are farming HHs  
7 banks with MF function  
operate in Agusan del  
Norte.**

CCAP is Outcome 3.4  
Demo Project of



MDG ACHIEVEMENT FUND  
MDG-F 1858: Strengthening the Philippines'  
Institutional Capacity to Adapt to Climate Change

Implemented  
by:



International  
Labour  
Organization

in partnership with:





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## MDG-F 1656 Outcome 3.4 Implementing Group



International  
Labour  
Organization



Partners:



Other Collaborators:







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## Key determinants of “Adaptive Capacity” to Climate Change

- 1-Economic condition
- 2-Availability of and access to financial & productive resources

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Demo Project of



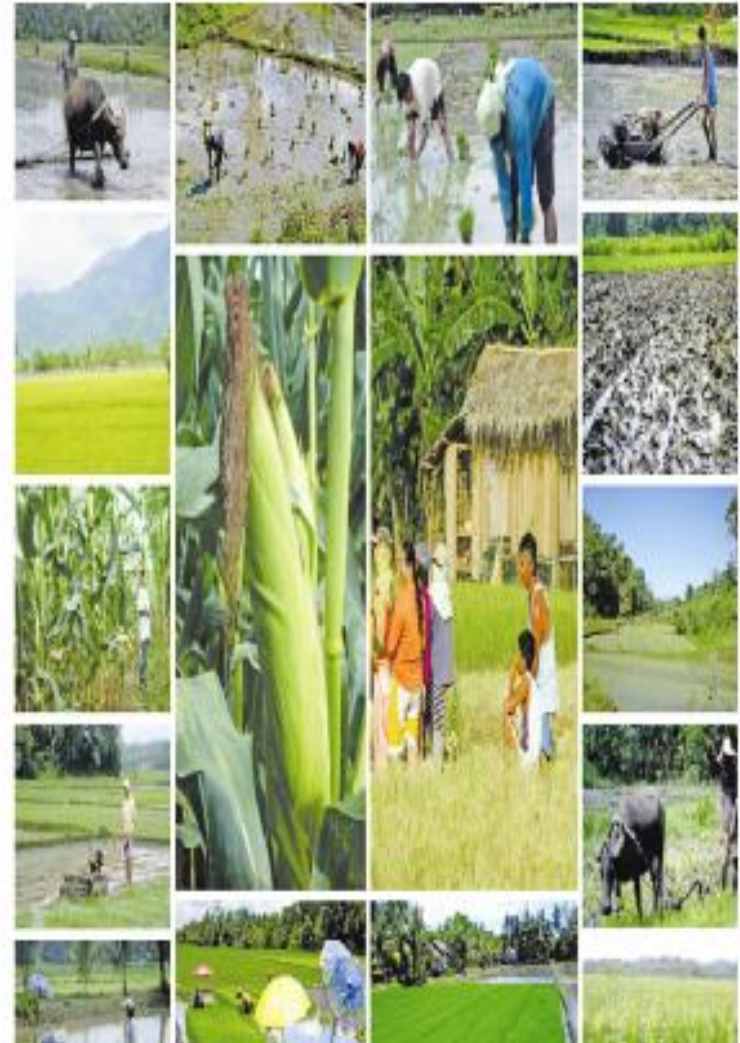
Implemented  
by:





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**“Financial mechanisms that facilitate risk transfer & risk sharing (credit and insurance) are essential for Farming communities to enhance their adaptive capacity thereby reduce their vulnerability, to climate change risks & impacts”**



CCAP is Outcome 3.4  
Demo Project of



Implemented  
by:



in partnership with:







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**Community-based  
& innovative Local  
Govt Unit (LGU)  
Loan Facilities  
offer great  
potential for  
“Financial  
inclusion”  
for CC-vulnerable  
Farming  
Communities**



International  
Labour  
Organisation

CCAP is Outcome 3.4  
Demo Project of



MDG Achievement Fund  
MDG-F 1636: Strengthening the Philippines'  
Institutional Capacity to Adapt to Climate Change

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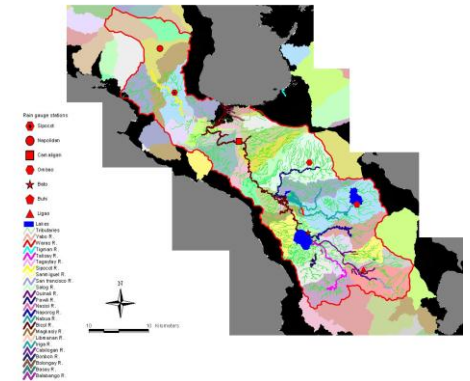


Risk Mapping and Typhoon  
Tracking



Participatory  
Capacities and  
Vulnerability  
Assessment

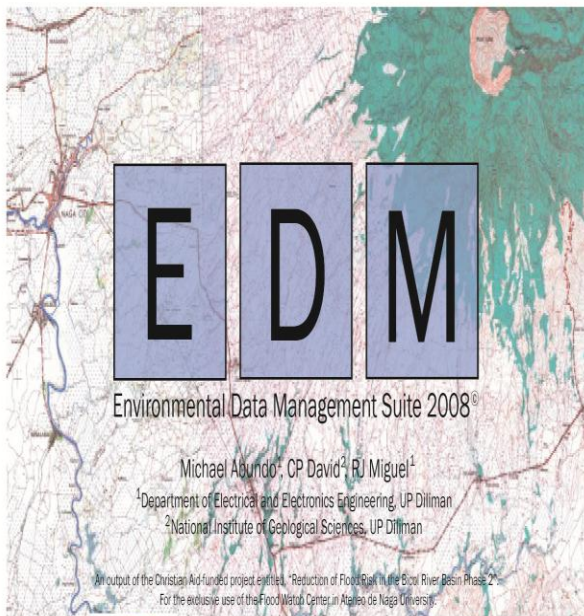
All Areas



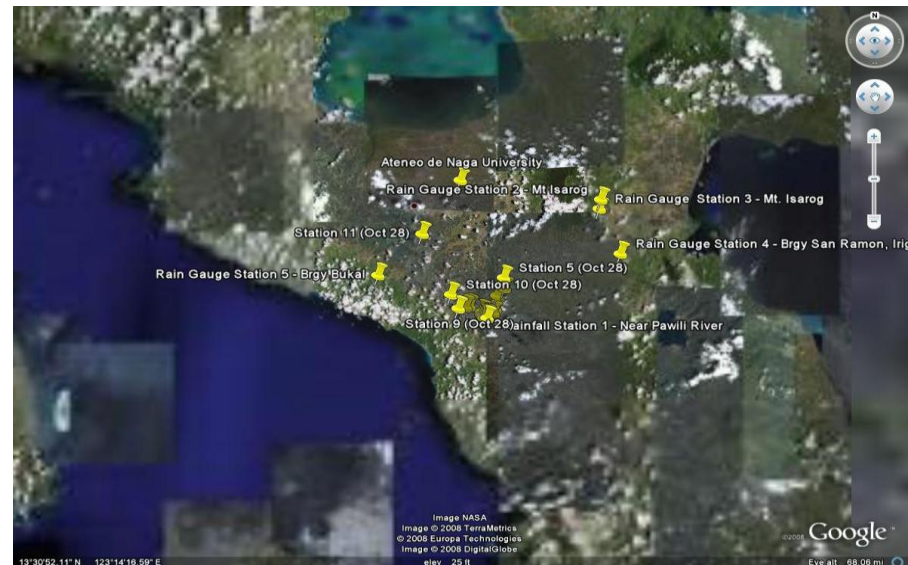
Software and Tools Development for  
Risk Assessments







Home-based weather stations that communicated data via SMS to scientists in the typhoon and floodwatch centers



1. Satellite Image Picture Fetcher
2. SMS Data Manager
3. Text Alert Console





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Flood-Resistant Crops



Food processing and Packaging







Value-adding on shellcraft



Handicraft from screwpines



Soil conditioner from, shore swept seagrass and household waste

Developing climate resilient alternative and additional livelihoods in coastal areas





WIR-DOOR







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# The product from screwspines...

- Handicraft production & enhancement of households & community productions
- Provided livelihoods support fund







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Indigenous and  
endogenous  
innovations against  
heavy rainfall and  
drought



Flood and  
drought  
resistant crop  
varieties



Mobile gardens

Developing climate resilient alternative and additional livelihoods in agricultural areas







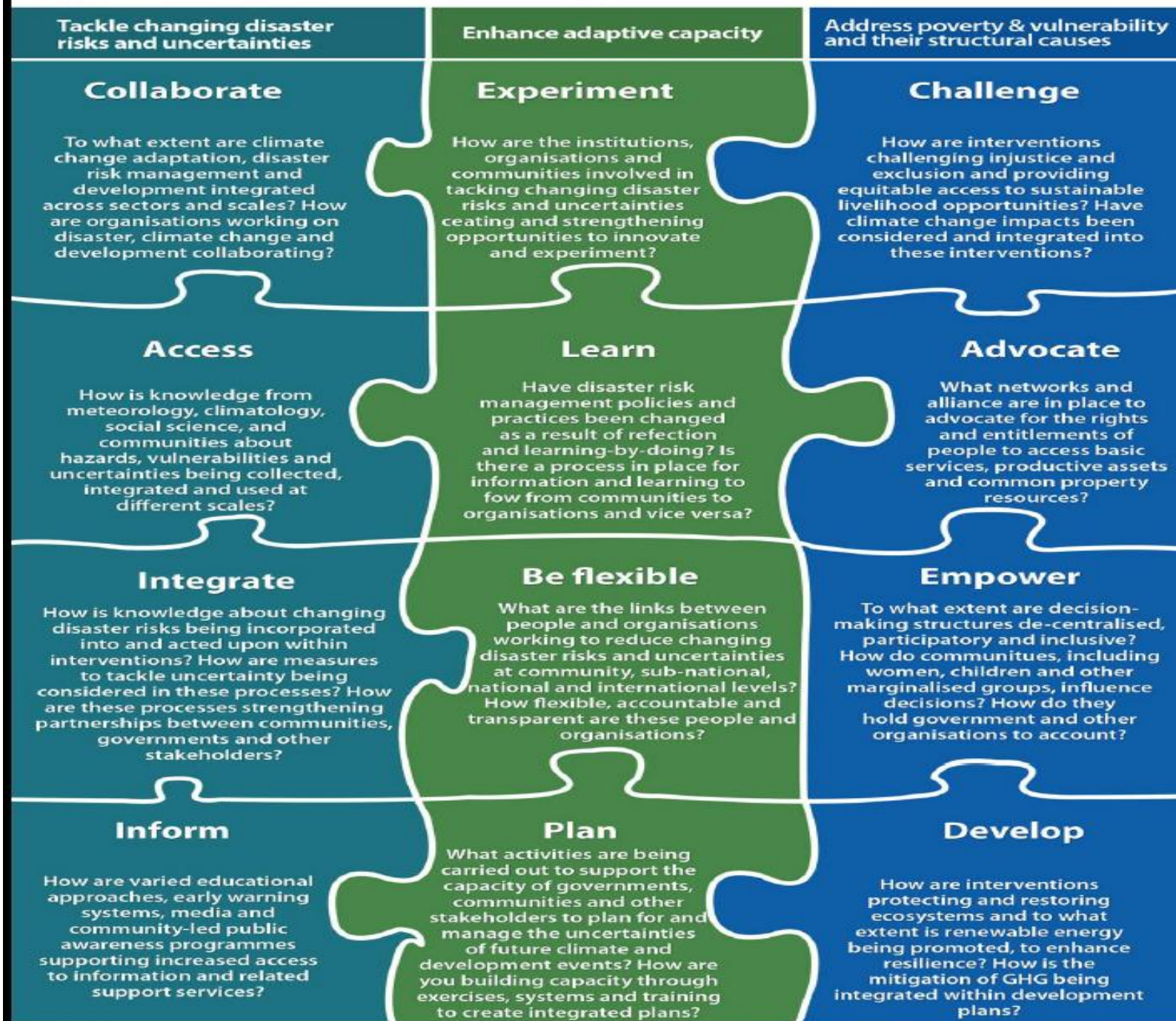
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# Are these Climate Smart- DRM attempts?

**Figure 1: The Climate Smart DRM Approach and its Action Points**



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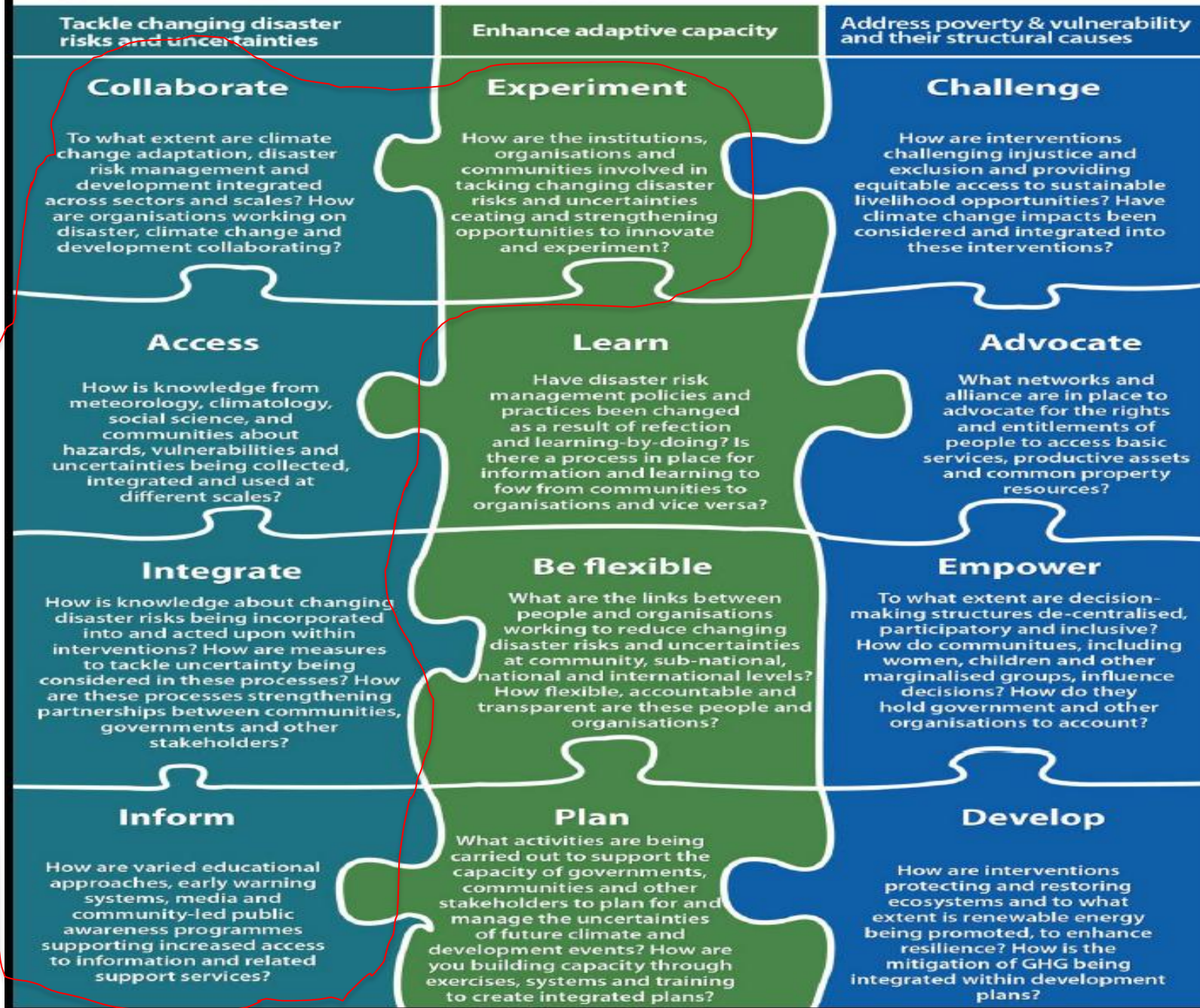
# Possible entry points for Research in Agriculture



**Figure 1: The Climate Smart DRM Approach and its Action Points**



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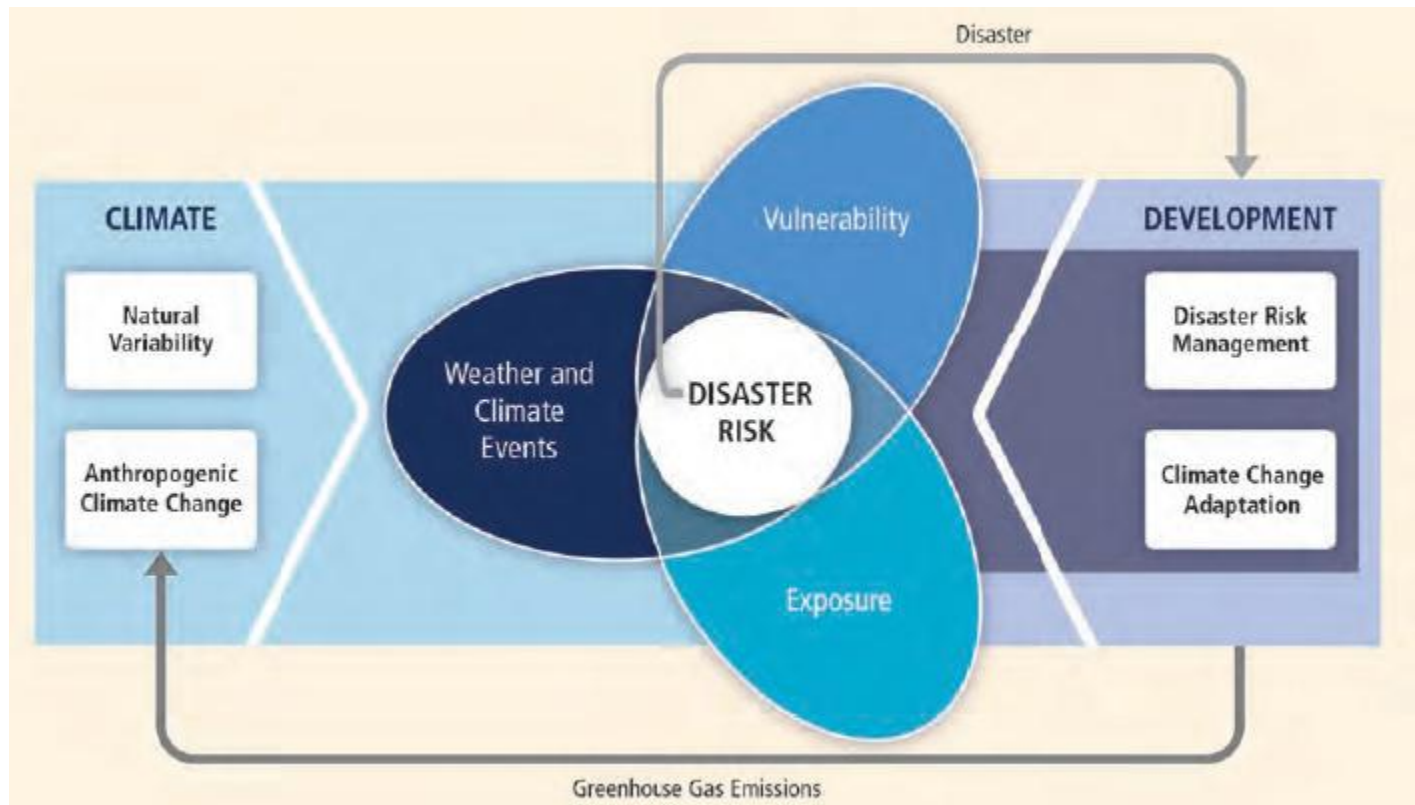




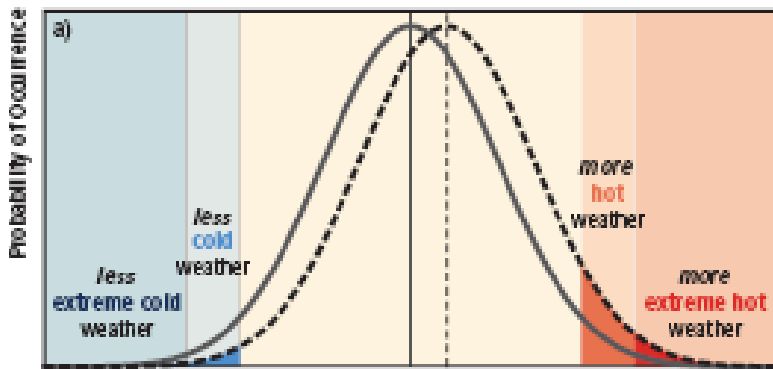


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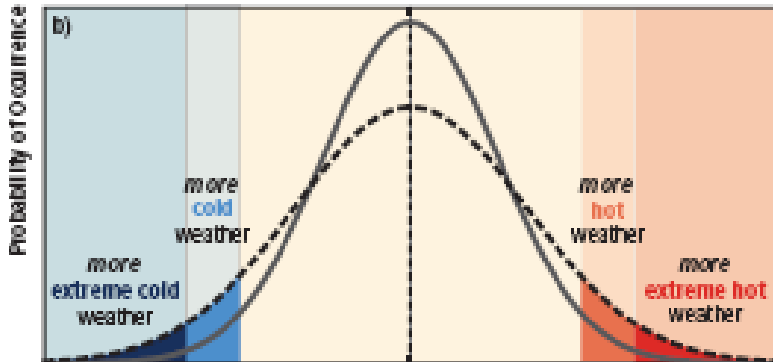
# IPCC, SREX, 2012



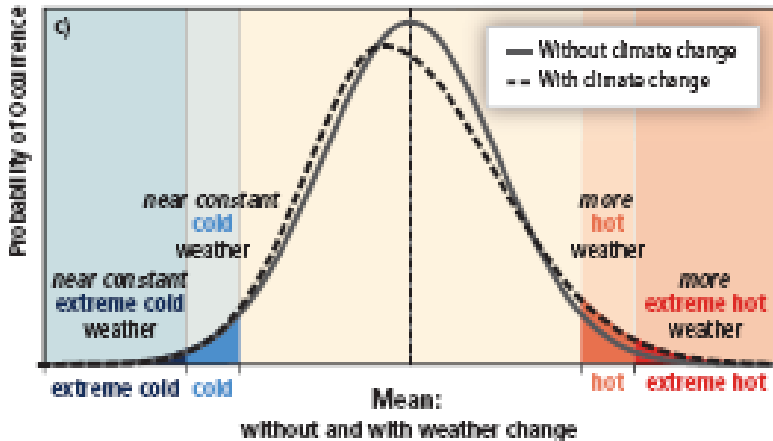
Shifted Mean



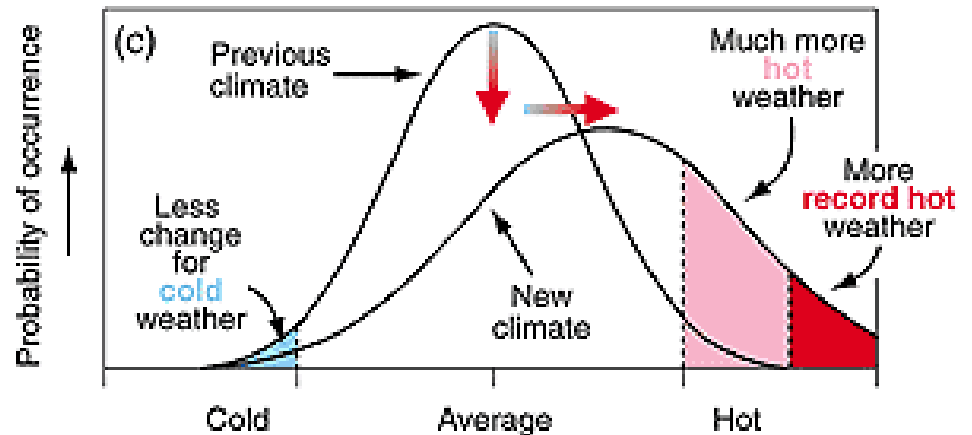
Increased Variability



Changed Symmetry



Increase in mean and variance



IPCC TAR WG1 2.7.1

**DRM that helps build resilience contributes to CCA in the long run; CCA actions now are forms of DRM! But climate change will push us to new climate extremes : new hazards (Perez, Gotangco 2012)**

Figure SPM.3, IPCC SREX SPM



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# Some Attempts





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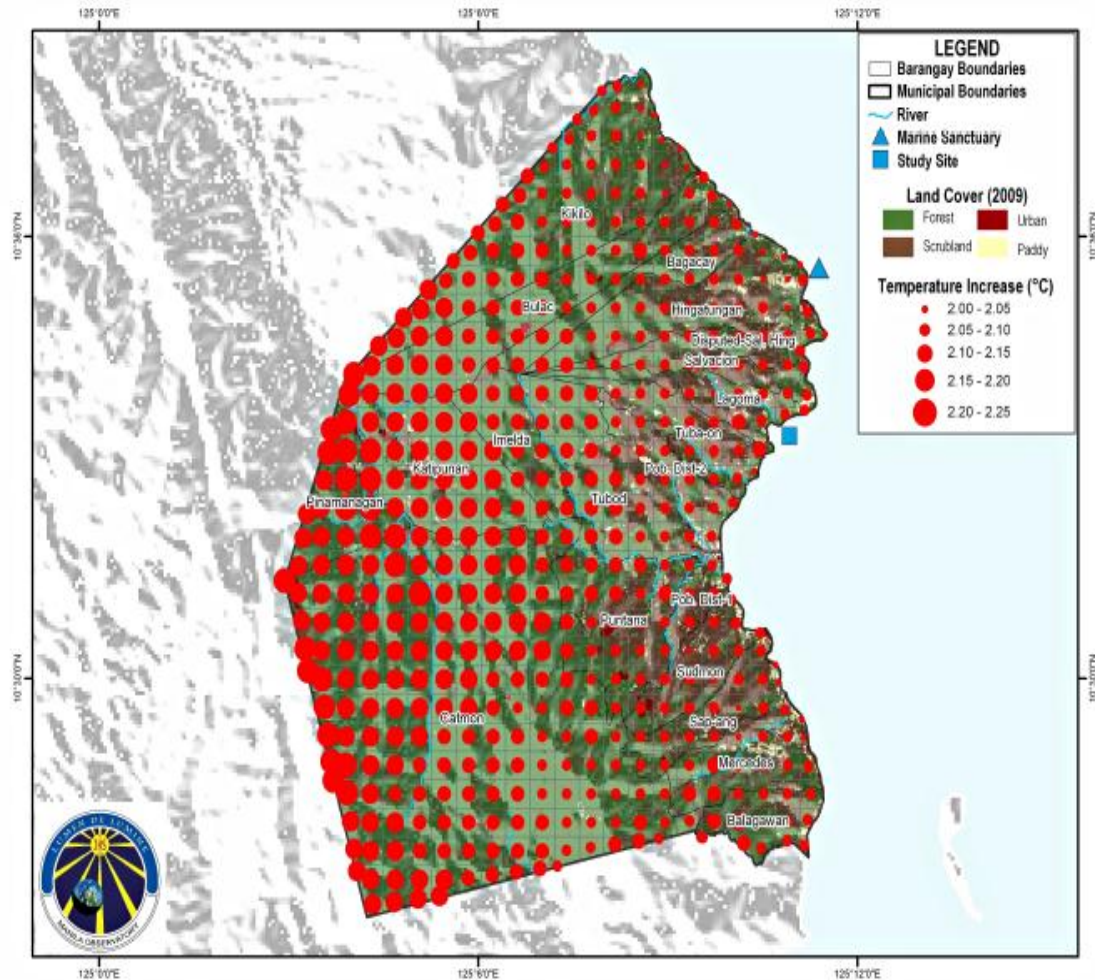


Figure VII.17. Projected increase in temperature by 2050 and the 2009 land cover of Silago. Larger red dots indicate higher increase in temperature. (Map Data Sources: Shuttle Radar Topographic Mission version 4 (Feb. 2000), Temperature Anomaly RCS-MO, Landsat 2009).

giz

On behalf of



Federal Ministry for the  
Environment, Nature Conservation  
and Nuclear Safety

of the Federal Republic of Germany



World Agroforestry Centre  
TRANSFORMING SITES AND LANDSCAPES

# CLIMATE CHANGE ADAPTATION PROGRAM - COMPONENT FOR JRMP II





# Jalaur River Multipurpose Project- Phase II



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*Towards the realization of a dream  
envisioned 50 years ago. . .*







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We need, for example, to collaborate to build a reliable climate risk knowledge base, use this to inform experimentation and innovation that will ultimately lead to socially just and economically equitable development arrangements – if we are to truly encourage resilience which is both climate smart and disaster proof. Hence, limiting interventions to integration within one pillar of the approach will not suffice in achieving CSDRM.





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# From Theory to Action



# ALTERNATIVE PATHWAYS TO CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION: Mainstreaming and Integration in Development Planning and Budgeting of Local Government Units



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PREPARED BY:



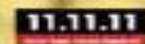
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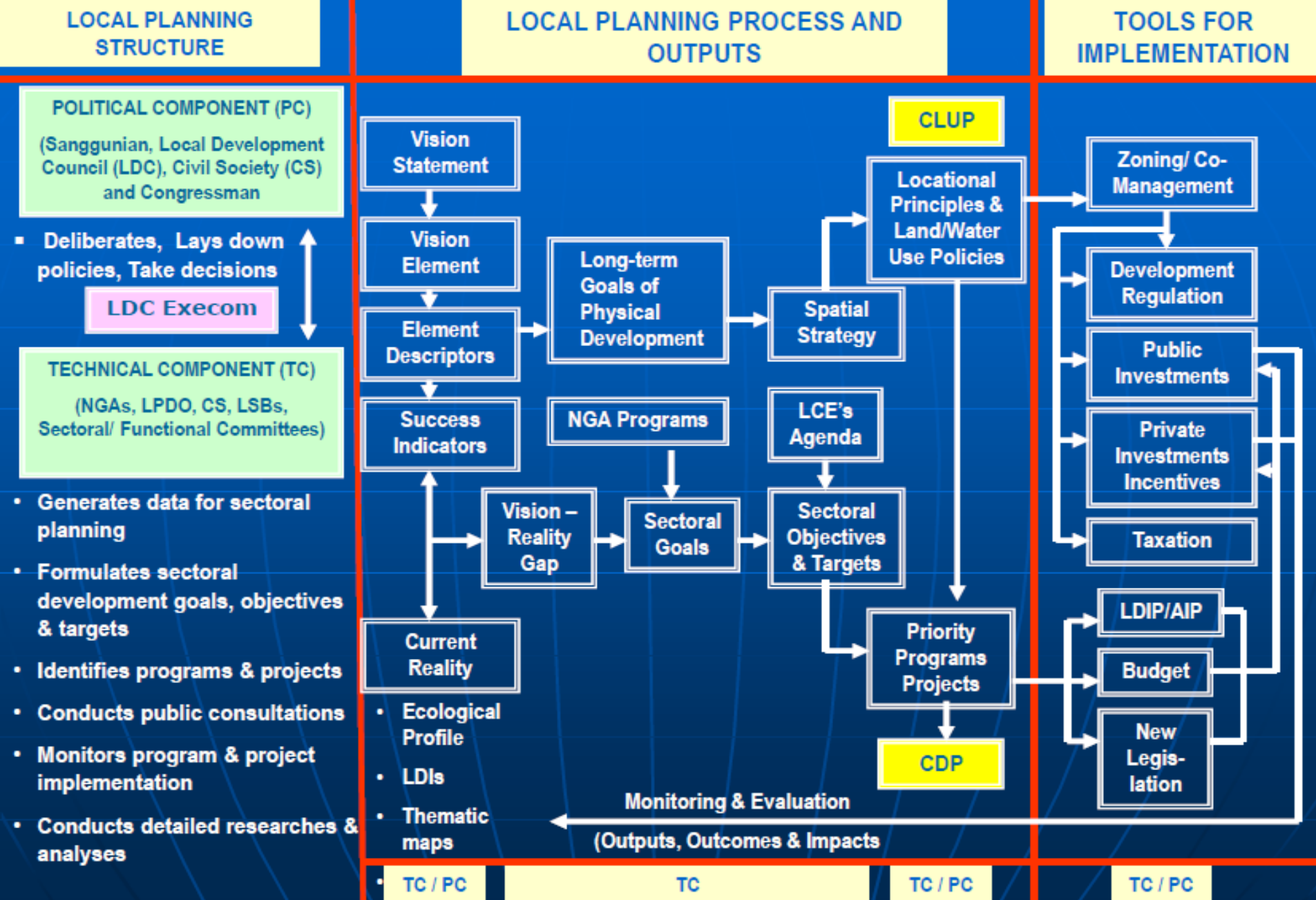


International Frameworks on Development, CCA and DRR	National Frameworks on Development, CCA and DRR	Accompanying National Plans	Local Plans	Processes Employed	Outputs
Agenda 21	Philippine Agenda 21	Philippine Development Plan	Provincial Development and Physical Development Plan (PDPFP)	Harmonization, Integration, Mainstreaming, and Institutionalization through joint memorandum Circular no. series of 2007, RA 9729 and RA 10121	Sustainable Development, Compliant and CCA and DRR-Enhanced Annual Development and Expenditure Program (Aip), Localap, Drmp, HRD Plan, Executive and Legislative Agenda, Productivity Plan, Annual Procurement Plan
Millennium Development Goals	Philippine Millennium Development Targets and Indicators	Philippine Investment Plan	Comprehensive Land Use Plan (CLUP)		
UN Framework Convention on Climate Change  Kyoto Protocol, Bali Pan of Action, etc.	RA 9729 Climate Change Law of 2009  People's Survival Fund  National Framework Strategy on CC	National Climate Change Action Plan	Comprehensive Development Plan (CDP)  Local Development Investment Plan (LDIP)  Annual Investment Plan (AIP)		
HYOGO Framework for Action	RA 10121 Philippine Disaster Risk Reduction and Management Law of 2010	National Disaster Risk Reduction and Management Plan	Local CC Action Plan (LCCAP)  DRRM Plan		



**Table 3. Hierarchy of Plans**

Level	Physical Plan	Development Plans	Investment Program	Budget
National	National Physical Framework Plan	Philippine Development Plan	Development Investment Program	General Appropriations Act
Regional	Regional Physical Framework Plan	Regional Development Plan	Regional Development Investment Program	
Provincial	Provincial Development and Physical Framework Plan		Provincial Development Investment Program	Annual Budget (Budget Ordinance)
City / Municipality	City / Municipal Land Use Plan	Comprehensive Development Plan	Local Development Investment Program	Annual Budget (Budget Ordinance)





Reality Check	Vision 10 year period	Strategic Direction (Roadmap to the Vision) 10 year period	Investment Programming (Programs, projects, activities)	Identifying funding sources	Major Final Output
<ul style="list-style-type: none"> <li>Ecological profiling,</li> <li>Check Desinventar Database</li> <li>Review secondary data</li> <li>Consult local and national meteorological and scientific institutions</li> <li>Integrated Climate Risk Analysis for Adaptation and Mitigation               <ul style="list-style-type: none"> <li>Use hazard maps, local climatology data, climate projections</li> <li>Scientific vulnerability assessments</li> <li>Crunch model to determine HxExV/C (hazards, exposure, vulnerability and adaptive capacity)</li> <li>GHG emission inventory</li> </ul> </li> <li>Examine CC risk in physical, social/cultural, economic, environmental, political/ institutional planning sectors of coastal health and agricultural forestry, water (C,H,A,W,F) ecosystem through multistakeholder PCVA (participatory capacities and vulnerability assessments)</li> <li>Use Climate Adaptation Anticipatory Matrix</li> <li>Create and monitor climate-informed HxExV/C per sector, per element, per ecosystem</li> <li>Validate data with and make available to stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>In the face of disaster and climate-related risks, what does the LGU aspire for the local population, local economy, natural environment, local leadership/ governance and the built environment?</li> <li>Use multi-stakeholder, evidence-based visioning process by reflecting in climate and other hazard-informed risk assessment conducted</li> <li>Does the LGU need to reduce its GhG emissions?</li> <li>Does the vision give consideration to the need of LGU to build adaptive capacities against climate and other hazards?</li> <li>Does the practical vision factor in the following:               <ul style="list-style-type: none"> <li>Human safety, human security, disaster resilience, climate adaptation, significant reduction of vulnerabilities, readiness,</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Per sector</li> <li>Per year</li> <li>RA 10121, amended RA 9729, RA 7160</li> <li>Considered strategies for current and future extreme events and other climate-related hazards (ie increase in temperature, precipitation, frequency of typhoons, sea level rise, storm surges, wave heights) and geo-hazards</li> <li>Consider the ff.: Remove exposure of communities and assets to hazards</li> <li>Reduce vulnerabilities per hazards</li> <li>Increase adaptive capacities per hazards</li> <li>Consider adaptive mitigation or forms of adaptation that contribute to inter-generational well-being</li> <li>Adaptation and mitigation per ecosystem</li> <li>Use ecosystem-based education</li> <li>Specify strategies for resilience in governance, risk assessment, early warning, knowledge mgt., vulnerability</li> </ul>	<ul style="list-style-type: none"> <li>Per sector, per year</li> <li>Clustered strategy, project/activity, annual estimated cost, timeline</li> <li>Cost: labor, supplies/materials, administrative overhead</li> <li>Create enabling programs, projects, activities that will help develop resilience by reducing risks to current and future climate and disaster-related hazards and help promote low carbon or GhG programs, projects, activities per sector</li> <li>Allow multi-stakeholder participation in the PPA design process</li> <li>Are these activities risk-reducing or risk-enhancing</li> <li>Do the activities help in reducing greenhouse gas emissions? Specifically, do they help reduce carbon emissions?</li> <li>Do the activities help in reducing any specific vulnerabilities to disaster or any climate-related risks in the present and in the future?</li> <li>Do the activities consider the PROVISIONING, SUSTAINING, CULTURAL AND REGULATING VALUE of the elements within an ecosystem in the planned program project activity?</li> <li>Will the activities enable people, structures, livelihoods, etc. in the community to adapt to projected climate-related and other risks?</li> <li>Are the rights of the people in the community guaranteed in the process?</li> <li>Are the activities gender and culturally-sensitive?</li> <li>Will the activities encourage multi-stakeholder participation?</li> </ul>	<ul style="list-style-type: none"> <li>Per sector, per year</li> <li>Identify funding: General Fund or other sources</li> <li>Mode of procurement</li> </ul> <p>Where can the funding come from?</p> <ul style="list-style-type: none"> <li>IRA: General Fund</li> <li>Disaster Risk Reduction and Management Fund</li> <li>People's Survival Fund</li> <li>ODA (official development aid support for CC and DRR initiatives</li> <li>SK Fund</li> <li>Access to available adaptation funding</li> <li>Private sector contribution</li> <li>Counter-part from other stakeholders (ie NGOs, international humanitarian organizations, academic and scientific institutions)</li> </ul> 	<ul style="list-style-type: none"> <li>Per sector</li> <li>Performance indicator per project and activity</li> <li>Cost per project</li> </ul> <ul style="list-style-type: none"> <li>Do the indicators reflect what adaptive and coping capacities were developed?</li> <li>Do the indicators reflect resiliency and inter-generational well-being?</li> <li>Do the indicators specify outputs that reflect vulnerability reduction, adaptation to, reduction of exposure to hazards, extreme events (climate extremes) and slow onset impacts of a changing climate per sector?</li> <li>Do the indicators reflect adaptive mitigation or mitigating forms of adaptations?</li> <li>Are there indicators for emission reduction and adaptation in C, H, A, W, F?</li> <li>Are performance indicators MDG-compliant? Do they contribute to Agenda 21, to sustainable development?</li> <li>Do they contribute to the NFSCC or the NCCAP, SNAP, or DRRM Plan?</li> </ul>

**RISK ASSESSMENT INFORMS THE REALITY CHECK and FEEDS INTO THE INVESTMENT PROGRAMMING**



# 12 Steps to Mainstreaming Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) in Development Planning: A Practitioner's Perspective

1

- Identify climate-related hazards
- Use climate projections; if absent, use climate trends
- Check PAGASA or local scientific institutions for local climate data
- To identify other hazards: check PHVOLCS for geophysical hazards, MGB for rainfall-induced landslides, and other development analysis from government agencies and from Universities and Colleges

2

- Identify elements exposed to the climate—related hazards
- Identify sectors exposed to the climate—related hazards
- Identify elements and sectors exposed to geophysical and other natural hazards and to human-induced hazards

3

- Determine the vulnerability of each sector and element at risk to climate-related hazards and to other forms of past, current and immediate and future hazards
- Use vulnerability assessment tools

4

- Determine the coping (for DRR) and adaptive (CCA) capacity of your constituency
- Use asset-based mapping tools (assess social, economic, physical, environmental, and institutional capacities and assets)

5

- Determine how the changing climate will affect each exposed sector and element given specific vulnerabilities and adaptive capacities (for CCA)
- Determine how the changing climate will interact with other forms of hazards to affect your exposed sectors
- Determine how current climate and weather-related hazards alongside geophysical, ecological and other hazards will affect your exposed sectors (for DRR)
- Use influence diagram/tools
- Ask the help of and work with scientists in your area

6

- Ask further help from and work with the scientific community in the translation of climate projections into probable impacts.

7

- Determine what climate-related (for CCA) and disaster risk-related vulnerabilities you want to reduce and what coping (for DRR) and adaptive (for CCA) capacities you want to enhance vis a vis the projected climate hazards (for CCA) and the current hazards (for DRR)

8

- Identify specific programs, projects and activities (PPA) that will help reduce vulnerabilities and develop adaptive capacities (for CCA) and coping capacities (for DRR)

9

- Ascertain whether such actions are also contributing to your other development goals. Analyze benefits and constraints
- Prioritization of PPAs

10

- Identify Performance Indicators, Capacity Building Needs, Policy Requirements, Supplies Needed, Implementing Agency, Time frame Budget Needed

11

- Identify budget

12

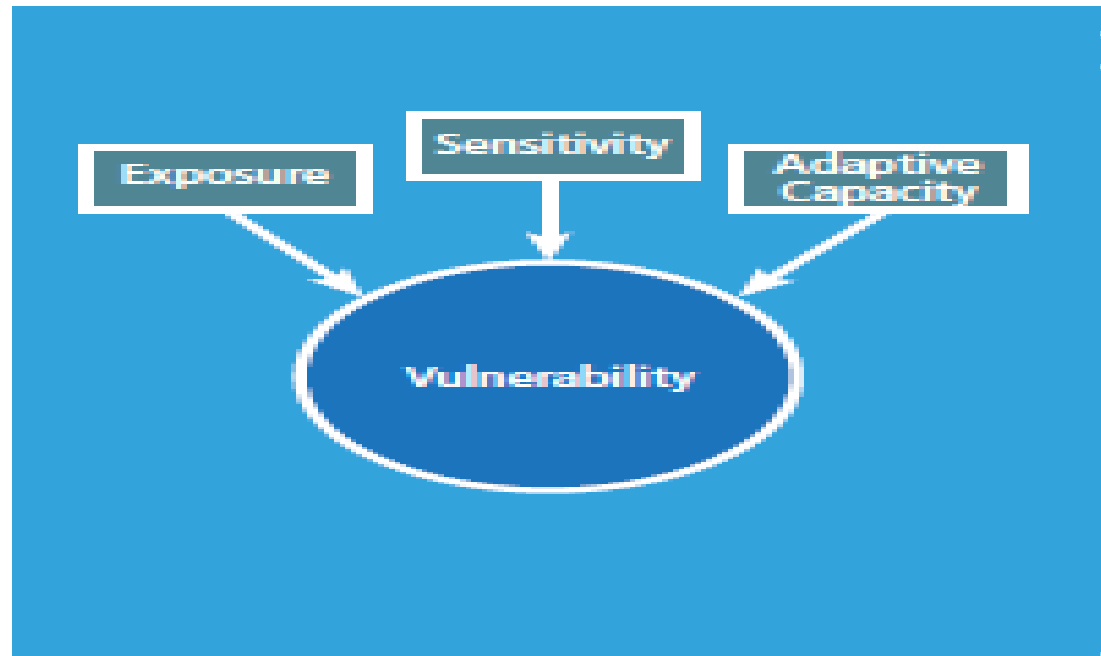
- Transfer data, information, analysis produced into the AIP and other planning and budgeting templates



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# Risk = Hazard x Vulnerability

$$V = f(\uparrow E, \uparrow S, \downarrow AC)$$







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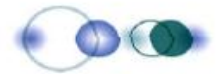
# What we also need to understand for the agriculture sector :

## THE GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS



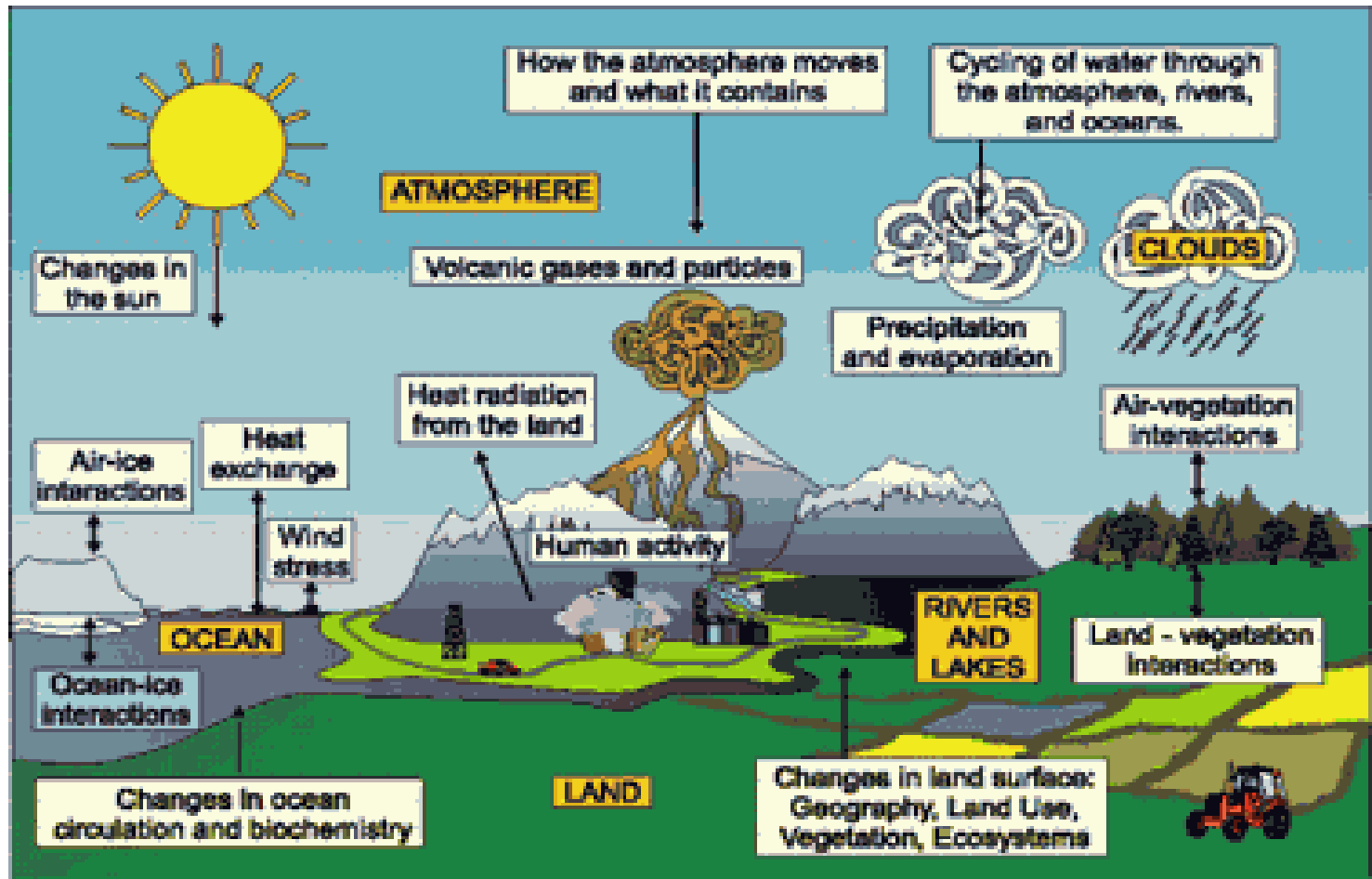
**GEO** GROUP ON  
EARTH OBSERVATIONS

**GEO BON**





# Climate Change and Ecosystems



SOURCE: [orc.gov.nz](http://orc.gov.nz)





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Figure 1. Understanding our Essential Climate Variable

Domain	Essential Climate Variables
Atmospheric (over land, sea and ice)	<p>Surface: Air temperature, precipitation, air pressure, surface radiation budget, wind speed and direction, water vapour</p> <p>Upper-air: Earth radiation budget (including solar irradiance), upper-air temperature (including MSU radiances), wind speed and direction, water vapour, cloud properties</p> <p>Composition: Carbon dioxide, methane, ozone, other long-lived greenhouse gases,<sup>a</sup> aerosol properties</p>
Oceanic	<p>Surface: Sea surface temperature, sea surface salinity, sea level, sea state, sea ice, current, ocean colour (for biological activity), carbon dioxide partial pressure</p> <p>Sub-surface: Temperature, salinity, current, nutrients, carbon, ocean tracers, phytoplankton</p>
Terrestrial <sup>b</sup>	<p>River discharge, water use, groundwater, lake levels, snow cover, glaciers and ice caps, permafrost and seasonally-frozen ground, albedo, land cover (including vegetation type), fraction of absorbed photosynthetically active radiation (fAPAR), leaf area index (LAI), biomass, fire disturbance</p>

<sup>a</sup> Including nitrous oxide, chlorofluorocarbon, hydrochlorofluorocarbon, hydrofluorocarbons, sulphur hexafluoride and perfluorocarbons.

<sup>b</sup> Includes run-off ( $m^3 s^{-1}$ ), groundwater extraction rates ( $m^3 yr^{-1}$ ) and location, snow cover extent ( $km^2$ ) and duration, snow depth (cm), glacier/ice cap inventory and mass balance ( $kgm^2 yr^{-1}$ ), glacier length (m), ice sheet mass balance ( $kgm^2 yr^{-1}$ ) and extent ( $km^2$ ), permafrost extent ( $km^2$ ), temperature profiles and active layer thickness, above-ground biomass ( $t ha^{-1}$ ), burnt area (ha), date and location of active fire, burn efficiency (percentage of vegetation burned per unit area)

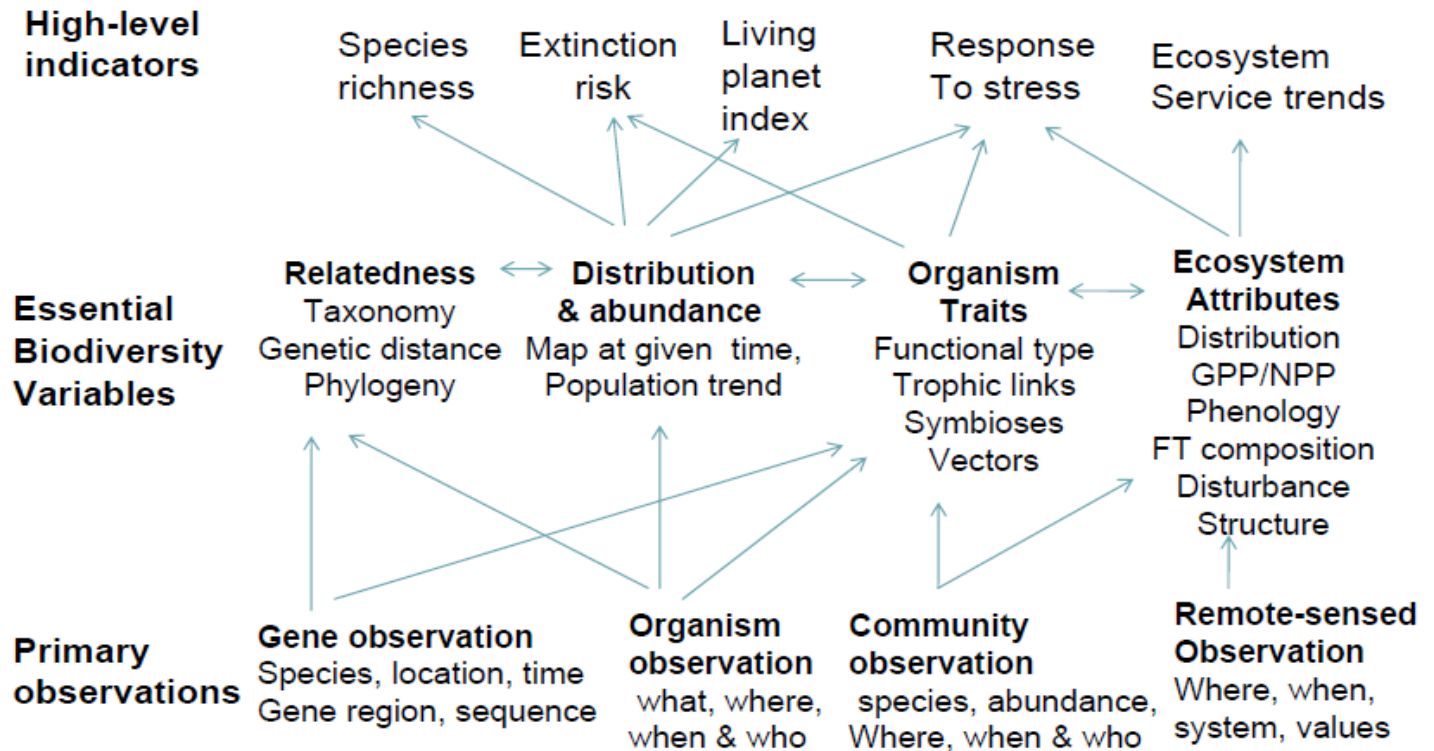




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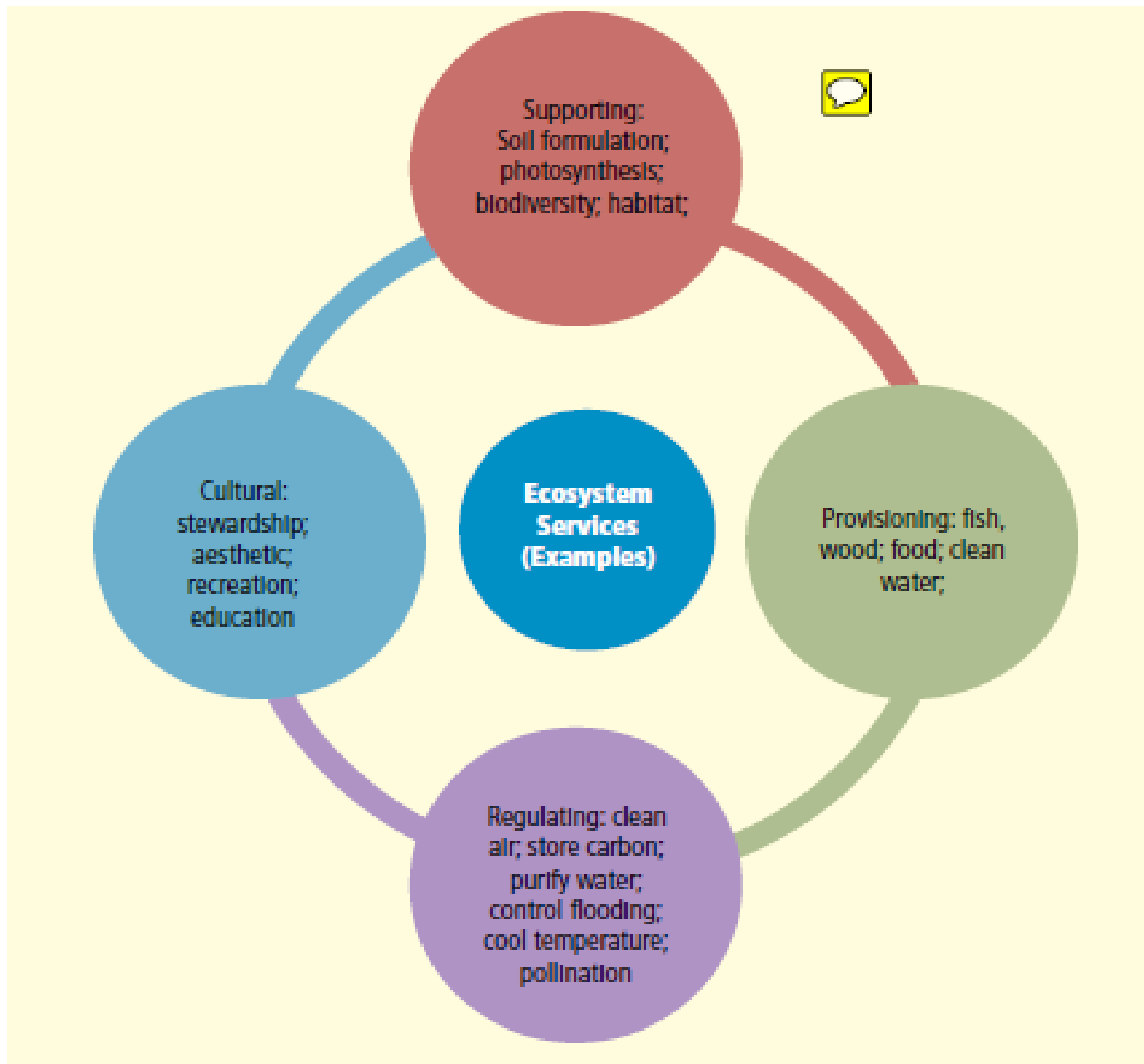
# Understanding the interaction between ECVs and EBVs

## A multilevel system





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# **The Need to Develop Informed CCA and DRR Options**



## SUMMARY TABLE FOR ASSESSING VULNERABILITY AND ADAPTATION OPTIONS

Indicate Sample Ecosystem: Terrestrial / upland

CURRENT HAZARDS (based on climate projections; at least 30-year climate analysis)

SECTORS	VULNERABILITY									IMPACTS	Program, plans or action to REDUCE EXPOSURE	Program, plans or action to REDUCE SENSITIVITY	Program, plans or action to INCREASE ADAPTIVE CAPACITY
	Exposure			Sensitivity			Adaptive Capacity						
	Variable	Indicator	Source	Variable	Indicator	Source	Variable	Indicator	Source				
Physical													
Social													
Economic													
Environmental													
Institutional													

These DRR and CCA options, resulting from analysis of ways to reduce EXPOSURE, reduce VULNERABILITY, and increase ADAPTIVE CAPACITY can be transformed into PROGRAMS, PLANS, and ACTIVITIES for the LDRRMFIP, the LDRRM Plan, the local CCA Plan, and eventually for the Annual Investment Plan (AIP)

## LGU BUDGETS

## OBJECTS OF EXPENDITURES

1. GENERAL FUND	
1.1 Personnel Services Fund	Salaries & wages fro DRR/CCA staff
1.2 MOOE Fund	Supplies & materials for DRR-CCA office
1.3 Capital Outlay Fund	Infrastructure, building, equipment
2. 20% LOCAL DEV'T FUND	Development, resilience & adaptation
3. ±5% DRRM FUND	Disaster risk reduction fund
4. (?) LOCAL CCA FUND	Climate adaptation fund
5. 10% SK FUND (for brgys. only)	Youth development programs, projects
6. NEW FEES AND CHARGES	For DRR-CCA Initiatives
7. COST-SHARING OF LGUs	DRR-CCA Initiatives

## OTHER SOURCES OF BUDGETS

## OBJECTS OF EXPENDITURES

1. DOF-LOGOFIND DRRM Fund	DRR/CCA Initiatives
2. NGA DRRM per RA 10121	DRR/CCA Initiatives
3. National DRRM Fund	DRR/CCA Initiatives
4. International Funding Institutions	DRR/CCA Initiatives
5. Official Development Assistance	DRR/CCA Initiatives
6. NGO-CSO Funds	DRR/CCA Initiatives
7. Public-Private Partnership Funds	DRR/CCA Initiatives
8. Joint Venture Funds per RA 7160	DRR/CCA Initiatives
9. People's Survival Fund	Climate change fund for LGUs and communities (CSOs)
10. Seal of Disaster Preparedness, Sasakawa Award, etc.	DRR Monetary Incentives

**POSSIBLE  
FUND  
SOURCES  
FOR CCA  
AND DRR**

# Preparing the LDRRMFIP from COA 2012-002



ANNEX A

## Local Disaster Risk Reduction and Management Fund Investment Plan (LDRRMFIP)

January to December 20\_\_

Province/City/Municipality/Barangay \_\_\_\_\_

Functional Classification (1)	Program/Project/Activity Code and Description (2)	Implementing Office (3)	Schedule of Implementation		Expected Output (6)	Funding Source (7)	Amount of Approp/Allo		
			Starting Date (4)	Completion Date (5)			MOOE (8)	CO (9)	Total (10)
9 – Other Purposes	94 – Disaster Risk Reduction and Management Program 1-Relief and Recovery *	LDRRMO	NA	NA		LDRRMF	xx		xx
	2- Preparedness and Mitigation Projects –MOOE								
1 - General Public Services	<ul style="list-style-type: none"> <li>Training</li> </ul>								
4- Health	<ul style="list-style-type: none"> <li>Medical Supplies</li> <li>Medicines</li> </ul>								
	3- Preparedness and Mitigation Projects – CO								
3- Education	<ul style="list-style-type: none"> <li>Rehabilitation of school buildings</li> </ul>								
6- Housing & Community Development	<ul style="list-style-type: none"> <li>Construction of Evacuation Center</li> </ul>								
	4- Others								
6- Housing & Community Development	<ul style="list-style-type: none"> <li>Premium on insurance of evacuation center</li> </ul>								

Risk assessment can result to DRR and CCA options that can be transformed into Programs/Projects/Activities for the LDRRMFIP – PLEASE NOTE that entries in LDRRMFIP will still have to be consolidated in the AIP (Annual Investment Plan) and the LDIP (Local Development Investment Plan)

\* Functional Classification will be based on projects and activities implemented.

Prepared by:

Approved by:

LDRRMO

Local Chief Executive



CY \_\_\_\_\_ Annual Investment Program (AIP)  
By Program/Project/Activity by Sector  
As of \_\_\_\_\_

Province/City/Municipality/Barangay: \_\_\_\_\_



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Risk assessment can result to DRR and CCA options that can be transformed into Programs/Projects/Activities for the AIP

AIP REFERENCE CODE (1)	PROGRAM/PROJECT/ACTIVITY DESCRIPTION (2)	IMPLEMENTING OFFICE/ DEPARTMENT	SCHEDULE OF IMPLEMENTATION		EXPECTED OUTPUTS (6)	FUNDING SOURCE (7)	AMOUNT (in thousand pesos)			
			STARTING DATE (4)	COMPLETION DATE (5)			Personal Services (PS) (8)	Maintenance and Other Operating Expenses (MOOE) (9)	Capital Outlay (CO) (10)	TOTAL (11)
General Public Services (10)										
Economic Services (80)										
Social Services (30)										

**Instructions:** This form shall be prepared by the planning and budget office of the local government unit based on the approved Local Development Plan of the LGU as approved by the Local Sanggunian. The annual component of the Capital Expenditure (Capex) shall be inputted by the Planning Officer and shall be integrated by the Budget Officer together with the Personal Services (PS), Maintenance and Other Operating Expenses (MOOE) and other Capital Outlay (CO) into the total resource Annual Investment Program as basis for the preparation of the Annual Budget.

Column 1. Indicate the reference code for the sector/sub-sector as per UBOM in order to facilitate consolidation of requirements.  
 Column 2. Describe briefly the program/project/activity to be implemented and accomplished by the LGU (i.e. infrastructure projects, programs or activities).  
 Column 3. Identify the office/department that will implement the program/project/activity.  
 Column 4&5. Specify the targeted starting and completion date.  
 Column 6. Describe the output or results in quantified terms (e.g. 3 kilometers of concrete road, 200 cavans of paddy per hectare, 10 hectares of reforested area, 400 pupils functionally literate, 5% reduction in infant mortality rate).  
 Column 7. Indicate the funding source of the program/project/activity. Specify if sourced locally from the General Fund or grant/loan from outside sourcing or subsidy from the national government.  
 Column 8. Indicate the estimated amount of the program/project/activity broken down into PS, MOOE and CO.

This form has to be signed by the Local Development and Planning Officer and Budget Officer and attested by the Local Chief Executive or his duly authorized representative.

Prepared By: \_\_\_\_\_

Attested by: \_\_\_\_\_

Planning Officer: \_\_\_\_\_

Budget Officer: \_\_\_\_\_

Local Chief Executive: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_