Climate and Disaster Risk Assessment in Land Use Planning

Experience from the Housing and Land Use Regulatory Board Technical Planning Assistance Program (HTPAP): The Case of Gloria, Oriental Mindoro in the Philippines

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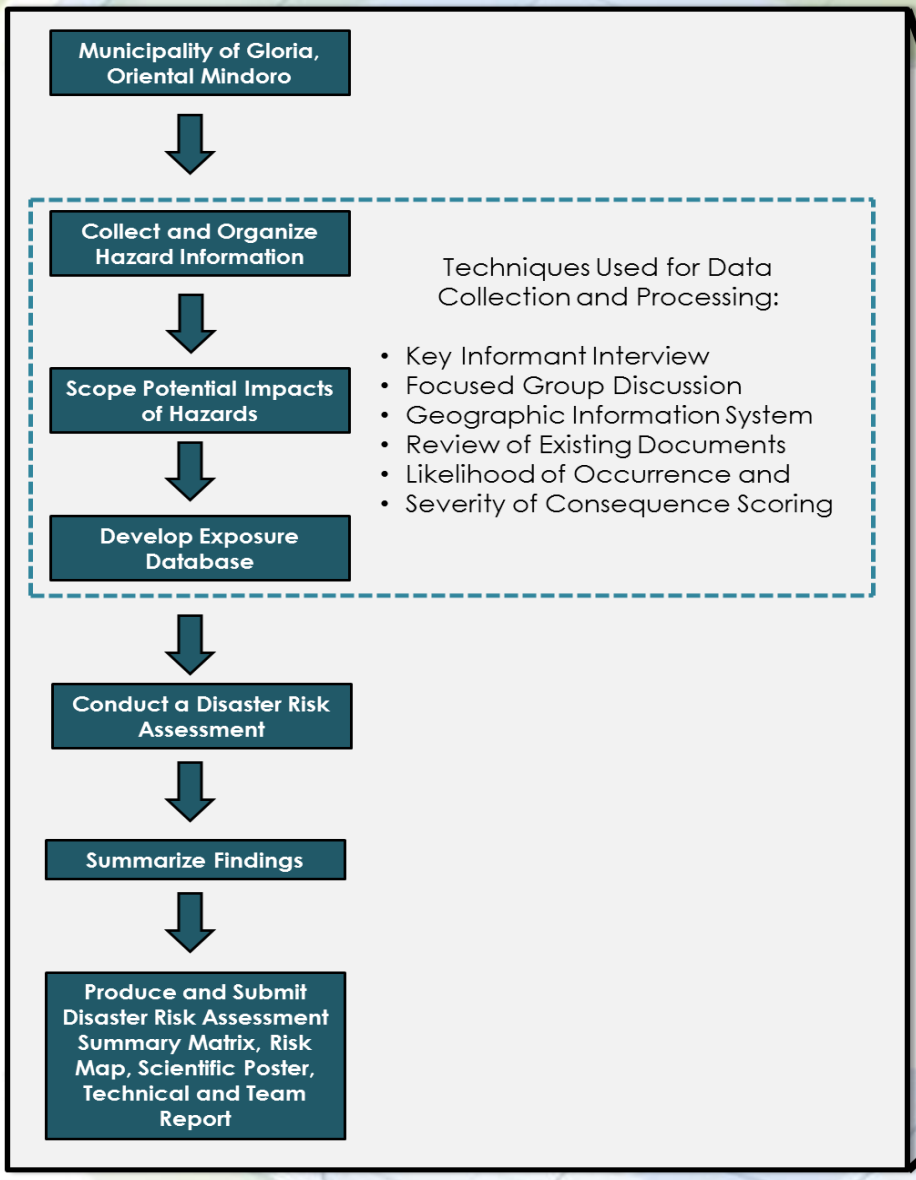
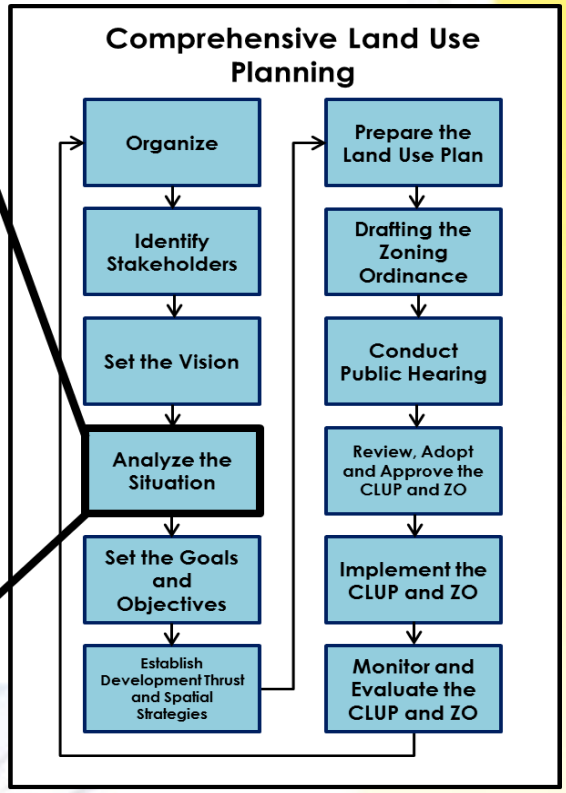
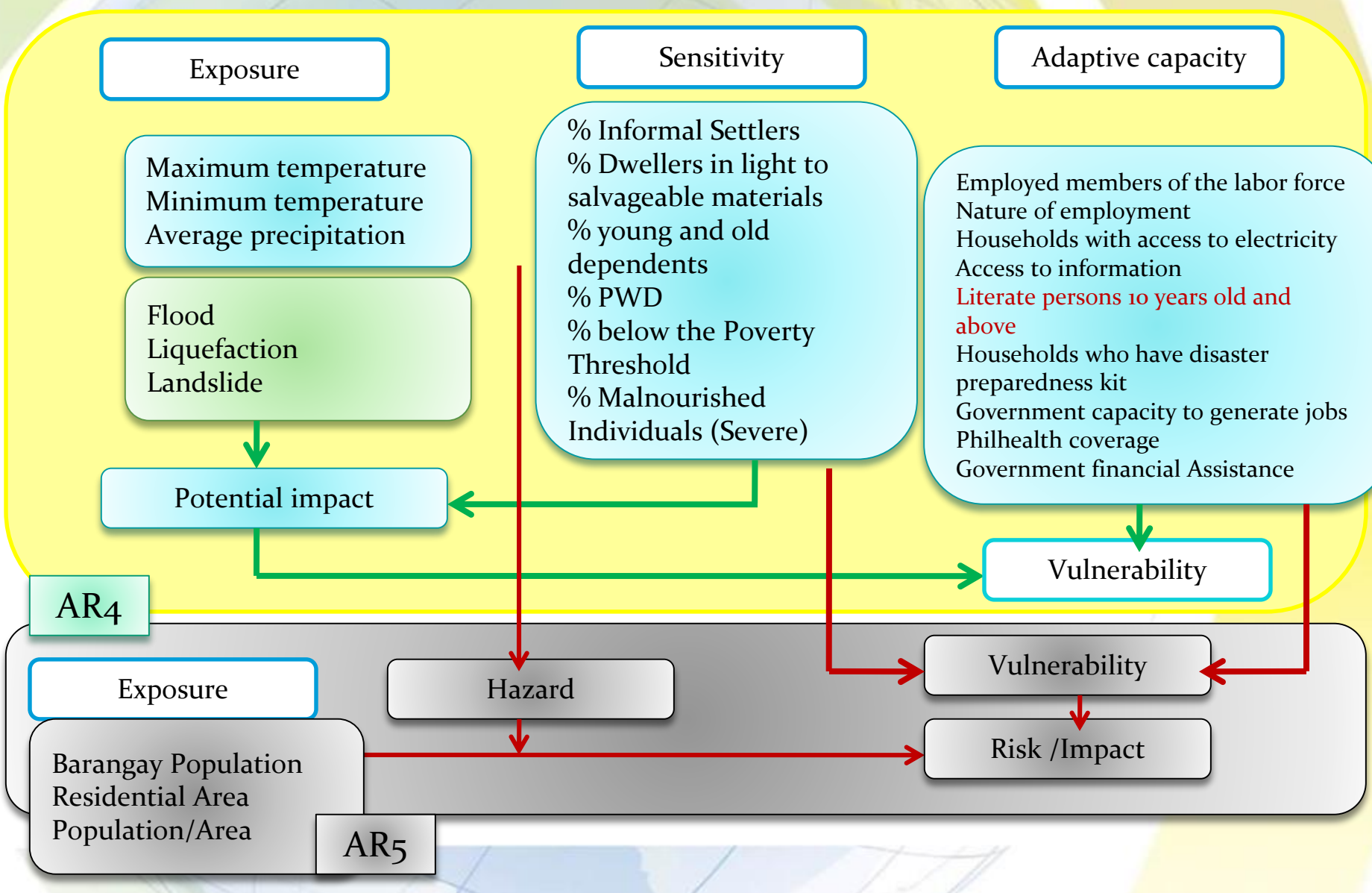
Operational framework for disaster risk assessment of Gloria, Oriental Mindoro





System of interest covered by the vulnerability and risk assessment

1. **Lifeline utilities**: transportation, water distribution, drainage and power & communication distribution network
2. **Critical point facilities**: schools, hospitals, RHUs, LGU buildings
3. **Natural Resource Based Production Areas**: Agricultural Crops, Fishery, Forest
4. **Urban**: Built environment - residential, commercial, industrial, tourism, sanitary waste management facilities, cemeteries
5. **Population**: spatial location and no. of potentially affected persons


Exposure
Sensitivity
Adaptive capacity
Maximum temperature
Minimum temperature
Average precipitation
Flood
Liquefaction
Landslide
% Informal Settlers
% Dwellers in light to salvageable materials
% young and old dependents
% PWD
% below the Poverty Threshold
% Malnourished Individuals (Severe)
Employed members of the labor force
Nature of employment
Households with access to electricity
Access to information
Literate persons 10 years old and above
Households who have disaster preparedness kit
Government capacity to generate jobs
Philhealth coverage
Government financial Assistance
Potential impact
Vulnerability
AR4
Exposure
Hazard
Vulnerability
Risk /Impact
Barangay Population
Residential Area
Population/Area
AR5

Hazard and Climate Information

1. Use of climate change projection from DOST-PAGASA
2. Records of Previous Disaster: Hazard events and description, affected barangays, casualties, damage to houses and properties (in PHP)
3. Projected changes in climate variables and potential affected exposure units
4. Climate Impact Chain Diagram (biophysical and socio-economic impacts included)

Exposure

Exposure of system of interest is assessed per hazard.

NATURAL RESOURCE BASED PRODUCTIONAREAS							
Landslide Susceptibility	**Likelihood of Occurrence Score**	**Area by Dominant Crop (Has.)**	**Dominant Crop**	**Exposed Area (Hectares)**	**Exposure %**	**Ave. Potential Income per Hectare per year (PhP)**	**Exposed Value (PhP)**
AGRICULTURE RICE							
Low	6	2554.592	Rice	2448.1198	95.83%	₱136,800.00	₱334,902,788.64
Moderate	5			97.1111	3.80%	₱136,800.00	₱13,284,798.48
High	5			9.3611	0.37%	₱136,800.00	₱1,280,598.48
MIXED VEGETATION							
Low	6	12988.869	Banana	7004.2474	53.92%	₱60,000.00	₱420,254,844.00
Moderate	5			1875.3769	14.44%	₱60,000.00	₱112,522,614.00
High	5			4109.2447	31.64%	₱60,000.00	₱246,554,682.00
FISHERIES							
Low	6	22.4431	Rice	8.7957	6.82%	₱136,800.00	₱1,203,251.76
Moderate	5			14.0262	62.50%	₱136,800.00	₱1,918,784.16
High	5			93.5887	417.00%	₱136,800.00	₱12,802,934.16

Indicative Likelihood of Occurrence Scores.

Source: adapted from Reference Manual on Mainstreaming Disaster Risk Reduction and Climate Change Adaptation in the Comprehensive Land Use Plans, NEDA-HLURB-UNDP, 2012.

Measure of Likelihood	Return Period in Years	Likelihood Score
Frequent	Every 1-3 years	6
Moderate	Every >3-10 years	5
Occasional	Every >10-30 years	4
Improbable	Every >30-100 years	3
Rare event	Every >100-200 years	2
Very rare event	Every >200 years	1

Conclusion of CDRA Report of Gloria, Oriental Mindoro includes recommendations on:

1. Policy interventions
2. Climate change adaptation per sector
3. Disaster risk reduction

Disaster risk assessment per system of interest

Example of disaster summary matrix for critical point facilities.

DECISION AREA NAME	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTION
AGOS	• The multipurpose hall is not susceptible to flooding • Prone to low susceptible to flooding are the Health Center and the Barangay Hall. • All critical point facilities are susceptible to low level of landslide • Moderate susceptibility to flooding are the Basketball court, Agos Elementary School, Catholic Church, church, Day Care center • All critical point facilities are exposed to moderate liquefaction. • There is an existing open court.	• Multipurpose hall of Agos is the safest area when flooding occurs. • Critical point facilities that are exposed to hazards are not safe as evacuation centers. • Evacuation centers are not safe in liquefaction. • Open court can be utilized as evacuation site.	• Establishment of evacuation centers on areas that are safe from hazards. • Evacuation centers should be fortified to withstand liquefaction of underlying soils. • Convert open court to covered court.

Disaster risk assessment per system of interest

Example of disaster summary matrix for lifeline utilities.

DECISION AREA NAME	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
NATIONAL ROAD	• 0.524 kilometers of National Highway are exposed to high susceptibility of flooding with low risk. The estimated likelihood of occurrence of every 11-30 years. These are some parts of Narra, Kawit and Maligaya National road. • 5.45 Kilometers are exposed to moderate flooding. This is a rare event that happens every 100-200 years. These are some parts of Narra, Kawit and Maligaya National road.	• Major disruption in transportation of agricultural produce. • Difficulty in evacuation and response.	• Establishment of alternate routes. • Formulation of flood contingency plans targeting potentially affected communities.

Thank you.