Cagayan de Oro City
Local Climate Change Action Plan
(LCCAP)

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City Planning & Development Office

N Hotel, Cagayan de Oro City, October 26, 2017
After TS Sendong (2011)

- LDRRM Plan
- Flood Contingency Plan (*Twin Phoenix*)
- Disaster Risk Assessment
- VAA (*WFP/UN Habitat*)
- Climate Change Adaptation Strategies
- Mainstreamed DRRM and CCAM concerns in the CLUP, CDP, and other plans. (*among the first in the country*)
- LCCAP (*Be Secure Project of USAID*)
Section 14 of RA 9729 or the Climate Change Act of 2009:

- The LGUs shall be the frontline agencies in the formulation, planning and implementation of climate change action plans in their respective areas, consistent with the provisions of the Local Government Code, the Framework, and the National Climate Change Action Plan.
What’s inside the CdeO LCCAP?

1. VULNERABILITY AND ADAPTATION ASSESSMENT (VAA)
2. ADAPTATION AND MITIGATION OPTIONS
3. MONITORING AND EVALUATION
1. Vulnerability And Adaptation Assessment (VAA)

- Exposure Analysis
  - Historical Trends and Observed Changes
  - Projected Climate Change in Cagayan de Oro
  - Characteristics of Climate-Related Hazards
    1. Flood (due to increase in average precipitation)
    2. Tropical Cyclone / Typhoon
    3. El Niño (Drought)
    4. Rain-Induced Landslide (RIL)
    5. Sea Level Rise (SLR)
    6. Ocean Acidification
**Increase in Temperature**

**OBSERVED CHANGES**
- From 1981 to 2010, annual mean temperature is 26.8 °C while average relative humidity is 81%.

**PROJECTED CHANGES**
- Increase in average temperature between 1.0 to 1.2°C by 2020 and 1.9°C to 2.4 °C in 2050. This is approximately 27.5°C and 28.55°C in 2020 and 2050.
- Increase in sea surface temperature

Source: PAGASA
Changes in Rainfall Pattern

OBSERVED CHANGES

- Average from 2001-2011: 1,500 mm per year & 125 mm per month
- Rainy season (June-November), average rainfall per month is 184.43mm
- Dry season (December-May), average rainfall per month is 95.66mm

PROJECTED CHANGES

- Generally, there is a reduction in rainfall volume during summer (MAM) season while a rainfall increase is likely during (DJF) and (SON) season

Source: PAGASA
• Current and Future Impacts of Climate-Related Hazards

✓ Impact of Flood
✓ Impact of Typhoon/Tropical Cyclone
✓ Impact of El Niño-induced Drought
✓ Impact of Rain-Induced Landslides
✓ Impact of Sea Level Rise and Ocean Acidification
## Current and Future Impacts of Climate-Related Hazards

<table>
<thead>
<tr>
<th>Climate Drivers</th>
<th>Hazards</th>
<th>Impacts</th>
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</thead>
<tbody>
<tr>
<td>Increase in precipitation</td>
<td>Flood</td>
<td>• Severe soil erosion that leads to siltation of rivers, creeks, and tributaries&lt;br&gt;• Loss/damage of livestocks, crops and equipment&lt;br&gt;• Disruption of economic activities&lt;br&gt;• Loss of lives and damages to properties</td>
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<tr>
<td>Climate Drivers</td>
<td>Hazards</td>
<td>Impacts</td>
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<tr>
<td>Increase in precipitation</td>
<td>Rain-induced landslide</td>
<td>• Soil erosion and damage to vegetative cover</td>
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<td>• Production and productivity are severely affected</td>
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<td>• Lowering farm-income and revenues</td>
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<td></td>
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<td>• Destruction of access roads and properties</td>
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<td>Climate Drivers</td>
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<td>Impacts</td>
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<tr>
<td>Increase in temperature</td>
<td>Drought</td>
<td>• Destruction of natural wildlife habitat</td>
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<td>• Insufficient water supply affecting irrigation leading to low crop yield</td>
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<td>• Public health issues</td>
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<td>• Loss of income</td>
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<tr>
<td>Sea level rise</td>
<td></td>
<td>• Reduction of land area along the coast</td>
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<tr>
<td>Increasing water acidity</td>
<td></td>
<td>• Saltwater intrusion</td>
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<td>• Lessening of corals/Imbalance of maritime ecosystem</td>
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<tr>
<td>Climate Drivers</td>
<td>Hazards</td>
<td>Impacts</td>
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<tr>
<td>Extreme weather events</td>
<td>Typhoon</td>
<td>• Strong winds destroying mangroves and other marine resources</td>
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<td>• Coastal inundation</td>
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<td></td>
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<td>• Disruption in livelihood (fishing)</td>
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<td></td>
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<td>• Disruption in recreational activities</td>
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<td></td>
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<td>• Destruction of/damage to infrastructure</td>
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<td></td>
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<td>• Internal displacement</td>
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<td></td>
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<td>• Loss of income</td>
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# Summary of Vulnerabilities and Adaptive Capacities to Climate Change

<table>
<thead>
<tr>
<th>Vulnerabilities</th>
<th>Adaptive Capacities</th>
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</table>
| Congested settlements along Waterways, Riverbanks, and Coastline | Flood-Adaptive Housing  
  - Some residents living near the shoreline and riverbanks have elevated their houses or installed additional floor/s and roof exits |
| Relocation of At-Risk Households                  |  
  - Shelter Plan for informal settlers in high-risk areas developed and approved  
  - Availability of safe relocation sites  
  - Approved establishment of a separate office solely devoted to shelter provision |
<table>
<thead>
<tr>
<th>Vulnerabilities</th>
<th>Adaptive Capacities</th>
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</thead>
<tbody>
<tr>
<td>Lack of Awareness on Sea Level Rise and Ocean Acidification</td>
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<tr>
<td>Attitudinal Concerns</td>
<td>High Awareness on the Effects of Flood and Tropical Cyclone</td>
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<tr>
<td></td>
<td>• Lessons from the experience with TS Sendong</td>
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<td></td>
<td>• People already know where to evacuate</td>
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<td></td>
<td>• Some families bring emergency bags or “go bags” in evacuation centers</td>
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<td></td>
<td>• <em>Bayanihan</em> strong when preparing for or confronting hazards.</td>
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<td>Organized Groups</td>
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<td></td>
<td>• Organized farmers and fishers</td>
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<td></td>
<td>• Organizations of youth, PWD, women, indigenous peoples, and home owners</td>
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<td></td>
<td>• Community-based environmental protection groups</td>
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<td></td>
<td>• Cagayan De Oro River Basin Council</td>
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<td>Vulnerabilities</td>
<td>Adaptive Capacities</td>
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<tr>
<td>Destructive Based Economic Activities</td>
<td>Implementation of Supplemental or Alternative Livelihood</td>
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<tr>
<td>Limited livelihood skills</td>
<td>• Alternative and supplemental economic activities which help mitigate the effects of flooding: manual quarrying after flood, selling of filling materials from silted rivers, processing of flood-resistant plants such as <em>kangkong</em> and water hyacinth, small-scale livelihood projects for farmers and fishers</td>
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<tr>
<td>Vulnerabilities</td>
<td>Adaptive Capacities</td>
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<tr>
<td>Unsustainable Agriculture and Limited Support to</td>
<td>Climate-Adaptive Agro-Fishery Practices</td>
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<tr>
<td>Farmers</td>
<td>• Farming practices that help maintain the fertility of the soil and prevent erosion</td>
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<td>(e.g. intercropping, ploughing).</td>
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<td>• <em>Lumad</em> households practice small-scale organic farming for their own food</td>
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<tr>
<td></td>
<td>consumption</td>
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<td></td>
<td>• Planting of crops that can withstand the heat during El Niño (e.g. cassava,</td>
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<td><em>malunggay</em>, and coconut).</td>
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<tr>
<td>Vulnerabilities</td>
<td>Adaptive Capacities</td>
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<tr>
<td>High Mortality Rate of Mangroves</td>
<td>Coastal and Riverine Reforestation Efforts</td>
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<tr>
<td>Limited Greens in Urban Areas</td>
<td>• Implementation of mangrove reforestation projects.</td>
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<tr>
<td>Lack of Available Technology to Protect Marine Life from Ocean Acidification</td>
<td>• Planting of bamboos along the riverbanks</td>
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<td>Vulnerabilities</td>
<td>Adaptive Capacities</td>
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<tr>
<td>Poor Waste Management</td>
<td>Waste Management Program</td>
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<td>• Setting up of sanitary landfill on-going and phasing out from the use of dumpsite.</td>
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<td>• Awareness raising campaign on solid waste management</td>
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<td>• On-going feasibility study on septage management</td>
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<td>Adaptive Capacities</td>
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<tr>
<td>Limited Infrastructure</td>
<td><strong>Climate-Adaptive Infrastructure</strong></td>
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<td></td>
<td>• Evacuation centers (except for those in Bayabas and Tablon) adapted to flooding</td>
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<td>• On-going improvement and expansion of drainage system</td>
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<td>• Sea wall constructed along the shoreline from Lapasan</td>
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<td>• On-going construction of: dike along the CDO and Iponan Rivers, elevated road from</td>
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<td>Lapasan to Bonbon</td>
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<td>• Plan to construct an elevated road from Macabalan to Bugo</td>
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<td>• Farm-to-market roads constructed</td>
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<td>Adaptive Capacities</td>
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<tr>
<td>Limited Sources of Sustainable Water and Energy</td>
<td>Additional and Adaptive Water and Energy Sources</td>
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<td></td>
<td>- Deep wells installed in Lumbia and Taglimao to provide additional water sources</td>
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<td>- Installation of 33 units of high pump water (impounding)</td>
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<td>- Control panels of water pumping stations raised to keep them safe from flood waters</td>
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<td>- Investment in generation sets to ensure sustained electricity and water supply even when power outages occur.</td>
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<td>- Conduct of regular monitoring (bacteriological analysis) of ground water to ensure water safety</td>
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<td>- Use of solar-powered electricity from the photovoltaic generator by CEPALCO</td>
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<tr>
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<tr>
<td><strong>Institutional Limitations</strong></td>
<td><strong>CCAM-Related Institutional Mechanisms</strong></td>
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<td></td>
<td>• Establishment of a GIS Center</td>
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<td>• Functional CDRRMC, with roles and responsibilities of members defined</td>
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<td>• Members of the CDRRMC trained on DRRM and CCA</td>
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<td>• CCA and DRRM concerns integrated in the city LGU’s plans</td>
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<td>• Formulation of contingency plan for flood</td>
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<td>• Installation of a city-wide, end-to-end EW), with hydro meteorological protocol</td>
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<td>• Rapid Disaster Assessment and Needs Analysis (RDANA) Team formed</td>
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<td>• CDRRMO training program that enhances response skills of barangays</td>
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<td></td>
<td>• Some barangays with own community-based EWS</td>
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</tbody>
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2. ADAPTATION AND MITIGATION OPTIONS

- Details the adaptation and mitigation initiatives of Cagayan de Oro City to address its vulnerabilities to current and future climate change impacts.

- Strategic Priority Areas (*DILG template*)

1. Food Security
2. Water Sufficiency
3. Ecological and Environmental Stability
4. Human Security
5. Climate Friendly Industries and Services
6. Sustainable Energy
7. Knowledge and Capacity Development
LCCAP Objectives Vis-à-vis NCCAP Strategic Priority Areas

<table>
<thead>
<tr>
<th>Strategic Priority Area</th>
<th>LCCAP Objectives</th>
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</table>
| 1. Food Security         | • Restore soil fertility and efficiency  
                          | • Reduce damage to farm products and sustain yield even when climate-related hazards occur  
                          | • Develop agricultural infrastructure support and facilities  
                          | • Enhance the knowledge, skills, and attitude of farmers on organic farming  
                          | • Ensure sufficient supply of food/products in urban areas when climate-related hazards occur |
## LCCAP Objectives Vis-à-vis NCCAP Strategic Priority Areas

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<thead>
<tr>
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<th>LCCAP Objectives</th>
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<tbody>
<tr>
<td>2. Water Sufficiency</td>
<td>• Ensure sustained water supply in commercial and business establishments when climate-related hazards occur</td>
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<td></td>
<td>• Sustain supply of water by utilizing climate adaptive resources and structures</td>
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<tr>
<td>Strategic Priority Area</td>
<td>LCCAP Objectives</td>
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<tr>
<td>3. Ecological and Environmental Stability</td>
<td>• Protect and rehabilitate the marine and river sources</td>
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<td>• Intensify reforestation and proper soil management initiatives in upland areas</td>
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<td>• Promote climate resilient forest-based tourism facilities and services</td>
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<td>• Develop green spaces in urban public areas</td>
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<td>• Reduce local carbon emission</td>
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### LCCAP Objectives Vis-à-vis NCCAP Strategic Priority Areas

<table>
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<tr>
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</table>
| 4. Human Security               | • Relocate informal settler families (ISF) in high risk areas (e.g. along the shoreline, riverbank, slopes, etc.) to safe places and resilient houses  
• Reduce incidence of climate-related diseases  
• Develop and introduce supplementary or alternative livelihood for farmers, fishers, and other sectors to help them cope with the effects of climate change |
LCCAP Objectives Vis-à-vis NCCAP Strategic Priority Areas

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<tr>
<td>5. Climate-Smart Services and Policies</td>
<td>• Improve rainwater absorption of urban areas&lt;br&gt;• Construct or retrofit structures that will prevent and mitigate the effects of climate-related hazards in high-risk areas&lt;br&gt;• Intensify the implementation solid waste management and septage management&lt;br&gt;• Develop local ordinances and policies to counter the effects climate-related hazards&lt;br&gt;• Enforce local and national laws that will promote climate change adaptation and mitigation</td>
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<td>LCCAP Objectives</td>
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</table>
| 6. Sustainable Energy   | • Ensure sustained energy supply in commercial and business establishments when climate-related hazards occur  
<pre><code>                      | • Sustain supply of electricity by utilizing climate adaptive resources and structures |
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<table>
<thead>
<tr>
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<tr>
<td>7. Knowledge and Capacity Development</td>
<td>• Enhance the knowledge, skills, and attitude of farmers on organic farming</td>
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<td>• Raise the awareness of city officials and general public on ocean acidification and sea level rise</td>
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<td>• Promote proactive climate change adaptation and mitigation efforts among barangays/barangay officials</td>
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| 7. Knowledge and Capacity Development (cont’n.) | • Strengthen linkage and collaboration between/ among barangay LGUs  
• Enhance partnerships with national government agencies and the private sector for financial and technical support and CSOs in the city towards joint implementation of CCA-related projects |
Daghang Salamat...