

Climate Change and Disaster Risk Reduction

Typhoon Sendong and Cagayan de
Oro

Philippines, Disaster Context

- The Philippines is ranked 3rd out of 173 countries in terms of vulnerability to disaster risks and natural hazards (World Risk Index)
- Due to its geographical location, it is exposed to seismic hazards, and a wide range of weather systems that can bring about high rainfall and strong winds, such as typhoons, the La Nina phenomenon, and the southwest monsoon

Philippines, Disaster Context

- Every year, the country experiences an average of 19-20 typhoons that enter the Philippine Area of Responsibility (not all make landfall)
 - These carry with it the associated threats of flood, landslides, strong winds and storm surge
 - PAGASA notes that extreme events have become more frequent and that there is an increasing trend of typhoons hitting Mindanao – although this was once considered a “typhoon free” zone

WORST TYPHOONS, PHILIPPINES (1947-2009)

NAME	PERIOD	DEATHS	DAMAGED B.PHP	HIGHEST WIND SPEED (kph)	AREAS MOST AFFECTED/ CITY HARDEST HIT
URING (Thelma)	02-07 NOV 1991	5,101	1.045	95 , Tacloban	ORMOC, LEYTE ISLAND
NITANG (Ike)	31 AUG- 04 SEP 1984	1,363	4.100	220, Surigao	SURIGAO, BOHOL, CEBU, NEGROS
FRANK (Fengshen)	18-23 JUN 2008	938	13.321	172, Roxas	ILOILO, CAPIZ, AKLAN, ANTIQUUE, ROMBLON, MARINDUQUE, CALABARZON, NCR, CENTRAL LUZON
ROSING (Angela)	30 OCT- 04 NOV 1995	936	10.829	260, Virac Radar	METRO MANILA, CALABARZON, BICOL (Catanduanes)
REMING (Durian)	26 NOV- 01 DEC 2006	754	5.086	320, Virac	BICOL, CALABARZON, MARINDUQUE, MINDORO

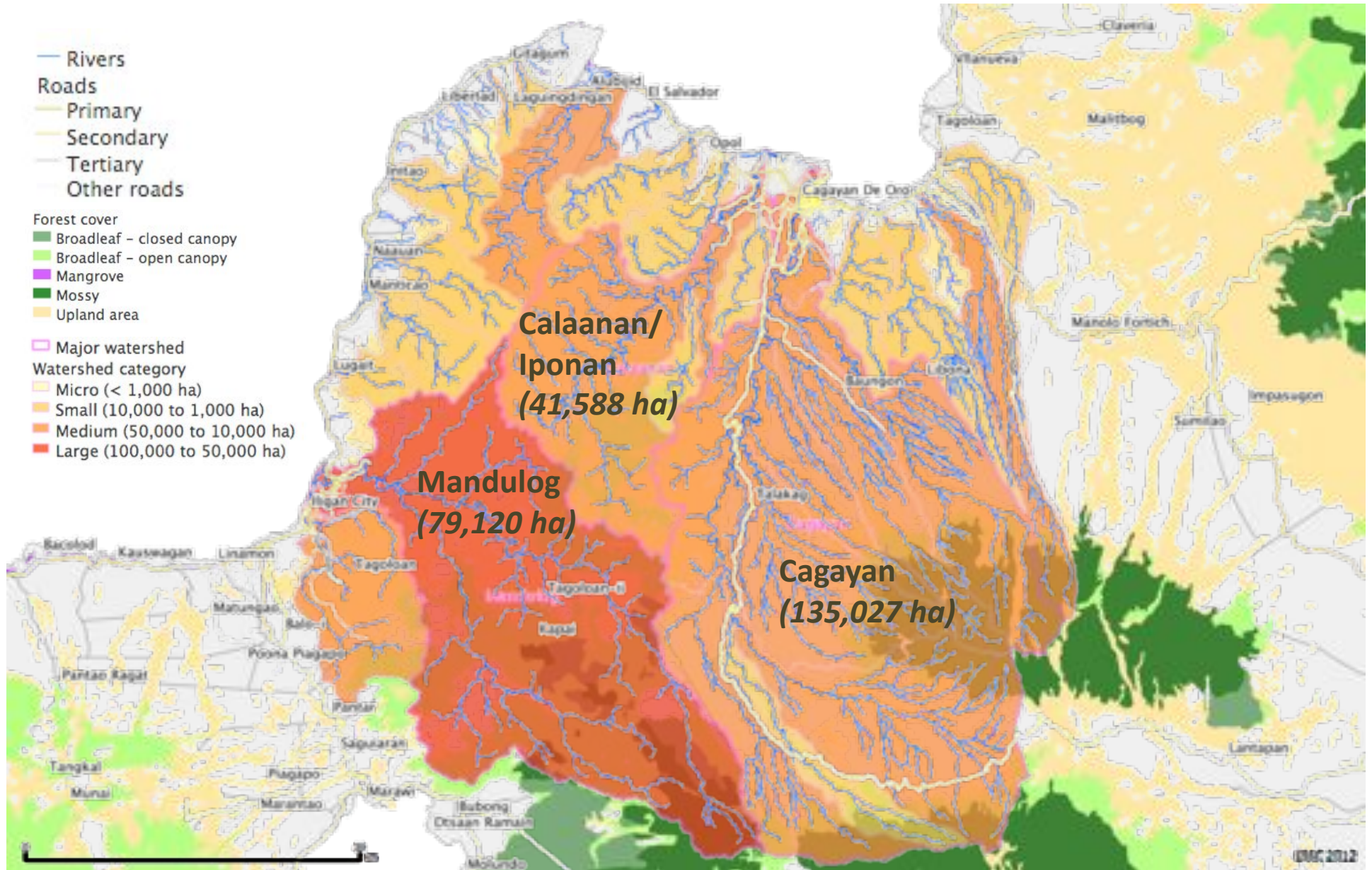
WORST TYPHOONS, MINDANAO (1947-2002)

NAME	PERIOD	DEATHS	DAMAGED B.PHP	HIGHEST WIND SPEED (kph)	AREAS MOST AFFECTED/ CITY HARDEST HIT
NITANG (Ike)	31 AUG- 04 SEP 1984	1363 to 3000	4.100	220, Surigao	SURIGAO, BOHOL, CEBU, NEGROS
SENDONG (Washi)	13-20 DEC 2011	1000+		118	CAGAYAN DE ORO, ILIGAN, VALENCIA
RUPING (Mike)	10-14 NOV 1990-	748	10.846	220, Cebu	VISAYAS (Cebu)
TITANG (Kate)	16-23 OCT 1970	631	1.750	95, Cuyo Island	MINDANAO
INING (Louise)	15-20 NOV 1964	400	0.010	240, Cebu	
PURING (Nell)	25-28 DEC 1993	45	0.152	150, Surigao	

Cagayan de Oro City

- Highly urbanized city serving as the regional hub for Northern Mindanao
- It is located at the lower end of the Cagayan River
 - It has its headwaters at the Mt. Kalatungan Range in Lanao del Sur and is fed by several tributaries from Mt. Kitanglad Range in the province of Bukidnon
 - Its upstream portion is mostly located in the municipalities of Talakag, Baungon and Libona in Bukidnon province

MINDANAO WATERSHED



Cagayan de Oro

- 10 out of 80 barangays in Cagayan de Oro are located along the river and are flood-prone
 - In 2009, these barangays were flooded when the Cagayan River overflowed due to prolonged rainfall
 - These same barangays were also flooded during Tropical Storm Sendong

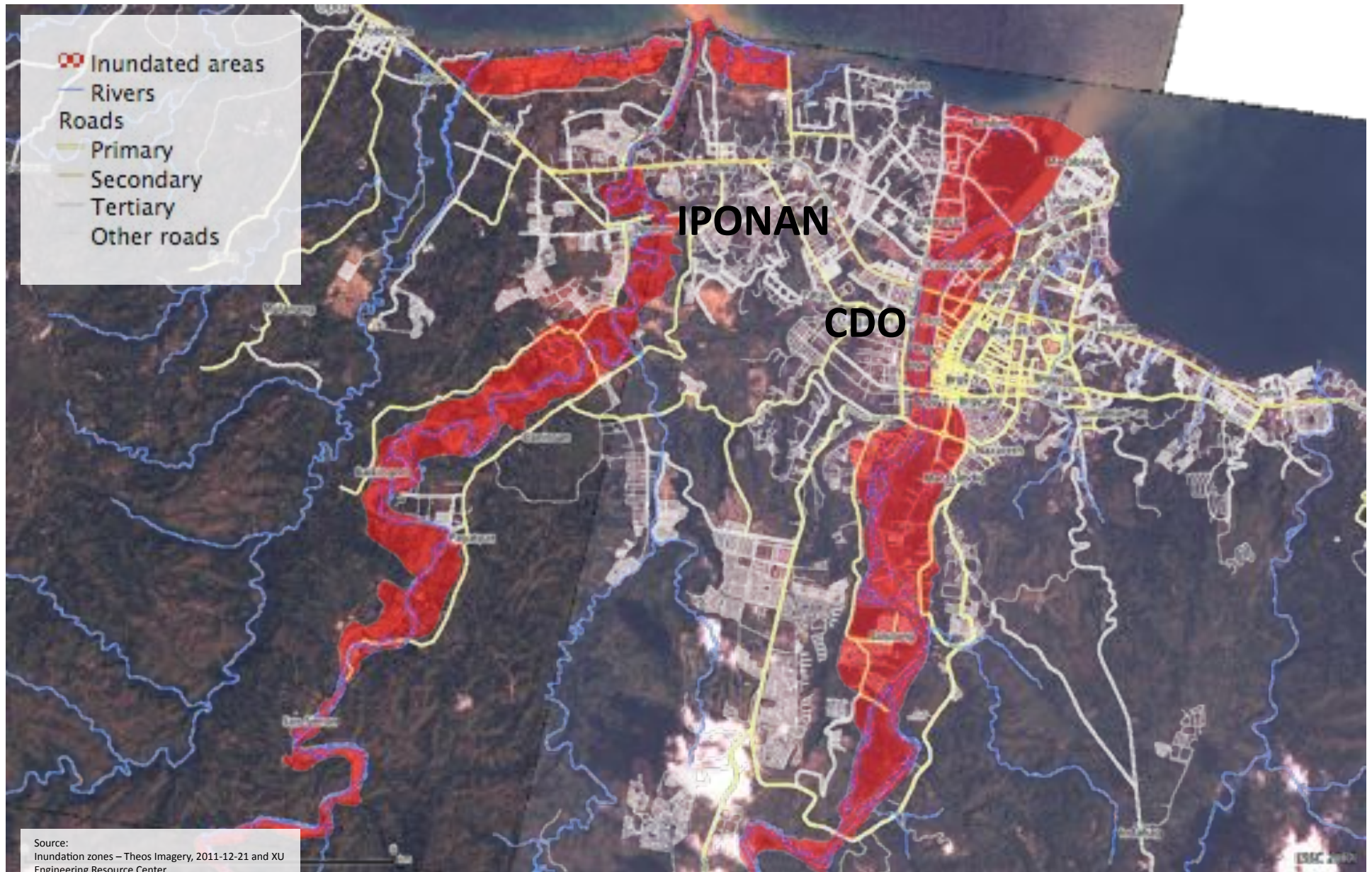
Tropical Storm Sendong

- Tropical Storm Sendong had a 24-hour rainfall of 180.0 mm at the PAGASA station in Barangay Lumbia
 - This exceeded the monthly average of 113.2 mm for December
- Sendong had a maximum wind speed of 118 kph
- The high rainfall triggered the flashfloods, which caused the most destruction

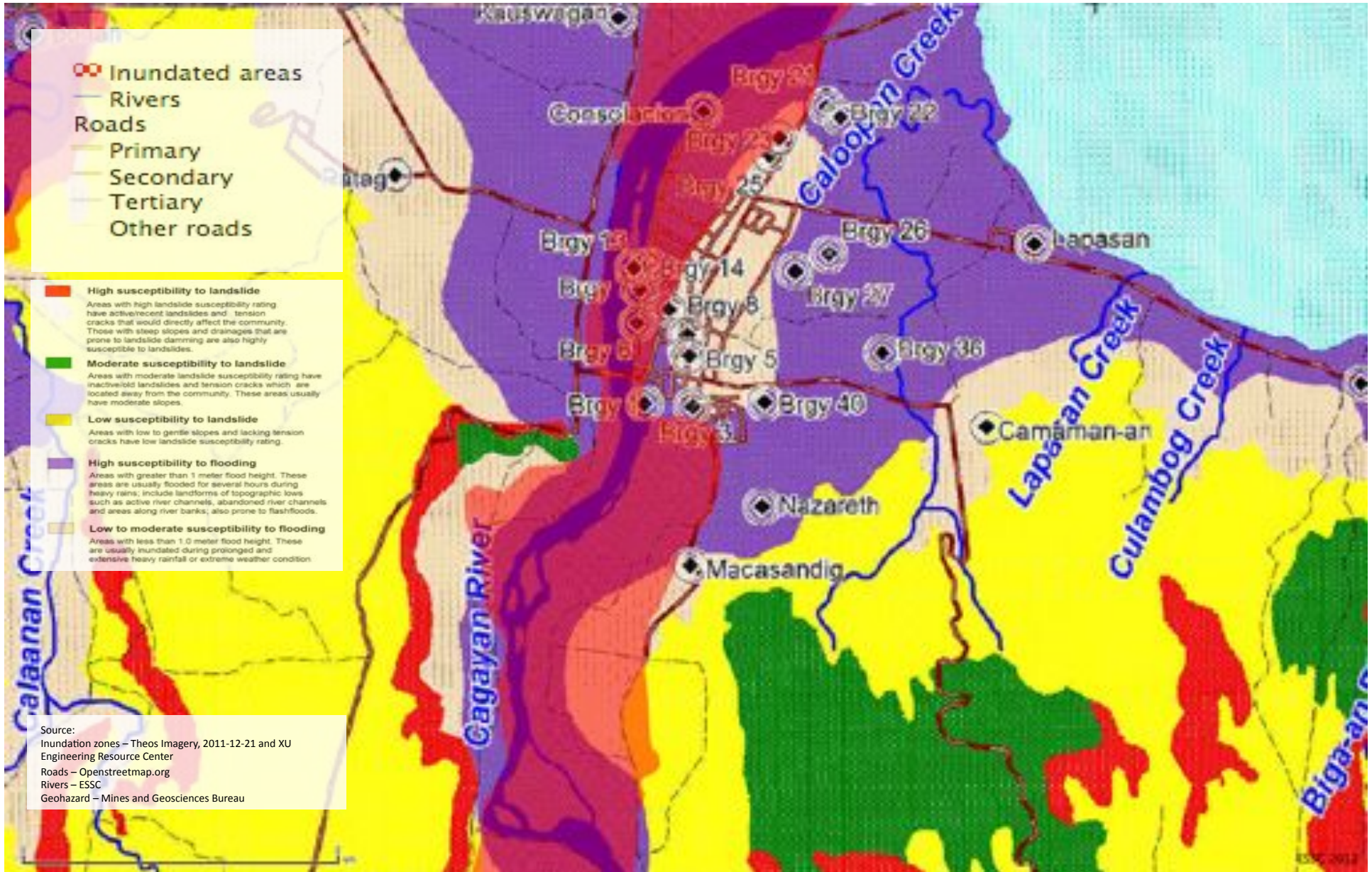
**FLOOD
EXTENT
CDO:
3rd JAN
2009**



FLOOD EXTENT, SENDONG DEC 2011



CDO FLOOD EXTENT, SENDONG DEC 2011



Damage

- In Cagayan de Oro
 - 1,268 casualties
 - 7,317 houses completely damaged
 - 12,635 houses partially damaged
- Barangay Carmen
 - The most populous barangay in the city (pop. 67,471) was among the most devastated
 - More than 8,100 families were rendered homeless or exposed to high risks, requiring them to relocate to safer areas

What do we learn?

- Disasters often occur in housing areas located on flat areas and estuary-floodplains
 - These usually serve as the main drainage channel
 - Communities living on this area are most likely to be severely affected or washed out
- Debris floods and/or flash flood are likely to occur:
 - when a tropical cyclone accelerates from ~30kph in 24 hours & an average sustained winds of ~170kph on land, accumulates 30-200mm/day rainfall – rainfall continuous in 3 or more days

What do we learn?

- Local emergency schemes and social and physical infrastructure need to be enhanced
 - Evacuation paths and centers
 - Public awareness and preparedness: meaning, they need to know what to do during a disaster
 - Importance of communication and early warning

What do we learn?

- Physical infrastructure
 - Building codes/standards that are not always complied with, particularly for low-cost housing
 - Proliferation of sub-standard construction materials
 - Roads, bridges, etc.

What do we learn?

- Economic infrastructure
 - The poor communities are often left with poorest quality land: result is that they build their houses in high-risk, danger zones (flood plains)
 - Livelihoods are dependent on natural resources – highly vulnerable to the impact of climate change and these livelihoods will often be the ones that will be washed out in a disaster

Relocation and Resettlement

- To date, there are 20 relocation areas established by national government agencies, local government and assisting partners in 8 barangays in the city and one site in the municipality of Opol (Misamis Oriental Province)
 - More than 5,760 housing units were completed as of April 2014

Ecoville, Brgy. Lumbia

- 5 hectares – donated by Xavier University
- 568 housing units – all occupied
- Distance from the city – 30 kilometers; transportation cost is Php21.00 (one-way)
- Public elementary school and high school are about 1-km away from the village

Challenges of relocation and resettlement

- Land
 - Availability: can it be procured?
 - Local government is required to do land banking, to set aside portions of land for housing and settlement
 - Challenge of purchasing land when there is prior ownership
 - Reality that most people are not interested in selling their land for socialized, economic or low-cost housing
 - Safety: Is the land safe? Suitable for human settlement?

Challenges of relocation and resettlement

- Access
 - Transport
 - Basic services: health, education
 - Livelihoods
- Provision of basic utilities: water, electricity
- Community building – social capital
 - Many relocation areas are populated by communities that come from different locations; they do not necessarily all come from the same village

LESSONS and NEEDS

1. Watershed management: managing the analyses
2. Prioritization land use planning: scope & capacity
3. Engineering response: mitigation
4. Social preparedness: awareness to evacuation, adaptation to relocation
5. Networks and partnerships: leadership, government, civil society, faith communities, universities and research

WATERSHED MANAGEMENT: FLOODPLAIN MANAGEMENT

- Re-establishment of natural flood areas for this purpose and a development of a floodplain management program and regulations that strictly enforce restrictions and controls in the:
 - alteration of natural floodplains, stream channels, and natural protective barriers that channel floodwaters;
 - developments that increase flood damage; and
 - construction of flood barriers that unnaturally divert floodwaters and increase flood hazards in other areas

MANAGEMENT PLANNING AND CAPACITY: RELOCATION AND LAND ALLOCATION

- Critical review and implementation of land allocation and securing access to assist city and local governments in identifying safe lands for settlements and the **procedures for acquisition**
- A prioritized relocation plan for every city and barangay
- A sustainable relocation that considers people's livelihood accessibility in ways that livelihood is sustained and risks are minimized

SOCIAL PREPAREDNESS: EMERGENCY PREPAREDNESS

- Warning Systems – not just for typhoons, but for all climatic events, in every area of potential risk that is implemented, and not just announced but operationalized
- A day or night evacuation strategy that carefully lays out the location, paths, and methods to reach safe areas for evacuation and temporary settlement

A Framework for Understanding

	Inclusive Economic Development	Inclusive Social Development	Environmental Sustainability	Peace and Security
Governance and the Global Economy These are overarching concerns: what is the governance of this resource concern?				
Resource Concern	What is the situation of economic participation in this case? What are the processes or institutions that exclude or include people?	How is social development taking place in this situation? What are the social development needs and concerns that need to be addressed?	What environmental concerns are raised in this case? What further questions do you have in relation to environment and ecological sustainability?	What is the impact of the issues and concerns in this situation on peace and security?

Other questions you might ask:

- What are some of the ways forward that you can see in terms of developing more resilient and inclusive economic systems?
- What social concerns need further integration in order to ensure resilience to disaster?
- Given the realities of climate change, how do you propose to move forward with ensuring environmental sustainability?
- What are the peace and security concerns that you foresee given the context of climate change/disaster?