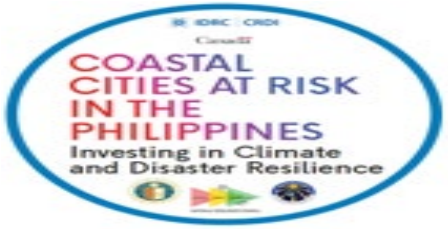

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Vulnerability, Adaptation and Resilience in Metro Manila

By Emma Porio, PhD

Professor, Ateneo de Manila University and Science Research Fellow, Manila Observatory

With the assistance of Emily Roque, Denise Gonzalez Dacera, Maria Ina Salas, Jose Francisco Santiago, Jerem Morales, Ann Malaki

Presented at the Global Emerging Future Markets Forum, Washington DC, Oct 20-22,2019

Risk Reduction ex-ante pays off---Megumi Muto (2019)

Strong need for action at a glance

The 15 countries with the highest **exposure** worldwide	
Country	Exp. (%)
Vanuatu	63.66
Tonga	55.27
Philippines	52.46
Japan	45.91
Costa Rica	42.61
Brunei Darussalam	41.10
Mauritius	37.35
Guatemala	36.30
El Salvador	32.60
Bangladesh	31.70
Chile	30.95
Netherlands	30.57
Solomon Islands	29.98
Fiji	27.71
Cambodia	27.65

The 15 countries with the highest **vulnerability** worldwide	
Country	Vuln. (%)
Chad	74.36
Eritrea	73.98
Afghanistan	73.61
Haiti	73.11
Niger	72.63
Central African Republic	72.50
Liberia	71.52
Sierra Leone	71.28
Mozambique	70.11
Guinea	70.01
Madagascar	69.30
Burundi	69.30
Mali	69.14
Guinea-Bissau	68.70
Nigeria	67.92

The 15 countries with the highest **risk** worldwide	
Country	Risk (%)
Vanuatu	36.45
Tonga	28.57
Philippines	27.69
Guatemala	20.46
Bangladesh	19.57
Solomon Islands	18.77
Costa Rica	17.16
Cambodia	16.92
El Salvador	16.74
Timor-Leste	16.37
Papua New Guinea	16.34
Brunei Darussalam	16.22
Mauritius	15.11
Nicaragua	14.88
Fiji	13.50

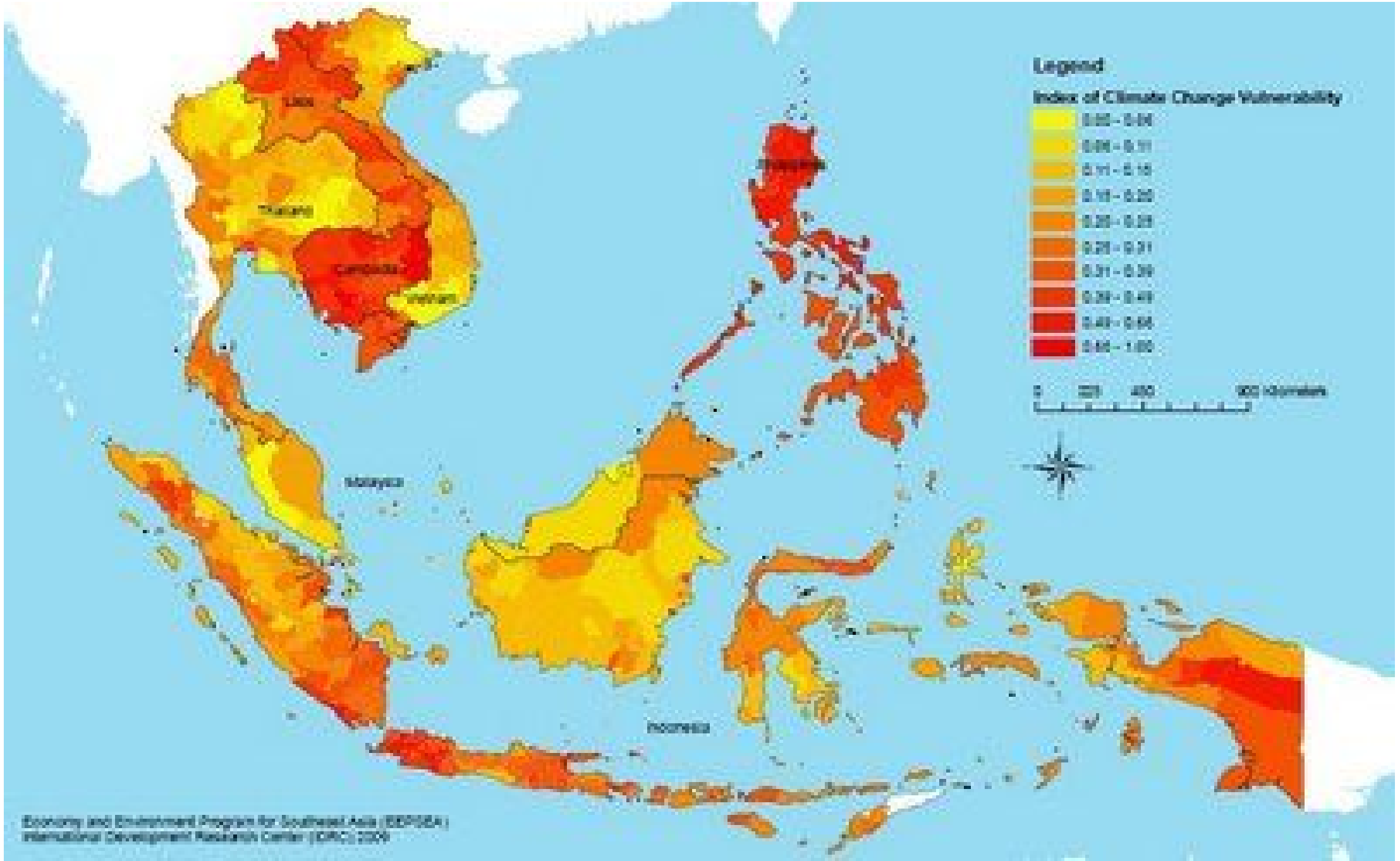
No. 17: JAPAN

From: World Risk Report 2017

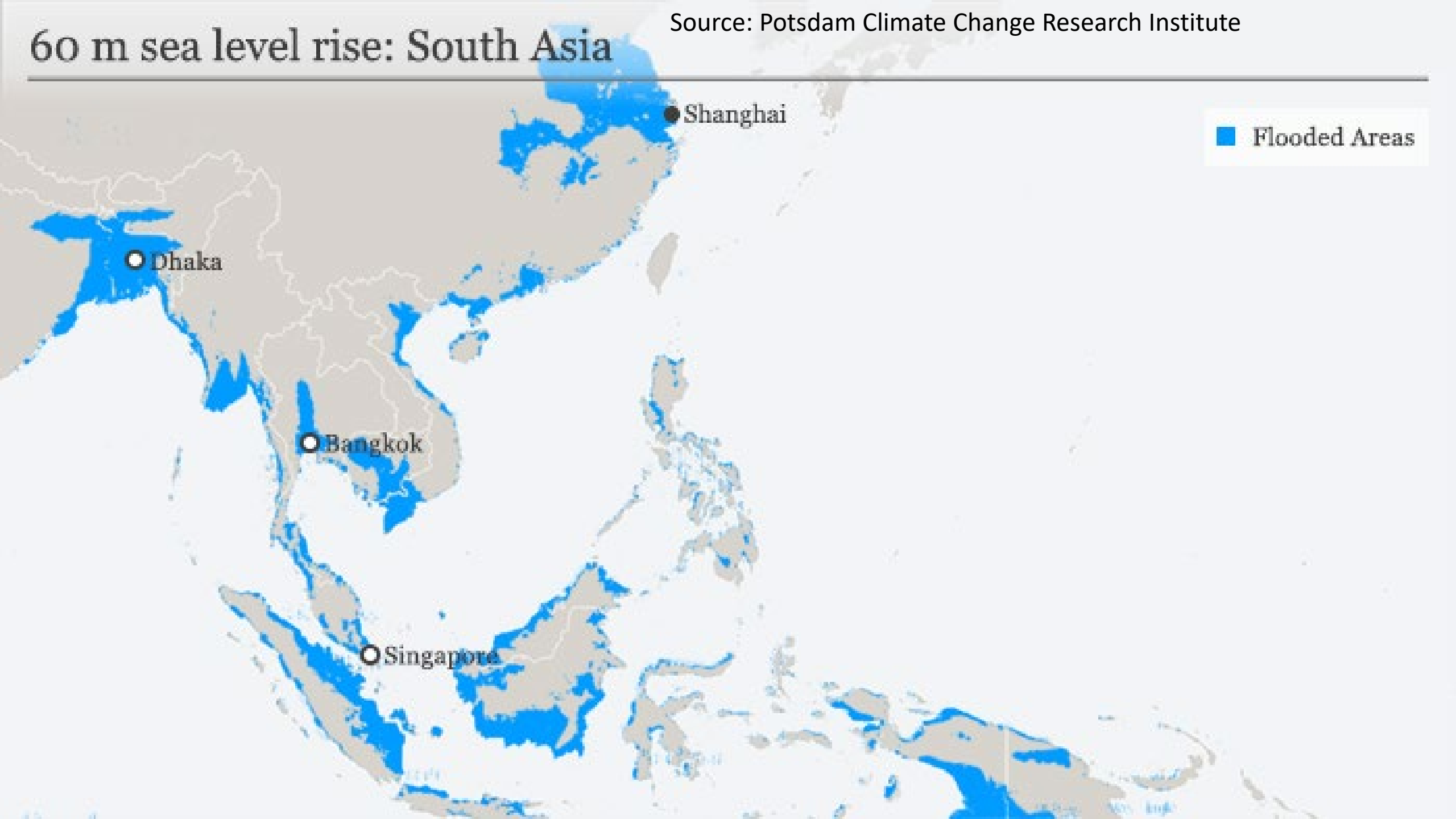
Part I. Key arguments and strengths of Dr. Muto's paper

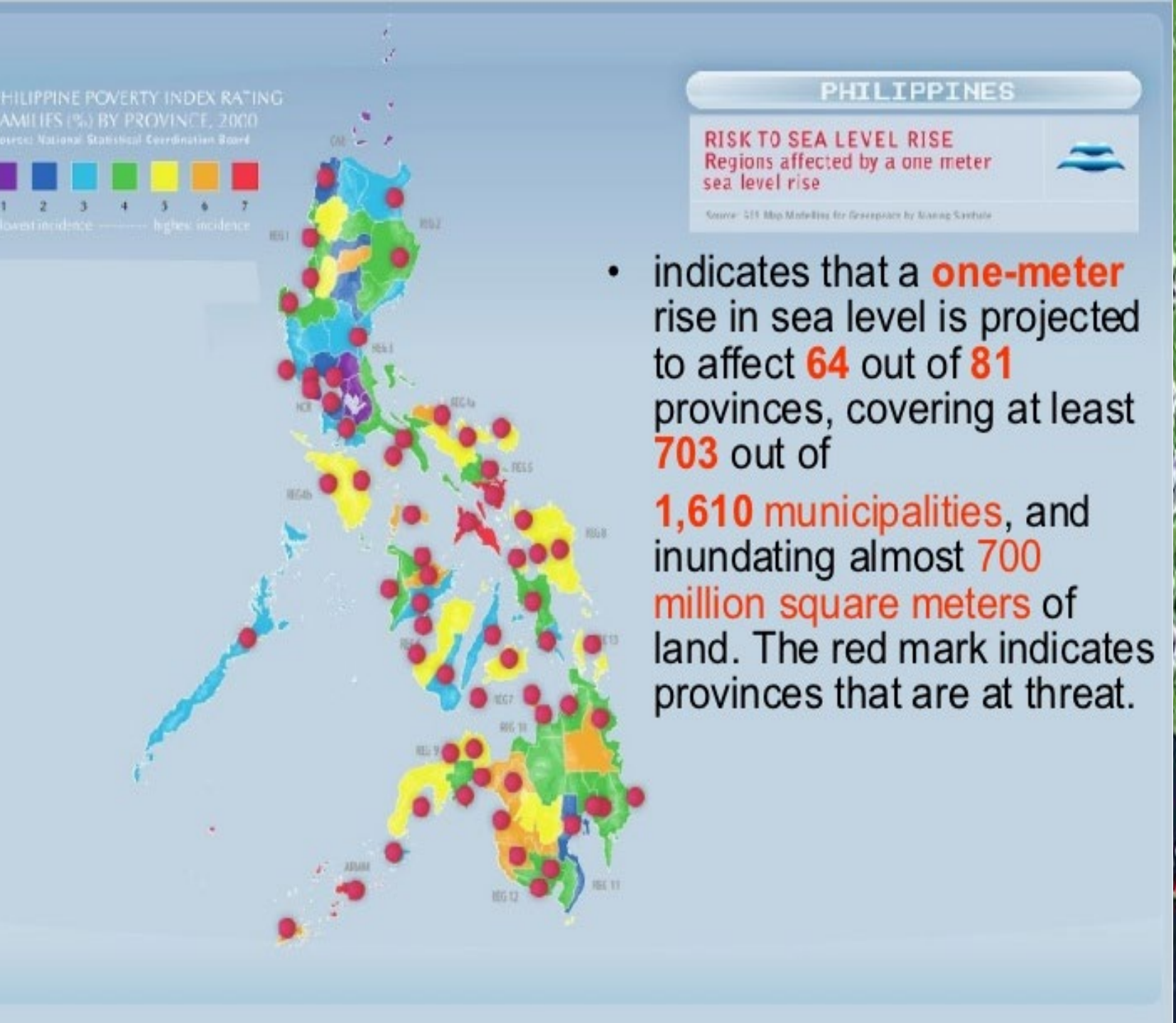
- Excellent paper, well-argued/evidence-based
- Investments in structural investments decreased damage and losses
- But chronic vulnerabilities in Metro Manila (interaction of hazards, exposure and vulnerability) persists
- Difficulties in Implementing Risk Reduction Policies and Programs-overlapping jurisdiction, lack of capacity, resources (especially the less-endowed LGUs) and political will;
- But more successful in Bangladesh towards resilience with structural investments
- Part II—Chronic vulnerabilities of people, communities
- Contextual drivers of chronic vulnerabilities of highly exposed populations of men/women along riverlines, coastal areas deemed "dangerous zones" for habitation.
- Inspired by the work(s) of Dr. Megumi Muto:
- Part III—Paradigm Shift from LGUs being reactive, emergency driven to risk-informed, resilience driven in their policies and programs through the **resilience scorecard**

Southeast Asian Countries: Index of Climate Change Vulnerability

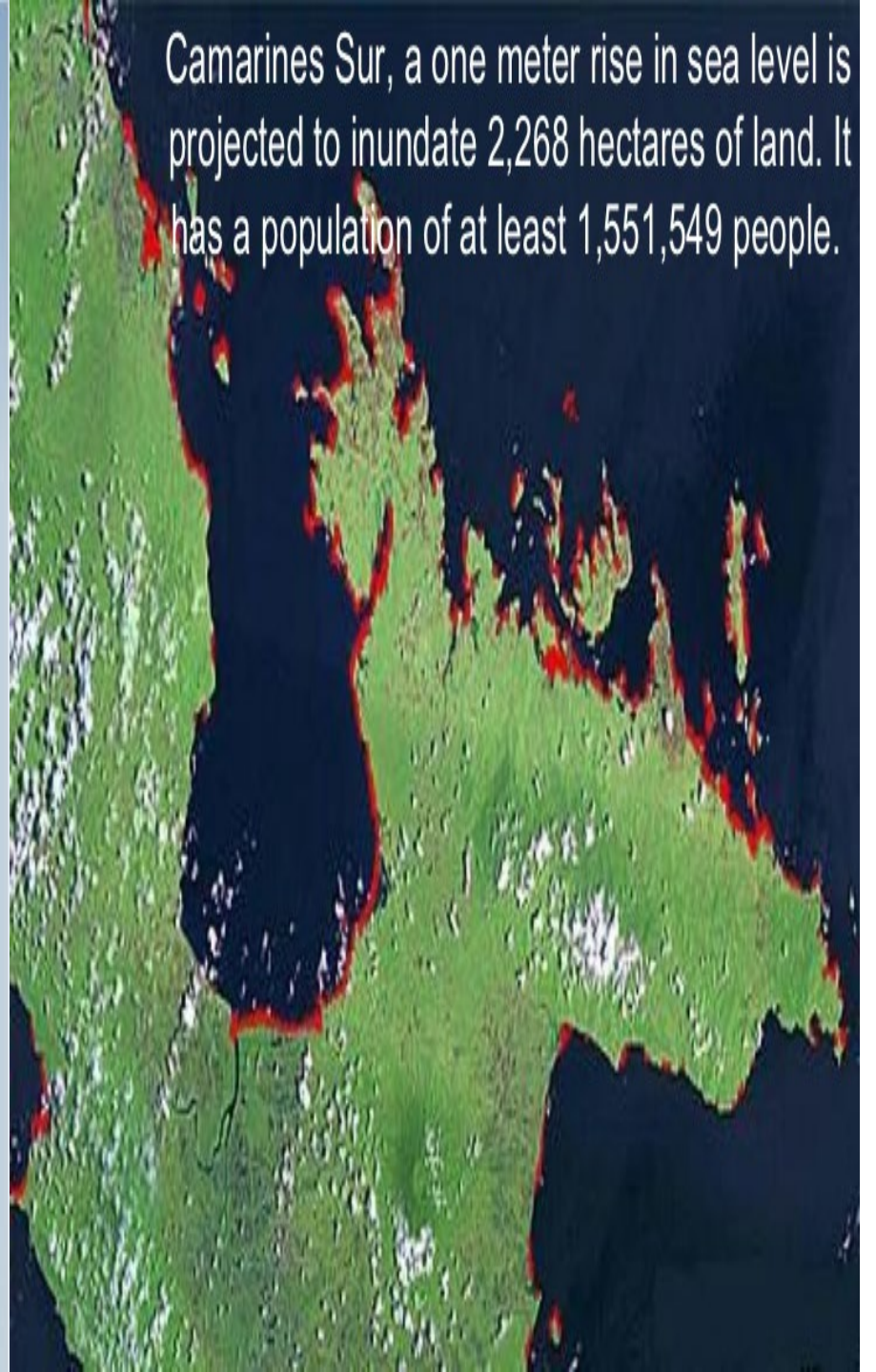


Source: Potsdam Climate Change Research Institute

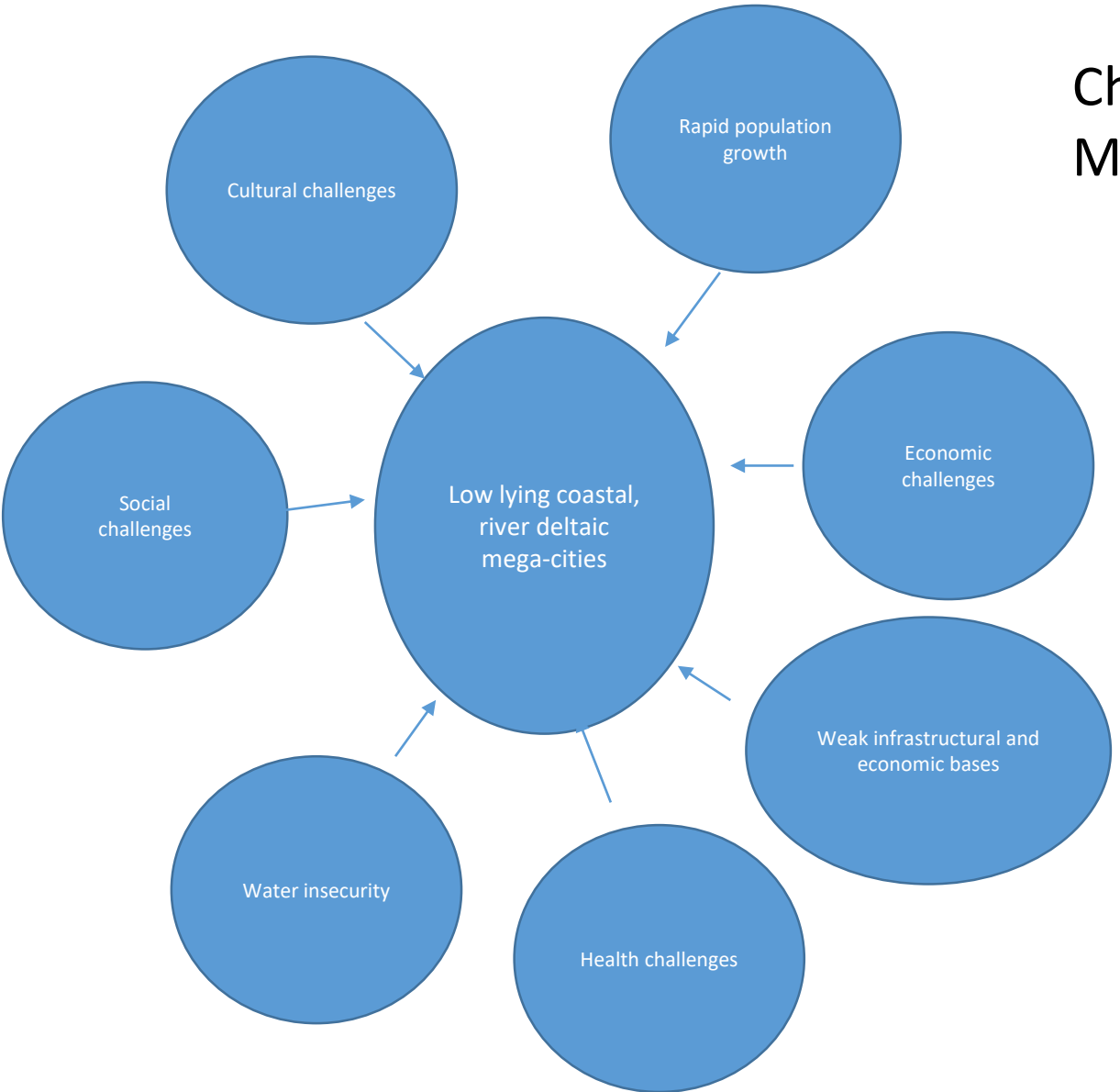




- indicates that a **one-meter** rise in sea level is projected to affect **64** out of **81** provinces, covering at least **703** out of **1,610** municipalities, and inundating almost 700 million square meters of land. The red mark indicates provinces that are at threat.



Challenges to coastal mega cities

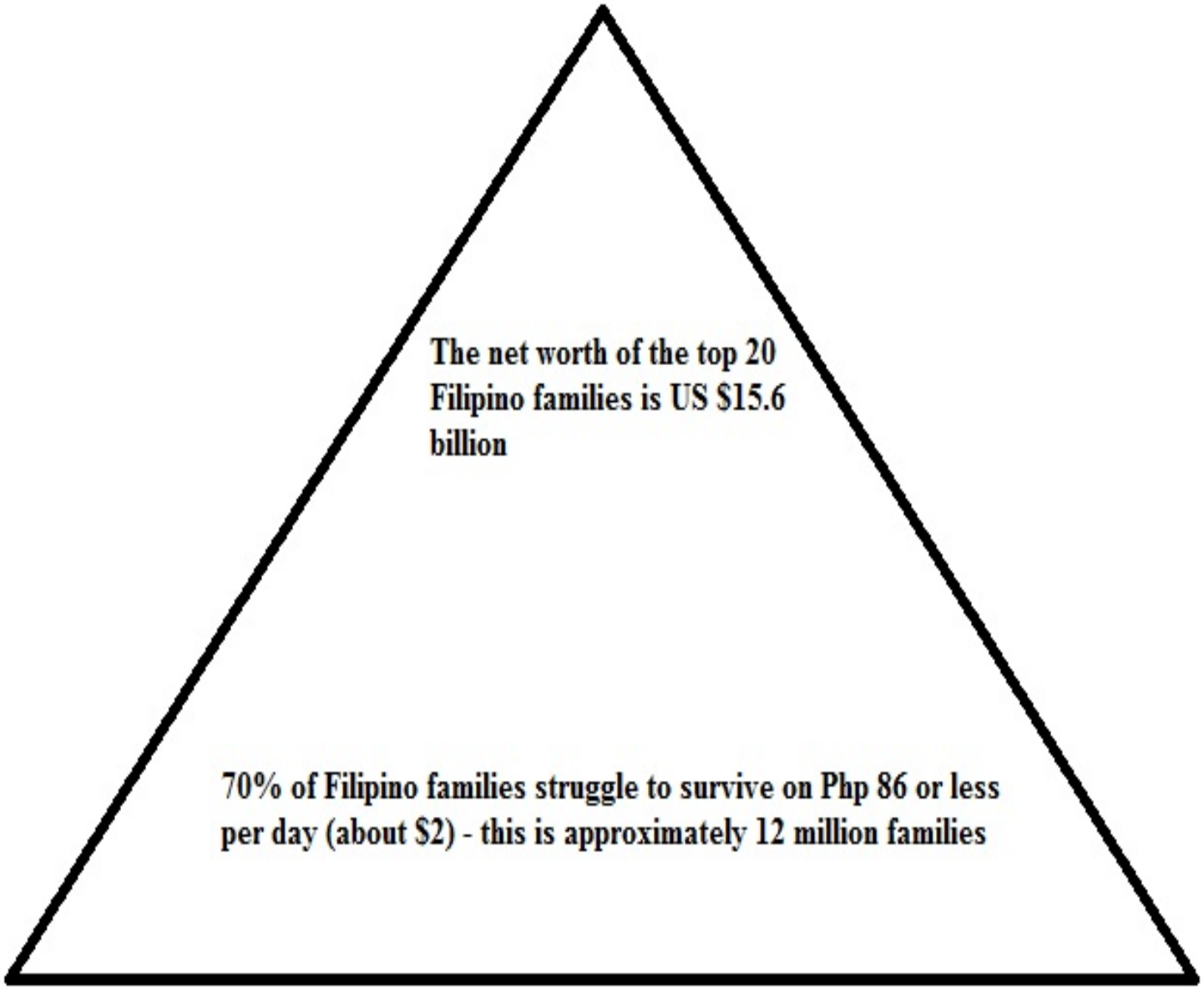


Challenge: Climate, Pollution, etc…Drive Metro Manila's Low Quality of Life

Ketsana Floods 2009, Manggahan Floodway, Metro Manila

Extreme Event: Ketsana 2009

Social Inequality in thePhilippines



Threats to City Resilience:
Poverty, Inequality and Social Exclusion

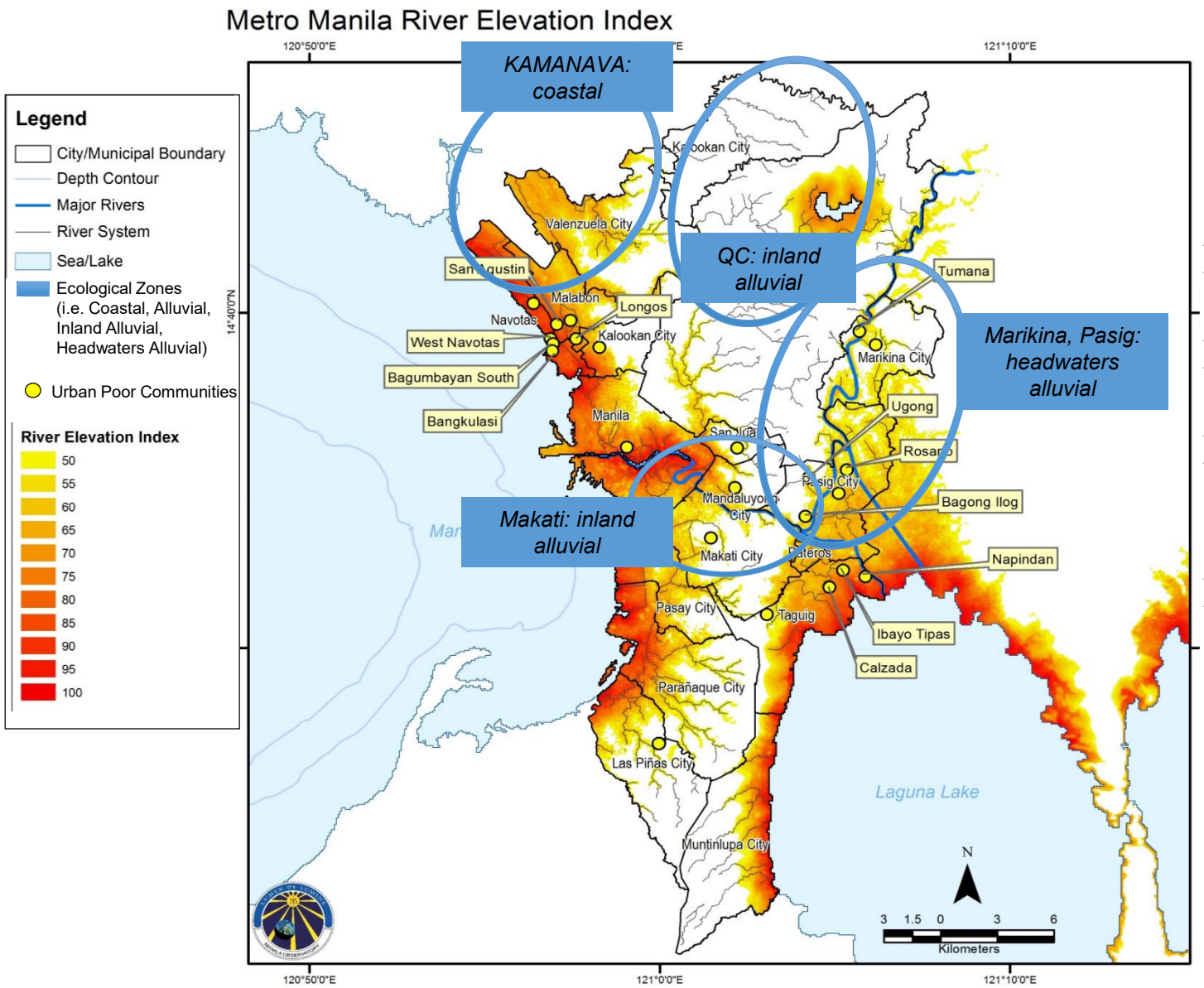
Business establishments

Informal settlements

Table 1. Environmental Vulnerabilities of Places: Social Vulnerabilities for Urban Poor Households in the Three Metro Manila Flood Plains (Place/Space-Social Vulnerability)

Flood Plains	Environmental characteristics: Sources of vulnerabilities	Socio-eco. characteristics: Sources of vulnerabilities	
Pasig-Marikina	Living in flood-prone areas along riverlines/riverbanks, subsidence, clogged waterways	Mdn monthly income: P18,000; Ave.Education--9.5 yrs.	
KAMANAVA	Living along flood-prone riverlines; near the coast (prone to floods and sea level rise/tidal surges), land subsidence, clogged waterways	Mdn monthly income: P15,000 Ave. education: 11 years	
West Mangahan	Living along flood prone riverlines (Mangahan Floodway, Napindan Channel) near Laguna Lake, **swampy lands/wetlands, subsidence,** clogged waterways	Mdn monthly income: P8,000;Educ: 7.5 years; Housing dilapidated, light materials, migrants, renters, women-headed households, no services	

Metro Manila's Risks: Socio-Pol & Economic, Ecological Governance

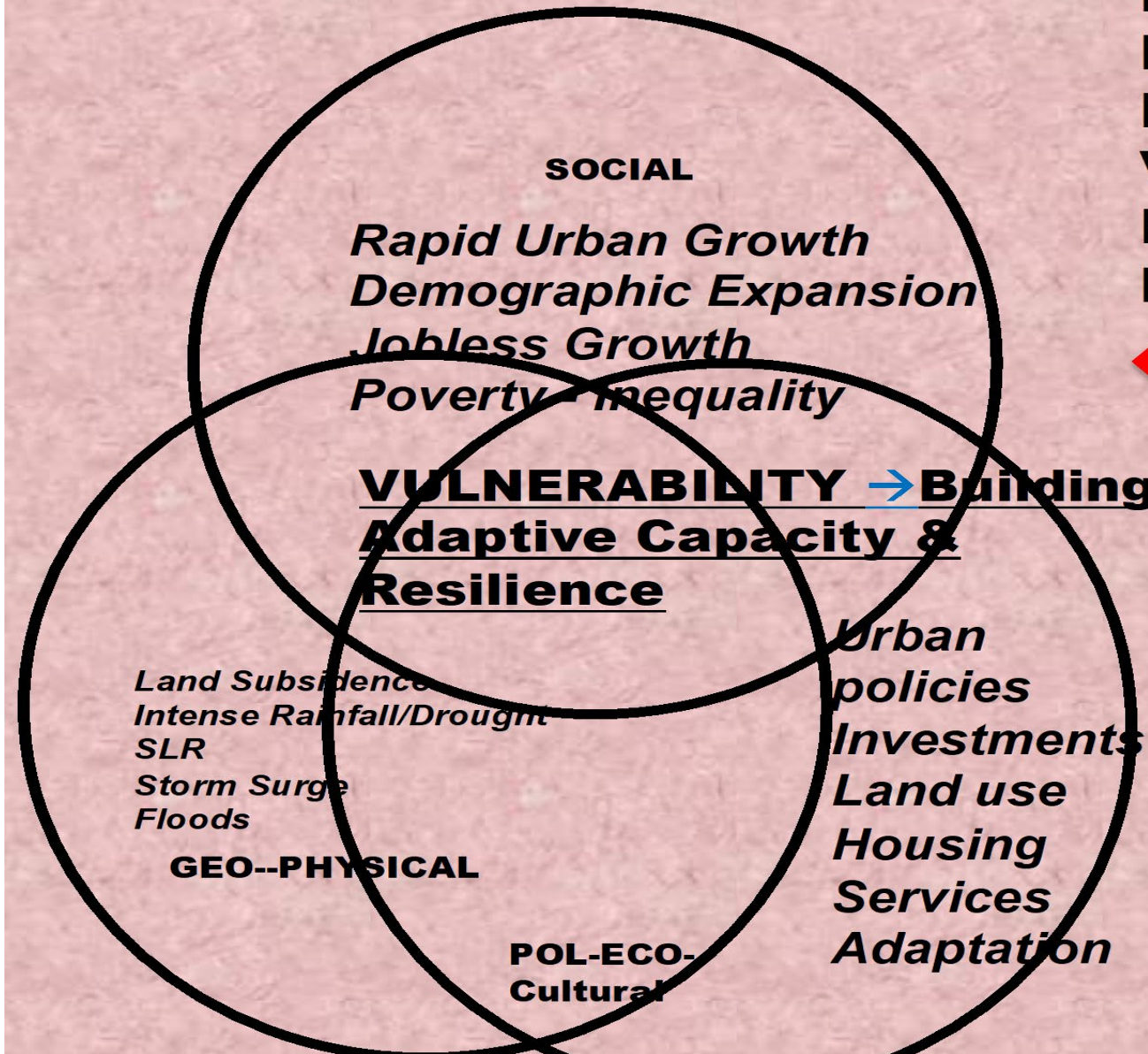


Source: Narisma (2011); Porio (2014)

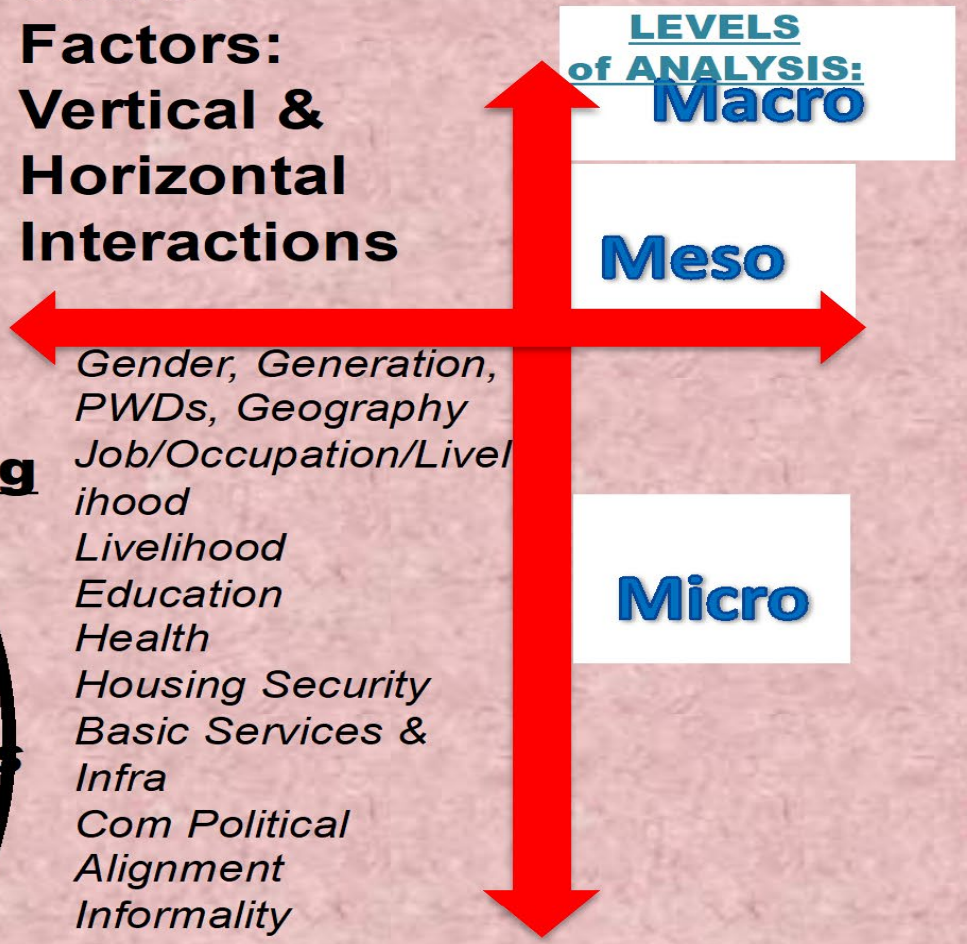
Metro Manila:

- Population:
  - **12 M**
  - Daytime: **16M- 18 M**
  - **Mega-Manila: 25M**
- Informality: **45 %-60%**
- Pop. Density: **20,000 per sq. km.**
- Urban Economic Primacy: **37% of GDP**
- Risk Governance:
  - **Metro Manila Dev. Authority**
  - **Decentralized –17 cities and 1 mun.**

Intersections of Vulnerability, Adaptation and Resilience in Metro Manila (City, Community, Household/Family/Individual)

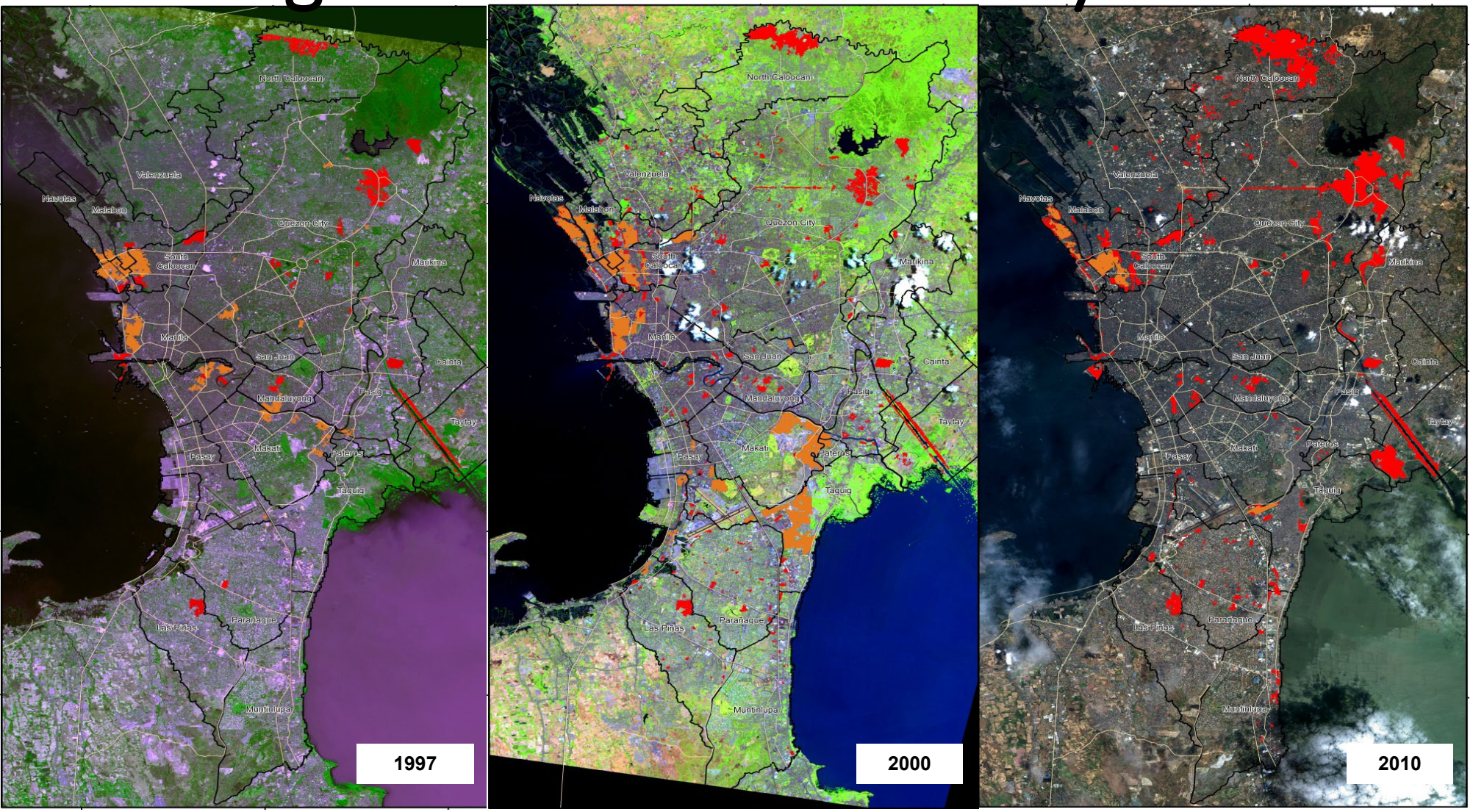


Macro-Meso-Micro Factors: Vertical & Horizontal Interactions



Gender, Generation, PWDs, Geography
Job/Occupation/Livelihood
Livelihood
Education
Health
Housing Security
Basic Services & Infra
Com Political Alignment
Informality
Social Capital/Trust Networks
Space/Place Vulnerability

Shifting Patterns of Informality and Vulnerability



Informal Settlement

Mixed Settlement

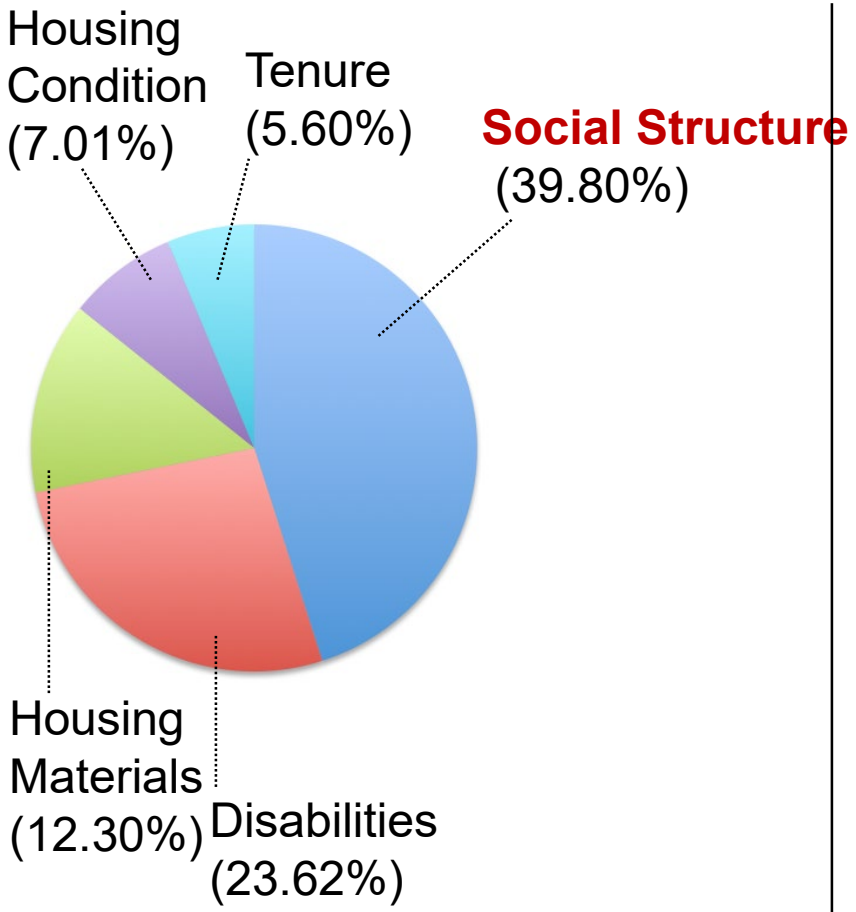
Informal settlements (red) appear to be migrating, agglomerating and expanding into large communities: Quezon City, Parañaque, Taytay and North Caloocan

Mixed informal and formal settlements (yellow-orange) are diminishing within and near the core areas of the metropolis in 2010: Malabon, Makati and Taguig

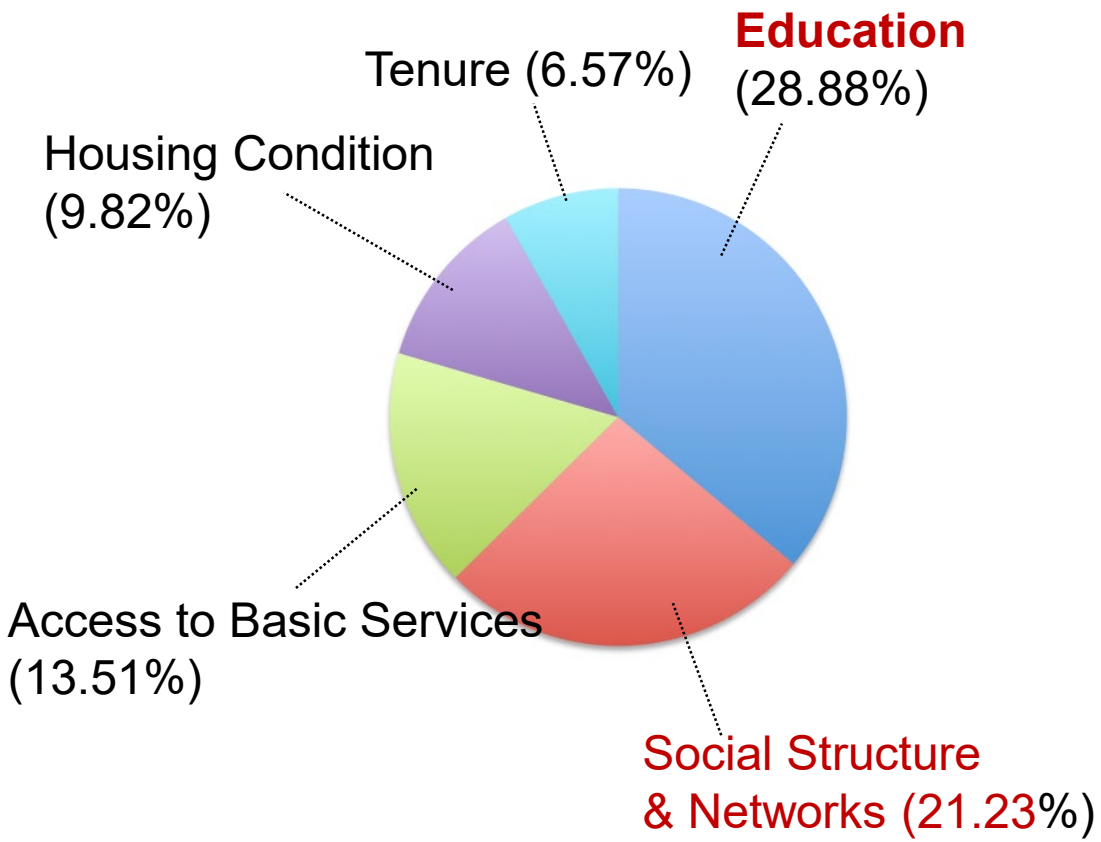
Comparison of results in study years 1997, 2000 and 2010. Red areas are informal settlements while the orange ones are mixed settlements.

SOURCE: GED, MANILA OBSERVATORY

Metro Manila: Components of Social Vulnerability at City and Household Levels (2010)



CITY LEVEL



HOUSEHOLD LEVEL

Source: Porio and See (2016)

Women-Headed Households Incur More Costs/Losses

Summary of Costs/Losses Due to Floods (monthly)

	Pre-Ondoy		Ondoy Period		Post-Ondoy	
	Men HH	Women HH	Men HH	Women HH	Men HH	Women HH
Absences from school	6	8	14	17	6	7
Number of workdays lost from sickness due to flood	5	7	9	10	5	8
Number of work days lost due to flood	6	8	20	22	6	9
Average income loss due to floods	P1,715	P3,250	P7,250	P6,450	P2,750	P3,400
Average amount of spent on medicine	P300	P400	P3,200	P3,000	P500	P450
Average losses (appliances, etc.)			P25,000	P20,000		
Average income	P6,250	P5,000	-	-	P6,500	P4,200

Source: Porio (2011;2017)

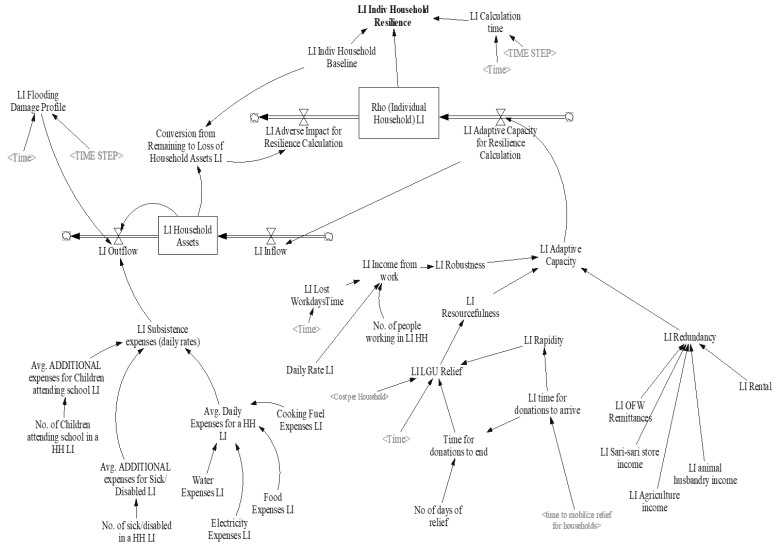
Women-Headed Households Incur More Costs/Losses

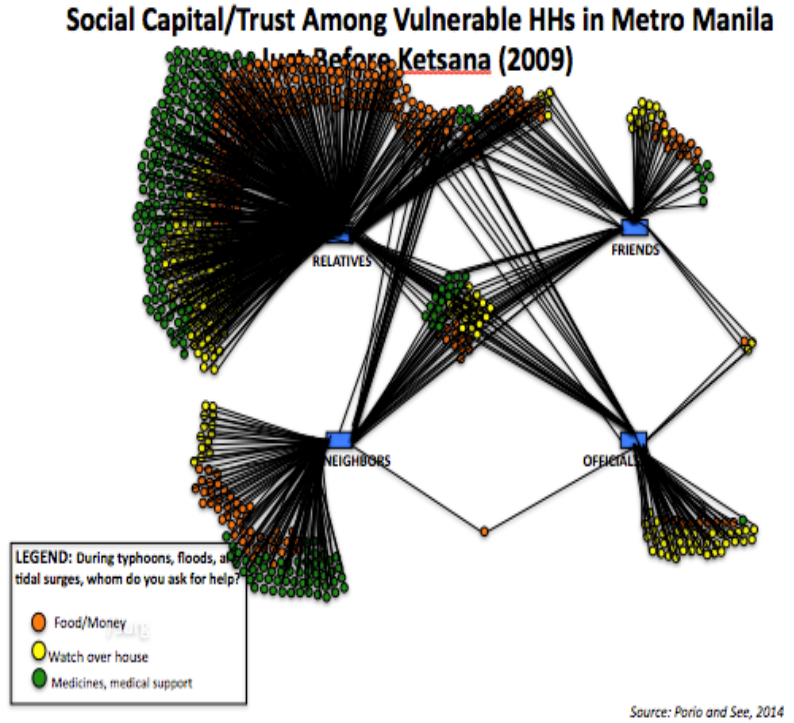
Summary of Costs of Basic Needs/Services (in pesos, monthly, US$ 1=P43)

	Pre-Ondoy		Ondoy Period		Post-Ondoy	
	Men HH	Women HH	Men HH	Women HH	Men HH	Women HH
Food	P6,000	P5,800	P2,500 + relief goods	P2,000 + relief goods	P6,500	P6,000
Water						
• Drinking	P50	P45	P240	P240	P60	P50
• Cooking/washing utensils	P80 (well) P500 (piped)	P80 (well) P550 (piped)	P80 (well, long lines) P1,500 (piped)	P80 (well, long lines) P1,500 (piped)	P80 (well) P740 (piped)	P80 (well) P700 (piped)
Energy/electricity	P2,000	P1,800	P5,000	P4,500	P2,000 (wet) P3,000 (dry)	P1,800 (wet) P2,500 (dry)
Sanitation/Laundry (mud, waist deep; cleaning – 2 weeks – one month)	P300	P310	P2,000	P2,000	P360	P320
House repair			P1,500 – P15,000	P1,000 – P8,000		

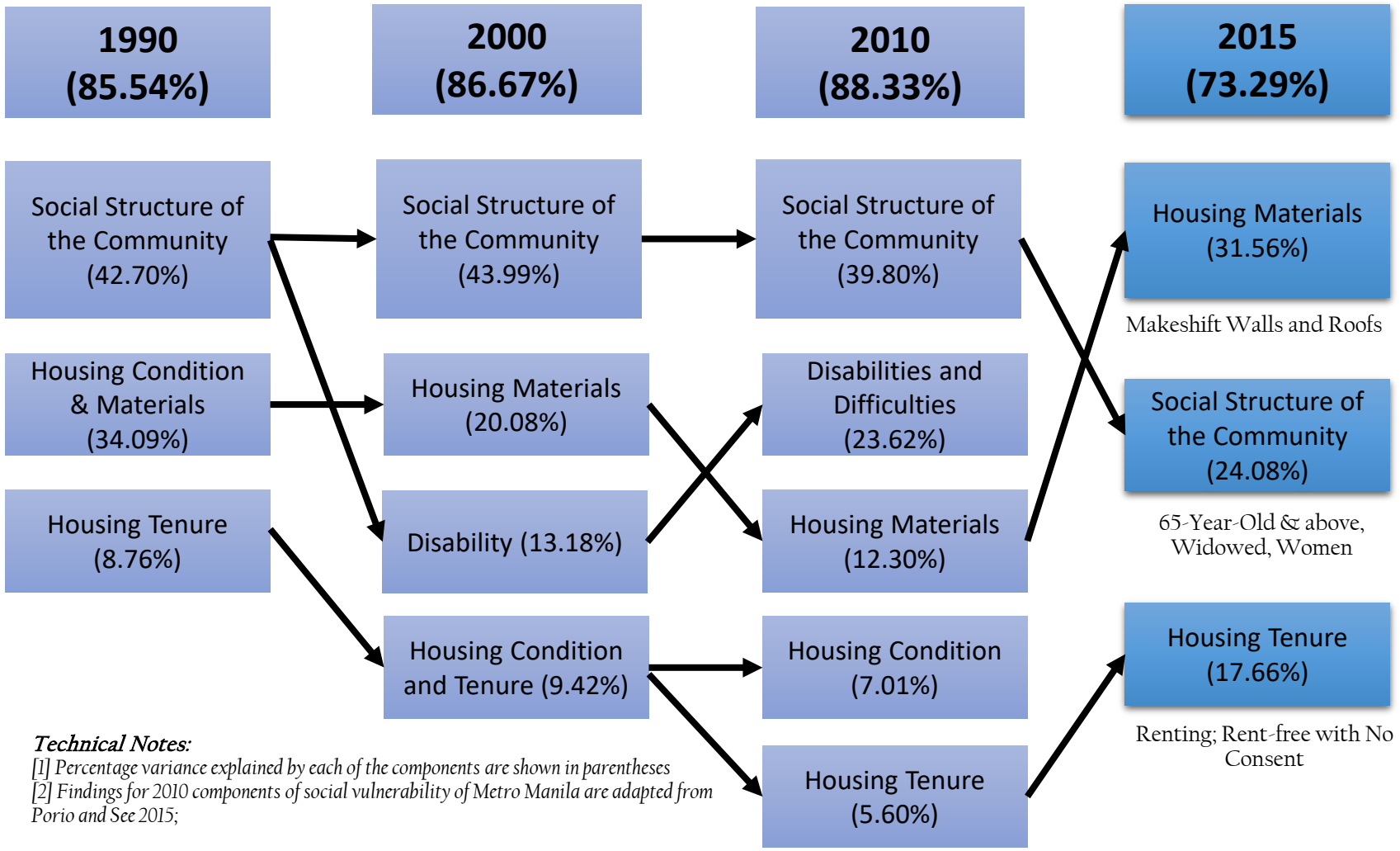
Source: Porio (2011)

Social Dimension: Resilience, Social Capital, and Trust Networks





SOCIAL VULNERABILITY IN METRO MANILA (1990-2015)



Technical Notes:
[1] Percentage variance explained by each of the components are shown in parentheses
[2] Findings for 2010 components of social vulnerability of Metro Manila are adapted from Porio and See 2015;

2008-2009; 2010-2011;
2012-2016; 2018-2021

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COASTAL CITIES AT RISK IN THE PHILIPPINES

Investing in Climate and Disaster Resilience

Two Laws: Climate Change Act of 2010
National Disaster Risk Reduction and Mgt Act 2010

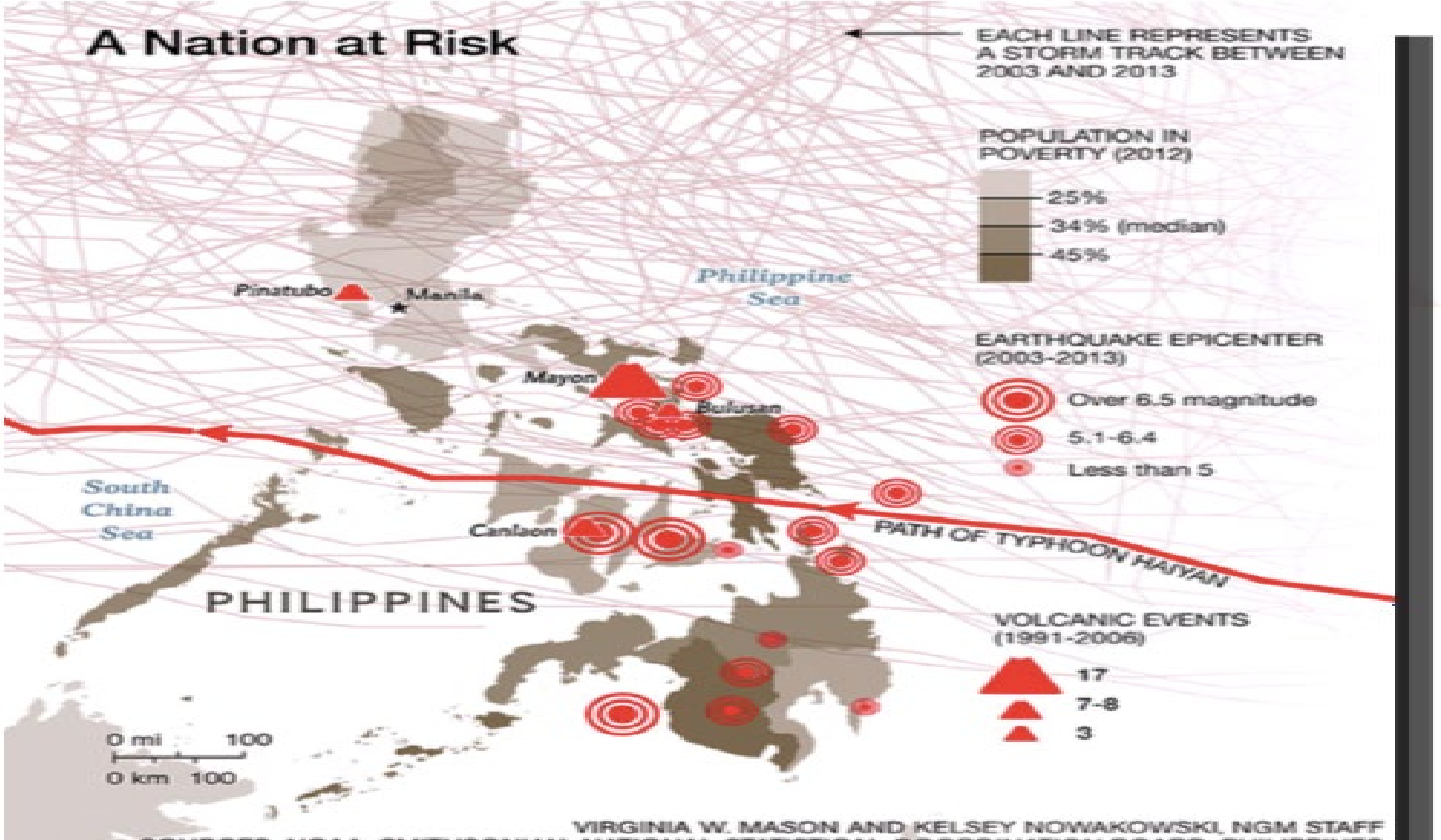
Public-Private Partnerships for Resilience:

- **Manila Observatory, Ateneo de Manila University**
- **National Resilience Council: Nat./Local Governments, Private Sector (SM, San Miguel, etc.)**
- **Mayors/City Resilience Council: Pasig, Valenzuela, Naga,**

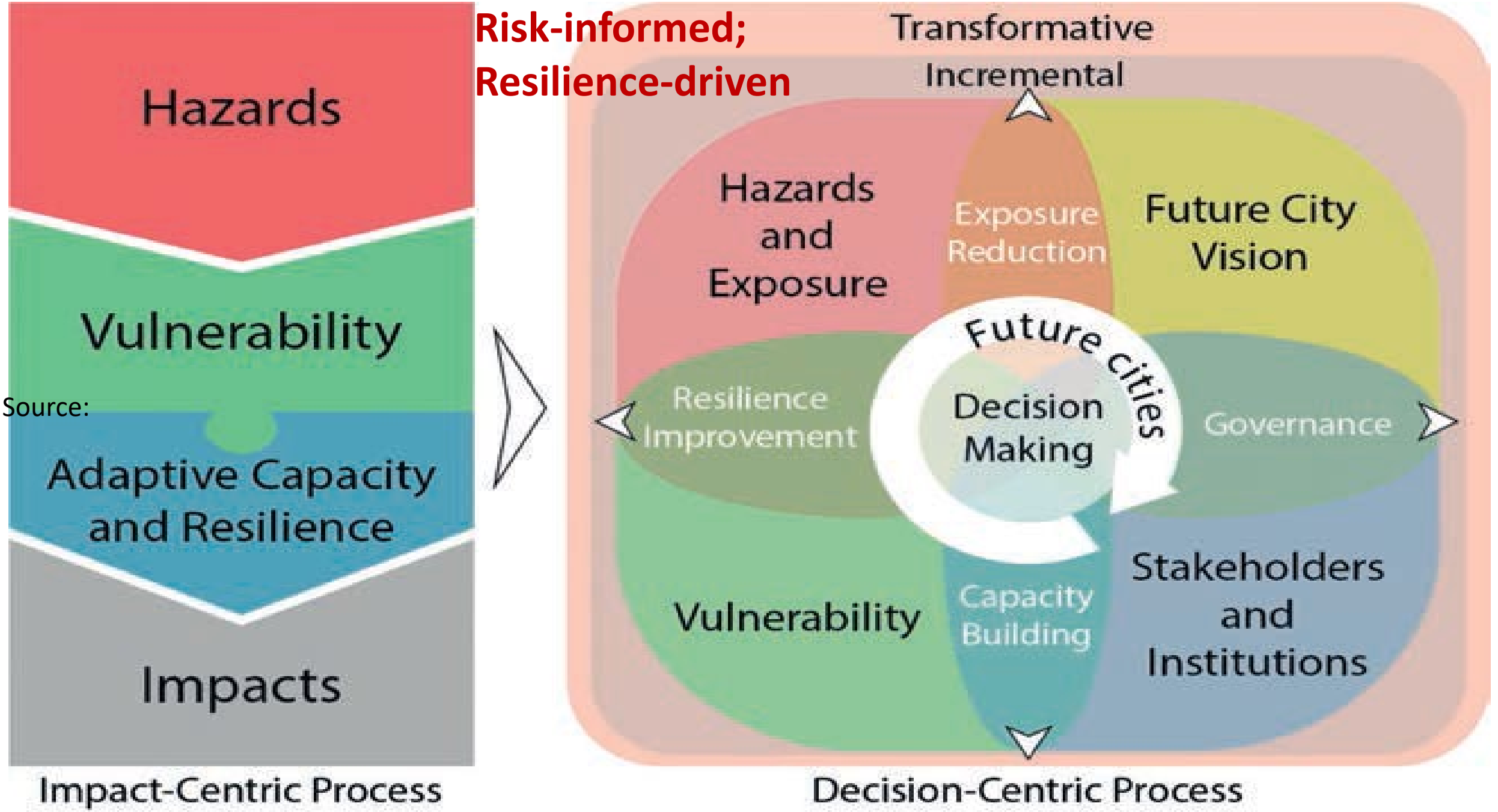
Context :The Philippine National Disaster Preparedness Plan 2016-2028

Reactive:

- **NDRRM 2010**
- **CCC 2010**



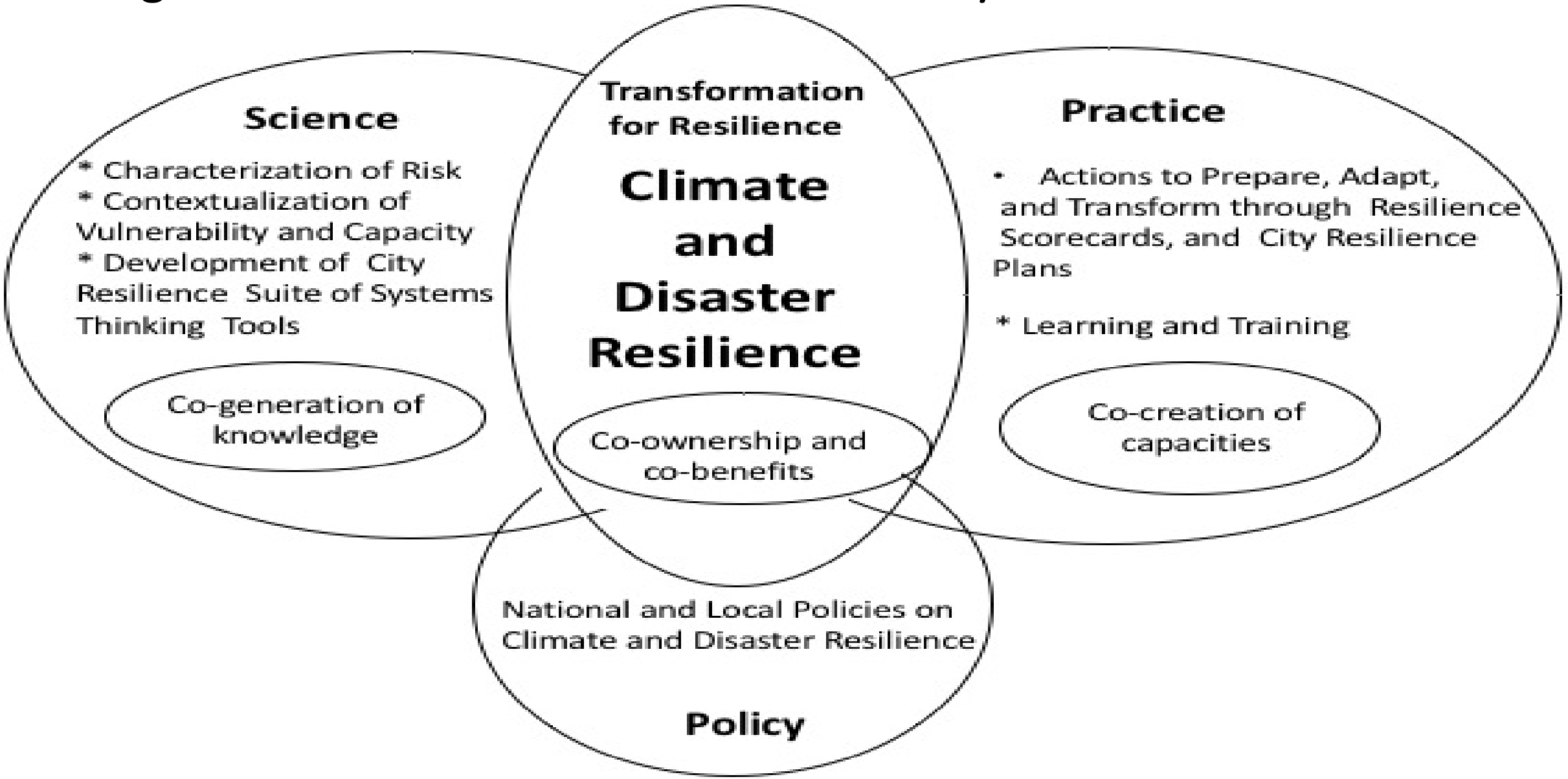
Risk-informed;
Resilience-driven



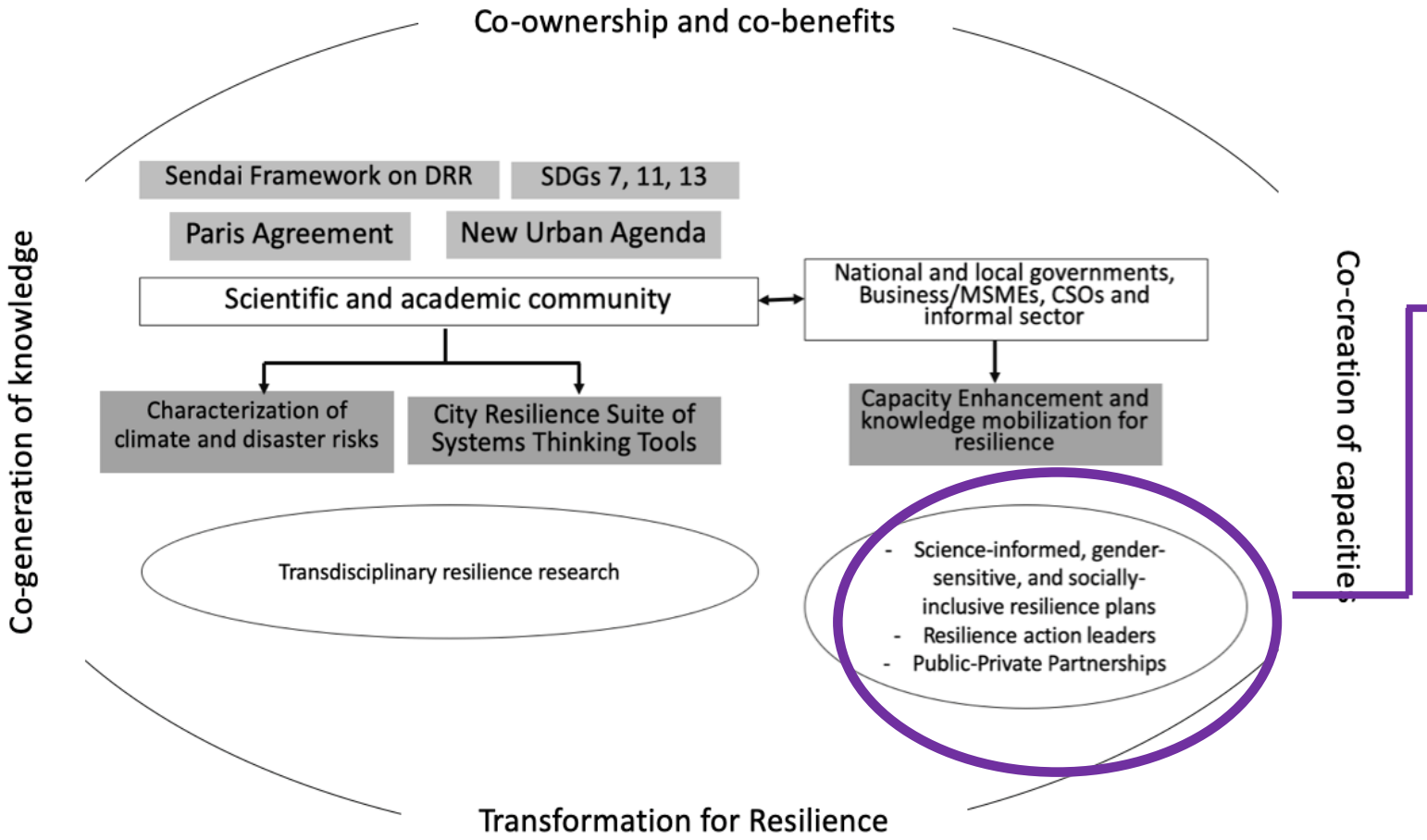
Source:

Source: Urban Climate Research Network 2018, Cambridge Publishers

Linking Climate and Disaster Science to Policy and Practice



Steps: Integrated Climate and Disaster Risk Assessment: Bases for Planning and Action Towards a Resilient Local Governance and Development –> Integrative, Convergent Pathways to Resilience



Investing on Climate and Disaster Risk Assessment (CDRA) for CDRA-informed public investment

- as input to:

Comprehensive Land Use Plan
Comprehensive Development Plan
Annual Investment Plan
Local Resilience Plan
Local Climate Change Action Plan
Local DRRM Plan
Seal of Good Local Governance-compliance

The National Resilience Council

Public-Private Partnerships for Resilience: THE National Resilience Council

- Enhance capacity and transfer knowledge for climate change adaptation and disaster risk reduction for resilience

- Deliver multi-stakeholder and transdisciplinary work with the **National Resilience Council** to inform policy reform and/or formulate public and private practice on resilience, including plans and actions for Resilient Cities 2022

NRC Co-Chairs: Sec of Department of National Defense/NDRRMC and UNISDR-ARISE, Philippines-

Designing the 3-Year Resilient LGU Program and Metrics

NATIONAL RESILIENCE COUNCIL

LEADERSHIP & GOVERNANCE

- Resilience Leadership Program Module 1 to Module 6
- NRC Coalition Workshop M1 to M6
- Practicum with Coaching

SCIENCE & TECHNOLOGY

- Year 1 – Climate and Disaster Risk Assessment
- Year 2 – Deepening Systems Thinking
- Year 3 – Solutions-Driven Action Research/Choosing the Right Tools

THE RESILIENCE FRAMEWORK

LEADERSHIP AND GOVERNANCE IN RESILIENCY

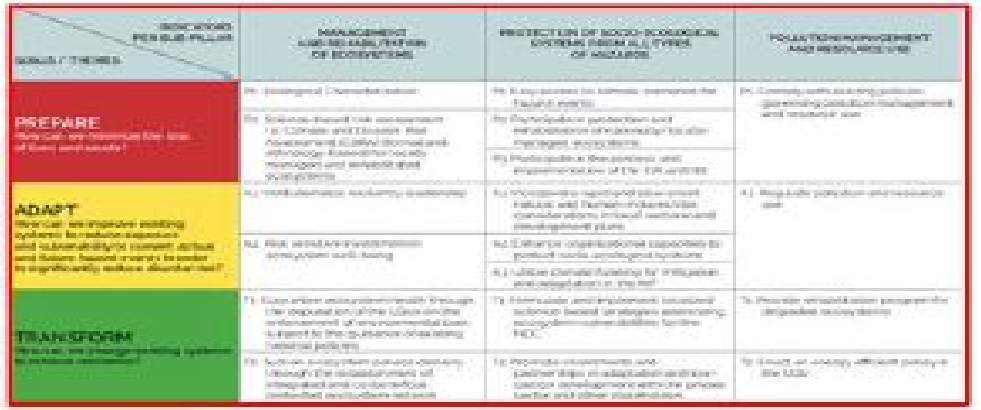
- Leadership Commitment and Competencies
- Empowered Stakeholders
- Integrated Development Planning, Implementation and Evaluation

IMMEDIATE OUTCOMES

Human Development	Local Economy	Infrastructure	Environment
• Health • Education • Social Protection	• Livelihood • Micro, Small, and Medium Enterprises • Large Businesses	• Housing • Buildings • Lifelines	• Ecosystems • Socio-ecological Protection System • Pollution Management and Resource Use

IMPACT

- Resilient Local Government Systems
- Reduced Deaths, Damage to Properties, Infrastructure, and Agriculture
- Development Continuity



RESILIENCE METRICS of Local Governments and Communities

RESILIENCE MODEL

IMPACT

Immediate Outcomes

PILLARS OF LGU SYSTEM

LEADERSHIP and GOVERNANCE in RESILIENCY	HUMAN DEVELOP-MENT	SUSTAINABLE LOCAL ECONOMY	INFRA-STRUCTURE	ENVIRON-MENTAL SUSTAINABILITY
Leadership Commitment and Competencies Empowered Stakeholders Integrated Dev't Planning, Implementation and Evaluation	Resilient systems of health, education, and social protection	Resilient livelihoods, enterprises and businesses	Resilient housing, buildings, and lifelines	Healthy ecosystems Socio-ecological protection systems Pollution management and resource use efficiency

→ **Resilient LGUS**
Provinces
Cities
Municipalities

Reduced Deaths

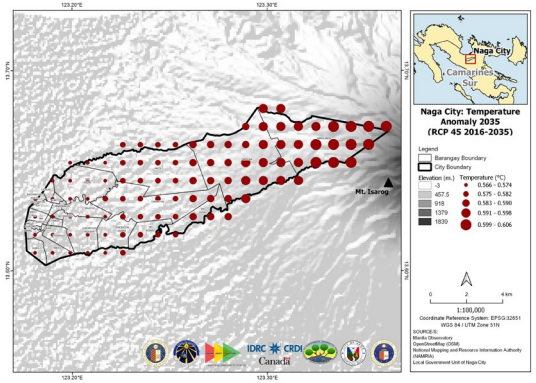
Reduced Damages to properties, infra and agri

Development continuity

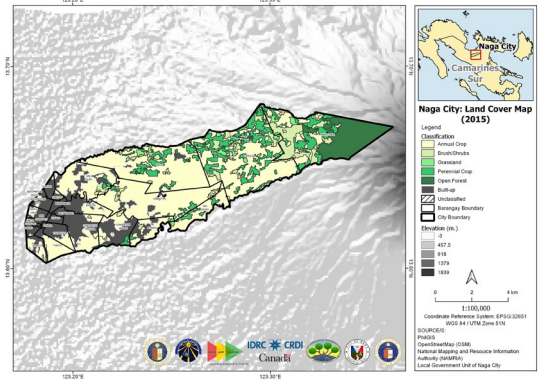
Resilience scorecards take into account the chronic vulnerabilities highlighted by Dr. Megumi Muto in her paper.

First Step: Co-generation of hazard, exposure and vulnerability maps

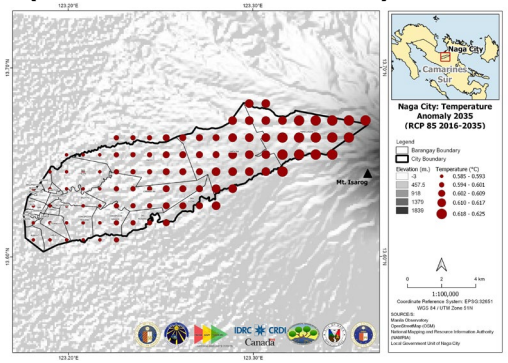
Naga City: Coastal Cities at Risk CDRA



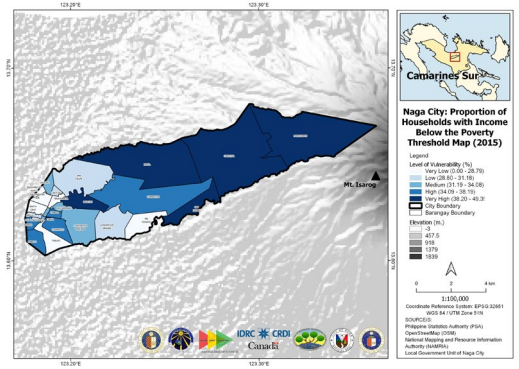
Temperature Anomaly 2035 (RCP 45 2016-2035)



Land Cover Map (2015)



Temperature Anomaly 2035 (RCP 45 2016-2035)



Proportion of Households with Income Below the Poverty Threshold Map (2015)

Muntinlupa City: Resilient Barangay Program

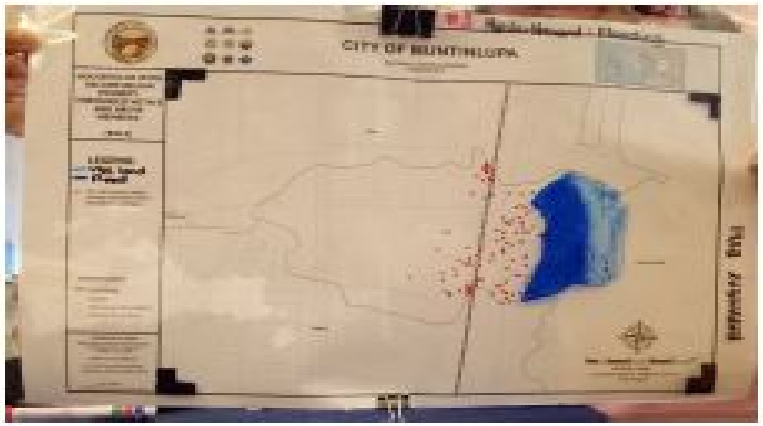
NATIONAL RESILIENCE COUNCIL

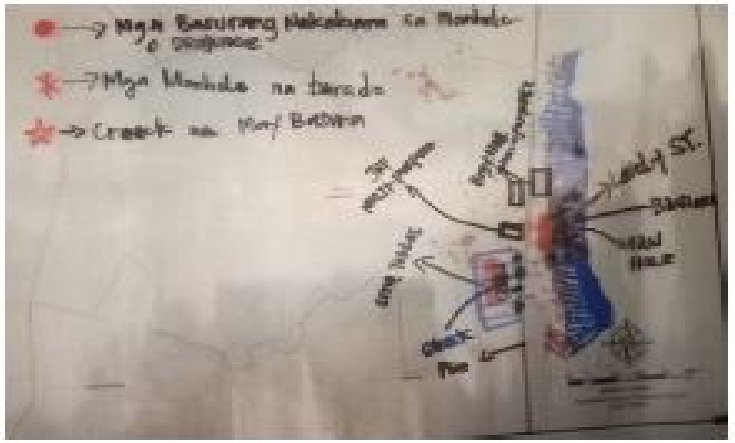
07 August 2019

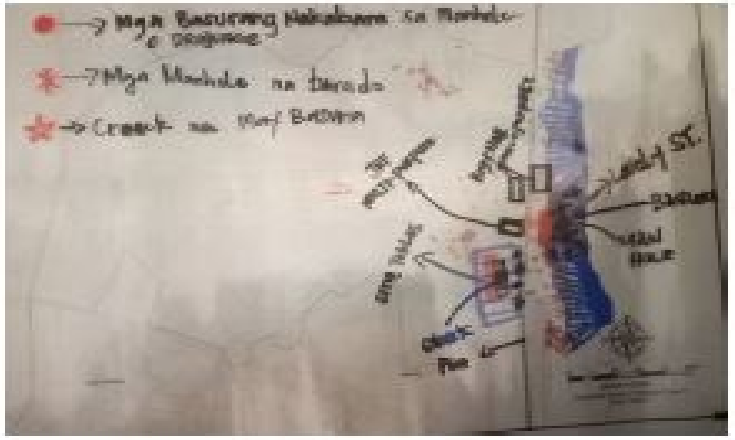
Muntinlupa City Government Coastal Cities and NRC enter into partnership to understand and address risk to earthquake and flood hazards, exposure and vulnerability at the smallest political unit level.

Interrogating Community-level Vulnerability

NATIONAL RESILIENCE COUNCIL







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ZUELLIG FAMILY FOUNDATION

Engaging the Private Sector: ADOPT-A-CITY Campaign

17 June 2019
NRC launch of adaptive PPP through the signing of a Memorandum of Understanding between SM Prime and Cagayan de Oro City.

29 August 2019
ADOPT-A-CITY Program expands to Iloilo and Naga City.

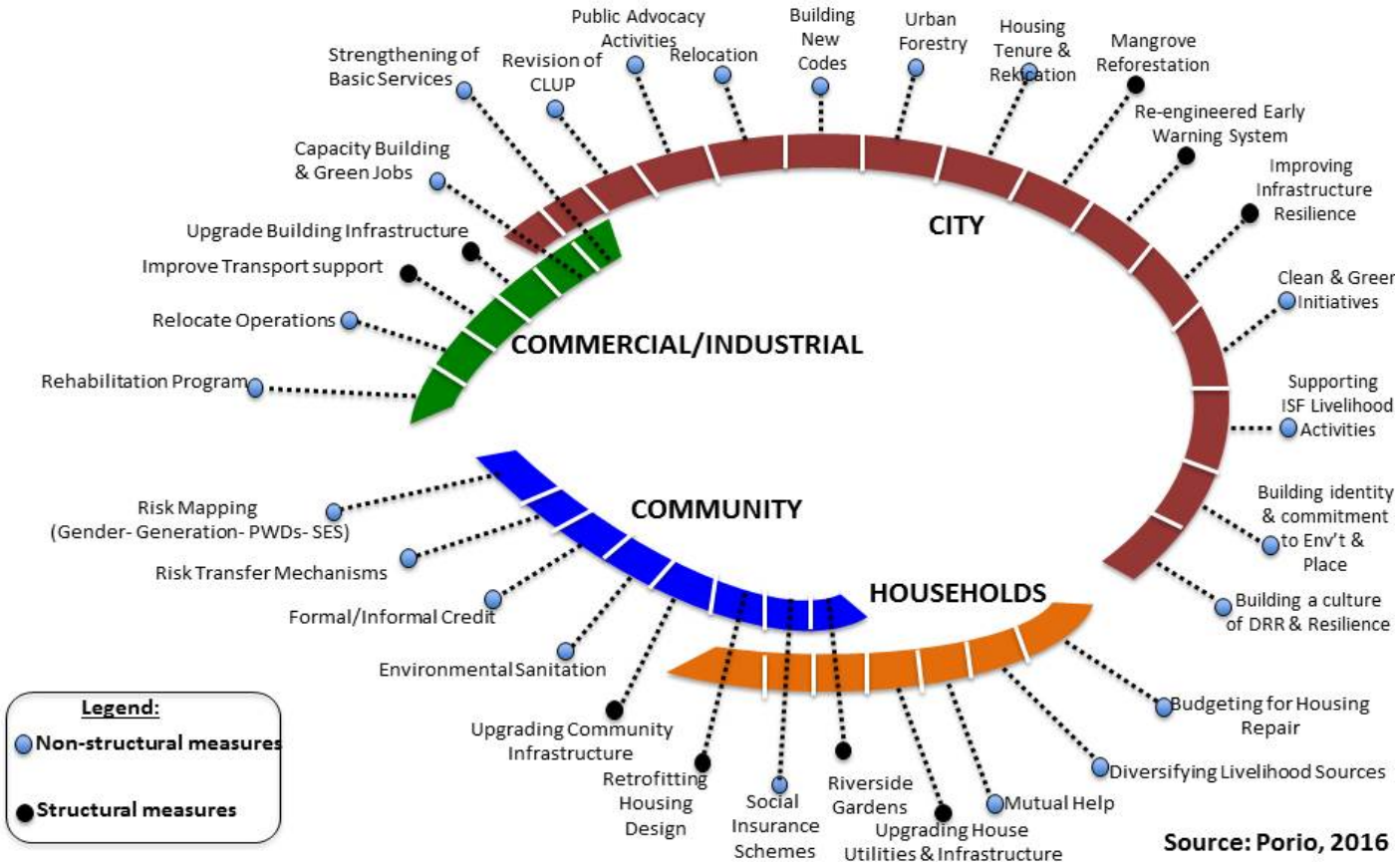
Towards an Integrated, Multi-Scalar Approaches to Risk Governance and Resilience

There is a need to establish coherence in the introduction of structural and non-structural measures of adaptation within and between sectors, across time and space (Porio 2011).

Resilience frameworks need to be designed to address dynamic interactions between sectors and scales and along different decision-making levels (Porio 2014).

Gender, generation and social geographies need to be contextualized to reflect conditions in formal and informal sectors (Porio 2016).

Adaptation-DRR Measures Across Local Governments, Commercial-Industrial and Vulnerable Communities



Risk & Resilience of Cities' Social-Ecological Systems

ZUELLIG FAMILY FOUNDATION

Resilience of Urban Systems: Prepare, Adapt and Transform

Risk Governance and Community Resilience: WATER ALLIANCE
Mobilizing environmental actors in Pasig City






Local Gov't Partnering with Communities: Constructing Resilience

Iloilo City: Building a Disaster Smart City

Source: NCDR

- 20+1 Earthquake EW Stations
- 20+11 Rain Gauge and Automated Weather Stations
- Web-GIS decision support system
- Capacity Building

Source: NCDR

Constructing *HUMAN SECURITY & RESILIENCE* through a *Positively* Responsive Community

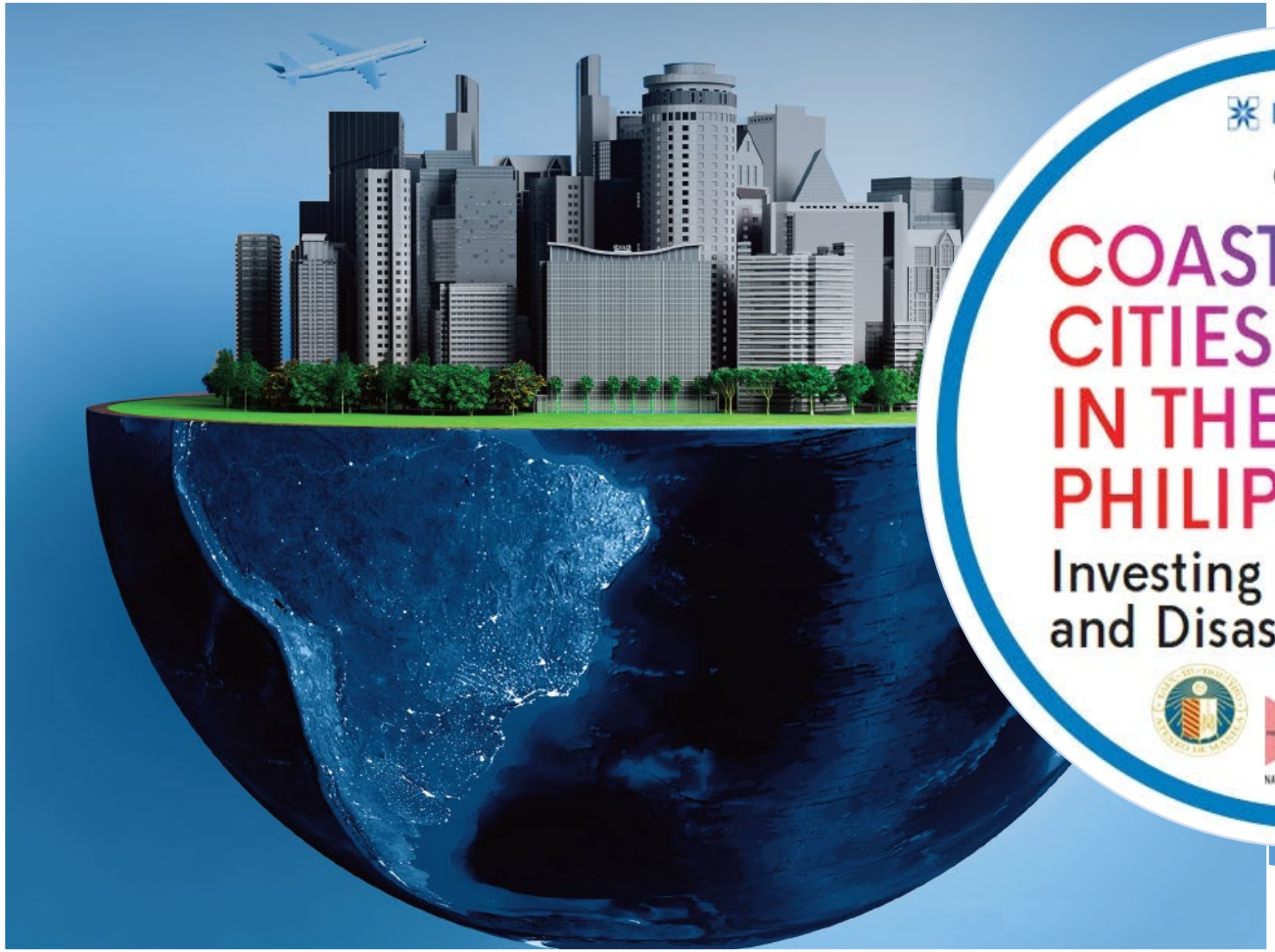
I love this quote by Yehuda Berg:
"A true community is not just about being geographically close to someone or part of the same social web network. It's about feeling connected and responsible for what happens. Humanity is our ultimate community, and everyone plays a crucial role."

Asia-Pacific Community in The Ring of Fire
The most dynamic region today, rising prosperity/widening inequality: security and equality for resilient, sustainable futures!!!!

Maraming Salamat! **Thank you for your kind attention**

Website: ccar2.wordpress.com

Facebook Page: https://www.facebook.com/CCARinthePhilippines



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COASTAL CITIES AT RISK IN THE PHILIPPINES

Investing in Climate and Disaster Resilience

NATIONAL RESILIENCE COUNCIL

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Legend:
ADMU: Ateneo de Manila University
AIC: Ateneo Innovation Center
DSA: Department of Sociology and Anthropology
ES: Environmental Science
MO: Manila Observatory
NRC: National Resilience Council
SOSE: School of Science and Engineering
UPSE: University of the Philippines School of Economics

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Commuting to-from Work, Metro Manila 2012

"CAR-POOLING" IN MANILA SEPT 15 2015


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