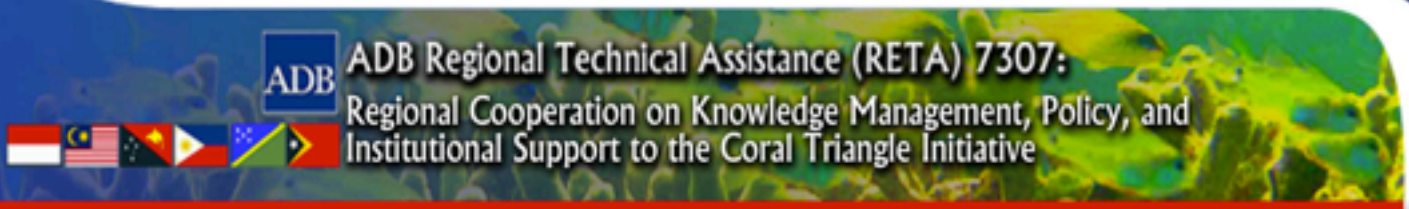
KM 4 CTI Learning Notes
2011-4



DSS 101. Preparing for Vulnerability Assessments:

Tools for Understanding Resiliency in Fisheries

August 2011

The coasts of the Coral Triangle are threatened by the impending potential impacts of climate change. Exposure to rising sea levels, increased sea surface temperatures which manifest in coral bleaching, and changes in fisheries production are just some of the imperatives of the climate change challenge.

Furthermore, extreme weather events as seen in high variations of storm intensities and rainfall lead to flooding, loss of life, and short to long-term disruption of daily economic and social activities.

Concomitant wave surges also affect coastal integrity and lead to coastal erosion and reduction of ecosystem services.

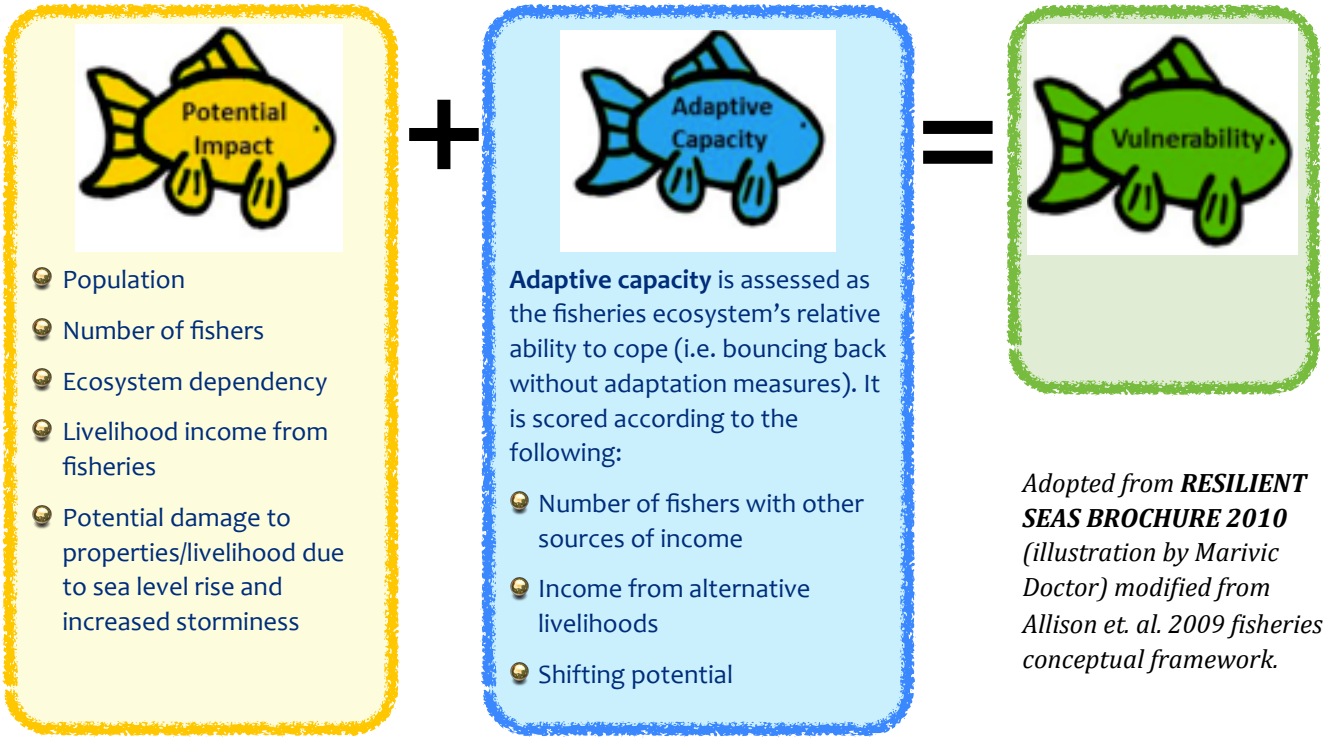
With a 3° to 4°C increase in the Earth's average temperature 330 million people could be displaced worldwide due to flooding and sea-level rise – over 70 million in Bangladesh, six million in Lower Egypt and 22 million in Vietnam.
(Photo Credit: International Federation of the Red Cross and Red Crescent Society)

These situations require timely individual and collective action, together with ***"learning by doing"*** amidst uncertainties. Coastal communities need good ocean governance, science, and monitoring that engages and capacitates them, so they can mitigate disasters and adapt wisely to climate change.

Tools are available to meet the challenge

Vulnerability assessment tools help inform communities on gauging the risks which can help them make timely responses. These tools use a systematic analyses process which can link early action to strategic programmatic approaches.

When communities develop a general program of action, they can significantly contribute to sustaining the use of coastal resources and achieving sustainable development goals. Mainstreaming the climate change agenda into integrated coastal management affords value-added benefits using ecosystem-based approaches.



*Adopted from **RESILIENT SEAS BROCHURE 2010** (illustration by Marivic Doctor) modified from Allison et. al. 2009 fisheries conceptual framework.*

One example of this is spatial planning with a social and ecological context. Within the **ADB KM Regional Learning Portal,** readers can download information on decision support tools that feature methods (including mapping routines, software models, and board games) that enhance the knowledge of policymakers on the impacts of certain decisions on a broad range of management parameters.

Vulnerability Assessment (VA) tools

Previous decision support tools such as FISHBE, ReliefMap and CoastPlan provide value-added insights on the potential impacts of climate change. Since these vulnerability assessment tools are interlinked, communities can use them in their integrated coastal management process of choices, decisions, and actions.

The suite of decision support tools such as FISHBE in combination with map-based tools like COAST Plan and its further enhancement into VA – Map Enhanced Decision (MED) tools, further fosters cooperative learning and the knowledge base of the community of practitioners.

In the Philippines, the ICE: CREAM (Integrated Coastal Enhancement: Coastal Research, Evaluation and Adaptive Management) program (now renamed as RESILIENT SEAS) uses a hierarchically nested approach to analyze the ecological and social conditions and processes of the Philippine fisheries ecosystems.

Assessment of the fisheries vulnerability in relation to its social and ecological system attributes is undertaken. Evaluation scores are done at various hierarchically nested governance levels i.e. using relative scores at the village or adjacent village clusters, within a municipality.

It uses a combined approach of climate change vulnerability assessment (modified from Allison et al. 2009, IPCC 2007) by evaluating the potential impacts and the sensitivity of the social and ecological system being assessed.

The potential impact is gauged from the exposure scenarios (e.g. degree of exposure to sea level rise, thermal anomalies in sea surface temperature and wave surge).

Meanwhile, the criteria used for the sensitivity of the fisheries ecosystem is based on their intrinsic susceptibility to the exposure of a climate change condition. The criteria includes following:

"RESTORED" STRATEGIES

	Restoring Resiliency through Learning Communities	Sustainable Philippine Fisheries Agenda	Maintaining Coastal Integrity and Equitable Access
R	Representative, replicated, resilient reserves	Reducing fishing mortality	Restoring coastal protection
E	Enhancing management effectiveness	Enhancing stock recovery	Effective erosion buffers
S	Sustaining healthy ecosystems	Sustainable fisheries use	Sustaining coastal integrity
T	Threat reduction in coastal ecosystems	Threat reduction to sustain fisheries with ecosystems capacity	Thresholds maintained within acceptable limits
O	Organizing knowledge based communities	Organizing fisher communities	Organizing a coast watch
R	Replenishing MPA networks for resilient reproduction and recruitment	Restoring resiliency & connectivity	Reducing threats and sharing costs
E	Enhancing connectedness	EAFM development with equitability	Enhancing equitable access
D	Doing good governance	Diversifying livelihood options	Disaster risk reduction

- **Fisheries scoring criteria** relates to the susceptibility to climate change exposure of fishing gears and dominant fisheries attributes such as catch rates and catch composition of gears within the habitat state
- **Ecosystem scoring criteria** relates to the susceptibility of the fisheries associated with the condition of their ecosystem such as their associated resources e.g. reef area, fish composition, biomass abundance and size distribution
- **Socio-economic scoring criteria** relates to the susceptibility of people to climate change exposure including population demographics and fisheries dependency on the habitats

Together with the consideration of potential impacts on the coastal ecosystems, the **adaptive capacity** is assessed as the fisheries ecosystem's relative ability to cope (i.e. bouncing back without adaptation measures) with these impacts and scored according to their: level and mix of livelihood incomes and opportunities for shifting livelihoods.

Deriving climate change adaptation strategies and actions

The VA tools help to elicit the evaluation of the relative vulnerabilities of coastal ecosystems by building their resiliency vis-à-vis their adaptive capacity.

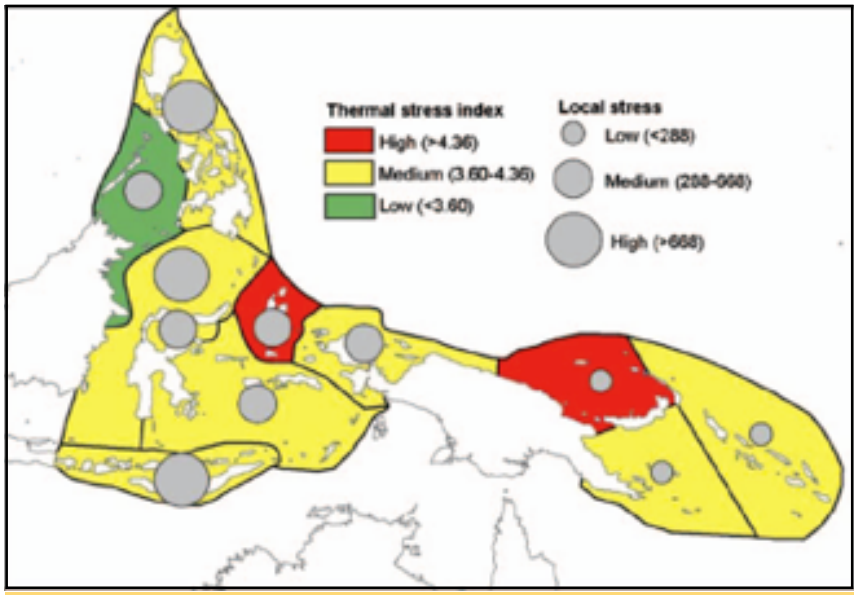
Adaptive capacity is derived from examining the ecosystem of concern such as the coral reefs' ability to

bounce back from the impending climate change impact e.g. how long the coral reef area is able to recover live coral cover (i.e. based on proxy indicators such as the amount of living corals after bleaching).

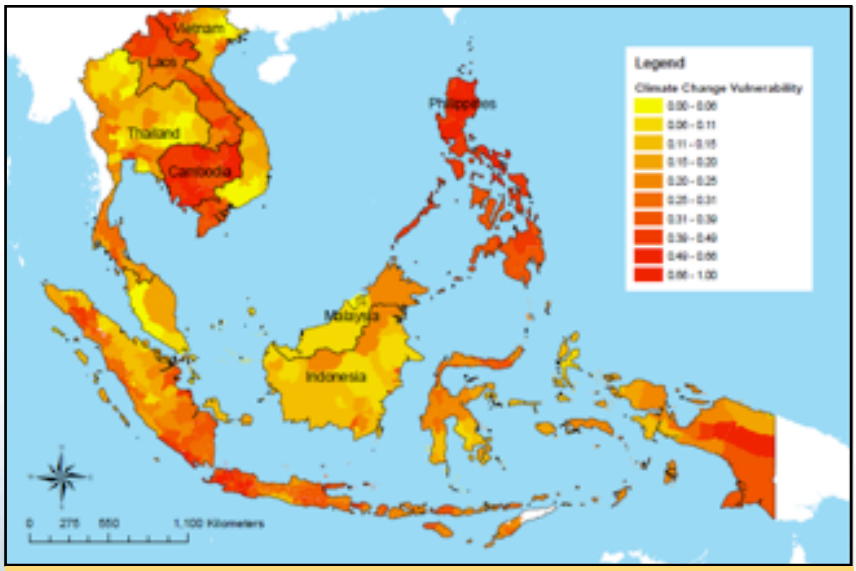
Looking at ways of enhancing the adaptive capacity of the fisheries ecosystem requires the combined prioritization of early actions and strategic programs. Improving adaptive capacity can be facilitated by considering the three-pronged thrusts to mainstream climate change adaptation.

It is also important to harmonize these efforts at various spatial and governance scales by maintaining coastal integrity, improving effectiveness of biodiversity conservation, and pursuing an ecosystem approach to fisheries management.

Some examples derived from some case studies in the Resilient SEAS (Sentinel Ecosystems of Archipelagic Seas) are promoted to achieve the objectives of the RESTORED programmatic strategies. These climate change adaptation actions contribute to value added benefits in learning to adapt wisely and building resiliency to the changing coastal environment.



Integrating vulnerability assessment using historical and projected thermal stress combined with local stress into vulnerability assessment. Local stress is derived from overlaying risks from coastal development, marine based pollution, overexploitation of marine resources, pollution and erosion (Reefs at Risk, Burke 2002) by ecoregion in the Coral Triangle. Source: McLeod et al. 2010.



Climate change vulnerability map or Southeast Asia (Yusuf and Francisco 2009) which includes most of the CT6 countries, using United Nations Inter-governmental Panel on Climate Change (IPCC) experts' panel meeting in Bali, 2008.

Prioritization of actions based on urgencies and competencies

Engagement of stakeholders at the various governance levels should be integrated to facilitate the prioritization of actions based on:

- urgency and need of actions to be undertaken such as critical areas of

weaknesses and dealing with the grave threats to achieve no regrets conditions; and

- the competencies and capacities to undertake the actions e.g. availability of human, social, institutional, economic and financial resources (see also USAID 2007, 2009).

References

Allison, E.H., A.L. Perry, M.C., M-C.Badjeck, W.N. Adger, K. Brown, D. Conway, A.S. Halls, G.M. Pilling, J.D. Reynolds, N.L. Andrew and N.K. Dulvy. 2009. Vulnerability of national economies to the impacts of climate change in fisheries. *Fish and Fisheries* 10:173-196.

Cabral, R.B., David, E.D.Jr., Geronimo, R.C., Lim, M.T. and Aliño, P.M. 2010a. Coastal Assessment Tool and Planning Software (COASTPLAN) Tool Demonstration Guide. *In:* Marine Environment & Resources Foundation, Inc. *Ecosystem-Based Management Toolkit for Philippine Coastal Resource Management.* Marine Environment & Resources Foundation, Inc., Marine Science Institute, UP Diliman, Quezon City, Philippines. 21 p.

Cabral, R.B., Geronimo, R.C. and Aliño, P.M. 2010b. Fishing Industries' Support in Handling Decision Applications (FISHDA) Tool Demonstration Guide. *In:* Marine Environment & Resources Foundation, Inc. *Ecosystem-Based Management Toolkit for Philippine Coastal Resource Management.* Marine Environment & Resources Foundation, Inc., Marine Science Institute, UP Diliman, Quezon City, Philippines. 23 p.

RESILIENT SEAS. 2010. Climate change vulnerability assessment. (A brochure developed for the RESILIENT SEAS PROGRAM).

Licuanan W., Aliño P.M., Campos W., Castillo G., Juinio-Meñez,A. (2006) A decision support model for determining sizes of marine protected areas: biophysical considerations. *The Philippine Agricultural Scientist*. 89(1):507-520.

McLeod, E., R. Moffitt, A. Timmerman, A., R. Salm, L. Menviel, M.J. Palmer, E. Selig, K.S. Casey and J.F. Bruno. 2010. Warming seas in the coral triangle: coral reef vulnerability and management implications

USAID. 2007. Adapting to Climate Change. A guidance manual for development planning. U.S. Agency for International Development, 1300 Pennsylvania Avenue, NW. Washington, DC 20523.24p. Can be downloaded from http://pdf.usaid.gov/pdf_docs/PNADJ990.pdf.

USAID. 2009. Adapting to Coastal Climate Change. A guidebook for development planners. Can be downloaded from http://www.usaid.gov/our_work/cross-cutting_programs/water/docs/coastal_adaptation/adapting_to_coastal_climate_change.pdf

Yusuf, A.A. and A.A.Francisco. 2009. Climate Change Vulnerability Mapping for Southeast Asia. Also available online at http://www.eepsea.org.

Note:

The Resilient SEAS program is a six institution collaborative coastal climate change research partnership funded by the Philippine Department of Science and Technology (DOST) administered under the Philippine Council for Aquatic and Marine Research and Development (PCAMRD).

Contact Persons:

Porfirio M. Aliño (pmalino2002@yahoo.com), KM team, PRIMEX and Dr. Samuel Mamauag (smamauag@yahoo.com), Marine Science Institute, University of the Philippines, Diliman, Quezon City. Ms. Milledel Quibilan is the UP-MSI focal person to assist in the USAID funded Regional (Coral Triangle Support Project) CTSP CTI - CLAN (Climate Learning Adaptation Network).

Together with the ReSILIENT SEAS, the CTSP, and with Conservation International, the VA Tools for Understanding Resiliency in Fisheries (VA TURF), are developing an Integrated Coastal – Sensitivity, Exposure, and Adaptation for Climate Change (IC-SEA CChange) through Dr. Wilfredo Y. Licuanan (DLSU) and co-workers to elucidate the interrelated concerns in coastal integrity, biodiversity and fisheries.

RETA 7307 supports ongoing CTI efforts via knowledge management in the preparation of a State of the Coral Triangle Report, sustainable financing, and environmental economics and payment of environmental services for the CTI.
http://www.primexinc.org/cti_km