TRAINING REPORT

Risk and Vulnerability Assessment
Regional Training Workshop

PEMSEA, 4-5 MARCH 2019

EXECUTIVE SUMMARY

PEMSEA organized and conducted a regional training workshop on risk and vulnerability assessment (VA) from March 4 to 5, 2019. The main purpose of this workshop was to introduce the Coastal VA tools that were locally developed that the participants may consider in conducting VA on target sites for each member country. A total of nineteen (19) participants consisting of representatives from ICM learning centers in Indonesia, Thailand and Timor Leste, as well as representatives from the Local Governments Units (LGUs) of Pampanga, Bataan, Cavite, Oriental Mindoro, and Guimaras attended this workshop. Three VA tools were presented by speakers from the Marine Science Institute: (a) CIVAT (Coastal Integrity Vulnerability Assessment Tool), (b) TURF (Tools for Understanding the Resilience of Fisheries), and (c) ICSEA Change (Integrated Coastal Sensitivity, Exposure and Adaptive Capacity for Climate Change). These tools have incorporated bio-physical attributes that are unique to tropical ecosystems such as the importance of coastal habitats for maintaining coastal integrity and the dependence on reef fisheries. This suite of Coastal VA tools was developed to assess the vulnerability of coastal ecosystems to climate change. Specifically, these tools aim to evaluate biodiversity, fisheries, and coastal integrity based on various factors of Sensitivity, Exposure, and Adaptive Capacity. They are semi-quantitative, incorporating a degree of technicality with ease of use.

On the first day, the VA tools for coastal integrity (CIVAT) and fisheries (TURF) were presented with more details, followed by scoring exercises to allow users to generate a vulnerability ranking for the selected assessed sites. To cap the session, the participants were asked to form 5 groups, one each for the participating countries, and 2 groups from the Philippines to discuss among themselves and report on how they can use the tools for their respective sites. The second day was focused on the more synoptic and integrated tool (ICSEA CChange), which, in addition to coastal habitats, integrity, and fisheries, also considers environmental and socio-economic attributes in the assessment. This was also followed by a scoring exercise. The two-day training concluded with a presentation on how to link the VA results to adaptation strategy development and mainstreaming in respective project sites.

For the scoring exercise, two barangays in El Nido, Palawan - Barangay Buena Suerte and Barangay Bebeladan – were selected as demonstration sites. These sites belong to the El Nido-Taytay Managed Resource Protected Area (ENTMRPA), which is also a National Integrated Protected Area Systems (NIPAS) site. Given the high biodiversity and productivity potential of the ENTMRPA, its management via protection is of paramount importance. However, threats (e.g. overfishing, sedimentation) that are presently occurring as well as looming threats (e.g. climate change) could greatly undermine its productivity potential and the ecosystem goods and services derivatives. Through the Coastal VA tools, the vulnerability of the bio-physical and socio-economic features of these two barangays to climate change was determined. Both barangays have low vulnerability with respect to fisheries. The potential impact from fisheries, reef ecosystem and socio-economic attributes may be offset or even negated by its relatively higher adaptive capacity. However, Barangay Buena has high vulnerability in terms of coastal integrity, due to its low adaptive capacity. Similarly, its high lack of adaptive capacity tipped the scale to high vulnerability based on ICSEA-C-Change. In contrast, Bebeladan has low vulnerability in terms of coastal integrity and medium or moderate vulnerability with respect to ICSEA-C-Change. The results from the scoring exercised are summarized below:

- Coastal Integrity VA Tool (CIVAT)
  - Barangay Buena Suerte: High Vulnerability
  - Barangay Bebeladan: Low Vulnerability

- VA-Tool for Understanding the Resilience of Fisheries (TURF)
  - Barangay Buena Suerte: LLL ~ Low Vulnerability
  - Barnagay Bebeladan: LLL ~ Low Vulnerability

- Integrated Coastal Sensitivity, Exposure and Adaptive Capacity to Climate Change (ICSEA-C-Change)
  - Barangay Buena Suerte: MMH ~ High Vulnerability
  - Barangay Bebeladan: MMM ~ Medium or Moderate Vulnerability

After doing vulnerability assessments, a wide choice of actions can be taken through strategies which serve as guide site-specific actions matching the VA results. These actions should be done in consideration of the urgency and capacity of the concerned management body. Learnings and insights from the VAs should be integrated into management plans. In order to reduce vulnerability, the most logical step is to reduce areas with high vulnerability to medium vulnerability, areas with medium vulnerability to low vulnerability, and areas with low vulnerability to not be vulnerable at all.

The final part of the training workshop was devoted on discussions pertaining to the utility of the tools where these are highly applicable as well as their limitations for which emergent opportunities were identified such as sensitivity and adaptive capacity variables for aquaculture and harmful algal blooms. Almost all the sites representatives agreed positively on the utility of the tool in their respective sites. The challenge is, to know to what extent can the tool be tweaked or modified to reflect the profile of their sites and make them fit in their localities. Another challenge in conducting vulnerability assessments is the problem with data, particularly with respect to data requirement; data generation; scoring ‘no data’; and using the tool when there is no data. In this case, the VA tool can tell which data or information is missing, which, in effect, it also becomes a tool for data gap analysis. For data gap, secondary data from previous reports and surveys, such as SOCs and Participatory Coastal Resource Assessment (PCRA) can be utilized.

The next steps following the workshop involve continuous consultation with the UP-MSI experts in assisting ICM LCs in Thailand in conducting VA in their respective sites. It was agreed that the Thailand representatives will work on a draft revision of factors and explore how the existing tools can accommodate the criteria needed to fit their localities. A validation workshop will then be organized in Chonburi to finalize the tool to be used provisionally in May 2019.

1.0 Introduction

1.1. Climate change adaptation has become a chief concern at all levels and sectors of governance due to its far-ranging implications such as sea level rise, storm surges and waves, sea surface temperature changes, and variable rainfall. Subnational to local units have been mandated to develop and implement climate change adaptation (CCA) in their respective jurisdictions in response to this threat. Vulnerability assessment (VA) is an essential preliminary step in the broader CCA process. It informs the development of suitable strategies to prepare for and adapt to the impacts of climate change.

1.2. Correct application of these tools, including being able to properly address the various data requirements, is critical to the success of the VA. In line with this, some basic technical training is required to prepare potential members of the CCA teams. In order to help, scientists and coastal managers from various institutions, including the Marine Environment and Resources Foundation (MERF) of the UP-MSI have developed VA tools that are participatory, not data intensive, and comprehensible to a wide range of audience in the realm of ICM. These tools have been employed by local government units of at least 20 project sites (e.g. Department of Science and Technology-Resilient Seas Project, DENR Philcore Project, Conservation International CTSP, National Economic and Development Authority Climate Change Project, Rare Philippines, etc.) and some of these sites (e.g. Lubang, Oriental Mindoro; Masinloc, Zambales, among others) have initiated to mainstream adaptation plans in their coastal resource management (CRM) plans.

1.3. The complete program of the training course is shown in **Annex 1**.

2.0 Learning objectives, design and expected outputs

2.1The primary objectives of the activity were:

2.1.1 To equip participants with knowledge, skills and resources in conducting Risk Assessment and Vulnerability Assessment for marine and coastal areas, and the application of results in ICM planning and implementation;

2.1.2 To strengthen capacity of ICM Learning Centers in providing capacity building and technical support to local governments developing and implementing ICM programs;

2.1.3 To introduce the three Coastal VA tools, namely: (a) Coastal Integrity VA Tool or CIVAT; (b) Tool for Understanding the Resilience of Fisheries or VA-TURF; and (c) Integrated Coastal Sensitivity, Exposure, and Adaptive Capacity to Climate Change or ICSEA-C-Change;

2.1.4 To provide detailed instruction on the Coastal VA tools using data from two barangays in El Nido, Palawan. The training consists of lecture and scoring exercises for each of the Coastal VA tools; and

2.1.5 To build an understanding on the CCA process.

2.2 The training covered 2 days of lectures, groupwork and open forum, with the following design:

2.2.1 Presentations on the concepts, methodologies and available tools in risk and vulnerability assessment, data requirement and processes;
2.2.2 Exercises on the use of each tool; and
2.2.3 Discussion of how results can be used to guide next steps in identifying priorities and relevant adaptation strategies for incorporation in local plans.

2.3 At the end of the training, the participants were able to:

2.3.1 Appreciate what tools on risk/vulnerability assessment are available and relevant to their respective sites, and how these can be applied to support development and implementation of local ICM programs;

2.3.2 Understand the requirements and processes in using these tools;

2.3.3 Assess their capacity to apply or guide the application of the tools in the ICM sites, and potential support needed.

2.4 The training began with the introduction of the VA tools for coastal integrity (CIVAT) and fisheries (TURF) on the first day. The second day commenced with a review of climate change concepts and impacts, followed by ICSEA-C-Change, and capped off by linking the VA tools with adaptation strategy planning. Each session consisted of VA tool presentation, scoring exercise for each tool, and open forum.

3.0 Participants and Resource Speakers

3.1 A total of nineteen (19) participants consisting of representatives from Integrated Coastal Management (ICM) learning centers in Indonesia (3), Thailand (3) and Timor Leste (2), as well as representatives from the Local Governments Units (LGUs) of Pampanga (2), Bataan (2), Cavite (1), Oriental Mindoro (2), and Guimaras (2) participated in this workshop. A number of PEMSEA staff (6) also attended the workshop. The list of participants is in Annex 2.

3.2 Resource persons and facilitators from UP-MSI include;

Dr. Samuel S. Mamauag
Marine Science Institute
UP Diliman, Quezon City 1101

Ms. Ma. Yvainne Sta. Maria
Marine Science Institute
UP Diliman, Quezon City 1101

Mr. Renmar Jun Martinez
Marine Science Institute
UP Diliman, Quezon City 1101

Mr. Robert Bryan Casauay
Marine Science Institute
UP Diliman, Quezon City 1101

4.0 PROCEEDINGS SUMMARY ON DAY 1, March 4 2019

4.1 WELCOME REMARKS AND INTRODUCTION

4.1.1 Ms. Aimee Gonzales, PEMSEA's Executive Director, delivered the welcome remarks where she acknowledged all the speakers/experts and the participants in the workshop. She considers the workshop as a critical step in PEMSEA's SDS-SEA implementation plan 2018 to 2022. She hopes that all learnings from the workshop be utilized and disseminated down to each country's local governments units, and that the workshop shall contribute in the formulation of local solutions to combat/mitigate the impacts of climate change that can help implement commitments to the Paris climate agreement.

4.1.2 Ms. Johanna Diwa-Acallar then introduced all participants from each ICM learning center per country, representatives from five sites in the Philippines, the PEMSEA resource facility, and the speakers from experts from UPMSI. She ran down all the activities of the 2-day workshop which comprise mostly of presentations on risk and vulnerability, vulnerability assessment tools, scoring activities and open forum.

4.2 PRESENTATION: DEFINING VULNERABILITY | YVAINNE STA. MARIA

4.2.1 Ms. Sta Maria of the Geological Oceanography Laboratory in UP Marine Science Institute and has been involved in the prevention of coastal erosion for the past 15 years delivered a short presentation on vulnerability.

4.2.2 She provided a brief overview of the Vulnerability Assessment (VA) Tools applicable for coastal communities – the Coastal Vulnerability Assessment Tool (CIVAT), Tool for Understanding the Resiliency of Fisheries (TURF) and the Integrated Coastal Sensitivity, Exposure, and Adaptive Capacity to Climate Change (ICSEA-C- Change). These tools aim to provide guidance in coastal climate change adaptation planning by measuring the vulnerability of coastal systems to a variety of climate-related hazards. The tools are in a simplified format, devoid of complicated mathematical equations that helps coastal managers and practitioners to assess the level of vulnerability in their area with some assistance from trained facilitators. It is best applied if the users receive training on correct application of the tools.

4.2.3 She also discussed briefly the VA framework for CIVAT and TURF. For these detailed tools, Vulnerability (V) is a function of Potential Impact (PI) and Adaptive Capacity (AC); PI, in turn, is a function of Exposure (E) and Sensitivity (S). A high PI would lead to equally high Vulnerability; whereas, a high AC would lower an area's Vulnerability.

4.3 PRESENTATION: OVERVIEW ON THE COASTAL INTEGRITY VULNERABILITY ASSESSMENT TOOL (CIVAT)

4.3.1 Coastal integrity is defined as the overall state of the coast resulting from its geologic history, bio-physical attributes and human activities that continuously shape and reshape the coastline. The integrity of the coast can be affected by sea-level rise, which would allow waves and tides to reach farther inland and cause worsening erosion and marine flooding. In the context of coastal integrity, Vulnerability is defined as the "relative measure of the system's natural vulnerability to the combined effects of bio-physical processes, geologic history and human activities". Vulnerability mainly comes from coastal erosion or the loss of sediments brought by wave and current activities, which are not replenished in

a given time. Coastal erosion is manifested as shoreline retreat (or landward movement of the shoreline) or to simply put, the narrowing or disappearance of beaches. Causes of coastal erosion include decreasing sediment supply from the watershed or offshore sources (e.g., coral reefs or offshore bar), increasing frequency of high-energy events (e.g. frequent typhoons), sea level rise, shift in river mouth position, structures along the foreshore (solid-base ports, groins and seawalls), beach mining, and degradation of habitats. Meanwhile, replenishment sources for the coasts include sediments from the watershed, and adjacent beaches, as well as from offshore carbonate sources (e.g. corals, halimeda, echindoerms, mollusks and foraminifera).

4.3.2 The vulnerability of the coast to erosion can be assessed using the Coastal Integrity Vulnerability Assessment Tool (CIVAT). It is a semi-quantitative rubric based on the IPCC VA framework. This tool considers a number of factors, both natural and human-induced, that contribute to coastal erosion. Natural factors or the physical drivers of coastal associated with climate change (e.g sea-level rise, storms and tides) are evaluated under Exposure (E). The intrinsic (e.g., coastal slope, geomorphology) and extrinsic (e.g., human-related factors such as beach mining) characteristics of the coasts are assessed under Sensitivity (S). The coastal resilience or ability of the coast to maintain sediment supply which can offset erosional processes (e.g. long-term movement of the shoreline and land use) is assessed under Adaptive Capacity (AC). CIVAT also recognizes the ecosystem function of coastal habitats such as coral reefs, seagrasses and mangroves for coastal protection.

4.3.3 Information needed for CIVAT can be derived from maps and satellite images, through primary data collection (e.g., beach profiling; coastal habitat assessments) as well as from the analysis of available historical data (e.g., relative sea-level change). In the absence of such data, the tool can utilize secondary information such as interviews and focus group discussions. It was also mentioned in this presentation that some vulnerability factors will be scored arbitrarily based on the sites being scored. Some of the methods that the coastal managers can use to obtain biophysical information as well as data available for download were mentioned in the presentation.

4.3.4 Below were the inquiries and comments from the participants after the introduction:

Inquiries and comments	**Feedback from the experts/speakers**
How to incorporate the capacity of the community in terms of adaptive capacity?	Since the presentation included in this part only highlights exposure, criteria/factors associated with the coastal community will be elaborated in in the succeeding presentations on Sensitivity and Adaptive Capacity
Please clarify the difference between exposure and sensitivity	Factors included in the Exposure deals with the physical characteristics external to the system such as waves, tides and typhoons. Sensitivity is more of the intrinsic factors inherent to the coastal such as coastal morphology, coastal slope and natural habitat. As an analogy, Exposure can be thought of sun (external) while Sensitivity is the differences in skin tone of the people (intrinsic property) that affects their sensitivity

	to sun exposure. The Adaptive Capacity can be considered as the availability of sun block or umbrella. One cannot do anything with the Exposure (the sun) but may decrease one's Sensitivity and increase one's Adaptive Capacity depending on his/her action.
Are there socio-economic factors associated with CIVAT?	CIVAT does not consider socio-economic factors, but these factors are included in the TURF.

4.4 PRESENTATION: THE CIVAT (SCORING EXPOSURE AND SENSITIVITY)

4.4.1 The workshop resumed with a recap of the CIVAT rubrics on the Exposure and Sensitivity components. To better understand the rubrics, the participants had a scoring activity using two barangays in the Philippines: Barangay Buena Suerte and Bebeladan in the municipality of El Nido, province of Palawan. Barangay Buena Suerte is the "Poblacion" or main town proper of El Nido. It has the highest population and is highly commercialized. Bebeladan, on the other hand, is less populated than Buena Suerte and is primarily an agricultural area. Each factor was explained and scored as the workshop goes through the whole CIVAT.

4.4.2 After scoring the Exposure and Sensitivity rubrics, the participants were allowed to ask questions and provide comments about the presentation and scoring activity, as shown below.

Inquiries and comments	Feedback from the experts/speakers
Where to get biophysical data?	For the sources of some biophysical data, information can be downloaded in open-access databases such as the NOAA website for rates of sea-level rise.
What can be done if there are wave data?	The advantage of the CIVAT is that some factors can be scored arbitrarily based on the sites covered. For example, waves can be scored based on the site's exposure to the predominant winds (NE and SW monsoon), whether the site is highly exposed (score =5) or relatively protected (score =1). .
How can hard coral cover be determined/measured?	This measures the habitat quality (%) of all the corals that are made of hard corals, not the total area covered. The area covered is treated as a separated factor.
In Thailand, how to score the mangrove zonation if there is only 1 species but the mangrove forest is very extensive (e.g. 1 km from the shoreline)?	The underlying attribute considered in the rubric is the species diversity which promotes ecological function. But if the mangrove is indeed extensive, then the evaluator can opt to score the site with a low vulnerability score
In Thailand, how to score a reef flat with no seagrass?	Score such barren area as "5" if it used to be covered with seagrass bed. For the seagrass rubric, the reef flat area considered excludes the actual coral reef zone.

How to determine present vs historical mangrove extent?	This shall include both anthropogenic and natural modifications. The score will vary per site based on available references or historical map.

4.5 PRESENTATION: THE CIVAT (SCORING ADAPTIVE CAPACITY)

4.5.1 Scoring for the Adaptive Capacity was continued after lunch break. Similar with the Exposure and Sensitivity, each factor in the Adaptive Capacity was elaborated as the scoring workshop ensued. The rating was obtained from a pre-determined range of values based on the number of criteria considered.

4.5.2 To determine the Potential Impact (PI) as a function of both Exposure and Sensitivity, Ms Sta. Maria presented the cross-tabulation method for determining the Potential Impact (PI = E x S) and for determining the overall Vulnerability (V = PI x AC).

4.5.3 After the scoring workshop, the participants had some inquires and comments presented below:

Inquiries and comments	Feedback from the experts/speakers
• Is the CIVAT scoring method linked or associated with the State of the Coasts?	• Yes. The data produced in the SOCs can be used to score the factors in CIVAT. Both the SOCs and CIVAT can help determine which areas to prioritize and what management actions should be taken on.
• Can the equation or type of analysis be considered for other factors such as marine pollution?	• Yes! But CIVAT variables must limited to factors affecting coastal erosion. For CIVAT and TURF, these are specific tools. But for the ICSea-CChange (to be presented in Day 2), these other factors can be considered.
• It is quite expected to have high vulnerability scores for areas that are urbanized. For these areas, hard structures may be difficult to remove. We are in need of other solutions especially in these types of urbanized areas. • In Indonesia, they ensured that structures are environmentally friendly, especially for Bali. It is expensive but would be beneficial for Bali. They did not use blocks or solid structures.	• In other countries, they are doing beach replenishment and modification of beaches/structures. However, beach replenishment can be costly. As such, replenishment and design of hard structures or other infrastructures must be designed by both engineers, scientists and the government • There is a need to inform leaders and influencers to protect tourism areas, because tourism areas are usually the ones with financial capacity that will benefit from ensuring coastal integrity.

4.6 PRESENTATION: OVERVIEW ON THE TOOL FOR UNDERSTANDING RESILIENCY OF FISHERIES (TURF) | RENMAR MARTINEZ

4.6.1 The TURF was presented by Mr. Renmar Martinez, a reef fish ecologist from the UP Marine Science Institute. He started his presentation off by presenting a framework that shows the

impacts of climate change and how it affects fish and fish stocks. The impacts of climate change are evident in the following: increasing water temperature which affects metabolism of fishes; irradiance which changes planktonic activity and alters food availability for fish larvae; changes in water circulation which affects development, survival and dispersal of fish larvae; ocean acidification and elevated water temperature which degrade fish habitat, eventually lowering recruitment rates due to loss of settlement areas. Direct effects of climate change (through elevated water temperature) can be manifested by changes in fish physiology and sex ratios, altered timing of spawning season, susceptibility to diseases and stress, and disruption of fish distributions (dependent on water temperature tolerance

4.6.2 The TURF incorporates three main dimensions of coastal ecosystems: the fisheries, reef ecosystem and the socio-economic attributes of the coastal area/s being assessed. The TURF features simple data analysis, devoid of complicated mathematical equations: data requirements are easily accessible or generated, assessment is participatory, and aids in decision-making for the local adaptation strategies. After the presentation of the framework and general description of each criterion, the scoring ensued afterwards, using Buena Suerte and Bebeladan as the sample sites.

4.7 PRESENTATION: THE TURF (SCORING EXPOSURE, SENSITIVITY AND ADAPTIVE CAPACITY) | RENMAR MARTINEZ

4.7.1 The rubrics and criteria featured in the TURF were elaborated as the scoring ensued. The scoring for TURF was quite different from CIVAT in that the approach was to segregate the vulnerability assessments among the three dimensions, instead of scoring the Exposure first, followed by the Sensitivity and Adaptive Capacity. Likewise, the TURF module used in the workshop is already automated such that the Exposure rubric is already incorporated under the Sensitivity rubric and the resulting Potential Impact rating (E x S) is already determined using the PI matrices used in CIVAT.

4.7.2 Next, the Adaptive Capacity for the two barangays was scored. Because the TURF module used is already automated, the Adaptive Capacity rubric already incorporates the resulting Potential Impact from the previous scoring activity on Sensitivity. The resulting Vulnerability (V = PI x AC) is shown per each dimension.

4.8 PRESENTATION: NEXT STEPS AFTER ASSESSING COASTAL VULNERABILITY: THE RESTORED STRATEGY | RENMAR MARTINEZ

4.8.1 After doing vulnerability assessments, a wide choice of actions can be taken using the acronym “RESTORED”.

4.8.2 This strategy is general but can guide site-specific actions that match the vulnerabilities of the areas. Actions should be done in consideration of the urgency and capacity of the concerned management body. Learnings and insights from the VAs should be integrated into management plan.

4.8.3 Inquires and comments of the participants after the introduction on TURF were the following:

Inquiries and comments	Feedback from the experts/speakers
• The TURF currently has no criteria considering fishers who own large parcels of land. In a country where these cases are common (e.g.	In the Philippines, it is uncommon for fishers to own large areas of land. But if it is needed to be considered, it can be included in the rubric

Thailand), how can we incorporate these?	
• How can TURF be modified to consider fisheries that are not reef-dependent such as Thailand which is more associated with invertebrate fisheries?	Because the TURF is designed for the Philippines, it is currently limited on the interaction between coral reef, reef fishes and reef fishers. If other types of fisheries are evident in other countries, then one can modify the rubrics to include these.
• Changes in sea surface temperature should be incorporated in the design of the TURF • Pollution, water quality and other conditions of the state of the environment can be incorporated in the tool.	

4.9 OPEN FORUM

4.9.1 After the presentations and scoring workshops on coastal integrity and fisheries, Ms. Diwa-Acallar enjoined the participants to form 5 groups, one each for the participating countries, and 2 groups from the Philippines. They were given 20 minutes to discuss among themselves and report on how they can use the tools for their respective sites. Their group reports are summarized below.

Participants from Indonesia:

Inquiries and comments	Feedback from the experts/speakers
• Target sites of PEMSEA in Indonesia are not affected by climate change as much as anthropogenic-- related threats such as reclamation and conversion of habitats. • The VA tools can be modified locally into Indonesian scenarios taking into account other anthropogenic factors. Should they develop their own tool, they will ensure to include more quantitative ways. What they need to determine, however, is the standard for each parameter or criteria. • They deemed that the VA tools must be modified according to specific area because each area has its own stressors and threats or impacts. • In order to use the VA tools, they shall conduct further training among	• For CIVAT, some of the cutoffs are based on local data that are specific to the Philippine situation. But some like the long-term shoreline trends are based on Thieler and Hammer-Klose (2000) and Gornitz (1993). • One of the salient features of the CIVAT is that it accounts for more variables compared to other tools (e.g. current tool used by USA considers 7 variables only). For the Philippines and Indonesia which are archipelagic, they need to consider the coral reefs. We took into consideration the role of the natural habitats – how they can protect the coasts, ensure the supply of the coasts. So far, the tools are more geared towards tropical systems. That would be the selling point for these tools versus the other tools.

themselves, among the trainors and shall invite representative from local universities and academies. • What are the selling points of these tools? What management strategies can they do after knowing the results of the vulnerability assessments?	• For TURF, the tool was designed from ground-up. We ensured the tool can be appreciated by the fishermen. So even if the data is sparse, we can easily obtain data rapidly especially with limited resources for surveys or research. • In terms of "what's next", the book (VA book) tells us priority areas or steps to consider after doing the vulnerability assessments

Participants from Thailand:

Inquiries and comments	Feedback from the experts/speakers
▪ One of the target sites in Thailand where the VA is crucial is the Chonburi province. ▪ This particular area is very developed, highly urbanized and very open. No corals, no seagrass, no buffering habitat per se. but have lots of data and there are lots of efforts to solve the problems. There are more solutions in the past that created more problems. ▪ Goal therefore is to adopt the tool but modify it and omit natural habitat. We will be focusing on the adaptive capacity. Right now, there are stone walls to prevent the waves. Removing some of the structures will be challenging but with the help of engineering, doing so can alleviate coastal erosion and induce sediment transport. ▪ Another area to be considered is the restoration of mangroves. As of now, there is now less erosion due to mangrove restoration efforts. ▪ But the major stressor now is climate change. Although its effects are for the long run, short run and immediate problems should be addressed first for Thailand.	▪ To adopt the CIVAT, you can omit or modify other factors under the natural habitats and focus on the rubrics/factors that are of concern, especially on anthropogenic threats such as coastal development. To allocate for these variables, exposure must coincide with sensitivity. You may modify the tool based on the characteristics of your area. ▪ In terms of exposure, one can input other anthropogenic stresses as long as you can produce a rating (1 to 5). Responses should avoid the "middle" score of 3. As such, scores should be answered on a 1-2, 3-4 and 5 scales. You can modify the TURF based on the specific fisheries in your area. If the focus is on invertebrate fisheries, you can consider attributes related to mangrove forests such as extent, diversity, or cover.

▪ For Thailand, the TURF can be modified since reef fishes is not highly targeted. They are more inclined in crab and other invertebrate fisheries. Fishers are also geared towards pelagic fisheries. ▪ In terms of the natural habitats, they will be giving more emphasis on the role of mangroves instead of reef areas. This is to account for the invertebrate fisheries.	

Participants from Timor-Leste

Inquiries and comments	Feedback from the experts/speakers
• Anthropogenic threats mostly come from coastal development and upland activities. In the dry season some communities burn the forest. As such, during the wet season, river runs offs down to mangroves and seagrass beds. The question is, how to maximize the tools to allocate for these factors. Timor Leste is concerned with by upland activities affecting the coasts)	• The limitation of CIVAT is that is designed for coastal areas, so no factors were considered to account for attributes relating to rivers and uplands. For Timor Leste, what they need is more of a ridge-to-reef approach. For sedimentation, it is important to identify the type of sediments being discharged by rivers. Finer sediments are transported farther offshore and the abundance of it may create mudflats. Coarse sediments would create beaches. So first, they need to look at the type of sediment being released to the coast. To estimate sedimentation, if you can access nautical charts with water depth data, you can do so by computing the changes in water depths between two time periods.

Group consisting of representatives from the LGUs of Cavite, Oriental Mindoro, and Guimaras, Philippines

Inquiries and comments	Feedback from the experts/speakers
• The Cavite participants agreed that they want to show the CIVAT results (e.g. Guimaras) or conduct CIVAT to new sites to show the effects of the establishment of groins and structures in the area. • The question is: Is there a simple questionnaire or tools (e.g. FGD) that can be used in conducting surveys especially for the older community?	• The Geological Oceanography Laboratory of UP-MSI has a questionnaire to supplement shoreline change analysis. For immediate assessment concerns, qualitative data from such questionnaires can be used. But in the long run, efforts must be made to gather quantitative data because the quality of the analysis

	depends on the quality or reliability of the data.

Group consisting of representatives from the LGUs of Pampanga and Bataan, Philippines

Inquiries and comments	Feedback from the experts/speakers
• CIVAT: Both provinces lack baseline data at the barangay and municipal level even if there are adequate tools to be used in gathering such. After they gather data, it is best that they be incorporated in current maps or undergo data analysis though GIS software. • For Bataan, both VA tools are applicable because it currently has 11 coastal municipalities. The limitation on Bataan is its limited data on natural habitats. By doing the CIVAT and TURF VAs, identification and analysis of vulnerabilities are beneficial for adopting local management plans and highlights the need for updated studies on natural habitat such as coral reefs, seagrass and mangroves. • Data gathering at the local level can pose a challenge (must forge partnerships with existing institutions). Doing VAs may require inculcating some sense of ownership on the local community and encouragement of local chief executives to think long-term and consider paying attention to vulnerability indicators of coastal communities. • For Pampanga, the Bangkung Malapad in Sasmuan Pampanga harbors critical coastal habitats that are susceptible to future reclamation projects. The local community must ensure ownership of their land to ensure the future of their children. • The TURF is a useful tool for fisheries-related planning. It is important to communicate the significance of the tool to the stakeholders and not just for compliance. The fishers, too, must	

imbibe some sense of ownership on their marine resources.	

4.9.2 Final comments of the speakers were as follows:

(a) The approach to minimize vulnerability or the ability to have mitigation strategies is through a regional-approach and is multidimensional. As such, there is a need to balance between economic, social and environmental activities.
(b) Likewise, some of the problems cannot be assessed simply by VA especially problems that are process-based. One needs to have a better understanding about the process and factors that lead to sedimentation. This will help produce the data that will be needed for future VA assessment.

4.10 Closing of Day 1

4.10.1 The first day of the workshop was closed by Ms. Johanna Diwa-Acallar. One of PEMSEA's deliverables is to conduct vulnerability assessments to target sites per member country. According to her, everyone has an understanding on how the tool works and how to tweak some of the variables in order to make them fit for their respective localities. The challenge now is, to know to what extent can the tool be tweaked or modified. Another challenge in conducting vulnerability assessments is the problem with data, particularly with respect to data requirement; data generation; scoring 'no data'; and using the tool when there is no data. In this case, the VA tool can tell us which data or information is missing, which, in effect, it also becomes a tool for data gap analysis. For data gap, secondary data from previous reports and surveys, such as SOCs and Participatory Coastal Resource Assessment (PCRA) can be utilized.

5.0 DAY 2, March 5 2019

5.1 Day 2 of the workshop was opened by Ms Diwa-Acallar where she provided to recap the previous day's discussions. She then introduced Dr. Samuel Mamauag, the lead author of the publication on the Tool for Understanding the Resiliency of Fisheries (TURF).

5.2 PRESENTATION: INTRODUCTION ON THE INTEGRATED COASTAL SENSITIVITY, EXPOSURE AND ADAPTIVE CAPACITY FOR CLIMATE CHANGE (ICSEA-C-CHANGE) | SAMUEL MAMAUAG

5.2.1 Dr. Samuel Mamauag first provided a recap on Potential Impact and Adaptive Capacity. But for the ICSEA-C-CHANGE, the Adaptive Capacity was modified to "Lack of Adaptive Capacity" to make the three parameters parallel for scoring (see Licuanan et al, 2015). He also reviewed how climate change impacts the natural system through stronger and frequent storms, stronger waves, rising sea level, increasing sea surface temperature and coastal run-offs.

5.2.2 The presentation then proceeded to the Integrated Coastal Sensitivity, Exposure and Adaptive Capacity for Climate Change tool (I-C-SEA-CC). Being the second largest reef-associated population in the world, the Philippines has high dependency of coastal communities on coral reef-based fisheries but has a low capacity to adapt to reef loss which indicates very high vulnerability to the impacts of climate change. The framework of I-C-

SEA-CC integrates the assessment of the 3 main components considered – coastal habitats, coastal integrity, and fisheries. This was discussed in relation to the standard Vulnerability framework of the IPCC. In addition, the ICSEA-C-CHANGE framework integrates the key elements of Vulnerability using a Venn diagram, highlighting their overlapping scopes.

5.2.3 Dr. Mamauag continued his presentation and redefined the three rubrics on exposure, sensitivity and adaptive capacity. Rubric scoring means choosing scores based on a series of questions. For the ICSEA-C-CHANGE tool, it is a combination of the two previous VA tools with the addition of more parameters. One of the major contributors to this tool is the Reefs as Risk Revisited (Burke et al., 2001), which mainly considers anthropogenic threats such coastal development, sedimentation, overfishing, destructive fishing and marine pollution.

5.2.4 Some of the salient features of ICSEA-C-CHANGE are the following: this tool encourages integrated systems thinking; it deals with single-factor scoring and subscoring, which creates an initial profile of a coastal area; it has a reduced the set of intrinsic and extrinsic criteria (no excessive detail); the data to be used can come from PCRA (Participatory Coastal Resource (or rapid) Assessments); the time scale of the tool is one year and thus, can measure acute impact); the spatial scale can be downscaled to the barangay level (smallest political unit of the Philippines); and it can be used for decision making. The ICSEA-C-CHANGE accounts for the coastal habitats (e.g. mangroves, seagrass and corals) in addition to coastal integrity and fisheries. It also includes elements of environmental quality and socio-economic attributes.

5.3 PRESENTATION: THE ICSEA-C-CHANGE (SCORING EXPOSURE, SENSITIVITY AND ADAPTIVE CAPACITY) | DR. SAMUEL MAMAUAG

5.3.1 Similar to CIVAT and TURF, the sample sites scored for ICSEA-C-CHANGE are Buena Suerte and Bebeladan, two barangays from El Nido, Palawan. Each criterion and rubric was elaborated as the scoring ensued. Scoring follows the rubrics and cross-tabulation procedures of the CIVAT and TURF. Criterion with no data will be given a score of 5.

5.3.2. The ratings of the different components of Vulnerability (E, S, and LAC) for Barangay Buena Suerte are MMH, which is equivalent to high vulnerability. Bebeladan, on the other hand, has a rating of MMM for the 3 components, and thus, has medium or moderate Vulnerability to climate change.

5.4 PRESENTATION: POST VULNERABILITY ASSESSMENT ACTIVITIES | DR. SAMUEL MAMAUAG

5.4.1 After conducting the VAs, what are the next steps to do for the management body? This was presented by Dr. Mamauag and stipulated that in order to reduce vulnerability, the coastal area's Sensitivity and Exposure must be reduced and its Adaptive Capacity must be increased. The most logical step is to reduce areas with high vulnerability to medium vulnerability, areas with medium vulnerability to low vulnerability, and areas with low vulnerability to not be vulnerable at all.

5.4.2 Some examples of adaptation strategies include:

- **Reducing potential impacts:** Avoidance of high exposure of fishers, relocation of sensitive species and communities, soft engineering, social preparation and marketing, and relying on hard engineering as a last resort.
- **Increasing adaptive capacity:** Accelerating recovery mechanisms e.g. MPA networks scaling up, improving MPA effectiveness, management thru good governance, synergies through climate-smart objectives.

5.4.3 Furthermore, the RESTORED strategy was elaborated by Dr. Mamauag. This strategy serves as a general guideline for such adaptation plans to reduce vulnerability. However, specific actions are also indicated for each component of coastal systems.

"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

5.5 OPEN FORUM | MS. JOHANNA DIWA-ACALLAR

5.5.1 The questions and comments for the ICSEA-C-CHANGE tool and scoring method in Day 2 were as follows:

Inquiries and comments	Feedback from the experts/speakers
• Where can we input marine pollution? What about harmful algal blooms? These types of threats are important to be included in the current tools.	• A limitation of the tools is that they do not cover these kinds of problems. For specific locations, there are different threats that must be considered for such tools. Therefore, new assessment tools

• Hopefully, these tools can be developed to included HABs and aquaculture.	may be improved to include such topics, including aquaculture. • Nonetheless, some important criteria or factors such as water quality and HABS criteria can be included by modifying some of the current criteria. Likewise, you can omit criteria not applicable in certain sites. • Moving forward, we learned how to use rubric system, and everyone can now modify or redesign VA tools that can be specific towards specific areas.
• How to go about when we lack many data for the assessments or when the environmental criteria are different from what is listed in the current VA tools?	• As much as possible, we can do pre-VA activities prior to scoring, to avoid preponderance of 5s as scores due to data limitation. At the pre-VA, provide a checklist for data requirements and do something like the SWWAT: S-snorkel, W-wade, W-walk along the shoreline (for shoreline tracing), A-ask people in the community, T-take pictures. For doing the VAs, you can do better scoring if you have pictures as references.
• When the team does the ranking or priorities for appropriate actions coming from the TURF, how do the respondents react?	• Most of them vie for the establishment of MPAs. So they need experts for consultation like determining sites for MPA establishment, management strategies etc. • Some are into providing fishing regulations, so we advise the conduct of studying specific fisheries for possible catch restrictions or seasonality. • For solid waste, review existing solid waste management policies. But the challenge is cost. Some would even need to be trained for sustainability fundings.
• The Thais may need to modify certain criteria based on local data. So in doing the VA in Thailand, they might tweak a lot of criteria and factors for the VA. So what would be the experts' advice to them when doing their own VA?	• Focus on the pertinent factors first, omit other factors that are not important. For Thailand, they can do pre-VAs first to determine the right factors such as precipitation, algal blooms, etc. • It is advised for Thailand to have their own VA tool or revamp depending on the criteria of interest. They can access national data to set the low, moderate,

	high categories. This is so that the VA tools are more fit for their country. • Make sure that the exposure factors are also matched with the sensitivity factor
• How do they account for precipitation in Thailand?	• If they have precipitation data, they can make a frequency table with 5 classes by getting the range and dividing it by the number of classes (5 classes).
• Another question from the Thais concerns HABs: where to put the HABS in the VA? Exposure or response?	• For the experts, this should be included in the Exposure since this is external. You can account for nutrient inputs, algal blooms, type of blooms. For the fishery, you can tweak it to consider the type of fisheries affected by HABs (e.g., fish, crabs, shrimp, and especially shellfish), as well as nclude number of farms in the area. • For the TURF, they can include the effects of HABS on the number of people consuming shellfishes.
• With regards to the tourism industry in Thailand, how can we include the sediment runoff from tourism? Should it go under exposure or sensitivity? What if we need to put more emphasis or weight on sedimentation/ erosion caused by tourism?	• If direct activity from tourism causes the sedimentation, you can consider tourism as exposure. But if tourism is affected because of sedimentation, then tourism goes towards sensitivity. • On assigning weights, put more weight on quantifiable data versus descriptive. You can also use regression analysis to determine coefficients of the independent variables that can serve as weights.
• A participant from Indonesia shared his insights on how to put weights. According to him, the weights may be determined by a pool of experts in a particular field. Multiple regression analysis would require a lot of data.	
• After the conduct of this VAs, how can we incorporate it to a national development plan? They are also eager to know what are the challenges the experts encountered after conducting the VAs and in terms of forwarding the results to the government	• As an example of the conduct of VA in Indonesian waters, the minister had a good reception on the results and called for drastic actions. For the illegal fishery, the government burned all the illegal fishing boats down. So it all depends on the reception of the government towards the results. • For the second question, it is still challenging to implement because we

	need to balance ecological conservation and provision of food and livelihood. That's why we need to continue collaboration with other academic units and stakeholders. • The VA is still under development and shall continue to be reviewed and developed. Especially for Thailand, we can integrate it towards the type of fishery, salinity, etc., being practiced in the country. • As long as we get the idea of the rubrics and the concept of the framework, the tools can be effective towards achieving their goals. The challenge for managers is prioritization and actualization of recommendations. So putting the urgency-capacity framework, the management can pool in their resources towards achieving certain objectives or recommendations.
• From Bataan: Because of the newly acquired knowledge on the tool, they will not rely much on the PCRA. Instead, they will seek help from the technical aspects such as divers during their initial assessments. The PCRA was done by BFAR in 2014. It is good to do an updated assessment with the tools in mind	•
• From Pampanga: How to present the final results?	• You can represent it via maps with color coding based on the LMH scores of each barangay. This map would give the manager an idea which areas are most vulnerable to coastal erosion, fisheries and climate change, and can help prioritize sites for action planning.
• From Thailand: ICSEA-C-CHANGE is more comprehensive. If a more holistic approach is needed, use the ICCSEA Change. If specific towards coastal integrity or fisheries – use the two tools	• A new tool is currently being developed in MSI with a lens on climate change. It incorporates the 5 major threats reported in Burke and others (2011). We are now reintegrating the natural causes, threats and the three components: fisheries, coastal integrity and natural environment. This is the Suitability, Sensitivity, Susceptibility – Governance and Socio-Ecological Integrated System (SSS-GSIS), which is currently being rolled out regionally.

5.6. CLOSING REMARKS

5.5.1 In behalf of the experts, Mr. Martinez gave his closing statement that it is not enough to have **"I"** CSEA-C Change. It is time to progress to "**We"** CSEA-C Change! This means that vulnerability assessments should not be constrained within one institution or one management body alone. The way to deal with climate change is to have a synergy among multiple stakeholders since climate change affects everyone.

5.5.2 The final statement and reminders were given by Ms. Johanna Diwa-Acallar.

6. NEXT STEPS

6.1 A follow-up discussion between the MSI experts and Thai delegation followed after the closing of the workshop proper. It was agreed that the experts from ICM LCs in Thailand will work on tweaking the tool as discussed to fit their criteria in conducting Risk and Vulnerability Assessment. The first week of May is being explored to invite the MSI trainers and deliver the training using the draft revision from the Thai team.

6.2 Ms. Diwa-Acallar to facilitate continuous coordination with the UP-MSI team leader, Dr. Mamauang, in finalizing the date and organization of the local training to be conducted in Chonburi.

Annex 1. Programme

REGIONAL TRAINING WORKSHOP ON RISK AND VULNERABILITY ASSESSMENT

Quezon City, Philippines

March 4-5, 2019

Provisional Program (as of Feb 28 2019)

Time	Activity	Speakers/presenters
Day 1 (March 4, 2019)		
08:00 - 08:10	Welcome Remarks	Aimee Gonzales Executive Director PEMSEA
	Overview and introduction of participants	Johanna Diwa-Acallar Capacity Development Manager PEMSEA
08:10 – 09:10	Coastal erosion lecture	Yvainne Sta. Maria
09:10 – 09:20	*Break*	
09:20 – 11:20	Coastal Integrity Vulnerability Assessment (CIVAT) Lecture	Yvainne Sta. Maria
11:20 – 12:20	CIVAT Scoring Workshop	Yvainne Sta. Maria Renmar Martinez Documenter
12:20 – 13:20	*Lunch*	
13:20 – 14:20	CIVAT Scoring Workshop (cont'd)	
14:20 – 15:50	Tools for Understanding Resiliency of the Fisheries (TURF) Lecture	Renmar Martinez
15:50 – 16:00	*Coffee Break*	
16:00 – 18:30	TURF Scoring Workshop	Renmar Martinez Yvainne Sta. Maria Documenter
18:30	Welcome Dinner	

Day 2 (March 5, 2019)		
08:00 - 08:30	Presentation of Results - CIVAT	Samuel Mamauag Yvainne Sta. Maria Renmar Martinez Documenter
08:30 – 09:00	Presentation of Results - TURF	
09:00 – 10:00	Climate Change in the Philippine Setting, Exposure Models	Samuel Mamauag
10:00 - 10:15	*Break*	
10:15 - 12:15	Integrated Coastal Sensitivity, Exposure, and Adaptive Capacity to Climate Change (ICSEA-CC) Lecture	Samuel Mamauag
12:15 - 13:15	*Lunch*	
13:15 – 15:45	ICSEA-CC Scoring Workshop (working break)	Samuel Mamauag Yvainne Sta. Maria Renmar Martinez Documenter
15:45 - 16:45	Adaptation Measures: Principles and Strategies	Samuel Mamauag
16:45 – 17:00	Open Forum	Samuel Mamauag Yvainne Sta. Maria Renmar Martinez Documenter
17:30	***Closing***	

Annex 2. List of Participants

Indonesia

Bogor Agricultural University

Dr. Ario Damar
Director of Centre for Coastal and Marine Resources Studies
Bogor Agricultural University
adamar@pksplipb.or.id

Udayana University

Dr. Ketut Gede Dharma Putra,M.Sc
Chairman, Center for Sustainable Development
University of Udayana,Bali
kgdharmap@gmail.com

Diponegoro University

Dr. Rudhi Pribadi
Diponegoro University
Semarang, Indonesia
rudhi_pribadi@yahoo.co.uk

Thailand

Burapha University

Dr. Praparsiri Barnette
Head, Department of Aquatic Sciences
Faculty of Science Burapha University
praparsi@buu.ac.th,
mayschonicm@yahoo.com

Dr. Wansuk Senanan, Ph.D.
Department of Aquatic Science, Faculty of Science
Burapha University
Chon Buri Thailand 20131
wansuk@go.buu.ac.th; wansuk@buu.ac.th;
wansuks2@yahoo.com

Dr. Sarawut Siriwong
Lecturer in Faculty of Marine Technology
Burapha University
Chon Buri Thailand 20131
sarawuts@go.buu.ac.th

Prince of Songkla University

Mr. SakananPlathong
Coral Reef and Benthos esearch Unit
Department of biology
Prince of Songkla University
Thailand
Email: sakanan2004@yahoo.com

Timor Leste

Mr. Leonito Amaral Aleixo
Dean Agriculture University
National University of Timor Leste
Dili, Timor Leste
Email: aleixo_la@yahoo.com

Mr. Da Costa Hornai Rui
Oriental University of Timor Leste
Dili, Timor Leste
Email ruisure.@gmail.com

Philippines

Bataan

Ms. Karen June A.Balbuena
Technical Assistant
Bataan ICM Program
Email: icmbataan@yahoo.com

Ms. Jaira D. Manalili
Community Development Assistant
PG-ENRO-ICM Division
Email: icmbataan@yahoo.com

Cavite

Engr. Ronalyn Pangilinan

Mr. Adbulbasit Abubakar
Administrative Aide I
PGENRO Cavite
pgenro.icm_cavite@yahoo.com

Guimaras

Ms. Jogie V. Diana-
Project Development Officer I
Provincial Government - Environment and Natural Resources Office
Guimaras
genroguimaras@yahoo.com

Ms. Queenilyn F. Galleto-
Community Development Assistant I
Provincial Government - Environment and Natural Resources Office
Guimaras
kayqueni@yahoo.com

Oriental Mindoro
Meljoy Malupa
Meljoymalupa19@gmail.com

Janine Jamilla
janinejamilla04@gmail.com

Pampanga

Ms. Irene Marie F. Villar
Provincial Government - Environment and Natural Resources Office
Pampanga

Mr. Joshua Earl V. Reyes
Provincial Government - Environment and Natural Resources Office
Pampanga

PEMSEA

Mr. Thomas Bell
Science and Communications Officer
Email: tbell@pemsea.org

Ms. Nancy Bermas
Senior Country Programme Manager
Email: nbermas@pemsea.org

Ms. Johanna Paula Diwa
Capacity Development Manager
Email: jdiwa@pemsea.org

Ms. Elsie Merina
Programme Assistant
Email: emerina@pemsea.org

Ms. Daisy Padayao
Country Programme Manager
Email: dpadayao@pemsea.org

Mr. Michael Villaueva
Librarian
mvillanueva@pemsea.org

Ms. Jhowilyn Zaldivar
Country Programme Assistant
Email: jzaldivar@pemsea.org

RESOURCE PERSONS

Dr. Antonio Samuel Mamauag
University of the Philippines – Marine Science Institute (UP-MSI)
samuel.mamauag@gmail.com

Ms. Yvainne Sta. Maria
UP-MSI
yvainne@gmail.com

Mr. Renmar Martinez
UP-MSI

Mr. Robert Bryan Casauay
Marine Science Institute