ASIA-PACIFIC NETWORK FOR
GLOBAL CHANGE RESEARCH

FINAL REPORT

Resilience-building and future-proofing strategies in a multi-stressed scenario in the province of Albay, Philippines.

CBA2021-05MY-Pulhin

2024

Project Reference Number: CBA2021-05MY-Pulhin

Project Duration: October 1, 2023 – March 31, 2024

Funding Awarded: USD 73,400

Grant DOI: doi.org/10.30852/p.20537

Date of Publication:

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Recommended Citation:

Pulhin, J.M., Lagmay, A.M.F.A, Peras, R.J.J., Villamayor, M.T., Sabino, L.L., Grefalda, L.B., Anders, C.S., Garcia, J.E., Santiago, J.T., Mendoza, J.E., Pulhin, F.B., Sajise, A.U., Predo, C.D., Singson, K.V.R., Esquivel, A.L.J.S., Agudo, G.J.L. (2024). Resilience-building and Future-proofing Strategies in a Multi-stressed Scenario in the Province of Albay, Philippines. Technical Report. Asia-Pacific Network for Global Change Research.

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1. Summary

This project funded by the APN under its CAPaBLE program led by UPLB-INREM. They conducted a seven-stage watershed-wide capacity-building activities under guided by the ISET Climate Resilience Framework and the Participatory Climate Change Adaptation Using Watershed Approach by Pulhin et. al. (2022) with the end goal of increasing knowledge on multi-hazard events of the communities and institutions and capacitating them in crafting adaptation measures (in the form of project proposals) using the information generated by the project. The seven stages are: Initial Meetings with Local Stakeholders, Formalization of Partnerships, Local Engagements and Data Gathering Activities, Assessment of Institutional Capacities, Trainings and Workshops, Declaration of Commitment, and the Conduct of the Science Policy-Forum. The conduct of the activities was not without challenges and three were identified: the travel restrictions of the COVID-19 Pandemic, the Changing Political Setting and Context caused by the national and local elections, and subsequent electoral protests, and the Challenge of Cooperation beyond LGU Boundaries.

The Quinali A Watershed is composed mainly by six local government units (LGU): Camalig, Guinobatan, Ligao City, Oas, Polangui, and Libon – all of which have expressed willingness to participate throughout the initial engagements and visits by the project team to the respective local chief executives (LCE). They were also equally enthusiastic during the data-gathering activities, assessments, and in attending the trainings and workshops. Based on the institutional capacity assessments, core group institutions were found to have high capacities to respond while they have low scores for information flows. To this end, the team conducted lectures on probabilistic risk assessments, hazard map interpretations, the watershed approach, a hands-on board game activity on cascading hazards, presentation of results, and project proposal training. A declaration of commitment was signed by the local stakeholders to ensure that the proposals, experiences, and lessons learned will continue beyond the project timeline.

As part of the policy advocacy of APN, UPLB-INREM, and the project, a Science-Policy Forum was held at the sidelines of the 4th International Conference on Integrated Natural Resources and Environment Management (INREM 2023) last November 22, 2023. It was attended by APN, researchers of the project team, and representatives of some core group institutions. The forum became an avenue to discuss policy recommendations and the find possible ways to mainstream multi-hazard scenarios in the development plans of the LGUs.

2. Objectives

- Capture the historical changes in the biophysical characteristics and sociopolitical processes of the province through forest fragmentation and narrative analyses, respectively;
- Conduct participatory and probabilistic climate change risk scenario assessments;
- Train the LGUs on effective utilization of risk assessments in designing climate change and other disaster related actions and its mainstreaming in the Comprehensive Development Plan of the barangays, cities/municipalities, and the province; and,
- Distill and recommend policy-relevant frameworks and strategies for transformative multi-risk management and governance.

3. Outputs, Outcomes and Impacts

https://analyticsinaction.co/definition-output-outcome-impact-with-examples

Outputs	Outcomes	Impacts
Six (6) Participatory Risk Assessment Reports for each of the LGUs	Local Government Units that are informed and equipped with the necessary knowledge on their vulnerabilities, risks, and cascading impacts of multi-hazard events	Resilient Communities and Future-Proof Institutions
One (1) Proceedings of the Science-Policy Forum	Local Institutions such as the provincial, municipal/city, and barangay level learned possible ways the research outputs can be integrated to local policies	Local Policies that are responsive to dynamic multi-hazard events in the face of climate change
Two (2) articles in the UPLB News Website on the Science-Policy Forum and Results Presentation Workshop	Wide dissemination of research activities and outputs to raise awareness and stir discussion on the importance of probabilistic risk assessment and multi-hazard events	A wider public that is aware and knowledgeable on probabilistic risk assessment and multi-hazard events that can raise conversations on discussions and increase demand for responsive policies from below
Conduct of Exposure trip and capacity-building activities.	Local stakeholders with increased understanding of hazard map interpretation creative learning of cascading impacts.	Resilient Communities and Future-Proof Institutions
One (1) Land Cover Change	Responsive policy and	Quinali A Watershed with

Assessment	transformative ecosystem-based adaptations based on sound land cover and landscape fragmentation area data.	intact forests and integrated landscape
Five (5) research papers presented in an international conference	Local Stakeholders with increased knowledge and perspective on multi-hazard scenarios and a research community made aware of the situation of the Quinali A Watershed	Transformative disaster risk reduction and management in a multi-hazard scenario and increased attention to the problems of the watershed

4. Key facts/figures

- 5 papers presented in an international conference;
- 3 early-career researchers trained and engaged;
- 1 Policy Forum held;
- 3 Training workshops conducted;
- 1 watershed assessed;
- 6 Municipal/City Local Government Units engaged;
- 18 Barangay (Village) Local Government Units engaged;

5. Publications

- Singson, K. V., Pulhin, J., Villamayor, M., Anders, C., Peras, R. J., Grefalda, L., Sabino, L., Garcia, J., & Pulhin, F. Visualizing the Cascading Impacts of Multi-hazards in Three Selected Barangays in the Quinali A Watershed, Albay, Philippines. *Science and Engineering Journal*. [UNDER REVIEW]
- Mendoza, J.E., Agudo, G.J.L., Lagmay, A.M.F.A., Pulhin, J.M., Cruz, R.V.O., Santiago, J.T., Moises, M.A.M., Predo, C.D., Villamayot, M.T., Mendoza, M.D., Peras, R.J.J., Sabino, L.L., Grefalda, L.B., Sajise, A.J.U., Pulhin, F.B., Garcia, J.E., Anders, C.S., Singson, K.V.R. Application of Geographic Information System (GIS) for Watershed-Scale Multi-Hazard Assessment in Quinali A Watershed, Albay, Philippines [FOR SUBMISSION]
- Probabilistic Risk Assessment of Flood Hazards in the Quinali Watershed Using Integrated and Participatory Approaches for Comprehensive Disaster Management [FOR SUBMISSION]
- Agudo, G.J.L., Garcia, J.E., Pulhin, J.M., Mendoza, J.E., Lagmay, A.M.F.A., Cruz, R.V.O., Santiago, J.T., Moises, M.A.M., Mendoza, M.D., Villamayor, M.T., Peras, R.J.J., Sabino, L.L., Grefalda, L.B., Anders, C.S., Pulhin, F.B., Sajise, A.J.U., Predo, C.D., Singson, K.V.R. Spatial Analysis of Land Cover Change Shows Increasing Flood Exposure and Landscape Fragmentation in Quinali A Watershed, Albay, Philippines [FOR SUBMISSION]

- Pulhin, J.M., Singson, K.V.R., Grefalda, L.B., Villamayor, M.T., Predo, C.D., Sajise, A.J.U., Sabino, L.L., Peras, R.J.J., Garcia, J.E., Anders, C.S., Pulhin, F.B., Mendiza, M.D., Cruz, R.V.O., Lagmay, A.M.F.A., Santiago, J.T., Mendoza, J.E., Esquivel, A.L.J.S., Agudo, G.J.L. Assessment of Institutional Capacity of Selected Local Government Units and Government Agencies of the Quinali A Watershed in Albay towards an Institutional Capacity Index [FOR SUBMISSION]

6. Media reports, videos and other digital content

1. **APN SCIENCE-POLICY FORUM**
   UPLB News Website: https://uplb.edu.ph/all-news/apn-science-policy-forum-proposes-policy-initiatives-for-albay-community-resilience/

2. **RESULTS PRESENTATION AND TRAINING WORKSHOP PART 2**
   UPRI News Page: https://resilience.up.edu.ph/up-ri-noah-center-uplb-inrem-facilitate-project-proposal-finalization-to-promote-resilience-in-a-multi-stressed-watershed-in-the-province-of-albay-philippines/

3. **RESULTS PRESENTATION AND TRAINING WORKSHOP PART 1**
   UPLB News Website: https://uplb.edu.ph/all-news/uplb-inrem-upri-facilitate-project-proposal-planning-on-resilience-building-for-albay-watershed/

4. **EXPOSRE TRIP AND CAPACITY-BUILDING ACTIVITIES**
   UPLB-INREM Website: https://inrem.cfnr.uplb.edu.ph/news/uplb-inrem-conducted-an-exposure-trip-capacity-building-activities-at-up-ri/

5. **SIGNING OF MEMORANDUMS OF UNDERSTANDING**
   UPLB-INREM News Page: https://inrem.cfnr.uplb.edu.ph/news/uplbfi-inks-memorandum-of-understanding-with-bu-denr-5/
   Bicol University News Page: https://bicol-u.edu.ph/uplbfi-taps-bu-to-take-part-in-project-to-build-resilient-lgu/

6. **DATA-GATHERING ACTIVITIES**
   UPLB-INREM News Page:
   https://inrem.cfnr.uplb.edu.ph/news/uplb-inrem-resilience-project-in-albay-conducts-first-site-visit/

   https://inrem.cfnr.uplb.edu.ph/news/inrem-spearheads-community-fgds-in-albay/

   https://inrem.cfnr.uplb.edu.ph/news/uplb-inrem-holds-community-fgds-in-camalig-albay/

7. Pull quotes

"DENR 5 strongly supports the implementation of the identified strategies, particularly, those environment related activities in line with our priority thrusts and directions, such as adopting climate risk lens in planning and policies, up-to-date information of forest cover, watershed management and conserving protected areas and biodiversity resources." – Francisco E. Milla, Jr. CESO III, Regional Executive Director – DENR 5

"Due to its geographical location and physical environment, the Bicol Region is highly vulnerable to typhoons, floods, and droughts. It is not only one of the poorest regions in the country but is also known as the country's "Disaster Paradise". Sabi nga po (As the saying goes), you name it, and we have it in Albay!" – Associate Professor Carlos V. Cortez - Bicol University

"Albay communities must continue to draw on lessons from past planning and recovery work, but they also need to prepare for longer-term, more gradual changes to our support systems and environment. For these communities, adapting to climate change is a vital part of reducing long-term disaster risk and becoming more resilient." – Rommel V. Negrete, Jr., J.D., PhD., DHum. - President, Local Association of DRRMOs in Albay

8. Acknowledgments

We would like to acknowledge the assistance and support provided by the Asia-Pacific Network for Global Change Research for the funding that made this research and capacity-building project possible.

Gratitude and appreciation are extended to the local institutions and stakeholders in the Province of Albay, Philippines:

- *Bicol University* through Professor Emeritus Arnulfo Mascariñas and Associate Professor Carlos V. Cortez, Jr.
- *Department of Environment and Natural Resources Region 5* through Regional Executive Director Francisco E. Milla, Jr., and For. Marlene M. Francia
- The *Local Association of DRRMOs in Albay* through Mr. Rommel V. Negrete, Jr., PhD., J.D., DHum.
- The *City Government of Ligao* through Hon. Mayor Fernando V. Gonzalez and Ms. Soledad T. Preña
- The *Albay Public Safety and Emergency Management Office* through Dr. Cedric D. Daep and Mr. John Eugene Escobar

- The *Municipal Government of Camalig* through Hon. Mayor Carlos Irwin G. Baldo and Mr. Rommel V. Negrete, Jr., PhD., J.D., DHum.
- The *Municipal Government of Guinobatan* through Hon. Mayor Paul N. Garcia and Mr. Autonomo A. Amano
- The *Municipal Government of Oas* through Hon. Mayor Domingo R. Escoto, Jr. and Ms. Monica Requillas
- The *Municipal Government of Libon* through Hon. Mayor Wilfredo V. Maronilla and Mr. Ian James Secillano, EnP
- The *Municipal Government of Polangui* through Hon. Mayor Raymond Adrian Salceda and Engr. Edgar Arbo, EnP and Engr. Alfred Mirabuena

1 INTRODUCTION

The Province of Albay is located at the crossroads of multiple hazards: floods, landslides, and volcanic eruptions. Typhoons are a regular visitor to the province with communities claiming at least four hit the province on a yearly basis. “Vatican of disasters” and “Disaster Paradise” as local stakeholders described their home. Most recently, Albay was rocked by consecutive typhoons in 2020 – Quinta, Rolly, and Ulysses - of varying strengths with Rolly being the strongest at Category 5 leaving destruction upon its path. Volcanic eruptions from Mt. Mayon in 2018 and recently in 2023 have wreaked havoc on the agricultural plains with lahar and ashfalls across the province. Fragmentation and ecosystem degradation in the background has added to the vulnerability of multiple sectors. Consideration of hazards and stressors in their lonesome has increasingly been found to be inadequate, and multi-hazard and multi-stressor assessments is the way to go. From accurate and efficient assessments, enhancing and increasing the capacities of the people is the next step to significantly and effectively reduce the vulnerabilities and risks of the people of Albay, particularly in the Quinali A Watershed.

In this report, the capacity-building process that the project implemented in the Quinali A Watershed was narrated. In addition, the experiences, breakthroughs, and challenges that the team experienced in its two years of engagement with the local stakeholders to achieve the goals at hand which may find application in other watersheds elsewhere.

1.1 APN-funded Project

The APN-funded project entitled “Resilience-building and Future-proofing Strategies in a Multi-stressed Scenario in the Province of Albay, Philippines” implemented by the UPLB Interdisciplinary Studies Center for Integrated Natural Resources and Environment Management, aimed to create resilient communities and future-proof institutions specifically in the Quinali A Watershed in Albay through enhancing the capacities of institutions towards this end.

Specifically, the project aimed to: Capture the historical changes in the biophysical characteristics and sociopolitical processes of the province through forest fragmentation and narrative analyses, respectively; Conduct participatory and probabilistic climate change risk scenario assessments; Train the LGUs on effective utilization of risk assessments in designing climate change and other disaster related actions and its mainstreaming in the Comprehensive Development Plan of the barangays, cities/municipalities, and the province; and distill and recommend policy-relevant frameworks and strategies for transformative multi-risk.

1.2 The Study Site

The Province of Albay is located near the southeastern end of the island of Luzon in the Bicol Region, with Camarines Sur to the north, Sorsogon to the south, Masbate across the Ticao Pass to the southwest and Catanduanes to the northeast beyond the Lagonoy Gulf. With an area of 2,554 square kilometers, it has a population of around 1.4 million Albayanos - the second most populous province in the region. The province is made up of 15 municipalities and 3 cities (Legazpi, Tabaco, and Ligao) with Legazpi City – the southern terminus of the old Philippine National Railways – South Main Line, as the provincial capital (Province of Albay, n.d.).

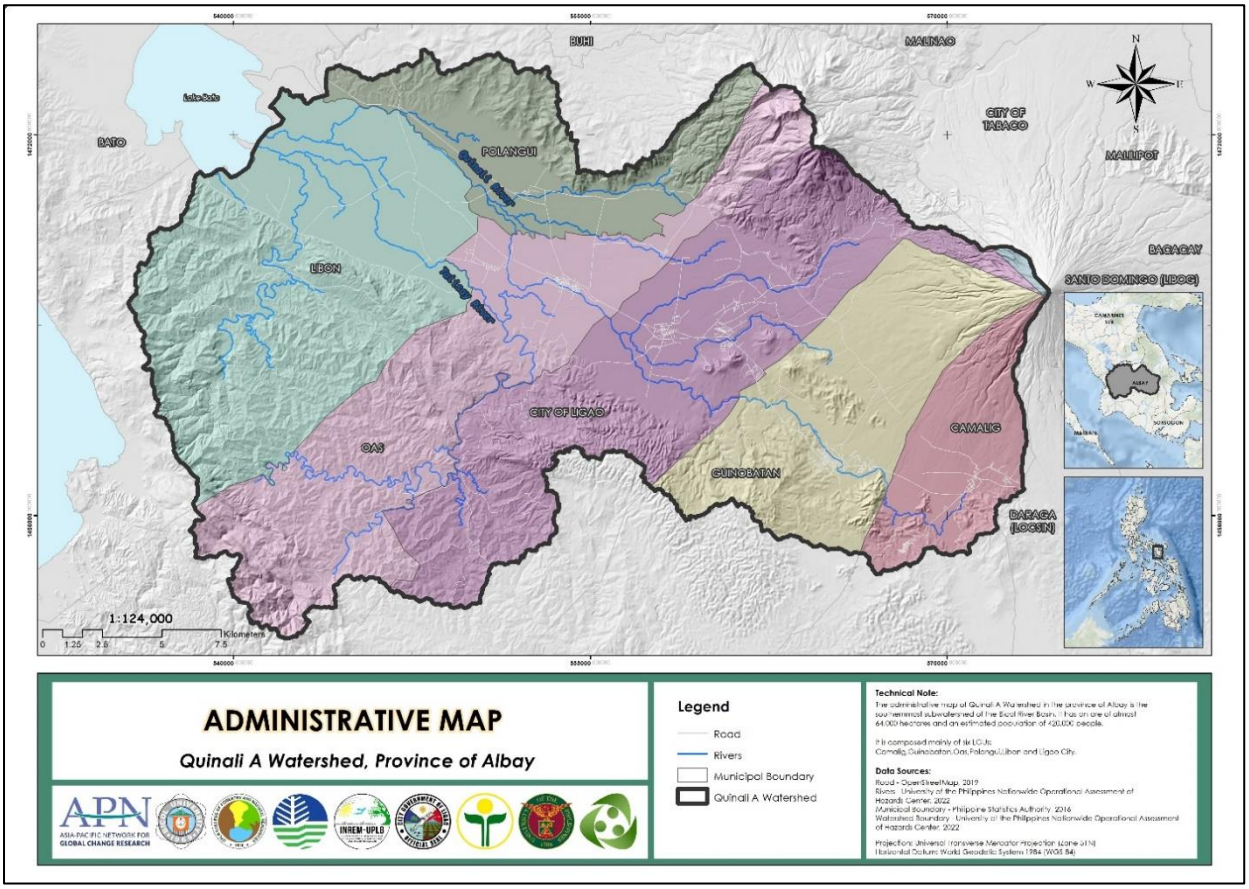


Figure X. The Quinali A Watershed in Albay

It is also the upstream reach of the Bicol River – one of the principal river basins in the country. Within the province lie the vast Quinali A Watershed, the southernmost sub watershed of the Bicol River Basin. Home to almost 450,000 people, it covers a variety of landscapes from volcanic fields, wide agricultural plains, rolling hills, and protected areas that are a source of water for the surrounding LGUs. It encompasses the urban cores of six local government units: Camalig, Guinobatan, Ligao City, Libon, Polangui, and Oas. The outlet of the watershed is in Bato Lake, shared between the Municipality of Libon of Albay and the Municipality of Bato in Camarines Sur. These LGUs, together

with Department of Environment and Natural Resources (DENR) Region 5, Bicol University (BU), and Albay Public Safety and Emergency Management Office (APSEMO), form the core group institutions of the project.

2 METHODOLOGY

2.1 The Watershed Approach

The watershed approach, as defined by the US EPA (1996), is a "coordinating framework for environmental management that focuses public and private sector efforts to address the highest priority problems within hydrologically-defined geographic areas, taking into consideration both ground and surface water flow" that uses the integrated approach as a management framework within a defined jurisdiction.

The approach is preconditioned on three guiding principles: partnerships, geographic focus, and sound management techniques. In our view, these three guiding principles are parallel to the three actors identified to the CRF actors that will be discussed in section 2.4. For these guiding principles to work, it must be operationalized through stakeholder involvement, geographic management units, coordinated management activities, and a management schedule (US EPA, 1996).

In the Philippines, Pulhin (2023) compiled a list of laws and issuances related to the watershed approach: Presidential Decree (PD) 705 or the Forestry Code, Department of Environment and Natural Resources (DENR) Administrative Order No. 1999-01 adopting the Watershed and Ecosystems Planning Framework, DENR AO 2005-23 adopting the Collaborative Approach to Watershed Management, DENR Memorandum Circular (MC) 2008-05 adopting the guidelines in the preparation of the Integrated Watershed Management Plans, DENR AO 2021-41 adopting the guidelines in the creation of Watershed Management Councils, Republic Act (RA) 7186 or the Local Government Code, RA 7586 or the National Integrated Protected Areas System Act, RA 8371 or the Indigenous People's Rights Act, among others.

2.2 Institutional Capacity Assessment

The institutional capacity assessment instrument used was patterned after the one used by Grefalda et. al. (2020) in a previous APN-funded project entitled "Enhancing climate risk resilience through human security development and capacity building in the province of Aurora, Philippines" also implemented by UPLB-INREM. The survey instrument has seven indicator sets: access rights and entitlements, information flows, decision making processes, application of new knowledge, capacity to anticipate risk, capacity to respond, and capacity to recover and change.

2.3 Lectures and Training Workshops

A series of lectures and training workshops were designed and developed based on the results of the institutional capacity assessments in section 2.2. These includes lectures on probabilistic risk assessment, the watershed approach, the research results and its possible applications, project proposal making, and a science-policy forum. All these were geared towards increasing the capacities of the local stakeholders and the core group institutions.

2.4 Capacity-building Process

The term and concept of capacity-building has been discussed on various literature involving climate change adaptation and disaster risk reduction. It must, therefore, call for a precise definition of the term for clarity. In addition, it allows for comparative analysis of similar studies to proceed as the definitions are clear (Cohen, 1995). As the project deals with institutions in general, and local governments in particular, a definition of the term from the discipline of public administration would find an apt application. Cohen (1995) then urges the academe, among others, to adopt the long-standing definition of capacity-building and cautioned the use of others. He quoted from the Dictionary of Public Administration that its *"major objectives the strengthening of the capability… in general purpose government to plan, implement, manage, and evaluate policies strategies, or programs designed to impact on social conditions in the community."* Cohen (1995) said that the definition is exhaustive in the sense that there is a demand for "skilled public sector personnel" that can alleviate the plight of the people it serves. In the specific case of disaster risk reduction, there is a demand for skilled and able DRRM personnel at the local government units to effectively anticipate, respond, and prevent such occurrences from happening.

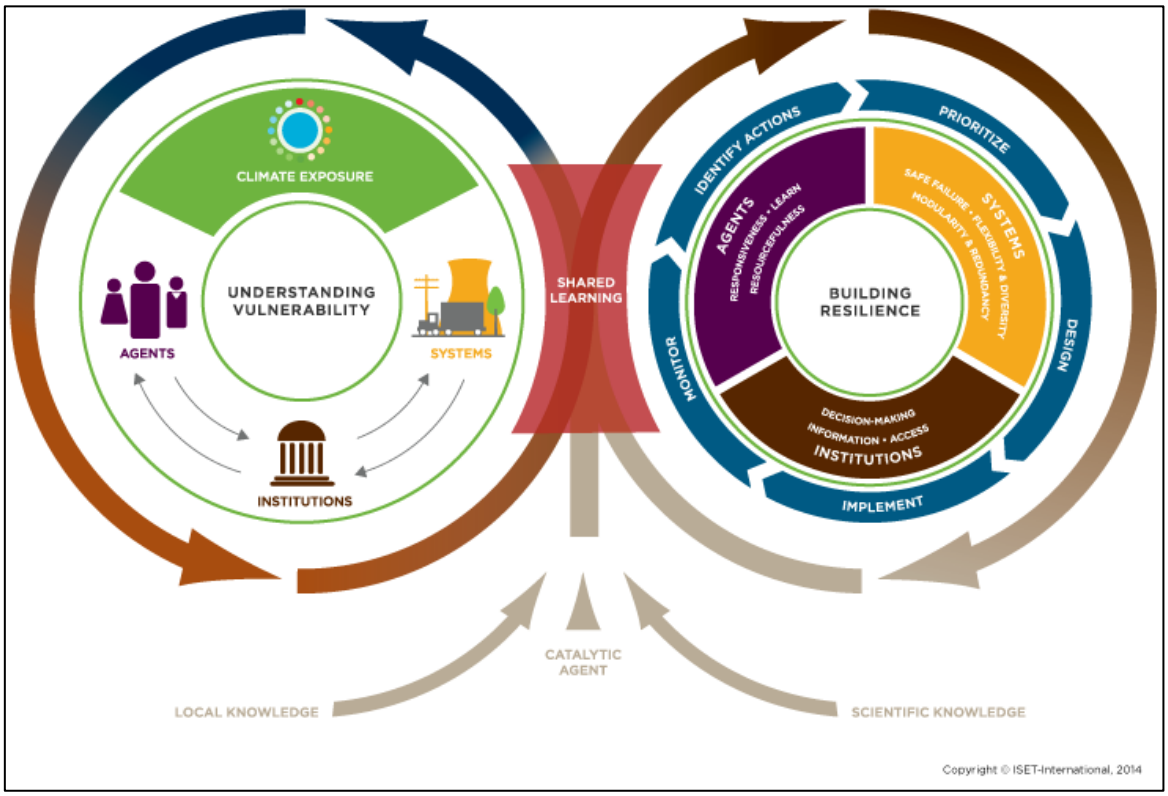
The capacity-building process of the project team employed in the watershed involves a combination of ideas and activities from two frameworks: Climate Resilience Framework (CRF) of the Institute of Social and Environmental Transition or ISET (2014) and the Participatory Climate Change Adaptation Using the Watershed Approach of Pulhin et. al. (2022).

The CRF was developed and refined by the ISET-implemented projects to enhance the capacities of local communities across Asia (ISET, n.d.). It is a framework with two overlapping parts: Understanding Vulnerability and Building Resilience. The former involves a deep comprehension of the actors involved in the analysis of vulnerability: agents, systems, institutions, and their exposure to climate. On the other hand, the latter involves processes on how the actors mentioned can contribute to resilience. At their overlap through the introduction of local and scientific knowledge, Shared Learning Environment was created where enhancement to climate resilience of vulnerable communities can occur. This general framework was also used by Grefalda

et. al (2020) and Pulhin et. al. (2021) in their institutional capacity assessment and capacity-building approaches, respectively, of their own study sites.

Figure X. The Climate Resilience Framework from ISET (2014).

A participatory climate change adaptation using the watershed (PCCAUW) approach was developed by Pulhin et.al. (2022) to document the adaptation approach that they



have devised for the Baroro and Saug Watersheds. Treating adaptation as a process, Pulhin et. al. (2022) defined it as the "the process of adjustment to actual or expected climate and its effects." It involves a seven-step approach which includes: Biophysical and Socio-economic assessment, Participatory risk and institutional capacity assessment, Visioning, Strategy Building, Action Planning, Implementation, and Monitoring and Evaluation. The first two steps can be argued to be as data-gathering in nature and steps three to seven involved the crafting of strategies and actions for climate change adaptation. The institutional capacity assessment was also a cornerstone of the capacity-building activity detailed in Pulhin et. al. (2021) in the province of Aurora.

Figure X. The Participatory Climate Change Adaptation Using Watershed Approach by Pulhin et. al. (2022).

Building on the above-mentioned frameworks and approaches, the project team devised a capacity-building process for application in the Quinali A Watershed, the advantages of which were outlined in section 2.1. For Stage 1, an initial engagement with local stakeholders was carried out to have knowledge about the actors outlined in part 1 of the CRF. Stage 2 involved a formalization of partnerships with the core group institutions in order to clarify roles and responsibilities of each institution through a Memorandum of Understanding (MOU). However, the absence of an MOU did not prevent some institutions to still engaged in the implementation of the activities.

From Stages 3 onwards, the other parts of the CRF were invoked which created a Shared Learning Environment between the project team and the local stakeholders. Stages 3 and 4 coincided with the data-gathering and institutional capacity assessments (Steps 1 and 2) of the PCCAUW approach. These stages served as inputs on the kind and type of training workshops that were implemented with the core group institutions. Stages 5-6 contained the lectures, trainings, and workshops specifically designed for the core group institutions based on the results of the data-gathering activities and the institutional capacity assessment. This is reflected in Steps 3-6 in the PPCCAUW. The last two stages on declaration of commitment and the policy engagement coincided with Steps 6-7 of the PPCAUW –ensuring that the learnings, experiences, capacities, and project proposals that were developed and created during the project implementation would be continued and enhanced by the local stakeholders. This capacity-building process, based on frameworks discussed above, will be explained in detail in the succeeding sections.

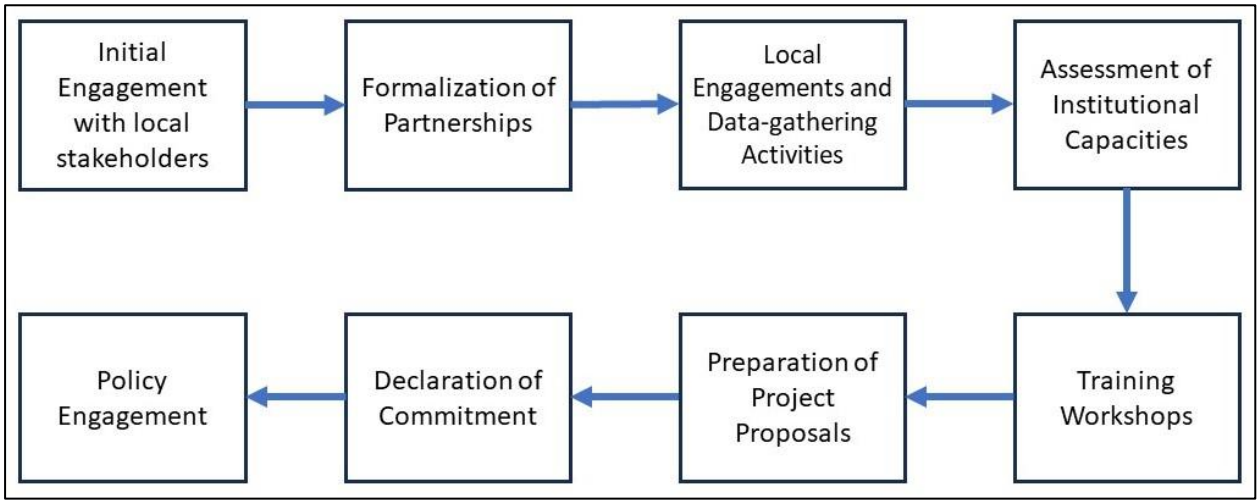


Figure X. Capacity-building Process crafted by the project team for Quinali A Watershed.

3 RESULTS AND DISCUSSION

3.1 Unique DRRM Institutions

The 2010 DRRM Act of the Philippines has mandated LGUs as the main responder and frontline of disaster response and created the Local Disaster Risk Reduction and Management Office that consolidated the DRRM tasks distributed to other LGU offices under the 1991 Local Government Code. The 2010 Act transformed disaster management in the Philippines from a mere disaster response to a well-rounded management involving disaster risk reduction and mitigation. As such, the institutions in charge in DRRM has a crucial role in ensuring the zero-casualty thrust of Albay (Andrade, 2014) in times of disaster occurrences.

Albay has been at the forefront of disaster response in the country due to its multiple hazard experiences. In 2017, the Local Disaster Risk Reduction and Management Officers of Albay banded together with the common goals of risk reduction and mitigation and disaster response to form the Local Association of DRRMOs in Albay (LADA). The acronym LADA was adopted as it is also the Bikol word for chili – a staple ingredient in Bicolano cuisine. The LADA meets on a monthly basis to share updates, best practices, and experiences with each other, and as an avenue to launch province-wide initiatives and coordinated disaster response. It is currently led by the MDRRMO of Camalig. Despite these initiatives, only seven (Local Association of DRRMOs of Albay, 2023) MDRRMO have appointments as Local Government Department Heads with their respective LGUs – the rest are appointed to other positions but are only designated to the perform the duties of a DRRM officer.

At the provincial level, the local DRRMOs are led by the APSEMO – the provincial DRRM office of Albay. Established in 1995, it was born out of the need for Albay for a

proactive DRRM office with the multitude of stressors it is experiencing. Through its multi-fold intitaitves on disaster preparedness, disaster mitigation, disaster response operations, and recovery (Lasco, n.d.), it was recognized by the DILG as part of its Good Practices in Local Governance: Facility for Adaptation and Replication (GO FAR) Project for its outstanding achievements (Galing Pook, 2008).

Figure X. Dr. Juan Pulhin, Project Leader, presenting the project overview to the members of the LADA.

3.2 Enhancing Capacities through engagements, trainings, workshops

3.2.1 Stage 1: Initial Meetings with Local Stakeholders

3.2.1.1 Project Kick-off Meeting

Disaster Risk Reduction entails collaboration from different stakeholders across different agencies, institutions, and local communities across multiple scales (WHO, 2023) and with any capacity-building project, the participation of local stakeholders through the establishment and continued building of trust and connection is of great importance. The project team gathered all relevant stakeholders in the Quinali A Watershed to a Project Kick-off meeting last February 2022 to introduce the APN-funded capacity-building project. Held during the COVID-19 Emergency, the kick-off

meeting was held via virtual video conferencing to ensure the safety of all concerned. The following institutions heeded the invitation: Bicol University, DENR Region 5, Department of Agriculture Regional Field Office 5, National Economic Development Authority Region 5, City Government of Ligao, Municipal Government of Oas, and the Provincial Government of Albay.

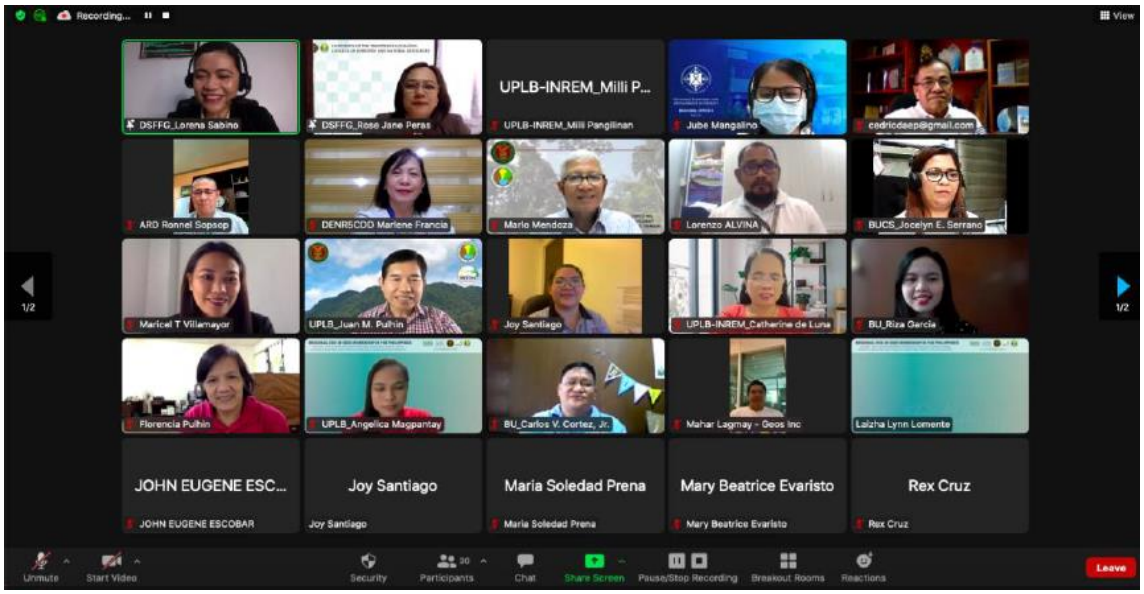


Figure X. Virtual Project Launch via Zoom application last February 2022.

The response from local stakeholders can be summarized into three: expression of support, expectations from the project, complementation with existing projects. The national government agencies in the province have expressed their full support for the project and can be used as inputs for their policy and planning initiatives. Likewise, the LGUs present have made the same expression of support and highlighted that the participation of LGUs is crucial for the success of the project and committed to the mainstreaming and institutionalization of the project outputs. Expectations that were articulated include: possibility of technical complementation with state universities, risk mapping as policy inputs for policy and planning initiatives, and acquisition of new insights and strategies through these capacity-building activities. The institutions have also mentioned that they have existing collaboration with other institutions in the implementation of projects in some of the identified project site. These stakeholders also suggested that a formal instrument should be drafted to clarify the roles of the institutions in the program implementation through a Memorandum of Understanding, and other similar documents.

3.2.1.2 Courtesy Visits to LGUs and other institutions

Inter-provincial travel restrictions were relaxed by the second quarter of 2022 and the opportunity was seized by the project team to visit the LGUs for further discussion,

especially those that were not present during the above meeting. The project team met with various department heads, particularly the MDRRMOs and the Municipal Environment and Natural Resources Officers (MENRO) which form a majority of the institutions' core group point persons to the project team. Courtesy calls and meetings were also made to the Local Chief Executives (LCE) to gain their permission to engage with some of the local government departments, to solicit their support, and to present the possibility of entering into an MOU. All LCEs have committed their support, a crucial initial step for the success and participation of the LGUs, which was emphasized during the kick-off meeting.

Figure X. Presentation of project overview and objectives to the Polangui Municipal Council

3.2.2 Stage 2: Formalization of Partnerships

For this project, UPLB-INREM has once again partnered with the UP Resilience Institute (UPRI) of the UP System in order to achieve the objectives of this project. The synergies between the two institutions have been proven and tested in the previous APN-CAPaBLE Project in Aurora and other multiple research and capacity-building projects. The UPRI has provided technical expertise in the preparation of hazard maps, probabilistic risk assessments, land cover change, and multi-hazard assessments while UPLB-INREM lead in the participatory methods, institutional capacity assessment, and landscape fragmentation analysis.

Figure X. Signing of the Memorandum of Understanding with the City Government of Ligao. Similar instruments were also signed with DENR 5 and Bicol University.

During the initial stakeholder engagements, formalized partnerships allowed these parties and institutions to have a clear guideline for collaboration and engagements. MOU were drafted and became the legal basis upon which these partnerships have materialized. However, formalization of partnerships does not preclude the said institution's participation in the project, as they are being thoroughly engaged prior. In essence, the MOU served to strengthen the already existing partnership, engagement, and collaboration to realize the objectives of the capacity-building project. The MOU contained provisions regarding the responsibilities of the parties, intellectual property rights, indemnification, effectivity, and dispute resolution, among others.

MOUs were individually signed between the University of the Philippines Los Baños Foundation, Inc. (UPLBFI), the implementing partner of UPLB-INREM, and the City Government of Ligao, BU, and DENR Regional Office 5. These institutions represent the diversity of partners that UPLB-INREM has collaborated with in this project: a city government, a state university, and a government agency, respectively. Owing to the different contexts of the institutions, initial discussions and finalization took months to bear fruit.

3.2.3 Stage 3: Local Engagements and Data Gathering Activities

In tandem with the assessment of institutional capacities of local government units, local engagements were coursed through the different point persons that were appointed by the core group institutions which were instrumental in the success of the data-gathering activities. These activities also served as opportunities for the institutions to be trained on appropriate participatory data-gathering methods and participatory vulnerability and risk assessment which were crucial in the preparation of sector-specific project proposals. These activities were held from April 2022 to February 2023.

Figure X. Residents and Barangay Officials of Barangay Nogpo during the conduct of the participatory risk assessment in the Municipality of Libon.

Focus Group Discussions (FGDs) were conducted in each of the six LGUs in the Quinali A Watershed through the cooperation of their respective LCEs, building upon the courtesy visits in the earlier stages of the project. The discussions became an avenue for the various offices such as the City/Municipal Disaster Risk Reduction and Management Office, City/Municipal Environment and Natural Resources Office, City/Municipal Social Work and Development Office, City/Municipal Planning and Development Office, City/Municipal Treasury Office, City/ Municipal Tourism Office,

City/Municipal Engineering Office and City/Municipal Public Employment Service Office to internalize the hazard and disaster situation in their locality.

While LGUs are at the forefront of disaster response in the country as stipulated in the 2010 DRRM Act, communities bear the brunt of hazards and disasters and usually are the most affected (Mishra, 2023). Recognizing this, FGDs were also conducted in 18 selected barangays across the watershed. These barangays were engaged within the specified time period above ranging from barangay officials and community leaders and members. In one case, the community members showed great enthusiasm to being part of the project as their experiences were laid out in an orderly manner through the impact chain diagrams that were developed.

Figure X. Institutional Focus Group Discussion with the Municipality of Guinobatan.

These activities combined have reached more than 100 institutional and community members in the watershed and a ripple effect of knowledge transfer is expected, especially through the engaged barangay communities – numbering 18 in total.

3.2.4 Stage 4: Assessment of Institutional Capacities

The comprehensive institutional capacity assessment conducted by the project team using the instrument described in section 2.2 was administered to the core group institutions with the assistance of the DENR Region 5 and was filled up by 75 respondents. The results have shown that among the seven indicator sets, the institutions ranked highest in Capacity to Respond. This reflects the already strong presence of the MDRRMOs in Albay from the provincial to the municipal/city levels

through the APSEMO and LADA, respectively. Unfortunately, the local stakeholders performed the lowest in the Information flows indicator set, indicating a capacity gap in terms of the availability and quality of available data to the LGUs. This is revealed on the indicator on the ease and access/retrieval of data and proper transfer/endorsement from previous officials. With these results of institutional capacity assessment, the project team has crafted appropriate materials for lectures, training, and workshops for the local stakeholders as part of the next stage of the capacity-building process.

3.2.5 Stage 5: Trainings and Workshops

A series of workshops were conducted for the project: Exposure Trip and Capacity-building Activity at the UP Diliman Campus in Quezon City, a Results Presentation and GAM Workshop, and a Project Proposal-making Workshop – the latter two held in Albay with the help of local partners and stakeholders. These workshops were designed to increase the knowledge and skills of the institutions by providing them with accurate information on multi-hazard scenarios toward the project goals of resilient communities and future-proof institutions.

3.2.5.1 Lectures

At the Exposure trip conducted by the project team on March 2023 at the UPRI, a lecture on Probabilistic Risk Assessment (PRA) was delivered. In this lecture, the local stakeholders learned that the deterministic approach of single-hazard scenarios are not enough and that the transition to PRA is a necessity in the current hazard situation of the country, particularly in Albay where multiple hazards have the possibility of occurring simultaneously. The PRA also allowed LGUs to anticipate events that are worse than their present experiences – highlighting its anticipatory nature in the face of uncertain future climate conditions (Lagmay, et. al., 2023). It was also noted that there is an imperative need to mainstream PRAs into LGU development and land use plans. Consistent with the lectures on PRA, the participants were also trained on proper interpretation and use of probabilistic flood hazard maps. These maps have wide applications for LGUs and were highly appreciated by the participants.

Through a feedback survey, the team learned that the participants have gained an improved understanding of climate change risk assessment (4.75/5.00) and that the lectures were relevant to the institutions that they represent (4.81/5.00). They are also confident that they can share their learnings to their officemates in the LGU (4.50/5.00). The participants similarly are willing to attend a similar activity in the future and recommend the same to other people.

The Climate Disaster Risk Assessment (CDRA) introduces a systematic methodology designed to advance our comprehension of the ramifications of climate hazards. This approach entails

the examination of impact chain diagrams, the establishment of exposure databases, and the implementation of assessments for climate change vulnerability and disaster risk. In the execution of CDRA, diverse hazard maps and climate change-adjusted hazard maps specific to various hydrometeorological hazards are employed. A mixed-methods approach is applied for both data collection and analysis, incorporating computer-aided hazard modeling and sieve mapping. CDRA involves the identification of potential impacts resulting from climate change and hazards that may exert influence on various sectors. Additionally, it discerns vulnerabilities and risks through a comprehensive analysis of exposure, sensitivity, and adaptive capacities pertaining to the units under scrutiny.

3.2.5.2 Training Workshops

During the exposure trip, the participants were invited to play the Sakunwari. The Sakunwari Board Game was developed by the UPRI Research and Creative Works Division as a creative and entertaining way to learn about the concepts of cascading hazards and risks. It was developed with the intention of capacity-building and/or its dual roles of learning and having fun, according to the developer of the game (Jadloc, 2022). The game is perfect for the participants since they have to play as the LCE of their own fictional LGUs with a variety of geographical, geological, and social settings ranging from the mountains to the coasts. A cascade of social and political constraints and biological and natural hazards beset the game and challenged the player to decide based on limited resources – amply mimicking the real-world experiences of LGUs.

Figure X. Local stakeholders listening to the lecture of Dr. Lagmay, Project Collaborator and Executive Director of UPRI, during the Exposure Trip and Capacity-building Activities.

Following the results of the multi-hazard and probabilistic risk assessments, representatives from the Quinali-A watershed conceptualized adaptation measures to cope with the potential impacts of hazards and climate change. The participants from the Quinali-A watershed identified which proposals highly contribute to adapting to the impacts of hazards and climate change using the Goal Achievement Matrix (GAM) tool. GAM is an evaluation technique for assessing local government plans and programs. It functions as a comprehensive listing of the social and political goals of a Local Government Unit (LGU), strategically prioritized based on the administrative agenda and aligned with consensus-driven sectoral goals established by the community (DILG, 2008). This methodology estimates the extent to which proposed projects contribute to achieving these goals.

GAM is highly participatory in nature, facilitating input from diverse community sectors. By allowing each sector to contribute to the weighting of goals based on their perceived importance, the methodology ensures a refined and inclusive assessment that reflects the varied priorities of the community. This participatory approach enhances the accuracy and relevance of the evaluation process, fostering a comprehensive understanding of the community's collective objectives and priorities.

Figure X. Local Stakeholders during the first Results Presentation and Training Workshop at the Ligao City Hall.

Various societal sectors or stakeholders were divided into groups and participated in the project ranking process. During this engagement, participants were tasked with assigning weights to reflect their group's perceived importance of the goals in alignment with their interests, biases, or advocacies. The sum of these weights totaled

100%, ensuring a comprehensive evaluation. The National Climate Change Action Plan (NCCAP) Goals, including food security; water sufficiency; ecological and environmental stability; human security; climate-friendly industries and services; sustainable energy; and knowledge and capacity development, acted as the criteria for ranking the projects. The participants rated the projects based on their contributions towards the overarching goal. This evaluation allowed for a thorough examination of each project's alignment with the defined objectives, providing valuable insights into their potential impact on achieving the specified goals. The participants codeveloped project briefs for the adaptation measures which were ranked highest among each group. The proposals integrated technical findings from the studies and designed strategies that were environmentally-sound, socially and culturally sensitive, and economically self-sustaining. Some of the highly ranked projects of the groups included: Project WILDERNESS: Watershed Improvement through Landscape-scale Forest Defragmentation Initiative to Enhance Ecosystem Resilience and Nature's Ecosystem Services and Assessment and Provision of Sustainable Livelihood Opportunities.

Figure X. Local Stakeholders during the Second Results Presentation and Training Workshop at the DENR 5 Regional Office.

3.2.6 Stage 6: Declaration of Commitment

The crafting of project proposals by the participants was a major achievement of the capacity-building process of this APN-funded project. Data and information produced

during the project were used as inputs into these seed proposals which would be implemented by the local stakeholders. It ensured that the lessons learned, and experiences gained, will continue to be nurtured and bear fruit.

To this end, the local stakeholders have signed a "*Declaration of Commitment*" to take advantage of the institutional relationship that was shared during the capacity-building implementation. It also served as a springboard to leap to greater heights, especially with the developed seed proposals towards the goal of resilient communities and future-proof institutions. Specifically, the stakeholders pledged: to seize the opportunity to "*build upon the participatory, probabilistic, and multi-hazard vulnerability and risk assessment outputs*"; to create a "*strong avenue of cooperation*" among themselves as individuals and the institutions they represent; and to bring forth "*transformative adaptation and resilience*" at the watershed level.

Such a declaration is not just a firm expression of support and commitment, but also a testament to the enhanced capacity and relationships built throughout the project implementation. A sign of progress where the commitment made to the project in section 3.2.1.1 has since then expanded to a commitment of cooperation beyond the project. While non-binding in nature, this declaration remains a crucial step in distilling the need for further and enhanced cooperation among the institutions within the watershed to achieve its common goals.

Figure X. The Declaration of Commitment signed by the Regional Executive Director of DENR 5, among others.

3.2.7 Stage 7: Conduct of the Science Policy-Forum

In addition to the capacity-building thrust of the project, it also has its own policy advocacy. To this end, the project held the APN Science-Policy Forum at the sidelines of the 4th International Conference on Integrated Natural Resources and Environment Management (INREM 2023) last November 2023 in Manila. As mentioned in section 1.1, it aimed to distill and recommend policy-relevant information and frameworks to be adopted by the LGUs, and possibly the national government. Here, project team members presented the policy implications of the research findings to a wider audience in a research conference setting. A diverse set of local stakeholders were also invited to the forum with representatives from the state universities and colleges (BU), national government agencies (DENR Region 5), and local government units (through the LADA) and identified initiatives and interventions that may be implemented from the outputs of the project, in addition to the seed proposals that were developed in section 3.2.5.3

Figure X. The APN Science-Policy Forum last November 22, 2023.

Among the salient recommendations of the project team are (Villamayor, et. al., 2023; Mendoza et. al., 2023; Mendoza et. al., 2023; Mendoza et. al., 2023):

- Investments or non-investment on infrastructure and materials exacerbate the vulnerabilities of communities and resource generation must be one of the top priorities of LGUs.

- Enhanced implementation of LGU services related to environmental integrity, solid waste management, reduction of waterway siltation, and the conduct of CEPAs to effectively influence the hazard perception of communities.
- Mainstreaming of probabilistic hazard maps and multi-hazard assessment in the development of LGU plans such as the local disaster risk reduction and management plans and the comprehensive land use plans.
- A systems approach to watershed management by integrating the interconnected components, robust community engagement through public awareness and education campaigns, holistic understanding, and informed decision-making.
- Using the landcover change and fragmentation as inputs, an effective and efficient reforestation program/legislation can be implemented to reduce the fragmentation of the landscape and aim for contiguous forest patches.

These research outputs of the projects can serve inputs to the following policy initiatives identified by the invited local stakeholders from SUCs, national government agencies, and LGUs:

- Implementation of strategies related to ecosystem-based adaptation, effective land use planning, and construction of green and grey infrastructures that are climate resilient.
- Maintenance of ecosystem integrity and promotion of societal development using "evidence-informed data through holistic, multi-dimensional, and interconnected methods."
- As inputs for the development of a policy for payment for ecosystem services.
- Drafting of a RDE program that ensures an interdisciplinary and interagency pool of collaborators.
- Launch an multi/inter – disciplinary undertaking to fully comprehend the "physical, ecological, and cultural" characteristics of the watershed.
- Encourage the enhanced conservation and sustainable management of the watershed due to its prime location within the Albay Biosphere Reserve.

These concrete policy recommendations from the project team and policy initiatives from the local stakeholders, together with the sound project proposals developed during the training workshops, would ensure that transformative change towards resilient communities and future-proof institutions can become a reality and not just a dream for the people of the Quinali A watershed.

3.3 Challenges in implementing the capacity-building activities

We have so far discussed the processes and successes of the project. Despite this, equal share of challenges was experienced throughout the project implementation, especially at the beginning when the team is in the process of building rapport with the

local stakeholders. Listed below are four main challenges that was hurdled by the team along the way.

3.3.1 The COVID-19 Pandemic

The COVID-19 pandemic was declared by the WHO (n.d.) on January 30, 2020 as a Public Health Emergency of International Concern (PHEIC) and was elevated to a global pandemic on March 11, 2020. These were indeed challenging times for most people as a scale of a health emergency this large was not seen in almost a century. In the Philippines, the first cases were reported on January 21 and the first local case was reported on March 3 (Argosino, 2021). Beginning March 12 of the same year, various lockdown and quarantine measures were implemented by the Philippine government to contain the spread the virus. LGU-specific assignments of community quarantines were also implemented. Eventually, community quarantines were gradually replaced by granular lockdowns, where only specific neighborhoods were placed on strict containment measures (Argosino, 2021). As vaccines became widely available, inter-provincial travel restrictions became relaxed. Eventually, the WHO (n.d.) has declared that the COVID-19 pandemic remains but is no longer considered a PHEIC on May 5, 2023.

These community restrictions on travel and physical reporting to the office has hampered the progress of the project for its first six months of implementation from October 2021 to March 2022. In the stretch, the project team were unable to travel due to restrictions implemented by the university on its constituents. The team was only able to physically meet with some local stakeholders in April 2022, almost half a year since the beginning of the project.

Alternative work arrangements were also enforced in government offices as an additional measure to prevent the spread of the virus (CSC, 2021). As such, some key personnel of LGUs and institutions may not be physically present for consultation and coordination via telephone lines – slowing down the process of initial engagements with stakeholders. The project team devised a combination of ways in order to circumvent these restrictions and policies such as the use of online video conferencing and other remote ways of engagements.

3.3.2 Changing Political Setting and Context

The 1987 Constitution of the Philippines provided for free and fair elections to be held regularly to democratically elect the people's representatives at the national and local level. Through the enactment and implementation of the 1991 Local Government Code, the first regular election was held in 1992 and was set to occur every three years. The LCEs, representatives, members of the Sanggunians (councils) have a fixed and regular

term of three years, with a three-term limit. As such, they stand for election every three years, and may be replaced depending on its results.

The 2022 national and local elections of the country have posed a significant challenge to the project as some LCEs in the watershed were defeated. In the stretch from October 2021 to May 2022, the project team has reached out to these LGUs to solicit their support for the project and understanding has been reached. Some of these LCEs, such as in Polangui and Guinobatan, have been defeated in the May elections. As such, the project team must conduct another set of courtesy calls with the new LCEs to gain their support and permission to engage – which they have enthusiastically provided.

At the provincial level, the incumbent governor was also defeated and replaced by the incumbent mayor of Legazpi City. Courtesy visits were also conducted with the new governor. From there, the elected governor was also removed from office by the Commission on Elections and was replaced by the incumbent vice governor (Bordey, 2022). This turbulent and changing context at the provincial level was the primary cause for the lack of a formal MOU at the that level. Despite this, the APSEMO has been very accommodating and engaging with the project.

While not political in nature, BU also had a change in its presidency in March 2023 due to retirement of the incumbent president. The project's engagement with BU remained as an MOU is currently in effect.

Changes in leadership has a great magnitude of effect upon the institutions affected, as well as the project being implemented. A formal partnership document, such as an MOU, can circumvent the problem by ensuring that the institution, not its leader, has a role in the project.

3.3.3 Challenge of Cooperation beyond LGU Boundaries

The watershed approach, in order to be truly effective, would need the cooperative and good-faith relationship of all local government units involved (US EPA, 1996). Unfortunately, due to the limitations enforced by the 1991 Local Government Code, LGUs are constrained in implementing projects with its own funds within its jurisdiction – despite the voluminous rules and regulations directing the adoption of the same. Some LGUs tend to view environment and natural resources and disaster risk reduction planning and management within its boundaries, without regard for the wider landscape upon which it exists. The engagements and implementation of the project allowed for a renewed interest in the watershed-level management of the Quinali A Watershed and fostered a community of practice among the local stakeholders.

4 CONCLUSION

The Quinali A Watershed plays home to a variety of hazard from floods, landslides, severe winds, liquefaction, ashfall, lahar, and mudflows – exposing its almost half a million residents to these threats. These hazards exacerbate existing vulnerabilities of communities and institutions that becomes path for compounding hazards to result in cascading impacts along human systems. This APN-funded project in the Quinali A Watershed, through its four-fold objectives, implemented multi-pronged activities on research and capacity-building, to respond to these concerns. The seven-stage capacity-building program of Engagements, Formalization of partnerships, data-gathering activities, Institutional capacity assessment, Training workshops, Project proposal preparation, Declaration of Commitment, and Policy Engagement lead to concrete and transformative improvements towards resilient communities and future-proof institutions. Future studies and programs in the Quinali A Watershed may work and assist the local stakeholders in implementing the identified project proposals and guide local government units in further mainstreaming of multi-hazard scenarios in future development plans.

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9. Appendices

APPENDIX 1. Memoranda of Understanding between UPLBFI and Bicol University, DENR 5, and City of Ligao

APPENDIX 2. Institutional Capacity Questionnaire used in the project sourced from Grefalda et. al. (2020).

APPENDIX 3. Program of the Results Presentation and Training Workshop 1

APPENDIX 4. Slide Deck of the Results Presentation and Training Workshop 1

APPENDIX 5. Program of the Results Presentation and Training Workshop 2

APPENDIX 6. Slide Deck of the Results Presentation and Training Workshop 2

APPENDIX 7. Program of the APN Science-Policy Forum

APPENDIX 8. Abstracts of the paper presentations to research conferences