Reaching the Intersection of Indigenous and Modern: A Critical Analysis of Disaster Risk Management Modernization in Ivatan Indigenous Communities

by

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Abstract

Known for their Indigenous knowledge, systems, and practices (IKSPs) in managing disaster risks, the Ivatans of Batanes Province in the Philippines are faced with the pressures of modernizing such generations-old traditions. While noble in intent, the technologically-driven narrative of managing disaster risks idealized by the National Disaster Risk Reduction and Management Council (NDRRMC) brings to question the change it influences on Ivatan Indigenous communities. The intersection between Ivatan IKSPs and the NDRRMC's initiatives reflected epistemological contrasts of positivist vis-à-vis constructivist approaches that warranted a critical view. Drawing new understanding and knowledge using the critical paradigm required an Action Research-driven methodology. Specific data gathering and collaboration methods included desk research; validation of an Ivatan DRRM IKSP inventory; FGDs and workshops that delved into understanding community and Local DRRM Council perceptions and critiques; and a workshop to craft recommendations for integrating Indigenous and scientific resiliency systems. Research findings pointed out hegemonic, top-down-centric policies that insisted outsider-oriented, technical solutions that were ineffective to the local context and were potentially damaging to traditional cultural systems and practices of resiliency. However, Ivatans were also faced with endogenous agencies such as the strong thrust for modernity through technology that may potentially wane traditional resiliency practices. Outcomes from community workshops also revealed a paradigm shift in society to integrate the scientific and traditional as a continuous evolution of IKSPs and resiliency in light of the increasing threat of climate change disruptions.

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List of Abbreviations

ADSDPP	Ancestral Domains Sustainable Development and Protection Plan
BDC	Barangay Development Council
BSC	Batanes State College
CCA	Climate change adaptation
DAR	Department of Agrarian Reform
DENR	Department of Environment and Natural Resources
DepEd	Department of Education
DRM	Disaster Risk Management
DRRM	Disaster Risk Reduction and Management
FGD	Focus Group Discussion
FPIC	Free, Prior, and Informed Consent
GI	Galvanized Iron
GPS	Global Positioning System
ICHCAP	Intangible Cultural Heritage Centre for Asia-Pacific
IEC	Information, Education, and Communication
IKSP	Indigenous Knowledge, Systems, and Practices
IP	Indigenous Peoples
IPed	Indigenous Peoples' Education
IPMR	Indigenous Peoples Mandatory Representatives
IPRA	Indigenous Peoples Rights Act
KII	Key Informant Interviews
LINK	Local and Indigenous Knowledge
LRA	Land Registration Authority
MDRRMO	Municipal Disaster Risk Reduction and Management Office
MOA	Memorandum of Agreement
NCCA	National Commission for Culture and the Arts

NCIP	National Commission on Indigenous Peoples
NDCC	National Disaster Coordinating Council
NDRRMC	National Disaster Risk Reduction and Management Council
NDRRMP	National Disaster Risk Reduction and Management Plan
PAMB	Protected Area Management Board
PAGASA	Philippine Atmospheric, Geophysical, and Astronomical Services Administration
PDRRMO	Provincial Disaster Risk Reduction and Management Office
RA	Republic Act
RDANA	Rapid Damage Assessment and Needs Analysis
RRU	Royal Roads University
UN	United Nations
UNDRR	United Nations Office for Disaster Risk Reduction

Glossary

Adipugpug	tornado (Hidalgo, 1998a).
Ahad	ring, typically referring to the corona, of the sun (Participant 1, FGD communication, June 4, 2019).
Akhad	food supplemented to the food prepared by the family sponsor during house building events (Department of Agrarian Reform [DAR], 2010)
Angaringang	half rainbow (Participant 1, FGD communication, June 4, 2019).
Anyin	typhoon (Hornedo, 2000).
Anyin nu vinyiveh	“banana typhoon” or typhoons with the strength of toppling banana trees (Esteban & Valientes, 2019).
Aryus	type of coniferous tree (*Podocarpus costalis*) common in Batanes (Esteban & Valientes, 2019; Hornedo, 2000).
Avayat	west winds (Hornedo, 2000).
Bandillo	town criers that often beat drums to create attention (DAR, 2010).
Barangay	smallest geo-political unit in the Philippines administered by a barangay captain (Philippines, 1974).
Bayanihan	spirit of communal and civic unity that is practiced through volunteerism, teamwork, and acts of kindness (Ang, 1979).
Carabao	water buffalo (*Bubalus bubalis*) (DAR, 2010).
Cogon	type of grass (*Imperata cylindrica*) that is commonly used as the primary roofing material for traditional Ivatan houses (Hornedo, 2000; Hornedo, 2013c). This is commonly known as *vuchid* in Ivatan.
Dipamchi	sudden gale and heavy rain with quick fluctuation into hot and sunny weather (Rede-Blolong, 1996).
Du-taw	from the ocean (Rede-Blolong, 1996).
Du araw	from the sun (Rede-Blolong, 1996).
Gada’gada	general term for stone and mortar Ivatan house (Esteban & Valientes, 2019).
Geget	house lizard (*Hemidactylus frenatus*) (DAR, 2010).
Idawud	north winds (Hornedo, 2000).
Inatdes	cogon-and-reed roofing shingle (Hornedo, 2013c).

Inawung	long strips of cirrus clouds used as typhoon signals by elderly residents (Interviewee 1, workshop communication, June 10, 2019).
Ipes	cockroach (*Periplaneta americana*) (DAR, 2010).
Ipula	local term for non-Ivatan foreigner or outsider (Esteban & Valientes, 2019).
Ijang	pre-colonial fortifications on top of hills or outcrops as protective settlements by ancient Ivatans (Bellwood & Dizon, 2013).
Kahehep	fog (DAR, 2010).
Kakavahayan	well-planned community aid during roofing installation and latter part of house construction (DAR, 2010).
Kakpehan	also known as *payurdinyan*, these are community assemblies to announce important community matters, discussions, arguments and resolutions (Buendia, Brillantes, Mendoza, Guiam, & Sambeli, 2006).
Kalipusan	cooperative group initiated before the kakavahayan completes the work (DAR, 2010; Hornedo, 2000).
Kamayuhan	also known as the *payuhwan*, this cooperative work with the community is often used in agricultural contexts such as cultivation or other farm work during harvest season or weeding periods (DAR, 2010).
Kanayi	men's vest made of woven banana or palm leaves worn on their shoulders that covers the front and back (Hornedo, 2000).
Kapanahtah	bracing of doors and windows to prepare for typhoons (Hornedo, 2000).
Kapangaraya / Kapayaraya	cooperative help involving individuals hauling boats to safer ground before a typhoon (DAR, 2010).
Kapanghu	service to be rendered with expectation of financial or more typically in-kind compensation (Hornedo, 2000).
Kapangulay	drying of food, usually meats and fish (Department of Interior and Local Government [DILG], n.d.; Salamagos, 2018).
Kapanpet	tying roofs using ropes or nets to secure from strong winds and typhoons (DILG, n.d.).
Kapañidungan / Kamañidungan	general term when group or community assistance is typically provided for persons or families requiring more labour than they could afford (Hornedo, 2000, 2013c).
Kapaychapteng	famine (Esteban & Valientes, 2019).
Kapaytima	mining and processing of lime (Hornedo, 2000).

Kapaypung-pung	clearing hazardous trees (Participant 1, FGD communication, June 4, 2019).
Kayvayvanan	mandatory community cooperation, similar to bayanihan, with typical purposes for infrastructural repairs and construction, for inclement weather preparations, road clearing, child care, and resource sharing (Batin, 2018; DAR, 2010; Hornedo, 2013c).
Kulay	sun-dried food, typically fish (Salamagos, 2018).
Kuvi	southeast winds (Municipal Government of Basco, 2017).
Laji	traditional oral poetry chanted as songs in Batanes (Hornedo, 2000).
Madagdag	red clouds (Esteban & Valientes, 2019).
Marahet a kawan	bad weather (Esteban & Valientes, 2019).
Makamumu a mapaparin	natural disasters (Rede-Blolong, 1996).
Masuhaw a vuhan	paled-coloured moon, as if it was “sick” rises from the east (DAR, 2010).
Mangununung	story-telling (Hornedo, 1977).
Mamnaw	during a typhoon, wind direction shifts south (DAR, 2010).
Mariyes	strong water currents (DAR, 2010).
Maychadadaji	fair weather (DAR, 2010).
Maychahehep	low altitude clouds (DAR, 2010).
Maychahuwan	assistance that is contractually repaid in similar labour based on the same length of time the assistance was rendered (DAR, 2010).
Maychawan	forecasting (Interviewee 4, workshop communication, June 10, 2019).
Maychavatuvatu	clouds shaped like rocks and stones (DAR, 2010).
Maychavuvuyas	clouds shaped like being swept by a broom (DAR, 2010).
Mayhurahed	house type that has a base of low walls made of stone and mud (Adami, 2013; Ignacio, n.d.).
Maylaji	singing (Hornedo, 2000).
Maymunyit	humid (DAR, 2010).
Maypatupatuyu	relaying information to other concerned persons (Hornedo, 2000).
Maytuab	traditional stone house with a four-sloped roof (Ignacio, n.d.).

Mayvulilaw / Maylanyag	bright yellow sunlight appears in the morning or afternoon and disappears quickly (DAR, 2010).
Mavid a kawan	good weather (Esteban & Valientes, 2019).
Mawyas a timuy	yellow clouds form during sunset (DAR, 2010).
Mukuvukut	shore roach (possibly *Ligia exotica*).
Nyisu	windy but rainless day (Rede-Blolong, 1996).
Palek	alcoholic drink from sugarcane (Hornedo, 2000).
Pangaditan	east winds (Hornedo, 2000).
Pamahsan	payment for a debt of service (DAR, 2010).
Payaman	communal pastureland where livestock are free to roam (Trinidad-Echavez, 2008).
Payuhwan	also known as the *kamayuhan*, this cooperative work with the community is often used in agricultural contexts such as cultivation or other farm work during harvest season or weeding periods (DAR, 2010).
Pilatun	traditional Ivatan astrological calendar used for scheduling reciprocal labour exchanges and other important activities such as agricultural and fishing tasks (Rede-Blolong, 1996, 2004).
Primus inter pares	first among equals (Merriam-Webster, 2020).
Salawsaw	windy day with rain (Esteban & Valientes, 2019).
Sinadumparan	general term for a traditional Ivatan low house made of stone and lime mortar walls with a thick cogon roof (Adami, 2013; Ignacio, n.d.)
Sumla	south winds (Hornedo, 2000).
Tagalit	collared kingfisher (*Todiramphus chloris*) (DAR, 2010).
Talukuk	Philippine coucal (*Centropus viridis*) (DAR, 2010).
Tapangku	door and window covering reinforcement often made of plywood to protect from strong winds and debris (DILG, n.d.).
Tataya	outriggerless, oar-driven boat (Hornedo, 2000).
Umang	hermit crab (*Paguroidea*) (DAR, 2010).
Uvi	yam (Hornedo, 2000).
Valakavak	winged termites (*Coptotermes formosanus*).

Vakul	head and back cover for women made of stripped banana leaves or palm (Hornedo, 2000).
Vuhan	moon (DAR, 2010).
Vutalaw	tropical tree plentiful in Batanes that is used for agroforestry purposes and as windbreakers for farm lots (*Calophyllum inophyllum*) (Rede-Blolong & Olofson, 1997).
Vuhawu	black ant (*Lasius niger*) (DAR, 2010).
Vuyavuy	flowering palm with leaves that are commonly used for making vakul and kanayi (*Phoenix loureiroi*) (Hornedo, 2000).
Yaru	mandatory cooperative duty of service to render to the community with typical purposes for infrastructural repairs and construction, inclement weather preparations, road clearing, child care, and resource sharing (Batin, 2018; DAR 2010).

Chapter 1: Introduction

Disaster occurrences in their hydrologic, geologic, and meteorologic typologies form homeostatic planetary functions that induce severe social disruptions, often resulting into casualties to life and property (Dyke & Weaver, 2013; Xu, Wang, Shen, Ouyang, & Tu, 2016). The Earth's perpetual hazards create requisite conditions for human responses to reduce risks of loss and suffering through multiple variants of paradigmatic approaches and problem-solving-oriented praxes (Hilhorst, Baart, Van Der Haar, & Leeftink, 2015; Gaillard & Mercer, 2012; Cutter et al., 2015; Gaillard, 2007). While positivist, scientific research traditions are heralded as benchmark and glorified systems in Disaster Risk Reduction and Management (DRRM) (Gaillard & Mercer, 2012; Howitt, Havnen, & Veland, 2011), such exclusivity undervalues, and to the extreme, rejects humanist, Indigenous, and social resiliency systems (Howitt et al, 2011).

Dichotomies of Indigenous and positivist paradigms in DRRM unveil stark divergences despite sharing common purpose of preventing casualties and saving lives. Furthermore, such impasse transcends into deeper discourses concerning policy and power structures (Howitt et al., 2011), modernity vis-à-vis indigeneity (Hilhorst et al, 2015), interdisciplinarity (Bendito & Barrios, 2017), and social change (Donovan, 2016). Much of these discourses transpire in the context of typhoon-prone Batanes Province in the Philippines, with its Ivatan Indigenous peoples facing social and cultural changes in light of state-predetermined and imposed modernist DRRM systems. Known for their culturally-developed Indigenous Knowledge, Systems, and Practices (IKSPs) in resiliencies (Hornedo, 2000; Rede-Blolong, 1996), the Ivatans are in an existential cusp of deciding whether endogenous and exogenous DRRM modernization impetus would either threaten or benefit Ivatan identity and society.

This dissertation is reflexive of the compelling situation bearing on the Ivatan socio-cultural landscape. It is the prerogative in this dissertation to delve beyond mere understanding of disaster impacts but to analyze policy implications, critique hegemonic tendencies, and examine symbiotic relationships of resident and outsider coexistence. As a

critical piece, the dissertation incorporates interdisciplinary research, Action Research methodology, social and critical theories, and Indigenous and political studies to make meaning given the contextual complexities of Batanes. Such research orientations aptly justify the paper's title of *Reaching the Intersection of Indigenous and Modern: A Critical Analysis of Disaster Risk Management Modernization in Ivatan Indigenous Communities*.

Chapter 1 (Introduction) is the dissertation's overture that explains and contextualizes the research problem, as well as the working scope, limitations, and what makes the study important. The intensions of undertaking the research is detailed in the Objectives of the Research subchapter, which also poses the research question to underscore what the research is committed to answer.

A full immersion and extensive review of the foundational elements and background of the research is covered in Chapter 2 (Literature Review). This secondary research probes into topics such as Batanes and its peoples, history, and legal frameworks applied to the province. A section about DRRM in the Philippines, specifically about the context of meteorological disasters, as well as legal frameworks from the national to the municipal levels, are also expounded in Chapter 2. Furthermore, the second chapter extensively delves into Indigenous knowledge, the hegemonies it experiences, as well as the inventory of Ivatan DRRM IKSPs.

In Chapter 3 (Conceptual Framework), concepts, ideas, processes, and syntheses are assembled into a conceptual framework. This chapter maps the chain of concepts and processes, complemented by discussions about the epistemological and pragmatic standpoints of the research.

Data-gathering imperatives that detail how data will be created and collected are outlined in Chapter 4 (Methodology). In this chapter, justifications for the use of Action Research as the core methodological design are explained. In addition, the specific primary and secondary data collection action steps are comprehensively described.

Post-data-gathering outcomes coupled with a deep dive into analysis are highlighted in the penultimate Chapter 5 (Research Findings and Analysis). The chapter is divided into two,

starting with an initial presentation and discussion of data results (Part 1) followed by an integrated analysis (Part 2). Part 1, examines DRRM governance studies, DRRM IKSP validations, and understanding perceptions of the Ivatan community and the local DRRM council, among others. Part 2 on the other hand cover in depth analyses of policies, academic research, the functionality and effectiveness of IKSPs for resiliency, threats to IKSPs, and cross-disciplinary integrations, among others.

Chapter 6 (Recommendations and Conclusions) is the terminal chapter that synthesizes the dissertation's core outcomes and analyses to answer the research question. A section that discusses policy and practice implications in do-nothing and best case scenarios is thoroughly discussed. Recommendations that feature a framework and comprehensive action steps are also expounded in this chapter.

Other than the core chapters, standard dissertation manuscript elements such as references, appendices, and supplemental materials such as the table of abbreviations and glossary of Ivatan terms are included.

Research Problem

Addressing the complexity of new world challenges like climate change with the purview of technologically-dominant science as panacea is an exercise in futility. Science-dependent DRRM systems could no longer afford to be entrenched in traditional silos of uni-disciplinary, positivist paradigms in creating resiliency (Clark & Wallace, 2015; Scolobig, Prior, Shröter, Jörin, & Patt, 2015). Baudoin, Henly-Shepard, Fernando, Sitati, and Zommers (2016); Hilhorst et al., (2015); and Mercer, Kelman, and Dekens (2009) elucidate the reliance of technocratic DRRM means is a denial of the humanity and socially-constructed dimensions of disasters; they are far from existing merely as environmental issues but as societal conundrums as well.

As climate change disruptions exacerbate the severity, likelihood, and impacts of disasters (Alexander, 2006; Ataur Rahman, & Rahman, 2015; Djalante, Holley & Thomalla, 2011; Forino, Von Meding, & Brewer, 2015; Freitag, Abramson, Chalana, & Dixon, 2014), scientific

and technologically-advanced systems to forecast and mitigate impacts from such weather extremes become idealized strategies to employ (Baudoin et al., 2016; Weichselgartner & Pigeon, 2015). Logically, the defining feature of these systems is its accuracy, which is considerable as the key prerequisite in guaranteeing better preparedness (Baudoin et al., 2016). Accurate and immediate forecasting capacity further equates to the greater potential to save lives and property (Cavallo & Ireland, 2014; Gaillard & Mercer, 2012; Howitt et al., 2011).

Consequently, novel forms such as IKSPs in DRRM are often downplayed, undervalued, and even replaced for more contemporary methods (Howitt et al., 2011; Mercer, Kelman, Taranis, & Suchet-Pearson, 2010). For instance, the Ivatans, who practice centuries-old weather-related adaptation methods ("Batanes: Facing the New Normal of Climate Change," 2018; Fantauzzo, 2014; Hornedo, 2000; Trinidad-Echavez, 2008), are coming under increasing pressure from the Philippine Government's National Disaster Risk Reduction and Management Council's (NDRRMC) plans and policies. With marginal consideration to DRRM IKSPs, the national policy is indoctrinated deeply into the community level, promoting communities such as the Ivatans to modernize their approaches and responses, to freely adapt technology, and to forego vernacular, community-led practices and their ways of knowing (Fantauzzo, 2014; Uy & Shaw, 2009).

Cultural "gentrification" seems to be an inevitable ramification when modernization is idealized, as seen under the lens of Hsu and Elliot's (2014) Social Acceleration Theory. The threat of climate change and its byproduct of disasters compels the government to react in haste, through aggressively modernizing and promoting its technology-flavoured ways and means of DRRM (Balay-As, Marlowe, & Gaillard, 2018; Djalante et al., 2011; Uy & Shaw, 2009). Ayers (2006) and Cox' (2012) perspectives similarly mirror the Ivatans' situation, where external players exert prominence over the values of society, consequently leveraging social change but in accordance to the vested interests of the outsider. The role of the state to advocate modern

DRRM strategies to protect is laudable, however such drive for modernity should not infringe on the Indigenous Peoples' right of cultural self-determination (United Nations, 2008).

While extreme weather disturbances become more prominent, so does the urgency to mitigate its impacts (Fantauzzo, 2014). Because the state is predisposed by its constitutional responsibility to protect its constituents, governments often become partisan to technology-backed DRRM strategies over the IKSP approach (Djalante et al., 2011). Aside from the common notion that the former is faster, advanced scientific systems are hailed as counterforces of nature and increase chances of surviving disasters (Balay-As et al., 2018). Critically, this mirrors nuances of Foucauldian thought where power and knowledge dynamics, through maintaining the authority of the state and reliance on advanced scientific capacities respectively, are key to maintaining social and environmental loci of control (Donovan, 2016; Foucault, 1982; Gaillard & Mercer, 2012). Conflict thus arises when such perpetuation undermines ethnometereological practices by communities much like those of the Ivatans.

The social problem becomes conspicuous in the NDRRMC's *National Disaster Risk Reduction and Management Plan* (NDRRMP) *2011-2028* due to its lack of clear-cut policies and action statements to acknowledge and espouse Indigenous knowledge. Much of the plan's thrusts prescribe technology development, science-based capacity-building activities, and mainstreaming tools and decision technologies for DRRM and climate change adaptation (Banwell et al., 2016; National Disaster Risk Reduction and Management Council [NDRRMC], 2011). Ironically, the plan primarily urges administering top-down competencies as the standardized approach even in circumstances where the best knowledge source is from the grassroots and the community. Although credit can be attributed to the plan's purpose on managing disaster risks, the NDRRMC's modernization approach lacks inclusivity and may potentially be a threat by replacing Indigenous processes that the Ivatan have been practicing for generations.

Furthermore, the NDRRMC's efforts to incorporate Indigenous means in the NDRRMP lacks depth, sensitivity, and is a mere recognition instead of direct action; much ambiguity exists in the NDRRM Plan's directives on Indigenous means of DRRM due to the absence of specific tasks and collaborative programs, in an otherwise comprehensive plan. Out of the NDRRMP's 70 pages, only the following content highlights Indigenous practices in DRRM:

> The NDRRMP recognizes the importance of culturally-sensitive risk reduction measures at all levels. People's vulnerability to disasters as well as their capacities to adapt to the changing realities are more often than not related to cultural and indigenous [*sic*] practices. By being sensitive to the indigenous [*sic*] practices and local knowledge, DRRM approaches will become more effective and more easily understood and embraced by the people. (NDRRMC, 2011, p. 36)

Pragmatically, crafting lightweight policies with no teeth like the above offer no leverage for resiliency-building, are not outcomes-based, and are ineffective to produce positive change. Contention also resounds in this paragraph since its ostensively desirous message masquerades between-the-line appropriation and commodification of Indigenous knowledge; recognition in this case does not necessarily justify genuine inclusion and true empowerment. Moreover, this policy problem is critical evidence of a deeper malfunction of governance, poor articulation of authority, and pretentious inclusion efforts.

Much of the policy's flaws also manifest a deep-rooted paradigmatic dispute. I posit that the NDRRMC is biased into treating DRRM as a positivist-rational ideology through its employment of meteorology and natural sciences, in contrast with the Ivatans who regard DRRM as an anthropological and social construct (Hornedo, 2000, Rede-Blolong, 1996). Because the involved paradigms have their own set of orthodoxies, unique definitions of truth, and distinct knowledge, I assert that hegemonic tendencies, or as Campbell (as cited in Hadorn et al., 2008, p. 4) claims as "disciplinary ethnocentrisms," emerge (Daldal, 2014; Pease, 2010).

In this context, the scientific knowledge preference evolves into a superiority quest, thus exacerbating subjugation and inequality. A plethora of academic literature affirm how the construct of Indigenous knowledge is vulnerable to be discriminated against to favour the epistemological lens of Western society or the Global North (Baudoin et al., 2016; Connell, 2013; Gaillard, 2007; Howitt et al., 2011). Similar to Connell's (2013) discourse on Southern Theory, the undermining and marginal treatment of IKSPs is the Westernization and colonization of thought (Howitt et al., 2011)—to control, assert power, and insist what the outsider, the NDRRMC, ought to be the epitome of DRRM. This is further supported:

> In many settings, however, key institutional structures continue to privilege discourses based on scientific and administrative expertise over locally contextualized knowledges, and to discount or dismiss social and cultural dimensions of risk in favour of the demands of responding to immediate responses to disasters or paternalistic presumptions about what is 'best' for minority groups. (Howitt et al., 2011, p. 52)

Paradoxically, both the Ivatans and the NDRRMC share the common prerogative of resiliency despite epistemological discordances. While collaborative potential through the harmonious integration of divergent disciplines of Indigenous knowledge and scientific approaches to DRRM exists and has proved successful in various contexts (Balay-As et al., 2018, Hiwasaki, Luna, Syamsidik, & Shaw, 2014b; Mercer et al., 2010), it still becomes important to assert that no discrimination or oppression should be felt in the process of such integration. The dichotomy of approaches opens possibilities of mutual and even complementing strengths that becomes a new and innovative approach to DRRM, yet deserves a respectful and mutually supportive co-existence. Integration also supports the interdisciplinarity narrative, which accommodates the plurality of the involved knowledge paradigms to tap into their shared strengths and cross-fertilization of epistemological perspectives (Repko & Szostak, 2016). To this point, this seems to be an unreached potential in the Ivatan context.

Hence, analyzing disruptions from increased climatological disturbances and other hazards through an interdisciplinary lens provides an extended view from its ubiquitous environmental and social dimensions to its epistemic underpinnings as well. This research also juxtaposes the championing of resiliency through modernity, and its consequent generation of social justice issues, policy issues, and paradigmatic issues that potentially disenfranchises Ivatan Indigenous identity. More specifically, the research problem emphasizes the complexities in the intersection of traditional Indigenous knowledge of the Ivatans and impacts of more modern competencies, policies, and approaches to DRRM according to the thrusts of the NDRRMC. In an ontological perspective, the research reflects divergent orthodoxies and individually interpreted truths about approaching DRRM from the basis of cultural ascription of the Ivatans and the NDRRMC's constitutional responsibility.

Objectives of the Research

The dynamics among the principal actors of the Ivatans and the NDRRMC signify the appropriateness to conduct research in the lens of the critical paradigm and the use of qualitative methods. In relation to the study, the critical paradigm critiques the positivist vis-à-vis constructivist approaches (Howell, 2017; Karataş-Özkan & Murphy, 2010; Pease, 2010) in preparing for disasters, specifically through scientific vis-à-vis Indigenous knowledge utilization respectively; these approaches are certainly evident among the Ivatan and the Philippine Government. Hence, it becomes essential to explore the impacts of DRRM modernization and shed light into Indigenous and scientific knowledge intersections. By doing so, what happens during these intersections become more clear; it is where they converge, or acknowledge each other's potential for utilization and effectivity for DRRM, that merits a worthy cause for research.

To reiterate, critiquing the interaction among the key players of the research given the plurality of their epistemological stances is the essence of my research. Epistemological plurality, explicit through the NDRRMC's positivist inclinations vis-à-vis the Ivatan's socially-constructed realities, conveys different ways of knowing and thus bestows different

methodological directions as well (Miller et al., 2008). The interdisciplinary approach accommodates such pluralities effectively, according to Miller et al. (2008), as it actively engages not only through critical knowledge generation but also the development of a new joint understanding among once independent and isolated ideas and perspectives (Repko & Szostak, 2016). In turn, epistemological plurality stimulates the creation of real-world solutions and facilitate change (Klein et al., 2001).

In this research, a duality is observed, especially in the framing of epistemologies of the traditional and modern. How knowledge is treated and differentiated by the entities of the Ivatan compared with the state is interesting, in which Pease (2010), Gaillard and Mercer (2012) reveal that Indigenous and local knowledge are dismissed by the state-supported, expert-driven narrative of scientists and geographers as "inferior and insignificant." Examining the intent of the NDRRMC under a critical lens therefore becomes important to uncover potential realities of injustice and inequality.

Because Indigenous peoples and government decision-making processes, orthodoxies, and epistemologies vary, I assume that more than an argument about effectivity occurs during their intersection. Also, the involvement of the state often means power structures and authoritative hierarchies are formed (Daldal, 2014; Pease, 2010; Winkel, 2012). Hence, the dissertation's research objective is to critique power structure phenomena and its role in inducing competitive or collaborative interrelationships during the intersection of scientific and Indigenous knowledge utilization. Understanding power structures, such as top-bottom and bottom-up administration within the study's context, and their impacts are also essential in determining the degree to influence change in the community.

Supporting the research objective will require an analysis of the interrelationships between overlapping disciplines of climate change studies, NDRRMC policies, and Ivatan Indigenous knowledge. Specifically, the Ivatan sense of self-determination and their reaction to the modernization thrusts of the NDRRMC in light of climate change pressure will be further examined and analyzed. The various elements and interdisciplinary complexities of the

Batanes context brew excellent conditions for high-level discourse; this research is stepping beyond insular disciplinary boundaries into collaborative and interdisciplinary opportunities to investigate the symbiosis between Indigenous knowledge and disaster risk management.

It is the melded transdisciplinary and participatory orientation of this dissertation that compels the research to not just stop at deriving critique in heterogenous lenses but also collaboratively develop practical solutions that address locally-recognized issues in DRRM. Transdisciplinarity is the advancement of interdisciplinarity, which makes space for ideological agendas to come to fruition (Bendito & Barrios, 2016). I strongly believe that the genuine embodiment of my doctoral work is to effect positive social change not simply through passive contribution to the corpus of knowledge but through active reification of ideas into valuable working solutions. There is no greater impact for generated solutions when stakeholders realize their cultural potential, the community is empowered to collaborate without preconditions, and realizable benefits are developed by and for Ivatans. Hence, it becomes a prime objective to extend this research from knowledge production into realistic, tangible, and effective improvements to existing DRRM policies and practices.

Free and unconditional participation has perpetually been the best practice in social science research involving Indigenous Peoples and within its context. From passive participation, where participant knowledge is simply derived, Ivatan stakeholders are actively enjoined to take stewardship and mobilize changes they collectively warrant. Extending beyond mere acknowledgement of their expertise in the research context, it therefore becomes a necessary objective to privilege Indigenous Peoples as key executors of the research outcomes. Expectations are also levelled where action is led by the Ivatans, while the researcher becomes the facilitator for the Ivatan's guided discovery, as mentioned by Berg (2009). Ultimately, the research's participatory and collaborative ethos results in its novel value-added transformations.

Research question. The research question asks, "how could the NDRRMC modernization approach impact the Ivatans' Indigenous ways of managing disaster risk?" It is succinct, specific, and affirmative to Berg (2009), Braun and Clarke (2006), and Patton's (1987) description as crucial in creating parallel subquestions for any specific inquiry format. The question is also in consonance with Babbie's (2004) emphasis on the necessity to reflect what the research paradigm espouses; it is grounded and reflective of the critical paradigm. Moreover, the general notion of the question implies Berg's (2009) Emancipating Critical Science mode of Action Research, which will be the principal methodology for this research and will be fully detailed on its own chapter. The Emancipating Critical Science mode attributed in the research also affirms Grundy's (as cited in Berg, 2009, p. 258) point how it "promotes emancipatory praxis in the participating practitioners; that is, it promotes a critical consciousness which exhibits itself in political as well as practical action to promote change."

Thematically, contrasts and dualisms are evident in the research question, with *modernization* and *Indigenous* identifiers, and *NDRRMC* and *Ivatan* key players. Epistemic perspectives equate the former pair into positivist and constructivist paradigms. The latter pair on the other hand relates to the Foucauldian discourse of power structures of actors vested with authority and the subordinate recipients of that governance. Altogether, the themes within the research question also denote a multiplicity of interpretations, whether regarded as a policy question, impact question, DRRM process question, and social justice question. This dissertation will cover them extensively in the Research Findings and Recommendations and Conclusions chapters.

Scope of the Research

It is crucial to narrow the scope of research to level reader expectations, guide discussions, and avoid misconstruing terminologies with definitions that are otherwise out of context. Aside from defining major elements in this research such as the problem and objectives, this section intends to provide superficial yet important variables to cover in the dissertation. By doing so, it sets the overall context and boundaries of the research. Ideas and

commentary beyond the confines of this boundary offer opportunities for future subsequent research.

While it is understood that interdisciplinarity is an essential approach of the research, its main orientation points at the field of social sciences. The core emphasis of the dissertation centres on human relationships and agencies from Indigenous perspectives, constructions, and interpretations. The dissertation places a premium on relational discourse as well as critical insights because of its intensions to interrogate government-to-Indigenous people power structures. Data triangulations from research participant responses are valid and reliable when used in Action Research (Chambers, 2017; Glenzer, Martnez, & Drinkwater, 2017). Compared to anthropological discourse that places empirically falsifiable theories as a foundation for understanding culture and society, research integrity through validity and reliability (Webster & Sell, 2011), and methodological approaches through ethnography (Howell, 2017), this dissertation employs more qualitative and relational approaches in research.

In comparison to common disaster forms like earthquakes, volcanic eruptions, floods, droughts, and others, meteorological disasters, moreso on typhoons (also known as tropical cyclones), will be focused on this research. The Philippines's geographic location makes it the world's most vulnerable and most exposed to the planet's strongest typhoons (U.S. Department of Defense, Center for Excellence in Disaster Management and Humanitarian Assistance [U.S. Department of Defense], 2018; Wingard & Brändlin, 2013). Averaging about 20 to 22 per year (Hiwasaki et al., 2014b; "Philippines", n.d.; Valenzuela, 2014), the country's extensive experience of typhoons pervades all aspects of society, income classes, and costs society and environment dearly more than any other country in the world (Bankoff, 2003b; Wingard & Brändlin, 2013).

The regularity of intense typhoons in Batanes, the country's northernmost province, makes it the highlight geographic setting for this study. Although the country's typhoon path is spread on the northern two-thirds of the country (Bagtasa, 2017; Valenzuela, 2014), Batanes is one of the more unique locations for this study due to the inclement climate's influence on

almost every aspect of life, environment, and culture in the province (Board, 2019; Hornedo, 2000; Trinidad-Echavez, 2008). Compared to others, typhoons are also the most frequent climatological hazards there, claimed by almost all participants involved in this study.

Basco, the provincial capital, was the focused municipality where the research was conducted. Research coverage was also extended to the Municipality of Uyugan but only for minor, yet targeted data-gathering. These were rationalized based on both practical and geopolitical viability. Funding and time constraints allowed only Basco as the research epicentre. Significant financial resources and a generous time allotment from my current workplace would have been factors to extend the research outside Basco municipal limits and stay with different communities longer. Unfortunately, this did not present a realistic scenario. To add, all government offices significant and relative to my research were all located within Basco. Research participants also mentioned that other municipalities may not have enough data to acquire since most related policies did not exist or are very limited, hence reducing research viability.

All levels of governance within the institutional framework of DRRM in the Philippines have been covered in this dissertation, though direct data gathering priority centred on the provincial, municipal, and *barangay* (village) levels. Specifically, this included both secondary research by mining for existing plans and policies, as well as through primary data gathering such as workshops, interviews, and focus group discussions. On the other hand, national-level data gathering centred more on secondary research such as the close examination of the NDRRMP, the *Philippine Disaster Risk Reduction and Management Act of 2010*, and other policies.

Research Limitations

Research is often bound to the inevitabilities of limitations surfacing despite thorough planning. It is acknowledged that the specific nature of this research creates certain limitations and challenges based on context, methodological processes, ethical considerations, and practicalities that are further elaborated in this section. Despite so, all possible ways and

means have been conceived to cover such caveats and acknowledge that the specificity of the research agenda, procedures, and outcomes will apply mainly to this dissertation unless otherwise stated.

Many authors discuss potential difficulties in dealing with research within highly evident cultural contexts (Howell, 2017), in the level of connection or even disconnection between the researcher and the research subjects, as well as power-structures within the subject community, according to Mercer, Kelman, Lloyd, and Suchet-Pearson (2008). The likelihood of such to happen is a function of context; reacting to the problems may typically be dependent on the situation, especially referring to the cultural milieu. Such situation may even be further rooted to the sentiments of the participants and stakeholders as well as the researcher's flexibility to adjust to the given circumstances.

My being an outsider from Batanes is initially a limitation due to the additional effort in starting rapport and building connection from the ground up. I humbly acknowledge my being an *ipula* or outsider will cause me to never be able to truly understand what it means to be Ivatan, which would consequently impact my data collection and analysis efforts. However, my being an ipula also comes as a potential blessing since there is still value in the perspective of an outsider being non-Ivatan and as a Canadian, which was also affirmed by one of the respondents from Batanes. This would allow me to retain my core function as a researcher and mission to pursue my research objectives. Mercer et al., (2008) also reveal researcher issues how certain researchers indigenous to an area actually having preconceived biases and vested interests because of their strong connection and exposure with the locality.

It is understood that adapting Action Research requires a closer connection and tighter researcher-participant relationship (Berg, 2009; Mercer et al., 2008). I have foreseen pre-drawing the boundary between me and the participant to be difficult, in which the only way to determine such boundary is while getting to know the participants more. Howell (2017) stated, “becoming too close to those under investigation (going native) may lack a level of detachment, objectivity and reflexivity.” In contrast, this becomes impossible according to

Mercer et al. (2008) as external researchers conducting Action Research will always have an implicit or explicit agenda.

Creating critique through Action Research also involves reflexivity to the my values, axiology, and belief systems (Wellington, Bathmaker, Hunt, McCulloch, & Sikes, 2011). This is a foundational aspect that reflects my fundamental beliefs and axiology in activism, advocacy in Indigenous empowerment, and the struggle for social justice. I see greater world-changing potential not in empirical sciences but in people's capacities and faith in humanity. However, I recognize that my positionality may also act as an inherent hazard in which my personal assumptions and biases create strong tendencies to influence the interpretation and creation of meanings (Howell, 2017), and thus compromising the credibility of the research. Supporting this, Karataş-Özkan and Murphy (2010, p. 456) also account researcher assumptions and axiology as fundamental ingredients in the critical research process since "facts can never be isolated from the domain of values or removed from some form of ideological inscription."

Indeed, there is wisdom in self-scrutiny—peeking through my personal origins, beliefs, values, and present circumstances becomes a way to uncover strengths, opportunities, as well as challenges that lay ahead. In a philosophical perspective, these qualities also become essential in my personal understanding of epistemologies of culture, positivist versus constructivist approaches of creating versions of the truth. To reiterate, my axiological assessment reveals my biases and advocacies for Indigenous knowledge empowerment. Carew and Wickson (2010) mentions the "willingness to recognize and account for one's [my] own values, biases, and beliefs and to acknowledge the limitations of one's [my] own knowledge" is an important factor in interdisciplinary studies, such as my own research. Additionally, Hogue (2011) accounts how an axiology may affect not only the research methodology but as well as the value of the research results.

In terms of methods, I also acknowledge that my intent to conduct FGDs and interviews have limitations and weaknesses. Some academics consider either formats as unempowering and abets the exemplification of the researcher-on-participant power structure positioning

(Ahrens & Rudolph, 2006; Mercer et al., 2008; Mercer et al., 2010; Pelling, 2007; Reason & Bradbury, 2008). This is certainly done in the frameworks of applied and conventional research, according to Waddell and Glenzer (as cited in Reason & Bradbury, 2008). On the other hand, Berg (2009) asserts that FGDs and interviews are also feasible in Action Research where participants also identify their problem, critique their situation, and also develop solutions appropriate to their community (Pelling, 2007, Reason & Bradbury, 2008); the researcher therefore becomes the referee and facilitator in this approach.

In terms of ethical challenges, I also share the same concern and difficulty identified by Pelling (2007), Datta et al. (2014), and Mercer et al. (2008) about research ownership. One of the unique selling points of the Action Research approach is about its capacity to espouse a sense of ownership (Datta et al., 2014; Mercer et al., 2008; Pelling, 2007). However, social science research inevitably questions up to how far research ownership goes. Complete and autocratic ownership by the stakeholders would potentially translate to a loss of control over the research. Datta et al. (2014) make an interesting approach in answering this question not just by crediting the key stakeholders in his research but also by including them as co-authors of the paper. This will be unnecessary, however, as the Provincial Government of Batanes has already initiated an initial research similar to mine at the time of data-gathering, much sooner than the completion of this dissertation.

The latent inequality of power structures such as between researcher and participants can also be manifested within the participants themselves. Not being fully familiar with the community, I may be potentially faced with what Mercer et al. (2008) coin as the “tyranny of participation,” or the power structures inherent within the local context. This term can also connote traditional paternal top-bottom hierarchical decision-making structures within the community itself — community decisions made by the community chief, which is also common in some Indigenous communities in the Philippines. Participation by local residents may potentially be coerced along with the chieftain providing unequally represented input.

Among the many concerns in interdisciplinary research is defining research quality. As a researcher, I believe that the robustness of both the means of conducting the research and its outcomes should be a marker of its credibility. But because the use of Action Research will warrant collaboration, I am challenged by how the community truly define what they deem as high quality outcomes, especially as I am left with comments of praise about the data-gathering approach but without further explanation of its credibility. Belcher, Rasmussen, Kemshaw, and Zornes' (2016) four criteria of relevance, legitimacy, effectiveness, and credibility in defining research quality would rate excellently as the criteria for the Action Research method to use. I acknowledge that this is a crucial step not just for the community, but also especially for levelling the research panel and supervisory committee's research quality expectations.

Practical limitations, specifically about funding and research schedule restrictions, therefore narrow the data and outcome representation within Basco only, in contrast to representing the province holistically and ideally. A member of my dissertation committee alongside Indigenous elders within the province affirm the geographical coverage of Basco as a valid and sufficient benchmark for the research. Despite the Basco focal point, research participants from the capital confirmed the IKSPs involved in the research as adequately representative of the province.

Significance of the Study

It is only becomes rational to avoid delays in the plans of the NDRRMC to protect and build community capacity much sooner to effectively prevent casualties before it becomes too late. The skyward intensity of disasters brought about by climate change creates pressure to resort to the modernization of disaster risk reduction methods and the championing technologically-advanced processes. But by doing so and even with good intent, it is still faced with the ethical issue of genuine inclusion and participation of Indigenous peoples, their knowledge, and their unique perspectives and methods. The state, through its constitutional

mandate to protect its citizens, will be compelled to extend such protection to include culture and traditions mutually and in a manner that avoids conflict.

Both internal and external forces are also provoking the Ivatan Indigenous people to question the manner of change as a consequence and determinant of their identity. The NDRRMC becomes an outside influence that necessitates the Ivatans to work with, in which the outcome of such interrelationship will act as the dissertation's core research agenda. Internally, Ivatan self-determination faces a new road to tread—either perceiving modernization as either a threat or opportunity, and determining how their culture will evolve as a result of making their choice. Moreover, on the discourse of cultural evolution, the Ivatans ultimately choosing their destiny would bring about this change as part of a shifting cultural identity; as opposed to being caused by external factors, potential influence from the NDRRMC, and oppression from others.

Batanes makes a logical case study not just due to its proneness and vulnerability, but on how its socio-economic context creates opportune conditions for advanced academic study; the province finds itself at the forefront of unprecedented weather instabilities that threatens the survival of centuries-old means of adaptation in light of modernization and economic struggle (Fantauzzo, 2014). Indigenous communities in other countries may also benefit as the study may mirror and share similar situations as well. In addition, it is hoped that the dissertation generates momentum and dialogue in academia, policy-makers, governments, and Indigenous communities.

Much pragmatic potential may also offshoot from the study. It may provide a stimulus in the development of practical solutions, in which traditional IKSPs in DRRM may be possibly worked out as a complementary extension and support to more concurrent means. Another presumed dissertation outcome include the potential creation of policies for the overall documentation, preservation, and utilization of other DRM IKSPs of other Indigenous peoples not just in Batanes but perhaps in other global contexts as well. Many tourism-reliant

communities may also find potential from this study, realized through the crafting of policies for better protection of cultural assets and the creation of a new educational attraction.

The dissertation's relevance as an applied research is also in consonance with the thrusts, research mandate, and commitment of Royal Roads University (RRU) to the global community. A number of RRU's programs, such as the Disaster and Emergency Management, Global Tourism Management, and Sustainable Community Development among others, also allow accessibility of experts and professors as intellectual resources for the study.

Chapter 2: Literature Review

Rigorous background reviews buttress robust research. With more than the intention of assembling the foundational knowledge context of the study, this chapter intends to expose the inner working systems of the study's key players for better understanding of the points for later critique. Each subchapter, which extracts and synthesizes key information from credible sources, has its role in the arena of the critical research process. All subchapters are integral and are interrelated elements that level the reader's expectation of the research actors involved and how they will be later intertwined in the Conceptual Framework chapter.

Batanes and the Ivatan Peoples

Province of Batanes. Batanes is the Philippines' northernmost frontier province with a story of several million years still in the making. The 10-island province was moulded by harsh geologic forces, forging its physical features of volcanoes, variable topography, and archipelago from the Late Miocene to the Quaternary periods, according to Hornedo (2013a) and Esteban and Valientes (2019). Located on the Luzon Strait separated from Taiwan by the Bashi Channel on the north, the Pacific Ocean on the east, the Balintang and Babuyan Channels on the south, and the West Philippine Sea on the west as represented in Figure 1, Batanes is nearer to Taiwan's southmost tip about 190 kilometres north, than from the main island of Luzon, approximately 280 kilometres south (Municipal Government of Basco, 2013; Provincial Government of Batanes, 2017; Esteban & Valientes, 2019; Uy & Shaw, 2008).

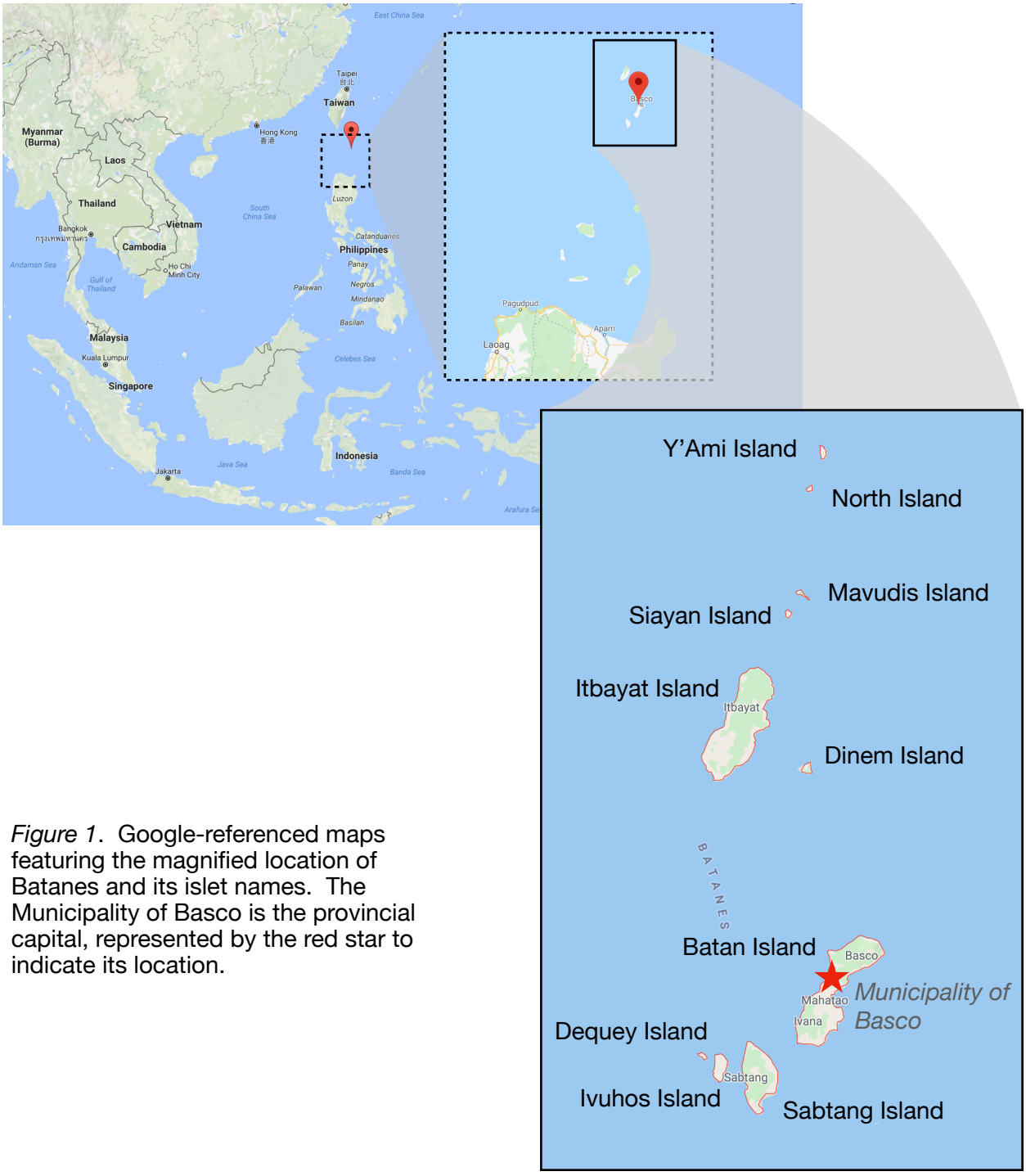

Figure 1. Google-referenced maps featuring the magnified location of Batanes and its islet names. The Municipality of Basco is the provincial capital, represented by the red star to indicate its location.

Scattered in a roughly north-south orientation, only three of the ten islands are inhabited (Provincial Government of Batanes, n.d.a, 2017). Batanes is the country's least populated province with a population of 17,246 as of 2015 (Philippine Statistics Authority, 2016) and as broken down in Table 1 (Philippine Statistics Authority, 2018), sparsely spread across six municipalities of Ivana, Mahatao, Sabtang, Itbayat, Uyugan, and Basco, the provincial capital and central administration and economic hub of the province (Municipal Government of Basco, 2013). As another superlative, Batanes' terrestrial area size of 230 square kilometres makes it the country's smallest province (Provincial Government of Batanes, 2017), though has contrastingly vast territorial waters 4,500 square kilometres in size (Provincial Government of Batanes, n.d.a).

Table 1

Batanes Population (2015) Distribution with Breakdown of Basco Barangays

Municipality	Barangay	Population
Basco		8,579
	Kayvaluganan	2,344
	Kaychanarianan	1,822
	Kayhuvokan	1,700
	San Antonio	1,969
	San Joaquin	384
	Chanarian	360
Itbayat		2,867
Ivana		1,327
Mahatao		1,555
Sabtang		1,621
Uyugan		1,297
	Total	17,246

Note. Basco's barangays are emphasized in this table for better understanding of the research context population. Adapted from "Total Population by City, Municipality, and Barangay of Region II - Cagayan Valley," 2015, *Philippine Statistics Authority*. http://www.psa.gov.ph/content/population-region-ii-cagayan-valley-based-2015-census-population. Copyright 2016 by Philippine Statistics Authority.

Unique rolling to steep landscapes and rough seascapes incomparable to other Philippine destinations characterize Batanes. Reminiscent of a hybrid between breathtaking Swiss rolling hills and Irish coastal cliffs, shown in Figure 2, complemented by the province's Ivatan culture, heritage, illustrated in Figure 3, and rich endemic flora and fauna has made Batanes a UNESCO World Heritage Site nominee ("Batanes Prepares for UNESCO Heritage Listing," 2016; Centre for World Heritage Studies, n.d.; Lopez, 2001; Provincial Government of

Batanes, 2017). There are plenty picturesque hilly grasslands dotted by grazing cattle rich in idyllic countryside themes, though Hornedo (2000) and Esteban and Valientes (2019) posit that the landscape was an outcome of forest exploitation for boat-building, preservative meat-smoking, and as fuel for lime kilns for *sinadumparan* (Indigenous Ivatan house) construction.

Figure 2. Rolling and hilly grassland pastures and farms such as these two images taken in Vayang Rolling Hills in Basco are found all over Batanes. Tall cliffs in the background of the bottom image border the extensive seascape of the province. May 25, 2019.

Figure 3. An archeological site of an *ijang* fortress in Basco, noticeable in the vegetation-covered mound piercing above the landscape in the background of the image above, was once a settlement of ancient Ivatans to defend themselves from pirates and invading rival tribes. Thick, stoned-walled *sinadumparan* traditional houses such as the image below are often converted into bed and breakfast facilities for tourists and can be found in almost all municipalities in the province. December 19, 2018.

Much of Batanes' diverse physical and cultural landscapes expectedly drew intrepid and off-the-beaten travellers (Department of Environment and Natural Resources [DENR], 2020; Esteban & Valientes, 2019; Kwak, 2015), subsequently positioning the province as one the country's top tourist attractions and catalyzing local tourism revenue generation (Baccay, 2016; Batin, 2018; Provincial Government of Batanes, 2017). The province's boom in hotel developments is testament to the sheer growth of the tourism industry, which further necessitated the importation of construction workers from outside Batanes to cover local counterpart labour deficit (Interviewee 1, personal communication, May 29, 2019; Batin, 2018). However, agriculture alongside fishing are still Batanes' top human and economic resource generators respectively (De Guzman, Zamora, Talubo, & Hostallero, 2014; Esteban & Valientes, 2019; Geronimo, 2015). Faced with the ubiquity of unpleasant climate however, these primary industries are chiefly subsistent and investment risky (Hornedo, 2000). Outmigration is expectedly rampant, thanks to the prevailing rural-to-urban shift, and better-paying extra-provincial opportunities (Esteban & Valientes, 2019; Hornedo, 2000).

Ivatan Indigenous Peoples and history. Hornedo (2000), Bellwood and Dizon (as cited in Esteban & Valientes, 2019), Dizon (2019), and the Center for World Heritage Studies (n.d.) collectively infer the habitation of the Batanes Islands between 5,000 BCE to 1,300 AD from the wave of Austronesian migration across the Pacific. Ivatan ancestors were master seafarers and migrated from the north using water craft, which Lopez (2001) implies was an inheritance passed onto contemporary Ivatan boat-building and ocean navigation wisdom. Neighbouring immediately north of Batanes is Taiwan, where much pre-colonial trade, evident with pottery influences and jewelry artefacts found in the province, existed (Lopez, 2001). Linguistical influence from the Indigenous Yami People of Taiwan's southern Orchid Island is also evident due to their strong resemblance with the Ivatan language (Esteban & Valientes; Hidalgo, 1996; Hornedo, 2013a; Lopez, 2001). Hornedo (2013a) and Bellwood and Dizon's (2013) research suggests pre-European contact trade, through the use of ocean highways, extended as far as mainland Asia and China (Hornedo, 2013a).

Archeological studies reveal how ancient Ivatans lived on precipices or hilltop outcrops called *ijang* for protection and relief from marauding pirates and intertribal wars (Hornedo, 2000, 2013a; Bellwood & Dizon, 2013). Protection proved futile, however upon the arrival of Spanish conquistadors in the latter 18th century with canons aimed at ijang occupants, consequently forcing them to descend and assimilate to Eurocentric urban grid settlements (Hornedo, 2000; 2013a; Rede-Blolong & Olofson, 1997). Although Batanes' entry into recorded history occurred much earlier in 1686 with the landing of Dominican missionaries (Hornedo, 1977), Hornedo (2000) asserts oppressive Spanish colonization agenda occurring a near century later, in 1783, through the promulgation of Ordinance 52. Its disruptive mandate was directed not only for ijang exile, but for "reducing the natives under the bell" for easier rule and supervision by hegemonic government forces, for attendance to church and religious functions, for children's education (Hornedo, 2000, p. 60), and for proper dress and embellishments according to Spanish decorum (Gonzalez, 1966).

Spanish settlement catalyzed Basco's development and mirrored colonial urban form archetypes, with street grids designed using laid-out ropes, and the church, convent, and government buildings collectively as the urban nucleus (Hornedo, 2000). As an alternative to fire- and typhoon-vulnerable wooden structures, lime and stone were used, resulting in extensive local mining and processing of lime (*kapaytima*) as the key ingredient combined with water and sand to create mortar for building (Hornedo, 1977, 2000). Over time, such construction technology was adopted by the Ivatans, further evolving into unique vernacular architecture that hybridized foreign building influence with their acute awareness of climate considerations and Indigenous knowledge of adaptability to the harsh environment (Hornedo, 2000; Ignacio, n.d.). The result of the crossed influences were the construction of sinadumparan or traditional Ivatan stone houses and their varying morphologies, seen in Figure 4, many of which could still be found around Batanes today (Adami, 2013; Hornedo, 2013a; Ignacio, n.d.).

Figure 4. A sinadumparan in the above image in Itbud, Uyugan Municipality has a windowless wall on the headwind side to protect against strong gusts. The image below is a four-sloped roof *maytuab* in Basco, which is an improvement of the sinadumparan's two-sloped roof. Note the smooth wall masonry dividing the stone-exposed lower side wall, which ought to be the ideal finished design of traditional houses in the province. May 31, 2019.

English freebooter and one of Batanes' earliest observers, William Dampier (as cited in Hornedo, 2000), described Ivatan people in 1687 as civil, peaceful (Hornedo, 2013a), and law-abiding (DAR, 2010), which remained consistent centuries after according to American scholar Otto Scheerer's 1910 ethnographic account (as cited in Hornedo, 1977). Gonzalez (1966), Hornedo (1977, 2000), and the Ancestral Domain Sustainable Development and Protection Plan (ADSDPP) (DAR, 2010), share identical description of ancestral Ivatans as jolly, fun-loving, and festive. They danced, drank *palek* (sugarcane beer), communed with neighbours, told stories (*mangununung*), and sang (*maylaji*) (Hornedo, 1977). Alongside their merry outlook, Ivatans in the 17th century were also described as industrious, who toiled their farm for rootcrops and fruits; fished the bounties of surrounding waters; raised livestock and traded them for iron (DAR, 2010; Hornedo, 1977, 2000, 2013a).

Mainland Luzon trade, continuous influx of missionaries, minor skirmishes between rebellious Ivatans and Spanish officials, and administrative shuffles under the watch of the Spanish colonial government ensued until 1898, which spelled the Philippine Revolution, consequently ending Spanish dominion (Gonzalez, 1966; Hornedo, 1977). Hornedo (1977) cites how Batanes endured less than 120 years of Spanish occupation and neo-feudal structures (2000) only to find a flip in colonizers, when the province and the country were taken over by the Americans in 1899 (Gonzalez, 1966). Later, the Second World War saw Batanes fall under the hands of the Japanese without resistance except for a short revolt by a small Ivatan guerrilla command that eventually succumbed to their capture and execution (Hornedo, 2013a).

Post-Second World War Batanes still felt American presence. Unlike the Spanish regime however, the American administration steered Ivatan society not on religion but on education, creating a strong educational and schooling system within the province (Hornedo, 1977). This legacy rewarded American social footprint with credit, where education's benefit could still be felt today when Batanes enjoys one of the highest literacy rates in the country (Gonzalez, 1966; Hornedo, 1977). According to Hornedo (1977), local literacy rates were

already high in 1977 at 92% of the population, higher than the 72% national literacy rate. More recently according to the last 2015 census, Batanes' literacy rate registered at 99.3% (Philippine Statistics Authority, 2018).

A sharp polarity is distinct and visible in contemporary Ivatan society. Despite the modern urban conveniences and globalized access to information and communications that Ivatans enjoy today, its society is still steeped in heritage, traditions, and culture (Hornedo, 2000; Veld, 2014). Evidence of old and new jot every corner of the province, where students work on laptops inside century-old sinadumparan, and women in farms wearing traditional *vakul* weather protective headgear (head and back cover made of woven stripped banana or palm [*vuyavuy*] leaves in Figure 5) while browsing the internet on their smartphones. Still, Hornedo (1977), Rede-Blolong and Olofson (1997), and Esteban and Valientes (2019) identify Batanes as somewhat isolated from mainstream Philippine society. The province's general remoteness, however can be merited for retaining commonplace customs and traditions without much outside interferences (DAR, 2010; Hornedo, 2000).

Figure 5. An elderly woman wearing a vakul rain cape. Similar to the sinadumparan, the vakul is one of Batanes' most ubiquitous cultural symbols. The vakul even has its own celebration during the annual Vakul Kanayi Festival in Sabtang (Del Mundo, 2016). Adapted from "Jay Jallorina Landscape Photography," by J. Jallorina. Jallorina, J., n.d. (https://www.instagram.com/stories/highlights/17924820274131807/). Copyright n.d. by J. Jallorina. Adapted with permission.

Hornedo (2000), an Ivatan himself, distinguish Ivatanship for its strong sense of cooperativism that takes root from the principle that rendering assistance to others in society is an investment that will be reciprocated at a later time (De Guzman et al., 2014). This is reflective to the general and more broad Filipino social value of *bayanihan*, or voluntary collective assistance to those in need (Hiwasaki et al., 2014a). Cooperativism and community collaboration and consolidation have been key for Ivatan adaptability and survival in the face of frequent tempestuous situations for generations (Hornedo, 2000; Provincial Government of Batanes, 2017; Uy & Shaw, 2008). Such social systems have further augmented into variants (DAR, 2010) further defined in Table 2.

Table 2

Cohesive Indigenous Cooperation Systems Ubiquitous in Ivatan Society

Cooperative System	Level of Participation	Description	Source
Yaru	Entire community with a minimum of one able-bodied family member to participate.	• Mandatory community cooperation similar to bayanihan, the spirit of voluntary assistance common in the Philippines. • Typical purposes are for infrastructural repairs and construction, for inclement weather preparations, road clearing, child care, and resource sharing • All participants benefit from improvements, thus rationalizing everyone's mandatory participation. • Absent members can be assigned work on another day. • No compensation is expected by participants.	Batin (2018), DAR (2010), Fantauzzo (2014), Hornedo (2013c), Uy and Shaw (2008)
Kayvayvanan	Family members and relatives almost often, and close friends on occasion.	• Commonly engaged during house construction or roofing and construction materials assembly, and to a lesser extent during large agricultural clearings, soil tilling, lumber sawing, corral fencing, and *tataya* (traditional boat) making • Get-together event is a proxy for a family reunion where participants work and eat together. • Home owner provides food and drink, while other participants are enjoined to bring additional food.	DAR (2010), Hornedo (2000, 2013c)
Payuhwan / Kamayuhan[a]	Between six to twelve young and old family members, and close friends on occasion.	• Often used in agricultural contexts such as cultivation or other farm work during harvest season or weeding periods. • Work can be done on a daily basis compared to kayvayvanan, which is more occasional. • Shifting work rotates daily. • Often delegated to younger family members to expose them to seasonal farm work. • Labour can sometimes be paid, though is uncommon.	DAR (2010), De Guzman et al. (2014), DENR (2020), Hornedo (2000)

Cooperative System	Level of Participation	Description	Source
Kapañidungan / Kamañidungan[a]	Between ten to twenty household members. Neighbours and friends may join.	• Activated only when assistance is needed, compared to kayvayvanan, which is more seasonal. • Assistance is typically provided for persons or families requiring more labour than they could afford. • Common practice when sheltering animals or replacing *cogon* (tropical grass — *Imperata cylindrica*) roof nets, or repairing other house portions such as walls prior to inclement weather. • May involve skilled and unskilled labourers, where the former are assigned tasks based on their expertise. • Skilled participants sometimes also contribute building materials. • Food and drink are provided by the home owner, while no monetary compensation is expected by labourers. • Often interpreted differently, in various communities in Batanes	DAR (2010), DENR (2020), Gibson et al. (2018), Hornedo (2000)
Maychahuwan	One to three persons.	• Assistance that is contractually repaid in similar labour based on the same length of time the assistance was rendered. • More occasional than common practice.	DAR (2010), Provincial Government of Batanes (n.d.)
Kakavahayan	Entire village	• Well-planned community aid during roofing installation and latter part of house construction. • Workers go home for lunch as no food is served. • Provision of service to other participants rotate for months or years upon roofing construction or replacement need. • All social classes have access to the social benefits of kakavahayan. • A participant loses privilege when one's roof is concreted but would still continue rendering to others that must be served.	DAR (2010)
Pamahsan	Individual	• Payment for a debt of service. • Applies to maychahuwan, payuhwan, or kapañidungan.	DAR (2010)

Cooperative System	Level of Participation	Description	Source
Kakavahayan + Kamañidungan	Entire village	• Hybrid of kakavahayan and kamañidungan. • Sometimes participants from other barangays participate. • Feast is served where the home owner slaughters and roasts cattle or pig for all participants. More food and drink are served after work completion. • Similarly, the home owner is indebted to render the same service to another's turn.	DAR (2010)
Kalipusan	House builder's family and relatives.	• Cooperative group initiated before the kakavahayan completes the work. • The objective of the gathering focuses on the reunion of the family and less on the immediate work. • Food is prepared and shared by the homeowner, while relatives bring *akhad* or food to add, pot luck-style. • Main difference compared to kakavahayan is family kinship; only family members are involved in kalipusan.	DAR (2010), Hornedo (2000)
Kapanghu	Individual	• Service to be rendered with expectation of financial or more typically in-kind compensation. • Payment is in form of resources used in work; yams are paid during yam-digging, or rice is compensated during rice harvesting. • Most practiced in events of food scarcity.	Hornedo (2000)
Kakpehan / Payurdinyan[a]	Post-church service attendees.	• Community assemblies to announce important community matters, discussions, arguments and resolutions.	Buendia et al. (2006); DAR (2010); Hornedo (2000)
Kapangaraya / Kapayaraya	Any able-bodied persons nearby.	• Cooperative help involving individuals hauling boats to safer ground before a typhoon. • Even persons without boats are enjoined to help in the spirit of cooperation.	DAR (2010)

Note. Hornedo (2000) claims many of the mentioned cooperative systems are slowly waning due to the increasing expectation of financial compensation as an outcome of service. Adapted from various sources listed above.
[a]Term varies in different municipalities.

Legal frameworks for the protection of Batanes. Recognizing the remoteness and distinctive yet fragile state of the province compelled its designation as a protected area through two legal proclamations, as inscribed in Republic Act (RA) 7586, or the National Integrated Protected Areas System (NIPAS) Act of 1992, and more explicitly through RA 8991, or namely the Batanes Protected Area Act of 2000 (Batin, 2018; Philippines, 1992, 2000). Both policies provide a regulatory layer of resource use in favour of protection and preservation of "scenic, cultural, historical and archeological features" of the islands (Philippines, 1992, 2000, p. 1). Ecological, cultural, and heritage preservation themes are also stipulated in RA 10866, or the Batanes Responsible Tourism Act, though serving a minor role than its weightier policy emphasis on developing sustainable tourism in the province (Philippines, 2016).

All protected areas in the country are to be managed by their jurisdictional Protected Area Management Board (PAMB) under the greater administration by the Department of Environment and Natural Resources (DENR) according to NIPAS law (1992). Batanes' legally-backed protected status authorizes the PAMB to play policy-maker, enforcer, and guardian of the province's resources (Philippines, 1992). In addition to more specific regulatory roles prescribed by the NIPAS law (1992) of general administration and planning, the PAMB also restricts conversion or redevelopment of properties, as well as prohibits certain extractive uses of resources such as lime, minerals, and hardwoods among others that are endemic to the province (Interviewee 2, personal communication, June 11, 2019).

In early January 2001, the Batanes Protected Area Act of 2000 was ratified to dovetail the NIPAS law and further solidify Batanes' protected state with core emphasis on the province (Philippines, 2000; Reyes, 2003). More specific regulations heavy on environmental preservation and protection themes can be found in Section 9 of the act (Philippines, 2000), among them as explicitly identifying prohibited acts and imposing penalties for:

- Conducting quarry operations for aggregates, limestones, coral, and sand without a PAMB permit.
- Gathering timber or forest products without authorization.
- Defacing any object of natural beauty or scenic value.
- Constructing any structure without a permit from PAMB.

A further legal entitlement of the islands being Ancestral Domain, according to the Indigenous Peoples Rights Act (IPRA) of 1997, privileges Ivatan Peoples with a development road map, policy agenda, and overall right to self-determination (DAR, 2010). Not only does the IPRA law enshrine protective leverage for Batanes through the declaration of the province as Ancestral Domain and the protection of its resources, the act provides a forward-looking and proactive stimulus for development, pursuant to Part 2, Section 2 of the Implementing Rules and Regulations (IRR) of the Act (National Commission on Indigenous Peoples [NCIP], 1998; Philippines, 1997). This section, specifically titled *Right to Develop Lands and Resources*, places importance for the continuity and survival of Ivatan culture and heritage (Esteban & Valientes, 2019; NCIP, 1998).

In consonance to the IPRA's IRR, development is specifically formalized and outlined through the ADSDPP (DAR, 2010; NCIP, 1998). Reminiscent of a cross between Official Community Plans and Indigenous Framework Plans in municipalities in Canada but in the context of Ancestral Domains in the Philippines, the ADSDPP lays the cornerstone for development policy agenda in each municipality in Batanes (DAR, 2010). Development policy is further applied through the formulation of underlying programs and projects classified into four fundamental Ancestral Domain rights such as the rights to ancestral domain, self-governance and empowerment, social justice and human rights, and cultural integrity (DAR, 2010; NCIP, 1998). Using Ivatan Indigenous Knowledge, Systems, and Practices (IKSPs) as a foundation according to DAR (2010), specific programs and projects for the jurisdiction of Basco in their respective rights clusters include:

- Right to Ancestral Domain:
    - Security of municipal waters through the provision of a patrol vessel
- Right to Self-Governance and Empowerment:
    - Organizational and management skill building of Basco's Tribal Councils
    - Consolidation and capacity building of cooperatives, peoples' organizations, livestock farmers, and fisherfolk organizations, etc.
- Right to Social Justice and Human Rights:
    - Upgrading access to fish landing ports and farm-to-market roads
    - Crop and livestock production enhancement
    - Basic education upgrading
    - Increasing health facilities and practitioners
    - Augmenting local water supply
- Right to Cultural Integrity:
    - Heritage and cultural preservation
    - Development of the tourism industry

Disaster Risk Reduction and Management in the Philippines

The Philippines and disasters. Unsurprisingly, the United Nations Office for Disaster Risk Reduction ranks the Philippines as the world's fourth most prone to disasters (Lee-Brago, 2016) due to its endemicity to hazards, specifically by being located in the Pacific Ring of Fire and directly in the corridor of the world's strongest typhoons (Wingard & Brändlin, 2013). As a geophysical and meteorological disaster hotspot, about 60% of the Philippines' total land area is exposed to a variety of natural hazards such as earthquakes, typhoons, volcanic eruptions, floods, land subsidence, among others (Swiss NGO DRR Platform, 2014) that has shaped the land and its people since time immemorial.

Meteorological disasters in the form of typhoons account more than any of its geophysical counterparts (Brown, 2013). The country's location, straddled on the western rim of the Pacific Ocean on the path where strong weather systems actively develop as seen in

Figure 6, makes it the world's most exposed and vulnerable to violent and destructive typhoons (Brown, 2013; U.S. Department of Defense, 2018; Wingard & Brändlin, 2013). Brown (2013) describes it in her Time Magazine article aptly titled, *The Philippines Is the Most Storm-Exposed Country on Earth*. Typhoons are also plentiful, averaging about 20 per year (Hiwasaki et al., 2014b; "Philippines", n.d.; Valenzuela, 2014), in which five to seven each year are highly destructive (Swiss NGO DRR Platform, 2014). These typhoons are a result of rain-bearing monsoon winds that occur from June to November annually (Swiss NGO DRR Platform, 2014; U.S. Department of Defense, 2018; Whiteman, 2014).

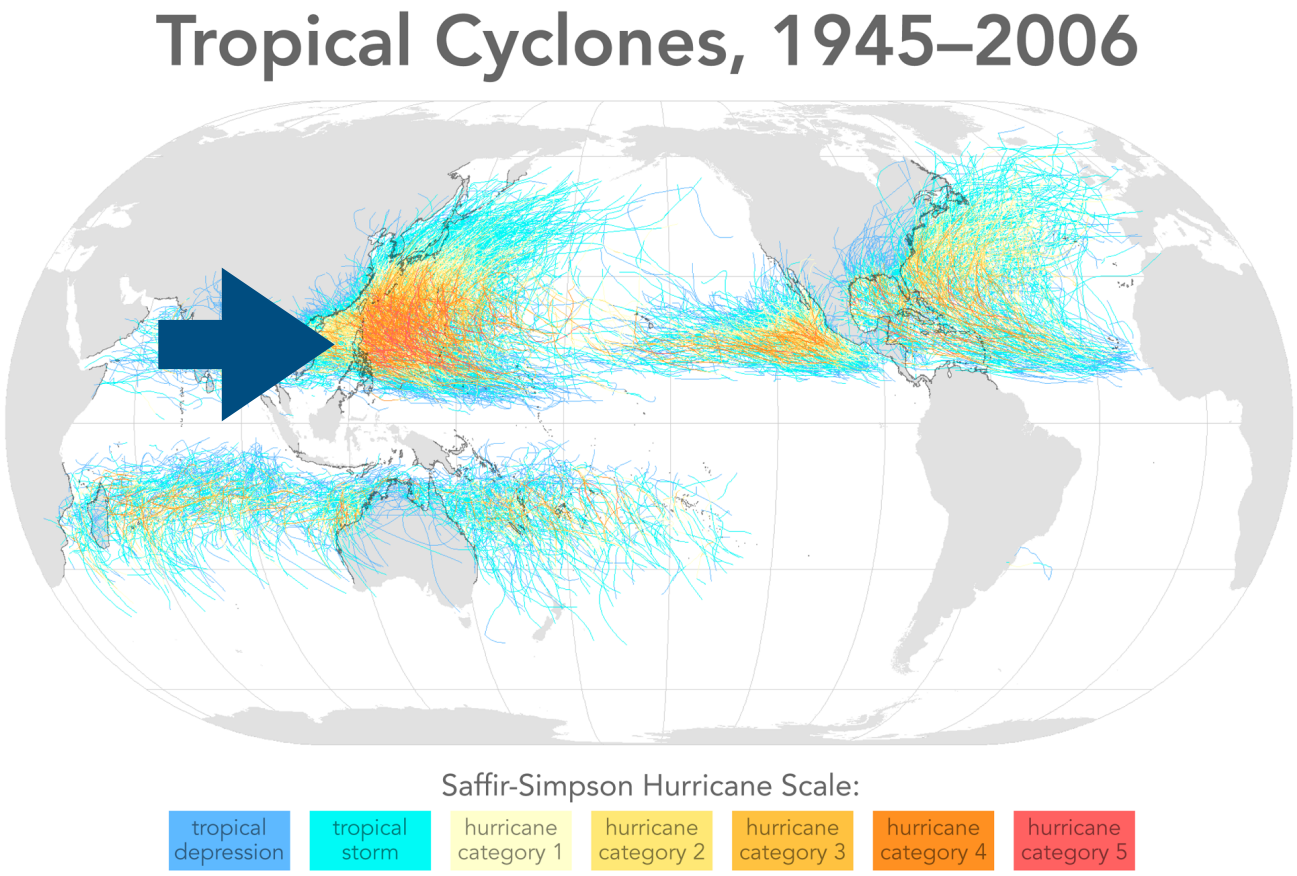

Figure 6. Global tracks of tropical cyclones and their intensity. Note the dark blue superimposed arrow that points to the Philippines and where typhoons, often from categories 3 to 5 on the Saffir-Simpson Hurricane Scale, are most prominent. Adapted from "Tropical Cyclones, 1945–2006," by Citynoise at English Wikipedia, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=18049077

From 1900 to 2019, typhoons have been the most destructive disaster in the country and topped statistical results in terms of total number of events, deaths, persons affected, and cost of damages, according to the Centre for Research on the Epidemiology of Disasters database (Guha-Sapir, n.d.). Deaths are widespread, as highlighted in Table 3, and cost of damages are extreme, as detailed in Table 4, during the onslaught of super typhoons when winds exceed 220 kilometres per hour (PAGASA, 2019). Typhoon Haiyan (Yolanda), which became one of the strongest storms in recorded history that measured 315 kilometres per hour when it hit the Philippines in 2013, is an example (Pitman, 2018); a Google search for "world's strongest typhoon" puts Typhoon Haiyan as the first entry.

Table 3

Casualties from Disasters in the Philippines

Rank	Disaster	Date	Total Killed
1	Typhoon Haiyan (Yolanda)	8 November 2013	6,300
2	1976 Mindanao earthquake[a]	17 August 1976	6,000
3	Typhoon Thelma (Uring)	5 November 1991	5,956
4	1990 Luzon earthquake[a]	16 July 1990	2,412
5	Typhoon Bopha (Pablo)	4 December 2012	1,901
6	Tropical Depression Winnie[b]	29 November 2004	1,619
7	Typhoon Kate (Titang)	13 October 1970	1,551
8	Typhoon Washi (Sendong)	15 December 2011	1,439
9	Typhoon Ike (Nitang)	1 September 1984	1,422
10	Typhoon Durian (Reming)	30 November 2006	1,399

Note. All super typhoons are simply addressed as "typhoons" and use international names with its counterpart Philippine names in parenthesis. Adapted from "Worst Natural Disasters in the Philippines" by G. de la Cruz, 2014, *Rappler*. https://www.rappler.com/move-ph/issues/disasters/64916-worst-natural-disasters-philippines. Copyright 2014 by Rappler.
[a]Disasters from earthquakes were also included. These highlight eight out of ten disasters as meteorological in nature.

[b]Tropical depressions, or those with winds up to 61 kilometres per hour, were also included to highlight that even other weather intensities may cause many deaths.

Table 4

Cost of Damages from Disasters in the Philippines

Rank	Disaster	Date	Estimated Cost of Damages (in 000, US $)
1	Typhoon Haiyan (Yolanda)	8 November 2013	2,051,711
2	Typhoon Bopha (Pablo)	4 December 2012	1,692,961
3	Typhoon Nina (Sisang)	4 September 1995	700,300
4	Typhoon Parma (Pepeng)	29 September 2009	585,379
5	Mt. Pinatubo eruption[a]	15 June 1991	443,000
6	Typhoon Mike (Ruping)	12 November 1990	388,500
7	1990 Luzon earthquake[b]	16 July 1990	369,600
8	Typhoon Nesat (Pedring)	24 September 2011	344,173
9	Typhoon Fengshen (Frank)	21 June 2008	284,694
10	Typhoon Megi (Juan)	18 October 2010	275,745

Note. All super typhoons are simply addressed as “typhoons” and use international names with its Philippine name counterparts in parenthesis. Adapted from “Worst Natural Disasters in the Philippines” by G. de la Cruz, 2014, *Rappler*. https://www.rappler.com/move-ph/issues/disasters/64916-worst-natural-disasters-philippines. Copyright 2014 by Rappler.
[a]Volcanic eruptions are also included.
[b]Disasters from earthquakes are also included.

In the provincial level, Batanes is exposed to a full list of both natural and anthropogenic hazards, moreso of the geologic and atmospheric categories. The 2017 to 2022 Provincial Disaster Risk Reduction and Management Plan (PDRRMP) (2017) describes that “… the province’s geographical location and archipelagic composition as a group of island municipalities implies high susceptibility to tropical cyclones, flooding, rain-induced landslide,

storm surges and earthquakes." During the writing of this section of the dissertation in July 2019, a powerful 5.9 magnitude earthquake shook the province according to the Philippine Institute of Volcanology and Seismology (as cited in Philippine Information Agency, 2019), felling the steeple and severely damaging the 131-year old Sta. Maria de Mayan Church in Itbayat Municipality as well as other structures ("LOOK: Itbayat Church, Ancestral Homes Damaged in Batanes Earthquake," 2019).

Typhoon frequencies from the past 50 years to recent decades however, seem contrastable. Both anecdotal evidence (F. Datar, personal communication, February 16, 2021) and some newspaper articles (Fernandez, 2014; Yap, 2014a) reveal slumping trends of typhoon occurrences in the province, which is likely linked to climate change according to the Philippine Climate Change Commissioner Naderev Saño (Fernandez, 2014). Despite lessening quantities, climate change exacerbations shifted from frequency to intensity and unpredictability (Cadiogan, 2017; Fantauzzo, 2014; Swiss NGO DRR Platform, 2014). Former Itbayat Mayor De Sagon chimes this in a Rappler 2017) article stating, "Iba na talaga ngayon. Marami dito ang nagsasabing hindi na nila mabasa ang panahon (Times have changed. Many residents are no longer able to understand weather patterns)." Cadiogan (2017) also quotes a synonymous narrative from a resident's experience with the intensity and unpredictability of typhoons:

> Pero kahit sanay na kami, nakikita ko na palakas nang palakas ang mga bagyong dumadaan sa amin. Hindi na namin ma-predict ang panahon ngayon, at kahit kami nagulat sa lakas ng typhoon Ferdie — never ko naranasan sa buong buhay ko ang ganun kalakas na bagyo (Even if we're used to typhoons, I'm seeing how storms that pass by here are getting stronger and stronger. We could not predict the weather anymore and we were astonished by Typhoon Ferdie — I have never experienced anything like it. (Cadiogan, 2017)

Nelson and Abrigo (n.d.), Hornedo (2000), and Bankoff (2003) generalize that the distinct geo-climatic context of the Philippines and Batanes respectively, has shaped the Ivatan psyche and perspective of disasters as an interrelationship with the physical to the social.

Typhoons are a common thread in the social fabric of the Ivatans, where unique means of coping, preparing, and predicting disasters have been deeply entrenched and imbibed to become part of their cultural identity (Rede-Blolong, 1996; Ignacio, (n.d.); Lopez, 2001; Valenzuela, 2014; Fantauzzo, 2014). During field work, every participant had a ready story, seemingly consequent to the intergenerational prevalence of turbulent weather systems. Moreso for the Ivatans, regularized typhoon experiences have become a normalization of threat.

The country's high vulnerability, frequency of meteorological disasters, and location on the pacific typhoon belt is analogous on a provincial scale as well. Batanes' geography and topography explain its furious typhoon endemicity (Provincial Government of Batanes, 2017), while between five to twelve of the country's strongest storms naturally traverse the Province annually (Provincial Government of Batanes, 2017; Warren, n.d.). Of these battering typhoons as described in Table 5, their maximum gustiness often ranges between 110 to 246 kilometres per hour (Provincial Government of Batanes, 2017). Historically, Batanes has experienced 261 typhoons from 1948 to 1998, which averages five typhoons annually and at times peaking to 12 typhoons per year, according to the PDRRMP (2017), though it should also be noted that not all typhoons that visit the country hit the province. Figure 7 visually explains the ferocity, frequency, and path of typhoons that traverse along Batanes' path.

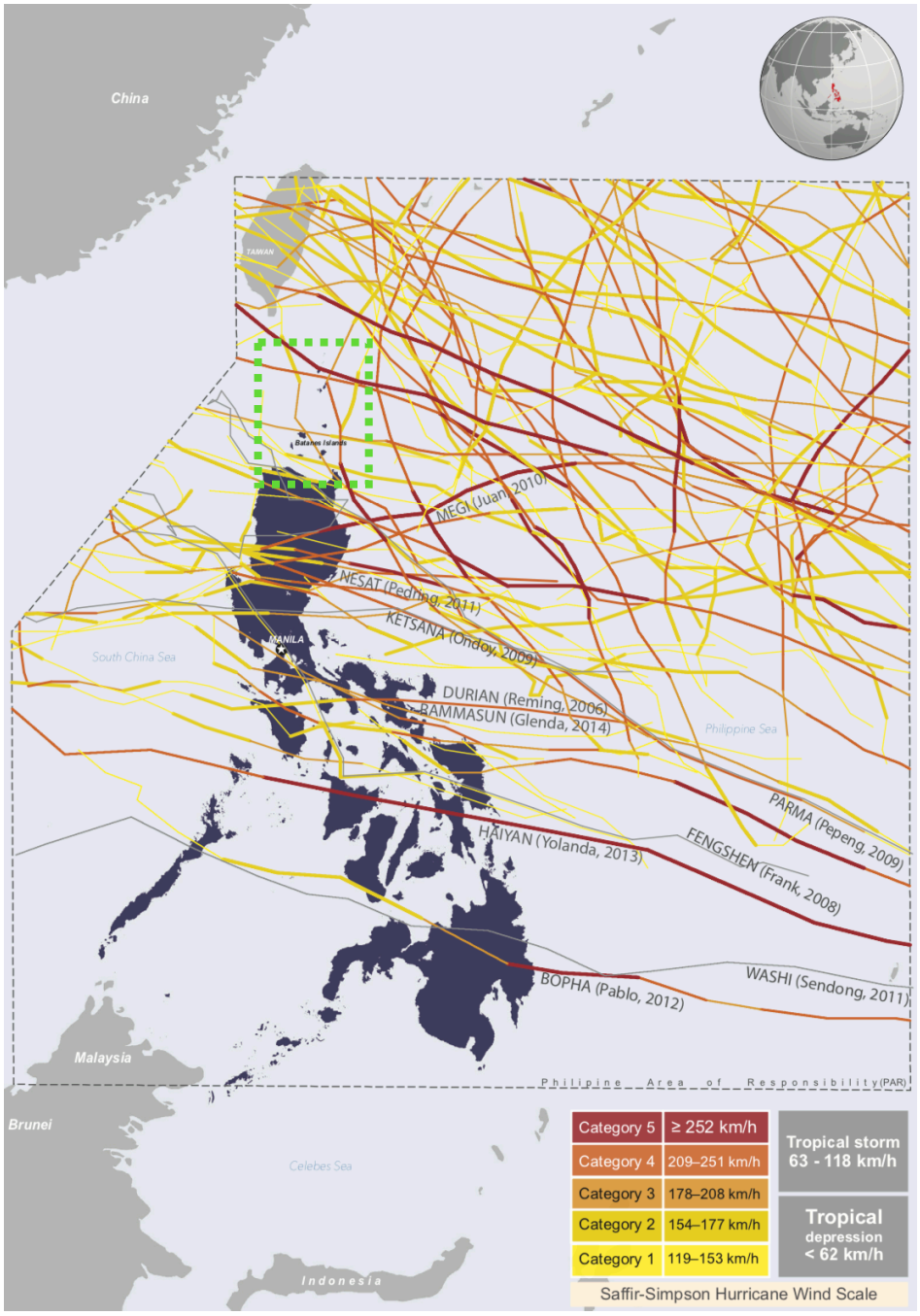

Figure 7. Track and intensities of tropical cyclones in the Philippines. Note the green, dotted, superimposed box that highlights the Province of Batanes. It is within the path of the most frequent and strongest storms categorized on the Saffir-Simpson Hurricane Scale. Adapted from "Philippines: Destructive Tropical Cyclones From 2006 to 2016," by the National Disaster Risk Reduction and Management Council, Department of Social Work and Development, Philippine Atmospheric, Geophysical and Astronomical Services Administration, Weather Philippines, Philippine Statistics Authority, Department of Interior and Local Government, Typhoon 2000, 2017. Copyright 2017 by the United Nations Office for the Coordination of Humanitarian Affairs. Adapted with permission.

Table 5

Strongest Weather Systems that Pummelled Batanes from 2012 to 2016

Rank	Weather System	Date[a]	Max. Wind Velocity (km/h)[b]
1	Super Typhoon Haima (Lawin)[c]	19 to 20 October 2016	225
2	Typhoon Meranti (Ferdie)	12 to 14 September 2016	220
	Typhoon Nepartak (Butchoy)	2 to 8 July 2016	
3	Typhoon Usagi (Odette)	16 to 22 September 2013	215
4	Typhoon Soudelor (Hanna)	5 to 8 August 2015	195
5	Typhoon Koppu (Lando)	14 to 21 October 2015	185
	Typhoon Noul (Dodong)	7 to 12 May 2015	
6	Typhoon Goni (Ineng)	18 to 23 August 2015	180
7	Typhoon Jelawat (Lawin)	20 to 29 September 2012	175
	Typhoon Bolaven (Julian)	23 to 26 August 2012	
	Typhoon Mawar (Ambo)[d]	31 May to 5 June 2012	
8	Typhoon Megi (Helen)	24 to 28 September 2016	160
9	Typhoon Guchol (Butchoy)	14 to 19 June 2012	150
10	Typhoon Krosa (Vinta)	29 October to 1 November 2013	130
	Typhoon Kalmaegi (Luis)	12 to 15 September 2014	
	Typhoon Saola (Gener)	28 July to 2 August 2012	

Note. Weather systems use its counterpart Philippine names in parenthesis, in which the strongest are also noticeably ranked as more recent. Adapted from the “Provincial Disaster Risk Reduction and Management Plan 2017-2022” by the Provincial Government of Batanes, 2017. Copyright 2014 by the Provincial Government of Batanes.
[a]Dates were correctly adjusted to reflect the entrance and exit of the weather system within the Philippine Area of Responsibility based from Final Severe Weather Bulletins from the National Disaster Risk Reduction and Management Council.
[b]Maximum wind velocities were correctly adjusted based from Final Severe Weather Bulletins and Situational Reports from the National Disaster Risk Reduction and Management Council.
[c]Super Typhoon category, characterized by wind velocity over 220 km/h, is based from PAGASA (2019).
[d]Sourced from the Directorate-General for European Civil Protection and Humanitarian Aid Operations of the European Union. Retrieved from https://reliefweb.int/map/philippines/19-september-2014-philippines-tropical-cyclone-fung-wong

Climate change is forecasted to exacerbate the intensity of meteorological disturbances according to the Swiss NGO DRR Platform (2014). PAGASA's mid-range climate projections (as cited in Swiss NGO DRR Platform, 2014) coincides with other climate change trends of a country and its sea surface warming by 1.8 to 2.2 degrees Celcius (U.S. Agency for International Development [USAID], 2017), thereby enhancing typhoon destructiveness and increased monsoon rainfall. Furthermore, the USAID (2017) projects how climate change impacts will be cross-cutting, projected to severely hit a majority of the Philippine's critical marine and terrestrial resource sectors such as agriculture, fisheries, forestry, energy, and tourism, as well as others such as human health, infrastructure, coastal ecosystems, and services.

Legal and institutional level frameworks of disaster risk reduction and management. As an overhaul from the ageing National Disaster Coordinating Council (NDCC), the National Disaster Risk Reduction and Management Council was established in 2010 as the focal government agency responsible for disaster protection, reduction, risk management, and resiliency (Philippines, 2009). Borne from the enactment of the Philippine Disaster Risk Reduction and Management Act of 2010 (RA 10121), the NDRRMC has since progressed in the promulgation of a multitude of policies, plans, and legal frameworks to observe its mandate (Hiwasaki et al., 2014a). This breakthrough from the previous reactive and coordination-based function of the NDCC featured a more robust, pro-active, multi-functional, and systematic institutional leadership in implementing strategies and directives for disaster resiliency.

Protection, readiness, capacity-building of the NDRRMC therefore is a state obligation, stemming from the essence of RA 10121's first policy declaration:

> Uphold the people's constitutional rights to life and property by addressing the root causes of vulnerabilities to disasters, strengthening the country's institutional capacity for disaster risk reduction and management and building the resilience of local communities to disasters including climate change impacts. (Philippines, 2009, p. 2)

Operationalizing the comprehensive declaration above showcases the NDRRMC's more unique multi-entity arrangement and approach, in contrast to the NDCC. Multi- and cross-sectoral collaboration with various member agencies such as government, non-government, civil and private sector organizations enable interdisciplinary expertise to manage and reduce disaster risks. Forty-five predominantly state-level working agencies complement NDRRMC functions. With the exclusion of governance, several external entities such as international aid agencies, donors, and the United Nations also play significant roles on financial and capacity-building support (Swiss NGO DRR Platform, 2014).

Despite positioning itself at the apex of institutional hierarchy for disaster risk reduction, the NDRRMC mainstreams the decentralization of DRRM functions to local levels (Philippines, 2014). The country's three-tiered local government system contextualizes the enforcement and planning of disaster risk reduction measures. They are mobilized from the highest level of the provincial government, followed by the city or municipal government (also known as the Local Government Unit [LGU]), terminating to the barangay council, the smallest political unit (NDRRMC, 2011; Swiss NGO DRR Platform, 2014). More specifically, equipping every province and municipality in the Philippines with their level-specific DRRM offices and the barangays with their councils was mandated through RA 10121 (Philippines, 2014). Overall DRRM policy-making as well as the formulation of related laws, guidelines, codes, or technical standards however, is still maintained as a top-bottom institutional prerogative, despite devolution and localization of enforcement and planning functions.

Translating policy into action is manifested through the formulation and promulgation of the *National Disaster Risk Reduction and Management Plan* (NDRRMP) *2011-2028*. It serves as the national guide for mainstreaming resiliency in the development process (NDRRMC, 2011; Philippines, 2014; Swiss NGO DRR Platform, 2014). The Swiss NGO DRR Platform (2014, p. 8) remarkably summarizes the plan with its three-prong aim of "building the adaptive capacities of communities, increasing the resilience of vulnerable sectors; [*sic*] and optimizing disaster mitigation opportunities." Covering four thematic areas of disaster (a) prevention and

mitigation, (b) preparedness, (c) response, (d) rehabilitation and recovery, to achieve the overall DRRM vision for the country (NDRRMC, 2011), the NDRRMP places a heavy premium and salience on science-based tools, mechanisms, and technological capacities for resiliency. These are highlighted comprehensively by the NDRRMC (2011), which include among others:

- Highly structured early warning systems.
- Technical disaster prevention and mitigating measures.
- Competency and science-based capacity building and knowledge development programs.
- Mechanized disaster response operations.
- Specialized disaster risk reduction research programs.
- Climate change-sensitive technologies and systems and support services.

The NDRRMP is the prescribed authoritative manual that all provinces, LGUs, and barangays are expected to refer for the execution and implementation of national DRRM policies and standards. Richly written with highly specific and implementable recommendations, the 82-page NDRRMP features 14 objectives, 24 outcomes, 56 outputs, and 93 activities (NDRRMC, 2011). In addition, the plan prescribes 13 immediate-term priority projects to fast track its implementation, most of which have already been put into effect (Domingo, 2016; NDRRMC, 2011). The plan has a timeframe from 2011 to 2028, in which the previously mentioned objectives, outcomes, outputs, priority projects, and activities ought to be accomplished.

Batanes Provincial Disaster Risk Reduction and Management Office (PDRRMO). All DRRM-related functions fall under the administration of the PDRRMO, the principal nerve centre in charge of reifying and localizing RA 10121 into action (NDRRMC, 2011). The office is the enabler of pre-, during, and post-disaster strategies and tasks such as search and rescue deployment, local DRRM planning, rapid damage assessment, monitoring, warning, and preemptive evacuations among others (Provincial Government of Batanes, 2017).

In typhoon-prone Batanes, the PDRRMO is the more formal government setup with a swathing jurisdictional coverage of all LGUs.

The PDRRMO network of collaborating agencies spans an arm's reach. Vertically, national-level authorities such as the NDRRMC, Office of Civil Defense, Department of Social Welfare and Development, the Department of Science and Technology through the Philippine Atmospheric, Geophysical and Astronomical Services Administration; and the more proximate Office of the Governor provide centralized DRRM leadership and top-down advice. Lower-tier agencies such as Municipal Disaster Risk Reduction and Management Offices (MDRRMO) and Barangay Development Councils (BDC) within the province on the other hand are recipients of PDRRMO directives, advice, as well as funding. Horizontally, the PDRRMO partners with collegiate provincial departments such as the Provincial Social Work and Development Office, Provincial Engineering Office, and other offices prescribed by the NDRRMP.

Batanes complies with RA 10121 protocol by creating and administering its own Provincial DRRM Plan (PDRRMP) with a five-year timeframe of 2017 to 2022. Much of the plan's content, programs, and initiatives are specific to the context and capacities of the province though also contain general, overarching goals of fostering resiliency and reducing risks. Specific examples in the Provincial Government's (2017) DRRM plan include stakeholder capacity building, early warning systems, two-way radio communications, data-driven environmental forecasting, and physical mitigation measures such as seawall construction and erosion countermeasures, among others. More context-specific than the NDRRMP, the 139-page PDRRMP explicitly localizes the four thematic areas prescribed in the NDRRMP and is further loaded with 42 objectives, 56 outcomes, 87 outputs, and 98 programs, projects, and activities (Provincial Government of Batanes, 2017).

Bolstered and benefited by both national and provincial priorities, the PDRRMO has experienced exponential growth in recent years. From what the Governor once witnessed as only having a "pail and shovel" (Gov. M. Cayco, personal communication, June 18, 2019), the now highly-functional PDRRMO is fully equipped with extensive rescue tools, extraction

equipment, communication gear, emergency food rations, to name a few. To complement, the office proudly postures itself as an organization that symbolizes the resiliency and dynamism of the Ivatans (Provincial Government of Batanes, 2017). At the time of writing, the office currently operates with a lean number of staff though experiences organizational challenges of funding for additional tenured positions and searching for qualified and experienced personnel, according to the PDRRMP (2017). It also describes the office's current personnel as "fitted with relative basic and advance trainings and seminars and are capable of carrying the task and job duties required of their positions" (Provincial Government of Batanes, 2017, p. 15).

Basco Municipal Disaster Risk Reduction and Management Office (MDRRMO). While echoing the principle of fostering resiliency and disaster risk reduction management functions of the PDRRMO, the MDRRMO engages its programs with greater geopolitical consideration to the local context and its specific needs. Operationalizing DRRM plans within the jurisdiction of the Municipality of Basco is carried out by the MDRRMO ideally, though realistically, it runs as a seemingly undersized division that requires further organizational needs. At the time of data-gathering, the MDRRMO was not as well-established as the PDRRMO as the former shared limited office space with the Municipal Environment and Natural Resources Office, was tenured by one personnel, and has a Tropical Cyclone Contingency Plan that was still being drafted.

Management and functionality of the MDRRMO seems to be about the execution of the PDRRMO's initiatives translated and applied to the LGU level. With few formalized programs and a concurrent draft plan that places little emphasis on actual area plans and specific action steps, the MDRRMO office is reliant on the PDRRMO's directives (Interviewee 3, personal communication, May 27, 2019). The MDRRMO's dovetailing of the PDRRMO's initiatives, however, becomes highlighted through effective coordination, oversight, and adaptation of provincial-level programs on all six barangays.

Indigenous Knowledge in Disaster Risk Reduction Management

Definitions and paradigm of Indigenous Knowledge. Reckoning the 370 million Indigenous Peoples belonging to 5,000 groups in 90 countries (Indigenous Corporate Training Inc., 2018) renders the creation of a homogenous and universal definition of Indigenous Knowledge implausible and impracticable (Mazzocchi, 2006; Tom, Sumida Huaman, & McCarty, 2019; United Nations Environment Programme [UNEP], 2008b). With the almost inexhaustible ocean of definitions of Indigenous knowledge, the UNESCO (2017) however settles with "…the understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings. For rural and Indigenous peoples, local [attributed in the same context as the term Indigenous] knowledge informs decision-making about fundamental aspects of day-to-day life."

Philip (2001) presses the convergence of the diversity of definitions to break the impasse, and supplemented by Tom et al. (2019), to create an anchoring point for analysis, debate, and examination of theoretical, epistemic, and empirical discourse. Aggregating the plethora of academic definitions of Indigenous knowledge reveal commonality of attributes and descriptors such as:

- Inherent knowledge owned and possessed by original inhabitants that is local, traditional and is differentiated with modern, empirical, often Western epistemological adoption (Esteban & Valientes, 2019; Hilhorst et al., 2015; Tozier de la Poterie & Baudoin, 2015; UNEP, 2008b).
- Transmission and acquisition of Indigenous knowledge across generations over time (Esteban & Valientes, 2019; Hilhorst et al., 2015; Mercer et al., 2010; UNEP, 2008b).
- Indigenous knowledge that is not merely created as a function of tradition but by continuous adaptation in a changing environment (Esteban & Valientes, 2019; Hilhorst et al., 2015; UNEP, 2008b).

- Evolution through generations of experiences and knowing, best practices, problem-solving, lessons learned, and community practices (Gaillard & Mercer, 2012; Hilhorst et al., 2015; Molina & Neef, 2016; UNEP, 2008b).
- Indigenous knowledge reasoning through the emic and intimate relationship between Indigenous peoples and what nature provides (Hilhorst et al., 2015; UNEP, 2008b).
- Endogenous coping mechanism in response to issues, threats, and stressors of a community to induce resilience and security (Hiwasaki et al., 2014a; Molina & Neef, 2016; Walshe & Nunn, 2012)
- Knowledge with varying terminologies synonymous to traditional knowledge, Indigenous science, Indigenous traditional knowledge, Indigenous technical knowledge, rural knowledge, environmental knowledge, traditional ecological knowledge (Hiwasaki et al., 2014a; Snively & Corsiglia, 2000; UNEP, 2008b).
- Unique association with Indigenous Peoples specific to a particular geographical context, in comparison to local knowledge, which is attributed to the competencies built up by persons not necessarily Indigenous who have lived within an area for a long time (UNEP, 2008b, “What is Local Knowledge,” 2020).

The Implementing Rules and Regulations of the Philippines’s IPRA law has its formalized version of Indigenous Knowledge, with a nuanced titular addition of “Systems and Practices” (NCIP, 1998). Collectively referred to as Indigenous Knowledge, Systems, and Practices (IKSPs), it provides a comprehensive definition that resembles the assemblage of the generic listed meanings that were earlier stated:

> [IKSPs] Refer to systems, institutions, mechanisms, and technologies comprising a unique body of knowledge evolved through time that embody patterns of relationships between and among peoples and between peoples, their lands and resource environment, including such spheres of relationships which may include social, political, cultural, economic, religious spheres, and which are the direct outcome of the indigenous [*sic*] peoples, responses to certain needs consisting of adaptive

> mechanisms which have allowed indigenous [*sic*] peoples to survive and thrive within their given socio-cultural and biophysical conditions. (NCIP, 1998, p. 3)

Indigenous Knowledge is a social construct (Howell, 2017; Kovach, 2009; Pease, 2010), which in an epistemological standpoint is an outcome of generating knowledge through social relations and traditions of social processes (Kovach, 2010), more specifically in an Indigenous worldview or paradigm (Kovach, 2009, 2010; Porsanger, 2004; Smith, 1999). Through the lens of Indigenous knowledge, it becomes an orientation of making meaning out of the world (Howell, 2017) emergent from a particular Indigenous context, philosophical positioning, and knowledge base, and simultaneously influences how actions are approached, conducted, and explained (Kovach, 2010; Porsanger, 2004; Wicks, Reason, & Bradbury, 2011). Moreso, Wilson and Graveline (as cited in Kovach, 2010) emphasizes and affirms the relational nature of Indigenous knowledge, particularly with the dynamic of nature-, others-, and the self-in-relation.

Not only treated as a paradigm or theory of knowledge, Indigenous knowledge is also manifested through praxis (Eikeland, 2017; Porsanger, 2004). From knowing to doing, Indigenous knowledge is converted into action through a multitude of categories, some of which are highlighted in the United Nations Declaration on the Rights of Indigenous Peoples (2008), such as language, medicine, visual and performing arts, traditional sports and games, design, literature, and local resource management among others. Deer (2019), Bruchac (2014), and Smith (2008) affirm how traditional practices and experiences are necessary elements for social and cultural survival. Indigenous knowledge does not only function for its demonstrative applicability but also guarantees the strengthening, growth, and transmission for the long-term survival of traditional knowledge and culture as a whole (Bruchac, 2014).

As a paradigm, Indigenous knowledge is commonly contrasted against scientific, positivist purviews that identify the truth, reality, and logic, as an outcome of universal and immutable laws, pure science, and rationality (Howell, 2017; Pease, 2010; Smith, 1999). Gaillard and Mercer (2012), Pease (2010), and Smith (1999) detail how the paradigmatic debate

of which is the better expert knowledge as an almost perpetual discussion served in the table of epistemology. Because of its relatively recent entry into the academic field of study (Jordan, 2014; Hiwasaki et al., 2014a), Indigenous knowledge especially in research, is commonly denigrated due to social interpretations of reality, Indigenous reasoning, and relational rather than empirical and evidence-based decorum in deriving knowledge (Jordan, 2014; Pease, 2010; Wicks et al., 2011).

Hegemony over Indigenous Knowledge. There is a plethora of academic publications that narrate "outsider" or hegemonic oppression of Indigenous knowledge. Linda Tuhiwai Smith's (1999) seminal work about the struggles of indigeneity conjure oppressed memories of colonized and subjugated peoples, as well as their inherent knowledge systems. Deconstructing imperialism and colonialism is an inextricably linked aspect of understanding Indigenous knowledge (Howitt et al., 2011; Smith, 1999). Pease (2010) and Smith (1999) argue that the superiority complex of positivist, scientific inquiry in deriving knowledge mirrors colonial history of domination, marginalization, and exploitation. The mandate of outsider authority was structural oppression based from economic and political systems that shape, colonize, and control social relationships (Pease, 2010):

> By the nineteenth century colonialism not only meant the imposition of Western authority over indigenous [*sic*] lands, indigenous [*sic*] modes of production and indigenous [*sic*] law and government, but the imposition of Western authority over all aspects of indigenous [*sic*] knowledges, languages and cultures. (Smith, 1999, p. 64)

Furthermore, the origins of hegemony over Indigenous knowledge stretch as far back as the Enlightenment, which provided an impetus in discovering new knowledges (Smith, 1999). Such resulted not only in resource exploitation of the colonies, according to Smith (1999), but knowledge commodification as an assertion of power and domination as well. Given that the Enlightenment was about "modernity" and the gradual shift of knowledge authority from religion to science, the standardization of sciences and logic in research

prevailed (Pease, 2010; Smith, 1999). Pease (2010) furthers by detailing how scientific inquiry neglected the role of human agency in creating true and authentic reasons that explain social phenomena. Smith (1999) describes the extreme by narrating how the Enlightenment period treated anything Indigenous as sub-human and was even classified alongside flora and fauna.

Smith (1999) highlights the prevalent misrepresentation and acknowledgment inequality of Indigenous knowledge in which its contribution to the overall corpus of knowledge is frequently viewed as both a confrontation and threat to the purity of Western knowledge. Porsanger (2004) describes how even today, the West reigns as the epicentre of legitimate knowledge, as an arbiter of what counts as civilized and acceptable. Dictating knowledge authority is a remnant of power and privilege vested through the legacy of colonization (Jordan, 2014; Smith, 1999). This also connects with Foucauldian and Lyotardian (as cited in Howell, 2017, p. 5; Howitt et al., 2011) thought that knowledge and grand theory creation is authoritarian, in which "whoever controls knowledge has political control."

Contemporary research about Indigenous knowledge also experiences oppressive and dominating post-colonial symptoms. Much systematic inequality exists, brought forth by intentional and unintentional consequences of Indigenous knowledge research (Smith, 1999; Porsanger, 2004), especially when conducted by non-Indigenous knowledge-seekers. Smith (1999) strongly affirms that the quest of knowing all about Indigenous peoples, which follows positivist principles, are impossible. Doing so is reductionist, insulting, and unethical (Smith, 1999). Western workings on Indigenous knowledge is often easily misinterpreted since Smith (1999) claims how it is based from the lived experience, as opposed to merely observed, interpreted, and adopted knowledge. Pease (2010, p. 5) supports this in claiming "all knowledge is located within a historical, cultural, and political context, and is shaped by the experiences and values of those who create it."

The narrow view of science in the paradigm of positivism renders it unable to accept knowledge yielded from constructivism, critical theory, or postmodernism (Pease, 2010). To add, evidence-based positivist perspectives disavow belief systems as credible since they lack

the rigour of fact verification and objective technicality (Howell, 2017; Pease, 2010). Denzin and Giardina (as cited in Pease, 2010) argue that knowledge in general should be about the control over defining what constitutes evidence and the real need for it since not all knowledge and fact are measurable through proof nor quantitative means. This paradigmatic difference then often leaves researchers in an insider-outsider stalemate and struggle to balance research demands and rigour on one side and the social realities of Indigenous encounters and the claim to truth on the other. Indeed, the discourse of Indigenous knowledge legitimacy in research is so powerful since it shakes the very core definition of science, research methodology, research rigour and excellence, the significance of causality, and requirement of proof.

Indigenous Knowledge in DRRM. Practicing Indigenous adaptive strategies for coping with hazards and natural environmental threats has been an ongoing survival impetus since the dawn of time (Iloka, 2016; Kelman, Mercer, & Gaillard, 2012). Iloka (2016) implies how Indigenous knowledge, as used in Africa, is environmental mastery acquired through repetitive improvements, study, and practice that has permitted communities to adapt and live in harmony with often destructive environmental forces. Used variedly as “ethnometeorology” (Fantauzzo, 2014), “traditional environmental knowledge,” or even “indigenous [sic] technical knowledge” (Kelman et al., 2012), Indigenous knowledge in the context of disasters still lacks universal definition and acceptability as a formalized branch of science due to ongoing epistemological debates over its legitimacy (Bankoff, 2003a).

Environmental stressors have long been catalysts for many Indigenous peoples to develop their own proficiency to cope with such stressors as a unique form of biophysical homeostasis (Gaillard, 2007; Rede-Blolong, 1996). For Bankoff (2003a), disasters are seen as a frequent life experience in many hazard-prone communities, in which Indigenous knowledge as a means for resiliency is simply a normalization of threat. Hilhorst et al. (2015) and Hiwasaki et al. (2014b) similarly frame disasters as a commonly embedded social construct in which the shaping of Indigenous knowledge has become an outcome of living closely and dependently

with nature, in response to weather dynamics and constantly changing environmental conditions. While local communities treat such knowledge as a habitual and customary response to inclement weather, outsiders and external entities perceive Indigenous knowledge applied in DRRM as exceptional and exotic (Hilhorst et al., 2015).

Resiliency development is tantamount to increasing the survival likelihood in vulnerable communities and is the common denominator for any paradigmatic approach, whether Indigenous and grassroots or scientific and technocratic (Iloka, 2016; UNEP, 2008a). Despite such commonality, a widened gap exists. Bankoff (2003a) argues that DRRM in the scientific approach is more predisposed to prioritizing loss avoidance, in comparison to Indigenous approaches, which idealize adaptability. The latter, according to Hilhorst et al. (2015) and Bankoff (2003a) implies the greater importance of social dynamism, the trait of coping in a volatile world as a common process of social change and key to survival. This certainly contrasts the scientific and oftentimes state-glorified perspective of DRRM as the reduction of damage or loss, which suggests property and material resource preservation as the primary objective of risk management (Balay-As et al., 2018; Hilhorst et al., 2015; Howitt et al., 2011).

Gaillard (2007) and Hiwasaki et al. (2014b) similarly infer that the frequency of extreme weather occurrences and environmental shocks are habitual catalysts of changes in Indigenous communities. Instead of disaster aftermaths delivering debilitating consequences, these experiences are rather constant build-ups of coping capacities and adaptation competencies in further strengthening “immunity” to inclement weather or other disasters; it allows communities to constantly adapt and further reinforce an inherent culture of safety and resiliency (Gaillard, 2007; Hiwasaki et al., 2014a). Various cases document the application of this constantly evolving Indigenous knowledge and has demonstrated and proven its effectivity, as exemplified in Table 6 (please see Appendix A for the full table).

Table 6

Indigenous Knowledge Examples and Their Application in DRRM

Location	Context-Specific Indigenous Knowledge Applied in DRRM	Source[a]
Bangladesh	Raising awareness of disasters through folk songs.	Shaw, Sharma, and Takeuchi
	Early warning systems for flood risk management.	Mallick and Rahman
Vietnam	Water-puppet show and story telling about awareness of floods.	Shaw, Sharma, and Takeuchi
	Climate forecasting based on complex cultural weather models for effective decision making for farmers.	Nguyen and Shaw
Philippines, Indonesia, and Thailand	Indigenous knowledge and coastal hazards as applied in housing, coastal green belts, religion and belief systems.	Baumwoll and Krishnamurthy
Himalayan region, Vietnam, and Japan	Utilizing local and Indigenous materials and techniques for house building.	Subedi
Philippines	Indigenous resource conservation, land management, and coping strategies during food shortages.	Cabatac, Pulhin, and Cabanilla
	Coastal community adaptation using traditional architecture, vernacular transportation systems, and social values.	Uy and Shaw
Indonesia	Story telling as an important preparation strategy for tsunamis.	Baumwoll
	Centuries-old building technology and local knowledge and construction techniques made contemporary.	Pribadi, Hidayat, Triyadi, and Harapan
Small Island Developing States (SIDS)	Featuring Indigenous navigation systems, community customs, traditional food preservation methods, shifting cultivation and cropping patterns.	Veitayaki
Tuvalu	Weather forecasting, coastal hazard management, and the importance of political will.	Resture
Papua New Guinea	Vernacular and flood-proof design of houses.	Mercer and Kelman
Sri Lanka	Indigenous land management for water and farming systems to cope from droughts.	Nianthi and Dharmasena

Note. All examples and applications are organized based on their location. Please see Appendix A for a more comprehensive listing of examples and applications. Adapted from "Indigenous Knowledge and Disaster Risk Reduction: From Practice to Policy" by R. Shaw, A. Sharma, and Y. Takeuchi (Eds.), 2009. Copyright 2009 by Nova Science Publishers, Inc.
[a]All chapter sources are dated as 2009.

Shaw, Sharma, and Takeuchi (2009) have compiled comprehensive evidence of Indigenous knowledge competencies as prime accounts for survival in communities in India, Maldives, Nepal, the Philippines, Vietnam, Papua New Guinea, Pakistan, Indonesia, Japan, China, Sri Lanka, and various small islands in the Pacific. Hiwasaki et al. (2014b) and Shaw, Uy, and Baumwoll (2008) on the other hand credit how Indigenous knowledge that allowed communities to survive the 2004 Indian Ocean Tsunami sparked a surge of interest in Indigenous knowledge in DRRM studies, despite its research being already active since the 1970s. On the global scale, frameworks designed to reinforce international commitments to community, people, and Indigenous knowledge in DRRM have been acknowledged since 1994 through the Yokohama Strategy and Plan of Action for a Safer World, the Hyogo Framework for Action 2005-2015, and the longer-term Sendai Framework for Disaster Risk Reduction 2015-2030 (Tozier de la Poterie et al., 2015).

Indifference, one-sided criticism, and to the extreme—hegemony and oppression have plagued Indigenous knowledge versions in approaching DRRM as well (Gaillard & Mercer, 2012; Hilhorst et al., 2015; Hiwasaki et al., 2014a; Howitt et al., 2011). As contemporary DRRM practices predominantly essentialize science-based tools and technocratic approaches as the gold standard (Balay-As et al., 2018), Indigenous methodologies and perspectives are consequently dismissed and as Agrawal (as cited in Hiwasaki et al., 2014a) describes—branded as inferior (Hilhorst et al., 2015). Briggs (as cited in Balay-As et al., 2019) even posits how the glamorization of the scientific method in DRRM elevates its status as the archetype of modernity, while any Indigenous means is typecast as primitive, outdated, and inefficient (Bankoff, 2003a; UNEP, 2008b).

Gaillard and Mercer (2012) assert how state-level DRRM policies adhere and idealize scientific approaches to further assert top-down command-and-control powers. This manifests Foucauldian notions of power and domination as a function of the more accurate and highly advanced stereotypical responses to disasters of the scientific approach (Balay-As et al., 2019). Post-colonial mentality, as symptomatic in governance structures, also

perpetuates superiority complexes that further entrench racism and marginalization of Indigenous knowledge in DRRM (Howitt et al., 2011). Howitt et al. (2011) further explains that Indigenous knowledge keepers are almost often labeled as victims rather than sources of expertise and alternative ways of resiliency.

Ivatan Indigenous Knowledge, Systems, and Practices in disaster risk reduction and management. Despite the ubiquitous countrywide notion as well as the Ivatans' common self-identification of their innate resiliency to strong weather disturbances, only few formal and focused ethnographic studies on Ivatan IKSPs in DRRM have been conducted. Almost all research works acknowledge how the accumulative biophysical features and distinction of Batanes' geography and location influence Ivatan culture and their relationship with DRRM (Esteban & Valientes, 2019; Hornedo, 2000; Rede-Blolong, 1996). The province's calamitous location, being one of the most storm-battered places on the planet, expectedly created a substantial history of disasters that have subsequently generated their rich understanding and extensive coping mechanisms for survival (Esteban & Valientes, 2019; Rede-Blolong, 1996).

As the first focused research work on Ivatan cultural adaptation to meteorologic disturbances, Rede-Blolong's (1996) ethnographic study not only attributes the Ivatans' tight-knit human-environment relationship for resiliency, but also places emphasis on emic and etic Ivatan cultural processes. Ivatan Indigenous resiliency originates from inherent cultural adaptation systems learned and practiced internally within Ivatan society, and cultural adjustment processes that are external influences and competencies shared by outsiders and refined within society (Rede-Blolong, 1996). The latter is supported by Hornedo (2000) through the example of the Spanish introduction of lime-making and masonry for traditional Ivatan house construction. Such technological infusion has been further enriched by local processes, evolving into a vernacular and Indigenous practice that has ultimately become integrated in Ivatan culture.

Upon closer examination, DRRM-related IKSPs of the Ivatans function as either prognosticative (Esteban & Valientes, 2019) for signs of impending foul weather, or preparatory

(Rede-Blolong, 1996) for longer-term adaptation and resiliency-building. This categorization is implicit in the data collected from the PDRRMO, Rede-Blolong (1996), Esteban and Valientes (2019), and the ADSDPP (DAR, 2010). Table 7 lists a select compilation (please see Appendix B for the most comprehensive compilation to date) of Ivatan IKSPs used for localized reduction of risks brought about by tempestuous weather. The inventory, adapted and modified from Hiwasaki et al. (2014b), further categorizes IKSPs into observations of animal and human behaviours, material culture, celestial bodies and above-ground phenomena, terrestrial environment, maritime environment, and traditions and practices.

Table 7

Ivatan Applications of IKSPs in Local DRRM

Subject	Observations	Predicted Meteorological Phenomena / Meaning / Function
Animal Behaviours		
Black ants (*Vuhawu — Lasius niger*)[a]	Whole ant colony moves to upper parts of the house or walls.	Stormy weather and heavy rain
Philippine coucal (*Talukuk — Centropus viridis*)	Bird sings “ta-lu-kuk” (hence the name) out loud in any part of the day.	Light or heavy rain will occur in a few hours.
Material Culture		
Heritage houses	a) Vernacular design use thick stone walls with uniquely-thatched roofs. b) House (*gada’gada*) design:[b] a) Windowless walls b) Use of stone and mortar	a) Storm proofing b) Design: a) Avoidance from the direction of the strongest winds. b) Wind, fire, and earthquake proofing
Attire	Vakul head gear for women and *kanayi* overcoat for men.	Protection from the sun, rain, and wind.
Celestial Bodies and Above-Ground Phenomena		

Subject	Observations	Predicted Meteorological Phenomena / Meaning / Function
Clouds	a) White clouds that are bright and shiny b) Clouds shaped like rocks and stones (*maychavatuvatu*) with a white colour form. c) Occurrence of black maychavatuvatu	a) Rainy weather b) Windy c) Winds with scattered light rains
Wind	a) North wind blows steadily when it is not the northwesterly season and does not change direction. b) Southeast wind blows when it is not the southeasterly season and suddenly changes to a northern direction. c) During a typhoon, the wind direction shifts south (*mamnaw*)	a) Typhoon b) Typhoon c) Typhoon is waning
Traditions and Practices		
Home preparations	a) Roof tying (*kapanpet*) b) Bracing doors and windows (*kapanahtah*) c) Covering windows (*tapangku*)	a) Storm proofing b) Storm proofing c) Storm proofing
Cooperative practices	*Please see Table 2*	
Food processing and practices	a) Smoking, salting, or drying (*kapangulay*) of meats and fish.[b] b) Stockpiling of root crops, assorted and preserved viands, and firewood.[b]	a) Food preservation. b) Preparations from inclement weather disruptions.
Terrestrial Environment		
Plants / fungi	a) The new leaves of many banana species continue to shoot up but fail to unfurl. b) Leaves of the aryus tree (*Podocarpus costalis*) turn light green or sprout any time of the year c) Aryus (*Podocarpus costalis*) tree leaves grow unusually long.[d]	a) Strong typhoon b) Rainy weather c) Typhoon
Sand and gravel	a) A sharp erosion of sand is formed by waves and becomes recurrent.[e] b) Mounds of gravel is formed by waves and is distinctly observable during quarter moons in fair weather. c) Grains of sand float to the water surface. d) Sand and gravel are deposited by waves on the shoreline.[c] e) Observations in Disvayangan in Ivana: sand is scattered on the reefs near the shoreline.	a) Waves increase in size[f] b) Waves increase in size[f] c) Typhoon d) Typhoon e) Bad weather[c]
Maritime Environment		

Subject	Observations	Predicted Meteorological Phenomena / Meaning / Function
Ocean waves	a) Rolling waves that the strike the beach produce similar-sized waves rolling back to the sea and do not weaken even when they meet other waves (backwash). b) Waves' force roils the sand at the sea floor. c) Waves generate sea spray that rise high into the air and into land. It forms mists in the morning and late afternoon when the weather is calm.	a) Typhoon b) Stormy weather c) Tropical depression
Ocean currents and tides	a) High and low tide current flows shift in direction. b) Currents are also unusually strong	a) Stormy weather or rain b) Stormy weather or rain

Note. Majority of this data have been further proofread, translated, and edited for clarity and coherence. Much opportunity in further refining and verifying the details above exists. Because of their voluminous quantity, only a select number is listed above. Please see Appendix B for a more comprehensive listing of subjects and applications. Adapted from "Indigenous Weather Forecasting" by the PDRRMO, 2019, *Provincial Government of Batanes*.
[a]Local term in parentheses and italics. Specific Latin name is not provided as they are generic and may have various lower-order species, unless indicated.
[b]Source: Esteban and Valientes (2019)
[c]Source: Board (2019)
[d]Source: Uy and Shaw (2008)
[e]Rephrased from original: "Sand level has a sharp drop formed by waves at their far reaches and is always observable before typhoons."
[f]Rephrased from original: "Big waves to level the drop."

Additionally, agglomerated sources from the PDRRMO, Hornedo (2000), Trinidad-Echavez (2008), and Uy and Shaw (2008) list below the most common general observations as Ivatan-centric Indigenous early warning mechanisms for weather disturbances:

- Sky colour, form, and movement.
- Unusual tidal and sea level changes.
- Sudden temperature changes.
- Continuous north and west wind direction. Hornedo (2000) has even indicated the level of wind harshness from different directions, including:
    - *Idawud* — harsh north winds.

    - *Avayat* — west winds, which are moody. There are often rough seas in Basco, Mahatao, Ivana, and Western Sabtang.
    - *Pangaditan* (east winds) and *sumla* (south winds) — the more gentle types.
- Wind and wave sounds, including the ebb and flow of tides, and texture and rhythm of ocean waves.
- Unusual animal behaviours, whether marine or terrestrial, including wild or domesticated animals.
- Changes in the morphology and phenology of plants, such as their fruitfulness.

In the Ivatan vernacular, terms used for meteorological phenomena have its own nomenclature based on severity as opposed to scientific classifications using specific wind velocity. Rede-Blolong (1996) translates disasters on the other hand as *makamumu a mapaparin*. They are limited to meteorological disturbances only, instead of the general understanding of the broad inclusion of other catastrophes such as tsunamis, earthquakes, volcanic eruptions, among others. Part of the Ivatan belief system related to dire events also includes non-meteorological phenomena such as famine (*kulay, kapaychapteng*), pestilence, epidemics, hazardous fires, and accidents (Esteban & Valientes, 2019).

Generally, Indigenous weather categorization for Ivatans is simplistic, with either good (*mavid a kawan*) or bad (*marahet a kawan*) weather, according to Yamada (as cited in Esteban & Valientes, 2019). The latter includes destructive super typhoons called *anyin*; *anyin nu vinyiveh*, also called “banana typhoons,” where wind speeds are capable of tumbling banana trees (F. Datar, personal communication, October 3, 2020); *adipogpog*, which are rainless tornadoes; *salawsaw*, or rain and winds; *nyisu*, which are windy but rainless days; and *dipamchi*, which are sudden gale and heavy rain with a quick fluctuation into hot and sunny weather, reverting to rain that often causes illness (Esteban & Valientes, 2019; Rede-Blolong, 1996). Rede-Blolong (1996) classifies bad weather and typhoon warning signs into sign categories of the sea (*du-*

taw), sun (*du araw*), plants and trees, sky and clouds, and animals, in contrast to the classification in Table 7.

Majority of Ivatan IKSPs in DRRM in Table 7 and Appendix B, specifically four out of the six categories, are characteristic of their prognosticative, early-warning functions rooted from biophysical observations compiled through generations. Rather than accepted through technical meteorological validations, IKSPs in DRRM earned local validity from generations of environmental monitoring. Arguably, most Indigenous knowledge in DRRM may seem unconventional from outsider perspectives, and arguably fall inequitably in the four-part thematic categorization and cycle of resiliency of the NDRRM Plan (2011), organized and described as:

- Disaster Prevention and Mitigation — avoidance and lessening of existing and potential hazard impacts and related disasters.
- Disaster Preparedness — building capacities to manage emergencies and disasters.
- Disaster Response — action and provision of services during or immediately after a disaster to ensure sustenance and safety.
- Disaster Rehabilitation and Recovery — restoration to normal and improved functioning levels of society

It is worth noting that the categories of Material Culture and Traditions and Practices as detailed in Appendix B show greater IKSPs in each of the four thematic categories of the NDRRMP.

Integration of Indigenous and scientific knowledge in DRRM. Integration between Indigenous and scientific knowledge bridges the interaction between socio-cultural factors to physical and environmental hazards (Mercer et al, 2009). Hiwasaki et al. (2014) claim how resiliency and decision-making effectiveness come to fruition when new and old techniques, alluding to scientific and Indigenous knowledge, are combined. Copious literature highlights other prospects for reconciling science and tradition through integration. For instance, convergence becomes a DRRM innovation (Mercer et al., 2009), a breakaway point from the

epistemological impasse (Agrawal, as cited in Mercer et al., 2010), a decolonizing and inclusive practice (Gaillard & Mercer, 2012; Mercer & Kelman, 2009), and as a new transdisciplinary agency (Bendito & Barrios, 2016).

Gaillard and Mercer (2012) caution how it cannot be assumed that Indigenous knowledge and sciences, in their individual isolated silos, necessarily provide answers in developing community resiliency. Each has increasing disadvantages when used narrowly and exclusively. For such reason, integrating science with local and Indigenous knowledge becomes novel and inclusive through collaborative processes of context-centric engagement preparations, technical data gathering and analyses of hazards and vulnerabilities, scientific validation, integration with local know-how, and the terminal popularization and utilization of the combined knowledges (Hiwasaki et al., 2014). Hiwasaki et al. (2014) emphasize that in this way, neither human, social and cultural factors, vis-a-vis scientific and technical factors are discounted in the better understanding of vulnerability, hazards, and disasters.

The discourse on integration is well-justified in both dichotomous views: from epistemological to practical perspectives. Epistemologically, the two knowledges employ varying, often divergent methods of research, applicability, and interpretation of reality (Mercer et al., 2009), though their hybridization creates a greater holistic understanding of complex disaster events (Bendito & Barrios, 2016). Hiwasaki et al. (2014) makes good end-in-mind reference on prioritizing DRRM effectiveness over epistemological arguments since some Indigenous knowledge cannot be scientifically explained. Yet, Gaillard and Mercer (2012) assert that gaps and challenges in translating knowledge into action exist, hinting at reasons of leadership hierarchy complexities, local and scientific knowledge incompatibilities, and stakeholder heterogeneity.

Pragmatically, Mercer et al. (2009) assert how Indigenous communities require not only open access to their traditional systems but also to relevant scientific information and research. The new gold standard is seen deviating from utilizing Geographic Information Systems and meteorological analyses and forecasting but through participatory methodologies (Gaillard &

Mercer, 2012). These include storytelling, narrative discussions, transect walks, and participatory mapping, and depends not merely on scientific validation but on stakeholder trust, personal connections, and consensus-building (Gaillard & Mercer, 2012; Hiwasaki et al., 2014; Rai & Khawas, 2019). Considering culturally-appropriate solutions and alternatives become key in contextualizing technical know-how.

On the contrary, Mercer and Kelman (2009) provide caveat that despite the conceptual feasibility of integration, the practicalities of implementation still face challenges. These include creating effective capacity building, breaking dependency patterns, guaranteeing genuineness in participation, ensuring long-term commitment, and strengthening feedback loops (Mercer & Kelman, 2009). Integration is made more challenging, consequent from the lack of trust between stakeholders, especially among government systems and Indigenous communities, resulting in autonomous work and competing perspectives on resiliency (Gaillard & Mercer, 2012). Distrust finds its roots from the lack of safe spaces for dialogue, and lowered priorities on engagement, according to Gaillard and Mercer (2012). Hiwasaki et al. (2014) also adds non-social factors to these challenges including area size, geography, and existing hazard types.

Briggs and Tibby (as cited in Mercer et al., 2009) also warn about the danger in over romanticizing Indigenous knowledge, despite the significance of its acknowledgement. Mercer (as cited in Gaillard & Mercer, 2012) asserts that local knowledge must be assessed carefully since some are ineffective, may no longer be viable, are not integratable, and even exacerbate vulnerability especially in a rapidly connected and globalized world. Dekens and Gaillard (as cited in Mercer & Kelman, 2009) supplement that extrinsic factors such as increased climatological disturbances and other hazards and rapid globalization further sustain community vulnerabilities, in which such pressures become impetus to reassess Indigenous knowledge.

Integration and the understanding of climate change may be very new for Indigenous communities, which in turn has not had enough time to generate sufficient and endemic

knowledge that would create local resiliency (Kelman et al., 2012; Mercer & Kelman, 2009). This challenge will require a guided discovery process of education and capacity building (Mercer & Kelman, 2009). Moreover, creating the sense of ownership and espousing community-led integration and validation are the foremost requirements for this to happen, followed by institutional support when required (Hiwasaki et al., 2014; Mercer & Kelman, 2009). This has to happen in conjunction with the removal of the paternalistic mindset of the outsider-knowing-better (Mercer & Kelman, 2009; Mercer et al., 2009).

Chapter 3: Conceptual Framework

Navigating the complexities of research is facilitated more manageably through the guidance of a conceptual framework. As a project map and skeletal description of the research, concepts, ideas, analyses, and syntheses are organized logically to outline the chain of processes and transcendence from concept to action. This chapter earmarks the dissertation's research recipe, showcasing essential ingredients such as project phases, conceptual interrelationships, and anticipated outputs among others in their sequenced order to make sense of the overall project.

The novelty of this research is distinguishable through its regressive yet transcendent dichotomy of the involved concepts. They are regressed deeply into its internal workings that delve not just on their evident operational descriptions but down to their core epistemological dimensions, such as through the Indigenous vis-a-vis scientific knowledge discourse. On the other hand, the research also showcases transcendent, forward-looking perspectives such as converting knowledge into action through collaborative processes. Therefore, the dissertation highlights the spectrums of abstract concepts, ideas, and principles, and real-world practical solutions such as new tools, policies, and actions forged from the research outcomes. Because conceptual and practical foundations are underlying elements in the assemblage of concepts through the framework, a subchapter of the epistemological and pragmatic standpoints are also supplemented.

Conceptual Framework

Rather than the simplistic development of a standardized conceptual framework that assembles available concepts at hand, this dissertation takes inspiration from the framework models of Gaillard and Mercer (2012) and Carew and Wickson (2010). The former's framework parallels this research through diagrams illustrating the conversion of knowledge into action, while considering local and scientific knowledge integration. On the other hand, the latter authors share framework similarities by using a transdisciplinary research heuristic, specifically highlighting elements such as the process, product, and contexts of the problem, researcher,

and the actual research in the framework design. Both combined provide conceptual and operational substantiation that are an idealized fit with the dissertation.

Figure 8 provides a glimpse of the dissertation's working framework. Unpacking it unveils a conceptual and cyclical-linear process flow of concept boxes and arrows that provide structural organization, flow, and reassessment. Each framework concept box is expected to be discussed in its appropriate chapter. More specifically, the third and fourth stages in the framework place emphasis on epistemological underpinnings and the researcher's critique and argument. Much of the critical thinking, ideation, and use of existing concepts, theories, and paradigms within the first to the fourth concept box are expected to be supported and referenced through secondary desk research. On the other hand, the two rightmost terminal concept boxes emphasize the methodological processes and resulting pragmatic outcomes borne from collaborative research.

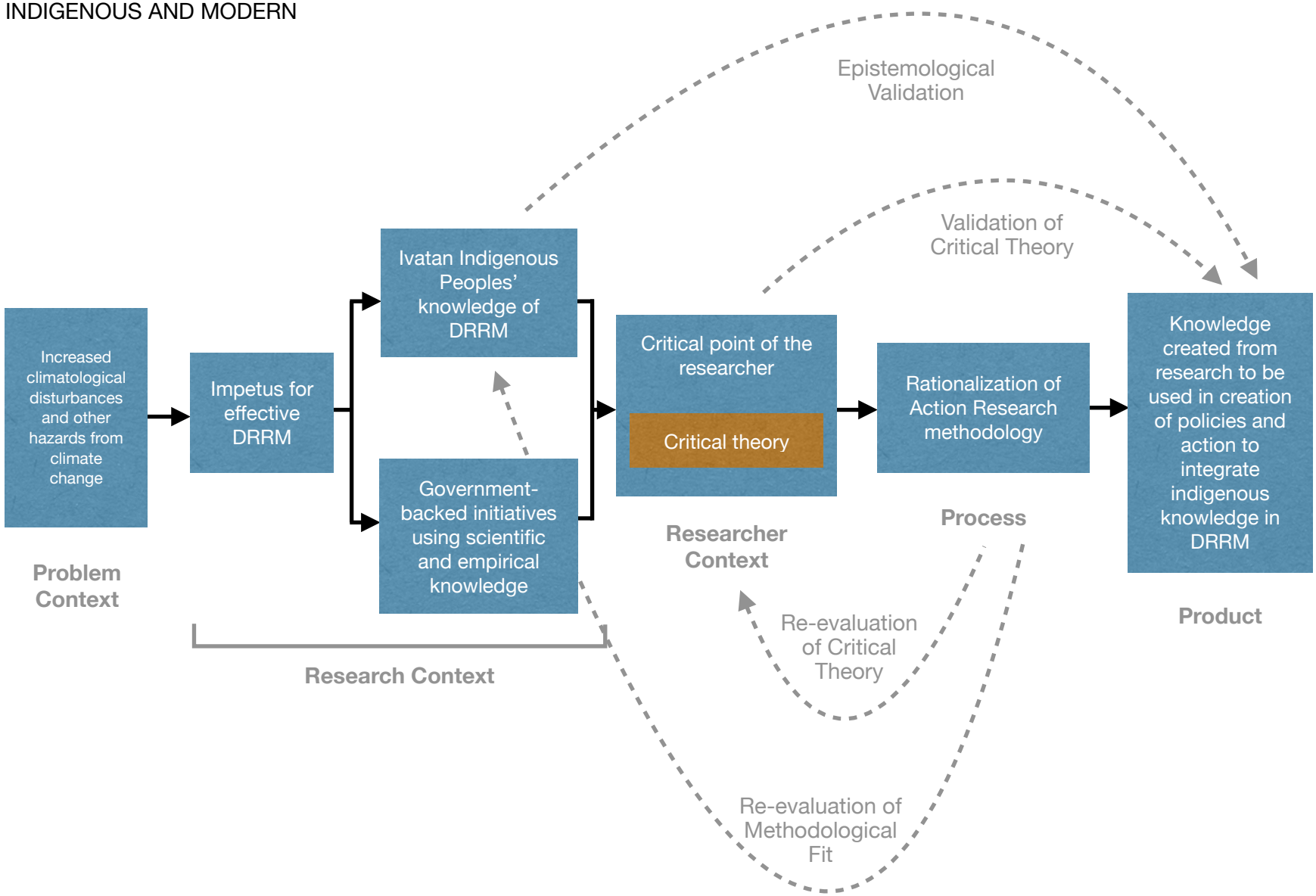

Figure 8: The Research Framework. Although flowing linearly, the framework demonstrates the possibility of concepts to revert to previous processes as re-evaluation and skip forward as validation.

It is essential to note that despite the overall framework having one general direction, a process may often require a constant one-, two-, or more steps back before progressing forward. This is evident by the dashed grey arrows that denote feedback loops. Berg (2009) coins such as a “spiralling forward” research approach that emphasizes a reflective need for feedback and constant validation of ideas and concepts from the previous process in order to move forward. Carew and Wickson (2010) also support this by asserting that the regressive nature of interdisciplinary work will always find itself being reflective and in constant re-evaluation; in this research, I realize that the need to frequently revisit and re-evaluate my theoretical arguments against actual the research outcomes would be crucial, as well as to have my research outcomes revalidated by the Ivatans in the name of transparency, inclusivity, and collaborative research. Each concept box will therefore have its feedback loops connecting to the previous box as part of the concept re-evaluation and validation process.

Additionally, each concept box is added with a description marked in grey underneath, consistent to the description of Carew and Wickson’s (2010) elements of transdisciplinary research. Integrating these elements to the framework is a better means of organizing an otherwise complex, messy, and ever-changing transdisciplinary study (Carew & Wickson, 2010) such as this research. Despite the framework appearing linear with a genesis and terminus, it is important to note that transdisciplinary research is dynamic (Wickson, Carew, & Russel, 2006). The linear structure is designed for the purpose of tactical organization and overview. It sets an almost step-by-step process to create phases, allowing an easier identification of beginnings, milestones, and the research’s finish line.

To set the stage, the first concept box features the research’s problem context how climate change intensifies the strengths of weather extremes. An evident impetus to react to such threat would be the formulation of effective DRRM strategies, identified in the second concept box. Along with the concept boxes of the principal actors and stakeholders involved in the third stage of the framework, these two following stages mark the research context of the study. The divergence of the Ivatan Indigenous Peoples and the Government is also

representative of the epistemological variances that establish the dissertation's argument. In any research, context greatly influences the objective, methodology, paradigmatic lenses, and the critical approach and arguments used to derive outcomes.

Because the dissertation places emphasis on the critical paradigm, the fourth stage of the framework highlights the critical point of the researcher, which is synonymous to the researcher's context, according to Carew and Wickson (2010). The previous problem and research contexts brew suitable conditions to consider the critical paradigm as the most appropriate method for raising the research argument. With the critical paradigm as an over-arching theme to use for the analysis of the research context, I aim to support the critique with reference to the main theoretical discourse of critical theories (Kemmis, 2008; Pease, 2010).

Delving deeper, research with critical purviews necessitates reflecting on the researcher's fundamental belief systems, values, and axiological positions (Wellington, et al., 2017). This not only becomes a further acknowledgment of the roots and origins of critical thinking, but as a prerequisite to the more forward-looking realization of knowing which methodological paths to take. Specifically, the fourth framework stage reveal nuances of interrogating often latent hegemonic power structures and approaches of the government, while also advocating for social justice, Indigenous welfare, and collaboration. These personal predispositions are crucial in validating the theoretical, argumentative, and methodological orientations in critical research (Pease, 2010; Scotland, 2012).

Interdisciplinary research that involves Indigenous peoples as principal actors in tandem with critiquing epistemological approaches would certainly require a participatory mode of generating research and data-gathering outcomes. Webster and Sell (2011) strongly argue that the effect of active participation yields credible and relevant outcomes in social science research. Engaging in Action Research is appropriate in conducting research with people and not merely about them, according to Howell (2017), which makes it sensible and espouses a shared sense of ownership in the research process. Hence, Action Research becomes the rationalized methodology not just because of its appropriateness or effectivity in producing the

best means to draw research data but also because it is the most ethical. This marks the Process stage in Carew and Wickson's (2010) interdisciplinary heuristic in which the methodology is carefully evaluated, chosen, and applied.

As the research synthesis, knowledge and action steps are generated outputs through Action Research and are considered as Products by Carew and Wickson's heuristic (2010). Although seemingly the final stage in the research framework, it is crucial to reiterate that the interdisciplinarity of the research makes processes dynamic. Therefore, it is acknowledged that the research participants may continue to generate new post-research knowledge or critique, though I presuppose that the ideal outcome is the action the community would take to realize positive change; the desired end result is not merely the generation of new knowledge but the more pragmatic outcome of change. More specifically, this change could perhaps be about the government's full recognition and integration of Indigenous knowledge into its DRRM practices, as well as a novel hybrid accepted, endorsed, and practiced by the Ivatans.

Epistemological Standpoint

The concepts utilized in the third stage of the framework, pertaining especially to Ivatan IKSPs and scientific knowledge espoused by the government, are merely the tip of the discourse iceberg. Epistemological underpinnings, defined as the assumptions how knowledge is formed, acquired, and transmitted (Scotland, 2012), form the foundation of this research. Understanding how knowledge operates in the Ivatan and meteorological sciences contexts defines their respective knowledge origins, nature of thinking, and value (Girod-Séville & Perret, 2011). Clarifying this definition and understanding enables the appropriate and robust methodological approach in later research phases to effectively, ethically, and legitimately draw data. Without correctly and judiciously understanding the functionality of various knowledge contexts or merely assuming knowledge as homogenous with one universal viewpoint, research outcomes will be rendered invalid and illegitimate (Girod-Séville & Perret, 2011; Pease, 2010).

Supported by multiple literature, Indigenous and scientific knowledge often contrast and debate each other's validity definitions, credibility, and confirmability among others (Girod-Séville & Perret, 2011), to which Scotland (2012, p. 9) generally substantiate, "what knowledge is, and the ways of discovering it, are subjective." To uncover the nature of thinking and generation of Indigenous versus scientific knowledge certainly matters, though by achieving understanding at the paradigmatic level, or ways of viewing the world, the roots of knowledge incompatibilities are further uncovered. While the epistemological level exposes Indigenous vis-a-vis scientific intersections, paradigmatically, respective constructivist versus positivist world views detail how their core ideological systems not only show incompatibilities but also dominating tendencies.

Positivist notions of a homogenous, universal knowledge are not only antithetical but undermining to other paradigms and knowledge systems (Mercer et al., 2010; Pease, 2010). Such favour for universality, as the basis for the context of this research, creates inevitability for the political, hegemonic, and power-structure-based issues of epistemological incongruences to surface. This argumentative context provides suitable conditions to activate the critical paradigm as it questions power relations and probes systemic faults and flaws of either Indigenous or government-backed empirical thinking. Other than critiquing social injustice and oppressive structures, the critical paradigm's emancipatory characteristics stimulate solution-generation in the epistemological level, postulating a just and collaborative integration between the two knowledges.

Pragmatic Standpoint

Beyond merely synthesizing concepts into new meanings or knowledge forms, the research transcends into designing workable solutions to pressing issues. The approach in creating effective solutions require the proper mix and assembly of concepts and their characteristics. Specifically, bridging umbrella concepts of the critical paradigm, transdisciplinarity, and action research together not only responds to the Research Question but extends the research outcomes into crafting policies or improved DRRM practices for

enhanced resiliency. In the most explicit sense, mitigating disaster hazards need not just thinking about but also taking action.

The multidimensional nature of disasters prompts the need for a more holistic understanding of inclement weather disturbances and the formulation of tangible DRRM responses. Transdisciplinarity is the farthest innovation of disciplinary studies to date (Van Niekerk, 2012). It involves cross-fertilization of knowledge, such as those from Ivatan IKSPs in DRRM and meteorological, technical knowledge to produce not only knowledge but also a means to create real-world solutions and facilitate change (Klein et al., 2001). The research framework includes a rationalized chain of such knowledge concepts and has done so in the mindset that pragmatism is a function of transdisciplinarity (Carew & Wickson, 2010; Jahn, Bergmann, & Keil, 2012). Overall, the dissertation adopts an end-in-mind outlook, in which the terminal concept in the framework is the development of practical tools to facilitate improved resiliency.

Collaboration is an espoused principle in undertaking this research. Elements such as Indigenous peoples, critical theory, and Action Research as methodology demand collaborative agency. The pragmatic emphasis in this dissertation stimulate value-added outcomes through the creation of communities, instead of isolated islands, of knowledge brought about by their integration. Thus, the converged communities of knowledge humanizes action strategies and empowers the carriers and activators of such knowledge. Knowledge is therefore reified by people, where hybridized knowledge is fully accepted, practiced, and further improved by Ivatan communities.

Chapter 4: Methodology

Methodologies extend beyond data-collection functionalities. It is well-understood that idealized methodological justifications demonstrate consistency with the dissertation's paradigmatic foundations, epistemological discourses, axiological orientation, and the research and problem contexts. This is especially defaulted in social science and qualitative research (Agee, 2009; Higginbottom, 2004). It must be noted that this methodology is hyper contextualized, where the given research and problem context dictate what methodological positioning to take root, which is consistent with Maxwell's (2012) assertion that no fixed qualitative research template or "cookbook" exists.

Aside from the retrospective angle on how the methodology should match and correspond to the research foundations, the research methods or actual strategies for data collection, analysis, and reporting (Pacific AIDS Network, 2020) should parallel the methodology as well. In this chapter, the qualitative research methodology—Action Research, will be further detailed, featuring the linkage of the data gathering methods to the research question and how it is rationalized. The purpose of this section is to delve into the Action Research methodological theme, supported by a secondary intent to elaborate how knowledge was generated, the specific research context and design, and the criteria of research evaluation.

Research Design: Action Research

In the quest for uncovering knowledge, the research design becomes the map that guides methodological processes (Research Methods & Design, 2018). Valerie Janesick (as cited in Berg, 2009) creatively phrases the design as choreography that establishes the research dance. While the design is an ubiquitous element to frame data gathering procedures, Tobi and Kampen (2017) assert that the research design becomes a more significant matter in research with interdisciplinary dimensions.

The design of the practical means of conducting research is vital to ensure coherence with the paradigm used, relevance with the research context, reflexivity to researcher axiology,

and accordance to the research objectives (Agee, 2009; Wellington et al., 2017). According to Belcher et al. (2017) and Carew and Wickson (2010), a dissertation that is transdisciplinary, or involving multiple disciplines such as Indigenous and political studies, will require the active inclusion of stakeholders in the research process. Also, the methods should be in consonance with participatory and collaborative principles, groundings, and ethical considerations.

The principal actors and the dynamic interrelationships between the Ivatans and the NDRRMC signify the social and qualitative focus of this research. In the analytical perspective, my use of the critical paradigm also centres on the detailed inspection of such actors, the utilization of paradigmatic lenses, as well as the consideration of researcher axiology and ideals. These therefore become important anchors that necessitate the use of qualitative research to derive knowledge.

Especially on employing the critical paradigm, Kant (as cited in Howell, 2017, p. 2) makes a crucial point that knowledge can be derived through critical thinking. It allows a critical reflection of the actors (Karataş-Özkan & Murphy, 2010), which leads to the examination of interrelationships, social orders, and the hegemonic tendencies that accompany such interrelationship. Scotland (2012, p. 13) also accounts for a Foucauldian perspective, in that "knowledge is both socially constructed and influenced by power relations from within society," and further critiques how "academic and scientific communities, which validate and legitimize knowledge claims, unwittingly contribute to systems of oppression."

Grounding critical paradigm on a people- and institution-centred study would require inclusive and participative methods as the appropriate and best means to draw research data. Webster and Sell (2011) strongly argue that the effect of active participation yields credible and relevant outcomes in social science research. Hence the specific methodology to apply in the research is Action Research given the advantages of its suitability to the research context and in light of the critique of the principal actors through the critical paradigm. Action Research is sensible, pragmatic, and empowering to stakeholders as they gain a shared sense of ownership of the research process (Howell, 2017).

Applying the principles and processes of Action Research adds to the novelty of this research through the democratization of the knowledge generation process. It is divergent from the conventional objectivist- and positivist-themed process of social science research with researchers as passive observers, quantification and testing of datasets, and focus on causal tendencies (Reason & Bradbury, 2008). Action Research also blends well with the critical paradigm since incorporating stakeholders in the research process fosters a more socially credible and robust knowledge generation (Karataş-Özkan & Murphy, 2010; Mercer et al., 2008), through creating local evaluation and critique of the government's exclusive approach in DRRM.

Engaging in Action Research is appropriate in conducting research with people and not merely about them (Howell, 2017; Reason & Bradbury, 2008). Such an approach implies that it becomes difficult (Howell, 2017), if not impossible (Mills, Bonner, & Francis, 2006), to detach oneself or become a passive observer in this research. Although Khazanchi and Munkvold (2003) assert that critical vis-à-vis interpretivist research share an ontological similarity of the impossibility of objective observation, I do not wear an interpretivist lens, since such approach renders me as a passive observer left to create my own observational interpretations. Its inherent hazard is the risk of my personal assumptions and biases interpreting and creating meanings (Howell, 2017), and thus compromising the credibility of the research.

Plenty of authors discuss the benefits of Action Research as their prime methodological tool in knowledge production (Coghlan & Shani, 2017; Jordan, 2014; Kelman et al., 2011; Kemmis, 2008; Gaillard & Mercer, 2012; Reason & Bradbury, 2008; Wicks et al., 2011). Almost all Action Research-related literature consistently remark on its pragmatic approach and partnered creation of knowledge, according to Bradbury and Reason (2008). The title alone is a giveaway of its action-oriented and participatory attributes, allowing its participants to become co-definers and co-implementors of the study (Coghlan & Shani, 2017). Implementation is a given in Action Research, as opposed to traditional research that has limited aims and terminates upon the consequent derivation of data only. Additionally, Action

Research is experiential and hands-on, empowering those involved to become not just passive audience members but active stakeholders who are led to a path of self-discovery, realization of their expertise, and capacity to lead the decision-making process (Reason & Bradbury, 2008).

To reiterate, the critical paradigm partners well with Action Research, given the research context. Active involvement with stakeholders is necessitated in this methodology, hence conducting the interpretivist's tasks of developing open-ended questions (Vanini, personal communication, May 25, 2017), following the duty to stay covert, relying on the interpretation of observations, and interacting meagrely (Howell, 2017) will not work. Because stakeholders are involved in critique and co-production of knowledge, what is generated will not result from mere interpretation from the researcher only. Active participant involvement therefore creates and adds value to the knowledge generated; direct involvement catalyzes direct interpretation from the participants. Pragmatically, the Action Research approach would therefore require me to act beyond an observer, but rather as a facilitator, encouraging Ivatan participants to create their own critique of the government's DRRM approach.

Howell (2017) makes an important point that Action Research neither positions the facilitator as a complete participant nor as a complete "Other," or passive observer. I assert that my facilitative role as a researcher is to be the guide pro tempore and initiator of change, in which the full change is carried out by the community. I would separate myself in a way that it would be the community that would further discover their situation and produce knowledge through critique of the government's DRRM approach. As what copious literature explains, embarking on action-infused research does not place focus on researcher-led interpretation, but by the construction of new meanings during social interactions among participants.

Indeed, one of the more novel features of this research is the inclusion of Ivatan Indigenous stakeholders in the research process. The Action Research-based method is ethical, suitable within the social context, and sensitive to local tastes, especially when dealing with Ivatan social systems, traditions, and practices. Conducting Action Research in such

context, where I am noticeably the “ipula" or non-native facilitator, means that I am required to expose myself to the community beforehand; it was therefore expected for me to travel to Batanes and reside within the community. The purpose was to blend in to increase my understanding and adjust to the same-level perspectives and parallel expectations. Gradually becoming more comfortable and accustomed to the local context were cues to liaise further and introduce the study to the target stakeholders.

Since I intend to also interact and collaborate with DRRM officials in Basco, I acknowledge that it requires extraordinary skill to flex my positioning and separability between participants to effectively draw knowledge and wisdom. I also acknowledge the risk of researchers gaining bias for the subject stakeholders and research context (Howell, 2017). Bias, after all, is a manifestation of the context, axiological orientations, and personal values of the researcher especially in embarking in interdisciplinary research (Carew & Wickson, 2010). Especially in a dissertation like mine, where it is essential to step inside the contrasting worlds of the highly rational organizational culture of the government as well as Indigenous peoples, this situation makes me aware how careful I must be in understanding the outcomes of the interaction of both.

Research Context

Understanding the research context of the Ivatan community and how it relates to the methodology is a necessitated prerequisite prior to actual data gathering. In this subchapter, important steps are considered before assembling and discussing the research design and later data-gathering techniques. Most importantly, Batanes is an Indigenous, Ancestral Domain (IPRA, 1997), which requires adhering to specific pre-data-gathering protocols; mindful, sensitive, and empathic researcher positioning to Indigenous contexts; and consideration of local values. With these in mind, much pre-trip planning and logistical organization was conducted. Actual experiences and practicalities prior to mining information in the Data Gathering subchapter will be detailed as well.

Basco and Itbud were the two municipalities, out of Batanes' six, where the research was conducted. This was rationalized based on both practical and geopolitical viability. Funding, time constraints, and other opportunities allow Basco as the research epicentre, seconded by Itbud. To add, all government offices significant and relative to my research were all located within Basco. Moreover, Basco-based stakeholders advised that other municipalities may not have enough data to derive since most related policies directed by municipal officers do not exist or are very limited (personal communication, December 20, 2018), hence reducing viability in conducting research.

The pre-organized, spread-out data-gathering schedule within Batanes was also compressed into a shorter, earlier timeframe as prescribed by local stakeholders. This was carefully considered to anticipate the high likelihood of their unavailability due to busy preparations for the provincial foundation celebrations of Batanes Day on the 26th of June 2019. Still, all data-gathering objectives were executed successfully with great interest, motivation, and participation by stakeholders.

Data Gathering

This subchapter enumerates the practical phases of the research conduct, which are further substantiated with their methodological rationale, justification, specific methods, and how knowledge would be generated. Each activity is supplemented by the actual data-gathering implementation and experience during the field study. Specifically, the facilitation of data-gathering techniques activities by the researcher and the targeted Ivatan community stakeholders and the provincial and municipal DRRM councils will also be further detailed in the following Summary Matrix of Steps and Data-Gathering Facilitation subsection. It should be noted that these are the summarized methods that incorporated previous in situ iterations and changes recommended by the dissertation panel.

Community immersion. A bulk of the data-gathering process required immersion, which was conducted through actual travel to and residing within the Ivatan community, specifically in the Municipality of Basco for five weeks from 15 May to 20 June 2019. It is also

important to note that the original plan to engage in volunteer work with the NCIP and Basco DRRM Council did not materialize, following local advise to just focus on social immersion and later data-gathering work.

After securing accommodations and minding personal errands to settle comfortably in Basco, it was imperative to connect with the key resource persons referred by Dr. Datar. The collective and very welcoming culture of the Ivatans allowed easy personal connection and fellowship. My first visit to Basco in December 2018, to which I was unexpectedly invited to join the NCIP Christmas party, enabled further rekindling of friends. The constant agenda-free socializing with locals prompted further snowballing of persons to meet. These encounters also eventually became an opportunity to latently assess their viability to become potential participants for later data-collection activities.

Building linkages and ensuring compliance with research protocols. Batanes' protected area status (Philippines, 1994) makes it protocol to request permission to the Governor of Batanes, the NCIP, the Provincial Environment and Natural Resources Office, and the Mayor of Basco Municipality ("Official Website of the Province of Batanes", 2018) prior to conducting research. Coordinating with the said agencies while still in Canada was successfully carried out. Permits were applied for and eventually received, which can be found arranged from national- to municipal-level order in Appendices C to G.

Particularly with the NCIP and its local Ivatan Tribal Council counterpart, undertaking numerous steps towards research approval were obligatory. Securing free and prior informed consent (FPIC) was the initial building block of approval, which required a simultaneous courtesy call and presentation of the research overview and plan to Ivatan Indigenous Peoples Mandatory Representatives (IPMR — interchangeably called "elders" in the dissertation) and senior NCIP officials on 21 May 2019. A signed Memorandum of Agreement (MOA) (see Appendix D) was later provided by NCIP and Ivatan elders, approving the research. In addition to the approval, the MOA explicitly stipulated the Ivatans' full ownership, control, and protection of their intellectual and cultural rights; the Ivatan's right to reject or allow FPIC; and

other authoritative declarations and responsibilities according to Administrative Order 1 of the IPRA Law (NCIP, 1998).

Soliciting consent and assuring privacy and anonymity are important irrespective of activity. Other than securing FPIC from the NCIP and Ivatan elders, it was essential to request consent down to the data-gathering participant level, not merely for statutory compliance, but also to adhere to high ethical standards in research as well. Dovetailing the importance of consent is also anonymity and privacy, which were actualized through verbal and written assurance in every formal or informal data-gathering encounter. Even after the research, the identity of the participants were assured to be kept anonymous and not be used to secure potential consultancy opportunities.

The request for consent and the guarantee of privacy and anonymity were specifically expressed in writing through their specific forms detailed in Appendices H and I. They also indicate that privacy and anonymity were assured by withholding and excluding participant identities in all drafts and unpublished or published reports. However, it was explicitly mentioned that the loss of individual anonymity may possibly occur during the conduct of focus group discussions when participants inevitably find themselves in the same venue with other participants. In light of this, it was important for me to still ensure and maintain participant confidentiality prior to the actual data-gathering activity.

In any research setting in the Philippines, relationship-building and the creation of social networks are essential prerequisites to create awareness and drum up local support for the research and later data-gathering processes. Networking was facilitated through key resource person referrals by Dr. Francisco Datar, a panel member of this dissertation. Upon arriving, settling in, and touching base with resource persons in Batanes, logistical arrangements such as data-gathering event scheduling, securing safe interview and FGD spaces, and coordinating for event catering were then organized. Other than few informal interviews in Itbud, most of the formal data-gathering events were held at the Batanes State College (BSC) library in Basco with granted permission from the college president.

As a function of action research, validation through iterative community feedback and advice empowers the Ivatan community as active evaluators of co-produced knowledge (Fetterman, 2017). Fetterman (2017) not only highlights action research' formative evaluation capacities through providing feedback for enhancing research, but as a summative validation and assessment tool as well. Operationalizing the latter makes it imperative to consider the Ivatan community as validators of the final outcome of the research as well. Prior to the final dissertation defence, the completed dissertation draft was submitted to the Ivatan community for their further commenting, validation, and endorsement. Pre-defence presentations conducted through Zoom to seek community feedback became the most feasible option in light of COVID-19 health and safety protocols at the time of writing. Privileging Ivatan members to be de facto panelists in the research is a symbolic endorsement of keeping research grounded and as insiders' corroborative work.

Review of DRRM plans, policies, and scholarly references. Secondary research by sifting through related literature only available in the Philippines was conducted before and after the Batanes immersion, from 12 to 14 May and 20 to 26 June 2019. Related literature are categorized as policy and academic literature, the former comprised of DRRM plans and strategies, national to local DRRM policies, and other government-generated literature; and the latter comprised of academic-produced literature such as Batanes-related research publications, Ivatan-themed journal articles, and other scholarly works centering on Indigenous knowledge and issues in Batanes. Specific literature titles are listed later in this subchapter.

Prior to community immersion, undertaking traditional methods of desk research and content analysis of macro- and micro-level DRRM policies become essential to delve deep into the research context and analyze the research problem. Investigating policy genesis from the macro-level policies of the NDRRMC down to the micro-, municipality scope determines whether DRRM policies have emanated as top-down devolutions, or bottom-up cognitions, or halfway. Doing so also exposes the ontological and epistemological formation of DRRM and

how it is grounded (Hilhorst et al., 2015). Moreover, the national and local policy assessment exposes whose expertise is not just being operationalized but also idealized.

Book, academic journal, and other literary reviews within the national sphere of DRRM studies in the Philippines are easily achievable, yet become the opposite once local-level policies are probed. Not even a provincial DRRM office website exists, let alone a municipal-level DRRM portal. Immediate access to pertinent information becomes a limitation of the research, hence justifying travel to Batanes and direct sourcing of these policies. In situ local DRRM policy acquisition and review will be listed as Secondary Research in the Philippines in the following subsection. Secondary Research in Canada on the other hand, involves desk research and literature reviews while in Canada.

Narrowing literature reviews through policy investigation justifies the use of content and narrative analyses. Policy content analysis is credible for exposing quantifiable patterns such as terminological frequencies and qualifiable interpretations through the topic, themes, and instruments used (Hall & Steiner, 2020). In this way according to Hall and Steiner (2020), deductive and inductive rationales and intentions are revealed. A historiographical approach was also conducted through the analysis of scholarly literature. In the same purpose as Berg (2009) explicates, historiography dives deep into analysis and theoretical explanations based on events and cases in Batanes' history. Outcomes through such analysis could potentially support the creation of meanings and how they relate to today's realities (Berg, 2009).

Secondary research in Canada. As earlier indicated, Philippine policies on DRRM and related data were obtained online and remotely in Canada through various sources such as credible websites, online academic journals, and various university libraries since the start of this research. To compare, almost all gathered policy datasets were national-level and macro-scale, as opposed to other datasets such as academic research, case studies, news articles, and other reports that scaled down to the local level. Some examples of these datasets from macro- to micro-levels include:

- Republic Act 10121: Philippine Disaster Risk Reduction and Management Act

- The National DRRM Plan 2011-2028
- Republic Act 8991: Batanes Protected Area Act
- Provincial Environment and Natural Resources Office — Brief History of Batanes Province (includes relevant ethnometeorological and cultural information of the province)
- Heritage Architecture of Batanes Islands in the Philippines: A Survey of Different House Types and their Evolutions by Ignacio (n.d.)
- The Ivatan Cultural Adaptation to Typhoons: A Portrait of a Self-Reliant Community from the Indigenous Development Perspective by Rede-Blolong (1996)
- Ivatan Indigenous Knowledge, Classificatory Systems, and Risk Reduction Practices by Esteban and Valientes (2019)

Secondary research in the Philippines. Direct sourcing of policies and data with permission was conducted in both Basco and Manila. Most of the following datasets centred on Batanes, such as:

- Provincial Disaster Risk Reduction and Management Plan 2017-2022 by the PDRRMO
- Ancestral Domain Sustainable Development and Protection Plan by the DAR and NCIP (2010)
- Crisis Management Strategies Despite Calamities for the Selected Tourist Accommodation in Batanes Islands, graduate thesis by Batin (2018)
- Ivatan Studies Journal by the Saint Dominic College of Batanes Graduate School (2014)
- Taming the Wind: Ethno-Cultural History on the Ivatan of the Batanes Isles by Hornedo (2000)
- Contingency Plan for Tropical Cyclone by the MDRRMO (2017)
- Municipal Profile of Basco, by the MDRRMO (2013)
- Barangay-level DRRM Plans

Connecting with the community. To reiterate, an activity in the Action Research process is exposure and immersion (Reason & Bradbury, 2008) to Ivatan communities, knowing that building rapport and trust is an integral first step in working alongside Indigenous peoples (Hiwasaki et al., 2014; Parker & Samantrai, 2010; Sillitoe, 2004) in the Philippines (Embassy of Finland & International Labour Organization, n.d.). Consistent in myriad academic literature, forging relationships and even gaining acceptance by the community increases the legitimacy of the methodological process as well as the credibility, trustworthiness, and robustness of the data gathered (Datta et al., 2014; Kelman, Lewis, Gaillard, & Mercer, 2011; Mercer et al., 2009; Pelling, 2007).

Connecting with the community with an explicit and immediate declaration of conducting research is a tension generator (Jordan, 2014) as Ivatan folk may perceive themselves as being exploited solely as research objects. I recognize that acceptance in the community is not demanded but rather earned. Thus, it becomes prerogative to engage with neighbours, create genuine friendships, and start by establishing personal connections with officers at the Batanes office of the NCIP and the DRRM council of Basco Municipality. This was not only meant to exchange cordialities and build my presence but to also demonstrate my willingness to belong and ally with the community. Thus, creating connections is an opportunity to build social capital and trust. Upon doing so, it became a plan to gradually disclose my research work and intent to engage with Ivatan stakeholders within the municipality.

Additionally, gaining a firm level of familiarization of the Ivatan cultural context, is crucial and greatly assists in making more sense of their cultural norms, ontologies, orthodoxies, and epistemological perspectives. Indeed, immersion and active local interaction are key and would also allow gradual “eye-openers” and understanding of local axiologies and what becomes most valuable and important to them. Familiarization also plays a crucial role in learning how to effectively co-direct the research process in accordance to Action Research principles. Working alongside Ivatan stakeholders would allow me to seek their thoughts and

inputs about the best methods to conduct the data-gathering process given the nuances of the local culture, network with the appropriate knowledge-keepers, and understand other potential research roadblocks.

For the purpose of this dissertation, Ivatan stakeholders and participants are defined as those who currently identify themselves as Ivatan, as recognized by the Indigenous Peoples Rights Act of the Philippines (Philippines, Republic Act No. 8371, 1997). This is among the important criteria for data-gathering activities that will be further explained in the next subsection.

DRRM IKSP inventory and validation. The validation of Ivatan Indigenous knowledge in DRRM and its related systems and practices becomes a crucial procedure in the research process. This is a favourable and time-saving deviation from the original inventory generation phase. Spearheaded by the PDRRMO, the inventory was formulated through the adaptation of a shorter version appended in the San Antonio ARC Cluster ADSDPP, and supplemented by surveys and interviews conducted by PDRRMO officials. Ivatan-centred validation enables the appreciation of their own distinct system of resiliency. It is empowering and centres the research on Ivatan cultural strengths. Furthermore, stakeholders collaboratively assess the utility, challenges, effectivity, and how DRRM IKSPs are mobilized and legitimized by local knowledge-keepers and decision-makers.

Through the validation process, how DRRM IKSP capacities are cultivated within the community and how they are still applied today are better understood. It has been noted that due to today's accessibility to technology, social media, and their appeal to the youth, it therefore becomes essential to uncover the youth's diminishing knowledge and familiarity about DRRM IKSPs (F. Datar, personal communication, December 12, 2018). The factors that allow these to happen will also be discussed and analyzed through the phase on understanding the Ivatan perception.

Community validation of local knowledge involves convening the community through a public event with Ivatan stakeholders with the approach of using reflexive thinking with the goal

of co-validating the inventory. This reflexive exercise prompts participants to use introspection as their means to examine, realize, and appreciate what may typically be considered mundane, conventional, and even taken for granted. Much potential to have participants be empowered and appreciative of their inherent cultural strengths exists through this method, which parallels the privileging prospect of Action Research (Reason & Bradbury, 2008). More specifically, collaborative workshops are appropriate methods to encourage participants to assemble, work together, evaluate the provided DRRM IKSP inventory, and publicly present them.

Simultaneously as community networks were being formed and strengthened, a flurry of behind-the-scenes preparation activities were being conducted. Highlighting this phase however, is the conduct of the validation event. These activities altogether included:

- Thoughtful and targeted formulation of the list of invitees for the Ivatan DRRM IKSP validation event. Following Action Research principles, a majority in the invitee list were identified by stakeholders, including NCIP officials and some residents. Criteria, such as requiring to have Ivatan heritage and not being an employee from either the PDRRMO or MDRRMO, were also co-developed to rationalize the targeted participants.
- Formulation of invitation letters (see Appendix J). While letters suggested the formality of the event, most invitations were conducted casually and by word-of-mouth. Also, invitees assisted through cascading invitations through their personal networks who fit the data gathering participant criteria.
- Event logistics preparations including scheduling for upcoming and future events, venue setup, equipment reservations, and catering coordination. To reiterate, NCIP officials and residents also assisted in calendar scheduling and availability planning, especially considering pending major events such as Batanes Day.
- Conduct of the event on 30 May 2019. A presentation of the research was initially provided, followed by a hands-on workshop with the 10 participants from multiple sectors who attended. They were grouped together to tackle pre-assigned DRRM IKSP

categories and their examples. In teams, participants discussed and assessed the following, characterized in Figure 9, and concluded by their group presentations:

- Active or declining use, and their reasons
- Challenges in using them in today's context
- Effectivity rating
- How the IKSPs are transmitted

- A post-event hosted dinner to celebrate the participation, effort, and achievement of participants. Providing meals in all formal data-gathering events is a cultural norm, carrying multiple symbolisms of bonding and alliance (Sta. Maria, 2001).

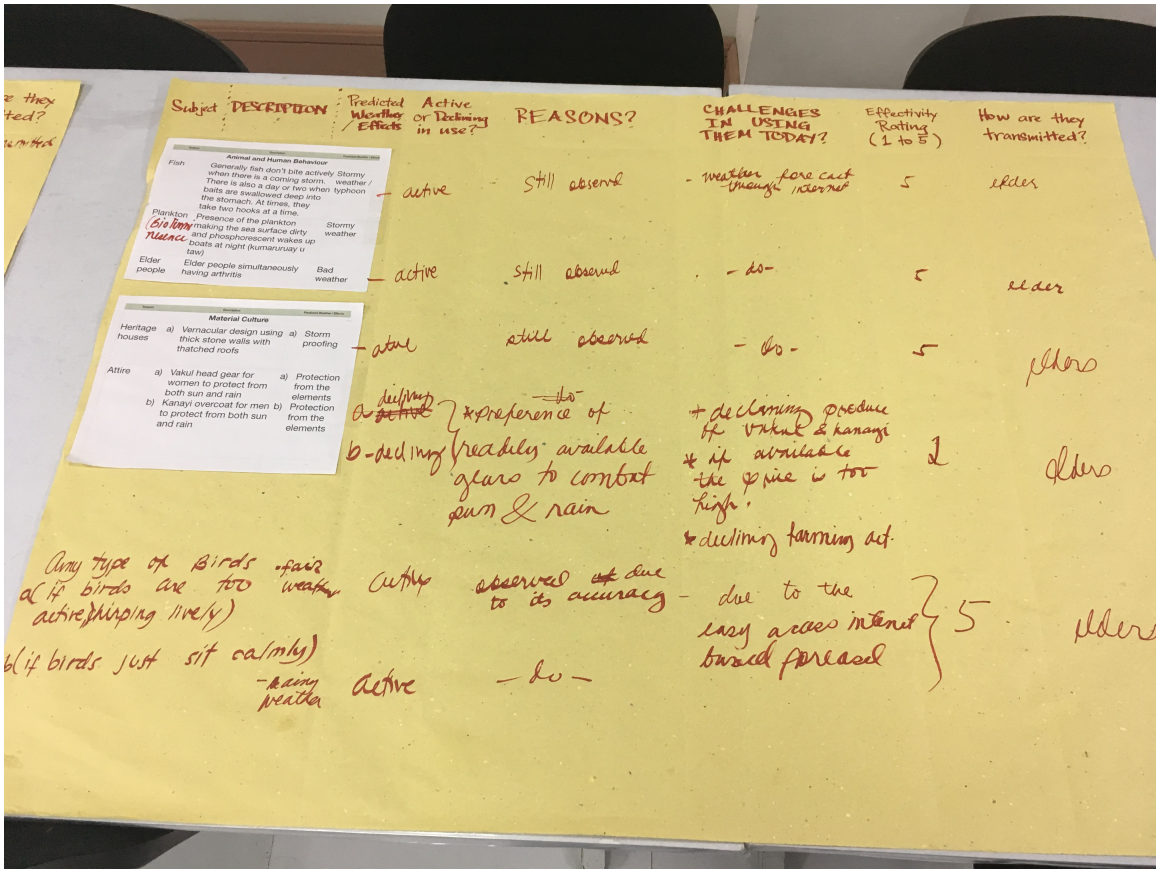

Figure 9. Teams evaluated specific examples of Ivatan DRRM IKSPs organized in their general categories. The upper left portion of this image showed the specific Ivatan DRRM IKSPs with their subject, description, and predicted weather/effects columns. Columns on the centre and right provided additional assessment categories that were responded and "graded" by participants. May 30, 2019.

Focus group discussions to understand Ivatan perceptions. While rousing self-awareness and appreciation is the key outcome of the previous phase, this phase pushes awareness further by allowing participants to understand and realize the existing DRRM governance context. This involves fronting government-led DRRM policy assessment outcomes and Ivatan traditional DRRM systems together for participants to compare and contrast. Facilitated through focus group discussions, participants were free to analyze, critique, and challenge DRRM initiatives. It is essential to note that the purpose of this process is not only to distinguish superiority versus inferiority but to also create critique on DRRM governance and approaches. The understanding of this duality sets the platform for later collaborative opportunities and discussion.

Understanding the Ivatan perception distinguishes how scientific and Indigenous DRRM approaches vary and highlights their exogenous and endogenous origins respectively. Through compare and contrast, the divide between disasters being social constructs versus being scientifically-operated episodes become more explicit especially for Ivatan participants. Despite the contrasting paradigm of the institutional approach to DRRM however, the common denominator of ensuring preparedness and resiliency is also made overt. Overall, this phase intends to become a participant-led diagnosis of power relations, existence of DRRM governance hierarchies, and the impacts they create.

Operationalizing this phase specifically requires organizing focus group discussions (FGD) with participants under the criteria of Ivatan residents in either private or public sectors and not to be employed in either the PDRRMO or MDRRMO. As another departure from the original Ivatan-elder-only plan, the deviated participant criteria opened opportunity for inclusive, Ivatan-led participant identification. Adhering to Action Research principles, Ivatans themselves had the privilege to choose appropriate participants for the FGD on their own. On the other hand, my role was not to impose but facilitate awareness of the significance of observing the criteria as stakeholders identify participants.

Three Focus Group Discussions were organized to cluster participants by their respective sectoral categories under the rationale of facilitating easier conversations on more familiar concepts, topics, and narratives. In this conducive way, participants became more comfortable as they spoke in the lenses of their competencies and common perspectives, while dead air was avoided. Conducted in English and Tagalog, the latter being my mother tongue, the hour-long FGDs were grouped in the following participant themes:

- FGD 1: Mix of five participants such as Ivatan elders and civil society, held on 4 June 2019
- FGD 2: Mix of five participants from different sectors such as education, tourism, and business, held on 5 June 2019
- FGD 3: Mix of four participants from different sectors such as local government and civil society, held on 6 June 2019

All FGDs were semi-structured and started with quick individual introductions, confirmation of consent, permission to record, and clear instructions. A brief preamble of the research and review of the IKSP validation workshop followed. Pre-formulated and thematically-organized sets of FGD interview questions, as listed in Table 8, were covered during the FGD proper. It is important to note that all discussion questions were the same for consistency throughout all FGD sessions, however some were skipped for time efficiency and participant context suitability, as well as for substituting probing questions. Although flexibility was surely important, reliability and integrity were guaranteed by ensuring no theme was left undiscussed. To reiterate, probing questions outside of the pre-formulated ones were also used to solicit deeper details. All FGDs were concluded with a brief summary of important discussions drawn from the participants. Additionally and similar after the conduct of the DRRM IKSP validation event, all sessions were capped off with light refreshments to celebrate.

Table 8

Thematically-Arranged Questions Used for All FGD Sessions

Theme	Average Time Spent (in minutes)	Question
"Warm-Up" and Rapport-Building	5	1. What is it like experiencing natural disasters here in Batanes? 2. What is your recollection of the strongest typhoon you've ever experienced? (briefly describe)
IKSP Assessment	10	3. What can you say about mainstreaming or continuously using these IKSPs given the reality of climate change?
DRRM Council Approach	10	4. What are the differences between the methods of the Ivatans vis-a-vis the approaches of the Municipal DRRM Council in disaster risk management?
Critique	20	5. What can you critique about the National and local (Municipal and Provincial) DRRM Councils' adoption of Indigenous knowledge? 6. Can you explain whether their strategies are a threat or benefit to the Ivatan knowledge, systems, and practices in DRRM? 7. What can you comment about the effectiveness of a top-down approach in DRRM? 8. What can you comment about the effectiveness of the bottom-up approach in DRRM?
Convergence	15	9. What are your thoughts on combining Indigenous Ivatan and scientific National or Municipal DRRM Council methods in DRRM? 10. What implementation challenges will this approach incur? 11. Will this approach receive more positive or negative critique among the community?

Note. The themes and questions above are placed in order, though were not strictly followed depending on the richness of discussions and the participants' response to the question prior to asking; a tolerable degree of flexibility was required in the order and actual mention of the questions.

Workshops to understand local DRRM Council perceptions. Significant benefit exists in administering interviews to local DRRMC officials to paint a perspective of their DRRM governance, decision-making processes, and policy rationales. Their responses are indicative of their level of awareness how their technology-driven DRRM appropriation initiatives

influence and impact local ways of managing disaster risk; while noble in intent, the positivist narrative of managing disaster risks idealized by local DRRM officials also brings to question the deliberate or unintentional social change it influences on the Ivatans.

Interviewing officials also creates a firmer understanding how receptive they are to bottom-up community-based adaptation methods and alternative approaches to resiliency. Given their expected obligation to operationalize national policies from the top into working initiatives on the local level, this phase opens an opportunity to understand their stringency in top-bottom mandate compliance and analyze how such rigidity potentially impedes collaborative opportunities with the community. Hence, the inclusion of these officials in the research inquiry creates a more well-rounded and holistic understanding of DRRM governance intentionality and complexity.

In-depth semi-structured interviews were the best fit for local DRRM officials, to allow them to freely digress within the realm of critical questions (Berg, 2009). The greater aim in utilizing such method is to draw critique about power structures and authority, which can also be triangulated with the critical views of the Ivatan community. Although deviating from the Action Research methodology applied to the Ivatans, conducting interviews with officials is still participatory, democratic, and inclusive (Howell, 2017; Kemmis, 2008). As earlier stated, the participation of these officials is also valued for their common goal of enhancing community resiliency and implementing DRRM mitigation strategies.

Officials from the provincial and municipal DRRM offices were interviewed in a semi-structured process with the provision to ask probing questions depending on the richness of the interview conduct. Similarly to FGDs but in the conduct of interviews, standard protocols for pre- and post-interview proper such as consent confirmation, research disclosure, and summary of interview points were provided. In both phases of understanding the Ivatan and local DRRM Council perspectives, the themes and questions were only disclosed during the session, as opposed to in advance, to generate a more candid and unrehearsed creation of meaning.

As expected, interview plans experienced changes, which necessitated additional interviews to other referred respondents including two in Itbud. The conduct of extra interviews was obliged, as a response to cultural protocol and avoidance of refusal awkwardness. Ultimately, the additional interviews proved beneficial as referred respondents were esteemed community leaders with significant subject matter competency and authority. Pre-formulated interview questions organized in their themes and respondents in Table 9 were utilized.

Table 9

Thematically-Arranged Questions Used for P/MDRRMO and Related Stakeholder Interview Sessions

Theme	Question	Target Respondent
"Warm-Up" and Rapport-Building	What is it like experiencing natural disasters here in Batanes?	All[a]
Approach to DRRM	What are the highlights in your department's DRRM Plan?	MDRRMO
	What will be done with the DRRM IKSPs that you have previously surveyed and collected?	PDRRMO
	How do you see them being used in actual practice?	PDRRMO
	How strictly do you implement the national-level's (NDRRMC) technology-driven DRRM initiatives?	PDRRMO and MDRRMO
	Do you get torn or see yourself in conflict being in this situation?	PDRRMO
Critique	What are your opinions on how the NDRRMC's science-driven and technology-based initiatives influence and impact local ways of managing disaster risk?	All
Convergence	What are your thoughts on combining Ivatan and National or Provincial DRRM Council methods in DRRM?	All
	What challenges will you have in this integration?	PDRRMO and MDRRMO
	What are your thoughts about the effectivity of this integration?	PDRRMO and MDRRMO

Note. The themes and questions above do not include probing questions.
[A]Includes officials from the MDRRMO and PDRRMO, as well as additional interview respondents from Basco and Itbud.

Ivatan stakeholder synthesis workshops. The phases before this clarify the research context and problem to lay fertile grounds for discussion, analysis, critique, and development of actionable solutions. Action Research comes alive in this phase, where principles of participation, co-generation of knowledge and solutions (Reason & Bradbury, 2008),

challenging dominant paradigms (Mercer et al., 2008), and activism through critique (Wicks, Reason, & Bradbury, 2011) are mobilized. As the penultimate outcome, the Ivatan participants, Provincial or Municipal DRRM officials, and I would collectively respond to the research question using previous phase outcomes as references for analysis. On the other hand, the dissertation's finish line would be crossed once the outcome of policy change would have then been endorsed.

A community critique and collaboration following the triangulation and cross-referencing of the previous research activity results were featured in this phase, and were specifically conducted by means of a public community event with Ivatan elders, DRRM IKSP Inventory Validation participants, as well as officials from the Provincial and Municipal DRRM offices. Paradoxical as it seems, viewpoints from the latter certainly matter as well since they exist in a dichotomous reality of implementing outsider, national-government idealized thrusts while also being Ivatan, simultaneously acknowledging their inherent traditional resiliency systems. The event became an opportune and empowering venue for Ivatan stakeholders to reflect, understand the situation more fully, voice their critique, and recommend solutions. In a deeper perspective, the event also provided a space for the symbolic convergence of two contrasting paradigms, through the face-to-face interaction with agencies that idealize scientific and technical interventions, and another that have always operated in their native, Indigenous systems for resiliency.

The Ivatan Stakeholder Synthesis phase was profound since it combined critical analysis themes in conjunction with the development of practical solutions. The phase also created realizations among Ivatans of the capacity of institutional DRRM policies to effect change, how such agency may have either enhanced or even diminished antecedent and established knowledge systems. If changes in Ivatan society were felt, the workshop's reflexive exercise may allow participants to understand the scale and depth of these changes, thus whether they manifest as superficial, operations-level modifications, or deep transformations of their attitudes, beliefs, and perceptions. If no changes in Ivatan society

were felt, this would provide clues to understand their own level of resistance to change as well.

The overall knowledge outcomes from DRRM plans and policy desk research, DRRM IKSP inventory validation, and understanding the perceptions of both Ivatan participants and the local DRRM Council were synthesized by creating solutions how to harness opportunities and solve problems. The Ivatan Stakeholder Synthesis phase thus addressed the possibility of both IKSPs and scientific knowledge to exist mutually and work collaboratively. The common goal of creating resiliency justified the potential for an Indigenous knowledge-science nexus, which signalled the recommendation of policy reforms and formulation of hybrid Indigenous-scientific DRRM processes. Specifically, this forward-looking phase encouraged stakeholders to take action through determining collaborative strategies and policy changes as a crucial agenda to be forwarded to local DRRM officials. My facilitative role was to assist in building capacity and encourage the community to identify solutions that fully represent their ideals and values.

An Ivatan stakeholder synthesis interactive workshop was held on 10 June 2019 that featured two important components of synthesis and discussion, and action planning. Attended by 17 stakeholders that included institutional representatives, DRRM officers in the provincial and municipal levels, civil society, government workers, and Ivatan Tribal Council representatives, the data-gathering capstone event centred on collaborative partnerships.

Specifically, an interactive hands-on workshop was an event highlight that was also capped with a culminating celebratory dinner. Like previous data-gathering events, pre- and post-workshop protocols such as recapping previous data-gathering activities and summarizing outcomes of the activity, respectively, were discussed though with an addition of next steps and the data-gathering conclusion. However and due to the limited time and richness of discussions, group presentations of their outputs were forgone. The hour-and-a-half event covered two main parts and their specific activities sequenced as:

- Part 1: Synthesis and Discussions. Aside from measuring the intension to use, outcomes of this exercise were recommendatory, requiring participants to determine the actionability and utility of IKSPs in DRRM.
    - Part 1 instructions, objective, and exercise question were disclosed.
    - Participants were requested to do a walk around and review outcomes from the DRRM IKSP Inventory Validation that were written on the displayed poster boards in the BSC library for everyone's view.
    - Four working groups were formed where participants discussed, deliberated, and provided critical points to the question, "What would you like to do with these IKSPs in DRRM?"
    - Answers were written in bubble diagrams emanating from the question in the centre.
    - Extending from the previous answer, another bubble diagram layer was drawn, with the response from the question, "What are the positive impacts or benefits of each answer?" An example is illustrated in Figure 10.

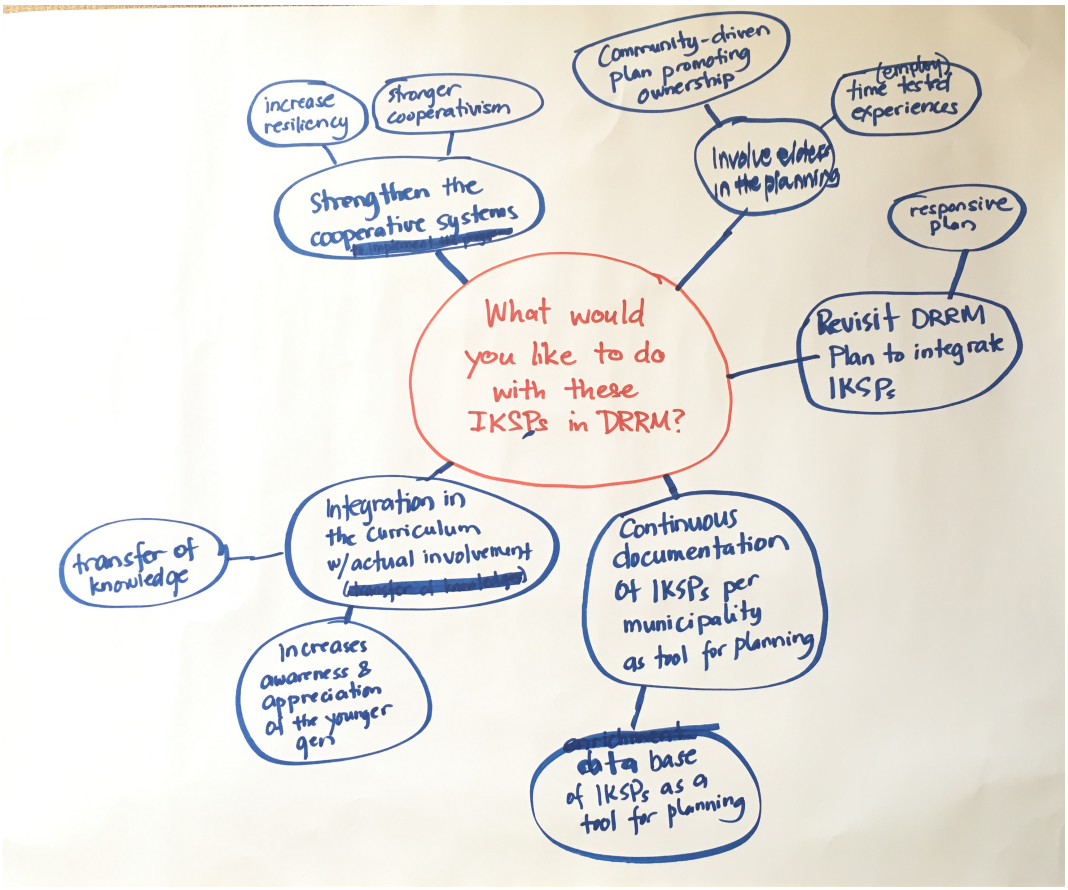

Figure 10. After discussing with each other, team members wrote responses in bubble diagrams that extended from the central pre-written question in red. Another set of bubble diagrams that indicated the benefits extend from the former. June 10, 2019.

- Part 2: Action Planning. The objective of this part was to crowdsource and collaboratively create a DRRM process that integrated Indigenous and technical systems to become a model example that the Provincial and Municipal DRRM Offices, as well as the community could adopt.
    - Part 2 instructions, objective, and exercise question were disclosed.
    - Three new teams with at least one member from either the P/MDRRM offices were formed.

- Each team were assigned to discuss either pre-typhoon, during typhoon, and post-typhoon resiliency practices.
- After the team formation and resiliency practice assignment, one or two topics from the workshop guide handout were chosen. Among the example topics listed in Table 10 included search and rescue, rebuilding damaged homes, and early warning systems.
- Soon after discussion, participants wrote the step-by-step process of the traditional method of the chosen topic on the left column on the provided manila paper worksheet.
- Afterwards, the previous step was repeated but on the right column that features the processes of the P/MDRRM offices. This exercise is highlighted in Figure 11.

Table 10

Workshop Guide Detailing DRRM Topics for Participants to Choose From

Pre-Typhoon	**During Typhoon**	**Post-Typhoon**
• Early warning systems or predicting weather • Preparations within the family / household • Typhoon-proofing property and infrastructure • Organizing emergency rescue teams • Food security and farm resource protection • Preparations within the community (outside of the household) • Education and training	• Search and rescue • Evacuation • Monitoring and checking your neighbour • Weather status checks and monitoring • Communications • Incident command system (what to do when communications are cut)	• Home and neighbourhood clean up • Rebuilding damaged homes / property • Food, farm, fishery resource recovery • Determining damages • Relief goods distribution • Livelihood or business continuity • Psycho-social trauma management

Note. The guide was created to facilitate a more time-efficient workshop; without the pre-listed topics, participants would still have been required to produce a topic, thus delaying the exercise.

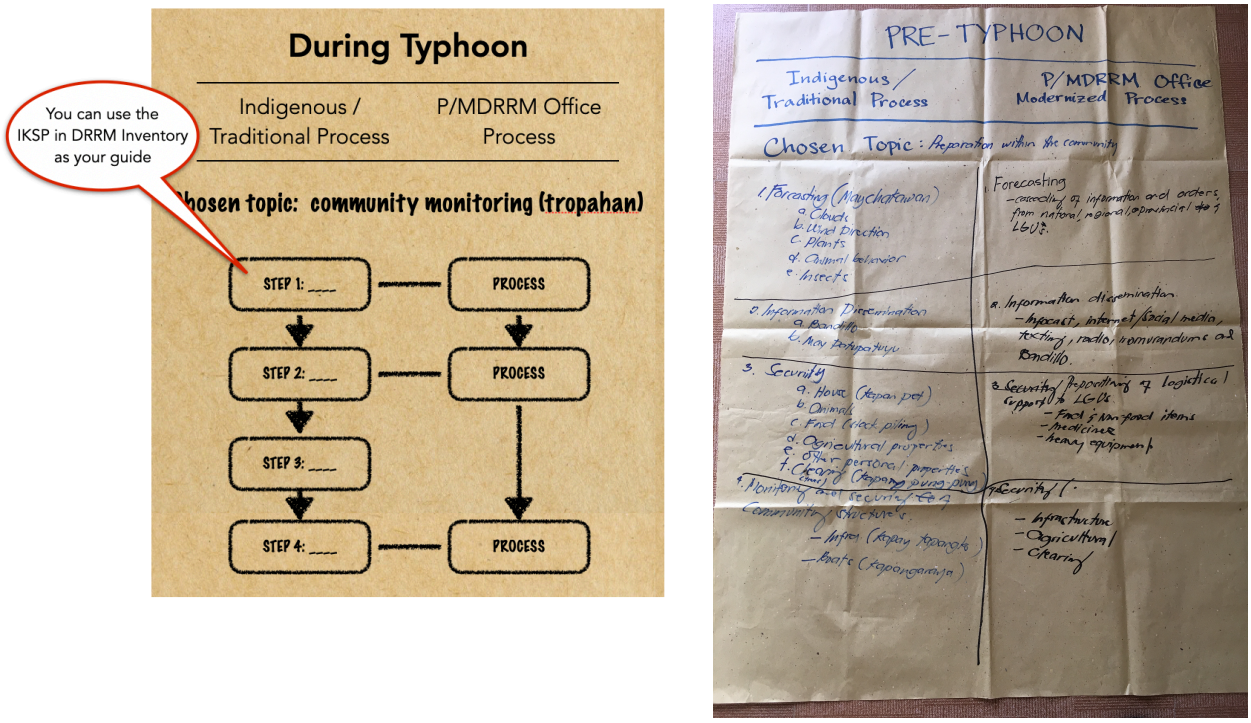

Figure 11. Part 2 worksheet examples. The left image is the conceptual example shown on the workshop presentation, while the image on the right is the actual worksheet scribbled by participants. June 10, 2019.

To conclude the session, a brief detailing of the data-gathering next steps was elaborated. It was necessary to mention how all the conducted sessions could be taken as models for future data-gathering exercises self-organized and administered by the PDRRMO. Encouraging greater involvement of elder knowledge-keepers would become valuable for future exercises and was collectively suggested by the participants. They were also reminded that I would be remotely presenting the draft final dissertation presentation in 2020, prior to the actual defence as per compliance with the signed MOA with the Ivatan Tribal Council. Overall, participants expressed great interest in further continuing the project in the future.

Pre-defence draft dissertation validation and presentation. Collaborative research with Indigenous Peoples require constant coordination and symbolic respectful gestures such as the provision of the draft dissertation and presentation of outcomes to the community prior to the official doctoral defence proper. Reifying the community-first principle through prioritizing community approval and presentation to the Ivatans first is privileging and just. As owners, keepers, and practitioners of Indigenous knowledge, the Ivatans are the rightful peoples to initially provide the draft for validation and present study outcomes not solely as a legal and obligatory commitment but as a continuous engagement in action research.

Following the completion and approval of the Dissertation Committee of the draft dissertation, its endorsement to the community was an opportunity for their initial reading and validation. This privileging of the draft to its eventual and ultimate recipients also enabled the community to be the first evaluators to scrutinize the dissertation. Other than for examining the accuracy of Ivatan vernacular concepts and terminologies, the provision of the draft became symbolic of transparency and continuous revalidation as per action research principles.

Given stringent COVID-19 pandemic travel restrictions that prohibited travel to Batanes during the pre-defence phase of the dissertation, a virtual Zoom video presentation was facilitated on 7 January 2021 as an alternative. Coverage of the presentation included essential dissertation subjects such as the research overview, activities, findings, analyses, conclusions, and recommendations. While the primary objective of the presentation was to impart the community with the outcomes of the dissertation, this secured a chance to seek further consultation and validation of the project holistically. Once presented, a symbolic gesture of seeking the Ivatan's community's permission and blessing was sought.

Post-defence recommendatory endorsements. Action research prescribes iterative and continuous processes of validation since these align decision-making to the primary beneficiaries of the research (Nicolaidis & Raymaker, 2017). Leveraged with approval from the Dissertation Committee, the recommendations were endorsed to the Ivatan community and

PDRRMO for subsequent constructive and collaborative comments immediately following the dissertation defence. In this way, communication and consultation channels were left open for constant recommendatory iterations, technical dialogue, and continuous improvements and contextualization of solution points. Thus, relaying enhanced recommendations to the Ivatans is the transition of ideas from academicians to practitioners.

It becomes important to note that the refinement of recommendations by the researcher during the dissertation writing process should not be misconstrued as antithetical to the co-production of solutions principle of action research. To recall, recommendatory strategies were initially crafted during the Ivatan stakeholder synthesis workshop and were further substantiated with constant back-and-forth consultations with the community during the writing of the dissertation. The defence would have served as an academic validation to ensure technical effectiveness and the soundness of the recommendations, which would then allow for further community contextualization. Integration complexities, the community's lack of experience, and the PDRRMO's call for technical assistance justified academic scrutiny.

Summary Matrix of Steps and Data-Gathering Facilitation Designations

For an enhanced and organized overview of the phases, activities, and the roles or outcomes of the stakeholders and researcher, the Table 11 matrix was produced. Please note that Table 11 focuses on activities with data gathering as the primary objective. Other activities previously explained in their respective headings such as Community Immersion and Building Linkages and Ensuring Compliance with Research Protocols did not require their own specific detailing in the matrix.

Table 11

Matrix of Activities Describing Data-Gathering Facilitation and Stakeholder Roles and Participation

Activity	Roles and/or Outcomes		
	Researcher	**Ivatan Community Stakeholders**	**Local DRRM Council (LDRRMC)**
Step 1: DRRM Plans and Policy Desk Research			
Collection of available national-level data and academic sources while in Canada	Familiarization of the research context, macro policies, journal articles through review of online data.		
Gathering of provincial-level data	• Data review to assess translation of national policies to action programs, in terms of consistency, rigidity, legitimacy, and effectiveness through the Provincial DRRM Plan. • Acquisition of IKSP DRRM inventory.		PDRRM Office assists by providing information on the development of the PDRRMP.
Gathering of municipal-level data	Data review to determine whether data/ordinances/ policies are generated upon strict instruction by National/Provincial DRRM Council or locally initiated.		MDRRM Office assists by providing information on the development of municipal ordinances.
Gathering of barangay-level data	Data review to assess and analyze DRRM-related tasks, milestones, and local ordinances.		Barangay DRRM Committee assists by providing information about tasks, milestones, and development of ordinances.

Activity	Roles and/or Outcomes		
	Researcher	**Ivatan Community Stakeholders**	**Local DRRM Council (LDRRMC)**
Post-data-collection and review in the Philippines	Researcher-based assessment of the degree of Indigenous vis-à-vis non-Indigenous knowledge integrated in the plans and policies.		
Step 2: Connecting with the Community and DRRM IKSP Inventory Validation			
Personal fellowship with the community	• Networking, bolstering social capital, trust-building • Familiarization and understanding of local context, sentiments, and best methods to conduct data-gathering	• Gradual awareness of researcher's presence in the community • Provide guidance and engage in data gathering with the researcher	
Courtesy calls	• Arrangement of courtesy calls with provincial, municipal, and barangay chief executives, community elders, P/MDRRM officers, barangay chairpersons • Immediate disclosure of research to chief executives but gradual disclosure to community elders	• Establishing rapport with researcher • Gradual understanding of research and acceptance of researcher intentions • Community leaders commit to participate	• Acknowledgment and recognition of researcher intention • Approval of courtesy calls

Activity	Roles and/or Outcomes		
	Researcher	**Ivatan Community Stakeholders**	**Local DRRM Council (LDRRMC)**
Public community event	• Planning, organization, and hosting of data-gathering event • Detailed introduction of research to community • Publicize DRRM IKSP inventory	• Participation in the event • Reflection and recollection of lived experiences and utilized DRRM practices • Collective discussion and validation of DRRM IKSP (co-creation of DRRM IKSP inventory) • Gain further interest and appreciation of the research	
Data review	Assessment and understanding which Indigenous practices are active and declining in use, their reasons, effectivity, etc.		
Step 3: Understanding Ivatan Perception			

Activity	Roles and/or Outcomes		
	Researcher	**Ivatan Community Stakeholders**	**Local DRRM Council (LDRRMC)**
Focus group discussions	• Planning, organization, and facilitation of FGD • Understanding whether the presence of the local DRRM council improves or diminish local systems, in the perspective of Ivatans • Understanding the depth of Ivatan perception changes or even tolerance to change	• Realize the duality of Indigenous and Manila-based systems of DRRM • Critical analyses and challenging of local DRRM initiatives • Realization of unequal representation, and imposition of non-Indigenous DRRM systems • Eventual response of the research question • Empowerment and appreciation from voicing out critique • Realize common thrust of resiliency	
Step 4: Understanding Local DRRM Council Perception			
Key informant interviews (KII)	• Planning, organization, and facilitation of KII • Understanding the level of awareness of the council of their impacts to local ways of managing disaster risk • Understanding of deliberate or unintentional influence of the council of their impacts • Understanding of the rigidity of top-bottom governance and strictness of compliance imposition • Draw a critique of power structures		• Acceptance and participation to KII • Provision of rationale for using local DRRM methods, initiatives, processes, and governance
Step 5: Ivatan Stakeholder Synthesis			

Activity	Roles and/or Outcomes		
	Researcher	**Ivatan Community Stakeholders**	**Local DRRM Council (LDRRMC)**
Public community event	• Planning, organization, and hosting of event • Recap of previous data-gathering activities • Facilitate stakeholders to generate critical questions	• Compare and contrast local DRRM council initiatives	
Synthesis and discussions	• Facilitate triangulation and cross-referencing of results from Steps 1 to 4 • Understanding Ivatan aspirations towards their IKSPs	• Review and re-validation of IKSPs in DRRM • Determining the actionability and utility of IKSPs in DRRM • Positive impact identification of using IKSPs in DRRM	Realization of challenges and opportunities in implementing DRRM initiatives while acknowledging their being Ivatan
Action planning	• Crowdsource the formulation of realizable solutions • Bridge Ivatan and P/MDRRMO strategies collaboratively	• Determining solutions for possible integration or co-existence of dual systems • Recommendation to the LDRRMC of policy reforms	• Determining solutions for possible integration or co-existence of dual systems
Wrap up	• Reporting back and dissemination of comprehensive data collected and initial synthesis for transparency • Pre-defence presentation	• Stakeholders validate and confirm researcher data • Stakeholders grant permission to researcher to pursue full data synthesis • Stakeholders comment on pre-defence presentation and grant permission to pursue defence	

Note. The term “Phase” and “Step” used in this chapter and the table above are interchangeably used. Although most activities for each step were organized in their logical and ordinal process, some may have been conducted simultaneously. Dates were not provided for this reason.

Chapter 5: Research Findings and Analysis

Meaning becomes substantiated under the rigorous processing of crude data. Post-data mining necessitates supplemented approaches such as understanding patterns to create more organized information (Weichselgartner & Pigeon, 2015) leading to the creation of understanding, new knowledge, and answers to research inquiries. Data is inanimate and will never speak for itself (Gould, 1981) unless methodically examined, contextualized, and critiqued under action research principles, transdisciplinarity, and the critical paradigm—the raisons d'être of this dissertation. It is essential to note however, that beyond uncloaking the unknowns and the creation of meaning, knowledge-making is only the penultimate outcome. Knowledge creation aids and justifies decision-making, transformative action, and positive change to accomplish the goals of the research journey.

Two broad objectives of divulging data-gathering results and employing diverse yet appropriate qualitative data analyses techniques encompass this chapter. Latter analytical techniques such as content, narrative, and collaborative analyses, as well as the traditional grounded theory analysis were utilized in creating greater understanding of the Ivatan condition. Minor quantitative analysis using software aids were also employed to complement the uncovering of latent information. For consistency and organization, subchapters referencing each of the five data-gathering process steps structure this chapter. Each subchapter delves into the data-gathering process outcomes followed by the uncovering of deeper knowledge structures, critical discourses, and emerging gaps through analysis. Being already discovered on the other hand, content uncovered in the secondary research from Step 1 remain an exception, where analysis will be directly divulged instead.

Acknowledging action research as the compass that guides the analysis outcomes is an essential foundation in this chapter. Action research also transcends from methodology into analysis (Flicker, 2014), as it becomes a joint effort, accounting for the diversity of epistemological traditions and the richness of analysis other than from the researcher but also from the primary knowledge keepers and users—the Ivatans. Through collaborative data

analysis, both etic (especially with secondary research analysis) and emic perspectives are cross-referenced, creating insider-outsider mutual discourse and corroboration. Retrospectively, tendencies to co-produce an over-abundance of data during stakeholder inclusion in the data-gathering exist. To enable effective analysis, data is jointly distilled and reduced for manageability and to avoid "analysis paralysis." Following collaborative traditions, co-produced knowledge is later aggregated, triangulated with reviewed literature, and synthesized in the Conclusion chapter.

Part 1: Data Presentation

Studies on Philippine DRRM governance and Indigenous Peoples. General to contextualized literature relating to DRRM and Ivatan Indigenous Peoples exists in the two fronts of institutional policies and academic studies, which will be further discussed in Part 2: Integrated Analysis. Much of this dissertation's core interrogations is relative to policy critique, especially with power structures wielding influence through government level hierarchies, and to a lesser extent with the academic studies front. The latter scholarly literature set places focus on descriptive, anthropological, and localized case-based studies, though none with critical dimensions. Altogether, secondary research with meticulous literature analysis is crucial to discover theory-laden content, expose the cracks in policy, sift through regulatory imperfections, and deduce the impacts they have. The etic perspective on the two fronts of the literature reviews is also an opportunity to offer the researcher a set of lenses to broaden and enrich the understanding of the research.

Validation of Indigenous Knowledge, Systems, and Practices in DRRM. Initial efforts by the PDRRMO in collecting local knowledge proved advantageous through skipping the data-gathering process and focusing on direct participant validation and justification of the use, challenges, effectiveness, and mode of transmission of the Indigenous Knowledge, Systems, and Practices (IKSP) inventory. Heavy symbolism was representative of the inventory formulation and the eagerness of participants to validate IKSPs as it reflected resident concern

for cultural identity preservation and appreciation of IKSP utility. Conducted in a safe and conducive space, the event outcome was highly interactive and productive. Other than validation results, excerpts from intense post-activity participant discussions are also included in this section.

To reiterate, validation criteria was contingent around five key variables that allowed greater understanding and evaluation of DRRM IKSP utility. Determining either the active or declining level of use enables theorizing the level of functionality and familiarity, as well as positing how contemporary or dwindling Indigenous weather prognostications and preparation practices are within contemporary Ivatan society. On the other hand, analyzing reasons uncovers causal explanations and premises for the active or declining utility. Identifying challenges for the DRRM IKSPs' use elucidates the issues and difficulties these practices face in contemporary application and may illustrate whether challenges were internally or externally induced. Metricating effectivity by rating it from 1 to 5 explicates how IKSPs demonstrate and produce their intended results successfully and accurately. Lastly, understanding how the IKSPs are transmitted is essential in understanding the level of access, acquisition, intergenerational transfer, storage, reproduction, and expression of knowledge.

Although no one among the interview participants took part in the formulation of the PDRRMO inventory nor has even heard that one exists, the validation event offered opportunity to examine, appreciate, and come face-to-face with knowledge that symbolically defines the Ivatan. By conducting an epistemological reflection and examination of IKSPs, their status, value, and utility are made more overt, thus creating further appreciation as well as potential concern. More specifically, validation becomes a key prerequisite to understanding pragmatic dimensions of IKSPs. Table 12 illustrates select subjects among the five pre-assigned DRRM IKSP categories, while the comprehensive table is further detailed in Appendix K.

Table 12

Condensed DRRM IKSP Validation Results Produced by Participants of the Inventory Assessment

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectiveness Rating (1 to 5)	Mode of Transmission
Animal and Human Behaviour							
Hermit Crabs (Umang — *Paguroidea*)	Abandon shore habitat to go further inland and in hordes to occupy holes and niches in walls, rocks or trees.	Strong typhoon	Active and declining	Still observed	• Due to technology, some folks prefer using [contemporary] weather forecasting • Lack of information [passed on] to youth	5	Orally transmitted by elders
Tagalit (*Todiramphus chloris*)	Seasonal fishermen never venture far out of sea until the bird sings at or near the beaches	Dangerous for fishing before the season	Active				
Other birds[a]	a) If birds are too active, such as chirping lively b) If birds just sit calmly	a) Fair weather b) Rainy weather	a) Active b) Active	Observed due to its accuracy	Due to easy access of internet-based forecast	5	Elders

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectiveness Rating (1 to 5)	Mode of Transmission
Fish	Generally fish don't bite actively when there is a coming storm. There is also a day or two when baits are swallowed deep into the stomach. At times, they take two hooks at a time.	Stormy weather / typhoon	Active	Still observed	Weather forecasting through internet	5	Elders
Elder people	Elder people simultaneously having arthritis	Bad weather	Active	Still observed	Weather forecasting through internet	5	Elders
Material Culture							
Heritage houses	a) Vernacular design using thick stone walls with thatched roofs	a) Storm proofing	Active	Still observed	Weather forecasting through internet	5	Elders
Attire	a) Vakul head gear for women to protect from both sun and rain b) Kanayi overcoat for men to protect from both sun and rain	a) Protection from the elements b) Protection from the elements	a) Declining b) Declining	Preference to readily available gear to combat sun and rain	• Declining produce of vakul and kanayi • If available, the price is too high • Declining farming activities	2	Elders

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectiveness Rating (1 to 5)	Mode of Transmission
Celestial Bodies and Above-Ground Phenomena							
Clouds	a) Maychavatuvatu (white) b) Maychavatuvatu (black) c) Maychavatuvatu (red before sunrise) d) Maychadadaji e) Angaringang (half-rainbow morning and afternoon)	a) Windy b) Winds with scattered light rains c) Strong winds and heavy rains occur within the day d) Fair weather e) Rain and gale winds	a) Active b) c) Active d) Active e) Active	Still existing, adoptable [sic], and comprehensible, and time-tested	• Because the youths are influenced by modern technology • Less interaction between the youths and the elder general communication gap	All 5 in this subject	• Thru [sic] actual experience or participation/ involvement • Family tradition • Indigenized curriculum
Sun	a) Large white or grey ring (ahad) with an opening rainbow color near the sun b) Mayvulilaw / maylanyag (appearance of the bright yellow sunlight in the morning or afternoon, disappearing quickly) c) Sunrays penetrating dark clouds d) Yellowish light of the sun with excessive heat	a) Storm or rain b) Typhoon or heavy rain c) Nyisu (windy day without rain) d) Rain or bad weather	All active	Still existing, adoptable [sic], and comprehensible, and time-tested	• Because the youths are influenced by modern technology • Less interaction between the youths and the elder general communication gap	All 5 in this subject	• Thru [sic] actual experience or participation/ involvement • Family tradition • Indigenized curriculum

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectiveness Rating (1 to 5)	Mode of Transmission
Moon	a) Large white or grey ring or rainbow color around it b) Fullmoon or newmoon — 3 days before kapay palang na tumayara am matimuy as an 3 days before fullmoon am mavid u kawan	a) Rain and typhoon very soon b) Rain	Active	Still existing, adoptable [sic], and comprehensible, and time-tested	• Because the youths are influenced by modern technology • Less interaction between the youths and the elder generational communication gap	All 5 in this subject	• Thru [sic] actual experience or participation/ involvement • Family tradition • Indigenized curriculum
Wind	a) A north wind when it is not the northwesterly season blows steadily and doesn't change b) Days of kuvi weather when it is not south easterly season and suddenly change to northern direction c) During a typhoon , the wind direction shifts to sumla (mamnaw) d) Very cold wind blows	a) Typhoon b) Weather disturbance forming, usually storms and typhoon c) Typhoon is over d) Weather changes	a) b) c) Active d) Active	Still existing, adoptable [sic], and comprehensible, and time-tested	• Less interaction between the youths and the elder generations • Communication gap	All 5 in this subject	• Thru [sic] actual experience

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectiveness Rating (1 to 5)	Mode of Transmission
Traditions and Faith-Based Systems and Practices							
Home preparations	a) Roof tying (kapanpet) b) Bracing doors and windows (kapanahtah) c) Covering windows (tapangku)	a) Storm proofing b) Storm proofing c) Storm proofing	Active	Still existing and adaptable		5	Observed
Communications	Dissemination of weather updates through bandillo (town criers)	Awareness and warning of inclement weather	Active			5	Observed
Cooperative practices	a) Kayvayvanan — family-based social cooperatives helping others in society b) Yaru — cooperative help involving the community, where members are given assigned tasks c) Kapañidungan — community or group help given to persons or families in need of more labour they can afford themselves	a) Forges strong solidarity and social bonds b) Creates a sense of "utang na loob" or a debt in service c) Strengthens social obligation to help	Active			5	Still observed

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectiveness Rating (1 to 5)	Mode of Transmission
Territorial Environment							
Plants	a) The new leaves of many species of banana fail to unfurl b) Leaves of the aryus (*Podocarpus costalis*) tree sprout any time of the year c) Dove orchid flowers appear d) Waling-waling plants blossom	a) Strong typhoon b) Rain c) Stormy weather and long duration of typhoon d) Heavy rain	a) Active for elders, but Declining for millennials b) Active c) d) Active	a) Passive b) Nobody explains to them. No care attitude because they obtain weather update from the internet c) d) They still hold true to the observation	a) Internet update is available. Younger generation want scientific explanations which the elderly could not provide b) c) d) No active protection of waling-waling (*kaduday*) plants	a) 4 b) 5 c) d) 5 e)	• Word of mouth from the elderly • Being taught in the schools through IPed [Indigenous Peoples education]

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectiveness Rating (1 to 5)	Mode of Transmission
Soil, rocks, or sand	a) Sand has a sharp drop formed by waves at their far reaches. Always observable before typhoons b) Mounds of gravel formed by waves distinctly observable during quarter moons in fair weather. c) Waves' force roils the sand at the sea bottom d) Grains of sand float to the water surface	a) Big waves to level the drop b) Big waves c) Stormy weather d) Typhoon	a) Active b) Active c) Declining		Construction of port improvement has obstructed/ disturbed the natural flow of wave and current	a) 3 b) c) 2	Seminars (NDRRM) [to] invite Ivatan speakers to talk about IKSP on Ivatan resiliency. (Publication)
Moisture	Concrete walls are cold and moist; the floors appears to have just been mopped	Rain	Declining			3	

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectiveness Rating (1 to 5)	Mode of Transmission
Maritime Environment							
Waves and the ocean	a) Long straight and unbroken sets of waves b) Smooth and glassy ocean waters c) The current flow in directions other than the normal flow of high and low tide currents d) Currents are also unusually strong e) Very large waves with crest, far apart, height about 10 feet or more. f) Medium waves about five feet or more g) Small waves about three to four feet	a) Tropical storm to super typhoon b) Squall or typhoon c) Storm or rain d) Storm or rain e) Super typhoon f) Typhoon – 100 to 150 kph g) Tropical depression	All Active		Availability and easy access to weather forecast thru [sic] internet	• 4 for a) to e) • 5 for f) to h)	Word of mouth

Note. Many sheets used in the actual validation exercise only had one response that was provided by some participants. These responses applied to all listed descriptions under their specific subjects. This was confirmed and verified by participants during the activity, who reasoned the unnecessary need for redundancies in their responses. This table is also a condensed version, featuring select result entries. Please see Appendix K for the complete table. May 30, 2019.
[a]Entries other than the prescribed IKSPs that were added by participants.

There is general concurrence among multiple stakeholders as well as the PDRRMO concerning the long road ahead for further data collection to augment the existing inventory. Indeed, much opportunity exists not just in collecting more but having data verified in the grassroots level especially in different municipal jurisdictions and smaller communities within Batanes. As knowledge-keepers of Ivatan traditional weather forecasting, many elder residents still have rich memories and actively use traditional ways. Elders however admit experiencing challenges by the accelerated use of other means and evolving preferences that render such knowledge unsustainable or worse, endangered (Participant 1, workshop communication, May 30, 2019). Thus, it is acknowledged that the inventory compiled in this dissertation is still a work in progress not just for anthropological and scholarship purposes but as a platform for instilling cultural pride and as reference for pragmatic tools for resiliency.

Longer years of exposure and experience commonly place elders as more knowledgeable in traditional resiliency systems (Billiot, Kwon, & Burnette, 2019), in contrast to younger generations who are still earning their awareness, experience, and Ivatan practices of resiliency. Ivatan youth are left with much reduced Indigenous knowledge transmission vectors due to uncontrollable factors such as lessened typhoon frequencies and thus the diminished exposure to resiliency practices. There is also tendency for the elder generations to forego the traditional due to shifting preferences to modern, often technological means such as through weather deterministic phone applications.

While the validation workshop provided an effective opportunity for local assessment of DRRM IKSPs, the richness of the post-workshop discussion outcomes became an unexpected yet pleasant departure from the workshop objectives. Participant interest instigated continuous unstructured conversations that candidly covered a range of topics such as strong weather experiences, effectiveness of Indigenous architectural designs and cooperative systems, social values, loss of traditions, and integrating scientific and Indigenous knowledge for resiliency. Expressions of critique concerning the approaches of the national government also became a significant part of the discussion without intentionally inciting such matters to

be delved upon. Elaborations and anecdotes per topic are divulged and translated in the following paragraphs.

Participants demonstrated acuity not just about storm occurrences or typhoon chronology in Batanes but as well as the distinct geographical features of the islands that explain their lower hazards compared to other areas. One participant explained for instance:

> We do have surges, and even big… Remember the 1987 tidal waves? We still have that, but why is it that we don't suffer like what [typhoon] Yolanda people suffered? Because Batanes and its natural height and elevation is above sea level. We are about 300 feet [91.44 metres] above the sea so all around the coastline are protected by height peaks and we have also the boulder beaches that really buffer the hitting of the waves. So I think that is one blessing that we have (Participant 1, workshop communication, May 30, 2019).

Another participant compared Indigenous roof designs using cogon (*Imperata cylindrica*) vis-à-vis more modern use of galvanized iron sheets. The ease of explaining architectural details highlighted the familiarity and proficiency of traditional means.

> Makapal talaga yung cogon, but when it's whipped by strong winds with water, mas makapal yung mababasa, and it becomes more dense. It will not move anymore with strong winds… Nung umpisa, nagagalaw pa, pero nung kumapal na siya, hindi na nagagalaw… And ang bubong na tin roof na GI sheets. Pag nagstart na kasi yun i-pump ng winds, mag-uumpisang umangat ang isang pako. Pagnatanggal na yan, tuloy-tuloy na [The cogon roofs are really thick, but when it's whipped by strong winds with water, a thick portion of the roof gets wet, and it becomes more dense. It will not move anymore with strong winds… At the onset, the roofs still shake, but when a thicker layer becomes wet from rainwater, the roofs become more stable from the heavy weight of the wet cogon. Compared to the galvanized iron tin roof sheets, when the wind start blowing, nails start getting pulled out. When that comes off, the damage just becomes more severe] (Participant 2, workshop communication, May 30, 2019).

It becomes essential to note that roofing strength is not an outcome from the use of cogon (*Imperata cylindrica*) alone but through the combination of other Indigenous roofing implements such as the use of kapanpet, the tight weaving of cogon-and-reed roofing shingle called *inatdes*, the meter-thick layering of cogon (*Imperata cylindrica*) layers, among others (Hornedo, 2013c; Ignacio, n.d.).

One participant expressed strong clamour for strengthening cooperative systems and was chimed in by the rest:

> Dapat i-strenghten pa yun e… yung cooperativism sa Batanes so that kasi pagkatapos ng bagyo, if you really want to rebuild your house na cogon-cogon yan, talagang kailangan ninyong magtulungan. Kung magkanya-kanya kayo, hindi magagawa. So kailangan pa natin palakasin yung mga cooperative systems na ganyan [The spirit of cooperativism should still be strengthened since if you really want to rebuild your house using traditional cogon roofing, you must all help each other. If you only do it by yourselves, it will be impossible. So we still need to strengthen those cooperative systems] (Participant 2, workshop communication, May 30, 2019).

The deviation from using traditional cogon (*Imperata cylindrica*) materials into GI (galvanized iron) sheets for roofing is being abetted by the Red Cross during their rehabilitation efforts following damaging storms. A participant elaborated in an example referring to Typhoon Ferdie in Mahatao Municipality:

> But dahil napakalaki ng impact ng mga nakaraang bagyo, the impact is just replacement that you can do… So ang madali like what happened in Mahatao, when we started touring noon, marami pang bubong na cogon. Pero nung bumagyo at nasira, ang binigay ng Red Cross ay ang GI at yun ang pinakamabilis, naging puro mga GI yung mga bubong doon [Because the impact of the last typhoon was so severe, roof replacement seems to be the only choice…. When we started inspecting places like Mahatao, cogon roof use was still common. But after being damaged by the storm, the Red Cross provided GI sheets instead since it is the fastest to replace, but as a result,

GI sheet use became the norm there] (Participant 3, workshop communication, May 30, 2019).

Participants also critiqued the government for their approaches to DRRM, dovetailed with an explanation how Ivatan values contribute to resiliency:

Ang nakakatawa po sa government, in so far as disaster management, disaster risk management, de kahon yon. And so, here comes the DILG assessing how far an LGU is doing… Eh Batanes never had this Gawad Kalasag. We're not even a passer of resiliency, but the cooperation of people before, during, and after calamity, especially typhoon, particularly typhoon, zero casualty, tapos mabilis yung pagtutulungan namin to recover, even nung wala pa yung national government, we have ourselves. We help one another and then… Sabi nga ng Red Cross, wala na silang nadatnan dito… Kasi naayos na namin. Kasi mahihiya ka. Mahihiya ka if you don't fix your house. Kaya yung ibang help that's coming from the national government, hindi ka maka-qualify dahil naayos mo na yung bahay mo, wala na… kulang lang kami sa documentation pero even without it, nandiyan pa rin yung identity namin as Ivatan, helping one another [What's funny about the government regarding disaster risk management is their boxed thinking. Batanes was never even a recipient of the Gawad Kalasag (an award for outstanding contribution to DRRM). We're not even a passer of resiliency, but the cooperation of people, before, during, and after calamity, especially during typhoons results in zero casualties. We're also quick in helping each other recover. Even if the national government has not arrived here yet, we have ourselves. We help one another and then… Even the Red Cross was surprised that there was nothing more to assist here since we have already cleared everything up. That's because you would feel ashamed if you don't fix your house. That's why the assistance coming from the national government becomes unnecessary anymore since the house is repaired already. We just lack documentation but even without it, our identity as Ivatan is still there, helping one another] (Participant 2, workshop communication, May 30, 2019).

> Camaraderie and self-reliance are also common values, according to participants: Mas uunahin pa namin ayusin ang bahay kaysa pumila sa relief goods… May na-eenjoy mo na malakas pa yung hangin, e nag-wawalis ka na. Tapos lahat kayo naglilinis. Tapos yung curiousity mo, sisilipin mo yung kapitbahay for damage or pupuntahan mo yung lola sa kabilang kanto, kumustahin mo kung napano siya [We would rather fix the house rather than line up for relief goods… It is actually enjoyable to start clearing debris even if the winds are still blowing. Then we all collectively help each other clear debris. It becomes common to be curious and check on your neighbour for damage, or visit the elderly in the next block to check how she is doing] (Participant 4, workshop communication, May 30, 2019).

Extending beyond the objectives of the workshop and without implying any recommendations for DRRM yet, participants already advanced by expressing interest in integrating Indigenous and modern approaches. A participant said:

> We want the cogon roofs to be maintained. But then, we have to be adept also with modern technology because that is what is available. We will not be forever bound. You say culture is improving, culture changes, but we should still have the basic Ivatan foundation of having the walls [of traditional Ivatan houses] be complete and then if we use the GI sheets, we should follow the way the cogon rafters are being placed. So, they would still be Ivatan houses, but they are moving into modern technology (Participant 1, workshop communication, May 30, 2019).

Understanding the Ivatan perception. Capturing local cognitions and purviews regarding the contrast between local and institutionalized DRRM approaches is the directive in this data-gathering step. Results not only provide an enlightening glimpse of local perceptions but extend further as interesting resident realizations of actual DRRM realities in Batanes. Several instances of nearly identical responses among different participants in different events mark the saturation of data within this small sample. Similar responses were also overheard in candid local conversations outside the research context. In this subchapter, select results from

the FGDs, organized by their respective themes and interview questions, will be divulged. Additional notes and initial analyses will provide another contextual layer to further substantiate the responses. For brevity, responses from warm-up rapport questions prior to the FGD proper were excluded in this section.

Theme: IKSP assessment. Technology's presence in daily life is ubiquitous, indicated by many participants' use of modern gadgets for determining weather conditions and for other uses. One participant indicated:

> Because of the modern technology now, we are abreast with the warnings, the location. Batanes may be backward in some ways, like when it comes to rural areas, but they [residents] are very very advanced in terms of technology. They even have these finders, gadgets, global positioning equipment (Participant 1, FGD communication, June 4, 2019).

Technology use is also multigenerational, claimed by a participant, "Almost everybody owns a gadget now. Almost everyone is connected in Batanes. Even the old people, old people who are not educated, those farmers who are not educated. They go to the field with their radios" (Participant 1, FGD communication, June 4, 2019). Though younger generations are said to be more technologically proficient, elders who still practice traditional weather forecasting also validate their prognosis with the youth. When asked how this is done, a participant mentioned, "So the elders learn to ask the computer-literate youth now" (Participant 1, FGD communication, June 4, 2019). Validation was clearly stated by a participant:

> This is where they meet: the old people will just look at the skies, the signs of the typhoons, or [when] the change of weather comes. When they see that, they will also verify it. I think they [Ivatans] are actually reconciling and validating what they have seen (Participant 1, FGD communication, June 4, 2019).

A majority of participants agreed how cooperative traditions are still strong and widely used in all typhoon phases. "Dito namin pinapairal yung tulu-tulungan na tinatawag na yaru [Here, cooperative systems like yaru is still practiced]," said one participant. Batanes' frequent

typhoon endemism, allows continuous resiliency practices and learning, as affirmed by a participant, “Dito parating… Ang mga Ivatan tinuturuan tayo ng bagyo. Teacher natin ang bagyo [Frequent storms always teach us to become resilient. Storms are the Ivatans’ teacher]” (Participant 5, FGD communication, June 4, 2019; June 5, 2019).

Upon asking about IKSP mainstreaming in the generation of climate change, many participants already have notions of integrating traditional and modern means for resiliency. A participant stated, “So I think maganda yung collaboration, sir. Yung mix ng bagong technology sa old practices ng mga Ivatan [So I think its good to have a collaboration, or the mix of modern technology and old Ivatan practices]” (Participant 5, FGD communication, June 5, 2019). Although indirectly[1] tying advanced weather forecasting with community preparedness and cooperativism, one participant expressed the effectivity of collaboration and impacts to behavioural change:

> So para sa akin sir, effective pa rin yun, at the same time in collaboration with yung mga bagong technologies, is na ii-strengthen siya. Example sir is meron si Ferdie is ginawa yung side niya, and then yung trauma at the same time, yung biglang meron another bagyong papasok sana, lahat sobrang red alert [For me, traditional means are still effective and are strengthened in collaboration with new technologies. For example, the traumatic lessons learned from Typhoon Ferdie allowed the community to use advanced weather forecasting while mobilizing yaru principles. So when the next storm was about to come, the community was better prepared and was in full red alert] (Participant 5, FGD communication, June 5, 2019).

Theme: DRRM Council approach. When questioned about the differences between institutionalized versus Ivatan methods in disaster risk management, a participant mentioned how Ivatan society in general, without pertaining to the prescriptions of the Provincial or Municipal DRRMC, already uses modernized means. This is evident in Ivatan architecture in

[1] Indirect communication, where meanings are not explicitly communicated, is common in the Philippines. Clear meanings were added by the author in the translation.

general and roof repairs specifically, where designs follow traditional yet modified ways. Modifications through alternative material use was coined by this participant as “resources” in the following quote:

> They are not using the native roofs and are now using the commercial roofs, which are stronger or they use the steel cables, which is stronger also. But they follow these steps and still follow the old ways but they modernize the resources, instead of going for the weaker ones like the cogon (Participant 3, FGD communication, June 4, 2019).

While both Provincial and Municipal DRRMC are mandated to react and follow certain protocols for disaster risk reduction, Ivatan society still engage in self-help or communal assistance practices without having to rely on government support. A participant said, “Kung nasira yung daan niyo, yung common na daan niyo, sabay-sabay kayong… hindi hintayin yung gubyerno magrepair niyan. Ganun. Maganda [When the road gets damaged during a storm’s aftermath, the community repairs it immediately without having to wait for the government, and that’s great]” (Participant 7, FGD communication, June 5, 2019). Another similar response highlights their pleasure in helping others:

> Yung isang na-eenjoy namin sa barangay is yung cooperation during the typhoon and the after. Umiikot po kami during the typhoon, kung meron may mga in-need, kasi may mga action team ang mga barangay. Hindi lang kami yung kaming actually na tumutulong, kahit yung mga kapitbahay tinutulungan [*sic*] [What we enjoy in our barangay is the cooperation during and after typhoons. While the official barangay action teams are instructed to do this, we nevertheless inspect the community during typhoons and when there are those in need, it is not just we who help but the neighbours as well] (Participant 5, FGD communication, June 5, 2019).

A clear difference, according to participants, is evident through the conventional government procedure of distributing relief goods. One participant declared how such procedure is unneeded in their municipality:

> And yung nakikita ko sa government is yung preparation nila, sa relief goods. So yun, dun sila nag-aano, kasi inisip nila yung wala pong naimbak na pagkain or ganun. Pero sa amin sa Itbud, yung banda sa amin, hindi masyadong problema yung supply ng food, kasi secured e [What I see in the government is their preparation of relief goods. They are preparing for those who were unable to prepare or stock up on food. But in our community in Itbud, the supply of food is not really a problem since we've already secured that] (Participant 5, FGD communication, June 5, 2019).

Theme: resident critique of external interventions. There is confidence among participants in declaring that IKSP use is still strong despite the activities and initiatives of government DRRM councils. Somehow residents are able to engage both Indigenous and non-Indigenous ways though separately. In comparison to the numerous identical responses from participants, this statement asserts IKSP use yet also implies the possibility of its threat from discontinuity. This is symbolic from the penultimate sentence in this quotation, "The Ivatans are adapting to anything na minamandate sa kanila [that are mandated to them], but the most important thing is the Ivatans are not abandoning the IKSPs, not abandoning the time-tested practices in preparing for disasters. So far" (Participant 4, FGD communication, June 4, 2019).

One participant critiqued how policies and mandates would structuralize and formalize basic social units. Consequently, prescription becomes unnecessary and ineffective since camaraderie is not bound to institutions or structures in the local context. A participant explains:

> Iniisip ko sa mga committee-committee na yan… kasi sa Batanes, tropa-tropa lang yung imiikot e. Pag nationally-mandated, may mga chairman na yan, so yung mga barkadahan na yan mapapapunta mo sa mga meeting? E itong mga barkadahan, walang mga meeting-meeting yan… Kung iorganize mo yung mga yan, pupunta kaya yan? Mag-aattend kaya yan sa meeting? [Mandating the creation of formal committees in Batanes may not apply because locally, assistance is informal practice

> among circles of friends. In nationally-mandated structures, formal responsibilities among stakeholders are invoked by chairpersons. If that is so, would informal groups act effectively in such formalities? Friends and cooperative groups don't require meetings. If you organize them, would they attend?] (Participant 4, FGD communication, June 4, 2019).

Policies that structure informal social units are said to mask political motives, asserted by one participant; national policies also politicize assistance. Because formalizing committees require funding, there becomes an implicit avenue for potential corruption. A participant mentioned, "Yung sa national? [About national policies?] Talagang politicized yan… [That's surely politicized] And they do that in order to get assistance, yung [the] funding. Ayan… [There you go] Because they will not be given funds if they do not have these organized plans [structures]. Siempre may plans, may budget [When there are plans, there will surely be a budget]" (Participant 1, FGD communication, June 4, 2019).

Monetization of favours also stigmatizes that any help must be paid. Accounted by one interviewee:

> What was very important to us before was the goodwill economy because you have to be good to your neighbours because they would come to help you. So, you want to be good to each other because somewhere in time, you have to need them… But lately of course, it's now the money economy… Well, money is there to get people to work on whatever project you want, so the money now is the factor that somehow brings in the relationship. Although hindi naman nawawala yung goodwill economy [although the goodwill economy will not wane] but in terms of getting people to help you, it is as if money talks (Interviewee 4, personal communication, June 19, 2019).

Furthermore, structuring informal systems undermines volunteerism. It becomes degraded because mandates inhibit non-formalized assistance and instead privileges officials to carry out assistance work because they are paid to do so. Fulfilling state obligations rather than social contracts become essentialized, as asserted by a participant:

> Yung spirit of volunteerism na dating ginagawa dito, irerely nalang sa mga nakalista dito na committee na ito o sinumang nakaupo dito — e yun naman yung trabaho nun e. Unlike yung informal structure na ginagawa natin, na 'o tara, tulungan natin si ganyan…,' kelangan yan ng tulong, wala siyang bigas, wala siyang pagkain, o may bahay diyan na may matanda na walang kasamang lalaki, kelangan i-secure yung bahay niya. Ngayon, pag nasa structure na yan, e sila yung may ano nyan… Sa barangay yan [The spirit of volunteerism that has been a tradition here is disregarded and assistance is just relied upon those committees or elected officials because helping is their job. It is unlike the informal structures that we practice where we just willfully help those in need, or those who have no rice or food, or if the elderly needs help in securing their house. When it becomes structured, it then becomes the sole obligation of the barangay] (Participant 4, FGD communication, June 4, 2019).

Because assistance such as relief goods and other services become freely provided by the government during disasters, residents consequently become dependent, easily dissatisfied, and querulous when withheld of their expected support. Some residents even become furious. This dependency eventually becomes politicized when officials become willing to satisfy expectations to gain voting favour in the next election. According to a participant:

> Kung hindi mo naibigay, magtatampo. So yung, sa umaasa ka…. Umaasa ka ngayon sa gobyerno. And then they will begin to say… ah politika yan e… dapat si ganyan yan e… papasok na ang politka diyan, mamaya… kaigbigan kasi ni mayor yan e… So si mayor will try to satisfy them because in the next election, hindi na siya bobotohan… [If the government does not provide, residents will complain. So then residents become reliant to the government. That then becomes politicized. That resident becomes the mayor's friend, so the mayor will try to satisfy them to win votes for the next election] (Participant 8, FGD communication, June 5, 2019).

Dependency also changes social behaviour. This is not an unknown concern for many residents, with some even fearing the undermining of traditional values. A participant worried, “Tsaka every after typhoon, hihingi na kami ng relief goods. Yan yung nakakatakot [After every typhoon, we now demand for relief goods. That is worrying.]” (Participant 7, FGD communication, June 4, 2019). Parallel to this, another participant even fretted how the traditional treatment of one’s neighbour as the nearest point of refuge becomes eroded because of the expectation to be doled out in evacuation centre. As simply described by the participant, “May libreng pagkain naman sa evacuation centre [There’s free food in the evacuation centre anyway]” (Participant 5, FGD communication, June 5, 2019).

Another participant conveyed a story consistent with how policies such as the Batanes Protected Area Act prohibited certain customary ways that contribute to resiliency. Many sinadumparan that are left derelict today, according to the participant, were a result of the halting of traditional house building practices since the collection of raw materials for construction was banned by the policy. As a further consequence, expertise was lost due to waned practice. As a form of aid and proof of its benevolence, government agencies freely provided light materials such as GI sheets for roofing, which were eventually damaged or blown away in succeeding storms. This further reinforced not only the cycle of dependency on spoon-fed aid but the abandonment of sinadumparan construction as well, stated the participant.

Theme: convergence of Indigenous and modern. There is general favour among stakeholders for the traditional-modern DRRM method nexus. Between traditional and modern, the latter is resonantly idealized and symbolized as a forward-looking aspiration for Ivatan society. Still, Indigenous resiliency traditions were viewed as important and unnecessarily obsolete. Cautionary integration, where the application of modern and scientific techniques is carefully and collaboratively grounded by tradition and social acceptability, is summarizable in the participants’ responses. As expounded by a participant:

> I would still hope that they marry—the Indigenous [and scientific] knowledge systems regarding disaster [risk reduction]. But so they [DRRM Councils] would not insist, what science can tell the people but also respect what all these Indigenous peoples know and what they have learned since time immemorial because they [IKSPs in DRRM] have been proven to be true (Participant 1, FGD communication, June 4, 2019).

Despite many participants' appeal for modern DRRM means, some treat it more suitably as complementary and secondary only after Indigenous knowledge. One participant relayed, "If the policy or the PDRRMC will still value the Indigenous ways, [for the] prevention ng ganun [of] disasters. Papasok lang siya [Modern ways will only be utilized] as something to strengthen the culture. Hindi yung kakainin yung buong culture [It's not going to modify the entirety of cultural practices]" (Participant 6, FGD communication, June 4, 2019). How modern means function as an ancillary to traditional ways is also paralleled by another participant, "Kung ano yung nakagawi noon, and then yung pagpasok ng modern, maganda. Basta this will help the traditional, na nadadagdag yung reach para mas ma-enhance pa nila yung way of preparing for disasters. [The accompaniment of modern means to what we have been used to since then would be good, as long as the modern could enhance the traditional ways we prepare for disasters.]" (Participant 9, FGD communication, June 6, 2019).

With a reflective and self-critical tone, one participant also justified the necessity of integration due to the changing climate, while implying the corollary need for innovating current Indigenous resiliency systems for safety:

> …Hindi namin puedeng ibandera yung nakagisnan na namin [we cannot be complacent to what we have been used to]… The climate has changed and of course [because of] those phenomenon [*sic*]… things that we are having [traditional ways] could fail kung ito tututukan lang namin ito [if these are only what we will use]. There has to be an integration. Ivatans should be open minded to the introduction of these things they have studied scientifically. We have to be safe (Participant 8, FGD communication, June 5, 2019).

Many participants attributed integration challenges to the long adjustment period, local resistance, and the DRRM Councils' lack of sensitivity to cultural nuances within the local context. Negative socio-behavioural impacts from integration were divulged with one participant who lamented, "Pero kapag sinabi nating advanced technology, parang it will lead us to laziness [But if it's about advanced technology, this may lead us to laziness.]" (Participant 10, FGD communication, June 5, 2019). Additionally, two particular challenges for merging Indigenous and modern means were community buy-in and social operationalization, as one participant mentioned:

> The challenge siguro is, if the national government will mandate that… how to let the people join it without yung hindi siya forced… coerced… aside from that… They are not bounded to utang na loob. May challenge eh, pano mo ipapagalaw itong mga… informal groups na 'to, under a structure. Kung paano mo sila mapapagawa. Mamaya… may bayad. [Perhaps the challenge if the national government will mandate structured and modern processes in DRRM is how to let people accept them without being forced, coerced, or bounded to indebtedness. The challenge is how to mobilize informal groups under a structure. Mobilizing them may be misinterpreted as something that requires an exchange of payment.] (Participant 11, FGD communication, June 6, 2019).

One participant viewed the challenges of integration as the clash between paradigms, or which the participant describes as "disciplines." There is a point in the participant's statement of the inevitability of conflict due to the classic epistemological superiority complex in the employment of either social versus natural science approaches in resiliency. This was substantiated by a participant by stating:

> Kasi magkaiba yung discipline ng dalawang ito. Definitely magkakaroon ng glitch later on diyan if they will not respect each other. Itong kabila is scientifically, of course may proofs. Yung kabila is may time-tested. Instead of magkaroon ng magandang collaboration, lalo pang sumabog, or lalong walang hindi mangyari [There is a difference

> between Indigenous and scientific approaches. Definitely, conflict can happen if they will not "respect" each other. The scientific approach is effective because of demonstrable proof, while Indigenous knowledge is effective since it is time-tested. Instead of creating a setting for good collaboration, their differences may just become complications and render integration as useless.] (Participant 6, FGD communication, June 5, 2019).

In all FGDs, participants balanced critical integration standpoints with optimism. A number of recommendations to enable smarter Indigenous-scientific integration were offered by participants through inclusive planning, education, and practical experience. One participant proposed inviting elders in DRRM planning, "Maganda yung nagcocombine, nagtutulungan sila. So lalo na iconsider yung core group nung DRRMC na nandyan yung matatanda namin, yung mga experts. We regard them as experts, para ma-share nila [It is good that they would combine as they complement each other. I hope that the DRRMC core group consider our elders as we regard them as experts who would be willing to share their knowledge.]" (Participant 8, FGD communication, June 5, 2019).

The FGDs also highlight the importance of Indigenous teachings in the curriculum as an effective means for continuous transmission of Indigenous resiliency knowledge across generations, as one participant stated:

> I think… the children should be educated by Indigenous [elders], [as part of the] indigenization of the curriculum. When we say indigenization of the curriculum, we follow the [standard, nationally-prescribed] skills that are being thought but the content should be the Indigenous practices and resources (Participant 12, FGD communication, June 5, 2019).

Participants also indicated the importance of learning that transcends from books and classroom settings. Practicing and applying knowledge is not only an effective means for cultural transmission but for tightening familial relationships since resiliency is often practiced among family members, as mentioned by a participant, "OK din yung classroom setting but the

best teacher is pa rin is when you're actually doing it outside. Kapag bumabagyo na, isama mo yung anak mo, 'tara… tulungan mo ako dito.' Hands-on. [The classroom is OK, but the best teacher is still when you're actually doing it outside. When the storms come, bring your child to help you out. It is quite hands-on.]" (Participant 4, FGD communication, June 4, 2019).

Understanding Local DRRM Council perception. Members of local DRRM councils happen to situate themselves in dichotomous positionalities simultaneously identifying as Ivatan and civil servants assigned to implement mandates that are arguably conflicting with local Indigenous systems. Such circumstance sets an enriching platform for understanding and analyzing local DRRM council perception. An understanding of value systems and rationales subscribed from both professional and personal purviews would shed light on the strict or lax policy implementations, deliberate or unintentional social influence, and compliance methods given the interviewees' circumstance. Due to the comprehensive outcomes from face-to-face interviews, only select results arranged in respective themes will be expounded in this subchapter. Similarly, responses from rapport questions have been forgone to focus on analytical discourse.

Theme: personal perspectives on resiliency. Interviewee responses reveal deeply-rooted and pre-understood Ivatan resiliency principles in the face of inclement weather. Even when faced with expected aid and structured response protocols by the government, local values still prevail according to interviewees. One of them expressed, "Abalang magwalis, abalang maglinis, magrepair ng bahay, wala man lang kami nakitang pumipila kay mayor, pumipila para sa pagkain. Sabi namin, ay talagang wala because that is part of our resiliency [We get busy cleaning, busy clearing debris and repairing the house. No one can be seen queueing to the mayor for food. There isn't anything like that here because being self-reliant is part of our resiliency.]" (Participant 5, workshop communication, June 10, 2019).

Another interviewee simply highlighted a relational, as opposed to confrontational, perspective of living in harsh environments, saying "… you're not going to fight with the nature

because you have to dance with nature…" (Participant 13, workshop communication, June 10, 2019).

Theme: rigidity in implementing institutional DRRM initiatives. Overall, all interviewees asserted the serious obligation to implement DRRM initiatives due to their formal promulgation as law and expectation by central authorities. In a forthright manner, one interviewee mentioned, "We are strictly implementing the procedures — because we have to comply and we have to report afterwards" (Interviewee 4, workshop communication, June 10, 2019). Cases where the reluctant shelving of Indigenous know-how in the name of authoritative compliance occurs, states one interviewee, "So sometimes the [DRRM] program na binibigay sa amin [that is given to us], we have to comply. Parang ganun na lang [It seems that way]. Setting aside everything we know." (Interviewee 4, workshop communication, June 10, 2019).

Supplementing the rigidity of implementation, one interviewee also disclosed how all local plans are extensions of RA 10121, mentioning, "Batas po yan e. Doon sa RA 10121, yun ay…ano, batas talaga. Kailangan… Dun na namin kasi binabase lahat ng mga katulad nitong plans namin. Siempre, gagawin namin na halos i-base dun [To implement DRRM is the law according to RA 10121. It is a legal imperative. That's the basis for all our plans. Of course, we must ensure all our plans are based on the law.]" (Interviewee 3, workshop communication, June 10, 2019).

Despite the rigidity, all interviewees expressed vacillation and difficulty in implementing programs and other sworn responsibilities in light of their Ivatan identity and traditions. Upon asking whether they become torn from the responsibility of implementation, "Yeah, para bang… most of the time, magtitinginan na lang kami… 'do we need to do this?' [Yeah, just like most of the time, we often look at each other in bewilderment and ask 'do we need to do this?']" (Interviewee 5, workshop communication, June 10, 2019). In a similar case, an interviewee found their duties as ironic and unnecessary, which were also recognized by community members as an exaggeration of threat. The interviewee voiced:

> And meron pa mga sinusundan na memorandums ng preparations na parang… reminder on how to prepare… na parang napaka sarcastic pa nga ng dating na 'aanhin pa namin 'to, e tumanda na kami na ganito sa Batanes na hindi naman kami naaano ng bagyo no?' And we know those procedures already pero pinapaigting namin through the national laws na binababa din sa amin… Nakakatanggap kami ng sagot na parang 'wag na kayo manakot'… [There are even memorandums to follow that are like reminders on how to prepare, which are quite sarcastic since we always ask 'why do we still need these since we've already lived for so long in Batanes that storms don't really impact us.' We know those procedures already but we intensify them with the national laws that are passed on to us. So when we implement them, we then hear the community respond, saying, 'don't scare us.']. (Interviewee 5, workshop communication, June 10, 2019).

An interviewee also critiqued the red tape enmeshed in post-disaster institutional processes by commenting:

> Every time na may [that there is a] disaster, you have to establish an incident command post and command system, na napaka-structure nung [which are very structured]… you have a lot of forms to fill out before you start with the operation, there's a lot of meetings [*sic*]… gagawa ka ng [you have to assemble] group [groups]… yung team may planning, may finance.. ganoon [there are teams on planning, finance, and others]… Pero sabi ko, pagdating ng disaster [But I lamented, when a disaster strikes]… do we really have to do all of this? (Interviewee 5, workshop communication, June 10, 2019).

While challenging, interviewees also expressed open-mindedness about compliance, being aware of the advantages of supplementing localized resiliency, stating "Since it's already part of the law, we have to comply it in a way na hindi naman tayo maging masyadong [that we don't become too] complacent, because delikado rin [it can also be dangerous when disregarded]."

Theme: how NDRRMC initiatives impact local ways of DRRM. No direct statements on how institutionalized DRRM initiatives impact local resiliency means were provided by interviewees, though one stated an observation how modernized ways pervade society. It must be noted though that such a statement does not necessarily implicate the National nor Provincial DRRM Council as the main influencers for the changes in local DRRM practices. One interviewee discussed, "… ngayon [recently]… they [residents] are starting to rely on the scientific ways na rin [as well]… the community, although they have their own way of forecasting weather or… ngayon [today] they… kinocombine nila e [are already combining both scientific and local means.]" (Interviewee 4, workshop communication, June 10, 2019).

An interviewee also narrated an observation that despite the implementation of their initiatives, residents continue to rely on traditional ways as a validation instrument against what the DRRM councils prescribe. That interviewee detailed, "Yun nga yung nakakatuwa dun na somehow parang they… vinavalidate nga nila, parang… naniniwala din sila sa scientific ways and at the same time …. inaaadopt pa rin nila yung dati [What's really interesting somehow are residents that validate what they know. They believe in scientific ways and at the same time they still use traditional means.]" (Interviewee 4, workshop communication, June 10, 2019).

Theme: integration of Indigenous and modern resiliencies. Without alluding details that would preempt the topic of integrating scientific or modern DRRM means with Indigenous practices of resiliency, all interviewees altogether suggested the potential of integration. When asked directly, an interviewee simply stated, "Oo, dapat talaga… yung lagi naming… magfocus sa integration talaga [Yes, integration should definitely be done. That's what we always strive to happen, to really focus on integration.]" (Interviewee 5, workshop communication, June 10, 2019).

Instead of the fusion of Indigenous and modern, an interviewee interprets integration as the contextualization of scientific means to add value and supplement existing local ways. There was also a recommendation that operationalizing integration would still centre the

strategies in the DRRM plan as the heart of resiliency, while localized for the community's utility. That interviewee stated:

> Based on the plan itself, the DRRMP, the plan [*sic*], we look at it as parang basis namin [our basis]. But in terms of resiliency, since this is already… been sa amin [something we know well], we try to localize it [strategies from the DRRMP] in a way that it will be understandable to us, because science is there and if we're going to utilize [it]… o hindi naman masama kung gagamitin namin…[it would not hurt to use it]. But we're not setting aside our knowledge. So what happens then is we're going to combine it [Indigenous and scientific DRRM practices] (Interviewee 4, workshop communication, June 10, 2019).

Theme: challenges in integration. Integration has limitations concerning the DRRM councils' operational capacity and funding, as well as the community's acceptability, capacity, and intergenerational transmission. DRRM councils have technical constraints and human resource limitations in integrating Indigenous and modern, which is affirmed by an interviewee who mentioned:

> Ang hirap lang kasi, we have limitations… we started it diba, yung documentation, pero dahil sa konti kami at ang dami ng focus namin… hindi pa namin magawa. Hindi kami makapagfocus sa pagco-continue ng… especially yung sa writeup portion. Kailangan namin ng siguro technical assistance for putting it together. [It is difficult since we have limitations. We started the documentation but since our office is understaffed and we have so much work, we could not do it. We could not focus on continuing the writeup portion. Perhaps we need technical assistance for putting it together.] (Interviewee 5, workshop communication, June 10, 2019).

Local resistance to using modern and technical equipment, implied as the use of weather monitoring gadgets and meteorological tools, exists, according to an interviewee, who stated, "There are mga old-school. We say we need to buy this… 'di natin kelangan niyan,' sasabihan sa amin" [There are those who are old-school. We say the community collectively

needs to buy this modernized equipment… 'we won't really need that,' as they would tell us.] (Interviewee 4, workshop communication, June 10, 2019). The community's combined traditional mindset and lack of acceptance compound the DRRM councils' efforts on integration. One interviewee discussed:

> Kasi kailangan mapractice siya ng community diba? Hindi yung push lang kami ng push tapos the community, hindi sila receptive dun sa change. Kasi alam mo ang elderly, hindi na siya masyadong receptive sa change. Parang… seniority… yung concept ng authority… [It should be practiced by the community, right? We cannot just implement this while the community is not receptive to change. You know the elderly, some of them are not receptive to change, since seniority is authority.] (Interviewee 5, workshop communication, June 10, 2019).

An interviewee indicated that even if the impracticability of integration would resort into the localization of DRRM technical initiatives instead, their responsibility and efforts would waive their liability, should there be local resistance. That interviewee indicated:

> Meron pa rin mga [There are still the] old-school. They will not accept it at once… Wala kaming magagawa [We could not always convince them] but we have to be insistent in a way that whether they will accept it or not, we have to give. Kasi bahala na sila kung mamatay sila basta ang importante [It is up to them to bear the risk of fatality, but what is important] is we have did [*sic*] our part. Because that's the nature of our job, the responsibility. And besides, hindi kami masisisi once na may mangyari [we would not be held responsible if something bad happens.] (Interviewee 4, workshop communication, June 10, 2019).

A specific challenge to integration are the practicalities of transmitting paradigmatic integration of resiliency means. While DRRM councils highlighted the potential for the IPed program of the Department of Education as the mechanism for intergenerational transmission of integrated knowledge, there is still concern about household modelling and reinforcement. One interviewee articulated:

> Although with the help of the Department of Education, malaking tulong yun…. Pero ang problema… oo nga… inaccept ng Department of Education, indadopt nila… inintegrate nila sa school, what if pagdating naman sa bahay… iba naman yung practices na nakikita nila, so it will be useless [Although with the help of the Department of Education, that is great help. But the problem is, despite the Department of Education's acceptance, adoption, and integration to school, it would still be different at home. The children observe different practices, so they will be useless.].

Theme: transferability of Ivatan resiliency systems to other contexts. Although more centric to existing DRRM practices, all DRRM Council interviewees expressed interest and mentioned the active transfer of Ivatan resiliency systems to other areas outside Batanes. Other than transmission, one interviewee also asserted the advantages of the transferability of knowledge, stating, "This can serve as a reference for the future generation. One thing for sure… Even other provinces [ask], 'tapos na ba, puede bang makahingi ng kopya?' ['Are you done with the documentation of Indigenous means for resiliency? Can we request for a copy']? We really wanted to replicate it." (Interviewee 4, workshop communication, June 10, 2019). In parallel, another interviewee highlighted favour for the sharing of Ivatan resiliency means, "Now we are trying to… let them [other municipalities outside Batanes] know the applicability, the functionality ng [of] Indigenous practices natin [from Batanes] for them to replicate if possible, for replication ng ibang [of other] places." (Interviewee 4, workshop communication, June 10, 2019).

One participant even proudly claimed the effectiveness of the *tapangko*, or the means to protect windows from typhoon damage, when shared to and applied by other jurisdictions:

> One example is yung [the] tapangko. Dito lang yan [that is only used in Batanes]. Walang term yan ng Tagalog e [There's not even a term for it in Tagalog]. One office that really… ginamit na [used it] is our own Office of Civil Defence in Region 2. The regional office. Why? Because when Typhoon Lawin… [previously] blew up the third floor…. kasi glass lang yon [since the windows were glass]. Then later on… 'anong

ginawa niyo kaya hindi nasira?' ['what did you to prevent damage?'] is because of this tapangko… Now they are using it.

Collective synthesis among DRRM Council members and local stakeholders. Converging stakeholders of divergent interests to coalesce communal strengths breaks away from traditions of debating competitive differences. Operating in their unique ways, both DRRM officers and residents are grounded upon common pragmatic orientations of resiliency. It is this common orientation driven by yaru principles that breaks the impasse of clinging into individual stakeholder's self-serving interests and rather accommodate integrative approaches. This fifth step is about rethinking resiliency, where the actionability of DRRM IKSPs are determined to optimize functionalities for effective integration, as well as how strategies for cross-fertilizing Indigenous and technology-backed systems are designed. As a pragmatic, co-generative synthesis among stakeholders and the researcher, the collaborative production of action plans amenable to both practitioners and policy-makers becomes the main goal.

To reiterate, this step will divulge the results of the collective synthesis among stakeholders, based from the two objectives of determining DRRM IKSP actionability and designing Indigenous and modern means of DRRM. Results from the former are disclosed in the following Part 1: Synthesis and Discussions subsection, while the latter from the Part 2: Action Planning subsection.

Part 1: synthesis and discussions. Fronting the previously evaluated set of DRRM IKSPs, it became imperative to understand their utility to reveal participants' desires and intensions. Determining actionability is the synthesis that enables Indigenous knowledge as a useful activity; intentionality becomes the pragmatic shift of converting Indigenous knowledge and concepts into concrete practices. In this part, participants provided bubble diagram responses to the question of what they would like to do with the evaluated IKSPs in DRRM, as well as the perceived positive benefits and impacts of each response. These are transcribed in greater detail in Table 13.

Table 13

Participants' Intensions with DRRM IKSPs and their Perceived Positive Impacts

Responses to "What would you like to do with these IKSPs in DRRM?"	**Responses to "What are the positive impacts or benefits of each answer?"**
Group 1	
Plan the procedures for the integration of IKSPs in DRRM.	Higher level of consciousness and preparedness for calamities.
	DRRM procedures based on IKSPs are localized.
Introduce IKSPs using social media platforms.	Higher probability of linking other communities without IKSPs.
Bridge the gap between Millennials and Generation X.	Ensures continuity of IKSPs.
Creating Android applications.	More fun way of learning IKSPs for millennials.
Incorporate the IKSPs with DRRM into curriculum development for high school and college levels.	Increase awareness of the younger generation regarding the integrated IKSP and DRRM approaches.
DRRM should lessen dole outs so as not to kill culture of self-reliance.	This should instead create more [socially] sustainable ways of surviving calamities.
	Reinforces self-reliance.
Group 2	
Continue house-to-house visitations.	
Preservation of IKSPs and continuous practices of culture and traditional ways of the Ivatans.	Enhancement of resiliency.
Implementation of yaru practices.	Ease of compliance and is made accessible.
Prioritize the identification of light materials and semi-concrete in preparation for typhoons.	Readiness and less casualties.
Weather forecasting through modern technology be disseminated through bandillo and mobile phones.	Accurate and less expensive.
Group 3	
Strengthen the cooperative systems.	Increased resiliency.
	Stronger cooperativism.
Involve elders in the DRRM IKSP planning process.	It becomes a community-driven plan that promotes ownership.
	Employs time-tested experiences.

Responses to "What would you like to do with these IKSPs in DRRM?"	Responses to "What are the positive impacts or benefits of each answer?"
Revisit DRRM plan to integrate IKSPs.	It becomes a responsive plan.
Continuous documentation of IKSPs per municipality.	This creates a database of IKSPs as a tool for planning.
Integration in the curriculum with actual involvement.	Increases awareness and appreciation of the younger generations.
	Effective transfer of knowledge.
Group 4	
Create legal support at all levels.	Creates or provides funding.
Integrate in the school curriculum.	Effective transfer of knowledge.
Documentation of IKSPs.	Easy retrieval of information.
Interface with DRRM.	IKSPs are mainstreamed.
Create community advocacy.	Reinforces the learning of IKSPs.

Note. Each response on the lefthand column represents a thought bubble in this bubble diagram exercise. All responses from the righthand column represents answers that extend from the lefthand column responses. Instead of verbatim rewriting, all responses above have been transcribed for clarity. June 10, 2019.

While a wide spectrum of responses characterized the results in Table 13, more common intentions included the incorporation of IKSPs in the educational curricula, integration of IKSPs and technical DRRM processes, and the continuous strengthening of cooperativism principles and practices. Various responses also relate to the interfacing of IKSPs with contemporary and technical use such as through social media and computer applications. Almost all responses seem to have a degree of overlap with general themes of the continuous and active use, preservation through documentation, and transferability of Indigenous knowledge.

Participants perceive that benefits exist in almost all intensions of IKSP use. There is greater particularity on the benefits and positive impacts of enhanced resiliency, as well as the better transfer and continuity of IKSPs across generations.

Part 2: action planning. As a response to the strong interest in integrating Indigenous and technical processes since Step 2, Part 2 of this culminating step was the attempt to collectively create such a model design that is both symbolic and practical. The end-of-day accomplishment in this action-oriented planning activity was the development of a novel and applied step-by-step DRRM process that both residents and DRRM officials could refer to before, during, and after harsh weather. Because IKSPs are plenty, making it impracticable to probe in one sitting, Part 2 was explicitly asserted as an initial attempt to model to both Provincial and Municipal DRRM Offices.

Instead of assembling the teams based on the six IKSP categories evaluated in Step 2, groupings were simplified and organized on pre-, during, and post-typhoon resiliency practices. The designation of each team to have a mix of both residents and personnel from DRRM offices was meant as an initial convergence to jumpstart dialogue and become a springboard for future collaborations. This part necessitated the imagination, insight, creativity, and critique of each team member as a prerequisite step for the development of integrative processes. Using the worksheets with pre-written guides and after choosing a particular IKSP topic, participants formulated integrated process designs as transcribed in Table 14.

Pre- and post-defence iterative consultation outcomes. Both the endorsement of the draft dissertation and the teleconferencing presentation to the community prior to the defence were well-received by participants, predominantly citing the accuracy of capturing Ivatan realities and situations in the paper and presentation. Spelling errata were appropriately amended by draft readers, therefore preserving vernacular concept and terminological integrity, as well as ensuring accuracy and consistency to the Ivatan Cultural Dictionary (Hidalgo, 1998b). Utlimately, the outcome of the pre-defence consultation process was favourable for all parties, and was approved by the community to proceed to the defence.

Table 14

Initial Integrated DRRM Processes to Model to DRRM Offices

Typhoon Phase	Indigenous / Traditional Process	P/MDRRM Office Process
Pre-Typhoon	**Chosen Topic: Preparation Within the Community**	
	Step 1: Forecasting (*maychawan* — analyzing and forecasting weather) [through checking]: **a)** Clouds **b)** Wind direction **c)** Plants **d)** Animal behaviour **e)** Insects	**Step 1**: Forecasting Cascading of information and orders from national, regional, provincial, and LGUs.
	Step 2: Information Dissemination [through]: **a)** Bandillo ***b)*** *Maypatupatuyu* (relaying information to other concerned persons)	**Step 2a**: Information Dissemination Infocast, internet and social media, texting, radio, memorandums, and bandillo.
		Step 2b: Prepositioning of logistical support to LGUs **a)** Food and non-food items **b)** Medicines **c)** Heavy equipment
	Step 3: Security **a)** House (kapanpet) **b)** Animals **c)** Food (stockpiling) **d)** Agricultural properties **e)** Other personal properties **f)** Clearing of trees (*kapaypung-pung*) [that pose as hazards]	**Step 3**: Security **a)** Infrastructure **b)** Agricultural [properties] **c)** Clearing [of hazards]
	Step 4: Monitoring and Security of Community Structures **a)** Infrastructure (kapay tapangko) **b)** Boats (kapangaraya)	
During Typhoon	**Chosen Topic: Weather Status Checks and Monitoring**	
	Step 1: Check the direction of the wind every hour.	**Step 1**: Check PAGASA weather bulletin or other weather outfits [applications]
	Step 2: Check the [wind] speed and gustiness by looking [at] the trees/ surroundings	**Step 2**: Hourly updates of actual [PAGASA] weather bulletins and issuance of advisories

Typhoon Phase	Indigenous / Traditional Process	P/MDRRM Office Process
Post-Typhoon	**Chosen Topic: Psycho-Social Trauma Management**	
	Step 1: Worry about the situation of your relatives and neighbours and eventually reach out.	**Step 1**: RDANA (Rapid Damage Assessment and Needs Analysis)[a] and reporting to different concerned government agencies for funding and rehabilitation.
	Step 2: Catching up with the aftermath of the storm accompanied by drinking.	
	Step 3: Game blame and playing god ([providing] unsolicited and unheeded [*Sic*] advice).	
	Step 4: Social institutions coming to play.	
	Step 5: Merry-making.	

Note. This table is templatable for future process integration initiatives. No transcription modifications were applied to the contents of this table unless explicitly mentioned above. June 10, 2019.
[a]RDANA also includes psycho-social needs support services, other than infrastructural and physical assessments, according to the NDRRMP (2011).

There was positive impression by the community despite the complexity of the recommendations. It is strongly emphasized that community approval of the recommendations is merely the beginning and still requires gradual transition until full sense of local ownership is realized. Moreover, continuous reformulation to contextualize the recommendation will be needed. As a validated by an Ivatan community member (grammatical corrections were extensive and applied):

> I have just received the recommendations part of the study and have gone over it immediately. I am amazed by how clearly and detailed you presented the processes of how to go about achieving the integration to actual implementation. It showed a clear, doable direction with involvement of key players. Your table 14 and 16 are truly comprehensible, to me. To a trainer conducting a workshop, as I have been, it is so easy to put into action. On my part I am raring to begin this way forward. You ask if it

> is satisfactory to me? It is a big YES and very commendable and acceptable. Let's get started. I will use the two tables as my handbook in doing my part. (Community member, personal communication, February 18, 2021).

Part 2: Integrated Analysis

The institutional policy front. Analyzing extant DRRM policies reveal a policy genesis reflecting one-way, top-down institutionalization. This follows top-down hierarchical tradition and chronology originating from national-level regulations, later devolving into local-level protocols upon ratification of "motherhood" statements and directives. The Philippines' patrimonial governance framework often yields sophisticated regulations and policies often drafted, ratified, and implemented collectively by a plethora of stakeholders across various departments on the state level only. Out of the 46 agencies that corroborate with the NDRRMC for example, 40 belong to national-level government departments and public offices (NDRRMC, 2011). As policies are drafted by aplenty in Congress, they are transposed and implemented down to the barangay level by only a few, sometimes even just one local DRRM officer.

Policy technicality is another concern. Borne from state-level agencies, various implementing rules and regulations (IRR) resemble technocratic and jargon-heavy strategies, symptomatic of implicit superiority by technocracy. Foucault, emanating through his theoretical perspectives (Cheek, 2012), posits how power is inherent in semantic constructions. In this parallel, national DRRM policies glorify technical verbosity as a perpetuation of patrimony, subversion, and repressive obedience to the state. Unnecessary linguistic complexities in policy only complicate direct implementation and increase risks of failure for actors in the grassroots to understand. DRRM officers in municipal and barangay levels often find themselves requiring technical assistance and training to reduce technicalities to context. Provided exclusively by nationally-sponsored technical agencies, reliance is then sustained and a cycle of dependency is made complete.

Constitutional endowment where the government leverages primus inter pares, or the first among equals, propriety provides adequate justification to monopolize decisions in behalf of society for its protection. In this ontology, the government becomes privileged to flex its muscle of institutional control. Although in the modest intention of protection, such as leading the DRRM and resiliency narrative, state protection oftentimes comes at all or any cost, including the undermining of cultural traditions. State brandishing of its hero image compromises contextual realities, where Indigenous communities and their traditional resiliency systems are made secondary or to the extreme, rejected outright. There is little doubt that the government has fulfilled its constitutional duties in many instances. Though in some cases and even unintentionally, the state neglects to be cognizant that existing Indigenous systems and traditions for resiliency, such as those of the Ivatans, have always been socially and functionally operational.

Switching gears into quantitative analytical keyword sleuthing of the NDRRMP reveal “national” as the fourth most commonly used term in the plan, with 151 word counts, trailing from the expectedly obvious core subject matter terms such as “disaster,” “DRRM,” and “risk.” Similarly applying computer-assisted keyword analyses of the IRR of RA 10121 also reveals “national” as appearing highly, garnering fifth place with a word count of 95. On the opposite side of the spectrum for both policies, “Indigenous” terms were very low, with nine and four word counts, including redundancies in the executive summaries, for the NDRRMP and the IRR respectively. Other targeted words in the former policy using “tech*” (the asterisk as a syntax identifier that matches any word following tech, such as “technology” and “technical”) scored modestly with 34 counts, while “scien*” (to identify terms like “scientific” or “science”) revealed 14 counts. Both terms contrasted in the IRR, with 19 counts for “tech*” and only a nuanced two counts for “scien*”. Despite the analytical simplicity, word count results reflect terminological priority on macro-, state-level semantics, a lesser yet significant extent for technical competencies, and little attention on Indigenous matters.

Content analysis aided by digital tools also reveal thematic relationships (Carrera-Fernández, Guàrdia-Olmos, & Peró-Cebollero, 2014). By meticulously analyzing and filtering targeted keywords relative to government-related DRRM responses such as “national” and “tech*” unveil linkages related to broad themes of organization and approaches. Specifically, computer-assisted analysis of the term “national” implied strongly to “management” in both the NDRRMP and the IRR, while “advice” was correlated to the latter. On the other hand, “tech*” was discovered to refer closely to other terms of “standards,” “characteristics,” and “assistance” in the IRR. Particularly for the NDRRMP, “tech*” conveyed close relationship with “tech-based,” “decisions,” “science,” “development,” and “research” themes. Overall, the results are indicative of heavy idealization of state-level grasp and technical precedent in the approach to DRRM, as represented in the policies.

Much is arguable how ironies, exclusions, and insularities are pervasive particularly in the IRR. In it, Indigenous Peoples are generalized in the category of “vulnerable and marginalized groups,” which is defined as "individuals or groups of people that face higher exposure to disaster risk” (NDRRMC, 2010, p. 8), a clear irony from the inherence of resiliency and weather expertise encultured among the Ivatans. Also, the IRR explicitly adopts principles such as the Convention on the Elimination of Discrimination Against Women and Convention on the Rights of the Child, but excluded the UN Declaration on the Rights of Indigenous Peoples. Insularities are also evident where not even the NCIP was included among the 36 horizontal and vertical partner members of the NDRRMC (at the time of promulgation, though there are 45 members as of 2020), despite the latent mention of ensuring DRRM measures to be “sensitive to indigenous [*sic*] knowledge systems and cultures” in Section 3 (j) (NDRRMC, 2010, p. 2, 2020).

Acknowledgment of indigeneity is indeed symbolic of universal reconciliation, though generalizing Indigenous Peoples on “vulnerable and marginalized groups” in this context only exacerbates systematic overrepresentation and stereotyping. This remarkably shakes core definitions that are often outsider-prescribed and challenges the framing of Indigenous Peoples

across the board—beyond the IRR to other policies as well. The a posteriori labelling of Ivatans as vulnerable and marginal manifests the maintenance of social and cultural rifts to create favourable conditions for the state to exert its messiah complex. It appears quite doubtful that Ivatans would ever challenge their own pride of identity and identify themselves as vulnerable and marginal after surviving and even thriving after the countless battering of typhoons and violent climatic systems since time immemorial.

Themes of systems-based, scientific, and technical applications are more conspicuous and focused compared to Indigenous means in the NDRRMP. Content analysis on the plan reveal how Indigenous practices and to a less extent, local knowledge, are less reified and are prescribed simply to be treated with sensitivity during local DRRM planning. As mentioned in the Research Problem of the dissertation, Indigenous means are only left as a mere recognition without direct and pragmatic implementing directives. As technical and science-backed prerogatives are favoured, while IKSPs in DRRM are lopsidedly treated, this ambiguity becomes a reflection of state insularity and epistemological tunnel vision. Pease (2010) and Howarth (2010) relate this as an instance of political management that espouses positivist hegemony as an assertion of power and the state's locus of control. This notion becomes imprinted in the NDRRMP, where scientific approaches reign and the integration of Indigenous systems are demoted.

Wording generalizations in state-level policy constructions is cautionary to the dangers of creating one-size-fits-all policies (Cerna, 2013; Rinfret, Scheberle, & Pautz, 2018). Mirroring this generalization in NDRRMP directives enables communities to interpret, contextualize, and enable policies in the grassroots level. Still, hazards exist in this classic top-down edict, experienced especially by provinces and municipalities that lack DRRM knowledge, applications, and capacity. Communities in this instance are often left on their own in a learning-by-abandonment expectation. Conversely for communities with capacity, the top-down approach can be interpreted as one-way prescriptions with no feedback learning from the bottom. This situation leaves Indigenous communities with distinct IKSPs in DRRM such

as Batanes merely obligated to comply with policy, while no collaborative learning opportunities are endorsed by the state. As supported by Alcayna, Bollettino, Dy, and Vinck (2016), grassroots communities are often the better source of expertise that could inform national-level stakeholders in decision- and policy-making.

The comprehensiveness of the PDRRMP demonstrates the PDRRMO's understanding of the need for a robust plan given the province's endemic hazards. As an exemplar, the plan is complete with Geographic Information Systems (GIS)-generated analytical maps, extensively-researched risk profile, and action and monitoring plans applying the four thematic areas in the NDRRMP. These distinctions are indicative of the evidence-based technical understanding and planning of DRRM strategies compliant to national-level planning and IRR expectations. Following best practices in planning, the PDRRMP formulation employed a multi-stakeholder representative and collaborative approach, appropriate in Batanes' Indigenous context. Indigenous-themed strategies were only nuanced in the PDRRMP and had no operational directives; the cognizance of IKSPs as an important agenda in the DRRM planning process was only later realized through the formulation of the IKSP in DRRM inventory.

In one institutional notch below, the municipal DRRM policy was still a draft during the data-collection period, though utilizing IKSPs in the DRRM process was already explicitly indicated even prior to ratification. Only a few IKSPs were indicated with operational details that were no different from those in the strategies and inventory results spearheaded by the PDRRMO. In the barangay level, only three plans out of the six barangays were obtained. Those plans were observed to lack robust details matching provincial level comprehensiveness and rather listed programs and activities to be conducted within their jurisdictions. Barangay officials claimed the unnecessary need for thorough detailing to reduce redundancies and because of their reliance to municipal and provincial instructions (Interviewee 6, personal communication, May 24, 2019).

Batanes epitomizes the detrimental consequences of contradicting policies and how protectionism curtails fundamental Indigenous rights and freedoms. Both the NIPAS and Batanes Protected Area Acts officiate dual obligatory protection to Batanes' natural resources, though are found to contradict Indigenous Peoples Rights Act provisions of self-determination and right to develop and manage natural resources among others (NCIP, 1998; Philippines, 1992, 2000). Although protection in this case did not conjure euphemisms of control, the confuting policies still became a microcosm of protection consequences and hit-and-miss policy-making that lacked contextualization and consultation. Environmental protection is a surely laudable principle, though such intentionality should not disenfranchise customs and traditions that have been existent prior to the entry of outsider policy impositions.

The NIPAS law leverages the Ivatans' right to self-determination and continuation of customary practices such as utilizing folk architecture in Ivatan house construction (Ignacio, n.d.; NCIP, 1998) and the use of communal pasturelands (Interviewee 2, workshop communication, June 10, 2019). Prohibited acts in Section 9 of the Batanes Protected Area Act such as quarrying sand and limestone for making mortar or harvesting timber products traditionally used for building shelters and homes inevitably outlawed customary processes. Limestone-walled sinadumparan construction and renovation waned for decades, ultimately losing Indigenous house-making expertise due to lack of practice and transmission of such IKSPs. Many structures dilapidated by time and damaged by earthquakes, such as in Figure 12, were also abandoned and deemed unsafe for habitation. Others were ultimately demolished to make way for more modern, typically weaker designs.

Figure 12. Examples of traditional homes in Itbud that were left dilapidated and abandoned. Many homes damaged by the 2000 earthquake, such as the bottom image used to be functional and liveable. Because DENR policies forbade the mining of lime for mortar and felling timber for construction, renovations and constructions were discontinued and the tradition of heritage house-building completely waned. June 8, 2019.

Efforts were pushed to interface and correct clashing policies. Stipulated in the Joint Memorandum Circular No. 8, between the DAR, DENR, NCIP, and the Land Registration Authority (LRA) (2012), were provisions to adopt win-win remedies in addressing jurisdictional issues, such as those Batanes faced. Protectionist measures in place for 12 years carried weightier legal command over Indigenous rights promulgated by the IPRA Law that eventually backwashed into severe socio-cultural repercussions still felt today. Regulations were so engrained in Ivatan society that despite the remediation of the conflicting policies, many residents are still unaware to this day and still believe the restrictions are still in place (Interviewee 2, workshop communication, June 10, 2019).

Other than the formal remediation of policies, the Joint Memorandum Circular failed to unfasten the regulatory vice and resurrect tradition to allow communities and affected heritage homeowners to rebuild the way their ancestors did. Cultural damage has been done as a consequence of the 12-year policy correction delay and much knowledge and cultural know-how have been lost by then. An Itbud resident attests how the younger generation are especially impacted, becoming more and more unsure about old ways, compounded by rapidly shifting social preferences catalyzed by technology (Interviewee 6, personal communication, June 8, 2019). Older generations are also influenced by exogenous factors such as cheaper building materials and labour sourced outside Batanes, in contrast to the extensive preparations and costs required to activate customary kayvayvanan or kapañidungan cooperative systems (Participant 1, personal communication, June 8, 2019).

The academic studies front. Scholarly work from Hornedo (2000), Rede-Blolong (1996), and the more recent Esteban and Valientes (2019) article are the most distinguishable and contextualized academic studies that concentrate on IKSPs in DRRM, though have little focus on critical theory dimensions. Mentions of multidisciplinary approaches and integrations justified through varying epistemological rationales were rare and not expounded thoroughly. Additionally, the PDRRMO's inventory on Ivatan Indigenous weather forecasting particularly offers much potential for more rigorous, scholarly assessment and validation similar to the

work of Hiwasaki et al. (2014a). Overall, a wellspring of opportunities in embarking on academic research that mirrors the dissertation's core subject matter exist.

Broad-level and multi contextual academic research on the general discourse of Indigenous Knowledge in DRRM and their associated niche topics of hegemony, colonialism, epistemological arguments and integration, and modernization are plentiful. While the Literature Review chapter has divulged most of the dissertation's crucial content, one of the most enlightening takeaways essential for analysis is Mercer, Kelman and Dekens (2009) and Gaillard and Mercer's caution of over romanticizing Indigenous knowledge. This all the more establishes the viability of balanced yet socially-idealized convergence between different knowledge paradigms in the common interest of inclusionary resiliency.

Mercer (as cited in Gaillard & Mercer, 2012) asserts how Indigenous and local knowledge deserve careful assessment since some may potentially be ineffective, may no longer be viable, and even exacerbate vulnerability given the hyper fluid and rapidly changing world. There is a point where a growing number of identified hazards may be new to locals, who in turn may not have had enough time to incubate understanding, generate sufficient endemic knowledge, and vernacularize them to create local resiliency (Kelman et al., 2012). Rai and Khawas (2019) also make an important point that proof and demonstration of utility are necessary for accepting the viability of Indigenous knowledge, which implies that utilitarian knowledge are the most important ones to be used for integration. Though it is essential to stress in the most ethical principle of inclusionary resiliency, that the functional knowledge to be used should be borne from trustful collaboration instead of extractive appropriation.

Much opportunity exists for Ivatan communities to carefully probe the viability and effectivity of some IKSPs in DRRM that are deemed questionable by scientific and technical paradigms. Similar to the research of Hiwasaki et al. (2014a), a number of local and Indigenous Knowledge may not have any equivalent scientific basis, are unexplainable, unvalidated, and are not related to DRRM. Instances in Appendix B such as when dogs (*Canis familiaris*) stare to the west as an indication of bad weather may not have scientific basis nor such observation

be connected to impending weather disturbances at all. It is understood however that there may be contention when empirical validation becomes normative for similar IKSPs in DRRM, thus the community's assessment and understanding their rationales become invaluable.

The four-part categorization matrix of Hiwasaki et al. (2014a) reflects a post-positivist process of rationalizing Local and Indigenous Knowledge (LINK) that has functional potential for the PDRRMO's use in their inventory. The matrix categorizes LINK as scientifically explainable and relatable to DRRM, scientifically explainable but not DRRM relatable, unexplainable scientifically yet DRRM-relevant, and unexplainable scientifically and irrelevant for DRRM (Hiwasaki et al., 2014a).

Caution is required in using this categorization method exclusively, particularly for the last two categories, since some Ivatan DRRM IKSPs carry socially-relevant sensibilities that are effective for resiliency and do not necessarily require empirical and technical explanation. This is further affirmed by Rai and Khawas (2019) who remarkably explain that the subjectivity of Indigenous constructed realities does not require scientific reasoning nor validation. Pilatun astrological calendar use of the Ivatans, laji songs, poetry and story-telling for instance may, although unproven within empirical and scientifically-bound reason, potentially be traditional coping mechanisms that fall under these categories. Also, this opens a novel justification and opportunity for methodological research on researcher positionality flexibility and respectful paradigmatic shifts in the context of Ivatan DRRM IKSP studies.

Conducting historiographic analysis on the lived experiences of the Ivatans and crucial turn point events in Batanes from a number of academic literature offers a wealth of information that elucidate the evolution IKSP and form theory about the Ivatan sense of resiliency. Historical isolation due to Batanes' insular geography, compounded by the endemism of harsh weather systems, were fundamental to the normalization and enculturation of adaptability amongst the Ivatans compared to other locations in the Philippines. Hornedo (2000), Rede-Blolong (1996), and Esteban and Valientes (2019) describe how the prevalence of unpleasant environmental phenomena through generations has left Ivatans with no choice but

to adjust and adapt, to work with as opposed to work against natural forces. This has become the orthodox of Ivatan psyche, a way of life that enabled environmental threats catalyze the formation of social and cultural strengths; this reality and lived experience shapes the IKSPs in DRRM.

For generations, inclement weather forced families and neighbours to shelter together, inevitably forging social cohesion, strengthening bonds, and inculcating collectivism (Participant 1, workshop communication, June 10, 2019; Hornedo, 2000). Moreover, the spirit of cooperativism and benevolence can be traced from the need to help each other to reduce risks associated from meteorological hazards and vulnerabilities. Even artistic expressions of songs (laji), poetry, and story-telling; craftsmanship such as handicraft and basketweaving; and other creativities were not merely time-killers when refuged from storms but as important coping mechanisms to mitigate psychological stressors and trauma associated with the devastation from typhoons (Participant 7, workshop communication, June 10, 2019; Hornedo, 2000).

Analyzing under sociological lenses, the combination of environmental and cultural manifestations that define the Ivatan lived experience parallels a Durkheim-reminiscent functionalist social structure. When sheer weather activates and justifies the creation of social roles and responsibilities for preparation, the reduction of social risks are realized. Social order and stability are therefore maintained and are reinforced especially with the continuous recurrences of such physical and social phenomena for generations. Establishing this commonplace practice of maintaining stability ultimately strengthens resiliency, demonstrated by constant casualty-free reportage following the onslaught of typhoons. Where others view typhoon prevalence as pestilent disruptors, the normalization of threat created by the stability of established social functions and reinforcement of social roles contributed to Ivatan views of typhoons merely as “another windy day,” as stated by a resident (Interviewee 7, personal communication, June 2, 2019).

Merton's functionalist theory of manifest and latent functions, defined as the explicit and implicit advantageous effects of conscious social actions (Cole, 2020) respectively, are also evident in the functionalist analysis of the Ivatan social make up. During sinadumparan construction, for instance, manifest functions become conspicuous when the activity extends beyond just the homeowner and their kin but through everyone's active participation as a collective duty of society. To affirm, Hornedo (2000, p. 9) states, "thus, every single traditional Ivatan home is literally the work of the community. It is hard to think of a better social masterpiece tradition than this." Through kapañidungan Ivatan cooperativism, the ultimate social goal of stability through resiliency is consistently maintained.

Latent functions on the other hand, tacitly restrains social differentiations of "othering" and individualist precepts, where community members, no matter their place in the socio-economic strata, are empowered with roles to contribute to social resiliency. While manifest functions mobilize other members of society including individuals not even familiar to the homeowner, social latent functions encourages collectivism and a sense of belonging that further shapes Ivatan identity. Although social class and role divisions have always been existent in Ivatan society prior to colonization (Hidalgo, 1996; Hornedo, 2000), the exaggeration of power structures are inhibited when the need for kapañidungan arises.

As the antithesis of functionalist theory, the concept of disfunction is evident in the Ivatan social context, where exogenous factors discussed by Hornedo (2000) destabilizes tradition, despite the intention to support the reduction of risks from violent weather. Both the erosion and distortion of social values in contemporary Ivatan society are palpable. Similar to other socio-geographic contexts, technology introduced outsider influences, stimulating rapid and often consequent shifts in social mindsets, values, and roles (Hornedo, 2000). Although radio and the internet certainly assist in disseminating information during typhoons, their arrival came at a cost of diminishing traditions and Indigenous practices of forecasting and preparation (Participant 1, personal communication, June 2, 2019; Hornedo, 2000).

Disfunction is also substantiated through the inadvertent dependency generated through the defaulted provision of government aid and DRRM interventions prior to, during, and after typhoons. Hornedo (2000, p. 124) attests this social value distortion:

> The *yaru* is a self-help community cooperative institution which has suffered badly under government unintentional intervention. For example, when funds became available to pay for building and repair of barangay roads, the perception suddenly shifted, and barrio folks have come to believe that repairs and maintenance of local services such as roads and bridges are the responsibility of government. So now, when roads get damaged by typhoons, villagers go to their local officials to ask for money to pay for their labor in repairing their own roads. And when the money is not forthcoming, they blame their officials and the government, but keep their roads unrepaired. There are still places where the *yaru* is a living tradition, but can be killed by imprudent, sometimes politically motivated policy.

The colonial experience of the Ivatans has significantly influenced much of their identity and resiliency. It is in this experience that the Ivatans demonstrated their innate adaptability to innovate outside influences to their advantage. The Ivatan adoption, adaptive modification, and evolution of lime and mortar house construction from the Spanish offer deep analytical insights; incorporating foreign technology in local architectural design is the best instance of local and foreign knowledge fusions (Hornedo, 2000). Such reveals a hybrid that showcases the strengths of merged dichotomous influences, which is a gradual transcendence from mere practical adoption into becoming a cultural vernacular. This is highly symbolic how resourcefulness, innovation, and fundamental adaptability are definitive in Ivatan culture. Today's remaining sinadumparan are the most widely-known tangible symbols that brand Batanes.

Specifically, stone masons, carpenters, stone cutters, and sculptors were brought from outside Batanes in 1795 to fulfill Spanish Missionary requests to replace public buildings with stone and mortar (Hornedo, 2000). Imported expertise was so costly that it necessitated local

labour to replace and assist in civil works, in turn allowing Ivatans to absorb foreign technology of lime-making and related trade skills, according to Hornedo (2000). This new know-how not only became a standalone idea exclusive to public structures but eventually permeated and integrated into local construction methods. Over time, this change not only contributed to social stability and typhoon resiliency, but has been engrained to the point of vernacularization into Ivatan culture. Contemporary local claim of stone-house architecture unique to Batanes as a purely Ivatan innovation is ubiquitous, though is actually a blend of influences.

Because cogon (*Imperata cylindrica*) grass roofs in sinadumparan required regular repairs and changing, kapañidungan was not just consigned as a singular event during construction only. Kapañidungan and other cooperative systems can be theorized to have become even more commonplace and strengthened during vernacularization. Compared to previous wood-and-thatch *mayhurahed* construction practices (Ignacio, n.d.), stone house building required more extensive resources such as lime, mortar, wood, as well as extensive labour since more people are needed for raw material sourcing, transport, and construction. As social roles and customs were even more clearly pronounced through kapañidungan, social stability was therefore induced and sustained.

The Ivatan history and experience of cultural homeostasis were based on social preconditions, innovation, and self-determination, and were not instigated through outsider, coercive conformity or assimilation pressures. It must be acknowledged however, that hegemony and imposed social changes by Spanish colonialism were undeniable and are found in other social dimensions. Centering on the Ivatan adaptability context provides a distinct difference vis-à-vis other Indigenous or non-Indigenous communities in the Philippines that may not have similar cultural, political, and environmental variables. Without similar endogenous and exogenous factors, influences adopted by a community may just be simply reduced as isolated events and may not even evolve nor synthesize enough to become local wisdom. The Ivatan epistemic instance of intersecting Indigenous and foreign influences is a

historical experience that offer valuable clues whether outsider cultural vectors may potentially either enhance or shake social stability in the event of integration.

Ivatan assertion of the functionality and effectiveness of IKSPs for resiliency. Knowledge for the purpose of reducing and managing risks from recurrent meteorological disturbances in Ivatan society exists and are functional, not just operating as incidental facts but as a way of life and orthodoxy. While scientific reasoning- or empirically-based paradigms that treat realities based on reducible phenomena ought to dismiss the purview of Indigenous knowledge in DRRM as constructed realities, Ivatans position themselves on the contrary. Ivatan Indigenous knowledge of resiliency are products not from technical explanation but from meaning-making through lived experiences. Knowledge exists as subjective axioms yet collectively created across generations. Because Ivatan IKSPs produced effective results to augment resiliency, the requirement for scientifically rigorous validation and reasoning seemed unnecessary.

Ivatan resiliency knowledge is tied from the interactions and relationships between the land, its people, and the environment. Hornedo (2000) affirms how the entirety that makes up Ivatan society and way of living is connected closely with the context of a benevolent but dangerous environment. As IKSPs were borne from observations and lived experiences, knowledge genesis could not have been an occurrence at one point in time only but through successive generations of trial-and-error cycles, tested and “perfected” through time. Full immersion and incubation through multiple generations has allowed enculturation and deep infiltration of knowledge into the Ivatan social fabric and identity that enabled resiliency from harsh climate. Overall, this knowledge has become valuable for survival.

Ontologically, Ivatan DRRM IKSPs cannot have developed without environmental agency; inhospitable climatic preconditions necessitated the development of knowledge as competencies for survival. While some IKSPs such as wind and cloud observations to forecast weather evolved in a confined, influence-free Ivatan context, some such as typhoon-proof architectural principles developed through incorporations of external influences. These

exogenous factors took time to infuse into Ivatan society (Hornedo, 2000), in contrast with today's rapid climatic changes or the NDRRMC's foisting of authoritative science-driven policies that can be felt in a single generation. Other than the environment, government forces have become the new agency, a major social intervenor that is constitutionally bound to impose under their predefined premises of danger and safety.

Pragmatically, Ivatan Indigenous knowledge used for DRRM as pre-, during-, and post-disaster resiliency practices are currently active and functional. Not only are the IKSPs utilized for prognostications and preparations but as measures for protection and social cohesion. Though the main utility of these IKSPs are for their direct (meteorological observations such as cloud and wind changes) or indirect (non-meteorological observations such as behavioural or physiological changes of animals and plants respectively) forecasting purpose, IKSPs also function as generators of social capital and prescriptions for social conventions. Cooperativism for instance, although not strictly exclusive for disaster preparedness, is a contemporary social contract that tempers bonds, camaraderie, and reciprocal relationships, and is common practice today, as validated by participants in the event.

Inputs are low and efforts to determine weather conditions through technology are minimal—just by a mere click of an app. Indigenous knowledge for weather prognostication is similarly straightforward, though requiring learned techniques in monitoring environmental phenomena such as cloud patterns and wind movements to deduce impending weather conditions. Other practices such as home construction and preparations, agricultural practices, and post-typhoon activities however are more extensive. Often, these practices require the actual cooperation of community members, a deep understanding of individual roles of the cooperative context, as well as specialized skills and mastered expertise such as those in traditional Ivatan architecture.

IKSPs, having become deeply embedded in Ivatan identity, are active not primarily because of their novelty but because of their utility for survival. Ivatans are the primary users of such knowledge that contributed to social stability and independent subsistence in order to

survive. Exogenous agencies however are triggering monolithic social changes with the potential to induce paradigmatic shifts and dependencies despite the common thrust of providing resiliency. With the idealization of scientific knowledge and modern techniques for resiliency comes the deactivation and waning of Indigenous knowledge. Encouraging GI sheet use in Mahatao, as instanced by participants, or the reliance to online weather information has become a redefined normal and epitomized the preference of convenience over tradition.

It is essential to acknowledge however that the idealization of convenience cannot be the lone explanation or motivation to deviate into non-Indigenous practices. Peripheral factors such as prevailing socio-economic conditions and powerful persuasive messaging from profit-driven businesses like mobile internet service providers also play roles in commodifying more convenient alternatives. Lacking cultural checks and balances inevitably reinforces favourability to convenience, and to the extreme induce dependency to imported knowledge and influences, and stigmatize age-old practices as ineffective and obsolete. Both internal conditions and external influences may exploit social vulnerabilities to favour the imported, which is symptomatic of insidious post-colonial mentality that is pervasive in Philippine society (David, 2017; Mateo, 2016).

To reiterate, most Ivatan IKSPs in DRRM are active, reasoned in the validation workshop and post-event discussions from cultural inherence and the demonstrated accuracy and practicability of Indigenous knowledge. However, participants also account how the multiplier effect from problematic, often unassociated, socio-economic conditions exacerbate the waning use of some non-prognosticative resiliency means. Declining interest in sinadumparan house construction due to cheaper building materials, faster construction time, and less tedious processes consequently resulted in almost no such construction since the 1970s (Yap, 2014; Times Higher Education, 2020). Certain cases like this create a realization how distant changes, even in extraneous circumstances, may inevitably lead to impacting resiliency traditions.

Modernity, as exemplified through technology, is a major cultural disruptor in Batanes. While it is important to acknowledge that there is nothing illegal with general technological use, the current context of Batanes being in its honeymoon stage for fast internet availability all the more makes IKSPs in DRRM vulnerable to change. Internet with LTE and LTE-Advanced speeds is a newcomer in Batanes, arriving only in 2018, where YouTube video streaming has been made freely available (Smart Communications, 2018). Easily eclipsed by the competing forces of weather advice automation and the Internet of Things, IKSP pervasiveness may potentially find itself being generationally exclusive. Even participants admit the value in convenience and practicality that is difficult to match by traditional methods. Despite being at the precipice of potential cultural displacement, the IKSPs' still-active use also signals the possibility for transformation. As concurred by participants, the integration of traditional and modern becomes key to continuous adaptation to various social accelerations felt in Ivatan society.

The momentum of social acceleration is not only impelled by modernity but also by general anthropomorphic shifts in values and preferences. Other than joining the bandwagon of being connected through the Internet of Things, technological idealization is also paralleled by a shift in the indices of prestige such as glamourizing ownership of sala sets, flat screen TVs, and preferring rice over uvi (yam). While this study has been unable to produce an accurate explanation of this phenomenon, Hornedo (2000, p. 359) offers insights to the Ivatan perception of "the good life" that emulates Manila-based urban material desires. It can be theorized that there may also be plausibility in Ivatan adaptability evolving into adoptability, evident in constantly absorbing and adopting new, often foreign ideas, aspirations, desires, and attitudes, rooted from the Ivatan resiliency function of acclimatizing to environmental changes.

Although no full research has yet been conducted for their objective accuracy, Ivatan belief in the predominantly high effectivity how IKSPs yield intended outcomes is theorized to be a product from generations of trial-and-error learning through observation. Effectivity may

be rationalized by validation through trial-and-error; after multiple generations of weather observations, accuracy may have been developed through repetitive learning and mastery of weather patterns. If weather forecasting through Indigenous means effectively yields accurate results, it may be inferred that IKSPs still have high value, and thus also justifies their contemporary active use. The rapid acceleration of increased climatological disturbances and other hazards however, poses a major challenge since not enough time has been expendable for the generation of distinct IKSPs, let alone the assurance of their accuracy and effectivity.

Similar to Ellen and Fischer's (2013) discourse on cultural transmission, Ivatan transfer and acquisition of DRRM IKSPs range from the micro, family level, to the macro, institutional level. A participant in another later interview concur that elders in the primary family unit are the first teachers and wisdom providers (Participant 7, workshop communication, June 4, 2019), indicating knowledge as an invaluable inheritance. Oral transmission, actual demonstration, and value modelling by elders are indicative of their social roles for the stability, sustainability, and resiliency of Ivatan culture. Knowledge transfer through mixed modes of narratives and praxis also entail synchronous and systemic learning processes that are traditionalized within society as a necessity for both physical and cultural survival. Also, the Indigenous Peoples' educational (IPed) curriculum provides an institutionalized and academic channel for passing on DRRM IKSPs, beginning at the elementary school level. It becomes confounding however that the internet, being one of the most powerful tools to store and communicate information and knowledge, is not used for transmission purposes.

Resident perceptions of the advantages and threats to IKSPs. Technological ubiquity is the manifestation of Ivatan society's strong thrust for modernity, as drawn from FGD participants. Enhanced convenience is the most compelling rationale for such ubiquity as advanced weather forecasting can be done on demand in mere seconds with remarkable accuracy. Other modern tools also become favourable not only for convenience factors but for their improved usability for those tending in fields or fishing in open waters. Even the means of using weather apps to verify traditional methods symbolize the entitling of utility and

knowledge authority over another. Outcomes from the FGDs reveal how Ivatan life has certainly reached the intersection that faces off Indigenous versus modern ways.

Ivatan duality is explicit in the idealism of modernity and participants' confidence in time-tested customs of cooperativism that contributes to localized resiliency. While modernity often subscribes to a linear, progressive future that is better than the current (Mouzakitis, 2017; Wagner, 2011), the duality felt in Batanes becomes antithetical—that although modernity resides in society, residents are still held back in defence of the richness of Ivatan Indigenous ways. This cultural dynamism however should not be taken for the literal, face-value logic that as one progresses, one also becomes "more traditional." Such notion is, in fact, the inverse: adaptability is a work in progress, similar to the evolution of Ivatan resiliency through trial-and-error learning for generations. Constant adaptability means constant learning, hence adapting in a world confined with the inescapable reality of technology does not necessarily mean the recession of culture, but the enhancement of it. Thus, integration becomes ripe for further dialogue and application.

Participants were aware and readily recognized contrasts between institutionalized vis-à-vis Indigenous resiliency means, as well as the jeopardies in their integration. In such a high cultural context society like Batanes, where inculcated and enculturated resiliency systems utilized across generations are prevalent, institutionalized procedures based from Western principles most especially from NDRRMC or Red Cross outsider assistance become conspicuous. Despite common resiliency goals, their method and what it represents make outsider aid questionable. DRRM councils and other alien agencies apply homogenous, cookie-cutter aid procedures that are the result of either messianic complexes or constitutional obligation that inevitably instigate consequent social changes. Misaligned benevolence that fail to consider cultural contexts as experienced in Batanes has normalized and idealized dependency to outsider relief over cultural self-help or yaru principles.

How assistance becomes structured and formalized up to the point of promulgation into law reveal inapplicability as a universal strategy for DRRM. Structured assistance

stumbling blocks in Batanes transcends from mere superficial implementation issues to deeper problems of epistemological hegemony, the privileging of state decision-making powers, and the false sense of resiliency that merits centralized political reasoning over localized social values. The involvement of institutional hierarchies, policies, and thrusts in a context that pivots on Indigenous orthodoxies explain how complicated legal entanglements can be on Indigenous practices. It is the resulting social change in the community, such as the erosion of altruistic values of volunteerism, idealization of systemic institutional and technological dependency, and the monetization of favours that consequently imperils Ivatan identity.

As an aftermath from unintentional government intervention, the conversion of assistance and favours into monetized transactions has significantly distorted Ivatan cooperative values. One participant's claim of the waning goodwill economy and the legitimization of paid assistance likewise mirrors Hornedo's (2000, p. 5) nearly 20-year old remark that yaru principles "have been killed by the government's teaching the communities that they should be paid to help themselves." The perpetuation of the government's structuralized assistance is an institutional contract, far from the values-centric Ivatan cooperative principles that has always existed as a social contract. Yaru does not centre integrity on the capitalization and assurance of auditable payment of labour but on instilling altruism, solidarity, and investing in the goodness of helping. Ultimately, yaru's return on investment is resiliency through collective compassion that no money can buy.

While modernity becomes a pull factor for novel DRRM means, the need to react to today's climate volatilities pushes Ivatans to rethink adaptability with openness to the plurality of perspectives. Integration was a promising proposition prescribed by participants. The openness to the modern and traditional nexus of DRRM strategies is symbolic of acknowledging interdisciplinarity and paradigmatic complementarity. Integration also signals a leap into cultural selflessness—the divergence from one-sided conservative purviews to accommodate other forms of knowledge for cultural survival and continuity. Increased climatological disturbance pressures require digression into new ways but still with cautionary,

regressive approaches that employ the strengths of traditions. Participants were confident that effective DRRM planning can also be relational rather than empirical.

The drive to include elders and consider traditional ways in DRRM is the step towards diplomacy and collaboration among once competing agencies. Challenges, however, continue to exist, affirmed by participants. Collaboration will not just mean fractional changes in the operational level but holistic and even radical changes elevated to the echelons of national-level leadership. It may still become questionable how collaboration can work by dismantling institutions that have long relied on Western ideals, and have been plagued with superiority complexes and hegemonic management tendencies. True inclusion will include privileging bottom-up leadership and empowering self-sufficiency within Ivatan communities since the ultimate practitioners of resiliency will eventually be the community and not exclusively as an endowed responsibility of the higher ups.

Dichotomous positionalities of Local DRRM Council members. Local DRRM council practitioners are caught in a discordant paradigmatic and cultural intersection themselves. Instead of the importation of DRRM experts from Manila or elsewhere, acknowledging locals to manage DRRM programs empowers local representation and privileges resident knowledge and worldviews. Their professional obligations to enact policies from Manila-based decision-making bodies however, expectedly requires Ivatan DRRM officers to adjust their positionalities from Ivatan-biased and rooted perspectives to more neutral grounds in order to accommodate compliance within institutional realms. The interviewees themselves admit that the balancing act complexities of serving the community vis-à-vis the government produce inner identity conflicts of being in an “Indigenous-outsider” position.

Similar to Nicholls’ (2009) assertion, one’s positionality governs decisions. Interviewees manifested tendencies to exercise neutrality, communicated by their insistence in policy compliance while mindful of customary DRRM ways, in order to simultaneously respect dichotomous values and idealisms. Neutrality however, stands on weak legs. An absolute win-win management scenario where regulatory compliance will allow the mutual flourishing of

IKSPs exists as a utopian illusion. Given histories of insensitive and even hegemonic institutional command, the mandated structuring of DRRM that balances Indigenous interests comes under the guise of possibility. Realistically, balance rather becomes a euphemism of compromise. Moreso, the rapid and long-term threat of climate change risks this euphemized balancing act to be initially imposed from a minor operational strategy into a later ideology of compromise.

The sanctification of DRRM as a national policy through RA 10121 results in its stringent observation and compliance. Much irony exists in the strict leveraging of this law since another national policy (RA 8371) that centres on Indigenous Peoples' right to self-determination and customary practices exists, which in the equivalent logic, should likewise be strictly observed. Given the reasonability of DRRM council officers' professional responsibilities, they are still legally backed by a law that protects and promotes their Indigenous identity and DRRM practices. Implementing the national DRRM policy then becomes an official duty made awkward personally as command conflicts with one's "cultural conscience." To the extreme, the lowest point of sheer obedience is the invalidation of IKSPs and inhibition of generating potentially more innovative and effective means of resiliency.

The attempt to impose a structure on an already stable set of socio-cultural norms is another irony that consequently results in disorganization. Even within the context of the provincial and municipal DRRM offices, bureaucratizing certain processes exacerbate operational complexities, contrary to best practices of instilling more lean and redundancy-free functions (Dennis, 2015). Disorganization potentially breeds inefficiency, which further jeopardizes the integrity of the offices primarily responsible for the security and safety of lives and properties in an epoch made more volatile by climate change. Compounded by tepid reception and antagonization to the extreme by the Ivatan community, the absence of operational and policy reforms could potentially degrade local confidence and attract organizational distrust and policy complacency. Ivatan DRRM officials are surely put to the test to navigate in awkward, in-between realities.

While the inherence of power structures is a challenge when striving for an equitable playing field in decision-making, local DRRM council members exert effort in finding middle ground. Instead of diagnosing as an operational entanglement or paralysis due to positional inhibitions, DRRM council members acknowledge the opportunity for collaborative and innovative integrations. This integrative opportunity offers feasibility to reify transdisciplinary and trans-paradigmatic DRRM frameworks. While the point of collaboration is the allied search for novel resiliency means, this must not divert the recognition or attention to the struggles for IKSP protection, accountability, and empowerment that centre and iterate the values of the local context.

Interviewees recognize their Ivatan identity as permission to integrate institutional means with IKSPs. As implied by interviewees, Indigenous knowledge alone may no longer be the defining factor for resiliency especially when humankind requires more novel and innovative adaptation strategies in light of increased climatological disturbances and other hazards. Equivalently important is the correct understanding and definition of integration; packaging integration as localization is inaccurate and lacks the intentional reference to the hybridization of Indigenous and scientific means. Localization is in fact a one-way course of action that only renders scientific paradigms digestible and compatibly applicable in the local context. The danger in equating integration with localization is the masked and implicit adoption of foreign systems and subsequent bypassing of IKSPs for resiliency.

In approving integration, local acceptance of change transcends the readiness, willingness, and ability of the community. The deficiency of these combined prerequisite variables fuels resistance, as cited by interviewees. Local DRRM council members certainly face enormous pressure since integration is an agency that operates not only on templated DRRM functionalities and processes but with complex contextual elements such as Indigenous knowledge as well. For those working in DRRM offices, identifying as Ivatan additionally bears great risks since convincing community members to step outside cultural comfort zones to try

untested integration approaches endangers not just one's professional credibility but also on one's personal reputation as a true ally of the community.

Enthusiasm from interviewees and even participants from FGDs regarding the sharing of IKSPs and all means to become resilient to turbulent weather carries heavy symbolism of cooperation through IKSP transmission as the core ingredient for survival. Efficient knowledge transferability is not only favourable vertically across generations within Ivatan society but horizontally as well, extending across different cultural contexts. Strong Ivatan cooperativism principles could be theorized as the main driver for cross-cultural transmission. Such proposition opens doors for further research into the relationships between increased climatological disturbances and other hazards, Ivatan cooperativism, knowledge exclusivity, and other cross-cultural transmission motivators.

Integration as a collaborative adaptation of IKSPs for improved resiliency. In contrast to dying or endangered practices, Ivatan DRRM IKSPs demonstrate high levels of utility and functionality. Participants in the Ivatan stakeholder synthesis event claim how IKSPs are not merely static facts but highly practicable systems and active practices. Whether operating in the mindset of institutional responsibility or as a resident practitioner of these IKSPs, they are ascribed with strong purpose and agency that enables their continuity and evolution. In each Part 1 response, participants reveal intentionality and aspiration in the normative functionality of their IKSPs, which is a reflection how invested residents are in intergenerational and arguably, cross-cultural resiliency. It is this intentionality that reveals how Ivatans idealize not just what is possible but what is preferred.

Core to the justification of IKSP transmission are their benefits; as long as IKSPs are advantageous and beneficial to the social fabric, utility and thus transferability are guaranteed. How IKSP transmission becomes reliant on participants' cost-benefit calculative decisions speak to the rational choice theory, which Gintis (as cited in Mesoudi, 2013) not only predicates but contrasts against the often-grounded human behavioural ecology and cognitive psychology lenses. The focus on the individual, rational choice however conflicts with the

collective, culturally-normative choice that suits the Ivatan condition. This follows Crossman's (2020) classic criticism of rational choice theory that posits how individual decisions are often overridden by social norms and cultural obligations.

Social accelerations manifested through rapidly-evolving technological advancements are redefining what rational is, most notably among Ivatan youth. Part 1 responses particularly indicate the benefit of technological infusion in DRRM IKSPs as the reconfiguration of the rational and as a viable means for practical knowledge transmission. While paradigmatic shifting from Indigenous to technological could be expectedly perceived as either an epistemic threat or a unique and progressive advancement of Ivatan culture, the sum of changes felt in the Ivatan landscape is validated as a form of socio-cultural continuity. In light of occurring social changes, social and Indigenous justice principles therefore become necessary doctrines to inhibit hegemonious and oppressive forces. This is why modelling bottom-up management approaches of Indigenous knowledge resiliency becomes essential to remain the core and non-compromising element in resiliency, while more scientific means act as a complementary periphery.

Integration is the manifestation of the continuous evolution of IKSPs. Their dynamics are made salient through minute optimizations, such as the infusion of technical influences in traditional means—similarly through cross-validating weather forecasts as disclosed by Part 2 participants. Although dynamism is postulated as small-scale agencies, it must be acknowledged that rapid and radical changes are rather possible during the nexus, iterating epistemological tendencies not just to harmonize but also to hegemonize. From Batanes' introduction to fast internet to the imposition of technically-favoured DRRM policies from Manila, it is often external stimuli that provokes socio-cultural changes, though such logic often finds itself as a mere exception rather than the rule. While change within Indigenous communities are inevitable, caution therefore rests on the conscientious respect for paradigmatic and epistemological boundaries to preserve Indigenous integrity without compromising technical effectiveness.

Results from Table 14 appear as parallel comparisons instead of absolute integrations because the latter may not be fully achievable. Analogous to the analytical categorization and validation of local and Indigenous knowledge by Hiwasaki et al. (2014a), not all IKSPs have potential for integration. Impracticalities exist for certain social resiliency customs to merge with institutionalized processes. Social coping mechanisms that call for personal conversations and even inebriation, for instance, may likely be interpretable as unreasonable steps to integrate into more structured DRRM mechanisms that are often prescribed with formal and professional protocols. On the other hand, others such as forecasting and information dissemination offer better feasibility for hybridization, yet still face numerous imperfections; examining the weather forecasting cross-validation example, such faces impracticalities and reliability issues especially when one forecast conflicts with another. It becomes clear in this case that epistemological idealism does not instantly equate to pragmatic success, as the latter will always be bound to contextual, structural, and practicable limitations.

In addressing participant realizations of superficial versus deep transformations upon the formulation of practical solutions, as indicated in Chapter 4, both transformation levels are realizable, though on varying temporal scales. Because integration's recency and infancy as a concept has not had enough time for cultural vernacularization and entrenchment, the impactful value of integration subsists only on the peripheral, superficial level. Faced with a new, complex, and experimental concept of hybridizing disciplines, participants would have been understandably challenged in integrating parallel DRRM processes steeped in divergent paradigms. Time is a necessary ingredient for the absorption and enculturation of integrative strategies into the Ivatan cultural psyche. As long as integration ought to maintain balance and respect Indigenous paradigmatic competencies and methodologies for resiliency, then deep transformation could still be realized.

Interdisciplinary integration's paradigmatic and pragmatic complexities demand a certain degree of technical competency for effective cross-fertilization of culturally and

technically divergent DRRM frameworks. This parallels one of the interviewed DRRM officers' claim for technical assistance needs, especially when increased climatological disturbances and other hazards become the new impetus for effective and innovative ideas. Despite the lack of in-province expertise, the locally-expressed willingness and intentions offer potential for future and long-term practical research endeavours. It must be noted with caution however that importing non-Ivatan expertise will require critical perspectives and consider methodological insights that parallel the core argument of this dissertation.

Chapter 6: Recommendations and Conclusion

This dissertation underscores not just the possibility but the preferred use of action research, transdisciplinarity, and critique as engines for social change. Berg (2009), Reason and Bradbury (2008) state that discourse through the critical paradigm combined with action research becomes emancipatory, which also yields significant knowledge (Karataş-Özkan & Murphy, 2010) that can be translated into actionability (Reason & Bradbury, 2008). In this research, critique and transdisciplinary thinking were used as a credible approaches and effective forms of generating new learnings, enhanced through the collective efforts of the community. Furthermore, I justified how action research becomes the ideal legitimate means within the Ivatan context to respond to the clamour for recognition of Indigenous DRRM. The praxis thrust of action research and transdisciplinarity further complements its effectiveness to realize positive change (Berg, 2009; Reason & Bradbury, 2008) to induce a novel form of resiliency in the face of climate change disruptions.

The holistic outcome of this research sums the elements of transdisciplinarity, the critical approach, and action research into an emergent and socially emancipatory research approach that works. This culminating chapter encapsulates such summation into subchapters that responds to the research question, details the research outcomes' implications to policy and practice, and provides practical recommendations to enhance resiliency practices. The chapter finally arrives at a terminal conclusion that synthesizes learning highlights and articulates the dissertation's titular discourse on reaching the intersection of Indigenous and modern.

Responding to the Research Question

Triangulating and synthesizing literature reviews and stakeholder analyses acknowledge how epistemic pluralities converge in intersections. Rapid social changes and their resulting complexities inevitably induce scenarios where disciplinary and paradigmatic contrasts come face-to-face. In their inherent ontologies, Indigenous vis-à-vis modern constructs only make sense within their individual and finite realms (Mazzocchi, 2006), though more importantly, it is

their symbioses in these convergences that warrant acknowledgment and understanding. The intersection between Indigenous and modern is relative to this; their individual distinctions are compounded further by hegemonic tendencies, creating tension where argument rather than dialogue prevails.

The Research Question[2] interrogates the unidirectional impact of agency among dichotomous actors. Impacts are transcendent, evinced from mundane processes to deep fundamental principles and range from commensal to parasitic, as analogous to symbiotic relationships. Regardless of impact intensity, social change is the inevitable outcome of the NDRRMC's disruption in Ivatan life. Convening social groups into formal committees or state-promotion and provision of more modern roof-building materials are few instances of the NDRRMC's new world order policies that Ivatan stakeholders flag as outsider prescription blindspots. While acknowledging that NDRRMC policies are better enablers of resiliency in other contexts, identical policies applied in Batanes risk becoming threatening disablers of culturally-pioneered, practiced, and transmitted transgenerational resiliencies.

Even without exogenous impetus, resiliency modernization is a ubiquitous desire among stakeholders, revealed through FGDs. But because DRRM modernization has become institutionalized as an operational thrust and policy, this deprived the Ivatan community of the moral and social privilege to self-direct change. Rather than being legitimized as an organic function of cultural progression, modernization has become forced and compelled by alien authority. Thus, change has become rational instead of relational, which concurs with the Weberian (1978) dictum that modernization is impersonal and dehumanizing. Answering the Research Question in this light divulges how modernizations in DRRM are bound to transpire among Ivatans, but as externally-dictated directives that potentially displaces Indigenous imperatives. This is the consequence of authoritarian and exclusive governance dismissive of collaboration, insisting that DRRM modernization as a state policy as evinced in Table 15 than personal and community aspirations.

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[2] For posterity, the Research Question is "how could the NDRRMC modernization approach impact the Ivatans' Indigenous ways of managing disaster risk?"

Table 15

Initiatives that Prioritize Modernization and Scientific Thrusts in the National DRRM Plan 2011-2028

Actual Thrust Statement (Emphases Added)	Initiative	Page
Enhanced and effective community-based **scientific** DRRM and CCA assessment, mapping, analysis and monitoring.	Disaster prevention and mitigation strategy	3 and 20
Competency and **science-based** capacity building activities alongside the nurturing of continuous learning through knowledge development and management of good DRRM practices on the ground.	Highlights of how DRRM shall contribute to sustainable development	5 and 14
Integrate DRRM and CCA in all educational levels and in **specialized technical training** and research programs.	Approaches of the Philippine Development Plan 2011-2016 and its integration with the NDRRMP 2011-2028	11
Increase resilience of communities through the **development of climate change-sensitive technologies and systems** and the provision of support services to the most vulnerable communities.	Approaches of the Philippine Development Plan 2011-2016 and its integration with the NDRRMP 2011-2028	11
It [disaster prevention and mitigation] **underscores the need for sound and scientific analysis** of the different underlying vulnerability factors, risks and exposure to hazards and disasters.	Disaster prevention and mitigation strategy	18
Decisions supported by **tools and technologies** that facilitate the financial and economically sound **mainstreaming** of DRRM and CCA.	Disaster prevention and mitigation strategy	18
Apply science and evaded-based scenarios in **mainstreaming** DRRM and CCA into plans, policies, programs.	Disaster prevention and mitigation strategy	19
Systems are in place to monitor and disseminate data on key hazards and vulnerabilities.	Community based and scientific DRRM and CCA assessment, analysis, and monitoring	20
Fully functioning knowledge management centre to act as a repository of data, products and information from development partners.	Community based and scientific DRRM and CCA assessment, analysis, and monitoring	20
Develop **partnership mechanisms** with utility providers and key stakeholders.	Disaster response strategy	31

Actual Thrust Statement (Emphases Added)	Initiative	Page
With the changes in the climate and technological advances, regularly conducting research and **technology development** will contribute to more innovative and adaptive mechanisms and approaches towards DRRM and CCA	Research, technology development and knowledge management	38

Note. The above statements of the National DRRM Plan 2011-2018 are the primary evidence used to demonstrate the thrust for modernization. Adapted from "National Disaster Risk Reduction and Management Plan (NDRRMP) 2011-2028," 2011, *National Disaster Risk Reduction and Management Council*. Copyright 2011 by National Disaster Risk Reduction and Management Council.

Modernization approaches idealized by the NDRRMC has double-edged-sword prospects in effecting advantageous and harmful impacts. Consistent with Weber and Durkheim exegeses of functionalist theories, Indigenous disaster risk management methods such as those of the Ivatans are culturally-established foundations of resiliency that exist in their own state of social equilibrium (Barkan, 2016). These DRRM IKSPs evolve and change on their own pace, as affirmed by Barkan (2016), inherently adaptive to their own homeostatic needs and situational contexts. Antithetical to self-paced change, sudden disruptions such as unfamiliar policy impositions by the NDRRMC create destabilizing and dysfunctional ramifications. While the purpose of resiliency remain unchanged, peripheral dimensions essential for resiliency such as cooperativism, self-sufficiency, ingenuity, and the value of traditions as social capital wane (Hornedo, 2000). This is collateral damage when intentionality is deficient in considering contextual foundations and needs of the Ivatan community.

In this critical juncture, it is appreciable how provincial-level DRRM officers become central arbiters of national and local purviews. As Ivatans themselves, PDRRMO personnel are cognizant of the Ivatan essence and bear the weight of reflexivity versus responsibility. While flawed NDRRMC policies are a result of their contextual disconnections and stationary position at the canopy of power and decision-making, PDRRMO personnel are key to appropriating policies to the grassroots of the Ivatan community. Digressing the Research Question to pivot

national to local agency devolutions, privileging the PDRRMO to independently generate policy that is genuinely representative of Ivatan values can be more effective in positively impacting Ivatan DRRM IKSPs. In such an arrangement, power distances are not only made more proximate but are shortened to further democratize and reclaim ownership of decision-making. Inaction results into implications for both policy and practice that are revealed in the succeeding section.

Implications for Policy and Practice

Revelations from this dissertation magnify implications for reconciling existing policies and developing successive ones. Pragmatically, implications also effect enculturated resiliency practices in Ivatan society. By orienting this research as a co-production of critical realizations and new meanings, exposing implications would catalyze the need for reforms as a necessary political and social agenda. Batanes' indigeneity however privileges and ordains reforms as a bottom-up, community-led undertaking, respective of their fundamental Indigenous right to self-determination. Overall, exogenous and endogenous factors become resiliency disruptors in Batanes, which therefore create implications for both policy and practice; in this subchapter, implications will be divulged specifically through their respective categories of policy and practice.

Conclusions related to policy implications. Synthesizing the main findings in this research bring to light a trove of implications for existing policies (as well as inexistent ones), given the context of no interventions or reforms in the prevailing state of affairs in Batanes:

- State-level policies and plans such as the NDRRMP and the IRR of RA 10121 retain a one-size-fits-all generalization and do not regress to the context of Batanes; generalization of policies will render them inapplicable, and hence ineffective for Batanes.
- Some policies and prescribed procedures, such as the Critical Preparedness Action Alert Level Charlie (Local Government Academy, 2015) flowchart in Figure 13, are excessively technical and complex:

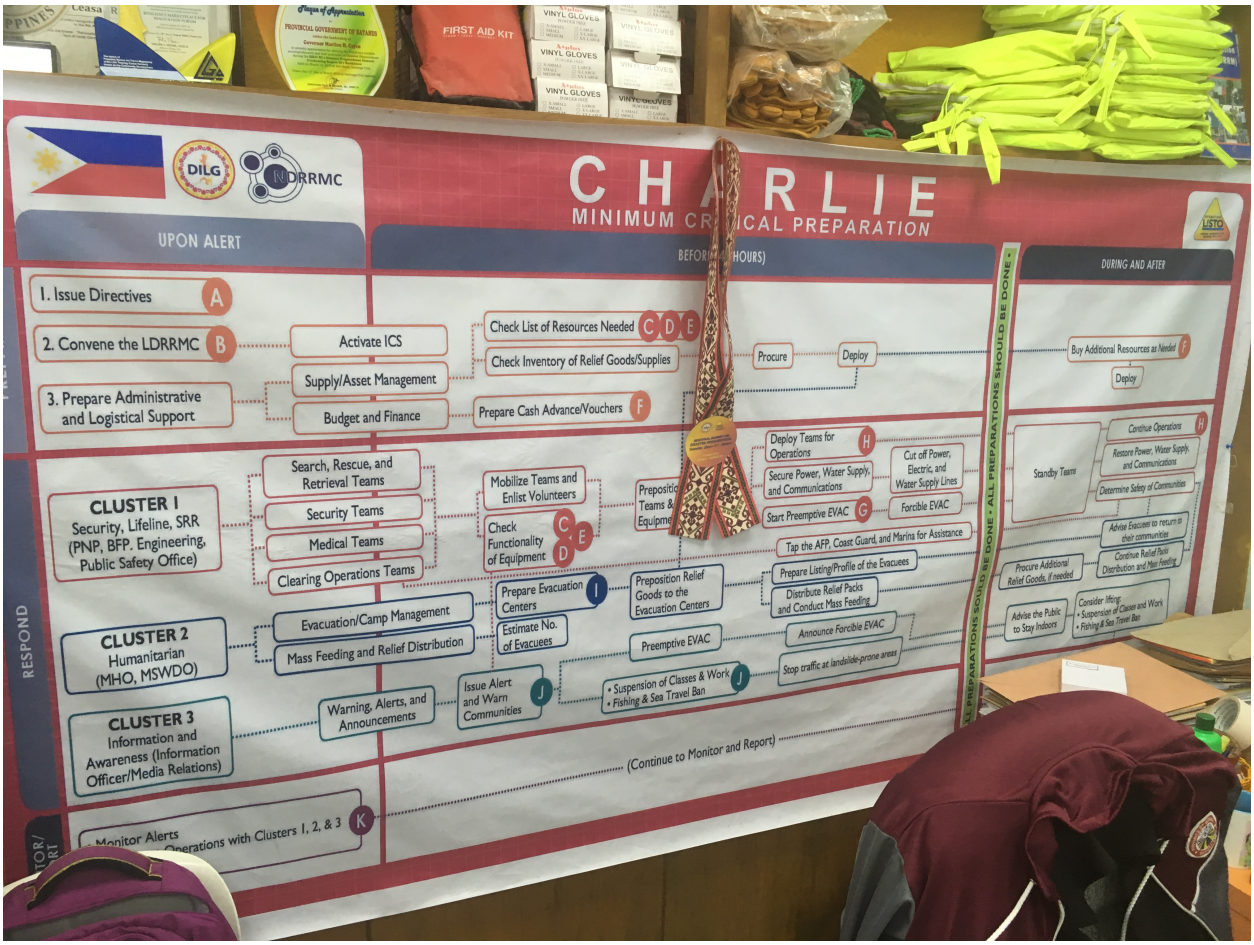

Figure 13. A PDRRMO poster of the highly structured Critical Preparedness Action Alert Level Charlie flowchart from the DILG and NDRRMC outlining the complex concepts, pathways, and action steps for disaster preparation, intervention, and recovery. While still considered to be the minimum level of preparation despite its comprehensiveness, understanding and memorizing this guide in high-pressure situations is surely a monumental challenge. May 22, 2019.

- Sophisticated DRRM systems demand steep learning curves that may be subject to misinterpretation, increased failure risk, and ineffectiveness. These systems often create dependencies for externally-provided training.
- Such technical information is not contextualized[3] for greater understanding, acceptance, and relativity to the local setting.

[3] It must be understood however that contextualization should be not interpreted as watering down the integrity of resiliency strategies nor compromising their effectiveness.

    - Much of the bureaucratic red tape, and complex pre-, during, and post-procedures in many government processes diverts crucial time for DRRM officers to focus on immediate high-priority tasks, frontline duties, and emergencies.
- Policy rigidity, as expressed by workshop participants concerning RA 10121, remain prevalent, consequently inhibiting flexibility and openness to explore effective methods such as Ivatan DRRM IKSPs.
    - Indigenous practices are pushed aside since non-compliance would become audited and penalized.
- Ivatan indigeneity is perpetuated and stigmatized to be vulnerable, according to the IRR of RA 10121. Ivatan society is subverted, only to be at the receiving end of regulations, as opposed to being resiliency experts that provide practical information and knowledge to the NDRRMC.
- National-level DRRM Council is still reserved to dictate obligatory policies and procedures:
    - Decision-making remains context-distant with no full autonomy delegated for the PDRRMO to make more independent, context-appropriate resiliency strategies and decisions.
    - Continuous reliance and idealization of more modernized DRRM systems and tools, consequently reducing priority to employ or even consider IKSPs for resiliency.
    - Continuous exaggeration of power structures and perpetuation of saviour mentality and messiah complex.
- Policies only privilege public officials to carry out assistance duties. This not only formalizes assistance but undermines volunteerism values, according to an FGD participant, who mentioned, “Yung spirit of volunteerism na dating ginagawa dito, irerely nalang sa mga nakalista dito na committee na ito o sinumang nakaupo dito —

e yun naman yung trabaho nun e [The spirit of volunteerism that has been a tradition here is disregarded and assistance is just relied upon those committees or elected officials because helping is their job] (Participant 4, FGD communication, June 4, 2019).

- Some protectionist policies such as the NIPAS and Batanes Protected Area Act remain prohibitive instead of motivating or incentivizing. The latter policy, for instance, prohibited the harvesting of resources such as lime and timber that were traditionally used for constructing traditional Ivatan houses. The Act even stipulated penalties for this. As a result, this waned traditional house construction and today, only very few Ivatans have the knowhow.
- Joint Memorandum Circular No. 8 that remedies overlapping and contradictory policies is still under communicated; persistent belief among residents of the prohibition of traditional practices in sinadumparan construction ensues.
    - Continuous deterioration of already-derelict stone houses.
    - Discontinued practice of traditional house construction inhibits the transmission of expertise and skills to younger generations; no practical skills would be would be passed from an exercise that was thought to be prohibited.
    - Some practices do not necessitate formalization into structured policies; these include psycho-social coping practices that involve personal relations and socializing.
- The lack of policies to research, document, and protect specialized IKSPs for weather prognostications and resiliency allow their waning.
    - Shortfalls to regulate aid agencies from providing context-inappropriate assistance such as relief goods or GI sheet roofing adversely impact cultural resiliency traditions.

Conclusions related to practice implications. Beyond policies, multiple exogenous and endogenous disruptors are at play that create profound implications on the dynamics of common practices in Ivatan society:

- Internet presence creates preference for convenience.
    - The rapidity and perceived accuracy of online applications become preferred substitutes for traditional weather forecasting and time-tested methods. The novelty of online approaches shift preferences from traditional to modern.
    - Online distractions hinder practice and transmission of Indigenous knowledge.
    - Mobile internet service providers play a significant role in commodifying convenient alternatives such as using internet-dependent systems for weather forecasting.
- Elder generations would continue using traditional weather prognostications, and validate results through cross-examining them with advanced weather applications (phone apps) with the younger generation for enhanced accuracy.
    - Certain IKSPs may become highlighted over others based on effectiveness. While the former becomes more utilized, the invalidation of latter practices may consequently result in their waning.
    - This practice opens opportunities for research regarding knowledge analysis and integrations similar to the work of Hiwasaki et al. (2014a).
- While yaru, or the compulsory cooperative duty to help in the community, and other cooperative values are still common, it is threatened to wane.
    - Shifting economic needs redefine assistance as a type of employment or business transaction rather than a social and altruistic imperative; the expectation of payment for any form of assistance may become the norm.
    - Growing mentality of transaction-based assistance would stigmatize aid as an exclusive privilege for those who could afford.

    - Growing dependency on government and non-government aid and expectation of their assistance no longer necessitates residents to help one another.
    - Social bonds are weakened since less are expected to socialize and form friendships when situations that require yaru are lessened.
- Requesting for relief goods become habitual and creates dependencies. Reliance to the provisions of others diminishes personal resiliency habits such as storing food reserves prior to typhoons. This in turn potentially increases risk to hunger when aid is delayed.
- Stringent conservativism by some members of society and reluctance to innovate (such as integration) existing DRRM IKSPs, vulnerabilities become exacerbated due to the more powerful onslaught of increased climatological disturbances and other hazards. In the Research Findings, an interviewee mentioned that there are still Ivatans who rely on "old-school" ways and even display antagonistic tendencies towards the approaches of the PDRRM Office. An interviewee even mentioned how she was told off by a resident, saying "Wag na kayo manakot" [don't scare us] (Interviewee 5, workshop communication, June 10, 2019) — implying the fear of change that the PDRRM Office would impose on traditional ways.
- While IPed integrates resiliency in the curriculum, the lack of personal practice by the youth due to the lack of intergenerational reinforcement and modelling creates capacity gaps in different age groups.

Postulating do-nothing and best case scenarios. The implications in the previous two subsections underscore consequences in a do-nothing scenario. Eschewing policy and practice interventions ultimately compromises resiliency. Status quo continuity of an Ivatan society that refuses to be responsive to exogenous and endogenous influences will dismantle cultural foundations, perpetuate hegemony, and endanger life. It is conclusive that the do-nothing scenario is the antithesis of Ivatan essence and identity since resiliency is a perpetual

and habituated action that has allowed Ivatan folk to survive and thrive despite environmental hostilities. Such laissez-faire postulations provide us a reflection of a hypothetically more hazardous Batanes and the lessons to learn to ensure the safety of life and cultural identity.

Best case scenarios on the other hand, offer promising realities to conjure. Upon structural reforms of state-level policies to become more inclusive, empowering, and representative, greater autonomy and decision-making imperative is relegated to the PDRRMO. Their championing is also symbolic of the repatriation of power and respect to the true knowledge-keepers, actors, and models of Indigenous resiliency. Local policies could be made more lean and strategic—ratified with greater cognizance of their fit, effectiveness, and acceptability within the more proximate contexts and cultural paradigms of Batanes.

Also, best case scenarios depict swimming with rather than against the tide of change, where technological ubiquity enables rather than debases Indigenous practices and knowledge transmission. The internet becomes a new curator that stores, shares, and adapts Indigenous knowledge into a novel learning platform; once endangered and waning DRRM Indigenous practices would have much potential to be revived through online documentation and sharing across Batanes' municipalities. While practice is still maintained as the true progenitor of knowledge, technology could be easily appropriated in various platforms to instigate knowledge applications. Various mobile programs would become exemplars in encouraging experiential learning through Augmented Reality, guiding outdoor weather observation activities through global positioning systems (GPS), and even gamifying Indigenous practices for the younger generation of learners. Overall, this would exemplify the Ivatan ingenuity of tapping exogenous influences to improve and innovate local knowledge.

Concretizing favourable scenarios necessitates planning not for what is merely possible but for what is preferred. Preferential outcomes fundamentally entail those that the Ivatan community intentionally aspires to achieve, as a form of collective actualization where they take full command and control of such envisioning process. With a number of different participatory and Indigenous methodologies at their disposal, there is much potential for Peoples'

Organizations-led scenario planning for Ivatans by Ivatans. This organic democratization of averting unfavourable scenarios and realizing ideal settings are participatory processes that engage not just on reactive problem-solving but on the proactive reification of Ivatan aspirations.

Recommendations

Transdisciplinary orientations in research invest in workable transformations without losing sight of disciplinary and thematic convergences (Bendito & Barrios, 2016). Other than concluding the dissertation with emancipatory realizations and understandings brought forth by interrogating policy and exogenous agencies, it is normative to produce practicable recommendations as fruits of transdisciplinary collaborative engagement. Batanes inevitably faces unorthodox challenges exacerbated by climate change to which reducing them as mundane problems treated under conformist, uni-disciplinary, and segregated epistemic silos will not effect holistic remedies. Thus, recommendations in light of the Batanes condition favours the scientific yet Indigenous, transformational yet conservative[4], critical yet collaborative, and far-reaching yet contextualized.

Knowledge is nothing without its application. The transdisciplinary foundations anchoring this dissertation demonstrates the transcendence of critical interrogations into pragmatism, agency, and solution-generation. In conditions when risks of human casualty and significant loss of culture become palpable and existential threats, the heightened importance of generating effective solutions compels the employment of novel techniques, tools, and practices. Enhancing resiliency mechanisms in Batanes through holistic integrations that highlight epistemic to practical co-productions become such an exemplar; rethinking and operationalizing integrated resiliencies have persistently been the fundamental and focal goal of the dissertation.

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[4] "Transformational" was meant as a forward-looking approach that embraces positive change. This would include championing adaptability to social changes to benefit (as opposed to inhibit) the general welfare and Indigenous identity and self-determination. "Yet [being] conservative" meant that while change is good, there are certain Ivatan attributes that are worthy of preserving such as yaru principles, benevolence, and the spirit of resilience.

Transdisciplinary fusions in light of the focal goal of enhancing resiliency agencies in Batanes feature dual intensions of collaborating once clashing paradigms on the epistemic dimension and the development of practicable strategies and solutions as the pragmatic call to action. While the latter offers a myriad of recommendatory solutions that exists within the research' context, they are assembled together through a framework that pivots on Indigenous and scientific knowledge and practice integrations. The framework, as detailed in Figure 14, maps and organizes essential steps for integration to create a holistic strategy for the ultimate goal of a new, augmented, and smart resiliency for Batanes.

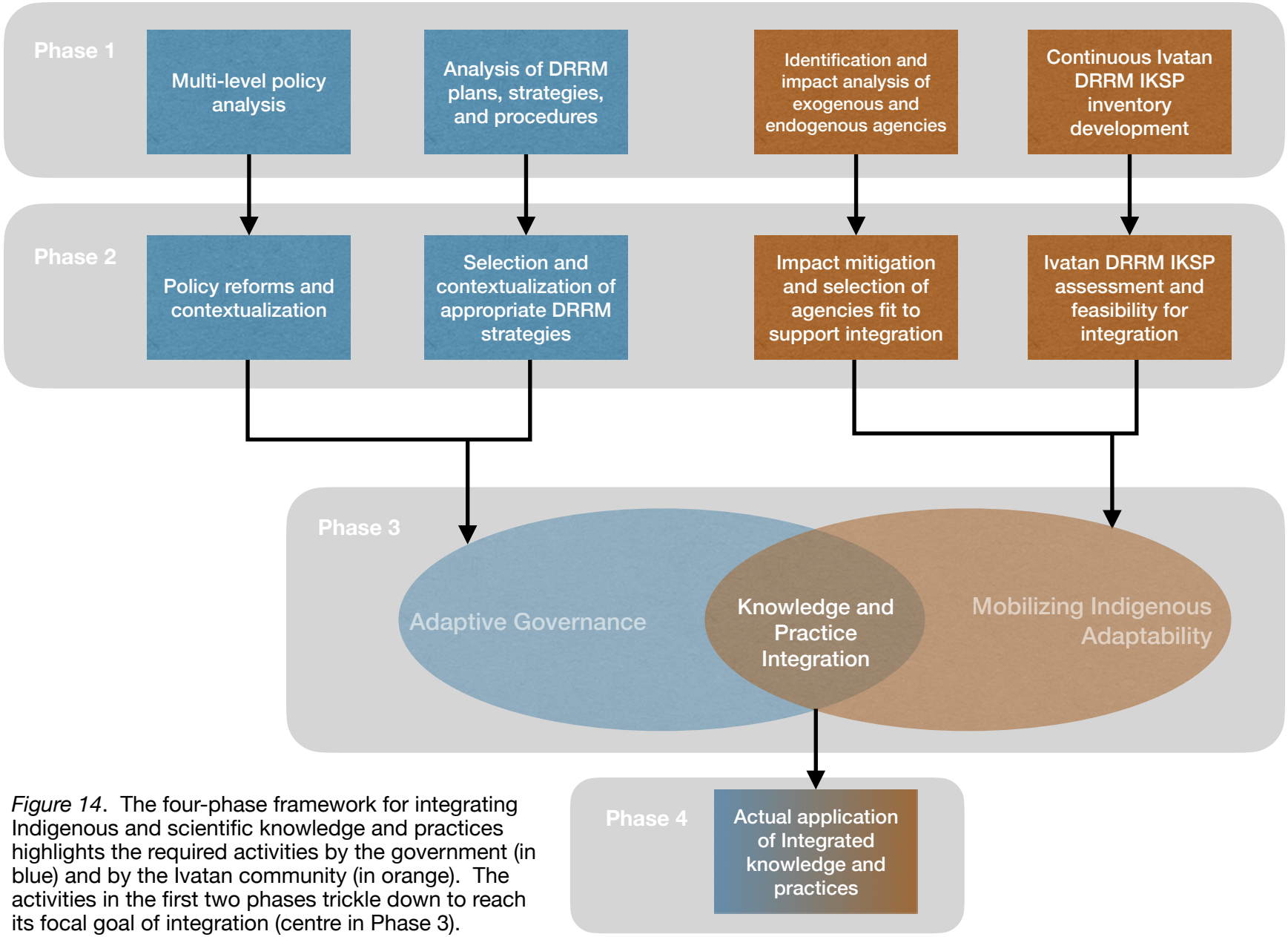

Figure 14. The four-phase framework for integrating Indigenous and scientific knowledge and practices highlights the required activities by the government (in blue) and by the Ivatan community (in orange). The activities in the first two phases trickle down to reach its focal goal of integration (centre in Phase 3). Integrated knowledge is then adopted and applied by the PDRRMO and the Ivatan community in Phase 4.

Caveats exist in the framework and are essential a priori justifications that rationalize how recommendations do not work in absolutes; recommendatory limitations exist, which is an essential acknowledgment and expectation levelling prior to actualization. Firstly, not all IKSPs in DRRM previously identified in Table 7 (see Appendix B for the more comprehensive table) are feasible for integration due to the very personal nature of some practices that may be out of bounds of professional protocol boundaries. Secondly, recommendations are constant iterations and works in progress that require perennial updates and customizations yet without straying from its focal goals. Lastly and abiding by Action Research prerogatives, precursory creation of community buy-in and establishment of trust are cornerstone prerequisite steps; community acceptance is and will always be a significant determinant for the effectiveness of the framework.

As a practical prelude to the execution of the framework and because of the involvement of government actors, formal institutional preparations become necessary prerequisites for action. Typical in government processes in the Philippines, primary preparations involve Mayoral and Municipal Council formal endorsement that mandates framework reification alongside the allocation of financial support for such a project. Facing off the parties of the Provincial Government, the IPMR, and the Ivatan community in a joint orientation follows. A Technical Working Group is often created in the joint orientation to assess, build capacities, and outline roles. Succeeding this, a more formal operations plan will be collaboratively developed.

Figure 14 is an integrative and ladderized framework featuring a funnelling of multiple processes and activities, commenced by independent actors of the state and Ivatan community, leading to the application of such activities through eventual collaboration. Separately conducted by the aforementioned actors, Phases 1 and 2 in the framework entail a combination of analyses and problem identification, followed by mitigation processes respectively. These phases are highly reflexive; imploring deep introspection to identify problem points and inefficiencies. Moreover, Phases 1 and 2 also follow recommendatory

traditions of problem solving. This contrasts Phases 3 and 4, which depart from the reactive traditions into appreciative inquiry; recommendations in latter phases focus on normative assumptions of what ought to be (Reed, 2007), or the more proactive and collaborative focus of uncovering opportunities and elucidate both actors' desired future state.

Phase 3 in particular highlights the culminating point of consensual convergence between once discordant actors. In its most conceptual state, this phase also encapsulates the intersection between institutional and Indigenous realities. Arriving at this phase means each actor acknowledges not just one's individual strengths and contrasts against the other, but on their identical purpose of creating an enhanced form of resiliency. Such alignment and parallel purpose justifies the need for convergence. Maintaining impasse on each actor's individual needs on the other hand inhibits the creation of novel collaborative strategies, which are much needed in light of the more intensified and disruptive disasters exacerbated by climate change. The goal of convergence in Phase 3 is then achieved through the integration of scientific and Indigenous knowledge and practices.

In Phase 4, integration evolves into normalized applications adopted by the community and PDRRMO. Beyond demonstrating effective resiliency through integration, this forward-looking and hypothetical foresight pays attention to the long-term enculturation of integrated knowledge and practice systems within Ivatan society. Phase 4 takes inspiration from Ivatan resiliency histories of adopting borrowed systems and indigenizing them, such as the evolvement of sinadumparan construction, to benefit social resiliency. In reiterating outcomes from the Research Findings chapter, deep enculturation of integrative systems will require time, trial-and-error learnings, and the primus inter pares regard for Indigenous paradigmatic competencies and methodologies for resiliency.

Recommendatory framework reification and execution is further detailed in Table 16. Under the column of *Specific Tasks*, activities are supplied with particular instructions to guide implementation. There is importance in acknowledging, however, that Table 16 directives are yet to be validated of their acceptability and feasibility by the Ivatan community and PDRRMO.

The specific tasks are initial templated actions meant to catalyze further dialogue, research, and assessment. Because these tasks are grounded and corollary from researcher positionalities, there is much to be subjected to social discourse, contextualization, and acceptance, to foster ownership and adoption of tasks as insider undertakings.

Table 16

Recommended Activities and Tasks to Integrate Indigenous and Scientific Knowledge in DRRM

Phase	Activity	Specific Tasks	Possible Parties to Lead	Resources Needed	Timeframe
	Community-Initiated Activities				

	Continuous Ivatan DRRM IKSP inventory development	• Continue extensive data gathering of disaster risk management-related Indigenous knowledge, systems, and practices (organized in similar categories in Table 7) down to the community level in Batanes.
		  • Conduct data gathering through formal and informal means, from casual interviews to structured surveys depending on target information source[a].
		• Validate obtained data, similar to the outputs in Figure 8, of the existing DRRM IKSPs compiled in Table 7 by community elders, practitioners, and knowledge-keepers.
		  • Identify DRRM IKSPs that are in danger of waning.
		  • Cross-validate and sift through IKSPs that are similar across different LGUs to reduce redundancies.
		• Create online repository for immediate access, crowdsourcing of information, and validation.
			Ivatan Tribal Council, Batanes State College and/or Saint Dominic College of Batanes, Batanes Heritage Foundation	High — possible funding through grants from NCCA, ICHCAP, and UNDRR	10 months (around three barangays per month to cover all 29 barangays in the province)

Phase	Activity	Specific Tasks	Possible Parties to Lead	Resources Needed	Timeframe
1	Identification and impact analysis of exogenous and endogenous agencies	• Conduct research work on identifying possible cultural and social disruptors such as modernization, urbanization, technology, etc. that would impact social functions, customs, and traditions in Batanes. These disruptors could be exogenous (influences from outside Batanes) or endogenous (changing lifestyles and value systems within Ivatan communities). • Conduct detailed impact analysis of agencies and the social and cultural changes and risks they could potentially create.	Ivatan Tribal Council, Batanes State College and/or Saint Dominic College of Batanes, and other Peoples' Organizations	Low	Four months of research and peer reviews
	Government-Initiated Activities				
	Multi-level policy[b] analysis	• Analyze potential policy issues and loopholes that may negatively impact Ivatan customs, traditions, and social functions. Issues include the perpetuation of external dependencies, lack of cultural sensitivities in policy, limited prioritization in Indigenous DRRM, compliance rigidity, culturally-inhibiting policies, and others indicated in Chapter 5. • Audit specific policies and implementing rules and regulations from national to municipal level policies such as the Philippine Disaster Risk Reduction and Management Act of 2010 (RA 10121), Batanes Protected Area Act of 2000 (RA 8991), National Integrated Protected Areas System (NIPAS) Act of 1992 (RA 7586), DENR-PAMB circulars, related policies in the provincial and municipal levels, among others. • Further analyze the implications of favouring technical processes in DRRM as prescribed in policy.	PDRRMO — may assign a committee internally or outsource external policy analyst consultant	Moderate — only when allocating funds for consultancy services	Three to five months

Phase	Activity	Specific Tasks	Possible Parties to Lead	Resources Needed	Timeframe
	Analysis of DRRM plans, strategies, and procedures	• Analyze the effectiveness, accuracy, and applicability of DRRM plans, strategies, and procedures from the national to municipal levels. • Cover plans and strategies from the National DRRM Plan 2011-2028, to the Batanes Provincial DRRM Plan 2017-2022, and Basco Contingency Plan for Tropical Cyclone. • Assess the level of complexity, technicality, and implementability of the plans.	PDRRMO — may assign a committee internally or outsource external analyst	Moderate — only when allocating funds for consultancy services	Three months
2	**Community-Initiated Activities**				
	Ivatan DRRM IKSP assessment and feasibility for integration	• Assess the collected DRRM IKSPs to determine which could likely or unlikely be scientifically validated, as well as their relation to DRRM similar to Figure 1.1 in Hiwasaki et al. (2014a). This will determine level of integration feasibility. • Determine and exclude activities that require personal or intimate decorum, such as socializing with peers that involves inebriation, which may breach professional protocols. • Promote further academic research on DRRM IKSPs.	Batanes State College and/or Saint Dominic College of Batanes	Low	One month
	Impact mitigation and selection of agencies fit to support integration	• Execute action planning to identify suitable strategies to mitigate harmful impacts of exogenous and endogenous agencies. This may entail coordination, collaboration, and solution-generation with identified organizations, companies, agencies, and entities that have identified potential to disrupt. • Identify disruptors and their opportunities to enable and support integration. For instance and if identified as a disruptor, technology and the Internet of Things could be potentially tapped to store and transmit DRRM IKSPs.	Batanes Indigenous Cultural Community Organization, Batanes State College and/or Saint Dominic College of Batanes, and other Peoples' Organizations	Low	One month
	Government-Initiated Activities				

Phase	Activity	Specific Tasks	Possible Parties to Lead	Resources Needed	Timeframe
	Policy reforms and contextualization	• Coordinate and collaborate with government agencies in-charge to address concerns about policy loopholes. • Create and ratify memoranda among involved government agencies to reconcile identified issues and contextualize previously generalized and conflicting rules and regulations within the policies.	PDRRMO and government agencies related to particular policies	Low	Six months to a year
	Selection and contextualization of appropriate DRRM strategies	• Indigenize, simplify, and contextualize broad plans to make them more comprehensible and applicable to the local geographic and social contexts. Series of collaborative workshops with the Provincial and Municipal DRRM Offices could be conducted. • Select specific DRRM strategies and techniques such as typhoon preparations, early warning systems, and prognostications that may have localized equivalents.	PDRRMO, LGUs within Batanes	Moderate — as workshop expenses	Two months
	Mobilizing Indigenous adaptability	• Create community buy-in and promote advocacy building for the importance of preserving traditions and practices while adapting some with rapidly changing resiliency needs in the face of climate change. This could be conducted using multimedia promotions. • Develop capacities and values building for the community, especially the youth through school-based activities, to understand DRRM IKSPs and the benefits of collaborative adaptability with scientific systems to improve existing traditional resiliencies.	Ivatan Tribal Council, Peoples' Organizations, youth groups, DepEd Batanes, Batanes State College and/or Saint Dominic College of Batanes	Moderate — as promotions expenses and training	Three months

Phase	Activity	Specific Tasks	Possible Parties to Lead	Resources Needed	Timeframe
3	Adaptive Governance	• Adopt a policy that clearly acknowledges, recognizes, and adapts the importance of DRRM as a bottom-up initiative and as a means to enhance not only the systems and processes but the capacities of people in the community. • Instil high respect and regard for cultural traditions in decision-making. This is symbolic of transferring trust and confidence not only on technical and scientific processes but also on traditions. • Continuously indigenize and contextualize plans and strategies.	Provincial and Municipal DRRM Offices, LGUs.	Low	Four months
	Knowledge and Practice Integration (ethnometeorology and hybrid resiliency practices)	• Conduct knowledge integration action planning similar to Ivatan Stakeholder Synthesis Workshops conducted in this research with DRRM officers; Ivatan community representatives; and organizations, agencies, and entities that have identified potential to disrupt. This would work as a venue for knowledge and systems exchange with top prioritization on how to create enhanced collaborative resiliencies. • Workshops may opt to continue topics highlighted in Table 10 and reuse the Part 2 worksheet example in Figure 10. • Pilot certain integrated knowledge and practices, such as hybridized weather forecasting and housing designs as trials to test their effectiveness and practicability. Improvements could be recommended to fill gaps and address challenges. • Organize a social and scientific validation workshop for the community as a reinforcement of participatory and inclusionary principles where the Ivatan community is empowered as true resiliency experts.	Ivatan Tribal Council, Provincial and Municipal DRRM Offices, youth groups, DepEd Batanes, Batanes State College and/or Saint Dominic College of Batanes	High	Eight months

Phase	Activity	Specific Tasks	Possible Parties to Lead	Resources Needed	Timeframe
4	Actual application of integrated knowledge and practices	• Community down to the household level would adopt and habituate the use of hybridized resiliency practices • Organize local information, education, and communication campaigns (IEC) that promote and disseminate integrated knowledge and practices in DRRM for continuous resiliency enhancement. • Promote continuous non-formal training in integrated DRRM to the household level. Integrated DRRM could be included in IPed. • Include IKSPs in DRRM information management systems and development agenda in the Provincial and Municipal DRRM Offices. • Government to allocate financial support for local projects that integrate and promote IKSPs in DRRM. • Include integrated knowledge and practices in Provincial and Municipal DRRM planning and operations such as in RDANA, Emergency and DRRM planning, resiliency training, IEC campaigns, climate change action planning, etc.	Ivatan community (household level), Ivatan Tribal Council, Provincial and Municipal DRRM Offices, Provincial Government of Batanes	Moderate	Continuous

Note. The above recommended integrative activities and tasks are constant works in progress. Further improvements and refinements from the community are most welcome and highly encouraged. Timeframe and resources are estimates.
[a]It is advised to consult with the Ivatan Tribal Council and NCIP for more appropriate research design and method for data gathering.
[b]Policies versus plans (including strategies and procedures) are differentiated where policies are the ratified set of rules and regulations that outline legal responsibilities, conduct, and conformity, while plans are defined as the operative tasks and more specific instructions to achieve objectives.

Final Statements

Conducting interdisciplinary and transdisciplinary research exists not only as a possibility but as a necessity. It is revealed in this dissertation that blending perspectives and disciplines to better explain phenomena becomes a new and more novel way of enhancing research as traditional disciplinary boundaries are blurred (Hagemeier-Klose et al., 2014). In this way, new communities of knowledge emerge, paving the way for a new coherence of ideas. As the problems of our time become more connected and complex, isolating them into their disciplinary silos may no longer offer relevant, credible, legitimate, and effective means to create solutions. Much like the phenomena of disasters, research in it must be progressive and focused not only on unifying various perspectives in understanding such phenomena but also translating these learnings into action. In light of this dissertation, the transcendence to transdisciplinarity is key not just to comprehend the world differently, but to create better disaster measures to lessen damage and ultimately save lives.

Transdisciplinarity in climate change broadens its defining periphery as a multiplex of environmental to social (Mercer et al., 2008; Rotherham, 2013), global to local (Djalante et al., 2011), and scientific to Indigenous (Gaillard, 2007; Hilhorst et al., 2015) phenomena. Hence, it has been understood in this research that employing diverse lenses in DRRM uncovers previously discreet social impacts that chime well with Bankoff's (2003) discourse how increased climatological disturbances and other hazards exacerbates social inequalities. This parallels power structure jousts between Ivatan Indigenous communities and state-directed, national-level DRRM offices. It is further revealed that the latter's institutional setup reveals oppressive tendencies that are systemic, symptomatic of post-colonial legacies, socially destabilizing, and atrophic to culturally-distinct Ivatan cooperative values. Revelations such as these would not have been deduced without crossing through and beyond disciplinary frameworks.

It is conclusive in this dissertation how superiority complexes extend beyond DRRM practices into deeper epistemic dimensions. Affirmed through analytical triangulations of

extensive literature reviews and Ivatan stakeholder interrogation and critique, DRRM IKSPs are implicitly discounted and made irreverent mainly by exogenous agencies such as aid organizations, the NDRRMC, and other government departments. Objective and scientific knowledge purviews reign as the gold standard, prescribed especially by the NDRRMC for managing disaster risks, reputably for scientific knowledge's asserted mastery over nature (Anderson, 1996). Justified by the constitutional imperative to protect and the culture of compliance to authority, technical means are favoured for their effectiveness, ultimately transgressing into hegemony over Indigenous knowledge. State impositions therefore expose the polarity between intent and impact.

Foucault's archetype of the inseparability of power and knowledge (Howarth, 2010) is reified through the state's authority to protect and the prescription of expertise that aggrandizes scientific thought and rationalism. This privileging of power justified by saviour mentality results in the colonialism of knowledge and the disenfranchisement of Indigenous realities. Indigenous knowledge is therefore threatened by culturally-insensitive government policy agenda. The outcomes of the dissertation elicits how Batanes epitomizes this Foulcauldian prospect. Resiliency through relational and social value systems, as highlighted in Ivatan cooperativism principles and examples, are subject to redesign to follow rigidly structured and formal protocols according to the IRR of RA 10121. It is the power vested in this law that destabilizes and alters time-tested Indigenous resiliency practices, potentially dispossessing Ivatan symbolisms, relationships, histories, and reputations.

When protectionist policies such as the NIPAS and Batanes Protected Area Acts inhibit cultural practices that are perceived to be extractive by outsider lenses, the law perpetuates cultural abandonment and reduces culture merely as a perspective and not as a holistic practice. Barring limestone sourcing for traditional sinadumparan construction is more than just a conversion of cultural practices into a contravention but a symbolic perversion, illegitimacy, and cleansing of Indigenous knowledge. Moreover, the consequent waning of sinadumparan construction know-how triggers a cascade of socially-blighting impacts in the

urban, cultural, and resiliency landscapes; more specifically, inhibited practices are effective in weakening disaster resiliency, devaluing kapañidungan, centering the self over others, idealizing dependency to external aid, and hindering intergenerational IKSP transmission. Much irony exists in potentiality versus actuality, reiterating how modest intensions could yield monolithic, long-term, and socially-destabilizing impacts. These are the most significant takeaways in this research.

It must be recognized that Ivatan society faces rapid and profound socio-cultural changes, citing exogenous forces that if left unchecked, could result in a myriad of imperilling impacts. On the contrary and based from the outcomes of this research, it is fairly conclusive that change is also internally-driven. Modernity is an undeniable social disruptor felt across a wide demographic range, though desired more prevalently among Ivatan youth, as uncovered in this dissertation. It is the awareness of their indigeneity and the right to self-determination that gives Ivatans permission to embrace modern privileges that benefit them as a society. Cautionary perspectives among many Ivatans however, as revealed through the FGDs and workshops, iterate that it is the same indigeneity that remains their main anchor to ground and protect them from the alienating tendencies of change. This offers innovative potential for the prospect of merging the strengths of Indigenous traditions and scientific advancements in resiliency, in light of the swift amplification of climate change.

While realizing Indigenous self-determination and the right to collectively define future tenets and social values are foundational to the rights of the Ivatans, the younger generations are also bound to inherit antecedent customs, traditions, and institutions from previous generations; the youth are heirs of traditions and are future knowledge-keepers and practitioners of Ivatan IKSPs in DRRM. While there is nothing wrong in the adoption of modern ideas, there can be reason for concern since the younger generations are considered more accepting of change (F. Datar, personal communication, February 16, 2021) that may potentially jeopardize the continuity of Ivatan resiliency traditions. Concern arises when impediments such as exogenous vectors and even endogenous notions that are countercultural inhibit

cultural transmission of Indigenous resiliencies. Other than inculcating heritage, culture, and identity, transmission of Ivatan IKSPs is also the enculturation of Indigenous knowledge and competencies for survival.

It is to be made clear that outright condemnation of scientific knowledge in its entirety and the romanticization of Indigenous knowledge as panacea are amiss in generating principled, legitimate, and effective solutions. In this light, the win-win approach that defines the boundary for socially acceptable change and bridges epistemic gaps is through the integration of Indigenous and scientific strengths. Integration has promise and potential made novel from the reciprocation and hybridization of social and scientific processes to advance new methods of adaptation and resiliency. This arguably demonstrates contemporary adaptations in Ivatan DRRM IKSPs. Such adaptations reveal emerging mutual symbioses between simultaneous exogenous influences, through integrating with technical approaches prescribed by the NDRRMC, and endogenous forces through Ivatan society's idealization of modernity.

Still, integration will not escape constant iterations of cautionary and critical checks and balances. While the principle of integration premises Indigenous and scientific knowledge as equals, as supported by Hiwasaki et al. (2014), realities may prove differently. The Philippine government's histories and tendencies of expropriating control under self-declared exceptional circumstances question the effectiveness of genuine and lasting integration. The onslaught of disasters are the perfect conditions when state tendencies to centralize command in times of great need come to fruition. Dovetailed by Baudoin et al. (2016), these trends arise since the government fears that integration signifies a reform to their power structures. This reality in integration all the more heightens the importance of intensifying critical acuities in questioning the decisions, policies, and perpetuation of government structures and actions, as per the critical paradigm (Pease, 2010).

To further conclude, much advantage exists with scientific knowledge-Ivatan IKSP nexus efforts applied in the Ivatan context to demand a primus inter pares (first among equals)

decision framework, rather than integration insistent on a levelled playing field of control. In this setup, the locus of Ivatan-based decision control and the moral and socio-cultural imperative are restored with respect to Ivatan indigeneity. Ivatans would be empowered as the primary DRRM experts, reinforced by technical knowledge processes. While the positivist interface of employing technical DRRM systems is also demanded for its strengths, Ivatan stakeholders affirm that scientific approaches are also socially-accepted validation means that complement the effectiveness of IKSPs. Such a framework breaks the epistemological impasse, shifts competition to respectful collaboration, and redefines integration as a regenerative methodology for Indigenous resilience.

This dissertation earmarks the importance of interdisciplinarity manifested through the symbolic, epistemic, and practical convergence of Indigenous and scientific in DRRM. In parallel, rich learning opportunities on the intersections of socially constructed vis-a-vis scientific knowledge exist. Learning is transcended once such intersections are viewed with critical lenses and in social justice paradigms. In this way, the dissertation exposed realities how the NDRRMC's aggressive promotion and positivist thrusts compromises thousand year-old traditions of DRRM. It is essential likewise to acknowledge how transdisciplinarity and action research may pave clear paths of collaborative opportunities through integrating Indigenous and scientific knowledge, systems, and practices for the ultimate purpose of enhancing resiliency. In the end, operationalizing such integrations hopes to showcase the timeless perseverance of the Ivatan and their resiliency in both inclement weather and socio-political disruptions.

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Appendix A

Indigenous Knowledge Examples and Their Application in DRRM

Location	Context-Specific Indigenous Knowledge Applied in DRRM	Source[a]
Bangladesh	Raising awareness of disasters through folk songs.	Shaw, Sharma, and Takeuchi
	Early warning systems for flood risk management.	Mallick and Rahman
Vietnam	Water-puppet show and story telling about awareness of floods.	Shaw, Sharma, and Takeuchi
	Climate forecasting based on complex cultural weather models for effective decision making for farmers.	Nguyen and Shaw
Nepal, Pakistan, and Japan	Local mountain ecosystems and disaster risk reduction principles and structural and non-structural measures.	Fujita, Shaw, and Takeuchi; Dekens
Philippines, Indonesia, and Thailand	Indigenous knowledge and coastal hazards as applied in housing, coastal green belts, religion and belief systems.	Baumwoll and Krishnamurthy
River basin communities	Flood inundation coping strategies such as local economic diversification, floating plinth infrastructure design, and strengthening kinship networks.	Tran, Takeuchi, and Shaw
Himalayan region, Vietnam, and Japan	Utilizing local and indigenous materials and techniques for house building.	Subedi
Japan	Using local learning and communication tools such as wooden clappers, kraft picture story shows, and card games.	Takeuchi and Sharma
	Traditional flood protection through prevention, erosion controls, and damage control measures.	Takeuchi and Shaw
	Community-controlled water management rules and system for fire protection.	Tanaka and Takeuchi
Philippines	Indigenous resource conservation, land management, and coping strategies during food shortages.	Cabatac, Pulhin, and Cabanilla
	Coastal community adaptation using traditional architecture, vernacular transportation systems, and social values.	Uy and Shaw
Indonesia	Story telling as an important preparation strategy for tsunamis.	Baumwoll
	Centuries-old building technology and local knowledge and construction techniques made contemporary.	Pribadi, Hidayat, Triyadi, and Harapan
Maldives	Using traditional nurseries, coastal bio-shileds, food security enhancement at the family level, and informal community coast guards.	Kobayashi

Location	Context-Specific Indigenous Knowledge Applied in DRRM	Source[a]
Small Island Developing States (SIDS)	Featuring indigenous navigation systems, community customs, traditional food preservation methods, shifting cultivation and cropping patterns.	Veitayaki
Tuvalu	Weather forecasting, coastal hazard management, and the importance of political will.	Resture
Papua New Guinea	Vernacular and flood-proof design of houses.	Mercer and Kelman
China	Century-old Karez water management system using natural underground water flow.	Fang, He, and Zhong
Sri Lanka	Indigenous land management for water and farming systems to cope from droughts.	Nianthi and Dharmasena
India	Evolving indigenous shelter technology to incorporate stabilized blocks in traditional mud-based housing system.	Sharma and Gupta
	Indigenous housing technology using local materials and techniques.	Khan

Note. All examples and applications are organized based on their location. Adapted from "Indigenous Knowledge and Disaster Risk Reduction: From Practice to Policy" by R. Shaw, A. Sharma, and Y. Takeuchi (Eds.), 2009. Copyright 2009 by Nova Science Publishers, Inc.
[a]All chapter sources are dated as 2009.

Appendix B

Ivatan Applications of IKSPs in Local DRRM

Subject	Observations	Predicted Meteorological Phenomena / Meaning / Function
Animal and Human Behaviours		
Black ants (*Vuhawu — Lasius niger*)	Whole ant colony moves to upper parts of the house or walls.	Stormy weather and heavy rain
Mosquitoes (*Tamuneng — Culicidae*)	A swarm of mosquitoes (*Culicidae*) occur.	Rainy weather
Collared kingfisher (*Tagalit — Todiramphus chloris*)	Seasonal bird sings at or near beaches from March to September.	Season for dangerous fishing has lapsed, making it safer for fishermen to venture further out at sea.
Philippine coucal (*Talukuk — Centropus viridis*)	Bird sings “ta-lu-kuk” (hence the name) out loud in any part of the day.	Light or heavy rain will occur in a few hours.
Chickens (*Gallus gallus domesticus*)	a) Chickens (*Gallus gallus domesticus*) bathe in dust. b) Chickens (*Gallus gallus domesticus*) crow at night or dawn[e]	a) Fair weather b) Fair weather
Cows (*Bos taurus*), water buffalo (*carabao [Bubalus bubalis]*), and goats (*Capra aegagrus hircus*)	a) Animals are not interested to drink water. b) Observations in Daman’aato hill in the Sabas de Sagon pasture, Itbayat: cows (*Bos taurus*) lay down.[e] c) Observations at Disiay promontory in Uyugan: water buffalos leave herd and stare at the ocean for a long duration[l]	a) Bad weather[c] b) Bad weather[c] c) Typhoon
Cows (*Bos taurus*) and goats (*Capra aegagrus hircus*)	a) Grazing on ridges or tops of mountains b) Grazing on the side of the mountain c) Grazing on the foot of the mountain, sometimes for days d) Cows (*Bos taurus*) leave communal pastures (*payaman*) and seek shelter.[i] e) Goats (*Capra aegagrus hircus*) stay in caves	a) Fair weather b) Cloudy with scattered showers c) Rainy weather d) Typhoon e) Rainy weather
Dogs (*chitu — Canis familiaris*)	Dogs face and stares to the west.	Bad weather[c]
Rats (*Rattus rattus*)	Rodents make plenty of holes in uvi fields and the soil is formed like a circle	Bad weather[c]

Subject	Observations	Predicted Meteorological Phenomena / Meaning / Function
Cockroaches (*Ipes — Periplaneta americana*) and winged termites (*Valakavak — Coptotermes formosanus*)	A swarm of cockroaches (*Periplaneta americana*) fly at random, coming from anywhere in the house, in the evening	Rainy weather
House lizard (*Geget — Hemidactylus frenatus*) or flying gecko	Animals cry out at the southern corner of the house signal that westerly winds are blowing.[e]	Hot and dry weather
Hermit crabs (*Umang*[a] *— Paguroidea*) and sand crabs (*Crustacea*)	Hermit crabs (*Paguroidea*) abandon shore habitat to go further inland in hordes to occupy holes and niches in walls, rocks or trees.	Strong typhoon[b] and large waves
Shore roach (*mukuvukut —* possibly *Ligia exotica*)	Typically found in Sumnanga and Nakanmuan in Sabtang, shore roaches (possibly *Ligia exotica*) move: a) To the inland edge of the shore. b) Mid-shore	a) Strong typhoon b) Typhoon with moderate intensity
Giant brown sea slug and black sea cucumber (*Holothuria atra*)	Sea slugs come out to forage on coral reefs or becomes exposed in low tide. Sea cucumbers (*Holothuria atra*) become absent on their sand colony.	Stormy weather or typhoon
Fish	Fish do not bite hooks and lines actively. Otherwise, fish bite two hooks at a time. Sometimes, baits are swallowed deep into the stomach.	Stormy weather or typhoon
Dolphins (*Cetacea*)	Dolphins (*Cetacea*) are observed to be jumping on water (*lumba-lumba*).[e]	Fair weather or a sudden change from inclement to fair, or from fair to better.
Plankton	Abundant plankton become visible, making the sea surface appear dirty. Sometimes, plankton become highly bioluminescent.	Stormy weather
Elder people[d]	Elder people simultaneously have arthritis or back pains	Bad weather[c]
Material Culture		
Disaster Prevention and Mitigation, Disaster Preparedness		

Subject	Observations	Predicted Meteorological Phenomena / Meaning / Function
Heritage houses	a) Vernacular design use thick stone walls with uniquely-thatched roofs. b) House (*gada'gada*) design:[e] a) Windowless walls b) Use of stone and mortar	a) Storm proofing b) Design: a) Avoidance from the direction of the strongest winds. b) Wind, fire, and earthquake proofing
Disaster Preparedness		
Attire	Vakul head gear for women and *kanayi* overcoat for men.	Protection from the sun, rain, and wind.
Celestial Bodies and Above-Ground Phenomena		

Subject	Observations	Predicted Meteorological Phenomena / Meaning / Function

Clouds	a) White clouds that are bright and shiny
	b) Clouds shaped like rocks and stones (*maychavatuvatu*) with a white colour form.
	c) Occurrence of black maychavatuvatu
	d) Red maychavatuvatu forms before sunrise
	e) Yellow clouds form during sunset (*mawyas a timuy*).[e]
	f) Streak of white, blue, or black clouds form before dawn or after sunset running from east to west or vice-versa.
	g) Clouds shaped like being swept by a broom (*maychavuvuyas*)
	h) Streaks of white maychavuvuyas form in the north.[e]
	i) Cottony clouds form and stay put.
	  a) *Maychadadaji* — cumulus clouds
	  b) *Nimbu* — cumulonimbus clouds
	j) Low altitude clouds (*maychahehep*)
	k) Red clouds (*madagdag*) form in the north.[e]
	l) Dark stratus clouds move at a fast pace
	m) Clouds scatter
	n) Many groups of small clouds cluster closely to each other within two to three days.
	o) Observations at Mt. Iraya in Basco:
	  a) Thin streak of clouds connect Mt. Iraya with Dinem Island.
	  b) Thick clouds cover Mt. Iraya entirely and move rapidly.[g]
	p) Observations at Dinem Island in Itbayat:
	  a) Plume of clouds touch the peak of the island.
	  b) White clouds cover the peak or hover above the island.
	  c) Thick dark clouds or orange to brown clouds (*inavung*) cover and sometimes join other clouds in the area.
		a) Rainy weather
		b) Windy
		c) Winds with scattered light rains
		d) Strong winds and heavy rains occur within the day
		e) Heavy rain
		f) Rain or stormy weather within the week.
		g) Windy and a change of wind direction within three days.
		h) Rain and gale-force winds
		i) Cottony Clouds:
		  a) Fair weather
		  b) Rain, lightning, and thunderstorm.
		j) Rainy weather
		k) Stormy weather
		l) Fair weather
		m) Continuous rain for two to three days.
		n) Rainy weather
		o) Mt. Iraya:
		  a) Sudden strong winds and heavy rain.
		  b) Typhoon
		p) Dinem Island:
		  a) Rain may come in the following days
		  b) Scattered showers
		  c) Heavy rain and high waves.

Fog (*kahehep*)	Fog lasts three to four days.[e]	Rainy weather
Rainbow	a) A half-rainbow (*angaringang*) appears in the morning and in the afternoon b) A full rainbow appears.[e] c) A rainbow is observed to be seemingly encircling the moon.[j]	a) Rain and gale-force winds b) Light rain

Subject	Observations	Predicted Meteorological Phenomena / Meaning / Function
Sun	a) Large white or grey ring (*ahad*) develops with an opening rainbow colour near the sun. b) Bright yellow sunlight appears in the morning or afternoon and disappears quickly (*mayvulilaw*). c) Sun rays penetrate dark clouds. d) Yellowish light of the sun forms, combined with excessive heat. e) Bright yellow or red sunlight forms during sunrise or sunset with a short duration f) Blood red sunsets are observed	a) Stormy weather or rain b) Typhoon or heavy rain c) Windy d) Rainy weather e) Stormy weather, or rain, or a hot day. f) Fair weather
Moon (*Vuhan*)	a) Large white or grey ring or rainbow colour forms around the moon. b) Bright halo that forms around the moon. c) Three days before the first quarter of the moon. d) Three days before full moon. e) Moon wanes before the last quarter and during new moon. f) Pale-coloured moon, as if it was “sick,” rises from the east (*masuhaw a vuhan*).	a) Rain and typhoon very soon b) Strong water currents (*mariyes*) c) Rainy weather d) Fair weather e) Rainy weather f) Typhoon intensity increases
Stars	Distant stars have an unusual or pronounced twinkle on a clear night. These stars may also shine more brightly.	Rainy weather

Wind	a) North wind blows steadily when it is not the northwesterly season and does not change direction.
	b) Southeast wind blows when it is not the southeasterly season and suddenly changes to a northern direction.
	c) During a typhoon, the wind direction shifts south (*mamnaw*)
	d) Very cold wind blows
	e) When strong winds suddenly stop and return strongly
	f) Wind blows dust in a tornado-like formation
	g) Observations in Itbayat:[e]
	  a) Wind blows clockwise
	  b) Wind blows counter-clockwise
		a) Typhoon
		b) Typhoon
		c) Typhoon is waning
		d) Weather changes
		e) Eye of the typhoon has just passed
		f) Typhoon
		g) Itbayat:
		  a) Fair weather
		  b) Rain

Moisture and humidity	a) Concrete walls are cold and moist, while floors appear to have just been mopped. b) Air becomes humid (*maymunyit*)	a) Rainy weather b) Rainy weather
Dew (*Apun*)	On a windless night, dew flows on the gutters of galvanized roofs, or meadows become very wet in the morning.	Rain with gale winds

Subject	Observations	Predicted Meteorological Phenomena / Meaning / Function
Traditions and Practices		
Disaster Prevention and Mitigation		
Cooperative practices	*Please see Table 2*	
Disaster Preparedness		
Home preparations	a) Roof tying (*kapanpet*) b) Bracing doors and windows (*kapanahtah*) c) Covering windows (*tapangku*)	a) Storm proofing b) Storm proofing c) Storm proofing
Communications	Dissemination of weather updates through town criers (*bandillo*)	Awareness and warning of inclement weather
Agricultural practices	a) Preference in planting root crops over above-ground varieties.[e] b) Culms or trees (*vutalaw — Calophyllum inophyllum*) act as hedges and are planted in between farming plots.[e] c) Planting in scattered land parcels.[f] d) Diversifying crops to plant.[g]	a) Root crops are more protected against strong winds. b) Crops are protected against strong winds. c) Food security through minimizing entire harvest to be lost from hazards. d) Guarantees food sufficiency in case one type of crop was affected by bad weather.
Food processing and practices	a) Smoking, salting, or drying (*kapangulay*) of meats and fish.[e] b) Stockpiling of root crops, assorted and preserved viands, and firewood.[e]	a) Food preservation. b) Preparations from inclement weather disruptions.
Schedule of Activities	*Pilatun* customary astrological arrangements schedule important tasks including sailing, travelling, farming, and domestic duties for survival.[h]	Guides residents on good or bad days with indirect reference to moon phases and direction of wind.
Disaster Response, Disaster Rehabilitation and Recovery		

Subject	Observations	Predicted Meteorological Phenomena / Meaning / Function

Post-typhoon activities[e]	a) Residents:
	  a) Immediately clear and clean yards from debris.
	  b) Visit chawi (*Pometia pinnata*) groves and gather fruits.
	  c) Visit coastal areas.
	b) Neighbours help in replacing thatched roofs.
	c) Activities of farmers:
	  a) Assess crop damage.
	  b) Visit caves, bush and rock shelters.
	d) Fisherfolk assess their boats.
		a) Resident activity:
		  a) Community cleanliness.
		  b) Salvaging fruit for additional food.
		  c) Fallen timber is retrieved to be used for various purposes.
		b) Repair and rehabilitation of the home
		c) Farmer activity:
		  a) Understanding what needs to be replanted.
		  b) Search and rescue animals that took refuge.
		d) Damage and seaworthiness assessment.

Terrestrial Environment		
Plants / fungi	a) The new leaves of many banana species continue to shoot up but fail to unfurl. b) Leaves of the aryus tree (*Podocarpus costalis*) turn light green or sprout any time of the year c) Aryus (*Podocarpus costalis*) tree leaves grow unusually long.[k] d) Nardu flowers appear in fair weather or some species bloom out of season e) Chawi flowers start blooming[e] f) Chawi plants become fruitful[e] g) Dove orchid (*Peristeria elata*) flowers appear h) Waling-waling (*Vanda sanderiana*) plants bloom i) Vula (*Alocasia macrorrhizos*) plants bloom j) Raxayen (*Erythrina variegata*) plants bloom[e] k) Mushrooms (*Agaricus bisporus*) appear[e]	a) Strong typhoon b) Rainy weather c) Typhoon d) Rainy weather e) Stormy weather f) Typhoon g) Stormy weather and long duration of typhoon h) Heavy rain i) Strong typhoon j) Rainy weather k) Rainy weather

Subject	Observations	Predicted Meteorological Phenomena / Meaning / Function
Sand and gravel	a) A sharp erosion of sand is formed by waves and becomes recurrent.[m] b) Mounds of gravel is formed by waves and is distinctly observable during quarter moons in fair weather. c) Grains of sand float to the water surface. d) Sand and gravel are deposited by waves on the shoreline.[j] e) Observations in Disvayangan in Ivana: sand is scattered on the reefs near the shoreline.	a) Waves increase in size[n] b) Waves increase in size[n] c) Typhoon d) Typhoon e) Bad weather[c]
Views	a) Islands north of Itbayat, Balintang Island to the southeast and Calayan Island to the southwest are clearly seen. b) When the horizon turns yellowish and quickly disappears.[o] c) An orange sky or hue can be observed east of Mt. Iraya.	a) Weather disturbances are likely to happen within a few days. b) Typhoon c) Typhoon
Maritime Environment		

Subject	Observations	Predicted Meteorological Phenomena / Meaning / Function
Ocean waves	a) Rolling waves that the strike the beach produce similar-sized waves rolling back to the sea and do not weaken even when they meet other waves (backwash). b) Waves' force roils the sand at the sea floor. c) Waves generate sea spray that rise high into the air and into land. It forms mists in the morning and late afternoon when the weather is calm. d) Smooth and glassy ocean waters are observed. e) Generally, long, straight, and unbroken sets of waves are observed, sometimes along the reef line. This is also observed in Diptan in Basco. f) Observations in Valugan, in Basco: sea surface becomes dark blue g) Observations in Nakurang in Ivana: big waves crash the shoreline and forms mist h) Observations in Paso, Vuhus Island; Chapunghuan, Savidug; Mayin in Ivana; and in Uyugan: a) Very large waves form with crests that are far apart and heights of about 10 feet or more. b) Medium waves about five feet or more form. c) Small waves about three to four feet form. i) Observations in Paso, Vuhus Island in Sabtang: a) When large breaking waves are observable from Paso to Vanua du Vatu. b) When large unbroken waves are observable from Chahahanan to Vanua du Vatu. j) Observations in Diptan, Basco and Sinakan in Sabtang: when waves do not follow the reef line but breaks upward along the underwater hill. k) Observations in Port Sinakan in Sabtang: the shoreline is cut, forming an abrupt steep where waves stop.	a) Typhoon b) Stormy weather c) Tropical depression d) Squall or typhoon e) Tropical storm to super typhoon f) Waves increase g) Typhoon h) Ivana and Uyugan: a) Super typhoon b) Typhoon (about 100 to 150 kph) c) Tropical depression i) Paso, Vuhus Island: a) Super typhoon b) Moderate to super typhoon j) Super typhoon k) Bad weather[c]
Ocean currents and tides	a) High and low tide current flows shift in direction. b) Currents are also unusually strong c) Observations in Port Sinakan in Sabtang: a) A strip of strong, narrow currents near the reef line towards or past the port to Panangalan is observed. b) Weak currents are observed c) Change of current flow d) When tide movements are strong at the mouth of the port	a) Stormy weather or rain b) Stormy weather or rain c) Port Sinakan in Sabtang: a) Typhoon b) Tropical storm c) Typhoon has changed direction and will not pass through Batanes d) Bad weather[c]

Note. Majority of this data have been further proofread, translated, and edited for clarity and coherence. Much opportunity in further refining and verifying the details above exists. Because of their voluminous quantity, only a select number is listed above. The four thematic categories of the NDRRMP (2011) have also been integrated in the categories of Material Culture and Traditions and Practices above. Adapted from "Indigenous Weather Forecasting" by the PDRRMO, 2019, *Provincial Government of Batanes*.
[a]Local term in parentheses and italics. Specific Latin name is not provided as they are generic and may have various lower-order species, unless indicated.
[b]There is no clear distinction between "typhoon" or "storm."
[c]There is no clear definition of "bad weather."
[d]Source: PDRRM Officer.
[e]Source: Esteban and Valientes (2019)
[f]Source: Bankoff (2019a)
[g]Source: Rede-Blolong (1996)
[h]Source: Rede-Blolong (2004)
[i]Source: Trinidad-Echavez (2008)
[j]Source: Board (2019)
[k]Source: Uy and Shaw (2008)
[l]Source: Fantauzzo (2014)
[m]Rephrased from original: "Sand level has a sharp drop formed by waves at their far reaches and is always observable before typhoons."
[n]Rephrased from original: "Big waves to level the drop."
[o]Source: De Guzman et al. (2014)

Appendix C

National Commission on Indigenous Peoples Certificate of Precondition

Republic of the Philippines
OFFICE OF THE PRESIDENT
NATIONAL COMMISSION ON INDIGENOUS PEOPLES
REGIONAL OFFICE NO.02
Turingan Bldg., #3 Campos St., Caritan Centro, Tuguegarao City
Tel. No.: (078) 844-7593/Fax No.: (078) 844-6796
E-mail Address: region002.ncip@gmail.com

CERTIFICATE OF PRECONDITION

THIS IS TO CERTIFY that based on the evaluation of the Indigenous Knowledge System and Practices (IKSP) Report by the Regional Review Team (RRT), **MR. ELI PAOLO FRESNOZA** from Vancouver, Canada with the research project entitled: **"REACHING THE INTERSECTION OF INDIGENOUS AND MODERN:A Critical Analysis of Disaster Risk Management in Ivatan Indigenous Communities",** has satisfactorily complied with the procedures and processes required for the issuance of a Certificate of Precondition (CP) as prescribed under the National Commission on Indigenous Peoples (NCIP) Administrative Order No.1, Series of 2012, or "The Indigenous Knowledge System and Practices (IKSPs) and Customary Laws (CLs) Research and Documentation Guidelines of 2012.

THIS CERTIFICATION PRECONDITION is issued in accordance with Section 8.12 of the afore-mentioned Guidelines subject to the terms and conditions of the Memorandum of Agreement (MOA) entered into and executed between **Eli Paolo Fresnoza** and the **Indigenous Peoples/Indigenous Cultural Communities** from the municipalities of Basco, Batanes and barangay Itbud, Batanes.

Done this 16th day of July, 2019 at NCIP Regional Office No. 2, Tuguegarao City, Cagayan, Philippines.

Redacted for privacy

RUBEN S. BASTERO, CESO III
Regional Director

IKSP CONTROL NO. R02 - 2019 - 07 - 014

Appendix D

National Commission on Indigenous Peoples Memorandum of Agreement

MEMORANDUM OF AGREEMENT

KNOW ALL MEN BY THESE PRESENTS:

This Memorandum of Agreement ("MOA") entered into by and between:

PAOLO FRESNOZA, a doctorate student at Royal Roads University with postal address at Victoria, Canada, an applicant for the issuance of Certification Pre Condition to conduct research, herein after referred to as "**FIRST PARTY**";

and-

BATANES INDIGENOUS CULTURAL COMMUNITY ORGANIZATION represented by **COUNCIL OF ELDER PRESIDENT, HON. VICENTA HIDALGO** with office postal address at Barangay San Antonio, Basco,Batanes, herein after referred to as the "**SECOND PARTY**";

-and-

The **NATIONAL COMMISSION ON INDIGENOUS PEOPLES (NCIP),** a government agency under the Office of the President, with Provincial office address at Batanes Heritage Center, Basco, Batanes, represented byRegional Director, **RUBEN S. BASTERO,** with office address at Caritan Highway, Tuguegarao City, hereinafter referred to as **"NCIP";**

WITNESSETH:

Redacted for privacy

WHEREAS, the **FIRST PARTY** is a doctorate student at Royal Roads University, Victoria, Canada;

WHEREAS, the **SECOND PARTY** are the Indigenous Peoples / Indigenous Cultural Community (IP's/ICC's) of Batanes represented by the BATANES COUNCIL OF ELDERS;

WHEREAS, the **THIRD PARTY** is a government agency mandated to formulate and implement policies, plans and programs for the recognition, promotion and protection of the rights and well-being of the Indigenous Peoples;

WHEREAS, the **FIRST PARTY** is requesting permission to conduct his research in Batanes;

WHEREAS, the Indigenous Peoples Rights Act of 1997 (IPRA) or R.A 8371 provides that the State shall recognize, respect and protect the rights of ICCs/IPs to preserve and develop their cultures, traditions and institutions;

WHEREAS, Section 34 of IPRA law provides "***Right to Indigenous Knowledge Systems and Practices and to Develop own Sciences and Technologies***"- ICCs/IPs are entitled to the recognition of the full ownership and control and protection of their cultural and intellectual rights. They shall have the right to special measures to control, develop and protect their sciences, technologies and cultural manifestations, including human and other genetic resources, seeds, including derivatives of these resources, traditional medicines and

health practices, vital medicinal plants, animals and minerals, indigenous knowledge systems and practices, knowledge of the properties of fauna and flora, oral traditions, literature, designs, and visual and performing arts;

WHEREAS, Section 3 (b) of NCIP Administrative Order No.1,series of 2012 provides that it is the state policy to ensure and guarantee the due exercise by the concerned ICCs/IPs of their right to allow or reject, through free and prior informed consent (FPIC), research and documentation of their IKSPs and customary laws and their derivatives;

WHEREAS, Section 3 (c) of NCIP Administrative Order No.1,series of 2012 provides that it is the state policy to regulate the use of IKSPs and customary laws, and ensure that the ICCs/IPs benefit from the use of research output/outcome;

WHEREAS,Section 4 (b) of NCIP Administrative Order No.1,series of 2012 provides that in the conduct of research and documentation of IKSPs and customary laws it is the policy of the state that IKSPs are owned by the ICCs/IPs as their collective property and are an inherent part of their cultural patrimony. Individuals or specific families may, however, serve as 'custodians'/holders of the IKSPs on behalf of the community in accordance with its customary laws;

WHEREAS,Section 4 (d) of NCIP Administrative Order No.1,series of 2012 provides that in the conduct of research and documentation of IKSPs and customary laws it is the policy of the state that the FPIC of the ICCs/IPs to any research activity that affects them shall be secured before any such activity/ies may commence. This is in recognition to their intellectual contribution in the development of knowledge, and their rights over these knowledge and resources. Accordingly, their voluntary consent should be based on informed opinion, which means that they should be fully informed what the activity/research is all about, what are the resources that will be gathered, and the aspects of benefit-sharing, among other concerns;

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WHEREAS, Section 4 (e) of NCIP Administrative Order No.1,series of 2012 provides that in the conduct of research and documentation of IKSPs and customary laws it is the policy of the state that Equitable sharing of benefits shall be observed.Arrangements over benefit sharing are tied to the recognition by the State of the rights of the ICCs/IPs over their ancestral domains, the resources therein, and the past, present and future tangible and intangible cultural heritage including the derivatives, of their IKSPs. The State shall ensure equitable sharing of benefits arising from the generation and utilization of knowledge, innovations and practices of ICCs/IPs embodying traditional lifestyles. Innovative forms and formula for benefit-sharing that are acceptable to all parties shall be developed.

Benefits need not necessarily come in monetary terms nor should it be confined to share in the royalties or up-front payments. Non-monetary forms of benefits should be explored. In cases where provision for technology transfer is provided, such technology transfer shall not be limited to the level of scientists and researchers but should primarily extend to the members of the indigenous cultural community;

WHEREAS, pursuant to NCIP Administrative Order No.1, Series of 2012, the

FIRST PARTY have subjected the proposed project to the concensus-building process of the community. After due presentation by the applicant and subsequent deliberation of the proposed project with the community, the

SECOND PARTY have fully understood the nature and extent as well as the advantages and disadvantages of the stated project;

The terms and conditions agreed upon are stipulated in this Memorandum of Agreement (MOA);

WHEREAS, both parties agreed to be bound on the following terms of reference on the conduct of the documentation;

WHEREFORE, for and in consideration of the foregoing premises, the Parties hereby agree that:

I. COVERAGE OF THE ACTIVITY

This MOA shall cover exclusively the activity as stated on the project proposal of the **FIRST PARTY;**

II. DURATION OF THE ACTIVITY

The duration of activity is from the BICC grant of permit or the issuance of Certification Pre-condition and upon finishing the research;

III - RESPOSIBILITIES OF THE PARTIES INVOLVED

A. RESPONSIBILITIES OF THE FIRST PARTY

1. Shall conduct its research project in accordance to and in compliance with the customary laws of the **Batanes ICC/IP's** all other laws, policies, regulations, and rules promulgated by the National Commission on Indigenous Peoples, the Local Government Units as well as the other different government agencies;
2. Shall preserve and adopt the Ivatan correct spelling as indicated on Ivatan glossary;
3. Shall respect and derive measures to protect the Indigenous Knowledge Systems and Practices (IKSP) of the Batanes ICC/ IPs bearing in mind that these (IKSP) are the Intellectual Rights of Ivatan's in Batanes;
4. Respect all aspects of the **Batanes ICC/IP's** community privacy when collecting and documenting data;
5. Shall pay the talents or provide snacks/transportation of ICC's whom they hire in the conduct of their activity;
6. Not commence nor involve itself in any activities relating to any form of extraction of any cultural artefact's;
7. No exploitation of environment and human resources;
8. Shall provide a copy of the research output to the **SECOND PARTY** for validation purposes prior to the finalization of the research output;

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9. Conduct the activity at his own expense as outlined in the Work and Financial Plan;

10. Subject to the provisions on environmental conservation and preservation provided for in its project proposal, ensure the conservation/protection of any affected portion of the ancestral domain critical for any and whatever specific purpose it may allotted for;

11. Shall not reorganize or enter into merger, novation of project, nor allowed to be acquired by another entity without undergoing another Free and Prior Informed Consent (FPIC) process;

12. That the adverse risk and impacts of research must be made fully disclosed to the community concerned and measures for the elimination of the occurrence of such risk and adverse impacts, or their mitigation must be put in place;

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13. Allow Batanes Council of Elders representative to accompany him in the conduct of all the activities within the ancestral domain;

14. Shall be liable for any damages in case of violation of the specific responsibilities under this Memorandum of Agreement;

15. There shall be no extraction of physical items from sites nor shall the proponents engage in activities that may damage, deface or in any other way that is ditremental to the sites or its sorrounding environment;

16. Observe the Customs and traditions of the locality;

17. Any violation on the agreed responsibilities shall be ground for the cancellation of the permit of the applicants.

18. Shall comply faithfully with the provision of the Memorandum of Agreement

B. SPECIFIC ALLOWED ACTIVITY

1. To conduct a research entitled, **"Reaching the Intersection of Indigenous and Modern: A Critical Analysis of Disaster Risk Management Modernization in Ivatan Indigenous Communities"**

C. RESPONSIBILITIES OF THE SECOND PARTY

1. Shall allow the FIRST PARTY to pursue his activities by issuing the Certificate Precondition and/or Resolution of Consent;

2. Has the right to oversee the conduct of activity to ensure the compliance of the FIRST PARTY responsibilities;

3. Shall inform and / or orient the FIRST PARTY on the cultural sensitivities of the communities; and

4. Shall comply faithfully with the provisions of this Memorandum of Agreement;

D. RESPONSIBILITIES OF NCIP

1. Ensure protection of the rigths and benefits of the **Batanes ICC/IPs** as regards the conduct of the activity by the **FIRST PARTY** following the National Commission on Indigenous Peoples Administrative Order (NCIP) AO No.3, series of 2012, otherwise known as "The Revised Guidelines on Free and Prior Informed Consent (FPIC) and Related Processes of 2012";

2. Facilitate and coordinate the whole activity;

3. Ensure that the community rights of the Batanes ICC's/IP's are properly respected and enforced;

4. Comply faithfully with the provisions of this Memorandum of Agreement;

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I. BENEFIT SHARING AGREEMENT

For the use of the ***Indigenous Knowledge Systems and Practices (IKSP)*** of Ivatan's in Batanes, the **FIRST and SECOND PARTY** hereby agree that the former shall commit to pay the latter in the amount of **TEN THOUSAND PESOS (P10,000.00).**

II. DISPUTE RESOLUTION MECHANISM / MANAGEMENT SANCTIONS

Any violation/s by the **FIRST PARTY** of this responsibilities shall be ground/s for the cancellation of the certificate of precondition /and or Resolution of Consent issued and for the termination of this agreement. Further, any violation of the **SECOND PARTY** of their responsibilities shall cause the termination of this agreement. And Furthermore, any person/party who wilfully violates or fails to comply with his duty or obligation under the provisions of this Memorandum of Agreement shall be proceeded with in accordance with the customary laws and practices of the **SECOND PARTY** and sanctions maybe imposed in accordance therewith: Provided, that the sanctions are not excessive, cruel, degrading, and without prejudice to the exhaustion of conciliation and mediation efforts of the office.

The parties can resort to the Rules on Procedures, Pleadings and Practices before the NCIP in accordance with NCIP Administrative Circular 1, Series of 2014 only if the dispute is unresolved under the customary laws of the **SECOND PARTY.**

NOW THEREFORE, any modifications/ amendments to any provisions and/or addition to this Memorandum of Agreement shall be subject to deliberation and

shall be agreed upon by all of the involved parties. Furthermore, the agreement shall be put into writing, signed by the parties involved and / or their authorized representatives/elders/leaders and duly certified.

FINALLY, THEREFORE, the **PARTIES** warrant that they are duly authorized to enter into this Memorandum of Agreement and that their signatories are duly authorized to execute and sign the same.

This Memorandum of Agreement shall take effect immediately upon signing of this document by the Proponent and the Second Part.

IN WITNESS WHEREOF, we have hereunto set our hands this 29th day of May 2019 here at **Basco, Batanes.**

SIGNED:

For the First Party

[redacted]

PAOLO FRESNOZA
Proponent

For the Second Party

[redacted]

VICENTA HIDALGO
Batanes Indigenous Cultural Community – Council of Elders President

[redacted]

FOR THE NCIP:
NATIONAL COMMISSION ON INDIGENOUS PEOPLE-REGIONAL OFFICE NO.11

RUBEN S. BASTERO
Regional Director, R02

SIGNED IN THE PRESENCE OF:

[redacted]

Witness

[redacted]

Witness

ACKNOWLEDGEMENT

Republic of the Philippines)
Basco, Batanes) S.S.

BEFORE ME a Notary Public for and in _____personally appeared the above-named parties and presented to me competent proof of their identity consisting of:

Redacted for privacy

NAME	ID NO/CTC	ISSUED ON /AT
1. Paolo Fresnoza	BC DL: 7590996	Jul.31,2017/BC.,Canada
2. Vicenta Hidalgo	18936455	Jan.23,2018/Basco

known to me and to me known to be the same persons who executed the foregoing instrument consisting of seven (7) pages including this acknowledgement, and who affirmed before me that they knowingly, freely and voluntarily executed the same.

WITNESS my hand and seal this JUN 17 2019 day of _____ 2019 at Basco, Batanes, Philippines.

NOTARY PUBLIC

Doc. No. 25;
Page No. 05;
Book No. XI;
Series of 2019.

Redacted for privacy

ATTY. EVA MARIE GUTIERREZ
Notary Public
for the Province of Batanes
My Commission Expires 12/31/2020
Roll No. 62504 / IBP Lifetime No. 03174
PTR No. 9953305 1/7/2019 Batanes
MCLE Compliance No. VI-0006420

Appendix E

Batanes Protected Landscapes and Seascapes — Protected Area Management Office, Provincial Environment and Natural Resource Office Permit

Republic of the Philippines
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
PROTECTED AREA MANAGEMENT OFFICE
BATANES PROTECTED LANDSCAPES AND SEASCAPES
PENRO Building, San Antonio, Basco, Batanes3900
Tel. No.: (0949)739-1962 & (0916) 769-3155
E-mail:posubpls@gmail.com

Date: May 22, 2019

BPLS-PAMB PERMIT
No. 19 – 05 - 150

Pursuant to BPLS – PAMB Resolution No. 2018 – 23 approved and adopted on August 2, 2018, BPLS – PAMB permit is hereby granted to:

PENRO - BATANES
RELEASED
Signature:
Date: 5-22-19
Time: 4:37 PM

PAOLO FRESNOZA
Names

Royal Roads University, Victoria, Canada
Office/Address

Purpose:
To conduct research entitled "A Critical Analysis of Disaster Risk Management Modernization in Ivatan Indigenous Communities".

Conditions:

1. No harming, collection, and/or destruction of wildlife (flora and fauna) to be undertaken during the conduct of research.
2. No littering during the conduct of research.
3. Vandalism such as writing and engraving on trees or walls is strictly prohibited
4. That the Permittee is responsible for any damages/violations outside the scope of this permit that maybe incurred by the researcher during his study.
5. That the Permittee after the completion of the study shall provide a hard copy of the result to the PAMB through the DENR for information and future reference.
6. Failure to comply with any of the conditions specified under this permit shall be sufficient ground for the immediate cancellation of this permit and disqualification from renewal.
7. That this permit is valid May 22 to June 20, 2019 or when the said research have been completed whichever comes first.

Issued this 22nd day of May, 2019 at DENR – PENRO, Basco, Batanes.

For and in the absence of

Redacted for privacy

DIOSDADO T. CONTILLO
Supervising Ecosystems Mgt. Specialist
In-Charge, Office of the PENR Officer

Amount Paid : 1,000
O. R. No. : 3126705
Date : 05/22/2019

Appendix F

Office of the Provincial Governor Letter of Approval

Republic of the Philippines
PROVINCE OF BATANES
OFFICE OF THE PROVINCIAL GOVERNOR
Basco

BOUNTIFUL CAGAYAN VALLEY REGION

12 November 2018

MR. ELI PAOLO FRESNOZA, En.P.
Doctoral Student
ROYAL ROADS UNIVERSITY
Victoria, Canada
Paolo.Fresnoza@RoyalRoads.ca

Dear MR. FRESNOZA:

This is to acknowledge receipt of your email dated 6 November regarding your plan to conduct your research for your dissertation about IKSPs and how Ivatans relate to disaster risk reduction and management. I appreciate your interest in considering our place as your area for study and I am hoping that as I allow you to conduct research, you will abide by our existing laws and provide the provincial government a copy of your study. With your request for interview, we will have to schedule it by next year considering the upcoming election in May 2019.

Please note that you must comply with the requirements of the Department of Environment and Natural Resources (DENR), the National Commission on Indigenous Peoples (NCIP), and the concerned Municipal Local Government Units (MLGUs). Compliance with these requirements is mandatory since the whole of Batanes is declared Protected Landscapes and the Ivatans are recognized indigenous peoples. The usual minimum length of time to obtain all permits is thirty (30) days

For full detail of the requirements, please check the link on *Requirements for Media and Researchers* posted on the Homepage of our provincial website www.batanes.gov.ph. Attached here are the contact details of local offices and the list of DOT accredited travel and tour agencies (local tour operators) who may provide additional assistance and arrangement. For other concerns, please coordinate with our Tourism Section at their hotline Redacted for privacy

Thank you.

Sincerely,

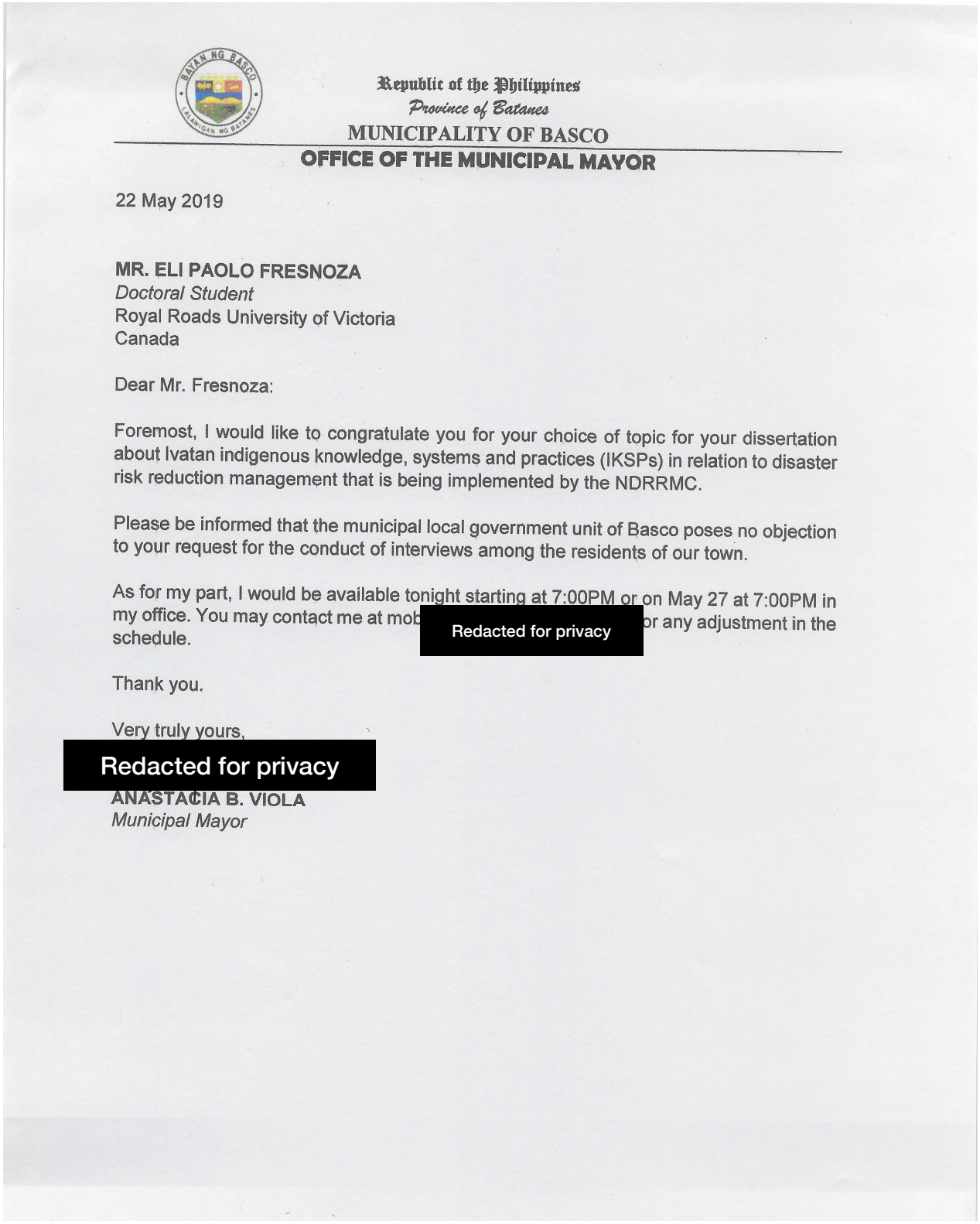
Redacted for privacy

MARILOU H. CAYCO
Provincial Governor

2/F Provincial Capitol Complex, National Road, Basco, Batanes 3900 Philippines
Email: governorbatanes@yahoo.com Website: www.batanes.gov.ph

Appendix G

Office of the Municipal Mayor Letter of Approval



Republic of the Philippines
Province of Batanes
MUNICIPALITY OF BASCO
OFFICE OF THE MUNICIPAL MAYOR

22 May 2019

MR. ELI PAOLO FRESNOZA
Doctoral Student
Royal Roads University of Victoria
Canada

Dear Mr. Fresnoza:

Foremost, I would like to congratulate you for your choice of topic for your dissertation about Ivatan indigenous knowledge, systems and practices (IKSPs) in relation to disaster risk reduction management that is being implemented by the NDRRMC.

Please be informed that the municipal local government unit of Basco poses no objection to your request for the conduct of interviews among the residents of our town.

As for my part, I would be available tonight starting at 7:00PM or on May 27 at 7:00PM in my office. You may contact me at mob Redacted for privacy or any adjustment in the schedule.

Thank you.

Very truly yours,

Redacted for privacy

ANASTACIA B. VIOLA
Municipal Mayor

Appendix H

Consent Form

Doctorate Dissertation Title:

Reaching the Intersection of Indigenous and Modern: A Critical Analysis of Disaster Risk Management Modernization in Ivatan Indigenous Communities

Researcher Information:

Name: Eli Paolo Fresnoza
Institution: Royal Roads University
Address: 2005 Sooke Road, Victoria, British Columbia, Canada
Mobile Number: 778-***-****, 0908-***-**** (until 26 June 2019)
Email Address: p*****@royalroads.ca

Academic Supervisor: Dr. Emmanuel Luna
Office Number: +632-***-****
Email Address: m***@yahoo.com, e***@royalroads.ca

Please email anyone of the above for inquiries about this research and its conduct. For verification outside of the research group, please contact Dr. Francisco Datar of the University of the Philippines at +63919-***-****.

This research has been approved by the Royal Roads University Research Ethics Board. Any questions regarding ethics or concerns about it can be directed to ethicalreview@royalroads.ca.

You are Invited

… to partake in this research. Please read the following details and sign at the bottom to indicate understanding and express consent to participate. Thank you!

Research Purpose:

The research purpose is to explore the impacts of disaster risk reduction and management (DRRM) modernization and its impacts to Ivatan traditional knowledge of DRRM.

Nature of Participant Involvement

You are invited to participate in one to potentially two interview/FGD/workshop sessions, each lasting about an hour. Also, you are highly encouraged to improve or create an enhanced agenda related to the research during the sessions that you may feel is relevant to discuss. There is a degree of flexibility in the research that we could all discuss and collectively agree during the sessions.

The interview sessions will be scheduled at your convenience as well as in a confidential venue where you are most comfortable.

Should you have any questions before, during, or after the interview process, please feel free to ask the researcher.

Nature of the Interview/FGD/Workshop Questions

Specifically, the interview/FGD questions will revolve on themes about Ivatan knowledge, systems and practices in DRRM; critique about the National Disaster Risk Reduction Management Council's (NDRRMC) DRRM approaches; and your insights on how to improve the latter. Each session will focus on a specific theme.

Please note that some questions may potentially recall traumatic experiences, in which you are able to change, delete, confirm the best time to answer, or answer privately.

Benefits of the Study

This study will benefit you by creating a greater appreciation and pride of your heritage, through fully acknowledging the uniqueness of Indigenous knowledge, systems, and practices in DRRM. The benefits of this study would also extend to society as a whole by enabling communities to become more disaster-resilient as DRRM policies and plans in the Philippines are improved. The study would benefit me by allowing me to graduate upon its completion.

Potential Harms

This study may have you recall traumatic experiences of previous natural calamities. You may also experience distress when presented with others' critique about the NDRRMC's approaches that may clash with your existing ideals and beliefs. Please note that you have the right to confidentially withdraw from this study at any time.

Protection of Privacy and Anonymity

All participants' identities will be kept anonymous and confidential as much as possible. No personably identifiable information will be used such as names or other ways to connect a particular person to an opinion. No individual opinion will be attributed to any one individual.

You are expected not to disclose any conversation from interview or FGD sessions outside the group. You are also expected not to name any one individual in terms of their opinion.

Recording of the Interview/FGD Sessions

Photography, video, and audio recordings will be conducted in all interview/FGD sessions. Once completed, all audio recordings will be transcribed in which each participant identity will be protected by allocating code numbers for each. All audio, photography, and video files will be destroyed upon graduating in January 2021.

All recordings or parts of the recordings associated with a participant who withdraws will be deleted and excluded in the study to protect anonymity.

No online servers will be used to store any data or media recordings used for this study. Only backup files will be stored in my personal standalone hard drive in my residence in Vancouver, Canada.

Freedom to Participate and Right to Withdraw

You are free to participate in this research upon expressing consent and understanding what you are being asked to do.

You are also free not to participate. You have the right to withdraw from this research at any time without prejudice and pre-existing entitlements. Your withdrawal confirmation will be kept confidential. Upon doing so, any and all information associated with you will be destroyed, however, there may be occasions where a withdrawn participant's idea remains as it becomes integrated in the discussion.

Upon consent, you will be provided with a copy of this consent form with signatures from both you and the researcher. Please keep this copy as your reference.

Potential and Perceived Conflict of Interest

With ethical consideration to avoid conflict of interest, I will not be engaging in any consultancy work related to this study at any time before graduating. Even after graduating and the completion of the research work, the identities of all participants will be kept anonymous and will not be used to secure potential consultancy opportunities.

Dissemination and Publication of Research Results

Over the course of interviews and FGDs, every session will be concluded with a summary of the collected and produced information as a means to ensure transparency among participants only.

The final outcome of this research is the publication of a doctoral dissertation, which is a requirement for graduating at Royal Roads University. The overall completed dissertation, which includes processed data, research findings, and recommendations will be provided to the elders as an electronic file.

After graduating, I may use the research findings only from the completed dissertation for publishing academic journals, trade publications, books, digital publications, and other formats. In addition, I may also discuss the research findings only from the completed

dissertation in conferences, presentations, in both private and public venues and to existing and potential colleagues, work associates, and clients.

Consent to Participate

I, _____, have read and understood this Consent Form and I hereby consent to participate in this study, participate in data-gathering activities such as interviews/FGDs, and understand that I may confidentially withdraw at any time.

Signature: _____ Date: _____

Consent to Photography, Audio, and Video Recording

I, _____, have read and understood this Consent Form and I hereby consent to the photography, audio, and video recording of the interviews/FGDs discussed herein.

Signature: _____ Date: _____

Principal Researcher Agreement

I, Eli Paolo Fresnoza, the Principal Researcher, agree to conduct this research in accordance with this Consent Form.

Signature: _____ Date: _____

Appendix I

Privacy Agreement

It is understood and agreed that the data and information generated in this study must be kept confidential by those who agree to participate and those who agree to take part in a collaborative effort and assistance in designing, validating, researching, and approving the study [defined as “participant”]. To ensure confidentiality and protection, it is agreed that:

1. The confidential data and information includes:

   Criticisms, individual and collective perspectives, Indigenous knowledge, Indigenous systems and practices, ideas, trade secrets, technical data and information, primary and secondary research information at the time of disclosure.

2. The participant agrees to keep secret and not disclose confidential data and information to anyone unless required to do so by law.

3. In terms of withdrawal of the participant and their contribution from a focus group participation, the participant acknowledges that some of their ideas may remain as they become integrated in the discussion.

4. Any addition or modification to this Privacy Agreement must be made in writing and signed by all participants.

Henceforth, the participant acknowledges that he/she/they have read and understand this Privacy Agreement and voluntarily accept the duties and obligations set forth herein.

Participant recipient of confidential information:

Name:

Signature:

Date:

Researcher:

Name: Eli Paolo Fresnoza

Signature:

Date:

Appendix J

Sample Invitation Letter

22 May 2019

To: ___
Basco, Batanes

Dear ____,

I hope this letter greets you well! As I have mentioned last time we met, I am actively in my data-gathering phase for my doctorate studies, in which key resource persons will be invited for a number of activities. Hence, I would like to cordially invite you to become an esteemed participant in the following events:

- **Ivatan (DRRM) IKSP Validation Workshop (1.5 hours)**
  - Agenda: Appreciation, value-building, utility status assessment, and validation of the accuracy of Ivatan DRRM IKSPs.
  - Date and Venue: Thursday, 30 May, 5pm at the Batanes State College Library.

- **Focus Group Discussion (FGD) (1.5 hours)**
  - Agenda: Critical views about Provincial- and Municipal-level DRRM Council approaches.
  - Date and Venue: Tuesday, 4 June, 9am at the Batanes State College Library.

- **Ivatan Stakeholder Synthesis (1.5 hours)**
  - Agenda: Action planning and implementation of strategies
  - Date and Venue: Monday, 10 June, 5pm at the Batanes State College Library.

Meals or refreshments will be provided. There is no cost to participate in any of these events.

Please note that your comments and contributions will remain confidential. All participants will be urged not to disclose any data to anyone.

If you would be available, I would appreciate if you could RSVP by text or call my number at 0908-708-0560 by Monday, 27 May. Should you not be available in some events, kindly let me know. It would be much appreciated if you could refer another participant who could substitute.

Your opinions, critique, and inputs to this project would be most helpful not just for the research but for contributing to the resiliency of the community and preservation of Ivatan heritage. Thank you and I look forward to your RSVP.

Dios mamajes!

Eli Paolo Fresnoza
MA-URP (hons), En.P., cpt, DSocSci (cand.)
Royal Roads University
Victoria, Canada

Appendix K

DRRM IKSP Validation Results

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Animal and Human Behaviour							
Hermit Crabs (Umang — *Paguroidea*)	Abandon shore habitat to go further inland and in hordes to occupy holes and niches in walls, rocks or trees.	Strong typhoon	Active and declining	Still observed	• Due to technology, some folks prefer using [contemporary] weather forecasting • Lack of information [passed on] to youth	5	Orally transmitted by elders
Black ants	Whole ant colony moving to upper parts of the house or walls	Stormy weather and heavy rain	Active	Still observed	• Due to technology, some folks prefer using [contemporary] weather forecasting • Lack of information [passed on] to youth	5	Orally transmitted by elders
Tagalit (*Todiramphus chloris*)	Seasonal fishermen never venture far out of sea until the bird sings at or near the beaches	Dangerous for fishing before the season	Active				

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Talukuk (bird — *Centropus viridis*)	A brown bird similar to the features of the crow, singing out loud, "ta-lu-kuk" (hence the name) in any part of the day	Light or heavy rain will occur in a few hours					
Other birds*	a) If birds are too active, such as chirping lively b) If birds just sit calmly	a) Fair weather b) Rainy weather	a) Active b) Active	Observed due to its accuracy	Due to easy access of internet-based forecast	5	Elders
Chicken (*Gallus gallus domesticus*)	Chicken (*Gallus gallus domesticus*) bathing in dust	Fair weather					
Cows (*Bos taurus*), carabao (*Bubalus bubalis*), and goats (*Capra aegagrus hircus*)	Animals are not interested to drink water	Bad weather	Active	Still observed	• Due to technology, some folks prefer using [contemporary] weather forecasting • Lack of information [passed on] to youth	5	Orally transmitted by elders

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Cattle, goats (*Capra aegagrus hircus*)	a) Grazing on ridges or tops of mountains b) Grazing on the side of the mountain	a) Fair weather b) Cloudy with scattered showers	Active	Still observed	• Due to technology, some folks prefer using [contemporary] weather forecasting • Lack of information [passed on] to youth	5	Orally transmitted by elders
Cockroaches (*Periplaneta americana*)	Flying at random, coming from anywhere in the house in the evening or at night	Rain	Active	Still observed	• Due to technology, some folks prefer using [contemporary] weather forecasting • Lack of information [passed on] to youth	5	Orally transmitted by elders
Giant brown sea slug and black sea cucumber (*Holothuria atra*)	The sea slug spends most of its life hidden in crags in the coral reef. It comes out to forage rarely on the reef and its sometimes exposed in low tide in fine or stormy seas. Absence of cucumber on their sand colony is a rare occurrence	Stormy weather / typhoon					

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Fish	Generally fish don't bite actively when there is a coming storm. There is also a day or two when baits are swallowed deep into the stomach. At times, they take two hooks at a time.	Stormy weather / typhoon	Active	Still observed	Weather forecasting through internet	5	Elders
Plankton	Presence of the plankton making the sea surface dirty and phosphorescent wakes up boats at night (kumaruruay u taw)	Stormy weather					
Elder people	Elder people simultaneously having arthritis	Bad weather	Active	Still observed	Weather forecasting through internet	5	Elders
Material Culture							
Heritage houses	a) Vernacular design using thick stone walls with thatched roofs	a) Storm proofing	Active	Still observed	Weather forecasting through internet	5	Elders

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Attire	a) Vakul head gear for women to protect from both sun and rain b) Kanayi overcoat for men to protect from both sun and rain	a) Protection from the elements b) Protection from the elements	a) Declining b) Declining	Preference to readily available gear to combat sun and rain	• Declining produce of vakul and kanayi • If available, the price is too high • Declining farming activities	2	Elders
Celestial Bodies and Above-Ground Phenomena							

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Clouds	a) Dinem Island a) The plume of clouds touching the top of the island b) White clouds covering the top or above the island c) Thick dark clouds covering and sometimes joining other clouds in the area. b) Maychavatuvatu (white) c) Maychavatuvatu (black) d) Maychavatuvatu (red before sunrise) e) Maychadadaji f) Angaringang (half-rainbow morning and afternoon) g) A streak of white, blue or black heavenly phenomenon across the skies at the pre-dawn or after sunset running from east	a) Dinem Island a) Rain may come in the following days b) Scattered shower c) Heavy rain b) Windy c) Winds with scattered light rains d) Strong winds and heavy rains occur within the day e) Fair weather f) Rain and gale winds g) Rain h) Predicts typhoon signals and direction of wind origin (the latter from its tail)	a) Dinem Island a) Active b) c) Active b) Active c) d) Active e) Active f) Active g) Active h) Active	Still existing, adoptable [sic], and comprehensible, and time-tested	• Because the youths are influenced by modern technology • Less interaction between the youths and the elder general communication gap	All 5 in this subject	• Thru [sic] actual experience or participation/ involvement • Family tradition • Indigenized curriculum

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
	west or vice-versa h) Long strips of cirrus clouds called *inawung* are still used by elderly generations. The straighter or leaner the strip, the stronger the typhoon.						
Sun	a) Large white or grey ring (ahad) with an opening rainbow color near the sun b) Mayvulilaw / maylanyag (appearance of the bright yellow sunlight in the morning or afternoon, disappearing quickly) c) Sunrays penetrating dark clouds d) Yellowish light of the sun with excessive heat e) Bright yellow sunlight in sunrise or sunset with a short duration	a) Storm or rain b) Typhoon or heavy rain c) Nyisu (windy day without rain) d) Rain or bad weather e) Storm or rain	All active	Still existing, adoptable [sic], and comprehensible, and time-tested	• Because the youths are influenced by modern technology • Less interaction between the youths and the elder general communication gap	All 5 in this subject	• Thru [sic] actual experience or participation/ involvement • Family tradition • Indigenized curriculum

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Moon	a) Large white or grey ring or rainbow color around it b) Fullmoon or newmoon — 3 days before kapay palang na tumayara am matimuy as an 3 days before fullmoon am mavid u kawan	a) Rain and typhoon very soon b) Rain	Active	Still existing, adoptable [sic], and comprehensible, and time-tested	• Because the youths are influenced by modern technology • Less interaction between the youths and the elder generational communication gap	All 5 in this subject	• Thru [sic] actual experience or participation/ involvement • Family tradition • Indigenized curriculum
Stars	Unusual twinkling on a clear night/brighter or with pronounced twinkling	Rain	Active	Still existing, adoptable [sic], and comprehensible, and time-tested	• Because the youths are influenced by modern technology • Less interaction between the youths and the elder generational communication gap	All 5 in this subject	• Thru [sic] actual experience or participation/ involvement • Family tradition • Indigenized curriculum

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Wind	a) A north wind when it is not the northwesterly season blows steadily and doesn't change b) Days of kuvi weather when it is not south easterly season and suddenly change to northern direction c) During a typhoon , the wind direction shifts to sumla (mamnaw) d) Very cold wind blows	a) Typhoon b) Weather disturbance forming, usually storms and typhoon c) Typhoon is over d) Weather changes	a) b) c) Active d) Active	Still existing, adoptable [sic], and comprehensible , and time-tested	• Less interaction between the youths and the elder generations • Communication gap	All 5 in this subject	• Thru [sic] actual experience
Dew (apun)	On a windless night, dew flows on the gutters of galvanized roofing, or meadows become very wet in the morning	Rain with gale winds					
Traditions and Faith-Based Systems and Practices							
Home preparations	a) Roof tying (kapanpet) b) Bracing doors and windows (kapanahtah) c) Covering windows (tapangku)	a) Storm proofing b) Storm proofing c) Storm proofing	Active	Still existing and adaptable		5	Observed

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Communications	Dissemination of weather updates through bandillo (town criers)	Awareness and warning of inclement weather	Active			5	Observed
Cooperative practices	a) Kayvayvanan — family-based social cooperatives helping others in society b) Yaru — cooperative help involving the community, where members are given assigned tasks c) Kapañidungan — community or group help given to persons or families in need of more labour they can afford themselves d) Kapangaraya — cooperative help involving individuals hauling boats to safer ground during a typhoon	a) Forges strong solidarity and social bonds b) Creates a sense of "utang na loob" or a debt in service c) Strengthens social obligation to help d) Boats are saved	Active			5	Still observed

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Territorial Environment							
Plants	a) The new leaves of many species of banana fail to unfurl b) Leaves of the aryus tree sprout any time of the year c) Aryus tree tree leaves turn light green d) Nardu flowers appear in fair weather; some species bloom out of season e) Dove orchid flowers appear f) Waling-waling plants blossom g) Vula plants blossom	a) Strong typhoon b) Rain c) Rain d) Rain e) Stormy weather and long duration of typhoon f) Heavy rain g) Strong typhoon	a) Active for elders, but Declining for millennials b) Active c) Active d) e) f) Active g)	a) Passive b) Nobody explains to them. No care attitude because they obtain weather update from the internet c) d) e) f) They still hold true to the observations g)	a) Internet update is available. Younger generation want scientific explanations which the elderly could not provide b) c) d) e) f) No active protection of waling-waling (*kaduday*) plants g)	a) 4 b) 5 c) 5 d) e) f) 5 g)	• Word of mouth from the elderly • Being taught in the schools through IPed [Indigenous Peoples education]

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Soil, rocks, or sand	a) Sand has a sharp drop formed by waves at their far reaches. Always observable before typhoons b) Mounds of gravel formed by waves distinctly observable during quarter moons in fair weather. c) Waves' force roils the sand at the sea bottom d) Grains of sand float to the water surface e) This happens rolling waves that the strike of the beach produce almost the same-sized waves rolling back to the sea and don't weaken even when they meet other waves (backwash)	a) Big waves to level the drop b) Big waves c) Stormy weather d) Typhoon e) Typhoon	a) Active b) Active c) Declining		Construction of port improvement has obstructed/disturbed the natural flow of wave and current	a) 3 b) c) 2	Seminars (NDRRM) [to] invite Ivatan speakers to talk about IKSP on Ivatan resiliency. (Publication)

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Views	Islands north of Itbayat, Balintang Island to the southeast and Calayan Island to the southwest are clearly seen by the naked eye.	Weather disturbances are likely to happen within a few days					
Moisture	Concrete walls are cold and moist; the floors appears to have just been mopped	Rain	Declining			3	
Maritime Environment							

Subject	Description	Predicted Weather / Effects	Active or Declining Use	Reason	Challenges in Today's Use	Effectivity Rating (1 to 5)	Mode of Transmission
Waves and the ocean	a) Long straight and unbroken sets of waves b) Smooth and glassy ocean waters c) The current flow in directions other than the normal flow of high and low tide currents d) Currents are also unusually strong e) Very large waves with crest, far apart, height about 10 feet or more. f) Medium waves about five feet or more g) Small waves about three to four feet h) The waves cause sea spray high into the air and into land. It forms mists in the morning and late afternoon. General weather is calm. i) Unbroken large waves from Chahahanan to Vanua du Vatu, Ivuhus	a) Tropical storm to super typhoon b) Squall or typhoon c) Storm or rain d) Storm or rain e) Super typhoon f) Typhoon – 100 to 150 kph g) Tropical depression h) Tropical depression i) Moderate to super typhoon	All Active		Availability and easy access to weather forecast thru [sic] internet	• 4 for a) to e) • 5 for f) to h)	Word of mouth

Note. Many sheets used in the actual validation exercise only had one response that was provided by some participants. These responses applied to all listed descriptions under their specific subjects. This was confirmed and verified by participants during the activity, who reasoned the unnecessary need for redundancies in their responses. May 30, 2019.
[a]Entries other than the prescribed IKSPs that were added by participants.