



Climate change, typhoons, and climate injustice: evidence from super typhoon Haiyan on Samar

Changement climatique, typhons, et l'injustice climatique: témoignage du super-typhon Haiyan, sur l'île Samar

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Abstract:

The island of Samar, in the Eastern Visayas of the Philippines, is one of the most vulnerable parts of the Philippines to typhoons. Samar is also one of the poorest parts of the Philippines. This juxtaposition of vulnerability to typhoons amid poverty exemplifies the vulnerability of the tropical developing world to climate change as intensified typhoons are a manifestation of anthropogenic climate change. The vulnerability of Samar to these enhanced typhoons demonstrates climate injustice, the situation where those who are not responsible for causing climate change must endure its consequences, and background injustice, the situation where a developing country has suffered from exploitation at the hands of its former colonial master, as it was ravaged by the United States Army during the Philippine-American War of 1899-1902. Samar illustrates how the developed world can provide aid to places in the developing world to enhance resilience and adaptability to climate change.

Résumé:

L'île de Samar, dans les Visayas orientales des Philippines, figure parmi les régions des Philippines les plus vulnérables aux typhons. Elle est aussi une des régions les plus pauvres des Philippines. Cette juxtaposition de la vulnérabilité aux typhons avec la pauvreté est un exemple de la vulnérabilité du monde tropicale en voie de développement au changement climatique, car l'augmentation du nombre de typhons constitue une manifestation du changement climatique anthropique. La vulnérabilité de Samar face à ces typhons renforcés démontre l'injustice climatique. Il s'agit d'une situation où les personnes qui ne sont pas responsables des causes du changement climatique doivent en endurer les conséquences et aussi un contexte d'injustice sans oublier la situation où un pays sous-développé a souffert de l'exploitation causée par son ancien maître colonial et a été ravagé par l'armée des États-Unis pendant la guerre américano-philippine de 1899-1902. Samar illustre parfaitement comment les pays développés peuvent fournir une assistance à certaines régions des pays en voie de développement afin d'augmenter leur résistance et leur capacité à s'adapter au changement climatique.

Keywords / Mots clés

*Philippines; Samar; Typhoons; Climate Change; Climate Injustice, Background injustice
Philippines, Samar, Typhons, Changement Climatique, Injustice Climatique, Contexte d'injustice*

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INTRODUCTION

On 8 November 2013, Super Typhoon Haiyan (referred to in the Philippines as Super Typhoon Yolanda) pummeled the eastern Philippines (Figure 1). Haiyan was the strongest typhoon to ever make landfall, had air pressure at its center of only 895 millibars, generated sustained one-minute wind gusts of up to 315 kilometers per hour (with wind gusts of up to 375 kilometers per hour), and in some locations had precipitation falling at up to 30 millimeters per hour (Primavera et al., 2016; Tajima and Shimozone, 2016; Takagi et al., 2015; Takagi and Esteban, 2016; United Nations Development Program Philippines, 2014). While the City of Tacloban, on the island of Leyte, bore the brunt of Haiyan (receiving much media attention) the island of Samar was also severely affected (IBON, 2015).

The southern coast of Eastern Samar, and portions of Western Samar on Leyte Gulf, were devastated by storm surge. At numerous

locations in Eastern Samar high watermarks over 10 meters were observed and in Salcedo the storm surge extended 1400 meters inland (Shimozone et al., 2015; Tajima and Shimozone, 2016). Along the eastern coast of Samar there was storm surge damage comparable to that of a tsunami (United Nations Development Program Philippines, 2014). Haiyan inundated an estimated 93 square kilometers of Samar and in Barangay San Antonio, in Basesy, Western Samar, the storm surge was seven meters high, extended almost 200 meters inland, and inundated almost all domestic water wells in a place where most people rely on groundwater for drinking water (Cardenas et al., 2015). Nathaniel Alegre, the Disaster Risk Reduction and Community Organizing Coordinator of the Diocese of Borongan, estimates that up to 2000 people were killed on Samar and there was no correct reporting of fatalities because of communication difficulties in the aftermath of the storm (Alegre,

2016).

There are many climate scientists arguing that enhanced tropical cyclones are expected with climate change and Samar, a place already vulnerable to typhoons, will become even more susceptible to this natural hazard as humanity progresses into the Anthropocene. Using Samar, the objective of this article is to describe a place in the tropical developing world demonstrating the vulnerability of the tropical developing world to climate change and, in doing so, illustrate the concepts of climate injustice and background injustice. Samar has been selected for study as it is a place vulnerable to climate change, a problem it has not created (climate injustice), and because it was adversely impacted during the American colonial period (background injustice).

The methodology engaged in for this article consisted of an extensive review of the literature focusing on the themes of climate change, tropical cyclones, climate injustice, background injustice, Samar, resilience, and vulnerability. Information acquired from this literature review was then augmented by fieldtrips to the Philippines in 2016 and 2017. During these fieldtrips, a series of interviews were conducted by the author with approximately 40 key informants selected for their knowledge of the themes elicited from the literature review. These informants included: government officials (from both the national government and the government of Eastern Samar), environmental activists, and members of the Roman Catholic Church (such as Social Action Directors and Diocesan disaster risk reduction program managers). The interviews were semi-structured in that preconceived questions were asked with enough flexibility remaining to allow the author to pursue any unanticipated lines of discussion emerging during the interview. A preliminary interview guide was utilized in each interview, with certain questions tailored to specific participants, depending on their roles, experience and expertise. Prior to each interview, the written consent of each participant was obtained in compliance with the ethics policy of the author's academic institution.

CONCEPTUAL FRAMEWORK

Climate injustice

In terms of the contributions of individual countries, climate change is a heterogeneous process. The developed countries have contributed substantially more to climate change than the developing countries of the world (Hariharan et al., 2017). The developed countries historically have enjoyed, and currently are enjoying, the benefits of activities emitting greenhouse gases. However, these emissions have caused, and are causing, others to disproportionately suffer the burdens of climate change. "The distribution of the benefits and burdens associated with the emissions generating activities," wrote Bell (2013: 190), "is a matter of justice" and, as a convenient shorthand, this can be called "climate justice." According to Mary Robinson, founder of the Mary Robinson Foundation for Climate Justice (and a former President of Ireland), "when we talk about climate justice, we are talking about the moral imperative of the injustice of how climate change affects the poorest, who are the least responsible" (Garfinkel, 2014: 20). Climate injustice occurs because the emissions of the developed nations have caused climate change and the biggest impacts of this will fall on "lower income populations, predominantly within tropical and subtropical countries" (Vanderheiden, 2008: 7). Essentially, as Okereke (2010: 471) stated, "climate change principally involves the rich imposing risks on the poor."

Background injustice

Intimately related to climate injustice is background injustice, which to Okereke (2010: 466), "reflects historical patterns of inequity between the political North and South." "Countries with colonial legacies of extraction," wrote Parks and Roberts (2006: 342), "are structurally predisposed toward higher levels of social, economic, environmental, and institutional vulnerability." "These structural disadvantages," wrote Parks and Roberts (2006: 342), "limit their ability to protect themselves from poverty and environmental degradation as well as the growing frequency and strength of climate related disasters." To Parks and Roberts (2006: 342), "many of these day-to-day realities are not the result of irrational policy choices, but are problems inherited from the colonial era." Shue (2014: 128) defines "background injustice" as "the background inequalities in wealth and power that are the present bitter fruit of centuries of colonialism, imperialism, unequal development, war, greed, stupidity, or whatever one thinks are the main features of the history of the international political economy."

The relevance of background injustice lies in its impact on vulnerability and resilience. "Vulnerability," wrote Gaillard et al. (2007: 257), is "the susceptibility of a society to suffer from damages in the event of the occurrence of a given hazard." Poverty and vulnerability are intimately related to each other and when the former rises, the latter accompanies it (Delica-Willison and Willison, 2004: 148). Vulnerability is also linked to resilience, which Harper (2018: 55) defines as "the measure of a society's capacity to absorb shocks and to fund recovery from injury." Resilience and vulnerability are inversely related to each other; when resilience is low vulnerability is high and when resilience is high vulnerability is low (Huigen and Jens, 2006). All former colonies, to varying extents, have suffered a legacy of colonialism but the extent to which colonialism has contributed to poverty causes an increase in vulnerability and a concomitant reduction in resilience. Those former colonies that suffered the most serious colonial depredations were not only rendered poor but were also rendered more vulnerable to climate change and less resilient to its effects.

SAMAR: THE WOUNDED LAND OF THE PHILIPPINES

Samar is located, along with the islands of Biliran and Leyte, in Region VIII, the Eastern Visayas Region of the Philippines (Figure 1). With a total land area of 14,402 square kilometers, Samar is the third largest Philippine island (Santos and Lagos, 2004). In terms of terrain, Samar has been described as an "island of moderate mountains and lush rainforest sliced through by rivers connecting the interior and the coast" (Couttie, 2004: 2). The island's terrain is rugged with two-thirds of its land area having a slope over 18 degrees (Santos and Lagos, 2004). The island has a wet climate, receiving over 3,000 millimeters of rainfall annually and, consequently, is covered with lush tropical rainforests and has the archipelago's largest remaining tract of unfragmented lowland tropical rainforest (Santos and Lagos, 2004). Some of the heaviest forest cover is found between Calbiga and Borongan, where the forest is composed mostly of closed canopy lowland dipterocarp forest (Haribon Foundation and Birdlife International, 2001). To protect Samar's biodiversity the Samar Island Natural Park (SINP) was created by Presidential Proclamation Number 442 issued by President Gloria Macapagal-Arroyo on 13 August 2003 (Holden, 2012). The SINP (Figure 1) consists of a 3333-square kilometer core area, wherein there are substantial land use restrictions, surrounded by a 1245 square kilometer buffer zone intended to provide an added layer of protection to the protected area while also providing livelihood opportunities to local communities.

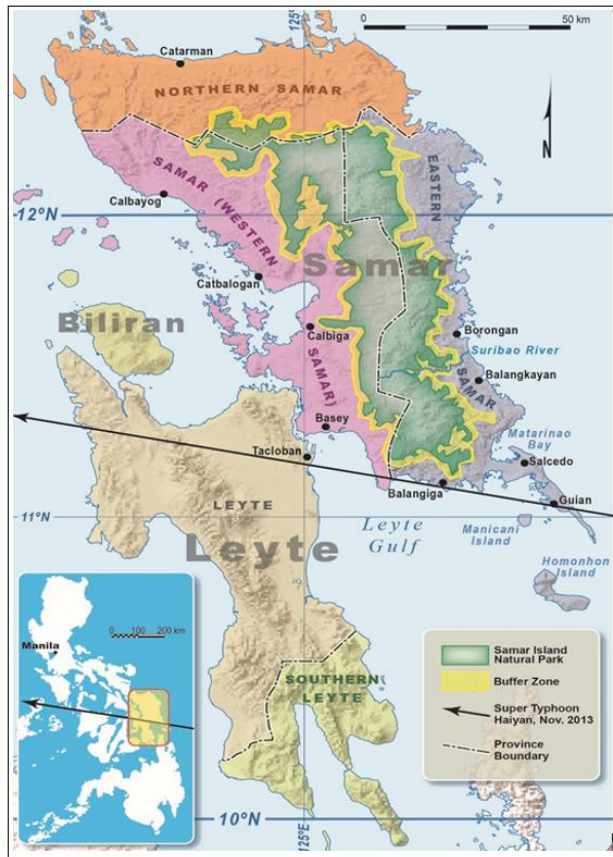


Fig. 1: Region VIII of the Philippines

Source: the author

In 2010, Samar had a population of approximately 1.8 million people (Philippine Statistics Authority, 2017). The population of Samar is overwhelmingly Christian with there being no appreciable Muslim or indigenous (people with a historical continuity with the pre-Islamic and pre-Hispanic Philippine religions) population (Holden, 2012). Two-thirds of all Samareños are engaged in subsistence agriculture and subsistence aquaculture and the principal commercial crop on the island is coconut, which has been called the “King Crop” of the island (Santos and Lagos, 2004: 146).

Samar derived its name from the Waray-Waray word samad meaning “wound” and, according to Santos and Lagos (2004: i), “Samar is a land that continues to bleed from gaping and festering wounds of impoverishment and backwardness.” “For most of its history,” wrote Cruikshank (1982: 219), “the island of Samar has been a backwater.” In 2015, the national poverty rate was approximately 22 percent while Samar had a poverty rate of approximately 50 percent (Philippine Statistics Authority, 2016). The island has experienced little poverty reduction over the years and whatever economic growth has transpired nationally in the Philippines has had no impact on poverty reduction among the Samareños (United Nations Development Program Philippines, 2014).

Much of Samar’s poverty is a legacy of the Philippine-American War, occurring after the United States acquired the Philippines from Spain (after the Spanish-American War) and repressed an insurgency led by Filipino nationalists from 1899 to 1902. On 28 September 1901, soldiers from the United States Army were attacked by Samareños at breakfast in the town of Balangiga (Figure 2) and out of the 74-man garrison only 26 survived. In vengeful retaliation,



Figure 2: The Balangiga Monument, Balangiga, Eastern Samar
Photo Credit: the author.

the Sixth Separate Brigade, consisting of 4000 soldiers and 300 marines, was sent to Samar under the command of Brigadier General Jacob Smith to pacify the island (Couttie, 2004). According to Miller (1982: 220), when Smith gave Major Littleton Waller, the commander of the Marines, his orders he ordered Waller to make the interior of the island a “howling wilderness” (Gates, 1973: 254). The Samar campaign resulted in the destruction of the island’s economy (Couttie, 2004). Waller reported that in eleven days his Marines had burned 255 dwellings, slaughtered 13 water buffalos, and killed 39 people (Gates, 1973: 255). Roads and bridges were destroyed, over half of the island’s 44 municipalities had been razed to the ground, and 85 percent of all draft animals had been killed (Couttie, 2004). Since the Philippine-American War there has been a steady migration of Samareños off the island in search of better opportunities (Santos and Lagos, 2004). At the time of the conflict, Samareños constituted 16 percent of the archipelago’s population; by 2010, this proportion had fallen to less than two percent of the population (Philippine Statistical Authority, 2017). “To say that Samar was devastated by the war,” wrote Couttie (2004: 287), “is something of an understatement.”

Perhaps the largest source of the poverty suffered by Samareños is the island’s vulnerability to typhoons. The term “typhoon,” coming from the Chinese tai (strong) and fung (wind), describes a tropical cyclone in the Western Pacific Ocean. Tropical cyclones develop in the North Pacific in an area ranging from 130o-180o East and 5o-15o North (Figure 3) during the months of July to November (Mei et al., 2015).

Since 2009, tropical cyclones have been divided into six categories, which are presented in Table 1, and the Western North Pacific basin experiences, on average, 26 named tropical cyclones each year, accounting for about 33 percent of the global total (Wu and Wang, 2004).

Type of Storm	Wind Speeds
Tropical Depression	63 kilometers per hour or lower
Tropical Storm	Between 63 to 89 kilometers per hour
Severe Tropical Storm	Between 90 to 119 kilometers per hour
Typhoon	Between 120 to 149 kilometers per hour
Severe Typhoon	Between 150 to 190 kilometers per hour
Super Typhoon	Greater than 190 kilometers per hour

Table 1: The Six Categories of Tropical Cyclones

Source: Abdullah et al. (2015)

These tropical cyclones travel in a northwesterly direction mainly affecting the eastern half of the Philippines. Accordingly, Samar is

one of the archipelago's most heavily affected portions and, between 1948 and 2009, has been impacted by 25 tropical depressions, 51 tropical storms, and 58 typhoons (National Disaster Risk Reduction Management Council, 2014). These typhoons destroy crops, destroy infrastructure, and impede economic development.

With high poverty rates, rough terrain, and heavy forest cover, Samar has become fertile ground for the New People's Army (NPA), a Maoist group seeking to overthrow the Philippine government since 1969 (Holden, 2013; United Nations Development Program Philippines, 2014). Between June 2016 and June 2017, 47 people were killed or wounded in confrontations between the NPA and government forces (Pacific Strategies and Assessments, 2016, 2017). These casualties represented ten percent of all casualties in the Philippines over this period while Samar constitutes only five percent of the archipelago's land area.

CLIMATE CHANGE, TYPHOONS, AND THE PHILIPPINES

The scientific literature indicates that climate change is contributing to stronger tropical cyclones (Anticamara and Go, 2017; Bagtasa, 2017; Camargo et al., 2013; Combest-Friedman et al., 2012; Elsner et al., 2008; Emanuel, 2005, 2013; Mei et al., 2015; Mei & Xie, 2016; Peduzzi et al., 2012; Rozynski et al., 2009; Takagi & Esteban, 2016; Takayabu et al., 2015; Trenberth, 2005; Webster et al., 2005). Kerry Emanuel, an atmospheric scientist at Harvard University, has written extensively on the impact of climate change on tropical cyclones finding that stronger tropical cyclones "cannot be written off as mere climate perturbations to which we easily adjust" (Emanuel, 2007: 51). The National Academies of Sciences, Engineering, and Medicine (2016: 110) has determined that "because maximum potential intensities are projected to rise, future observations of tropical cyclones with intensities significantly higher than those observed in the past would be consistent with expectations in a warming climate.

The principal process through which climate change engenders stronger typhoons are the elevated temperatures of the world's oceans, which are, in the view of Emanuel (2007: 50), "responding to warming sea surface temperatures faster than we originally expected." As ocean surface temperatures rise, the oceans provide more energy to convert into tropical cyclones (Elsner et al., 2008). These higher sea surface temperatures act to increase the energy available for tropical cyclone formation (Trenberth, 2005). During 2013, for example, sea surface temperatures in the genesis location for North Pacific tropical cyclones (Figure 3) exceeded 29 degrees Celsius, providing ample energy for the formation of Super Typhoon Haiyan (Takagi & Esteban, 2016).

The increase in subsurface sea temperatures occurring over the last thirty years are an important component of how climate change leads to stronger tropical cyclones. Normally, during a tropical cyclone, the disturbance of the ocean's surface causes an upwelling of cold water from below the surface; as this happens, sea surface temperatures decline thus acting as a natural break on tropical cyclone strength. Such upwelling of cold water can reduce surface temperatures by as much as nine degrees Celsius, which is enough to reduce surface water temperatures below that needed for tropical cyclone maintenance (Subrahmanyam, 2015). One of the first to suggest climate change as a contribution to stronger tropical cyclones was Emanuel (1987: 485) who raised this possibility but then discounted it due to "the tendency for strong cyclonic circulations to induce upwelling of cold water." However, research conducted by Mei et al. (2015) shows that over the 1985 to 2015



Figure 3: Genesis Location for North Pacific Tropical Cyclones
Source: the author

period there has been a 0.75 degrees Celsius rise in the temperature of the world's oceans at a depth of 75 meters. Similarly, research conducted by Ortiz et al. (2016) has shown that by 2100, ocean temperatures will increase by up to two degrees Celsius in the top 100 meters of the world's oceans. These higher subsurface sea temperatures eliminate a natural buffer on the potency of tropical cyclones, favor rapid tropical cyclone intensification, and go a long way towards explaining why typhoon intensity from 2005 to 2015 has been, on average, the strongest over the period from 1955 to 2015 (Mei et al., 2015). According to Mei et al. (2015), by the end of the 21st century the average tropical storm will increase from being a severe tropical storm to a typhoon, and even typhoons of moderate intensity will increase by 14 percent. Takagi and Esteban (2016) predict an increase in the mean maximum tropical cyclone wind speed of between 2 to 11 percent by 2100, in association with deeper low pressures in the core of these systems. "The strengthened typhoon intensity," wrote Mei et al., (2015, p. 4), "poses heightened threats to human society." When interviewed by the author at the Scripps Institution of Oceanography, in La Jolla, California, Dr. Wei Mei, a climate scientist, stated that people in the Philippines must be concerned about the intensity of tropical cyclones in the coming future; if he lived in the Philippines he would be very worried about tropical cyclones (Mei, 2015). Amalie Obusan, the Greenpeace Southeast Asia Country Director for the Philippines, stated she reacts to these predictions "with trepidation" because she has seen what these typhoons can do and the idea of more extreme, and more intense, weather events is very frightening (Obusan, 2017).

There are some who maintain that tropical cyclones in the Western North Pacific are becoming more unpredictable, tracking in an east to west trajectory instead of their normal southeast to northwest trajectory, and it has been estimated that typhoon landfalls between latitudes 10°-12° north have increased by around 0.02 times per year from 1945 to 2013 (Takagi and Esteban, 2016; Thomas et al., 2013; United Nations Development Program Philippines, 2014; Wu and Wang, 2004; Yumul et al., 2012). Super Typhoon Haiyan tracked in more of an east to west trajectory instead of a southeast to northwest trajectory. Typhoons tracing in more of an east to west trajectory is significant for the Samareños as much of Samar lies between latitudes 10°-12° North.

Rosalie Baje, the Disaster Risk Reduction Program Manager of the Diocese of Borongan, has found, in her experience that typhoons

seem to be tracking in more of such a trajectory instead of a southeast to northwest trajectory (Baje, 2016). Sheryl Cabaguing, from Cordaid Philippines in Guiuan, Eastern Samar, finds these predictions “very alarming” (Cabaguing, 2016: interview). Artemio Rebato, the Disaster Risk Reduction Management Focal Person of the Province of Eastern Samar in Borongan, Eastern Samar, attributes the tendency of typhoons to track in more of an east to west trajectory instead of a southeast to northwest trajectory to climate change (Rebato, 2016). Father Alcris Badana, the Relief and Rehabilitation Director of the Archdiocese of Palo (on the island of Leyte), is concerned with typhoons tracking in more of an east to west trajectory because the smaller islands of the Visayas do not take energy out of the typhoons, unlike larger islands such as Luzon (Badana, 2016).

An important interface between climate change and typhoons are stronger typhoons concomitant with rising sea levels as a higher sea level generates an even higher storm surge. Climate change leads to sea level rise through two mechanisms: first, as water warms it expands; second, as the world’s climate warms, terrestrial glaciers will melt, particularly those in Antarctica and Greenland. It is also important to stress that sea-level changes will not be uniform across the world and the western tropical Pacific has experienced above-average increases in sea-level (Mass and Carius, 2012; Rhein et al., 2013). The Philippines themselves have experienced above-average increases in sea-level; since 1970 mean sea-level readings taken at Legazpi, in the Bicol Peninsula of Luzon, indicate an increase of 0.2 meters per year (Lander et al., 2014). From 1960 to 2012, sea level in Manila Bay rose by 15 millimeters per year, which is approximately nine times the average rate of global sea level rise (1.7 millimeters per year) attributed to climate change (Morin et al. 2016). Bellard et al. (2014) estimate that sea level rise could cause the archipelago to lose up to 17 percent of its land area and the Philippines is one of the world’s three most vulnerable places to sea-level rise land loss along with the Caribbean and Sundaland. There is anecdotal evidence that sea level off Samar may be rising at an abnormally high rate. Artemio Rebato related how people on the coast are already providing anecdotal reports of sea level rise; sea level rise is a serious concern to the provincial government and it wants all municipalities and barangays to prepare climate change action plans to be prepared for this eventuality (Rebato, 2016). To Father Alcris Badana, the combination of higher sea levels and stronger typhoons “will really be deadly” (Badana, 2016, interview).

PERVERSE SYNERGIES BETWEEN TYPHOONS AND OTHER TYPES OF ENVIRONMENTAL DEGRADATION

The perverse synergies between stronger typhoons and other types of environmental degradation prevalent on Samar have great potential to aggravate stronger typhoons. Over the years, the island has experienced environmental degradation from many anthropogenic sources, both local and global, and these, when taken into conjunction with stronger typhoons, make Samar even more vulnerable to their harmful effects. Coral reefs provide protection to coastal areas from the strong waves generated by typhoons and reefs on the east coast of Samar generally range from 100 to 200 meters off shore and do a good job of dampening waves (Tajima and Shimoazono, 2016). However, research conducted by Anticamara and Go (2017) found that most reefs off Eastern Samar had already suffered degradation prior to Haiyan from destructive fishing and siltation form forest degradation. A principal cause of damage to reefs is sedimentation resulting from illegal logging in the SINP. On the same day Artemio Rebato was interviewed, heavy rainfall had caused the Suribao River to turn brown, thus indicating

deforestation upstream (Rebato, 2016). Mangroves, the trees capable of growing in brackish water in estuaries, also provide protection from typhoons and a 100-meter band of mangroves can cause a reduction of wave energy between 13 to 60 percent (Primavera et al., 2016). In Matarinao Bay (Figure 1) mangrove forests dramatically reduced damage during Haiyan, even in some areas near the entrance to the Bay, which opened to the direction of the storm surge (Tajima and Shimoazono, 2016). Nevertheless, the province of Eastern Samar has experienced a decline in mangrove forest area from 1990 to 2010 of ten percent (Long et al., 2014). This means that a diminution of a natural defense against typhoons has occurred in precisely the area where it is most needed. According to Artemio Rebato, the government of Eastern Samar has advocated the preservation of mangrove forests and coral reefs because these are the “first line of defense” when there is a typhoon, but it is much harder to plant mangroves in a disturbed area and it will take years before a disturbed mangrove area can be rehabilitated (Rebato, 2016).

Deforestation is another form of localized environmental degradation with a perverse synergy with stronger typhoons. Should there be a typhoon, with its associated heavy rains, landslides will occur more quickly on deforested hillsides. Deforestation also reduces the mitigating effect availed to inland locations by their remoteness from the ocean since the deforestation of coastal areas allows typhoons to penetrate further inland and inflict damage over wider areas (Myers, 1988; United Nations Development Program Philippines, 2014). According to Owen Migraso, an environmental activist with the Center for Environmental Concerns, Samar has been subjected to massive illegal logging since the 1970s, which have degraded its natural resources (Migraso, 2017). The SINP (Figure 1) was created to protect Catbalogan and Calbayog on the western side of the island by taking energy out of typhoons as they pass over the island (Holden, 2012; United Nations Development Program Philippines, 2014). However, the SINP was only created by a Presidential Proclamation, not legislation, and it has been underfunded (Migraso, 2017).

DISCUSSION: CLIMATE INJUSTICE IN THE WOUNDED LAND

The stronger typhoons affecting Samar are a manifestation of climate change. In the words of Flannery (2005: 314), typhoons “focus attention on climate change in a way that few other natural phenomena do.” Samar has contributed disproportionately less to cause climate change, yet the island is also disproportionately more vulnerable to its effects. According to Albert Magalang, Head of the Philippine Government’s Department of the Environment and Natural Resources (DENR) Climate Change Office (and the Designated National Authority for the United Nations Framework Convention on Climate Change), the top three obstacles to negotiating climate change are Australia, Canada, and the United States (Magalang, 2017). Table 2 displays the 2014 CO₂ emissions in these three countries in metric tons per capita along with those of the Philippines and Filipinos are responsible for substantially less emissions on a per capita basis than the residents of these countries. To some extent, this data understates the difference in per capita CO₂ emissions between these countries and the Philippines because it compares the emissions of all Filipinos with these countries and does not make it clear that the poorest Filipinos have extremely low emissions with it being estimated that there are 54 million Filipinos emitting less than 0.42 metric tons of CO₂ per person each year (Oxfam, 2015). This data also does not facilitate a

Country	CO ₂ Emissions Per Capita in Metric Tons
Australia	15.37
Canada	15.12
United States of America	16.49
Philippines	1.06

Table 2: CO₂ Emissions Per Capita (2014)
Source: World Bank (2018)

comparison of per capita CO₂ emissions between these countries and Samar. Research conducted by Sumabat et al. (2016) found that in 2010 the Eastern Visayas Region of the Philippines was responsible for a negligible percentage of all fuel consumed in the archipelago and was responsible for only 2.14 percent of all electricity consumed in the Philippines. Table 3 displays the 15 countries most at risk to climate change and the Philippines is behind only Vanuatu and Tonga while Australia, Canada, and the United States are substantially less vulnerable to climate change.

Rank	Country
1	Vanuatu
2	Tonga
3	Philippines
4	Guatemala
5	Bangladesh
6	Solomon Islands
7	Costa Rica
8	Cambodia
9	El Salvador
10	Timor-Leste
11	Papua New Guinea
12	Brunei Darussalam
13	Mauritius
14	Nicaragua
15	Fiji
...	...
121	Australia
...	...
126	United States of America
...	...
144	Canada

Table 3: The 15 Countries Most at Risk to Climate Change
Source: Bündnis Entwicklung Hilft (2017).

Within the Philippines, Samar is a part of archipelago with the lowest adaptive capacity to climate change (Department of the Environment and Natural Resources, 2010; United Nations Development Program Philippines, 2014). To Magalang, climate injustice means that climate change impacts are more pronounced in poor communities and in poor countries and those who have done the least to cause the problem bear most of its costs.

One of the most pernicious aspects of Haiyan's impact upon the Samareños was how it led to the increased poverty of an already impoverished population (IBON, 2015). The typhoon's damage led to a loss of livelihoods, particularly among subsistence farmers and fisherfolk, and this caused its survivors to become even more mired in poverty. Table 4 provides data on the effect of Haiyan on Samareño subsistence activities and rice, corn, fish, crustacean, and mollusk production all fell between 2013 and 2014, largely because of the environmental degradation inflicted by Haiyan. Anticamara and Go (2017) found that fish catch and income from fishing was lower across Samar after Haiyan. "Given their poverty and degraded resources," wrote Anticamara and Go (2017: 710), "many fishers in Haiyan-impacted areas had trouble recovering their properties and way of life."

While many other parts of the Philippines (such as the City of Tacloban on the island Leyte) were badly affected by Haiyan, Samar

Commodity	Decrease in Production from 2013 to 2014
Rice	3.27%
Corn	11.96%
Fish	1.90%
Crustaceans	22.05%
Mollusks	8.41%

Table 4: Effect of Haiyan on Samareño Subsistence Activities
Source: IBON (2015)

was still struggling to cope with background injustice due to the depredations inflicted upon the Samareños during the Philippine-American War. "If there is a spot for background injustice," stated Amalie Obusan (2017: interview), the Greenpeace Southeast Asia Country Director, "Samar would be it!" In Obusan's opinion, Background injustice has set the Samareños so far back that it will take a long time to fully recover from the American occupation (Obusan, 2017). In the opinion of Father Edwin Gariguez, the Executive Secretary of the National Secretariat for Social Action, Caritas-Philippines, Samar is an appropriate example of background injustice because it was subjected to colonial occupation and then to further suffering caused by climate change (Gariguez, 2017). To Father Meliton Oso, the Social Action Director of Archdiocese of Jaro in Iloilo City, Samar is a good example of background injustice because it was devastated by our colonizers and now, because of climate change, Haiyan "pummeled it" (Oso, 2017: interview).

What happened to the Philippines (in general) and to Samar (in particular) demonstrates the importance of how the developed world can provide aid to the developing world in supporting resilience and adaptation programs for vulnerable communities. In the Philippines, there is a need to improve performance in harnessing renewable energy sources (such as biomass, wind, and solar energy) to reduce greenhouse gas emissions (Sumabat et al., 2016). In addition to providing technology transfer to assist with renewable energy the developed world can also provide aid to developing countries to support resilience and adaptation programs for vulnerable communities. It is Nathaniel Alegre's view that developed countries should at least contribute funds to help places like Samar cope with climate change through ecofriendly development initiatives (Alegre, 2016). A good example of this in a Samareño context would be the United Nations Development Program (UNDP) typhoon recovery and resilience program. This is a 65 million US Dollar program aiding with resilience and adaptation across the Visayan Islands of the Philippines (United Nations Development Program Philippines, 2014). On Samar, the UNDP is involved in a multi-year program to enhance biodiversity conservation and natural resource management. This program, operating in conjunction with local governments and the DENR, is designed to conserve Samar's forest cover to reduce flooding and soil erosion. The UNDP (in conjunction with the European Union) has worked to improve early warning systems, such as the Coastal Flooding Early Warning Evacuation System in Salcedo, Eastern Samar (Figure 4). The UNDP (also in conjunction with the European Union) has also reviewed the existing inventory of evacuation centers, such as the Community Evacuation Center in Balangkayan, Eastern Samar (Figure 5), and identified measures for their use during emergencies. The UNDP intends to devise strategies to prepare for risk management under conditions projected with climate change and will address how Haiyan's degradation of ecosystems contributed to the risk of further damage during future storms.



Figure 4: Coastal Flooding Early Warning Evacuation System in Salcedo, Eastern Samar

Photo Credit: the author



Figure 5: Community Evacuation Center in Balangkayan, Eastern Samar

Photo Credit: the author

While programs, such as the UNDP typhoon recovery and resilience program, to some extent help the Samareños, developed countries must reduce their emissions. The United States was cited as one of the top three obstacles to negotiating climate change by Albert Magalang and is historically the cause of so much Samareño suffering. The United States, according to Goodell (2006: 184), has “grown rich by burning fossil fuels.” Because of this, the United States has a “moral obligation to show leadership in dealing with the problem of global warming” (Goodell, 2006: 184). Many in the United States articulate resistance to reducing emissions because it will slow economic growth and be bad for their economy (Shue, 2014; Vanderheiden, 2008). The United States is particularly worthy of attention in this regard because on 1 June 2017, President Donald Trump gleefully withdrew the United States from the Paris Climate Change accord citing the primacy of protecting the American economy. “Trump,” wrote Chomsky (2017: 260), “called for rapid increase in use of fossil fuels, dismantling of regulations, denying help to developing countries that are seeking to move to sustainable energy, and in general speeding toward the cliff as fast as possible.” To Samareños who survived Haiyan such a view is vastly short-sighted; in Sheryl Cabaguing’s words, “The economy is not the answer to everything. We have this world and we have to protect it” (Cabaguing, 2016). In the opinion of Reynato Cano, from Catholic Relief Services in Salcedo, Eastern Samar, developed

countries have a social obligation to reduce their emissions and the people in these countries need to realize that “life is short, and one cannot take your money with you when you die” (Cano, 2016). In the view of Angelo Llorin, also from Catholic Relief Services in Salcedo, Eastern Samar, the poor countries of the world cannot continue to develop if climate change continues and rich people must give up their lifestyles for other people to live (Llorin, 2016). Both Father Juderick Calumpiano, the Social Action Director of the Diocese of Borongan, and Rosalie Baje articulated a feeling of profound unfairness in addressing this issue. To Father Juderick, developing countries did not cause the problem of climate change yet they must address its consequences (Calumpiano, 2016). To Baje, people in developed countries emitting lots of greenhouse gases are not experiencing the risks of climate change, “it is us who are suffering the consequences of what they are doing” (Baje, 2016, interview).

It is in this context that the principle of common but differentiated obligations becomes imperative (Shue, 2014; Vanderheiden, 2008). All countries in the world have a common obligation to reduce greenhouse gas emissions but those countries who have historically emitted the most have an obligation to reduce their emissions even more- they have a differentiated obligation. To Albert Magalang, the responsibility for addressing climate change should be placed on developed countries because they have emitted the most. All countries should work together but this should be done based on the principle of common but differentiated obligations (Magalang, 2017). Historical emissions should always be considered in determining the concrete support that should be given to developing countries to assist them cope with climate change; those who have done the emitting should support the developing countries with finance, technology transfer, and adaptation (Magalang, 2017).

Ultimately, as humans we only have one planet and we must share it; in the words of Goodell (2006: 230), “we all live on the same planet, after all.” The countries causing the problem of climate change, and standing to benefit from causing it, must assist those countries that did not cause the problem and stand only to be hurt by it. It is in this context that the Papal encyclical *Laudato Si: On Care for Our Common Home*, released by the Vatican in June 2015 becomes salient. *Laudato Si* is an encyclical that, among other things, warns of the dangers of run-away climate change and calls attention to the impact of environmental degradation upon the world’s poor (Pope Francis, 2015). To Father Juderick Calumpiano (2016: interview), *Laudato Si* inspired him because it was what he was already working on when it came out and it is one of the most beautiful documents he had ever read. In *Laudato Si*, Pope Francis (2015: 12) calls for establishing mechanisms and subsidies allowing developing countries “access to technology transfer, technical assistance, and financial resources.” Pope Francis (2015: 126) then emphasizes the importance of the principle of common but differentiated obligations stating, “the countries which have benefited from a high degree of industrialization, at the cost of enormous emissions of greenhouse gases, have a greater responsibility for providing a solution to the problems they have caused.” “Reducing greenhouse gases,” wrote Pope Francis (2015: 125), “requires honesty, courage, and responsibility, above all on the part of those countries which are more powerful and pollute the most.” These are the lessons of Super Typhoon Haiyan, a catastrophic event amplified by climate change, in the wounded land of Samar. In many parts of the tropical developing world the poor are still struggling to recover from the legacies of colonialism. These same people are those who stand to be hurt the most by

climate change, a problem they did little to cause. The poor of the world could benefit from aid that enhances their resilience and their ability to adapt to climate change but while this occurs those who have emitted the most must reduce their emissions and cause the problem of climate change to stop, or at the very least, slow down.

CONCLUSION

The objective of this article was to describe a place in the tropical developing world that demonstrates the vulnerability of the tropical developing world to climate change and, in doing so, illustrate the concepts of climate injustice and background injustice. Samar, being vulnerable to the amplified tropical cyclones accompanying climate change, is such a place. The Samareños have done little, if anything, to cause climate change and the Samareños were rendered poor by the legacy of the Philippine-American War. This on-going poverty has contributed to their vulnerability and reduced their resilience. When one considers climate change one must not only consider who is responsible for causing climate change but also who is responsible for weakening the ability of others to withstand its effects; the former is the concept of climate injustice and the latter is the concept of background injustice.

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