Journal of Environmental Science and Management 24-1: 56-67 (June 2021) ISSN 0119-1144

Flood Disaster Risk Perception and Sense of Place Among Households Along the Ocoy River in Negros Oriental, Philippines

ABSTRACT

This quantitative study using a survey method aims to understand the relationship between flood disaster risk perception and the sense of place of people living in communities along a river. The survey covered a non-probability sample of 120 respondents from households located along with the downstream, midstream, and upstream sections of the Ocoy River in Negros Oriental. Generally, the respondents have very high flood disaster risk perception and sense of place scores which do not significantly differ across communities. But the significant positive relationship between these two major variables contradicts the common understanding that disaster makes people devalue particular places and relocate to safer areas. The majority who conditionally agreed to relocate may not proceed if they perceived a more difficult life in the resettlement site. Adaptive resettlement programs and policies are recommended where the desired characteristics of a place of flood survivors are reconstructed. At the same time, risk reduction and mitigation mechanisms are designed for those who decided to remain in riverside communities.

Keywords: *Flood disaster risk perception, sense of place, relocation decision, Ocoy River, Negros Oriental*

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INTRODUCTION

Flooding and flood disasters are perennial problems in many countries—both tropical and temperate and those developing and developed—suggesting that these are now universal phenomena that cause significant loss and damage to human lives and properties. The increasing frequency and intensity of flood occurrences at present as compared several decades ago in the Philippines (*Anacio et al. 2016*) and elsewhere like Vietnam (*Anh et al. 2019*) illustrate the seriousness of climate change impacts. Flooding as a natural phenomenon requires the synergistic design and operation between the domains of climate change adaptation and disaster risk reduction for human communities in both urban (*Solecki et al. 2011*) and rural communities (*Abagat et al. 2017*), particularly among highly vulnerable households like those headed by women (*Delfino et al. 2019*). However, the inevitability of the impact of flooding is variable but more intense in settlements along coastal zones and river banks because of their greater exposure to hazards, henceforth, higher vulnerability to flood disaster during excessive rainfalls, typhoons, or tsunamis (*Hooke 2017*).

Despite the threats of flood disaster, however, many households do not consider voluntary evacuation as an option out of disaster-prone areas. In contrast, some persistently reject the government's proposal for resettlement, where essential commodities and livelihood opportunities are promised. Others return to the exact locations after the situation is normalized. Not only that the affected households have doubts about the trustworthiness of the promises of the government in resettlement areas (*Curato 2017*), there are likewise other factors or variables that have severe implications on the decision-making of households regarding their safety and survival (*Xu et al. 2017*).

Several disaster risk studies found out how demographic and socioeconomic factors, risk perception and disaster preparation, and sense of place has influenced a household's relocation. For instance, *Anton and Lawrence* (*2014*) observed that long-time residents who had already identified themselves with specific communities tend to express an increased desire to stay, although the place is disaster-prone. Familiarity with the place and its people is a product of time, which may be challenging to establish in other places, and is valued more than evading disaster risk. Moreover, residents who owned their homes, compared with the

renters, and do not have other places to move into also opted to stay, which is likewise the option of the less educated who realized that they have no livelihood opportunities elsewhere. But other demographic factors such as gender, age, experience, distance to hazard sites, household size, presence of children and older people in the household, and housing material are not significantly related to relocation willingness as compared to household income, economic loss from disaster, and presence of social support system (*Xu et al. 2017*). The latter three variables imply that lightly devastated residents may not relocate to other places if they have a better chance to economically recover and with social networks ready to assist them in their needs.

Meanwhile, risk perception that also accounts for household decision to relocate, either voluntarily or upon orders by the authorities, has several dimensions relative to the impending disaster. These dimensions or parameters include the anticipated degree of threat of a disaster, the level of fear a disaster brings, the probability and unpredictability of disaster occurrence, and the uncontrollability of disaster (*Peng et al. 2017*). Incurred loss and damage due to most recent flood disasters leave different emotional effects on affected community residents, which subsequently produced different levels and forms of responses. Those affected may have either adapted to the recurring phenomenon and consider this as already part of their "way of life," which *Bankoff* (*2003*) described as the "culture of disaster," or they have finally abandoned the place and resided somewhere they considered safe. Again, the number of years that people have lived in disaster-stricken communities like those affected by bushfires in the study of *Anton and Lawrence* (*2014*) would explain variation in human responses to natural disasters. Households that remained or returned to these communities and rebuilt from what limited resources are left for them may be considered more resilient (*Oracion 2015*) compared to those who resettled somewhere and become dependent upon assistance from government or non-government organizations.

So, are households less willing to relocate more attached to their home place despite the risk of disaster and would rather stay if given the option and clearance by authorities? Interestingly, the concept of people's sense of place explains this behavior which many may consider irrational and contrary to instinct. *Anacio et al.* (*2016*) define a sense of place as the "subjective perception and conscious feelings" of people resulting from their daily interactions within a "predefined functioning environment" that determines their relationships with it comprised of place attachment, place dependence, and place identity. Among the three components, a group of flood disaster researchers earlier reported that place attachment has significantly influenced flood preparedness (*Mishra et al. 2010*). Still, recent findings were not confirmed (*Xu et al. 2017*), although they were sure about place dependence (*Xu et al. 2018*), making this matter open for more investigation.

Nonetheless, *Mishra et al.* (*2010*) have exciting results when they segregated the place attachment scores and found out that households with more significant economic place attachment have prepared more for impending disaster than households with greater religious place attachment. This observation supports the earlier argument why families with higher uncertainty about a place where they are to be resettled, but more prepared to confront impending floods, would remain in a community they considered more economically secured. Meanwhile, households with greater religious place attachment relied upon divine intervention for their safety. This behavior may explain why they prepared less for disaster—a form of fatalism firmly anchored in solid personal faith that whatever would happen is all God's will and beyond human control. Likewise, it is relevant to note that people who reside in their birthplace reported higher place attachment (*Anton and Lawrence 2014*).

Although *Xu et al.* (*2017*) reported that place attachment is not significantly associated with disaster preparedness, they found out that households with respondents who have higher scores on place identity and place dependence are less willing to relocate. This variable was earlier considered to be positively associated with disaster preparedness. Perhaps the discrepancy can be explained by the location of the households or the origin of the respondents. *Anton and Lawrence* (*2014*) found out that wherein the rural residents scored higher in place identity, particularly the females, the urban residents scored lower in place dependence than the former. Arguably, place identity and place dependence must have significantly contributed to place attachment because of the socio-cultural and economic bonds that people have established with a place and its resources for a given period. Therefore, making sense of a place is a vital element in understanding the adaptation and resiliency of households and in promoting disaster preparedness among those chronically affected in disaster-prone communities (*Jeffers 2019*).

This study examines the flood disaster risk perception and sense of place of respondents from households located in three communities along the different sections of the Ocoy River in Negros Oriental.

The study hypothesized that the respondents from the different river sections would have different flood disaster risk perceptions and sense of place scores. These two variables were hypothesized to be significantly related, subsequently influence their willingness to relocate to safer areas. The goal is to highlight that the concepts of risk perception and sense of place are helpful in policy formulation to strengthen the disaster preparedness and risk reduction programs of the local government units that have jurisdictions over the flood-prone communities.

MATERIALS AND METHODS

This quantitative study examined and correlated the flood disaster risk perception and sense of place of respondents from households located along the different sections of the Ocoy River in Negros Oriental. The river stretches 19.8 km to the coast, excluding the headwaters with west to an east direction (**Figure 1**). The study conducted from 2018 to 2019 covered 17 barangays classified into three clusters labeled upstream, midstream, and downstream communities. The experiences with flood events may be variable among these clusters because more than half of the barangays included in the survey are within the Ocoy River Basin (*Paringit and Otadoy 2017*). The rest of the sample barangays are outside the basin but affected when the river would overflow.

The downstream communities, with the corresponding sample sizes, included Calabnugan (9), Looc (11), Magatas (10), and Poblacion (10) in the Municipality of Sibulan. One household in the midstream section was in Calabnugan, while the rest of the households in this section were in Candauay (8) and Camanjac (2) within the jurisdiction of Dumaguete City. Others were in the Municipality of Valencia which included Palinpinon (17), Balili (9), and Poblacion (3). Meanwhile, all the upstream communities are in the Municipality of Valencia which included Caidiocan (16), Malaunay (7), Pulangbato (5), Cambucad (4), Puhagan (4), Malabo (3), and Sagbang (1). These communities have areas adjacent to or connected with the Ocoy River that made them vulnerable to flooding during heavy rains and typhoons like Sendong in 2011 and Pablo in 2012.

The respondents included the husbands or wives of sampled households present during the survey. Using the cluster and non-probability sampling techniques, a quota of 40 households per section of the river, or a total of 120 samples, was the target to survey. All households within a kilometer from the riverbanks were qualified to participate in the survey until the expected number of households was satisfied. Sixty-five percent (n= 78) of the respondents were wives because most of the husbands were not available and working away from home most of the time during the survey.

Trained field interviewers did the face-to-face interviews using a semi-structured interview questionnaire written in English with Cebuano translation

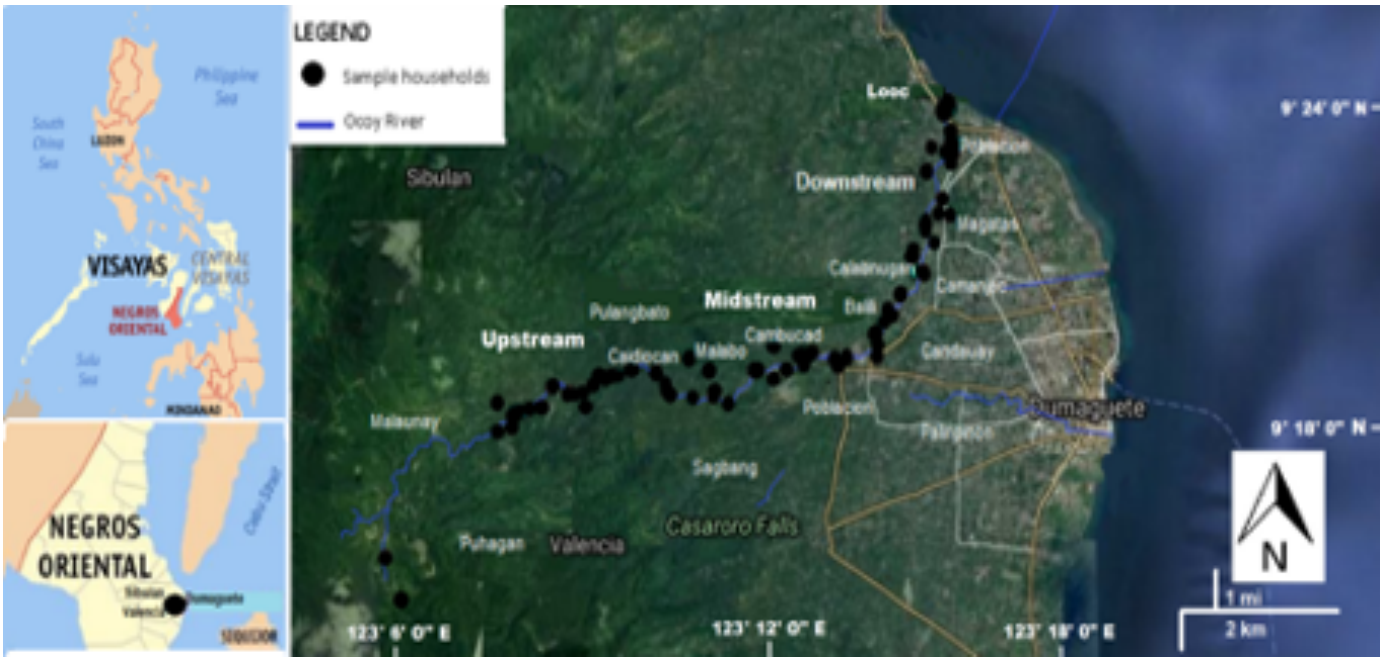

Figure 1. Study sites and distribution of sample households along the Ocoy River in Negros Oriental, Philippines. (Sources: https://ocoyproject.org/anticipated.php, https://en.wikipedia.org/wiki/Negros_Oriental, https://en.wikipedia.org/wiki/Dumaguete).

under the supervision of the author and a research assistant. The disaster risk perception and sense of place rating scales were patterned after the published works of *Xu et al.* (*2018*) and *Anacio et al.* (*2016*), respectively. The parameters of flood disaster risk perception included uncontrollability of disaster, fear of disaster, unpredictability of disaster, probability of disaster, and anticipated degree of disaster. The sense of place had place attachment, place dependence, and place identity.

Before the fieldwork, the research ethics clearance was secured first from the Silliman University Research Ethics Committee and several coordination meetings were held with local government officials, particularly with the mayors and the disaster risk reduction officers. The purpose was to inform them about the research project and secure endorsement of the survey to the barangay captains. During the survey, the sampled respondents were asked for their informed consent, and those who refused were immediately replaced. The respondents had the opportunity to decline to answer further questions when they already felt uncomfortable, perhaps due to sensitive issues. Complete confidentiality and anonymity were observed throughout the gathering and processing of data to hide the identity of every respondent.

Data presentation and descriptions employed frequency and percentage distributions, mean, and standard deviation. At the same time, Spearman rho Correlation Coefficient, Chi-square, and Analysis of Variance (ANOVA) determined significant relationships and differences between and among the selected variables, respectively.

RESULTS AND DISCUSSION

Profile of the Respondents

On average, the wives are older than their husbands in downstream and upstream communities, while in the midstream community, the husbands are older than the wives. Among the husbands, those in the downstream community were significantly older than the other sections, while no significant differences existed in age among the wives in all communities. It appears that the couples in the downstream communities are relatively older as compared with those in the midstream and upstream communities. However, the husbands and wives in the downstream communities are less educated based on their education scores which suggests that they, on average, have only completed elementary school and some years in high school as compared to the couples in the two other communities.

Expectedly, given their educational attainment, the monthly estimated husbands' income is PhP 8,139.00 (US$1 = PhP 52.66, average in 2018), which is noticeably higher than their wives who only stayed at home doing more unpaid domestic tasks. More specifically, the husbands in upstream communities have more than twice (PhP 12,651.00) of husbands' income in downstream and midstream communities who have significantly lower monthly incomes. The wives across communities do not differ substantially in their monthly estimated income; however, the wives in the midstream section must be more stressed because they have the lowest income compared to the other wives. Perhaps, the said wives are yet economically building up considering that they have lived with their husbands for only about 19 years, which is significantly lower than the wives in the downstream and upstream communities who have been together with their husbands between 26 to 27 years.

But the number of years the couples have been living together does not translate to differential fertility because the average number of children does not significantly vary among the three communities. The average household size across communities of 4.8 is slightly higher than

Table 1. Profile of the respondents across communities along the Ocoy River, Negros Oriental, Philippines (2018, n= 120).

Demographics	Downstream		Midstream		Upstream		All Sections	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age of husbands in years*	51.27	19.00	19.00	13.49	46.97	10.93	49.08	14.83
Age of wives in years	54.76	14.90	14.90	12.79	48.03	14.33	49.75	14.43
Education score of husbands*	1.55	0.06	0.06	0.76	1.91	0.88	1.80	0.78
Education score of wives*	1.50	0.65	0.65	0.73	2.08	0.80	1.85	0.76
Monthly income of husbands* (Php)**	5,871	4,357	4,357	5,023	12,651	34,149	8,139	20,440
Monthly income of wives (Php)**	2,753	4,603	4,603	1,923	6,086	11,479	3,357	7,456
Years living together*	27.12	13.92	13.92	9.52	26.30	16.35	24.36	14.12
Number of children	3.50	2.24	2.24	2.22	3.05	2.33	3.34	2.25
Household size	4.35	1.994	1.994	1.81	4.92	2.34	4.80	2.07

*Difference is significant at the 0.05 level (ANOVA), **1 USD=Php 52.66 (average in 2018)

the national average of 4.4 members in the 2015 census (*PSA 2016*). Respectively, 12% and five percent of the household members belong to 0-5 years and 61 and above. The data suggest that 17% of the total household members are vulnerable age groups during floods. Moreover, 60% of all the respondents were locals, while 40% were from other places. Although no significant differences exist in origin between husbands and wives, either as a whole or by communities, the distribution suggests that neither patrilocality nor matrilocality is a practice of the surveyed households.

Livelihoods and Resource Dependence

Generally, more husbands had livelihoods during the survey period than their wives (Chi-square= 25.7, df= 2, p-value = 0.000) while no significant differences exist across communities in the livelihoods of husbands and wives, respectively. For analysis purposes, the livelihoods engaged by husbands and wives were classified into farm-related, non-farm-related, and river-related. Farm-related livelihoods (20.00%), common among husbands than wives, included those economic activities that utilized the soil to plant food crops such as corn, root crops, and vegetables, as well as ornamental plants for the market. Non-farm-related livelihoods (48.78%) cover employment in private enterprises and government agencies outside of their communities and self-employment such as running a variety store, engaging in buy-and-sell business, operating a resort, and so on (**Table 2**).

Meanwhile, river-related livelihoods (1.46%), mainly done by husbands in the downstream and midstream communities, may also be included in non-farm-related activities. These included sand quarrying and the growing of kangkong (water spinach) in the river for sale. But the latter is now reported to be a limited activity due to the river's frequent flooding. Overall, about 30% of husbands and wives have no livelihoods, particularly the wives. However, nearly 68% of all the families owned a farm which could have been an opportunity for wives to be productive similar to those with salaried income, often associated with "work" by many.

Only 53 households (44.16%) were engaged in farming. Although the distribution of farm ownership is not significantly different due to geographical variations, the percentage of households with farms is highest in upstream communities (78.26%), then downstream communities (61.54%), and midstream communities (58.82%). Therefore, it is safe to conclude that economic dependence upon the river is not prominent compared to the past when a good number of households claimed to fish when the water was yet deep and abundant with freshwater fishes. Presently, fishing in the river is an occasional activity and not considered a livelihood. At the same time, a good number of households reported that they only use the river for bathing, washing clothes, and water for plants and animals. Nevertheless, three husbands admitted during the survey to have been involved in sand and gravel quarrying in the river as a significant source of livelihood.

House Location and Flood Disaster

Seventy-four percent of the households owned the houses where they stayed at the time of the survey, and only 18% claimed that relatives owned these who allowed them to occupy for free, while the other 18% either paid rents or were informal settlers. On average, these houses were located 86 m away from the river banks that expectedly exposed them to the threats of flash flooding and overflowing of the river, which are more frequent now than before because of heavy siltation resulting in a shallow river. The distance of the respondents' houses away from the river banks on both

Table 2. Livelihood types of husbands and wives across communities along the Acoy River, Negros Oriental, Philippines (2018, n=120).

Livelihood Types	Husband				Wife				Total (%)
	Down (%)	Mid (%)	Up (%)	All (%)	Down (%)	Mid (%)	Up (%)	All (%)	
Non-farm related	17 (54.84)	21 (65.62)	19 (57.58)	57 (59.37)	16 (43.24)	9 (25.72)	18 (48.65)	43 (39.45)	100 (48.78)
Farm related	9 (29.03)	6 (18.75)	9 (27.27)	24 (25.00)	8 (21.62)	4 (11.43)	5 (13.51)	17 (15.60)	41 (20.00)
River related	2 (6.45)	1 (3.13)	-	3 (3.13)	-	-	-	-	3 (1.46)
None	3 (9.68)	4 (12.5)	5 (15.15)	12 (12.5)	13 (35.14)	22 (62.85)	14 (37.84)	49 (44.95)	61 (29.76)
Total	31 (100.00)	32 (100.00)	33 (100.00)	96 (100.00)	37 (100.00)	35 (100.00)	37 (100.00)	109 (100.00)	205 (100.00)

Note: Down= Downstream, Mid= Midstream, Up= Upstream

sides is not significantly different, but the farthest house was about 1,000 m away. In contrast, the nearest house was one meter, or it was practically at the edge of the river banks. The latter is a common scenario among the downstream households in low-lying areas, while the farthest house was in the upstream communities.

Generally, 72% of all the respondents considered themselves highly exposed to the risk of flooding, mainly those found in the downstream communities, where 82% claimed a high exposure to risk. Still, as a whole, no statistically significant difference was established between house location and flood risk exposure (**Table 3**). Nonetheless, the data still suggest that houses in low-lying areas and closest to the river may be more vulnerable to floods if they do not prepare for such events, which generally occur during heavy rains and typhoons. The Ocoy 25-Year Flood Hazard Map supports these responses, particularly among residents along the midstream and downstream sections of the river where the hazard rating is high level with flood water going up to 1.5 meters (*LIPAD 2017*).

Meanwhile, among households badly affected by the floods, 42% across communities had received assistance from relatives, friends, and the government. On average, 64% of the husbands and wives have relatives in the community, which are potential sources of assistance. The upland section of the river has a good number of households with relatives in the community. However, the difference is not statistically significant compared with those in midstream and downstream communities.

How the sampled households responded to Tropical Storm Washi (Sendong) and Typhoon Bopha (Pablo) were examined and the other typhoons before 2011 to illustrate the risks they experienced and their vulnerability to the flooding disaster. Interestingly, 68% of the respondents reported Tropical Storm Washi to be most devastating compared to Typhoon Bopha (51.67%) and the other typhoons (22.50%). Only 68% evacuated during the typhoons before 2011, while 77% evacuated during tropical cyclones Washi and Bopha. Among those evacuees, 94% returned home after cleaning and repairing their houses during typhoons before 2011, while 81% and 76%, respectively, did the same during tropical cyclones Bopha and Washi. The distribution suggests that despite the flood experiences of the affected households, a majority still decided to repair or rebuild their houses and normally lived after the disastrous event up to the period of this study while anticipating another typhoon to come but hoping for a less destructive one.

Effects of Flood and Relocation Decision

The effects of a flood are measured by the amount of damage and loss experienced by the households. A briefer produced by the Oscar M. Lopez (OML) Center contains some definitions of damage and loss used in the study. Damage refers to "harm to something that can be repaired," while loss refers to a value that is "lost forever and cannot be brought back once lost" (*Huq 2014 cited in OML 2017*). The Ocoy River respondents recalled what resources were damaged or lost and the estimated amount they incurred during the most recent flood they considered most destructive from 2011 to 2017. Seventy-five percent reported being seriously affected came from the downstream community and closely followed by households in upstream (72.50%) and midstream (67.50%) communities. But if based on the percent incurred by households relative to the total costs of damage and loss reported by all households, it would appear that those in the upstream community suffered most, having 55% of the share of the total amount followed by households in the midstream (31.72%) and downstream (13.08%) communities.

Meanwhile, the data further show that the affected households suffered more damage than loss, constituting 90% and 10% of the total amount reported, respectively. Houses registered the highest damage (66.76%), followed by a wide gap by vehicles comprised of four-wheels and motorcycles (20.89%), farmlands (9.70%), store buildings (0.99%), resort facilities (0.22%), and other properties (1.48%) which included appliances and utensils, dresses, copra driers, and farm sheds. The number of farm animals that died constitutes 69% ofthe loss, while farm crops were estimated to be 31% of the total. The difference among the three sites is statistically significant, proving the study's hypothesis (**Table 4**).

Table 3. House location and perceived flood risk of the respondents across communities along the Ocoy River , Negros Oriental, Philippines(2018, n= 120).

Responses	Downstream (%)	Midstream (%)	Upstream (%)	Total (%)
High risk location	33 (82.50)	26 (65.00)	27 (67.50)	86 (71.67)
No risk location	7 (17.50)	14 (35.00)	13 (32.50)	34 (28.33)
Total	40 (100.00)	40 (100.00)	40 (100.00)	120 (100.00)

Respectively, the losses on farm animals and farm crops are highest among households in the upstream and downstream communities. In terms of damage, although not statistically different, the highest amount incurred by midstream households was on houses followed by four-wheel vehicles and motorbikes among upstream households. Damage on farmlands was highest among households in downstream communities due to their being in plain areas and adjacent to the river.

Due to the damage and loss incurred by 72% of the surveyed households, 41% had agreed to relocate if there were available sites where they could build their houses. The majority of the households willing to relocate were from the downstream communities (54.55%), while those unwilling households were highest from the upstream communities (29.63%). However, the decisions to relocate do not statistically differ across communities (chi-square= 6.60, df= 4, p-value= 0.159) and negates the hypothesis about the influence of variable damage and loss reported by households in decision-making. This proposition further argues that these variables would result in differential risk perceptions and willingness to relocate, significantly when 37% had conditionally answered "it depends" if they will relocate. The following were their reasons: a better place to live that is safer, with available livelihoods (23= 71.88%), given land for free (6= 18.75%), if the respondennts have money to move out (2= 6.25%), and if still physically able to transfer (1= 3.12%).

The numbers of undecided respondents are significant enough to change the situation if the conditions they cited for relocation are not guaranteed or they cannot perceive their happiness or safety in their new communities. The respondents may go back to their original communities to find their lives, socially and economically, more difficult in the relocation sites after a year or two. This situation is a common scenario in many places in the Philippines, like in Tacloban City, where the resettled households who survived Typhoon Yolanda returned to the coastal areas to satisfy their basic needs for food quickly, water, and electricity (*personal observations 19 May 2019*). So presuming that the relocation site is perceived to be problematic, the combined number of respondents who rejected relocation as an option and the undecided would now decide to relocate across communities to significantly differ (Chi-square= 10.9, df= 2, p-value= 0.004). More upstream and midstream households would not relocate even if they had suffered tremendous damage and loss during the past years (**Table 5**). Also noted that house and farm ownerships are not good indicators for willingness

Table 4. Types and estimated damage and losses reported by households across communities along the Ocoy River, Negros Oriental, Philippines (2018, n= 120).

Household and Farm Resources	Downstream PhP (%)	Midstream PhP (%)	Upstream PhP (%)	All Sections PhP (%)
Damage				
House	803,000 (63.72)	2,890,000 (95.07)	2,280,000 (49.06)	5,973,000 (66.76)
Vehicles	-	-	1,869,000 (40.22)	1,869,000 (20.89)
Farmland	386,600 (30.68)	91,000 (2.99)	390,000 (8.40)	867,600 (9.70)
Store buildings	-	-	85,000 (1.83)	85,000 (0.95)
Resort facilities	-	-	20,000 (0.43)	20,000 (0.22)
Other properties	70,500 (5.60)	59,000 (1.94)	3,000 (0.06)	132,500 (1.48)
Total	1,260,100 (100.00)	3,040,000 (100.00)	4,647,000 (100.00)	8,947,100 (100.00)
Losses				
Farm animals	14,300 (38.34)	33,000 (31.02)	620,000 (74.97)	667,300 (68.74)
Farm crops	23,000 (61.66)	73,400 (68.98)	207,000 (25.03)	303,400 (31.26)
Total*	37,300 (100.00)	106,400 (100.00)	827,000 (100.00)	970,700 (100.00)
Percent Reported	30 (75.00)	27 (67.50)	29 (72.50)	86 (71.67)

*Difference is significant at the 0.05 level (2-tailed, ANOVA= 4.077, p-value= 0.026)
1 USD=PhP 52.66 (average in 2018)

Table 5. Decision to relocate of flood disaster victims across communities along the Ocoy River, Negros Oriental, Philippines (2018, n=86).

Responses	Downstream (%)	Midstream (%)	Upstream (%)	Total (%)
Had agreed	18 (54.55)	11 (42.30)	6 (22.22)	35 (40.70)
Had not agreed	5 (15.15)	6 (23.08)	8 (29.63)	19 (22.09)
Conditionally agreed	10 (30.30)	9 (34.62)	13 (48.15)	32 (37.21)
Total	33 (100.00)	26 (100.00)	27 (100.00)	86 (100.00)

to relocate among the affected households along the Ocoy River--it could be social and psychological.

Flood Disaster Risk Perception and Sense of Place

This study used five parameters to measure the respondents' perception of disaster risk due to river floods. The results are presented here corresponding to the ratings they gave from 1 as the lowest to 4 as the highest. Respectively, the lowest and highest ratings mean that they "strongly disagree" and "strongly agree" to the statements that describe their situation. The composite average rating of the respondents from the three clusters of communities is 3.55 or that they "strongly agree" to the statements, which collectively means a high disaster risk perception. The disaster risk perception mean ratings of respondents in three communities are as follows: downstream (3.59), midstream (3.53), and upstream (3.52). The observed differences in the mean ratings, however, are not statistically different. But the order of the ratings per parameter suggests something relevant that would shed light on why the flood-affected households would not relocate even if the government may assist. Among the profile of the respondents presented in Table 1, only the number of children significantly relates to flood disaster risk perception (Spearman rho= 0.221, p-value= 0.015, critical level= 0.05). The result suggests that couples with more children tend to worry more about the destruction the flood would bring to the households. The perceived effects of floods caused anxiety among parents in securing and caring for their children.

The parameters, were based on average ratings, according to the following order: uncontrollability of disaster (3.82), level of fear of disaster (3.66), unpredictability of disaster (3.54), probability of disaster (3.47), and anticipated degree of disaster (3.25) (**Table 6**). It suggest the direction of how respondents perceived the situation. First, they strongly agreed that once the river overflows in the nearby areas, it would be difficult to control the flood, but some preventive measures may reduce the damage and losses. Second, the respondents strongly agreed the association between heavy rains or typhoons and river floods and the destructions this will bring to their families and communities are what the respondents feared most. Third, they still perceived that whatever would happen during river flood is by "luck" because this is God's plan, and it is unpredictable. Fourth, river floods have been common in recent years, and they perceived these to have already affected their households. And fifth, consistent with the fourth, they perceived that river floods would destroy their properties, but the amount may be lesser than other households.

Moreover, the relationships among the parameters need further analysis because these are useful information in raising awareness among community residents about the importance of disaster preparedness at the household level in response to what is designed by the local government units at the community level. Only the level of fear of flood disaster is significantly related to all the other parameters. At the same time, its perceived probability to happen is further linked to its anticipated degree of being catastrophic- a situation that is also perceived to be highly unpredictable. This connection implies that efforts to persuade the residents to be ready during rainy or typhoon season are to associate the gravity of damage and losses that floods would bring in the campaign for disaster risk reduction of the local government units.

Operationally, the sense of place of the respondents, computed as weighted means of the extent that the respondents agree or disagree with a series of statements, collectively represents their place attachment, dependence, and identity. Theoretically, the mean composite score defines the meanings and connections they have with their respective communities. Overall, the sense of place mean score of all the respondents is 3.56 with place attachment (3.64) as more pronounced as to how the respondents give meaning to their place where they currently reside for a good number of years as compared with place dependence (3.52) and place identity (3.52). But among the demographic variables,

Table 6. Disaster risk perception correlation matrix of respondents from sampled households across communities along the Ocoy River, Negros Oriental, Philippines (2018, n=120).

Disaster Risk Perception Parameters	Mean Ratings	Spearman rho Coefficient				
		UCD	LFD	UPD	PPD	ADD
Uncontrollability of disaster (UCD)	3.82	1	0.210*	0.141	0.146	0.140
Level of fear due to disaster (LFD)	3.66	0.210*	1	0.346**	0.294**	0.329**
Unpredictability of disaster (UPD)	3.54	0.141	0.346**	1	0.261	0.193*
Perceived probability of disaster (PPD)	3.47	0.146	0.294**	0.103	1	0.281**
Anticipated degree of disaster (ADD)	3.25	0.140	0.329**	0.193*	0.281**	1

Correlation is significant at the *0.05 and **0.01 levels (2-tailed, Spearman rho)

only wife's age is significantly related to the sense of place scores (Spearman rho = 0.208, p-value = 0.029, critical level = 0.05). The sense of place mean rating across all sections of the Ocoy River is higher compared to the 3.13 among the residents in a community located in Laguna Lake (*Anacio et al. 2016*).

These three components of sense of place significantly influence each other as to how the respondents constructed and experienced the meanings or values of their respective communities (**Table 7**). Along with the different descriptions of their attachment to their communities, foremost was being happy despite the river's flooding, which was worst in 2011 when Typhoon Sendong hit them. Meanwhile, the feeling of belongingness being borne and raised in the place and having lots of friends and relatives in their communities scored highest in place identity and place dependence, respectively. Livelihood opportunities scored lowest in place dependence, which may explain that economic reason was not a significant consideration for staying, according to a good number of respondents. But for residents who owned land along or nearby the river had found no similar or better place to relocate where they could personally acquire land. This reason is similar to what *Anacio et al.* (*2016*) had documented among households that refused to leave a flood-prone community.

The respondents of households in downstream communities have the highest rating in place attachment relative to the ratings of households in two other communities, which is statistically significant (**Table 8**). Meanwhile, the ratings of the respondents in the downstream communities have the least standard deviations in all components, which suggests that the respondents agreed, more or less, on certain experiences corresponding to the available resources and the behavior of the river and how their respective households were positively or negatively affected.

In totality, the respondents from downstream households have the highest sense of place mean rating (3.68) as compared with the mean ratings of upstream households (3.52) and midstream households (3.48). The difference, however, is not statistically significant, which confirms the foregoing contention that the respondents across communities along the Ocoy River have attached similar meanings or values to it except in place attachment which is just one of the three components of sense of place. The respondents from downstream households have perhaps the highest place attachment score being the longest residents together with their spouses compared to the other communities (**Table 1**).

As a whole, the correlation coefficient between the flood disaster risk perception and sense of place scores, notwithstanding the location of communities of the respondents, shows a statistically significant positive relationship (Spearman rho = 0.303, p-value = 0.001, critical level = 0.01). This result rejects the hypothesis that the higher the perceived flood disaster risk score would mean a lower sense of place score. The value attributed to a place remains significantly high despite the perennial problem of river floods like those households residing in a lakeshore community (*Anacio et al. 2016*). In fact, some of the flood-affected residents said during the data validation meeting that they valued a lot their social networks and the land they inherited or acquired through hard work. Amidst the impending threats of the flood, respondents claimed to be already well-adjusted and related beautiful stories about their respective communities, which they perceived to be difficult to achieve in resettlement sites.

Table 7. Sense of place correlation matrix of respondents from sampled households across communities along the Ocoy River, Negros Oriental, Philippines (2018, n=120).

Components	Place Attachment	Place Dependence	Place Identity
Place Attachment	1	0.503**	0.503**
Place Dependence	0.503**	1	0.470**
Place Identity	0.503**	0.470**	1

**Correlation is significant at the 0.01 level (2-tailed, Spearman rho)

Place Attachment and Resiliency

The experiences with floods of households in the three clusters of communities along the Ocoy River may be unique compared to the communities elsewhere,

Table 8. Mean ratings of sense of place of respondents across communities along the Ocoy River, Negros Oriental, Philippines (2018, n= 120).

Components	Downstream (%)	Midstream (%)	Upstream (%)	Total (%)
Place attachment**	3.83 (0.40)	3.55 (0.55)	3.56 (0.59)	3.65 (0.53)
Place dependence	3.57 (0.55)	3.53 (0.63)	3.49 (0.59)	3.53 (0.59)
Place identity	3.64 (0.56)	3.38 (0.77)	3.52 (0.61)	3.52 (0.65)
All components	3.68 (0.32)	3.48 (0.59)	3.52 (0.52)	3.56 (0.49)

**Difference is significant at the 0.05 level (2-tailed, ANOVA= 3.713, p-value= 0.027)

perhaps due to how different people perceived and gave meanings to these natural realities. Similarly, how the respondents in all clusters still put a high value on their communities despite the perceived high disaster risk caused by river floods is exciting and demands further analysis to negate or validate findings in similar communities elsewhere in the Philippines (*Anacio et al. 2016*). This prevailing behavior runs counter to the common notion that survival through risk avoidance is always on top of the agenda of any human communities. But it also explains the resistance of affected households to relocate after a disaster or to return to the disaster-prone areas when the conditions returned to normal, especially when spaces are available to rebuild their houses and make a living. Thus, it is not proper to ignore community perception about natural hazards and disasters to promote preparedness and design risk reduction programs (*Peng et al. 2017*).

The residents' manner weighed in the perceived risks and value of a place brings us to the importance of considering the three reinforcing components of sense of place- attachment, dependence, and identity. But note that place attachment scored highest among the other components, which implies that how connected the residents are to their respective communities is more than the sum of the socioeconomic and cultural values they found there. Almost half of the sampled households had husbands and wives employed or engaged in non-farm-related livelihoods within or outside their communities. Moreover, the losses of families due to floods were more associated with farm animals and the reported damage comprised more houses than farm crops or river products. Generally, this means that it was not purely economic because they attached a high sense of value to where they are now and why they would not relocate. And since relocation means disrupting their sense of place, there is a need to investigate the views of both those affected and unaffected households (*Clarke et al. 2018*) and to put hazard management in a broader context (*Jeffers 2019*).

The situation now might be completely different when no significant industries in the past were within or near the Ocoy River Basin like the geothermal energy plant, quarrying for the construction business, tourism infrastructures, and others that brought other economic opportunities to the residents. However, these have also altered or destroyed the natural features of the Ocoy River. Floods were also common in the past, but the river overflowing was uncommon and non-destructive to farm crops and houses along the riverbanks. The majority who practically grew up along the river had fond memories of enjoying its beauty and cleanliness, which they used for bathing and washing clothes. The river had also provided various freshwater fishes for food when the respondents could not go to the market. While these beautiful stories are now just parts of the social memories of residents, it is the present networks of relatives and friends that they have transformed into sources of economic support during a disaster that also matter. Although flooding does not happen every day, this has become more frequent and intense than before, which they have learned to accept as the way of life in riverside communities.

This development raises the question of what resiliency is about among the affected residents with their refusal to resettle in safer areas and their ability to recover lost farm animals and crops and rebuild or repair damaged houses, vehicles, farmlands, and others every after disastrous floods. Going into this matter would clarify the concept of resiliency, as applied to human communities, if indeed the residents who remained in disaster-prone areas were more resilient than those who resettled. Based on the description of *Gitz and Meybeck* (*2012*) that resilience is "the capacity of systems, communities, households or individuals to prevent, mitigate or cope with risk, and recover from shocks," it seems that households that remain in disaster-prone areas are "partly" more resilient than those who moved or have plans to move to sponsored resettlement sites. They may not prevent and mitigate risk, but they had recovered from stress due to floods without leaving the place and reducing vulnerabilities over time. The majority evacuated when floods came and returned to their respective areas when the condition of the river normalized as they repaired or rebuilt the damage brought by the floods, particularly in 2011, which marked the most devastating in the history of the Ocoy River so far.

CONCLUSIONS AND RECOMMENDATIONS

The disastrous experiences with flooding quantified in terms of the amount of damage and losses incurred significantly differ among households across the different communities along the Ocoy River. Although more families in the upstream communities reportedly experienced more damage and losses, relocating to safer areas because of the floods do not significantly differ among these households. They did not only have high flood disaster risk perception and sense of place; these two variables were also positively and significantly correlated. Moreover, the relocation decisions of the respondents from these households do not statistically differ across communities despite the perennial flooding of the Ocoy River.

The fear about the quality of life that awaits the respondents in resettlement sites may have discouraged the flood-affected households from leaving the communities where they currently reside. Meanwhile, the fear of flood they kept for years may have been calmed by their perception that although the flood is uncontrollable, except through divine intervention, being prepared to react to an extreme situation could minimize destructions. Moreover, reducing the unpredictability of floods may be possible by knowing the probability of the occurrence through sufficient and reliable information. Therefore, with appropriate details and enough resources, those households that do not relocate must learn to adopt a way of life adaptive to floods. At the same time, households in resettlement sites must have that sense of place they have lived with for many years to prevent them from returning to their previous communities.

The preceding summarizes why the flood-affected households along the Ocoy River are unwilling to relocate and shows how the local government units may pursue a proactive adaptation stance in resettlement programs and mitigation measures informed by the concept of sense of place (*Anacio et al. 2016*). A proactive adaptation primarily requires appropriate information and awareness-raising on the extent of destructions caused by river floods and are crucial ingredients in the campaign and capacity-building for disaster preparedness (*Peng et al. 2017*). The efforts must be both cognitively and emotionally appealing to their decisions to relocate if they prefer to stay and always prepared to move to the nearest designated evacuation centers during heavy rains and typhoons. Consistent with the principle of transformative adaptation, and where place attachment is strong, *Clarke et al.* (*2018*) consider proactive adaptation to be "more acceptable and fairer for individuals than alternatives that transform places involuntarily" provided that there is substantial "community involvement in decision-making."

In this regard, an enacted ordinance offering resettlement sites to residents in the high hazard zone for those willing to relocate is necessary. Still, what desirable characteristics of the relocation site the affected households have identified must be considered. In the consultations conducted in venues within the surveyed communities (*Emmanuel et al. 2019*), the participants validated the following attributes of a resettlement site: near the sources of livelihood and schools of children, have spaces for private vegetable gardens and domestic animals, have the network of relatives and friends, have the security of occupancy for relaxed feelings among others. Moreover, the construction of appropriately designed dikes to prevent overflow of floodwater and the installation of flood warning devices in strategic sections of the Ocoy River were needed. Along with this, the local government units must intensify disaster preparedness training to prevent significant loss of lives and properties among the residents who opted to remain within a safe distance from the river banks as required by law. Therefore, using what *Jeffers* (*2019*) wrote, place attachment "can act as either a barrier to transformative adaptation or as a motivator for action," and this should not simply perceive as emotionalism.

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ACKNOWLEDGMENT

The data in this paper come from the social component of a multidisciplinary research project known as the Settlement and Resilience of Ocoy River Communities headed by Dr. Jorge Emmanuel as Project Leader and funded by the Oscar M. Lopez (OML) Center for Climate Change Adaptation and Disaster Risk Management Foundation, Inc. through Silliman University (RG2017-19).