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Flood experiences, resiliency and migration intentions of flood-risk residents of Tuguegarao City, Philippines

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Key words: Flood experiences, Household flood resiliency, Migration intention.

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Abstract

This paper challenges the commonly held idea that household flood resiliency is associated with the residents' intention to stay or migrate. It also investigated the household characteristics, flood experiences, household flood resiliency, and migration intentions of flood-risk residents of Tuguegarao City, Philippines. It employed quantitative and qualitative research methods with 172 respondents from the 10 flood-risk Barangays of Tuguegarao City. Stratified random sampling and serpentine approach were used in identifying the households based on the barangay map. Structured interview and focus group discussion were utilized to substantiate data obtained from the Survey Questionnaire. The study concludes that the flood-risk residents of Tuguegarao City are resilient having no intention to migrate. They are able to reach and maintain an acceptable level of functioning and structure during and after inundation. Significantly, household flood resiliency is not associated with migration intention. High or low household resiliency does not influence migration decision. Thus, flooding is not a "singular driver of migration" because migration decision is a confluence of many interplaying factors.

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Introduction

Tuguegarao City is a rurban area located in the southern part of Cagayan. It is one of the flood risk areas in the whole of Cagayan Valley Region because it is mapped as a flood prone area and a catch basin of water from the different tributaries in the mountains surrounding the region (CDRRMO Report, 2013). In addition, Tuguegarao is a peninsula in the lower Cagayan River basin which is easily flooded during wet seasons. The succession of severe floods in Tuguegarao City has given rise to a perception that the residents are facing an increasing level of flood risk.

There are two commonly held assumptions in understanding the behavior of residents in flood prone areas. One is that flooding is seen as a "singular driver of migration" (Salamanca, 2015). Negative flood experiences may influence the residents to have migration intention. In such case, flood experiences become a push factor for relocation or flooding experiences are "push" stimuli to migrate. The devastating impact of flooding pushes households to seek for a better place to live thus, making migration as a "flight" against damaging and bad flood experiences. On the other hand, household resiliency to floods may hold the intentions of the households to migrate. The ability of the households to manage flooding and bounce back after trying times allow them to adapt and minimize the risks of their lives and properties. In this case, the higher household flood resiliency acts as migratory "pull" to remain in flood risk residence while lower household flood resiliency acts as a migratory "push".

To date, there has never been a study unraveling the relationship between flood experiences, household flood resiliency, and migration intention of the residents of Tuguegarao City. The absence of empirical studies along this concern poses some issues and concerns in the area. Having been exposed to periodic inundation, what are the experiences of the residents and how do they adapt to reduce their vulnerabilities to these flood experiences? What personal and household characteristics may influence their household resiliency? How do the impacts of flooding significantly influence the residents' intentions to remain or migrate from their residence? Does household flood resiliency influence their migration intentions?

Given these concerns, the link between environmental hazard, resiliency, and migration is a theme which needs urgent and preferential concern particularly in a rurban area like Tuguegarao City. As the National Research Council's Committee on the Human Dimensions of Global Change (1999) notes "there is very little empirical documentation of the relationships between migration, resilience, and environment." Thus, this paper offers a contribution to the limited literature examining the ways in which migration is linked to household resiliency and flooding as an environmental push factor.

This paper offers a contribution to the limited literature examining the ways in which migration intention is linked to household resiliency and flooding as an environmental push factor. Specifically, it investigated whether the flood experiences and household flood resiliency of the flood prone residents of Tuguegarao City is associated to their intention to stay or migrate in their current residence.

Method

Study Design

This study employed both quantitative and qualitative research methods. The survey on household flood experiences was measured using the instrument made and pretested by the researcher. On the other hand, the household flood resiliency questionnaire was adopted from Nguyen & James (2013) titled "Measuring household resilience to floods in the Mekong River Delta" which has three factors or properties of households' resilience to floods namely: (1) households' confidence in securing food, income, health, and evacuation during floods and recovery after floods; (2) households' confidence in securing their homes not being affected by a large flood event; and (3) households' interests in learning and practicing new flood-based farming practices that are fully adapted to floods for improving household income during the flood season. This instrument has a Cronbach's alpha coefficient of 0.77 for factor one; 0.89 for factor two; and 0.67 for factor three.

Respondents

Using stratified random sampling, the study utilized 172 respondents covering 10 flood-risk Barangays of City namely; Centro 10, Balzain East, Balzain West, Tagga, Gosi Sur, Gosi Norte, Atulayan Sur, Annafunan East, Linao East, and Linao West. These barangays were identified based on the Report of the City Disaster Risk Reduction and Management Office (Tuguegarao City Annual Report, 2013). Data were collected primarily from the household heads represented either by the father or mother. Households were selected using the Base Flood Elevation (BFE) of two (2) feet and above inside the respondents' houses.

Data Collection Procedure

The sampling of the households was done using serpentine approach based on the barangay map. In-depth interviews with key informants and focus group discussions (FGDs) were utilized to unravel detailed and nuanced information on the respondents' flood experiences, household flood resiliency, and migration intentions in much more depth than a survey questionnaire. Focus group participants were recruited from the household questionnaire survey and were asked if they are willing to participate in a focus group to explore some of the issues in greater depth.

Analysis of Data

Analysis of household characteristics, flood experiences, household flood resiliency, and migration intentions was done using frequency counts, percentage and means. Tests of relationship were done through Chi square and Pearson Product Moment Correlation.

Results and discussions

Profile of the Respondents

Table 1 shows that majority of the respondents are females (106 or 61.63%); their mean age is 50 with ages mostly ranging from 51-60 (46 or 26.74%); and majority are married (140 or 81.40%). In terms of ethnic group, majority of them are Itawes (78 or 45.35%); are engaged into farming (75 or 43.60%); and have net monthly income below P 10,000 (109 or 43.60%). Finally, majority of the respondents are elementary graduate (41 or 23.84%); and their average years of residency is 29 with 58 or 33.72% having stayed in their residence from 21-30 years.

Table 1. Profile of the respondents.

Profile of the Respondents	Frequency	Percentage
Sex		
Male	66	38.37
Female	106	61.63
Age		
20-30	16	9.30
31-40	33	19.19
41-50	36	20.93
51-60	46	26.74
61-70	28	16.28
71-80	12	6.98
81-above	1	.58
Mean Age	50	
Civil Status		
Single	16	9.30
Married	140	81.40
Widow/Widower	16	9.30
Ethnic Group		
Ibanag	29	16.86
Itawes	78	45.35
Ilocano	44	25.58
Others (Tagalog, Kalinga, etc)	21	12.21
Occupational Group		
Professional workers	14	8.10
Service Workers/Middle level/blue collar	23	13.40
Farmers	75	43.60
Entrepreneurs/Business persons	55	32.00
Unemployed	5	2.90
Net Monthly Income		
Below P 10,000	109	63.40
P11,000 – P20,000	31	18.00
P21,000 – P30,000	17	9.90
P31,000 – P40,000	15	8.70
Highest Educational Attainment		
Elementary undergraduate	21	12.21
Elementary graduate	41	23.84
High School undergraduate	19	11.05
High School Graduate	26	15.12
College undergraduate	29	16.86
College graduate	31	18.02
Graduate School	3	1.74
Vocational	1	0.58
Never Attended School	1	0.58
Years of Residency		
1-10	15	8.72
11-20	45	26.16
21-30	58	33.72
31-40	22	12.79
41-50	14	8.14
51-60	13	7.56
61-above	5	2.91
Mean Years of Residency	28.67 years	

Household Characteristics of the Respondents

The household characteristic of the respondents (Table 2) reveals that majorities have a household size of 1-5 (104 or 60.47%) and the household structure is extended family (88 or 51.16%). Moreover, 73 or 42.42% have concrete houses and majority of them own their houses (133 or 77.33%).

Table 2. Household characteristics of the respondents.

Household Characteristics	Frequency	Percentage
Household Size		
1-5	104	60.47
6-10	60	34.88
11-above	8	4.65
Household structure		
Conjugal	16	9.30
Nuclear	68	39.53
Extended	88	51.16
Type of House		
Concrete	73	42.42
Semi-concrete	59	34.30
Wood	20	11.63
Light materials (cogon, bamboo)	20	11.63
Ownership of the house		
Owned	133	77.33
Rented	5	2.91
Inherited	30	17.44
Others	4	2.33

Flood Experiences/Preparedness of the Respondents

Table 3 reveals that the main cause of flooding in the respondents' barangays is the release of water reservoir from the Magat Dam (142 or 82.56%) located in Ramon Isabela. Notably, only 17 or 9.88% attribute the flooding of their communities to intense rainfall and 13 or 7.56% charged it to overflow of drainage during heavy and continuous rains. Thus, the residents are more exposed to fluvial (river flooding) rather than pluvial flooding (rainfall generated). The floods have posed numerous problems to the inhabitants, too. Principally, most of them experienced lack of food supply (122 respondents) and lack of potable water supply (99 respondents).

Table 3 further presents that majority of the respondents were "Very Well Prepared" in the past floodings (92 or 53.49%). A greater proportion (124 or 72.09%) have received flood warning and the flood warning was communicated to them through neighbors (94 respondents) who received the incoming flood from various sources.

In particular, AM Radio stations were essential sources of flood warning (93 respondents).

The finding affirms that higher preparedness levels could be obtained through communications that do not only explain how best to prepare but also highlight the benefits of being prepared. Undeniably, the key to effective flood preparedness is making people act on time and making them internalize the manifold benefits of pro-active rather than reactive actions to flooding (O'Sullivan, *et al.,* 2012).

Table 3. Flood Experiences/Preparedness of the Respondents.

Flood Experiences of the Respondents	Frequency (Multiple Response)
Source or cause of last major floods	
Water release from Magat Dam	142
Intense rainfall	17
Overflow of drainage	13
Problems and difficulties	
Lack of food supply	122
Lack of potable water supply	99
Destruction of house	72
Destruction of agricultural crops	69
Destruction of valuable properties	77
Health and security of family members	50
Others	9
Level of household preparedness in the past flooding	
Not at all prepared	12
Not very prepared	14
Don't Know	1
Slightly prepared	53
Very well prepared	92
Number of household who received flood warning	124
Number of households who did not receive	48
Manner by which the flood warning was communicated	
Television	86
Radio	93
Door to door communication from Barangay officials	78
Neighbors	94
Others	4
Time gap of the warning received relative	

to the flood occurrence	
Less than half an hour	26
Half an hour to two hours	14
Two hours to six hours	24
More than six hours	56
Adequacy of time to take action	
Adequate	110
Not adequate	62
Actions taken before the flood occurred	
Move items of sentimental value	109
Move or protect costly items	90
Block doorways	30
Switch off gas/electricity	86
Moved valuable items on higher elevation of the house	108
Watch the water levels	102
Collect/secured clothing, food, water, medication	92
Listen to TV/radio for information	95
Contacts family/friends for help	72
Move myself and family members to safe places	98
Prepare for loss of power (candles/flashlight)	103
Move pets/livestock to safe place	83
Move motorcycle, tricycle car and other vehicles to safe place	58
Help neighbors	80
Leave behind the house and other property	50
Contact barangay officials for assistance	55
Accommodation of Residents with Forced/Voluntary evacuation	
Stayed in the Evacuation Center	9
Stayed with friends and relatives	15

As to the time gap of the warning received relative to the occurrence of the flood, 56 respondents received the warning in more than six hours and for them this time gap is adequate to take action (110 respondents). This means that the time gap of the warning received is sufficient for the households to prepare and keep them safe. FGD participants highlighted that one essential factor for flood preparedness is for a flood message to reach all intended recipients at a given time. They prepared well because they had enough time to perform safety measures in securing themselves and their properties.

Moreover, FGD discussion points that receiving a warning increased their confidence in preparing for the incoming flood. Flood alerts and flood information allow them to determine the expected flood elevation based on the number of gates released by the Magat Dam. However, the respondents expressed their sentiment towards disaster risk agencies that did not provide information on available relief goods. Some conveyed the partiality of these agencies in distributing relief goods to actual flood victims as distributors kept the relief goods for themselves or gave them to their relatives and friends.

Interestingly, the respondents have taken five (5) primary actions before the occurrence of the flood such as (a) moving items of sentimental value; (b) moving valuable items on higher elevation of the house; (c) preparing for candles/flashlight for the loss of power; (d) moving oneself and family members to safe places; and (e) watching the water level. FGD participants expanded on this issue noting that their simple preparedness helped them in ensuring the safety of sentimentally important and valuable items such as valued photographs, treasured heirlooms and irreplaceable memorabilia.

Of the 172 respondents, only 5% (9 households) of those forced to leave their homes used an Evacuation Center but 9% (15 households) sought temporary accommodation from friends and relatives.

Respondents' Level of Household Flood Resiliency

The household flood resiliency of the respondents is "*high*" with an overall weighted mean of 3.71 (Table 5). This finding implies that they have the capacity to immediately adapt and recover from stress brought by flooding. They, too, have high confidence in securing their family members, food, health, safety, properties, and evacuation during floods. This finding is similar with the level of resiliency of Metro Manila residents who registered an overall resilience index of 3.77 out of a perfect 5.0. These residents have high physical, institutional, and social resilience and moderate natural economic resilience (Metro Manila City Profile Climate and Disaster Resilience Initiative, 2010).

Results of FGD reveal that their high resiliency springs from their attitude to see difficulties as temporary and their capacity to rise thereafter. They also attribute it to their abilities to be at their best even in difficult situations. Interestingly, taking time to laugh during flooding and maintaining an optimistic behavior under such condition affirm their resiliency.

Table 5. Respondents' Level of Household Flood Resiliency.

Statements	Mean	Adjectival Value
I can replace or repair my house quickly when it is affected by floods	3.22	Moderate
I am confident that my house will not be submerged by the highest floods in the next 20 years	3.10	Moderate
I am confident that my house will not collapse or be swept away by the highest floods in the last 20 years	3.48	High
I am confident that my household has enough food and other provisions to eat during the flood season	3.95	High
I am confident that my household will not need to borrow money or ask for relief goods from formal and informal sources during the flood season	3.13	Moderate
I am confident that my household can find a safe place to evacuate to if there is an extreme flood event in the future	4.06	High
I am confident that children and elderly people are safe during extreme floods	4.13	High
I am confident that the health of my family members will not be negatively affected by floods	3.87	High
I want to learn new farming practices to cope with floods	4.07	High
I have used new farming practices to cope with floods such as fishing and vegetables farming	4.06	High
Weighted Mean	3.71	High

Legend:

1.00-1.79 – Very Low Resiliency
3.40-4.19 – High Resiliency
1.80-2.59 – Low Resiliency
4.20-5.00 – Very High Resiliency
2.60-3.39 – Moderate Resiliency

Among the items of household flood resiliency questionnaire, the respondents show high resiliency particularly in the statement, "*I am confident that children and elderly people are safe during extreme floods*" (4.13). Such finding signifies that safety and welfare of children and the elderly are the primordial concern during flooding. FGD participants reveal that children and elders either go to their nearest kin or stay in the barangay hall and other safe places within the barangay for refuge. This data is consistent with the finding of Nguyen & James (2013) that flood-prone residents along Vietnamese Mekong River Delta (MRD) are concerned with several issues for maintaining livelihood during and after floods which include: (1) capacity to secure food, (2) income, (3) health of family members during the floods, (4) capacity to find a safe place if evacuated during floods, and (5) capacity to recover if houses are affected.

Moreover, the respondents registered high resiliency in the statement, "*I want to learn new farming practices to cope with floods*" (4.07). This finding suggests that the respondents are in dire need for farm flood planning and climate resilient farming practices. FGD participants expressed their need to be given high-quality seeds that can withstand floods and technical training to capacitate them on integrated farming where they combine two or more farming and livestock enterprises, as well as planting vegetable crops grown on raised platforms and floating gardens. On the other hand, the item which the respondents have registered moderate resiliency is on the statement "*I can replace or repair my house quickly when it is affected by floods*" (3.22). This may be attributed to the fact that replacement and repair of houses are costly. It entails longer time for them to accumulate additional funds to replace and repair such damage.

Furthermore, the respondents show moderate resiliency in the statement "*I am confident that my house will not be submerged by the highest floods in the next 20 years*" (3.10). Majority of the FGD participants perceive flooding in the coming years to be more alarming since the elevation of flood is increasing and wide ranging.

They attribute this to climate change, deforestation of mountains, and siltation of the Cagayan River and its tributaries. Thus, they anticipate the flooding in the ensuing years to be more frequent, hazardous, and debilitating. Given this finding, it is clear that the respondents are able to reach and maintain an acceptable level of functioning and structure during and after inundation.

Respondents' Migration Intentions for the Next Twenty Years

Migration may be a strategy to cope with perceived risk associated with environmental hazards like flooding. However, Table 6 reveals that majority of the respondents (130 or 76.47%) have no intention to migrate for the next 20 years. They do not have any plan of changing residence despite periodic flooding experience. Focus group participants identified several "pull" factors to remain in their residence namely; lack of financial resources; having little faith in finding better jobs elsewhere; leaving family, friends, and relatives behind; leaving properties behind; and possible disruption in the schooling of their children.

Table 6. Migration Intentions for the Next Twenty Years.

Response	Frequency	Percentage
With intention	29	31.98
No intention	130	61.63
Undecided	11	6.40

The lack of intention of the respondents to migrate supports the idea that environmental quality may not be sufficient motivation for relocation. As Wolpert notes (1966, cited by Hunter, 2005), an individual may accept a negative, yet stable, environment rather than face the stress associated with change. The decision to migrate may be shaped by a number of considerations, including *in situ* vulnerability factors and assets available to households (Salamanca, 2015). In short, environmental factors interact with socioeconomic, cultural, and political processes to shape migration decision-making (Macleman and Hunter, 2010).

FGD participants also convey that the absence of death toll and major damages of property during flooding as one of the primary reasons for non-migration. Such is validated by the records of the City Disaster and Risk Reduction Management Office showing zero casualty in Tuguegarao City during flooding. This is completely a different case in the flooding brought by Vietnamese Mekong Delta wherein child deaths during the flood season is a great concern. Deaths of children were related to drowning due to lack of supervision from caregivers (Nguyen & James, 2013).

Finally, a relatively small proportion of the respondents (29 or 31.98%) expressed intentions to migrate while only 11 or 6.40% are undecided. Probing on their migration intentions during the FGD reveals that households with migration intention want to relocate only at a short distance away or within the city.

Relationship Between Household Flood Resiliency and Select Personal and Household Variables of the Respondents

Table 7 illustrates that the null hypothesis of the study is accepted since all the personal and household characteristics of the respondents are not related to their household flood resiliency. This finding indicates that age, educational attainment, years of residence, monthly net income, and household size do not influence the household flood resiliency of the respondents. In the same vein, the household flood resiliency of the respondents is not associated with their sex, civil status, family structure, and house type. Thus, the household flood resiliency of the respondents remains the same irrespective of differences in these select profile variables. FGD participants reveal that with the regularity of flood experience, they embrace the phenomenon as a way of life. In this case, households who experience high flood vulnerability are less likely to migrate because they accept the disaster as an ordinary event and a significant part of life's survival.

Table 7. Relationship Between the Household Flood Resiliency of the Respondents and their Select Personal and Household Variables.

Select Personal and Household Variables	Statistics	Df	Computed Value	Probability
Household Flood Resiliency and				
Age	r	171	-0.019^{ns}	0.805
Educational Attainment	r	171	-.051^{ns}	.510
Years of Residence	r	171	-.034^{ns}	.659
Monthly Net Income	r	171	.034^{ns}	.657
Household size	r	171	-.018^{ns}	.810
Sex	X^2	2	2.664^{ns}	0.264
Civil Status	X^2	4	1.853^{ns}	0.763
Family Structure	X^2	4	1.160^{ns}	0.885
House Type	X^2	6	10.596^{ns}	0.101
Occupation	X^2	8	7.610^{ns}	0.472

Relationship between Respondents' Household Flood Resiliency and Migration Intentions

Table 8 reveals the absence of relationship between household flood resiliency and migration intention of the respondents. Such is revealed in the computed p-value of 0.240 and a chi-square value of 5.496. The finding implies that the respondents do not intend to migrate irrespective whether they have high or low resiliency. Thus, household flood resiliency does not influence migration intention. This finding proves that environmental quality may not be a sufficient motivation for relocation. An individual may accept a negative, yet stable, environment rather than face the stress associated with change brought by relocation (Wolpert cited by Hunter, 2005). Migration decision is a holistic process which is not solely influenced by environmental factors rather it interacts with socioeconomic, cultural, and political processes (Macleman and Hunter, 2010). Only in extreme cases will the entire family migrate away altogether (Bilsborrow and Delargy, 1990).

Table 8. Relationship between Respondents' Household Flood Resiliency and Migration Intentions.

Intention to Migrate		Level of Household Flood Resiliency			
		Low	Moderate	High	Total
Yes	Count	2	13	40	55
	Percent	25.0	28.9	33.6	100.0
No	Count	6	26	74	106
	Percent	75.0	57.8	62.2	100.0
Undecided	Count	0	6	5	11
	Percent	0.0	13.3	4.2	100.0
Total	Count	8	45	119	172
	Percent	4.7	26.2	69.2	100.0

X^2- value (df= 4) = 5.496 p = 0.240 - ns

This finding provides two perspectives. First, it disproves that low resiliency acts as migratory "push" while high resiliency acts as a migratory "pull". As there is no association between resiliency and migration, low resiliency will not necessarily alleviate migration pressure while high resiliency will not necessarily "pull" residents to stay. Second, it proves that flooding is not a "singular driver of migration". Migration decision is a complex and multidimensional concept which is not influenced by a single factor. The decision to move or stay in flood risk residence is intertwined with other forces. Various factors interplay such as, but not limited to, personal, economic, social, political, cultural, and demographic factors.

Conclusions

The study concludes that the flood-risk residents of Tuguegarao City are resilient having no intention to migrate. They are able to reach and maintain an acceptable level of functioning and structure during and after inundation. Significantly, household flood resiliency is not associated with migration intention as well as their select profile variables. High or low household resiliency does not influence migration decision. Thus, flooding is not a "singular driver of migration" because migration decision is a confluence of many interplaying factors. In this case, resilience to environmental hazards such as flooding generally contributes indirectly and in combination with other factors for migration to occur.

Premised on the finding that flood-risk residents are poor, are engaged into small scale farming, and have no intention to migrate, it is recommended that the national and local government as well as disaster risk management agencies must give financial support, access to credit with low interest rate, health assistance, and alternative job opportunities after the flood as this will to give them the opportunity to effectively transition in their life events. Congruently, government agencies should also scale up their efforts to encourage these farmers to venture on flood-based farming practices and flood resilient agricultural crops to improve their household income during the flood season.

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