Chapter 16
Vulnerability, Resilience and Quality of Life: A Micro Level Study of Ghoramara Island in the Sundarban Region of West Bengal, India

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Abstract Climate change has become a burning issue worldwide as the effects of it on the human beings are gradually increasing. The Millennium Development Goals (MDG) and Sustainable Livelihood (SL) are difficult to be achieved by the rural communities due to the climatic hazards in a socio-economically marginal area like the Sundarban. The study area is situated in a high-risk region of climatic accidents, which are occurring with increasing frequency and intensity day by day and generates fear, tension, stress, insecurity, social vulnerability as well as marginalization. As a result the quality of life, which can be viewed from the aspect of satisfaction regarding living conditions is deteriorating as some indicators of it are directly linked with vulnerability as well as resilience of people to the climatic uncertainties. The study area selected for the present problem is Ghoramara, an isolated island of the Sundarban which has already become popular as a vanishing island since parts of the island like Lohachara has been disappeared from the map. Frequent attack of different environmental hazards like cyclone, flood, tidal surge, periodic water logging arising out of extreme climatic events affects quality of life of the islanders. As a result, poor and marginalized people suffer the most resulting in poor living condition as well as outmigration of the inhabitants in a large number and emergence of environmental refugees. In this context, this paper throws light on different dimensions of resilience like human, financial, social, physical and natural capital of the people of the study area to deal with climatic shocks so that it helps to strengthen the adaptive capacity of the vulnerable community to sustain a decent quality of life of this fragile area.

Keywords Climatic hazards · Quality of life · Vulnerability · Resilience · The Sundarban

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16.1 Introduction

Climate change has become a burning issue worldwide as the effects of it on the human beings are gradually increasing. The Millennium Development Goals (MDG) and Sustainable Livelihood (SL) are difficult to be achieved by the rural communities due to the climatic hazards in a socio-economically marginal area like the Sundarban. The study area is situated in a high-risk region of climatic accidents, which are occurring with increasing frequency and intensity day by day and generates fear, tension, stress, insecurity, social vulnerability as well as marginalization. As a result the quality of life, which can be viewed from the aspect of satisfaction regarding living conditions is deteriorating as some indicators of it are directly linked with vulnerability as well as resilience of people to the climatic uncertainties.

The issue of vulnerability can be viewed from different perspectives of the scholars of different knowledge domains, and even within the same domain (Fussel 2007: 155). Adger and Kelly (1999) outlined vulnerability as the state of individuals, groups or communities in terms of their ability to cope with and adapt to any external stress placed on their livelihoods and well-being. The concept of vulnerability has also been found in relation with social context 'to explore the key role played by socio-economic factors in creating a weakness in responding to, and recovering from, the effects of extreme natural events' (Armas et al. 2013: 1482). Sometimes vulnerability is being associated with 'resilience, marginality, susceptibility, adaptability, fragility and risk' (Fussel 2007: 155). Tesso et al. (2012: 871) mentioned that 'the resilience of households to climate change impact is another important issue in maintaining sustainable livelihood'. Resilient people can combat the climatic shock more successfully than non-resilient people. Adger and Kelly (1999) emphasized that a resilient community 'is able to maintain its core functions as a community despite those stresses'. Chambers and Conway (1992) included material as well as social resources as capabilities and assets within the livelihood concept and it has been accepted worldwide. Thus, livelihood becomes sustainable only 'when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base' (Chambers and Conway 1992: 6). On the other hand quality of life simply means the well-being of people which emphasizes on satisfaction level towards achieving happiness. Thus quality of life is a multidimensional concept which varies greatly according to space, time and human perception. Physical, cultural and social environment plays vital role in framing descent quality of life. Now, in a high-risk region of climatic accidents when vulnerability denotes the exposure of the community living there to different hazardous events, resilience refers to their capability to defend to those events or to cope with it. Therefore, quality of life of that community is deeply rooted within the interlinkages between vulnerability and resilience issues. Vulnerability is negatively linked with quality of life, whereas resilience is positively associated with it.

16.2 The Study Area

Ghoramara is an isolated island of West Bengal in the Sundarban region which has already become popular as a vanishing island since parts of the island like Lohachara has been disappeared from the map. Ghoramara village, a part of this island falls within Sagar C. D. block of South 24 Parganas district of West Bengal has been selected for this study. The village is located in an isolated island where tectonic, hydro-geomorphic, as well as climatic events play crucial roles in determining the fate of the islanders. Some portions of the island have already been disappeared. Climatic accidents, associated events and their effect aftermath like cyclone, flood, tidal surge, severe bank erosion, periodic water logging, increased salinity, economic instability create potential risk of social vulnerability of the inhabitants by affecting the indicators of quality of life like crisis of safe drinking water, sanitation, shelter, loss of farmland, dwelling.

16.3 Methodology

Household survey, field observation and interviewing of people are key sources of information for this study. Data has been collected through survey of 75 household through purposive sampling. Interview of selected informants from the village have also been taken into consideration. Data covered different aspects like educational level, population composition, age structure, economic condition, levels of poverty, income level, availability of drinking water as well as sanitation facility, house types, infrastructural facility, social support, buffer condition as all of these are well reflectors of the quality of life of the villagers. Simple cartographic representations have been used to display the findings.

16.4 Objectives

People of Sundarban are becoming more vulnerable and sensitive due to various events associated with climatic accidents which demands proper coping mechanism for sustainable living. Therefore, in this study attempts have been made to represent different dimensions of resilience like human, financial, social, physical and natural capital of the people of the study area to deal with climatic shocks so that it helps to strengthen the adaptive capacity of the vulnerable community to sustain a descent quality of life in this fragile area.

16.5 Findings and Discussion

Quality of life is not uniform everywhere. It varies spatially and depends on different aspects. There are many indicators of quality of life. But here, some indicators of quality of life have been highlighted, which are directly linked with vulnerability as well as resilience of people due to climatic events. Five important forms of livelihood assets have been mentioned by The International Institute for Sustainable Development in 2003 which forms the foundation of livelihood pattern like natural capital, social-political capital, human capital, physical capital and financial capital (Basar 2010: 13). All these have significant impact on people of the area of climatic accidents to respond, adapt and make proper recovery.

16.6 Human Capital

(A) ***Education***: This is one of the most effective human capitals as it is positively linked with higher level of resilience for long term. Illiteracy, low levels of education lead to ignorance, low level of perception as well as consciousness, prejudice which further obstruct them towards progressive thinking and adopt proper coping techniques. Level of education is low (Fig. 16.1). With the increase in educational level, the percentage of population is decreasing. 38% of the surveyed population had received primary education and 40% of them reached to upper primary level. On the other hand, 14% of them have completed secondary education, only 5% of them have reached to higher secondary level and 3% have reached to graduation level. In this study area, only 71% of the families were first learners and 24% of the surveyed population was illiterate; both of them unable to adapt the coping mechanism (Fig. 16.2).

(B) ***Gender***: Gender difference always creates a difference in quality of life between male and female, especially, after a climatic shock in rural areas of Sundarban. Women are mostly vulnerable due to 'their traditional roles as mothers and caregivers within the family; and when disaster is about to strike, they become

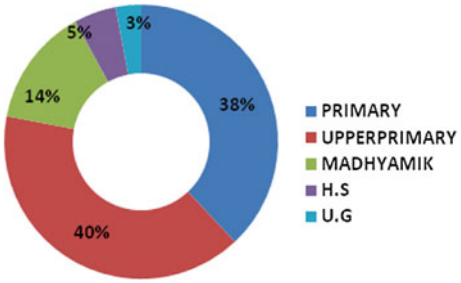

Fig. 16.1 Levels of education

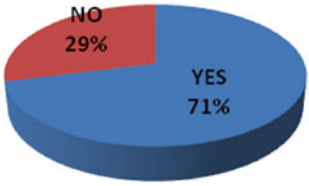

Fig. 16.2 First learner family. *Data Source Household Survey, 2013*

unable to seek safety as it restricted by their responsibilities to the young and the very old people' (Rygel et al. 2006: 748). Woman seldom possess equal position in the society as a result their right for basic needs is not being preserved. Their upbringing process lowers their confidence, consciousness and knowledge, power of expressing opinion and decision making power which creates crisis during disaster. Delaney et al. (2000: 14) also viewed that 'the usual role that women play as caregivers for the young, the elderly, and the disabled can also increase their vulnerability to disasters by limiting their mobility and doubling or trebling their workload'. Gender inequality has strong association with resilience. Mainly the gender division of work, social norms and traditional attire always create hurdles in building their resilience. As for example females are mainly engaged in cooking, collection of drinking water, cattle feeding, looking after the children and old aged family members. At the time of disaster as extra time and labour is needed to perform these activities, the females are being overburdened. Within the surveyed household, 49% population has been identified as vulnerable as they are females. The level of quality of life of women in such an area is always found to be lower than the men.

(C) ***Age***: The aged people as well as children are more susceptible to disasters and their quality of life. Vincent (2004: 13) opined that, 'populations with a low dependency ratio (high proportion of working age adults) and in good health are likely to have the widest coping ranges and thus be least vulnerable in the face of hazard exposure'. Their mobility is being restricted by their physical disability. Ngo (2001) mentioned that 'they are more likely to suffer health problems and experience a slower recovery'. They are the people who are financially dependent on others. Sometimes the older people deny shifting from their place of origin to another for making the evacuation process successful. Generally, lack of physical ability, financial support and will power stops the elderly people to respond quickly to evacuation process. The elderly people become anxious by the stress of leaving their own homes and living even on a temporary basis, in a group setting (Cutter et al. 2009: 21). The population that falls within the age group <5, 6–15 and >60 years are 10%, 21% and 8%, respectively, who have been marked as vulnerable. They have to depend on others for many reasons, especially, for economic help. Building resilience within the children, young adolescents and old-aged demands early warning and providing quick evacuation.

16.7 Financial Capital

People economically secure, stable and healthy are more likely to be resilient, and they have a capacity for anticipatory adaptation to reduce their vulnerability to (Vincent 2004: 14). Stable financial condition enables a family to withstand during climatic accidents. Financial capital is most critical dimension of resilience.

(A) ***Economy***: Most of the people of this area are engaged in work on a daily payment basis (Fig. 16.3). Apart from this, cultivation and fishing also occupy second and third position. Only 8% of them are engaged in different services. At the time of climatic accidents, agriculture and fishing become most affected due to salt water invasion, water logging and inundation of land. As a result, daily labourers also lose their work. Know-how strategy, introduction of salt-resistant species, alternative farming on the one hand and alternative income generation activities on the other can build resilience among them.

(B) ***Poverty***: People living below poverty line suffer badly during disaster. Fothergill and Peek (2004: 103) concluded that the poor are 'less likely to respond to warnings; more likely to die, suffer injuries, and have proportionately higher material losses; have more psychological trauma; and face more obstacles during the phases of response, recovery, and reconstruction'. Being poor is an obstacle for making better choices to recover from shocks of climatic events for existence. They are being unable to provide themselves the necessary equipment to combat or resist. In the view of Adger (2008: 9) 'poverty affects the coping and recovery from extreme events through directly constraining opportunities for coping and reducing the resilience to impacts'. 57% population is found to be within below poverty line who may act as weak in building resilience or adapting coping mechanism (Fig. 16.4). Leaving ancestral home and belongings along with asset like agricultural land, pond, betel garden in search of an alternative leaving is not at all easy for the poor.

(C) ***Income***: It acts as a strong indicator of resilience. People having a consistent and decent earning always hold a better position than the marginalized people (in terms of income) during climatic accidents. Low level of income (less than Rs. 3000) is found within 20% of the families. Another 25% of the families having monthly income within Rs. 6000 and they have been marked as vulnerable. As the levels of expenditure are nearer to the income levels, they cannot save much for the future.

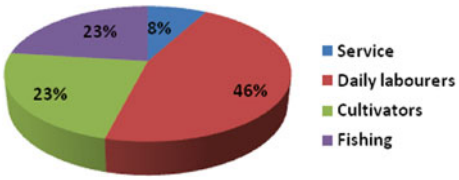

Fig. 16.3 Occupational type

16.8 Physical Capital

(A) ***Drinking water***: This facility is also inadequate. Availability of safe drinking water depends mainly on deep tube well. Though they have tube wells, which are available within one kilometre (Figs. 16.5 and 16.6) but at the time of saltwater invasion and waterlogging, these tube wells are being submerged under the water and cannot meet the demand of drinking water. For making water usable again, people have responded in three manners, like some water cannot be purified, some portions can be through sweet water wash and through pumping out the saltwater.

(B) ***Sanitation***: Condition of sanitation is very poor. Most of the inhabitants (57%) still practice open defecation. Only 43% of the surveyed population avail sanitation facility (Fig. 16.7). Only 14% of them have a proper chamber within their house (Fig. 16.8). Rest of them have some semi-permanent structure like hole, pit. They do not pay any attention to the governments' initiatives like Nirmal Bharat Aviyan and Total Sanitation Campaign. Places of open defecation become limited after a cyclonic storm due to waterlogging. The basement of

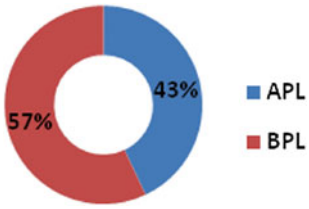

Fig. 16.4 Poverty level. *Data Source Household Survey, 2013*

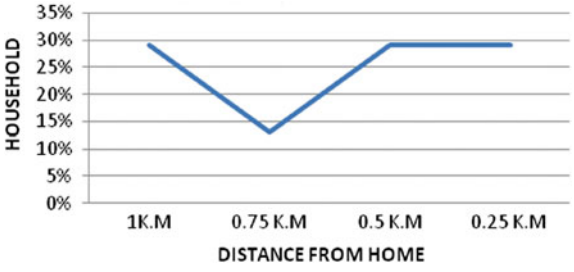

Fig. 16.5 Availability of drinking water

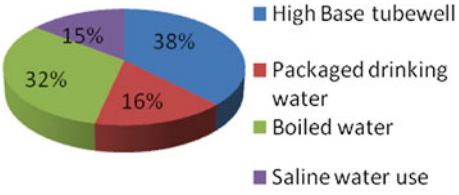

Fig. 16.6 Source of drinking water. *Data Source Household Survey, 2013*

latrines and tube wells should be raised above the embankment level to avoid the contamination. Both males and females use the river bank for defecation during disasters. In case of females, it leads to embarrassment, discomfort and lack of safety. Apart from that the waterlogged surroundings is also being further polluted and increases the scope of spreading water borne diseases. Thus, environmental hazard causes health hazards through unhygienic condition.

(C) **Housing profile**: Most (72%) of the houses are kachha in nature and another 28% are semi-pucca (Fig. 16.9). Only 14% of the roofs of the houses are pucca in nature. Most of the roofs (43%) are made of straws (Fig. 16.10). Lack of permanency, less durability, weak structure are the reasons behind the vulnerability of the population living in these houses. They are mostly exposed and marginalized. 25% huts are adapted to coping mechanism through raising the basement of huts. Kaccha houses should be converted in such a manner that it can resist disaster. As a result, they have to take shelter in a school building or any other high land during climatic hazard. Outmigration continues to happen in a huge volume and some people also get the rehabilitation facilities to the main Sagar land.

(D) ***Infrastructure***: This is an element that boosts up the resilience of the community. The condition of infrastructural facilities reflects quality of life. Infrastructure regarding health service and transport condition of the study area is very poor. During crisis period, people mainly get health services from local practitioners (quack doctor) and moving health team on vessels. Death also occurs due to unavailability of health service at proper time. On the other hand, it takes too much time to reach this island from the mainland and the boat journey is

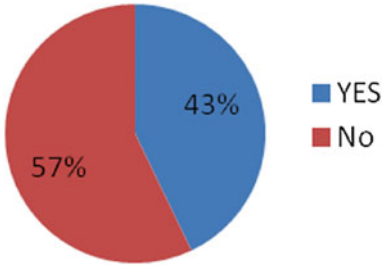

Fig. 16.7 Sanitation facility

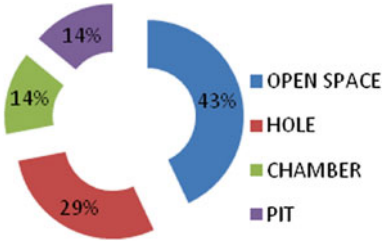

Fig. 16.8 Sanitation type. *Data Source Household Survey, 2013*

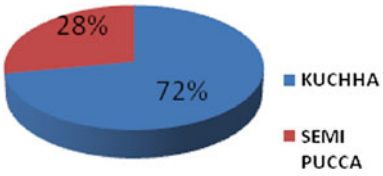

Fig. 16.9 House type

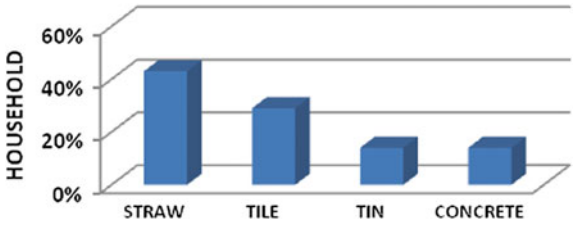

Fig. 16.10 Roof type. *Data Source Household Survey, 2013*

totally dependent on the time of tide. Some of the roads are muddy within the island.

16.9 Social Capital

(A) ***Social support***: Social network is associated with improved resilience as it acts as a buffer because it facilitates the way to easy recovery. Flood centre provides shelter to victimized people; emergency vessels rescue them to a safer place; radio broadcasting, and BDO/SDO send the alert immediately regarding the impending hazards. Television, newspaper, mobile message also provide information, but it takes time to reach (Figs. 16.11 and 16.12). Though it is a positive sign that most of them have mobile phone, but still there is a lack of provision of getting alert during calamities.

(B) ***Buffer scenario***: Buffering elements only includes assets and food stock. But when they have to migrate, leaving their home they cannot carry all food stocks or assets. So in true sense, the savings or insurance which can act as real buffer element is completely absent within the poor surveyed communities (Fig. 16.13).

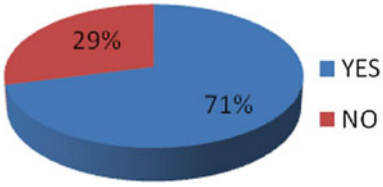

Fig. 16.11 Social

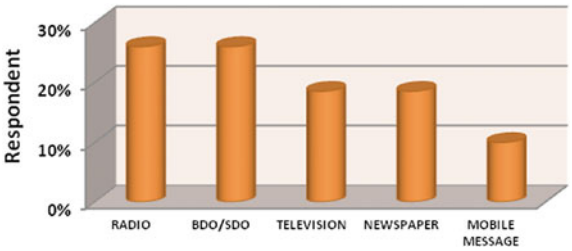

Fig. 16.12 Warning system. *Data Source Household Survey, 2013*

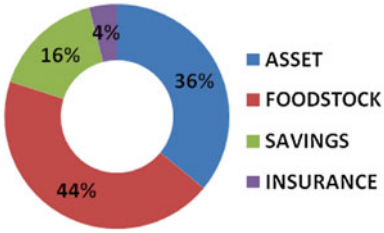

Fig. 16.13 Buffer elements. *Data Source Household Survey, 2013*

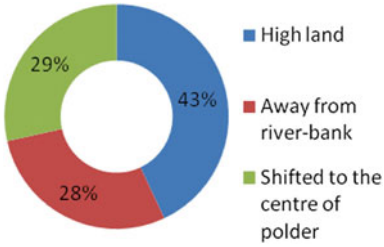

Fig. 16.14 Housing

16.10 Natural Capital

Agricultural field, water bodies, land of settlement, which seems to be the natural capital for the people of the study area get affected mostly by extreme climatic events. Maximum land loss is caused due to tidal surge and bank erosion. Proper maintenance of embankment and making them durable are needed. As it is going to be a vanishing island negligence of the government to invest here is a responsible factor. Most of the people are shifting towards the central land of the island as well as migrating to the main Sagar Island. Outmigration takes place in a huge volume and some people get the rehabilitation facilities to the main Sagar Island. People try to construct their houses on the high land, riverbank and shift to the centre of the polder (Fig. 16.14). They take shelter on the highland, flood centre, road and riverbank (Fig. 16.15).

Most of the respondents have idea on increasing temperature. They have also experienced late monsoon, irregular rainfall, water level rise, cyclone etc. Repeated attack of extreme climatic events damage crops, destroy their dwelling places and degrade the lands which further affects the food security of the local people. Malnutrition is also a very common phenomenon. As rice is their staple food and agriculture

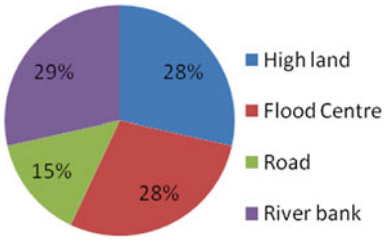

Fig. 16.15 Shelter. *Data Source Household Survey, 2013*

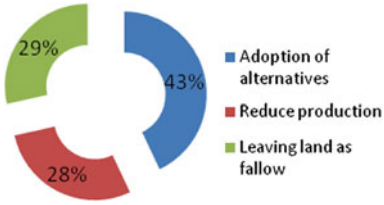

Fig. 16.16 Agriculture

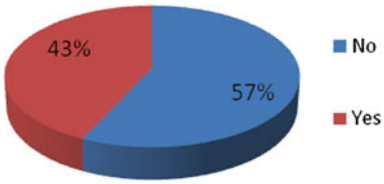

Fig. 16.17 Saline water fishing. *Data Source Household Survey, 2013*

is being disturbed, low production causes lower calorie intake. In case of agriculture, 29% of respondents reported that land remains as fallow, 28% of the respondents reported of reducing production and most of the respondents (43%) agreed that they adopt alternative methods to continue agricultural production (Fig. 16.16) after any hazard. In case of fishing due to the conversion of sweet water reservoirs into saline one, 43% of the respondents agreed (Fig. 16.17) to introduce saline water fishing.

16.11 Conclusion

It can be concluded that extreme climatic events have a definite impact on the quality of life of the inhabitants in this study area which further make them exposed, vulnerable, insecure and less resilient. In this part of Sundarban where people have to depend on nature's mercy for existence, mitigation through early warning, quick evacuation and suitable adaptive techniques are of utmost priority. Strengthening the community support system, empowering the womenfolk, betterment of social connectivity as well as communication is needed in building resilience. But topmost priority should be given in raising the level of consciousness of people through the provision of effective information and ideas about extreme climatic events, consequences, risks, coping strategies, etc. Initiatives in this regard should be taken at

government, non-government, and community level in an integral manner for the benefit of the whole society.

References

Adger, N. W. (2008). *Indicators of Social and Economic Vulnerability to Climate Change in Vietnam*, CSERGE Working Paper GEC, pp. 1–16.

Adger, W. N., & Kelly, P. M. (1999). Social Vulnerability and the Architecture of Entitlements. *Mitigation and Adaptation Strategies for Global Change, 4,* 253–266.

Armas et al. (2013). *Social Vulnerability Assessment using Spatial Multi-Analysis (SEVI Model) and the Social Vulnerability Index (SOVI Model)- A Rumania*, pp. 1481–1493.

Basar, M. A. (2010). *Climate Change, Loss of Livelihood and the Absence of Sustainable Livelihood Approach: A Case Study of Shymnagar*, Bangladesh Centre for East and South-East Asian Studies, Lund University, pp. 1–68.

Chambers, R., & Conway, G. (1992). *Sustainable Rural Livelihoods: Practical Concepts for the 21st Century, IDS Discussion Paper 296* (pp. 1–33). Brighton: IDS.

Cutter et al. (2009). S*ocial Vulnerability to Climate Variability Hazards: A Review of the Literature*, Final Report to Oxfam America Hazards and Vulnerability Research Institute, Department of Geography, University of South Carolina Columbia, pp. 1–44.

Delaney et al. (2000). *Gender and Post-Disaster Reconstruction: The Case of Hurricane Mitch in Honduras and Nicaragua* (Decision Review Draft), pp. 1–60, Available at: http://www.anglia.ac.uk/geography/gdn/resources/reviewdraft.doc.

Fothergill, A., & Peek, L. (2004). Poverty and Disasters in the United States: A Review of Recent Sociological Findings. *Natural Hazards, Kluwer Academic Publishers, Netherlands, 32*(1), 89–110.

Fussel, H. (2007). Vulnerability: A Generally Applicable Conceptual Framework for Climate Change Research. *Global Environmental Change, 17,* 155–167.

Ngo, E. B. (2001). When Disasters and Age Collide: Reviewing Vulnerability of the Elderly. *Natural Hazards Review, 2*(2), 80–89.

Rygel, L., et al. (2006). A Method for Constructing a Social Vulnerability Index: An Application to Hurricane Storm Surges in a Developed Country. *Mitigation and Adaptation Strategies for Global Change, Springer, 11*(3), 741–764.

Tesso, et al. (2012). Analysis of Vulnerability and Resilience to Climate Change Induced Shocks in North Shewa. *Agricultural Sciences, Ethiopia, 3*(6), 871–888.

Vincent, K. (2004). Creating an Index of Social Vulnerability to Climate Change. *Paper, 56,* 1–50.