World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(Research Article)

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An inquest into the resource mobilization and utilization capacity of local leaders for community resilience to agriculture-threatening droughts and floods

Washington Muzari * and Ezra Pandasvika

Department of Agricultural Engineering, Chinhoyi University of Technology, P. Bag 7724, Chinhoyi, Zimbabwe.

World Journal of Advanced Research and Reviews, 2024, 22(01), 912–923

Publication history: Received on 05 March 2024; revised on 12 April 2024; accepted on 15 April 2024

Article DOI: https://doi.org/10.30574/wjarr.2024.22.1.1154

Abstract

The main objective of the study was to analyze the relationship between resource mobilization and utilization capacity of local leaders and community resilience to droughts and floods in Lower Muzarabani District of the Zambezi Valley in Zimbabwe. Continual exposure to the hydro-climatic disasters of droughts and floods in Lower Muzarabani has accelerated the vulnerability of poor rural communities, plunging them deeper into poverty and preventing them from taking advantage of economic opportunities. With Lower Muzarabani faced with increasing magnitude, frequency and intensity of droughts and floods, the need for concerted efforts towards building disaster-resilient communities can never be overemphasized. The Conjoint Community Resilience Assessment Model (CCRAM) Household Questionnaire was used to collect data in face-to-face interviews among the sampled households. in Lower Muzarabani. The original CCRAM Model structure, consisting of 5 disaster-resilience factors (Leadership, Collective Efficacy, Preparedness, Place Attachment, and Social Trust) and 28 items, was used as the basis for the survey. The multi-stage sampling method was used in selecting the 200 households for the survey. The major finding obtained with the use of the Pearson Bivariate Correlation Analysis and Linear Regression Analysis was that the efficiency and effectiveness of resource mobilization and utilization activities (represented in the CCRAM model by the preparedness factor) significantly and positively influence community resilience to the hydro-climatic disasters of droughts and floods in Lower Muzarabani.

Keywords: Resource mobilization; Local leaders; Community resilience; Agriculture; Droughts; Floods

1. Introduction

The rain-fed agriculture base of Lower Muzarabani District has made the economies of local rural communities particularly vulnerable to the climatic extremes of droughts and floods (Bongo et al., 2013). Exposure to these disasters has also increased the vulnerability of the poor, thereby plunging them deeper into poverty and preventing them from taking advantage of economic opportunities (Bongo et al., 2013). Hydro-climatic disasters originate from climatic and weather elements. The most severe and recurrent hydro-climatic disasters in Lower Muzarabani are droughts and floods (Government of Zimbabwe, 2012). The increasing magnitude, frequency and intensity of droughts and floods threaten the profitability, viability and sustainability of livelihoods and food security among communities in Lower Muzarabani (Gwimbi, 2009; Mazzeo, 2011; Bassell, 2014; Bongo et al., 2013). The efficiency and effectiveness of disaster relief work by government officials and local leaders in Lower Muzarabani in the Zambezi Valley of Zimbabwe are being hampered by the prevalence of severe hydro-climatic disasters in the district (Government of Zimbabwe, 2012). Adding to the already precarious hydro-climatic disaster situation in the district, electronic climate models have predicted an imminent rise in the magnitude, frequency and intensity of hydro-climatic disasters in Lower Muzarabani (Government of Zimbabwe, 2012). With Lower Muzarabani faced with increasing magnitude, frequency and intensity of droughts and floods, the need for concerted efforts towards building disaster-resilient communities can never be overemphasized (Bongo et al., 2013). Hence the rationale for undertaking research activities aimed at facilitating or informing efficient

* Corresponding author: Washington Muzari

and effective disaster resilience-building among local rural communities in Lower Muzarabani, such as the disaster-resilience assessment activities in this study.

A local leader in this analysis is envisaged from four dimensions. The first dimension is that of a community leader in the traditional sense, having an influence on community development activities at the local level. This dimension includes all traditional structures such as village heads, chiefs and headmen. The second dimension comprises of representatives of the state bureaucracy such as local government and parastatals at district and sub-district levels. This category includes the District Administrator and other district level civil service officials, Member of Parliament, Chief Executive Officer and other executives within the Rural District Council, Ward Councilors, Ward Development Committee (Wardco) and Village Development Committee (Vidco) officials, heads of public sector rural institutions within the district in sectors such as education, health, environment, agriculture and natural resources conservation. The third dimension of a local leader is that of representatives of private sector institutions at the local (district and sub-district) levels, including Non-Governmental Organizations (NGOs) and donor agencies. Finally, a local leader in this analysis is envisaged as leader of a religious or political organization at the village, ward or district level.

The definition of community resilience adopted in this study functionally consists of five major components: "Communities are said to be resilient to disasters if they are capable of:

- Responding, acting or reacting appropriately to disturbances, emergencies, catastrophes or predicaments;
- Surviving through disaster situations (minimizing losses or disruptions to agricultural activities, infrastructure, incomes and livelihoods);
- Coping with, adapting to, bearing and tolerating common, recurrent and severe disasters or calamities;
- Assisting or depending on one another during disaster episodes; and
- Efficiently and effectively preparing for, responding to, and recovering from the adverse impacts of a disaster" (Kimhi et al., 2013; Aharonson-Daniel et al., 2013).

Research objectives

The main objective of the study was to analyze the relationship between the resource mobilization and utilization capacity of local leaders and community resilience to agriculture-threatening hydro-climatic natural disasters, with particular focus on droughts and floods in Lower Muzarabani District of the Zambezi Valley in Zimbabwe. Resource mobilization and utilization are represented in the CCRAM model by the preparedness factor. The rationale is that efficient and effective resource mobilization and utilization get a community disaster-prepared. The specific objectives were to:

- Analyze the efficiency and effectiveness of resource mobilization and utilization activities in facilitating resilience to disasters in the community;
- Assess the level of community resilience using community resilience scores under different disaster resilience leadership scenarios; and
- Determine the implications of resource mobilization and utilization for effective resilience building.

2. Research methodology

2.1. Sampling Method and Sample Size

The study province and district were identified and selected in close consultation with the Department of Civil Protection, which has up-to-date data on areas that are most prone to natural disasters in Zimbabwe. Lower Muzarabani District in Mashonaland Central Province was selected because of the prevalence of two hydro-climatic disasters, namely floods and droughts, which have threatened the profitability, viability and sustainability of agricultural operations in the district (Department of Civil Protection, 2019) . Lower Muzarabani is situated in Natural Region IV of Zimbabwe. Natural Region IV is characterized by an arid to semi-arid climate with low annual precipitation of 450-650mm and frequent droughts. Because it occupies an undulating lowland area below a mountainous high rainfall region to the south (Mavuradonha Mountain Range), Lower Muzarabani also experiences flooding during most rainy seasons. A brief literature survey also substantiated Lower Muzarabani as a suitable study district (Manyani and Bob, 2018; Manyena et al., 2013; Bongo and Manyena, 2015).

Four important considerations were taken into account in arriving at the final practical, workable sample size for the Lower Muzarabani CCRAM household survey. These considerations were

- The need to have a sample size large enough to obtain statistically significant results;
- The requirement to have a questionnaire of adequate length to cover all aspects of the analytical framework;
- The necessity to adequately address all the objectives of the study using primary data from the household survey; and
- The availability of resources to undertake the survey, taking particular cognisance of the constraints imposed by the limited budget available for field data collection.

The multi-stage sampling method was used in selecting the 200 households for the survey, as follows. At the top-most sampling stage, randomization was performed at district level to select 5 wards (i.e. 35.0 percent of the total number of flood- and drought-prone wards in the district). The selected wards were (in the order in which they were selected) Ward 8, Ward 4, Ward 6, Ward 7, and Ward 5. At the next sampling stage, one village was randomly chosen from each of the 5 selected wards. At the final sampling stage, one cluster of adjacent households was selected from each of the five selected villages, starting at an arbitrarily chosen point at the edge of each village, and interviewing adjacent households from that point until the required number of households was reached for that cluster. Cluster sizes were determined using the probability proportional to size sampling method (ERCS/SRC, 2014). In this context, the number of households in each cluster was obtained by the formula: $C_t = (n_t / n_{TOT})*200$ where C_t = cluster size in ward t; n_t = number of households in ward t; and n_{TOT} = total number of households in all the selected wards. Using this formula, the cluster sizes for the sampled wards were as follows: C_8 = 63 households; C_4 = 51 households; C_6 = 22 households; C_7 = 13 households; and C_5 = 51 households, giving a total sample size of 200 households. Data on ward sizes were obtained from the District Administrator for Lower Muzarabani (District Administrator, 2019).

2.2. Data Collection and Analysis Methods Used in the Survey

The "*a-priori approach in retrospect*" was used in data collection and analysis. Respondents were requested to indicate their perceptions of the efficiency and effectiveness of resource mobilization and utilization activities of local leaders and communities. The perceptions were based on their responses to the "preparedness" factor in the CCRAM model as a determinant of community resilience, the rationale for this being that resource mobilization and utilization activities get a community "disaster-prepared". In this analytical technique, interviewees were requested to imagine that they were living in the Lower Muzarabani community during the period of operation of three relevant pieces of legislation, namely the Civil Protection Act 1989, the Civil Protection Act of 2001 and the Disaster Risk Management (DRM) Bill of 2011. Based on the disaster management provisions of these pieces of legislation, which are considered useful proxies of disaster-resilience leadership scenarios 1, 2 and 3 respectively (see below), respondents were asked to rate the extent to which they agreed or disagreed with each item in the Preparedness Factor in the CCRAM model under each scenario, using a 5-point Likert scale. The analyses of correlation and linear regression combined responses to all seven items of the preparedness factor to come up with a single independent variable "Preparedness", which was then correlated and linearly regressed against the single dependent variable "Overall Community Resilience" whose overall score combined the responses to all the 28 items of the five factors in the CCRAM model. Correlation coefficients of magnitude equal to or greater than 0.5 were an indication of a strong functional relationship between the dependent variable ("Overall Community Resilience") and independent variable ("Preparedness"), while linear regression coefficients of magnitude greater than or equal to 2 also indicated a strong functional relationship between the dependent and independent variables.

The preparedness factor is the factor in the model that most closely represents resource mobilization and utilization by local leaders and community members. "Preparedness" in the CCRAM Model depicts the readiness of local leaders and communities to react appropriately to disaster situations. It also reflects their capacities and abilities for coping and adaptation (both being constituent elements of community resilience) when they encounter disaster events. These elements of preparedness (i.e. readiness to react appropriately to disasters; and capacities and abilities for coping and adaptation) largely depend on the degree or extent to which various forms of community resources or capitals have been mobilized and utilized by local leaders and communities for building resilience to disasters. The greater the degree of resource mobilization and utilization, the better is the community prepared or equipped to deal with the effects of a disaster. In other words, community resource mobilization and utilization enhance community disaster preparedness and community resilience. Thus, resource mobilization and utilization on the one hand, and disaster preparedness and community resilience on the other, are inextricably linked.

Put in alternative terms, more effective and efficient resource mobilization and utilization activities equip community leaders and members with the means to achieve higher levels of disaster preparedness and community resilience to disasters. Therefore, an assessment of the status and dynamics of the "preparedness" factor in the CCRAM Model is also a way of assessing or "investigating the capacity of local leaders and communities to mobilize and utilize resources for enhancing community resilience to hydro-climatic disasters". The status and dynamics of disaster preparedness are very good indicators of the efficiency and effectiveness of resource mobilization and utilization activities.

The items in the Preparedness Factor in the CCRAM model are Item 3 ("My community is prepared for an emergency situation"), Item 8 ("Residents are aware of their roles in an emergency"), Item 13 ("There are sufficient facilities for public protection (e.g. shelters) in the community"), Item 17 ("My family and I are acquainted with the emergency system in my district (to be activated in times of emergency")), Item 21 ("The residents of my community will continue to receive district services even in an emergency"), Item 23 ("The health services in my district will continue to function appropriately in an emergency situation"), and Item 27 ("In an emergency, the public transportation system where I live will function").

The main features of the three disaster-resilience leadership scenarios are as follows. Under the Civil Protection Act of 1989 (representing Scenario 1 of disaster resilience leadership) local leaders, local communities and grassroots organizations in Lower Muzarabani were not accorded the opportunities, autonomy and independence to plan and implement disaster resilience, disaster risk reduction and disaster management activities at the local level (Manyani and Bob, 2018). The Disaster Risk Management Bill of 2011, in contrast to the earlier disaster resilience Acts, proposes extensive decentralization and devolution of power, authority, resources and decision-making responsibilities from the national level to local authorities. This Bill represents Scenario 3 of disaster resilience leadership. Under this scenario local leaders at district and sub-district levels, as well as the local leaders at ward and village levels, will be actively involved in assisting the affected communities in preparing for, responding to, and recovering from the impacts of natural disasters such as droughts and floods. In other words, under Scenario 3 of disaster-resilience leadership, local leaders at district, sub-district, ward and village levels play an active role in building community resilience to disasters. Scenario 2 of disaster resilience leadership borrows features and functions partly from Scenario 1 and partly from Scenario 3. It is represented in Zimbabwe's legislative and policy framework by the Civil Protection Act of 2001.

The selected analytical model (the Conjoint Community Resilience Assessment Model - CCRAM), unlike other community resilience/ leadership models (e.g. the Hannah Model and the Meijerink-Stiller Model), incorporates community resilience for the complete disaster cycle, starting with the pre-disaster phase and proceeding to the disaster and post-disaster phases. An additional merit for CCRAM is that it incorporates both leadership and social components of community capital as determinants of community resilience to disasters. The CCRAM also provides a detailed research methodology that can be used for testing empirical data. More importantly, the Delphi technique and the Nominal Group technique which were central to the development of the CCRAM Model ensured that it drew a major input from experts, making it a highly credible and relevant framework for purposes of assessing, anticipating and predicting community resilience to disasters (Aharonson-Daniel et al., 2013). For these reasons, the Conjoint Community Resilience Assessment Model (CCRAM) was selected from among the available theoretical frameworks to address the objectives of the study.

The CCRAM Household Questionnaire was used to collect data in face-to-face interviews among the sampled households in Lower Muzarabani. The original CCRAM Model structure, consisting of 5 disaster-resilience factors (Leadership, Collective Efficacy, Preparedness, Place Attachment, and Social Trust) was used as the basis for the survey. A 5-point Likert Scale was added as 5 separate columns numbered 1 to 5, to the right of the "Item" column, to convert the CCRAM Model structure into a CCRAM Household Questionnaire. The points on the Likert Scale were as follows: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; and 5 = very strongly agree.

The CCRAM Household Questionnaire was administered to household members in the study area. The Questionnaire was divided into three parts to capture data for three different time frames, namely the periods of operation of the Civil Protection Act of 1989, Civil Protection Act of 2001, and the Disaster Risk Management Bill of 2011. This was done to cater for the different disaster-resilience leadership scenarios prevailing in each time frame at the local level.

During data analysis, the strength of the functional relationship between the preparedness factor and community resilience was investigated using the Pearson Bivariate Correlation Analysis and Linear Regression Analysis. The interpretation of correlation coefficients with regard to the indicative strength of the relationship between the dependent variable (community resilience) and independent variable (preparedness, representing resource mobilization and utilization in the CCRAM model) was based on the following scale according to Cohen (1988): 0.5-1 (high/strong); 0.3-0.49 (medium/slightly strong); 0.1-0.29 (small/weak); and 0-0.09 (none). The interpretation of linear regression coefficients with regard to the indicative strength of the relationship between the dependent variable (community resilience) and independent variable (preparedness, representing resource mobilization and utilization in the CCRAM model), was as follows. If the results of linear regression analysis exhibited a linear regression coefficient of 2 or more, then the functional relationship between preparedness and overall (CCRAM total) community resilience was considered as strong; if the linear regression coefficient between the two variables was less than 2, then the functional relationship between them was considered as weak (Muzari, 1997).

3. Survey results

The Pearson Bivariate Correlation Analysis and Linear Regression Analysis were used to analyze the functional relationship between preparedness (representing resource mobilization and utilization) and overall community resilience for Scenario 1, Scenario 2 and Scenario 3. The results of the survey are presented under the sub-headings Data Presentation and Data Analysis.

3.1. Data Presentation

This section presents data on the relationship between resource mobilization and utilization capacity (through its impact on the preparedness factor) on the one hand, and overall (CCRAM total) community resilience on the other.

Table 1 Correlation between preparedness and overall (CCRAM total) community resilience for scenario 1

		Resilience Score (Total) for Preparedness, Scenario 1	**CCRAM Resilience Score (Total), for Scenario 1**
Resilience Score (Total) for Preparedness, Scenario 1	Pearson Correlation	1	0.854**
	Sig. (2-tailed)		0.000
	N	200	200
CCRAM Resilience Score (Total), for Scenario 1	Pearson Correlation	0.854**	1
	Sig. (2-tailed)	0.000	
	N	200	200
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Survey data, 2019

Table 2 Correlation between preparedness and overall (CCRAM total) community resilience for scenario 2

		Resilience Score (Total) for Preparedness, Scenario 2	**CCRAM Resilience Score (Total), for Scenario 2**
Resilience Score (Total) for Preparedness, Scenario 2	Pearson Correlation	1	0.892**
	Sig. (2-tailed)		0.000
	N	200	200
CCRAM Resilience Score (Total), for Scenario 2	Pearson Correlation	0.892**	1
	Sig. (2-tailed)	0.000	
	N	200	200
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Survey data, 2019

Table 3 Correlation between preparedness and overall (CCRAM total) community resilience for scenario 3

		Resilience Score (Total) for Preparedness, Scenario 3	**CCRAM Resilience Score (Total), for Scenario 3**
Resilience Score (Total) for Preparedness, Scenario 3	Pearson Correlation	1	0.906**
	Sig. (2-tailed)		0.000
	N	200	200
CCRAM Resilience Score (Total), for Scenario 3	Pearson Correlation	0.906**	1
	Sig. (2-tailed)	0.000	
	N	200	200
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Survey data, 2019

Table 4 Linear regression between preparedness and overall (CCRAM total) community resilience for scenario 1

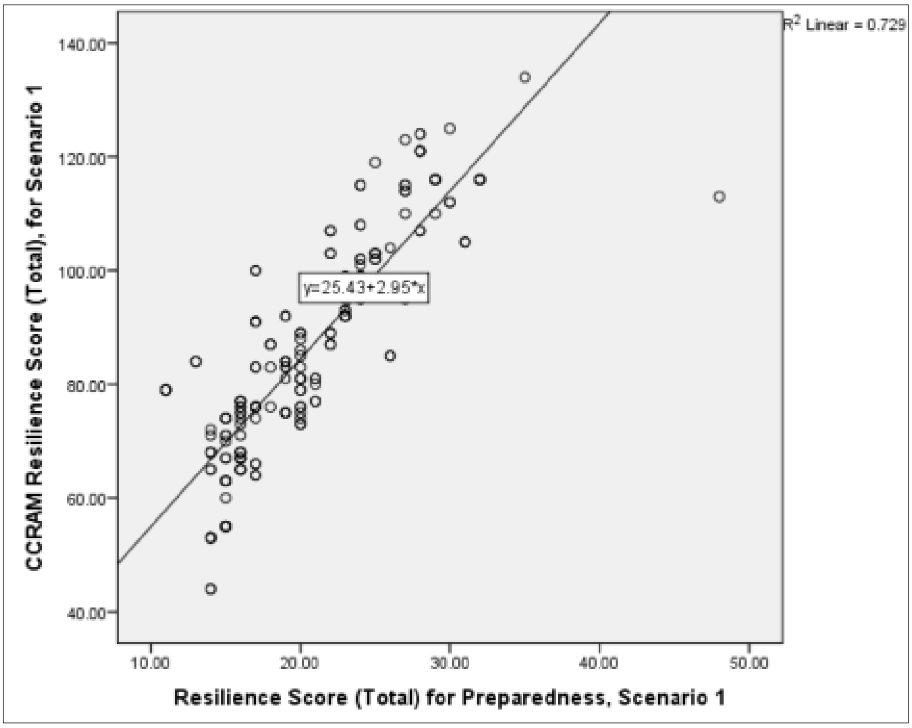
Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	25.434	2.704		9.407	0.000
	Resilience Score (Total) for Preparedness, Scenario 1	2.951	0.128	0.854	23.082	0.000
a. Dependent Variable: CCRAM Resilience Score (Total), for Scenario 1						

Source: Survey data, 2019

Table 5 Linear regression between preparedness and overall (CCRAM total) community resilience for scenario 2

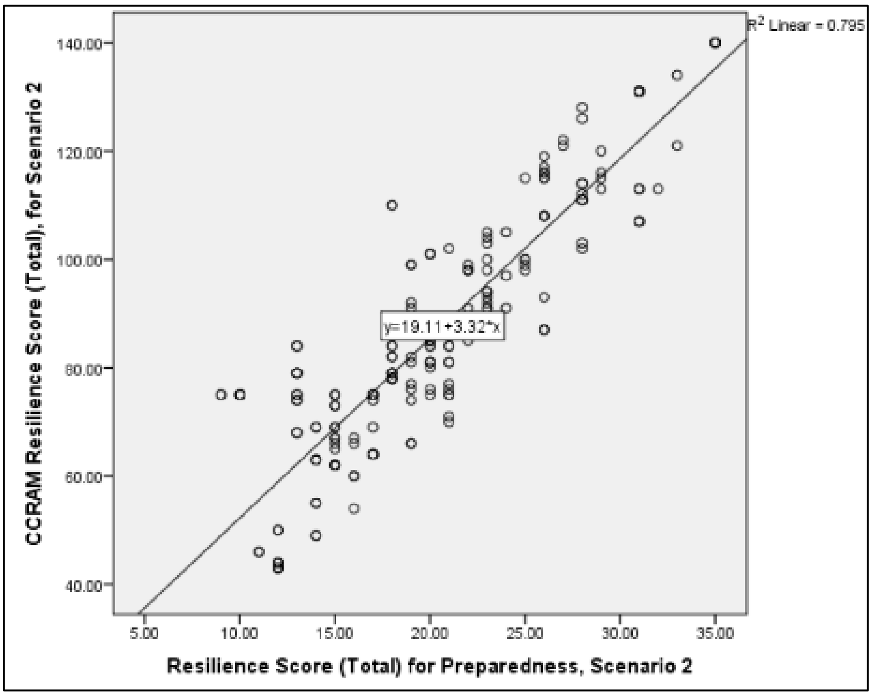
Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	19.109	2.540		7.522	0.000
	Resilience Score (Total) for Preparedness, Scenario 2	3.317	0.120	0.892	27.747	0.000
a. Dependent Variable: CCRAM Resilience Score (Total), for Scenario 2						

Source: Survey data, 2019



Source: Survey data, 2019

Figure 1 Linear Regression Plot between Preparedness and Overall (CCRAM Total) Community Resilience for Scenario 1



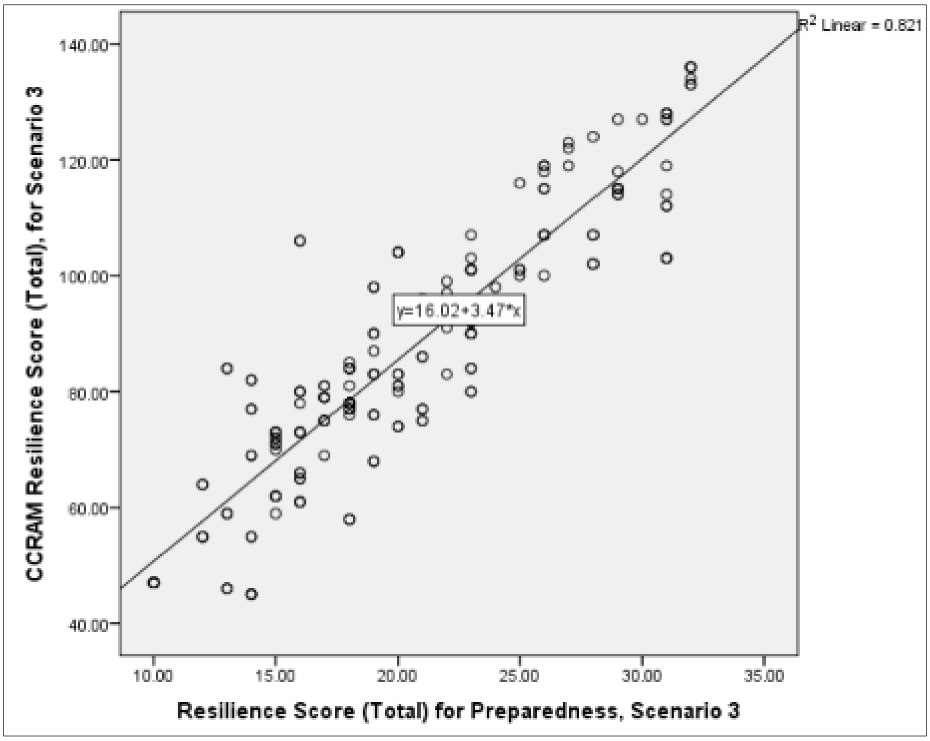
Source: Survey data, 2019

Figure 2 Linear Regression Plot between Preparedness and Overall (CCRAM Total) Community Resilience for Scenario 2

Table 6 Linear regression between preparedness and overall (CCRAM total) community resilience for scenario 3

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	16.015	2.448		6.543	0.000
	Resilience Score (Total) for Preparedness, Scenario 3	3.474	0.115	0.906	30.160	0.000
a. Dependent Variable: CCRAM Resilience Score (Total), for Scenario 3						

Source: Survey data, 2019



Source: Survey data, 2019

Figure 3 Linear Regression Plot between Preparedness and Overall (CCRAM Total) Community Resilience for Scenario 3

3.2. Data Analysis

Analysis of the data presented in the preceding section shows that preparedness under Scenario 1 is very strongly positively correlated with overall community resilience under that scenario, since the correlation coefficient between the two variables is greater than +0.5 and the level of significance is very high. The Pearson Bivariate Correlation Analysis result is: (Pearson Correlation Coefficient r(200; scenario 1) = +0.854; pb = 0.000). The interpretation of this result is that the efficiency and effectiveness of resource mobilization and utilization activities (which influence disaster preparedness) by local leaders very strongly influence the level of overall community resilience to disasters (droughts and floods) in Lower Muzarabani under scenario 1.

In addition, preparedness under Scenario 2 is very strongly positively correlated with overall community resilience (Pearson Correlation Coefficient r(200; scenario 2) = +0.892; pb = 0.000). The interpretation of this result is that the efficiency and effectiveness of resource mobilization and utilization activities (which influence disaster preparedness) by local leaders very strongly influence the level of overall community resilience to hydro-climatic disasters (droughts and floods) in Lower Muzarabani under this scenario.

Under Scenario 3 preparedness is also very strongly positively correlated with overall community resilience under that scenario (Pearson Correlation Coefficient r(200; scenario 3) = +0.906; pb = 0.000). The interpretation of this result is that the efficiency and effectiveness of resource mobilization and utilization activities (which influence disaster preparedness) by local leaders very strongly influence the level of overall community resilience to hydro-climatic disasters (droughts and floods) under this scenario in Lower Muzarabani.

Results of the Linear Regression Analysis in Table 4 and Figure 1 show that preparedness is significantly positively associated with the CCRAM total resilience (since the linear regression coefficient exceeds the minimum threshold value of 2), at less than 1% level of significance under Scenario 1 (Linear Regression Coefficient B = 2.951; pb = 0.000). This means that the greater the efficiency and effectiveness of resource mobilization and utilization activities (which influence disaster preparedness), the greater the overall community resilience to disasters (droughts and floods) under Disaster-resilience Leadership Scenario 1 in the Lower Muzarabani community.

Analysis of the data presented in Table 4 and Figure 1 yielded the following Linear Regression Equation:

$$Y_{1(T)} = 2.951X_{1(P)} + 25.434$$

where:

$Y_{1(T)}$ = CCRAM Total Resilience Score for Scenario 1 (incorporating 5 resilience factors: Leadership, Collective Efficacy, Preparedness, Place Attachment, and Social Trust);

and $X_{1(P)}$ = Preparedness factor resilience score for Scenario 1.

Results of the Linear Regression Analysis in Table 5 and Figure 2 show that preparedness is significantly positively associated with CCRAM total resilience at less than 1% level of significance under scenario 2 (Linear Regression Coefficient B = 3.317; pb = 0.000). This implies that the greater the efficiency and effectiveness of resource mobilization and utilization activities (which influence disaster preparedness), the greater the overall community resilience to disasters (droughts and floods) under Disaster-resilience Leadership Scenario 2 in Lower Muzarabani.

The data presented in Table 5 and Figure 2 were used in deriving the following Linear Regression Equation:

$$Y_{2(T)} = 3.317X_{2(P)} + 19.109$$

where:

$Y_{2(T)}$ = CCRAM Total Resilience Score for Scenario 2 (incorporating 5 resilience factors: Leadership, Collective Efficacy, Preparedness, Place Attachment, and Social Trust);

and $X_{2(P)}$ = Preparedness factor resilience score for Scenario 2.

Results of the Linear Regression Analysis in Table 6 and Figure 3 show that preparedness is significantly positively associated with CCRAM total resilience at less than 1% level of significance under Scenario 3 (Linear Regression Coefficient B = 3.474; pb = 0.000). This implies that the greater the efficiency and effectiveness of resource mobilization and utilization activities (which influence disaster preparedness), the greater the overall community resilience to disasters (droughts and floods) in Lower Muzarabani under Disaster-resilience Leadership Scenario 3.

Analysis of the data in Table 6 and Figure 3 yielded the following Linear Regression Equation:

$$Y_{3(T)} = 3.474X_{3(P)} + 16.015$$

where:

$Y_{3(T)}$ = CCRAM Total Resilience Score for Scenario 3 (incorporating 5 resilience factors: Leadership, Collective Efficacy, Preparedness, Place Attachment, and Social Trust);

and $X_{3(P)}$ = Preparedness factor resilience score for Scenario 3.

4. Discussion

Survey results indicated that the efficiency and effectiveness of resource mobilization and utilization (represented in the CCRAM model by the preparedness factor) by local leaders very strongly influence the level of overall community resilience to the hydro-climatic natural disasters of droughts and floods under Scenario 1, Scenario 2 and Scenario 3. In addition, it was found that higher levels of efficiency and effectiveness of resource mobilization and utilization activities of local leaders led to greater disaster-preparedness and community resilience to disasters. These results were consistent in the use of both the Pearson Bivariate Correlation Analysis and Linear Regression Analysis.

These results led to the acceptance of the null hypothesis which stated that the practices of local leaders (in this case resource mobilization and utilization activities) have a significant influence on the level of community resilience to hydro-climatic disasters. Survey results showed that the efficiency and effectiveness of resource mobilization and utilization activities very strongly positively influence the level of community resilience to hydro-climatic natural disasters (droughts and floods) in Lower Muzarabani.

Related literature supports and expounds on these findings. In the literature, it is stated that the resource mobilization and utilization activities in the community constitute mobilizing and utilizing several types of resources or "capitals". These include natural resources, financial resources, physical resources, human resources, social resources, and technological resources. According to Stokols et al. (2013), Elasha et al. (2005), and Margis (2007), natural resources comprise land, water, and biological resources such as trees, pastures, and biodiversity. The second form of community resources that local leaders and local communities can mobilize and utilize for building community resilience to disasters are financial resources (Stokols et al., 2013; O'Rourke, 2007; Elasha et al., 2005; Margis, 2007) which consist of stocks of money or other savings in liquid form such as livestock, income levels, income distribution, financial savings, and access to credit.

Physical resources can also be mobilized and utilized by local leaders and their communities in efforts to build community resilience (Elasha et al., 2005; Margis, 2007; Coleman, 1990). They include resources that are created by economic production, such as roads, irrigation works, electricity, reticulated equipment, and housing. Human resources can also be mobilized and utilized for community resilience, and they consist of the quantity and quality of labour available, such as skills, health, knowledge and information of community members (Stokols et al., 2013; Coleman, 1988; Abramson et al., 2015; Elasha et al., 2005; Margis, 2007). Human resources are created or mobilized through changes in persons (e.g. educational experiences) that equip them with new skills and capabilities that enable them to act in new ways (Coleman, 1988). Human resources are utilized to develop and access other resources and to develop the community. In particular, they increase the efficiency of financial and built capital (Margis, 2007).

Local leaders and local communities can also mobilize and utilize social resources for building community resilience to hydro-climatic disasters (Dynes, 2005; Coleman, 1990; Savage et al., 2005; Field, 2004). Social resources encompass the ability to call on friends or relatives in times of need, support from trade or professional associations such as farmers' unions, and political claims on chiefs or politicians to provide assistance to community members affected by disasters (Elasha et al., 2005). Finally, technological resources which can be mobilized and utilized for community resilience consist of machinery, equipment, and digital/communication devices including telephone systems, computing and mobile communications equipment, and fiber optic technology (Stokols et al., 2013).

5. Conclusion

The following points form a conclusion to the data presentation, data analysis and discussion sections covered in this paper. Survey results indicated that the efficiency and effectiveness of resource mobilization and utilization (represented in the CCRAM model by the preparedness factor) by local leaders and local communities very strongly influence the level of overall community resilience to the hydro-climatic natural disasters of droughts and floods under Scenario 1, Scenario 2 and Scenario 3.

In addition, it was found that the greater the efficiency and effectiveness of resource mobilization and utilization activities of local leaders and local communities, the greater the disaster-preparedness, and the higher the community resilience to disasters. These results led to the acceptance of the null hypothesis which stated that the practices of local leaders (in this case resource mobilization and utilization activities) have a significant influence on the level of community resilience to hydro-climatic disasters. Analysis of survey data in this study showed the existence of a strong, positive relationship between the capacity (efficiency and effectiveness) of resource mobilization and utilization activities on the one hand, and the level of community resilience to disasters on the other. The implementation of measures to promote the efficiency and effectiveness of resource mobilization and utilization among local leaders and local communities is therefore likely to result in higher levels of community resilience to disasters in Lower Muzarabani and similar areas.

The recommended measures for enhancing resource mobilization and utilization are associated with manipulating the various resource forms including natural resources, financial and economic resources, physical resources, human resources, social resources, and technological resources. To effectively and efficiently mobilize natural resources for building community resilience to disasters, local leaders and their communities should introduce and sustain relevant programmes such as conservation and sustainable utilization of forest products, both timber and non-timber; afforestation and reforestation; terracing of arable lands on hilly or mountainous terrain; agro-forestry; commercial community forestry; conservation agriculture; micro-watershed management; small scale irrigation; and participation in environmental education, environmental health, sanitation and rehabilitation programmes.

Economic or financial resources can be mobilized and utilized through the establishment and operation of a savings-credit system based on community organizations. The amounts of money saved are loaned out to members for their social and business needs. Economic or financial resource mobilization can also include the implementation of various income generating activities, infrastructure development, and hazard mitigation measures and practices that are funded through locally mobilized funds. Human resource mobilization activities in the area of indigenous and modern skills development include the promotion of skills to run community organizations and functional groups; implementation, operation and management of infrastructure; and skills development to carry out various income generating projects like crop production, animal husbandry, off-farm and non-farm activities, and marketing. Skills could also be developed that directly tackle emergencies, hazards and disaster preparedness, response and recovery.

Social resource mobilization and utilization can be cultivated through recreational activities, religious and spiritual gatherings, and political and institutional affiliations. Other activities to mobilize and utilize social resources may include the development of local organizations and institutional set-ups such as the formation of community organizations and promoting women's voices in decision making processes. Mobilization and utilization of technological capital or resources for building community resilience to disasters may include technology promotion and know-how transfer. Emphasis should be placed on technologies that enhance productivity, reduce the drudgery of rural life, and help in restoring the natural environment. Economical and viable technologies that offer more benefits and protect the community from the adverse impacts of natural disasters (e.g. irrigation, water harvesting and conservation agriculture technologies) should be promoted. Pro-poor and pro-women technologies with less bulkiness and possessing built-in operational and handling safety mechanisms should also be given high priority in selection and implementation in Lower Muzarabani and similar areas.

The expeditious and effective implementation of the above measures can significantly improve the capacity of local leaders and communities for resource mobilization and utilization. Ultimately this should lead to higher community resilience to the prevailing hydro-climatic disasters of droughts and floods in Lower Muzarabani District and areas with similar agro-ecological, demographic, socio-economic, cultural and political characteristics.

Compliance with ethical standards

Disclosure of conflict of interest

There is no conflict of interest to disclose.

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