SURFACE WATER FLOODING SCENARIO IN GASSAMU VILLAGE: ISSUES, CHALLENGES AND MANAGERIAL TECHNIQUES

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Abstract

The study was an attempt to assess issues, challenges and managerial techniques involved in the recent surface water flooding in Gasamu. Questionnaire was design and distributed randomly to 34 respondents across 15 settlements to collect the data. Descriptive, inferential statistics and IBM SPSS software was used to analyze and interpret the data. From the results obtained, it was found that most affected areas by the flood were; Anguwar Kari, Anguwar Mallam Nuhu, Anguwar Ali Dan Kano, and Anguwar Sani Danau. The affected areas were mostly dominated by Hausas whose on arrival habited the out skate of the research area. Recommendation for further research were identified and proposed.

Introduction

Flood is one of the natural disasters that cause serious damages to properties, environment and human livelihood. (Wikipedia, 2023). In Nigeria, the pattern is similar with the rest of the world, flooding in various parts of Nigeria have forced out millions of people from their homes, destroyed businesses, polluted water resources and increased the risk of diseases (Baye et al, 1988). Flood is an overflowing or irruption of great body of water over land not usually submerged (Oxford English Dictionary, 2010). Flooding is the most common of all environmental hazards and it regularly claims over 20,000 lives per year and adversely affected around 75 million people world-wide (Smith, 1996).

Gasamu is a village in Jakusko local government area of Yobe state. Situated closed to the village of Amshi and Guyik located at latitude 12.7291^0 or 12^04345 north and longitude 10.9694^0 or $10^058'10$ east with an evaluation of 341square meters or 1,119square feet (Mapcarta, 2023).



Fig 1.1 A Section of Gasamu village (picture taken by the researcher, 2023)

The main occupation of people living in the area is farming. The cash crop is Sesame (Ridi) while the Food Crops Are Maize, Millet, and Guinea corn. Some of the villagers engage in fishing while the Fulani are cattle breeders. (the village head, 2023). The major tribe in the village is Bade followed by the Hausas which dominate almost half of the population, then the Fulani which are very few, (the village head, 2023).

The district head of the village (Lawan) is Lawan Bukar Musa, a retired inspector of police asserted that, the village has fifteen domains namely; Anguwar Lawan, Anguwar Man-Nuhu, Anguwar Liman, Anguwar Ya-maha, Anguwar Bulamele, Anguwar Grema, Anguwar Barde, Anguwar Isari. All these areas are mostly dominated by the Bade tribe followed by Anguwar Sarkin Hausawa, Ali Dan –Kano Anguwar Sadiku, Anguwar Kafinta, Anguwar Sarkin Fawa, Anguwar Baban Dauda , and Anguwar Sani Danau which were dominated by Hausa tribe.

Statement of the research problem

Water flooding in Gasamu is not something common, it rarely happens. And this is as a result of heavy rainfall. Despite the heavy rainfall, building of houses in water ways is another factor that

contribute to the flood scenario (the village head, 2023). The recent flood in Gasamu has impacted negatively on the people by disrupting their social life, farm activities, forcing movement of people, goods and services. (the village head, 2023). The effects of flooding in some part of Gasamu village include submerging of buildings, farmlands and walkways. (the village head, 2023).



Fig 1.2 A Cross Section of Gasamu village submerged by flood (picture taken by the researcher, 2023)



Fig 1.3 Gasamu village flood affected area (picture taken by the researcher, 2023)

The motivation of this study is to assess and evaluate the degree of vulnerability in order to protect life, health, safety and welfare of the community residing in the area in the future. The study also focused on evaluating how the flood affects schools and pupils/students in the area.

Introduction

This chapter is about the description of the collection, design, population and procedures used to collect sample size of the study area.

Research design

The study is design to evaluate the surface water flooding scenario in Gasamu village. Issues, challenges and managerial techniques will be the main focus. Survey method will be used to obtain data.

Population of the study

The population size considered in this research includes the residence in the four most affected areas in Gasamu which are Anguwar Isari, Anguwar Man-Nuhu, Aguwar Ali-Dan kano, and Anguwar Sani Danau. A total of 10 people will be selected from each of the affected area, to cover up the research sample.

Sampling size

After deciding on what information or data to collect, the next step is to decide from whom and where to collect the data. Usually, small representative group are what researcher used in order to ensure the data collected provides suitable close estimate of the characteristics of the population. These representative groups are known as sample. According to Asike (2004), sampling techniques refers to the method use to select a sample. There are various techniques of sampling, but for the purpose of this research, simple random sampling techniques will be used. In simple random sampling every element in the population has an equal opportunity to be selected.

Method of data collection

Method of data collection refers to the items that aid in collecting information; these instruments include questionnaire and interview (Illiyasu, 2017). The questionnaire is made up of systematically designed questions best on the research problems. In this study 40 questionnaires were distributed to cover the sample size.

Method of data analysis

The data was analyzed and explain in a simple form. The techniques adopted were descriptive, inferential statistics and IBM SPSS.

Results and discussion

This chapter deals with data presentation, analysis and discussion of the major findings. The data presented here were obtained from the primary and secondary sources. All the information presented here was based on the research questions formulated for the study.

Data Presentation, Analysis and Interpretation

The results are hereby presented in the order in which the research questions have been stated. Fourty (40) copies of the questionnaires were distributed out of which thirty four (34) were duly filled and returned for analysis. The Decision rule of 2.50 are guidelines or criteria that help guide decision-making in the analysis of data, The purpose of a decision rule is to provide a systematic way to make decisions or draw conclusions based on the results of an analysis; any mean of 2.50 and above is consider accepted otherwise rejected. The researcher used IBM SPSS statistics 25 program for the analysis. The table includes the following information for each item:

1. S/N: Serial number or item number.
2. Items: The specific question or statement being assessed.
3. N: The number of respondents who answered the question.
4. Mean: The mean (average) response on a numerical scale.
5. S. Dev: The standard deviation, which measures the variability or spread of responses.
6. Decision: The judgment made based on the analysis.

Research question one

What are the causes of the recent surface water flooding in Gasamu?

Table 1: The causes of the recent surface water flooding in Gasamu

S/N	Items	N	Mean	S.Dev	Remark
1	Do you think that climate change is among the causes of the surface water flooding in	34	2.826	0.448	Accept

	Gasamu?				
2	Do you think that heavy rainfall is the causes of the surface water flooding in Gasamu?	34	2.721	0.410	Accept
3	Do you think that building on water ways are among the causes of the surface water flooding in Gasamu?	34	2.632	0.475	Accept
4	Do you think that deforestation and overgrazing contributes to causing of flooding in Gasamu?	34	2.526	0.448	Accept
	Grand Mean= 2.67625				

Decision Rule 2.50

The Descriptive statistics in table 1 above showed the result of data used to examine the possible causes of the surface water flooding in Gasamu. Thirty four (34) respondents participated in the study. Here's a summary of the findings: **Item 1: climate change**: Out of the 34 respondents, 2.826 on average agreed that climate change is among the causes of the surface water flooding in Gasamu. The standard deviation (S.Dev) is 0.448, suggesting a moderate level of agreement among respondents on this cause. **Item 2: heavy Rainfall**: On average, 2.721 respondents out of 34 believed that heavy rainfall is the cause of the surface water flooding in Gasamu. The standard deviation is 0.410, indicating a moderate level of agreement. **Item 3: building on Waterways**: Respondents averaged a score of 2.632, indicating agreement that building on waterways is among the causes of the flooding. The standard deviation is 0.475, suggesting some variation in responses but generally, an agreement. **Item 4: deforestation and Overgrazing**: On average, 2.526 respondents out of 34 thought that deforestation and overgrazing contribute to flooding in Gasamu. The standard deviation is 0.448, showing a moderate level of agreement. The grand mean, which is the average of all the responses across these questions, is calculated as 2.67625. This value suggests a moderate level of agreement among respondents that these factors (**climate change, heavy rainfall, building on waterways, and deforestation/overgrazing**) had indeed contributed to the surface water flooding in Gasamu.

These findings suggest that there is general a consensus among the respondents that multiple factors, including climate change and land-use practices, play a role in causing surface water flooding in Gasamu. Further analysis and research may be needed to explore these factors in

more detail and assess their relative contributions to the flooding. In addition, mitigation and adaptation strategies can be developed based on these findings to address or reduce the impact of flooding in the region.

Research Question Two

What are the problems associated with the surface water flooding in Gasamu community?

Table 2: The problems associated with the surface water flooding in Gasamu community

S/N	Items	N	Mean	S.Dev	Remark
5	Number of houses destroyed by the flooding disaster	34	3.47	0.861	Accept
6	Do you think that flooding has a negative impact on the health of people in Gasamu?	34	2.50	0.000	Accept
7	Do you think that flooding has a negative impact on the agricultural produce in Gasamu?	34	2.62	0.327	Accept
8	Does the flood affect the transportation system in Gasamu?	34	2.03	0.171	Reject
Garand Mean 2.6550					

Decision Rule 2.50

The Descriptive statistics in table 2 above showed the result of data used to examine the problem associated with the surface water flooding in Gasamu. Thirty four (34) respondents participated in the study. Here's a summary of the findings: **Item 5: number of houses destroyed by the flooding disaster (Mean: 3.47, S.Dev: 0.861.** The mean of 3.47 indicates that, on average, respondents perceive a relatively high level of houses being destroyed by flooding. The standard deviation of 0.861 suggests that there is some variation in responses, with some respondents reporting higher levels of house destruction and others reporting lower levels. **Item 6: impact of flooding on the health in Gasamu (Mean: 2.50, S.Dev: 0.000,**: The mean of 2.50 suggests that respondents perceive a moderate negative impact on the health in Gasamu due to flooding. The standard deviation of 0.000 indicates that responses are very consistent, with all respondents giving similar scores. **Item 7: impact of flooding on agricultural produce in Gasamu (Mean: 2.62, S.Dev: 0.327**: The mean of 2.62 indicates that respondents perceive a moderate negative impact on agricultural produce in Gasamu due to flooding. The standard deviation of 0.327

suggests that there is some variation in responses, with some respondents reporting a higher impact on agricultural produce and others reporting a lower impact. **Item 8: effect of flooding on the transportation system in Gasamu (Mean: 2.03, S.Dev: 0.171**: The mean of 2.03 suggests that respondents perceive a relatively lower negative impact on the transportation system in Gasamu due to flooding. The standard deviation of 0.171 indicates that responses are fairly consistent, with little variation among respondents. **Overall Mean (Grand Mean): 2.6550**: The overall mean of 2.6550 provides an average score across all the items, indicating that, on average, the problems associated with surface water flooding in Gasamu are moderate in severity.

The data analysis reveals that surface water flooding in the Gasamu community is associated with significant problems, particularly regarding house destruction, as well as moderate impacts on health and agricultural produce. However, the impact on the transportation system is perceived as relatively lower. These findings highlight the various challenges faced by the community due to flooding and can inform decision-makers and stakeholders in developing strategies to mitigate these problems in the future.

Research question three

How does the flooding event affect education in Gasamu?

Table 3: The flooding events affect education in Gasamu

S/N	Items	N	Mean	S.Dev	Remark
9	Does the flood hazard affect the educational system in Gasamu?	34	3.21	0.410	Accept
10	If the answer above is YES, please specify the ways it affect the educational system in Gasamu village……	34	flood hazard affects the educational system in the village Among other in the following ways: (i) Disruption to children's access to quality education during the event.		

					(ii)The impact of the floods on school's physical infrastructure.
11	For how long were school closed due to the surface water flooding disaster in Gasamu?	34	3.56	0.705	Accept
12	Does the flood cause damages to school facilities or educational materials?	34	3.41	0.500	Accept

Grand Mean=2.545

Decision Rule 2.50

The Descriptive statistics in table 3 above showed the result of data used to examine its negative impact on education in Gasamu community. Thirty four (34) respondents participated in the study. Here's a summary of the findings: **Item 9: does the flood hazard affect the educational system in the village? (Mean: 3.21, S.Dev: 0.410**: The mean score of 3.21 suggests that respondents perceive that the flood hazard significantly affects the educational system in the Gasamu village. The standard deviation of 0.410 indicates that there is some variation in responses, but generally, there is agreement that flooding has an impacted negatively on education. **Item 10: if the answer above is YES, please specify the ways it affect the educational system in Gasamu a**mong others in the following ways: (i) disruption to children's access to schools (ii) the impact of the floods on a school's physical infrastructure. **Item 11: for how long were school closed due to the surface water flooding disaster in Gasamu? (Mean: 3.56, S.Dev: 0.705:** The mean score of 3.56 indicates that respondents believe that schools were closed for a relatively extended period due to the surface water flooding. The standard deviation of 0.705 suggests that there is some variation in responses, with some respondents perceiving longer closures than others, but in the overall, there is agreement that closures were substantial. **Item 12: does the flood cause damage to school facilities and educational materials? (Mean: 3.41, S.Dev: 0.500:** the mean score of 3.41 suggests that respondents perceive that flooding causes significant damage to school facilities and educational materials. The standard deviation of 0.500 indicates that there is some variation in responses, but in the overall, there is agreement that flooding negatively impacts school infrastructure and materials. **Overall Mean (Grand Mean): 2.545**: The overall mean of 2.545 provides an average score across all the items, indicating that, on average, the flooding event significantly affects education in Gasamu. **Decision Rule (2.50)**: The decision rule of 2.50 is used to determine whether to accept or reject

a statement or hypothesis. In this case, all items in Table 3 are accepted as they have mean scores above 2.50, indicating that respondents perceive significant negative effects of flooding on education in Gasamu.

The data analysis reveals that respondents believe that flooding has a substantial negative impact on education in Gasamu. This impact includes disruptions to children's access to education, extended school closures, and damage to school facilities and educational materials. These findings highlight the importance of addressing the educational challenges posed by flooding in the community.

Research Question Four

How does one prevent the future occurrence of the surface water flooding in Gasamu community?

Table4: Prevent the future occurrence of the surface water flooding in Gasamu community

S/N	Items	N	Mean	S.Dev	Remark
13	Does any organization(s) provide emergency management responses on flooding disaster?	34	2.09	.288	Rejected
14	Can the provision of drainage help in combating the flood hazard in Gasamu?	34	3.32	.475	Accept
15	Do you presently have any disasters management plan?	34	1.41	.500	Rejected
16	Do you think that the construction of embankments can help to prevent future occurrence of the disaster?	34	3.95	.359	Accept
Grand Mean 2.6924					

Decision Rule 2.50

The Descriptive statistics in table 4 above showed the result of data used to examine ways by which future occurrence can be halt or reduce to the minimum. Thirty four (34) respondents participated in the study. Here's a summary of the findings: **Item 13: does any organization(s) provide emergency management responses on flooding disaster? (Mean: 2.09, S.Dev: 0.288:** The mean score of 2.09 indicates that respondents are somewhat skeptical or do not strongly

agree that organization(s) provide effective emergency management responses to the flooding disaster. The standard deviation of 0.288 suggests that there is relatively low variation in responses, indicating a certain level of consensus among respondents that emergency responses may not be adequate. **Item 14: can the provision of drainage help in combating the flood hazard in Gasamu? (Mean: 3.32, S.Dev: 0.475:** The mean score of 3.32 suggests that respondents believe that the provision of drainage can be an effective measure in combating the flood hazard in Gasamu. The standard deviation of 0.475 indicates some variation in responses, but overall, there is agreement that drainage can help mitigate flooding. **Item 15 Do you presently have any disaster management plan? (Mean: 1.41, S.Dev: 0.500:** The mean score of 1.41 is relatively low; indicating that, respondents do not believe there is a strong presence of disaster management plans in the community. The standard deviation of 0.500 suggests that there is some variation in responses, but the overall sentiment is against the existence of comprehensive disaster management plans. **Item 16: do you think that the construction of embankments can help to prevent the future occurrence of the disaster? (Mean: 3.95, S.Dev: 0.359:** The mean score of 3.95 indicates that respondents strongly believe that the construction of embankments can be an effective measure in preventing future occurrences of the disaster. The standard deviation of 0.359 suggests that there is relatively low variation in responses, indicating a high level of consensus among respondents regarding the effectiveness of embankments. **Overall Mean (Grand Mean): 2.6924**: The overall mean of 2.6924 provides an average score across all the items, indicating that, on average, respondents have mixed opinions about preventing future surface water flooding in Gasamu.

The data analysis suggests that respondents have varying opinions on how to prevent future surface water flooding in the Gasamu community. While there is some level of agreement on the effectiveness of measures such as drainage and embankments, there is skepticism about the adequacy of existing emergency management responses and the presence of disaster management plans. This indicates the need for further investigation and potentially the development of comprehensive flood prevention strategies in the community.

4.3. Testing the hypothesis

4.3.1 Hypothesis 1: Climate change may be the causes of the surface water flooding in Gasamu

Table: 5 Chi-square (X^2) analysis showing climate change and the surface water flooding in Gasamu

S/N	Items	N	Mean	S.Dev	X^2	df	p	Rem.
1	Do you think that climate change is among the causes of the surface water flooding in Gasamu?	34	2.826	0.448	24.486[a]	1	0.060	accept the null hypothesis
2	Do you think that heavy rainfall is the cause of the surface water flooding in Gasamu?	34	2.721	0.410				
3	Do you think that building on water ways are among the causes of the surface water flooding in Gasamu?	34	2.632	0.475				
4	Do you think that deforestation and overgrazing contributes to flooding in Gasamu?	34	2.526	0.448				
Grand Mean= 2.67625								

($X^2_{(1)} = 24.486$, $p < 0.060$).

The findings from the analysis in the table 5 above show the calculated chi-square(X^2) value Climate change and the surface water flooding in Gasamu village. The *chi-square* analysis revealed that there was a significant association between the surface water flooding in Gasamu village (X^2) = 24.486, $p < 0.060$). Since the p-value is greater than our chosen significance level $\alpha = 0.05$, we can accept the null hypothesis, and conclude that there was a significant association between the surface water flooding in Gasamu village. Based on the results, we can state the following: Climate change is the cause of the surface water flooding in Gasamu village.

4.3.2. Hypothesis 2: Flooding has a negative impact on agricultural productivity**.**

Table:6 Chi-square (X^2) analysis showing negative impact of flooding on agricultural productivity

S/N	Items	N	Mean	S.Dev	X^2	df	p	Rem.
5	Number of houses destroyed by the flooding disaster	34	3.47	0.861	16.874	3	0 .091	accept the null hypothesis
6	Do you think that flooding has a negative impact on the health of people in Gasamu ?	34	2.50	0.000				
7	Do you think that flooding has a negative impact on the agricultural produce in Gasamu?	34	2.62	0.327				
8	Does the flood affect the transportation system in Gasamu?	34	2.03	0.171				
Garand Mean 2.6550								

(X^2) = 16.874, p <0 .091).

The findings from the analysis in table 6 above shows the calculated chi-square(X^2) value thus, flooding has a negative impact on agricultural productivity. The *chi-square* analysis revealed that there was a significant negative association between the impact of flooding on agricultural productivity (X^2) = 16.874, p <0 .091). Since the p-value is greater than our chosen significance level α = 0.05, we can accept the null hypothesis, and conclude that there was a significant negative association between the impact of flooding on agricultural productivity. Based on the results, we can state that flooding has a negative impact on agricultural productivity.

4.3.3. Hypothesis 3: The frequency of flooding in Gasamu has negatively affects the quality of education in the area.

Table: 7 Chi-square (X^2) analysis showing the frequency of the negative effects of flooding in Gasamu and quality of education in the area.

S/N	Items	N	Mean	S.Dev	X^2	df	p	Rem.
9	Does the flood hazard affect the educational system in the village?	34	3.21	0.410	8.311[a]	3	0.072	accept the null hypothes is
10	If the answer above is YES, please specify the ways it affect the educational system in Gasamu village…	34	flood hazard affects the educational system in the village Among other in the following ways: (i) disruption to children's access to quality education during (ii) the impact of the floods on a school's physical infrastructure.					
11	For how long were school closed due to the surface water flooding disaster in Gasamu?	34	3.56	0.705				
12	Does the flood cause damage to school facilities or educational materials?	34	3.41	0.500				
Grand Mean = 2.545								

(X^2) = 8.311[a], *p* <0 .072).

The findings from the analysis in the table 7 above shows the *chi-square* (X^2) analysis revealed that there was a significant negative association between the flooding in Gasamu and quality of

S/N	Items	N	Mean	S.Dev	X^2	df	p	Rem.
13	Do any organization provide	34	2.09	.288	4.700[a]	1	0.050	Accept the

education in the area (X^2) = 8.311, p <0 .072). Since the p-value is greater than our chosen significance level α = 0.05, we can accept the null hypothesis, and conclude that there was a significant negative association between flooding in Gasamu and quality of education in the area.

Based on the results, we can state that the frequency of flooding in Gasamu has negatively affects the quality of education in the area.

4.3.4. Hypothesis 4: Provision of Adequate drainage system may prevent the future occurrence of the surface water flooding in Gasamu.

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	emergency management responses on flooding disaster in Gasamu?							null hypothesis
14	Can the provision of drainage help in combating the flood hazards in Gasamu?	34	3.32	.475				
15	Do you presently have any disasters management plan the area?	34	1.41	.500				
16	Do you think that the construction of embankments can help to prevent future occurrence of the disaster in Gasamu?	34	3.95	.359				
Grand Mean 2.6924								

(X^2) = 4.700, p <0 .050).

The findings from the analysis in the table 8 above shows the calculated chi-square (X^2) value on whether provision of adequate drainage system may prevent the future occurrence of the surface water flooding in Gasamu The *chi-square* analysis revealed that there was a significant association between Adequate drainage system and future occurrence of the surface water flooding in Gasamu (X^2) = 4.700, p <0 .050). Since the p-value is greater than our chosen significance level α = 0.05, we can accept the null hypothesis, and conclude that there was a significant association between the adequate drainage system and future occurrence of the surface water flooding in Gasamu. Based on the results, we can state that provision of adequate drainage system may prevent the future occurrence of the surface water flooding in Gasamu.

Method of data analysis

Descriptive and inferential statistics were employed in this study; this is because the descriptive statistics is appropriate for answering survey research question items, in order to address the research question. The data collected from questionnaire ware analyzed using mean, and standard deviation. The research questions raised in the study were answered using descriptive statistics. Inferential were used to test the hypothesis. On the bases of making decision 250 were employed as a cut-off point because the researcher used 2 point-scale (Yes and No), and item 5

and 11 use 4 point-scale. They are weighted as 1 and 2, while the 4 scale are weighted as 4, 3, 2 and 1. Mean responses to any item less than cut-off point is regarded as disagree, otherwise is agreed. The software used for data analysis was IBM SPSS statistics 25 program for the analysis.

Summary

The study was an attempt to assess the causes, issues, and managerial techniques that may be employing to avert the future occurrence of the surface water flooding in Gasamu. Survey research method was used in obtaining the required data. The data obtained was analyzed and interpreted using SPSS. Based on the findings, it was revealed that, heavy rain fall, inadequate drainage facilities and building structures on water ways were the major causes of the flood disaster in Gasamu.

Conclusion

Although the flood disaster in the study area was a flash flood, mainly caused by heavy rainfall, and rainfall cannot be stopped. However, the risk and hazard of the flood disaster can be prevented and controlled through the application of precautionary measures in the area. The other side of the flood disaster is that, people living in the flood prone areas should learn to live with the flood and appreciate its positive impacts (irrigation farming, etc).

Recommendation

Based on the major findings, the following recommendations were made:

- Provision of adequate drainage system in Gasamu settlement must be provided by government of Yobe state (YBSG).
- There should not for any reason erection of buildings along water ways by any person or group of people.
- Authorities should imposed restriction of human activities along the floodable areas.
- There should be a proactive mitigation plan on ground in case of emergency (YBSG, NGO, etc)

Suggestions for further research

Considering time and financial constraints, as well as the scope of the study, the researcher was only able to say a little on the research topic. I therefore, recommend that further investigations should be carryout on the following areas:

- Managing flood in Yobe state using structural and non-structural measures
- Flooding risk assessment in some prone areas of Jakusko local government areas.

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