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Victim Perception On Issues And Relief Measures During Environmental And Natural Disasters: A Study Of Kodagu District

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Abstract:
Bavkground: *Kodagu, located in the Western Ghats of Karnataka, India, is highly susceptible to environmental disasters such as floods, landslides, and droughts. The relief measures provided during these disasters play a crucial role in mitigating the impact on affected communities. The perception of these damages, however, can vary depending on various factors such as socio-economic status, geographical location, awareness, and personal experience with past disasters. Understanding public perception of the damage caused by environmental disasters is crucial for disaster management, recovery, and building resilience.*
Materials and Methods: *Present study deals with the perception of the environmental/natural disaster victims in the Kodagu district. A total of 260 victims of disaster were selected from three taluks of Kodagu- Madikeri, Somvarpet and Viraj pet. They were personally contacted and requested to answer the questionnaire on issues and relief measures. Once the data were collected they were analysed by frequency, per cent and chi-square tests.*
Results: *Results revealed that 42.7% of the selected sample of victims lost completely their house, 47.3% of them lost partially, 5.8% of them lost connectivity and 4.2% of them suffered from other problems. 124 (47.7%) of the victims lost below 25% of their land, 94 (36.2%) of the victims lost 25 – 50% of their land, 22 (8.5%) of the victims lost 50 – 75% of their land and 20 (7.7%) of the victims lost their land completely. 183 (70.4%) of the victims stayed at rehabilitation centre by government, 60 (23.1%) of the victims stayed with relatives, 10 (3.8%) of the victims stayed at rented houses and 7 (2.7%) of the victims stayed with others. majority of the victims of Madikeri, followed by Virajpet and Somwarpet lived at rehabilitation centre by government.*
232 (89.2%) of the victims received relief measures from local governance, 181 (69.6%) of the victims received relief measures from state government 173 (66.5%) of the victims received relief measures from NGO's. 188 (72.3%) of the victims received emergency relief before 24 hours, 52 (20%) of the respondents received emergency relief within 1 – 2 days, 7 (2.7%) of the victims received emergency relief within 2 – 5 days and 13 (5%) of the victims received emergency relief after 5 days. A majority of 244 (93.8%) of the victims were rendered with house construction help and 16 (6.2%) of the victims were rendered with financial help to construct house. Rehabilation of the victims due to environmental disasters have been delineated.
Keywords: *Environmental and natural disasters, victims, Relief measures, Kodagu*

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I. Introduction

Kodagu, located in the Western Ghats of Karnataka, India, is highly susceptible to environmental disasters such as floods, landslides, and droughts. When such disasters occur, victims in the three taluks (administrative divisions) of Madikeri**,** Virajpet**, and** Somwarpet face significant challenges. The region's hilly terrain, dense forests, and heavy rainfall make it vulnerable to these disasters, which have caused significant damage in recent years, especially in 2018 and 2019. Relief measures in such areas focus on both immediate assistance and long-term recovery, involving local authorities, state and national agencies, and non-governmental organizations (NGOs). The relief measures provided during these disasters play a crucial role in mitigating the impact on affected communities. Environmental disasters, such as floods, earthquakes, wildfires, droughts, and landslides, cause significant damage to both the natural environment and human communities. The perception of these damages, however, can vary depending on various factors such as socio-economic status, geographical location, awareness, and personal experience with past disasters. Understanding public perception of the damage caused by environmental disasters is crucial for disaster management, recovery, and building resilience.

Communities also perceive the destruction of critical infrastructure, such as roads, bridges, schools, and hospitals, as a long-term hindrance to recovery and development. The loss of transportation routes and power lines disrupts daily life and hampers relief efforts (Benson * Clay, 2004). For rural communities, environmental

disasters like floods or landslides lead to the degradation of agricultural land, making it difficult to restore farming (Re, 2020). Victims of environmental disasters often experience trauma, anxiety, and depression, leading to long-term psychological scars. The social fabric of affected communities is also damaged, with displaced families facing difficulties in re-establishing their lives. Natural disasters can displace populations, leading to increased migration. Displaced persons may face challenges in adapting to new environments, leading to a perception of long-term social instability (Pelling, 2011). Public perception of environmental risks varies based on their understanding of vulnerability. For instance, communities living in flood-prone areas may develop heightened risk perception after frequent flooding, leading to increased demand for disaster preparedness. In some cases, especially in regions where environmental disasters are rare, communities may underestimate the risks. This can delay preparedness efforts and response to impending disasters (Slovic, 2000). Communities that perceive the government as responsive and well-organized during disaster recovery efforts often feel less devastated, as they have greater confidence in recovery. In contrast, communities with poor governance may feel abandoned and experience a sense of prolonged damage.

Before 2018, landslides were rare in Kodagu, limiting opportunities to study the experiences and traditional knowledge of landslide disaster survivors in the region. However, recent floods have become a recurring event, even affecting other districts in the Western Ghats. Despite the increasing frequency of landslides in India, particularly in Kodagu since 2018, very few studies have explored the experiences of survivors (Matpady, et al, 2023). Therefore, the current study was designed to explore the damagers and relief measures provided by government and other agencies, intended to strengthen the steps to be taken in possible disasters of this nature. The study also highlights need for the development of policy, guidelines and plans for environmental and natural disastsers in the future. .

II. Materials And Methods

A total of 260 victims of disaster were selected from three taluks of Kodagu- Madikeri, Somvarpet and Virajpet. The selection was based on the identification of victims by taking into consideration of reports and actual verification by the researcher in three taluks of Kodagu District. They were personally contacted and requested to answer the questionnaire on issues and relief measures to due to environmental and natural disasters. The questionnaire was designed by the researcher in consultation with the experts in the field considering all the possible options. Further, the questionnaire was subject to content validation too. Data collection took 6 months in three taluks of Kodagu district. Once the data were collected, they were analysed by frequency, per cent and chi-square tests.

III. Results

Table no 1: Presents frequency and per cent responses on various issues faced by victims in three taluks and results of chi-square tests and Table 2 presents frequency and per cent responses on various relief measures to victims in three taluks and results of chi-square tests

Issues	Responses		Taluks			Total	Test statistics
			Madikeri	Somwarpet	Virajpet		
Damage to house	Partial	F	37	45	41	123	X^2=16.304; p=.012
		%	46.2%	45.0%	51.2%	47.3%	
	Complete	F	39	37	35	111	
		%	48.8%	37.0%	43.8%	42.7%	
	Loss of communication	F	4	8	3	15	
		%	5.0%	8.0%	3.8%	5.8%	
	Others	F	0	10	1	11	
		%	0.0%	10.0%	1.2%	4.2%	
Land loss	<25	F	28	51	45	124	X^2=9.807; p=.133
		%	35.0%	51.0%	56.2%	47.7%	
	25-50	F	36	32	26	94	
		%	45.0%	32.0%	32.5%	36.2%	
	50-75	F	10	8	4	22	
		%	12.5%	8.0%	5.0%	8.5%	
	Complete	F	6	9	5	20	
		%	7.5%	9.0%	6.2%	7.7%	
Stayed at/with	Rehabilitation by Govt,	F	65	65	53	183	X^2=27.063; p=.001
		%	81.2%	65.0%	66.2%	70.4%	
	Relatives	F	9	28	23	60	
		%	11.2%	28.0%	28.8%	23.1%	
	Rented	F	6	0	4	10	
		%	7.5%	0.0%	5.0%	3.8%	
	Others	F	0	7	0	7	
		%	0.0%	7.0%	0.0%	2.7%	

Damage to house: Out of 260 samples selected, 123 (47.3%) of the victims' houses were partially damaged, 111 (42.7%) of the victims' houses were completely damaged, 15 (5.8%) of the victims lost communication and 11 (4.2%) of the victims' houses have other damages. In Madikeri, 37 (46.2%) of the victims' houses were partially damaged, 39 (48.8%) of the victims' houses were completely damaged and 4 (5%) of the victims lost communication. In Somwarpet, 45 (45%) of the victims' houses were partially damaged, 35 (37%) of the victims' houses were completely damaged, 8 (8%) of the victims lost communication and 10 (10%) of the victims' houses have other damages. In Virajpet, 41 (51.2%) of the victims' house were partially damaged, 35 (43.8%) of the victims' houses were completely damaged, 3 (3.8%) of the victims lost communication and 1 (1.2%) of the victim's house have other damages. On a whole more of the victims' houses were partially damaged. Further, when the association between taluks and responses was analysed, the chi-square value obtained was 16.304 with a significance p value .012 indicating that majority of the victims' houses were partially damaged in Virajpet and Somwarpet whereas more of the victims' houses were completely damaged in Madikeri.

Land loss: 124 (47.7%) of the victims lost below 25% of their land, 94 (36.2%) of the victims lost 25 – 50% of their land, 22 (8.5%) of the victims lost 50 – 75% of their land and 20 (7.7%) of the victims lost their land completely. In Madikeri, 28 (35%) of the victims lost below 25% of their land, 36 (45%) of the victims lost 25 – 50% of their land, 10 (12.5%) of the victims lost 50 – 75% of their land and 6 (7.5%) of the victims lost their land completely. In Somwarpet, 51 (51%) of the victims lost below 25% of their land, 32 (32%) of the victims lost 25 – 50% of their land, 8 (8%) of the victims lost 50 – 75% of their land and 9 (9%) of the victims lost their land completely. In Virajpet, 45 (56.2%) of the victims lost below 25% of their land, 26 (32.5%) of the victims lost 25 – 50% of their land, 4 (5%) of the victims lost 50 – 75% of their land and 5 (6.2%) of the victims lost their land completely. On a whole more victims lost 25% of their land. When association between taluks and responses was analysed, the chi-square value obtained was 9.807 with a p value of .133 further, indicating that there was no significant association between taluks and responses on land loss of victims.

Stayed at/with: 183 (70.4%) of the victims stayed at rehabilitation centre by government, 60 (23.1%) of the victims stayed with relatives, 10 (3.8%) of the victims stayed at rented houses and 7 (2.7%) of the victims stayed with others. In Madikeri, 65 (81.2%) of the victims stayed at rehabilitation centre by government, 9 (11.2%) of the victims stayed with relatives and 6 (7.5%) of the victims stayed at rented houses. In Somwarpet, 65 (65%) of the victims stayed at rehabilitation centre by government, 28 (28%) of the victims stayed with relatives and 7 (7%) of the victims stayed with others. In Virajpet, 53 (66.2%) of the victims stayed at rehabilitation centre by government, 23 (28.8%) of the victims stayed with relatives and 4 (5%) of the victims stayed at rented houses. On a whole majority of the victims stayed at rehabilitation centre by government. Further, when the association between taluks and responses was analysed, the chi-square value obtained was 27.063 with a significance p value .001 indicating that majority of the victims of Madikeri, followed by Virajpet and Somwarpet lived at rehabilitation centre by government.

Table no 2: Frequency and per cent responses on various relief measures to victims in three taluks and results of chi-square tests

Relief measures	Variables	Responses		Taluks			Total	Test statistics
				Madikeri	Somwarpet	Virajpet		
Emergency relief by	Local governance	Yes	F	74	91	67	232	X^2=3.716; p=.156
			%	92.5%	91.0%	83.8%	89.2%	
		No	F	6	9	13	28	
			%	7.5%	9.0%	16.2%	10.8%	
	State Government	Yes	F	53	66	62	181	X^2=3.398; p=.183
			%	66.2%	66.0%	77.5%	69.6%	
		No	F	27	34	18	79	
			%	33.8%	34.0%	22.5%	30.4%	
	NGOs	Yes	F	50	60	63	173	X^2=27.063; p=.001
			%	62.5%	60.0%	78.8%	66.5%	
		No	F	30	40	17	87	
			%	37.5%	40.0%	21.2%	33.5%	
Timing of emergency relief	<24 hours		F	49	76	63	188	X^2=12.327; p=.055
			%	61.2%	76.0%	78.8%	72.3%	
	1-2 days		F	26	15	11	52	
			%	32.5%	15.0%	13.8%	20.0%	
	2-5 days		F	1	4	2	7	
			%	1.2%	4.0%	2.5%	2.7%	
	>5 days		F	4	5	4	13	
			%	5.0%	5.0%	5.0%	5.0%	
Type of help rendered	House construction		F	80	84	80	244	X^2=2.064; p=.356
			%	100.0%	84.0%	100.0%	93.8%	

	Financial help to construct house	F	0	16	0	16	
		%	0.0%	16.0%	0.0%	6.2%	

Emergency relief by local governance: 232 (89.2%) of the victims received relief measures from local governance and 28 (10.8%) of the victims did not receive relief measures from local governance. In Madikeri, 74 (92.5%) of the victims received relief measures from local governance and 6 (7.5%) of the victims did not receive relief measures from local governance. In Somvarpet, 91 (91%) of the victims received relief measures from local governance and 9 (9%) of the victims did not receive relief measures from local governance. In Virajpet, 67 (83.8%) of the victims received relief measures from local governance and 13 (16.2%) of the victims did not receive relief measures from local governance. On a whole majority of the victims received relief measures from local governance. When association between taluks and responses was analysed, the chi-square value obtained was 3.716 with a p value of .156 further, indicating that there was no association between taluks and responses on emergency relief measures by local governance.

Emergency relief by state government: 181 (69.6%) of the victims received relief measures from state government and 79 (30.4%) of the victims did not receive relief measures from state government. In Madikeri, 53 (66.2%) of the victims received relief measures from state government and 27 (33.8%) of the victims did not receive relief measures from state government. In Somvarpet, 66 (66%) of the victims received relief measures from state government and 34 (34%) of the victims did not receive relief measures from state government. In Virajpet, 62 (77.5%) of the victims received relief measures from state government and 18 (22.5%) of the victims did not receive relief measures from state government. On a whole majority of the victims received relief measures from state government. When association between taluks and responses was analysed, the chi-square value obtained was 3.398 with a p value of .183 further, indicating that there was no association between taluks and responses on emergency relief measures by state government.

Emergency relief by NGO's: 173 (66.5%) of the victims received relief measures from NGO's and 87 (33.5%) of the victims did not receive relief measures from NGO's. In Madikeri, 50 (62.5%) of the victims received relief measures from NGO's and 30 (37.5%) of the victims did not receive relief measures from NGO's. In Somvarpet, 60 (60%) of the victims received relief measures from NGO's and 40 (40%) of the victims did not receive relief measures from NGO's. In Virajpet, 63 (78.8%) of the victims received relief measures from NGO's and 17 (21.2%) of the victims did not receive relief measures from NGO's. On a whole majority of the victims received relief measures from NGO's. Further, when the association between taluks and responses was analysed, the chi-square value obtained was 27.063 with a significance p value .001 indicating that majority of the victims of Virajpet, followed by Madikeri and Somwarpet received relief measures from NGO's.

Timing of emergency relief: 188 (72.3%) of the victims received emergency relief before 24 hours, 52 (20%) of the respondents received emergency relief within 1 – 2 days, 7 (2.7%) of the victims received emergency relief within 2 – 5 days and 13 (5%) of the victims received emergency relief after 5 days. In Madikeri, 49 (61.2%) of the victims received emergency relief before 24 hours, 26 (32.5%) of the respondents received emergency relief within 1 – 2 days, 1 (1.2%) of the victim received emergency relief within 2 – 5 days and 4 (5%) of the victims received emergency relief after 5 days. In Somwarpet, 76 (76%) of the victims received emergency relief before 24 hours, 15 (15%) of the respondents received emergency relief within 1 – 2 days, 4 (4%) of the victims received emergency relief within 2 – 5 days and 5 (5%) of the victims received emergency relief after 5 days. In Virajpet, 63 (78.8%) of the victims received emergency relief before 24 hours, 11 (13.8%) of the respondents received emergency relief within 1 – 2 days, 2 (2.5%) of the victims received emergency relief within 2 – 5 days and 4 (5%) of the victims received emergency relief after 5 days. On a whole, majority of the victims received emergency relief before 24 hours. When association between taluks and responses was analysed, the chi-square value obtained was 12.327 with a p value of .055 further, indicating that there was no association between taluks and responses on timing of emergency relief.

Type of help rendered: A majority of 244 (93.8%) of the victims were rendered with house construction help and 16 (6.2%) of the victims were rendered with financial help to construct house. In Madikeri, all 80 (100%) of the victims were rendered with house construction help. In Somwarpet, 84 (84%) of the victims were rendered with house construction help and 16 (16%) of the victims were rendered with financial help to construct house. In Virajpet, all 80 (100%) of the victims were rendered with house construction help. On a whole, majority of the victims were rendered with house construction help. When association between taluks and responses was analysed, the chi-square value obtained was 2.064 with a p value of .256 further, indicating that there was no association between taluks and responses on type of help rendered.

IV. Discussion

Major findings of the study are

- 42..7% of the selected sample of victims lost completely their house, 47.3% of them lost partially, 5.8% of them lost connectivity and 4..2% of them suffered from other problems
- Majority of the victims' houses were partially damaged in Virajpet and Somwarpet whereas more of the victims' houses were completely damaged in Madikeri.
- 124 (47.7%) of the victims lost below 25% of their land, 94 (36.2%) of the victims lost 25 – 50% of their land, 22 (8.5%) of the victims lost 50 – 75% of their land and 20 (7.7%) of the victims lost their land completely
- 183 (70.4%) of the victims stayed at rehabilitation centre by government, 60 (23.1%) of the victims stayed with relatives, 10 (3.8%) of the victims stayed at rented houses and 7 (2.7%) of the victims stayed with others. majority of the victims of Madikeri, followed by Virajpet and Somwarpet lived at rehabilitation centre by government
- 232 (89.2%) of the victims received relief measures from local governance and 28 (10.8%) of the victims did not receive relief measures from local governance.
- 181 (69.6%) of the victims received relief measures from state government and 79 (30.4%) of the victims did not receive relief measures from state government.
- 173 (66.5%) of the victims received relief measures from NGO's and 87 (33.5%) of the victims did not receive relief measures from NGO's
- 188 (72.3%) of the victims received emergency relief before 24 hours, 52 (20%) of the respondents received emergency relief within 1 – 2 days, 7 (2.7%) of the victims received emergency relief within 2 – 5 days and 13 (5%) of the victims received emergency relief after 5 days.
- A majority of 244 (93.8%) of the victims were rendered with house construction help and 16 (6.2%) of the victims were rendered with financial help to construct house

Relief measures for victims of natural environmental disasters aim to alleviate immediate suffering and support long-term recovery. These measures can be divided into short-term and long-term strategies, involving various levels of government, non-governmental organizations (NGOs), and international aid. The larger the disaster, the greater the number of agencies involved in the response, which necessitates proper planning, coordination, and communication during the early stages of disaster management. Crucially, situational awareness and analysis form the foundation for effective planning, coordination, and communication (Roller, 2019). Additionally, evacuation requires accessible routes to remove the affected population (Munawar et al., 2018). As reported by respondents, the local administration communicated that, with all roads blocked, only air evacuation was feasible, which required careful planning and coordination and could take more time. Furthermore, the increased frequency of landslides and rainfall forced individuals to evacuate independently.

The government's immediate response was commendable, particularly in the search, rescue, and evacuation efforts following the landslides. However, participants noted that the local administration was unprepared to efficiently disseminate situational information and facilitate evacuations due to the loss of both road access and cellular connectivity. Importantly, the fear for personal safety and social pressures played a significant role in prompting self-evacuations, which ultimately helped reduce casualties in this study. Similarly, during the 2018 Sulawesi Earthquake tsunami, there was no official warning issued, and most of the population evacuated upon witnessing others doing so, which significantly reduced casualties (Munawar et al., 2018). However, the study also highlighted congestion during the evacuation in urban areas (Munawar et al., 2018). In this study, the family unit and the community played key roles in supporting each other as they evacuated to safer locations in the forest and hills.

V. Conclusions

The study concludes that community-driven, community-managed evacuation efforts played a crucial role in minimizing casualties during the 2018 Kodagu landslide in the immediate disaster response phase. The government's response in the early disaster phase was deemed satisfactory. While the community was unprepared both traditionally and within the formal disaster management framework, the fear for life and social triggers were key factors in encouraging self-evacuation, which helped reduce casualties. Other challenges faced included poor communication of situational information, the loss of road and cellular connectivity, concerns about physical and mental health, both direct and indirect losses, and various cross-cutting issues commonly seen in other natural disasters. Going forward, involving the community in micro-planning at the village and ward levels, and integrating these efforts into the district management plan, would enhance coordination and effectiveness in emergency relief responses.

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