

Understanding Local Perspectives on Human Induced Climate Challenges and Resilience in Skardu

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ABSTRACT

Aim of the Study: Present research study analyses the incrementing climate challenges in Skardu that are primarily human-induced. It encompasses factors like unprecedented growth in tourism, unplanned construction of hotels/ resorts, uncontrolled population expansion with urbanization as its secondary effect, deforestation and global warming leading to rapid glacial melting. Primary objective of the present research is to understand the local population's perspective with respect to these changes and explore how local populace is coping up with these challenges.

Methodology: Qualitative approach was adopted; wherein, in-depth interviews and field observations were made. Only locals of Skardu (both genders were incorporated, involving a multi-generational approach aimed at gaining experienced as well as futuristic point of view). Observation of tourist spots, hotels as well as local surroundings which witnessed unprecedented population shifting/ growth and resultant environmental stress were also made.

Findings: Findings revealed mixed perception among locals. As per people enhanced tourism created job opportunities, yet has given rise to multiple environmental issues. As per people's opinion land, forests and water are equally stressed by these factors. In addition, overpopulation and urbanization are causing much stress on the limited resources of the area. Older generations are more concerned about environmental stress, whereas, young individuals keep economic prosperity as their priority.

Conclusion: Study concludes that human induced climate change is one of the major factors, adversely affecting Skardu's environment. Study emphasizes on proper planning, effective legal framework, solid waste management systems and public awareness programs. Collaborative efforts of community and institutions are needed for mitigating the effects of human induced climatic challenges and ensure environmental preservation.

Keywords: Human-induced Climate Challenges, Climatic Change, Local Perspectives, Skardu Locals, Environmental Issues, Environmental Preservation.

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1. BACKGROUND OF THE STUDY

Skardu is well known for its beautiful valleys, snow covered peaks and rivers carving out the landscapes. Such beauty captivates the visitors and that is why it attracts maximum tourists every year (Abbas, et al., 2025). Area has its natural magnificence but at the same time substructures are not so well developed and people largely rely on erstwhile/ traditional systems of farming, livestock handling etc (Sameer et al., 2025). Due to increased access tourism is on rise and also serves as one of the sources of livelihood. However, in recent years, Skardu has witnessed a drastic climatic change (Sameer et al., 2025). This change though in line with the global phenomenon is intensified due to the human activities which include tree cutting, timber/ fossil fuel burning, urbanization requiring construction and tourism requiring hotels/ resorts. It is in very less time that these changes have occurred and are adversely affecting the climate which in turn will affect local lives adversely (Fatima, et al., 2025). Present research aims at identifying the local people's understanding of this climate change and highlight their efforts in mitigating this challenge.

1.1 Rationale of the Study

Present research carries immense importance as it airs the unheard voices of Skardu people (Sohail et al., 2025). Many previous researches highlight the aspect of climate change and support it with empirical data and scientific models, but very few attempts to bring out the insight of local populace as to how they feel and think (Emeka et al., 2024; Baber et al., 2025; Ajani & van der Geest 2021). Being located at one of the toughest places and countering different challenges in every winter, locals carry a lot of knowledge and understanding which makes their comments valuable and can impact the issue positively (Ali et al., 2023). As the local knowledge is not documented, therefore, it is important to link the local understanding with the research work. This study will cover that gap and document the ways to deal with the problem of the climate change.

1.2 Problem Identification

Human interference has always been causing problems for the locals of Skardu in addition to the nature (Qutoshi, et al., 2021). Reliability of watercourses that were sustained by glacial melt has been sufficiently reduced due to irregular melting patterns (Sohail, et al., 2025). Farming, one of the principle sources of income is becoming difficult due to rapidly changing weather patterns (Ajani & van der Geest 2021). Moreover, inflow of tourists and buildings construction due to rapid urbanization is adding up in the problems like waste accumulation and pollution (Baig, et al., 2019). Continued reliance on timber as a main fuel source and its utility in different fields as well as deforestation to support construction has created an ecological imbalance (Ullah, et al., 2021). More prominently, being very simple, people of Skardu are not well aware of the climatic change and its challenges thus overcoming problem becomes more difficult.

1.3 Problem Statement

Anthropogenic activities remain at the core of issue as they are exuding an adverse influence on the environment, however, most of the people of Skardu and surroundings are not so well aware of it (Nadeem, et al., 2024). People of Skardu are dealing with number of issues including water shortage, hot/ long summers and cold/ short winters. These issues are coupled with other natural reasons of climate change; however, less awareness of the local populace complicates the issue (Abbas, et al., 2025). Moreover, there is a gap that exists between local/ native knowledge and scientific researches, thereby meaning that the local knowledge remains undocumented. Present research intends identifying these gaps and what can be done to overcome the issue.

1.4 Objectives of the Study

- ❖ To comprehend how people of Skardu view the climate change and its effects.
- ❖ Study the human-induced environmental changes.

- ❖ Analyze the effects of climate change on lives of local populace.
- ❖ Understand the adjustment efforts/ resilience shown by people of Skardu.
- ❖ Explore/ analyze solutions, if any by the local populace.
- ❖ To compare whether the local thinking coincides with the research.
- ❖ Segregate useful info for future preparation and alertness.

1.5 Research Questions

- ✓ What do the locals of Skardu think about climate change and its effects?
- ✓ What are the human induced environmental changes?
- ✓ What is the effect of environment change on the daily lives of the people of Skardu?
- ✓ How are the people of Skardu adapting to these challenges and contemplating responses?
- ✓ Are there any solutions that are being implemented by the local populace?
- ✓ Is there any support required from Government and other institutions/ NGOs?
- ✓ What is the useful knowledge available for future preparation and alertness?

1.6 Significance of the Study

Present research is important not only for the local populace but also the area. Study allowed the researchers to interact with the local populace and came to know about their understanding of the issue. Research will help all the stake holders to engage amongst each other and work for the benefit of the area. Moreover, study will help in airing the voices of people directly affected by the climate change and also propose a future course for mitigating the challenges. In addition, research will aid in enhancing awareness amongst the populace and affect positive change that will help in preserving environment.

1.7 Limitations of the Study

Sample Size: Small sample size (31 respondents); therefore, the findings may not ideally depict the thinking of complete population.

Area: Only Skardu and surroundings have been explored, therefore, research does not speak of views of complete Gilgit Baltistan or Baltistan.

Response Bias: Personal views, emotional attachment may have marred the true reflections.

Understanding Issues: Language barrier may have led to difficulty in comprehension of questions and thus inaccurate answers (though very marginal).

Constraints: Limited time and resource may have compromised the deep analysis.

2. LITERATURE REVIEW

Sameer et al., (2020) discovered the climate variation and its effects on water resources in article ‘The impact of climate variability on water resource management in Skardu’ using the method of secondary data analysis. It was established during the study that melting of glaciers creates the water inequity and shortage. Study concluded that awareness amongst the population must be enhanced and measures must be adopted to ensure judicious water distribution.

Abbas et al., (2025) in the article ‘Developing localized and inclusive disaster risk reduction strategies for Skardu, Gilgit-Baltistan’ talk about disaster plans that are developed by the communities. Multi-hazard risk model was employed by the researchers to analyze the disaster plans formulated by the communities. Findings discovered land slides and floods as important outcomes of the climatic change. It was established during the study that local knowledge is of prime importance to increase resilience against the climate change and its disastrous effects.

‘Empowering climate action through policy analysis and education in Gilgit-Baltistan’ by Fatima et al., (2025) explores the policy issues and wherewithal against natural calamities. Researchers employed a comprehensive mixed analysis method to analyze the policy framework in detail and highlight the

existing issues. It was found that feeble policy incorporation disallows the adaptation. Study concluded that modifications in the fields of education and governance are a must to increment wherewithal against natural calamities.

‘Regional probabilistic threats: Assessing the impacts of glacial melting on mental health’ by Sohail et al., (2025) is aimed at exploring the emotive effects of change in climate. Interviews of 40 correspondents were recorded by the researchers. It was established during the study that stress due to climate change and ambiguity is incrementing with each passing day. It was concluded that cultural coping strategies enhance resilience against adverse climate change effects.

Khalid & Hannan, (2025) in their article studied the effect of floods on a particular gender. Different case studies were analyzed by the researchers that established that the women specifically faced issues of health care services during natural calamities. It was determined that women specific policies are need of the hour to address the issue.

Saif & Ali (2025) in their article ‘Glacier lake outburst floods (GLOFs) in Northern Pakistan: Local interpretations & social impacts’ aimed at understanding community perceptions about GLOFs. Researchers took executive interviews to validate the causes of GLOFs and local understanding of the phenomena. Findings established that change in climate can be attributed to both anthropogenic and natural activities and should be accepted as a fast-emerging reality. It was concluded that local knowledge is key for adaptation and improvement.

Anis & Kumpulainen (2025) in their study about climate information practices in Western Himalyan people explored the availability and access to information about the climate. 30 interviews were conducted to understand the climate information means as well as their access. Study found out that technological advancement has enhanced the cognizance level of the populace, thereby linking the digital literacy with resilience.

Ullah et al., (2024) analyzed the effects of change in climate on tourism in GB through a tourist climate index (TCI). A quantitative research using TCI to establish relationship between tourism and the climate change. It was established during the study that climate unpredictability is inversely proportional to tourism. If we need sustainable tourism, climate must behave as we predict it.

Farhan et al., (2025) in their article on climate change discourse and public perception undertook discourse analysis. Study was able to establish the relationship between local communication/ languages and climate awareness. It can be easily said that understanding of local languages allows prediction/ understanding of climate.

2.1 Research Gap

Previous researches on the subject primarily focused upon the physical indicators of climate change. Some studies also tried to establish the relationship between nature and science but all ignored the local knowledge and its documentation. Previous studies even talked about policy level solutions, albeit ignoring the actions taken on community or self- help basis by the local community. Most of the studies also do not portray the wholistic picture i-e identifying women and children as the missing link in awareness as well implementation strategies. Role of technology in raising awareness has also not been pondered about much. Overall work on Gilgit-Baltistan is available, however, Skardu and surrounding studies are very less.

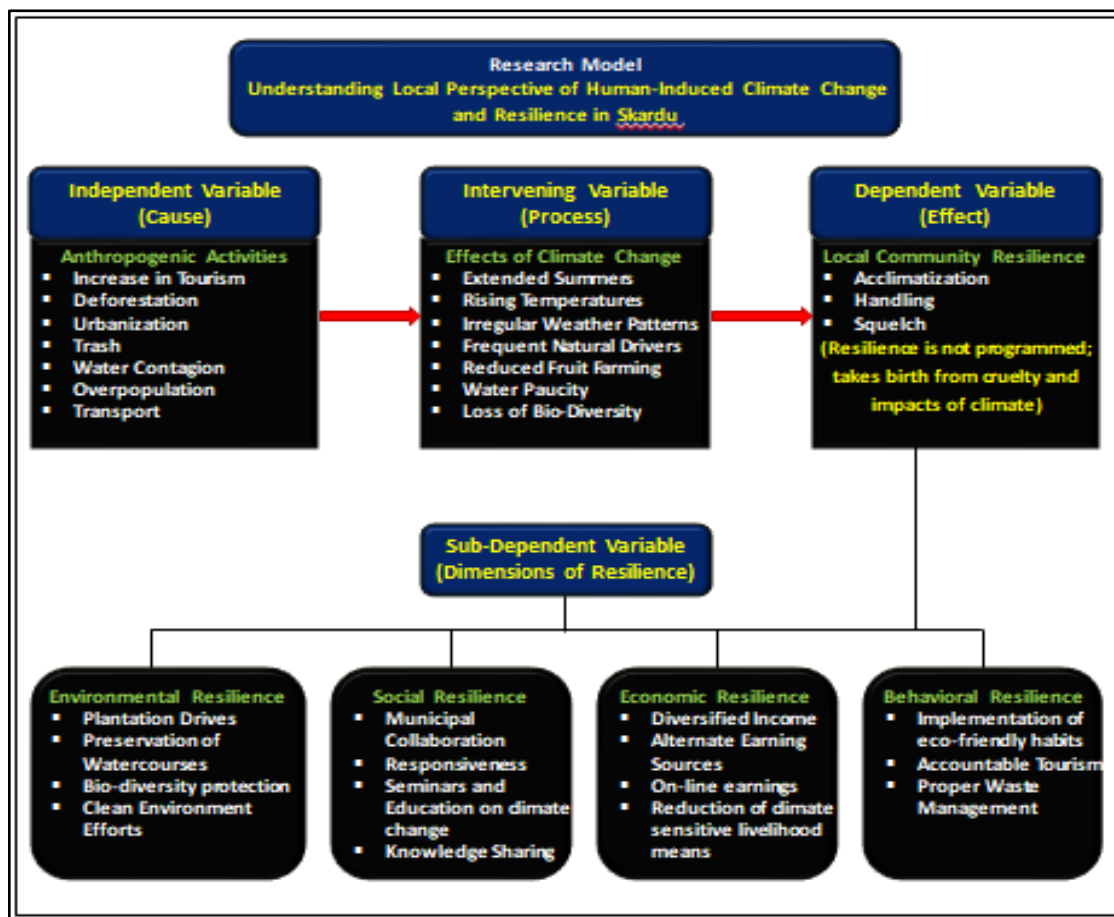
2.2 Theoretical Framework

Present research is anchored around Social Construction and Resilience Theories. This theoretical framework would allow understanding opinion of local populace on the subject of climate change and how they mitigate these challenges. Theories cumulatively provide a lucid understanding of what are the people’s perceptions and what are their actions, thereby linking it with the main aim of the study i-e to understand perspective of the people and their resilience.

Social Construction Theory (Berger & Luckmann, 1966) illustrates that culture and traditions in addition to the terrain molds relationship of people with the climate. Being one of the toughest natural habitats people of Skardu carry a varied opinion on climate. On one hand people think that the climate change is human induced, on the other few also blame the nature only for it. Some are proponent of the combination of both. Social construction theory helps in navigation the path of perceptions of local community.

Resilience Theory (Masten, 2001) explains the survival strategies of local populace and communities. It elucidates upon people's adaptation techniques under difficult circumstances. Evolution is a constant process and local populace evolves in farming, water preservation, land preservation and other techniques. Resilience theory helps understand how people respond to challenges.

Figure 1: Research Model



Study model (figure 1) describes linkages of climate change due to anthropogenic activities and understand the wherewithal of local population against the change. Anthropogenic activities are the major cause of the climate change. Anthropogenic activities cause the climate changes like extended summers, rising temperatures, irregular weather patterns etc. These climatic changes in turn make the local populace stand against the change through resilience and adaptation i-e the dependent variable (The effect). There are multiple dimensions of the resilience including environmental, social, economic and behavioral aspects of resilience.

3. METHODOLOGY

3.1 Independent, Dependent and Sub-Dependent Variables

Independent Variable: These are the anthropogenic activities that cause the change in climate. Few to mention are uncontrolled tourism, cutting of trees, construction of buildings, more vehicles, pollution etc. These all factors contribute in the climate change.

Intervening Variable: These are the outcome of anthropogenic activities which include raised temperatures, hotter/ longer summers and harsh/ shortened winters, glacial melting, water shortage, floods etc. These factors push the population to the verge, where, they evolve and become resilient.

Dependent and Sub-Dependent Variables: This is the people's resilience aspect or the people's skill to evolve, cope up with the adversities and mitigate the challenges. Further dimensions of the resilience include environmental, social, economic and behavioral aspects of the resilience.

3.2 Population of the Study

Skardu and surroundings remain the focus of research study. Effort made to interact with both male and female members of the community despite cultural barriers. To allow difference of opinions for a wholistic view young and mature both were include across multiple professional fields (Businessmen, teachers, students, farmers and local elders/ leaders). Being residents of Skardu and surroundings, they are witness to a great change that is happening around them. Their insight which was missing in the previous studies remains the prime focus of present research work.

3.3 Sampling Technique

'Purposive Sampling' technique has been adopted as the sampling technique which is a deliberate but measured method, allowing selection of sample on the criterion of knowledge and understanding of the subject. Pre-dominant objective of the sampling technique is to only include such parts of the segment, who either understand the issue or their views are important to bring the change. This approach allows grasping perspectives at a wider scale and depicting the actions/ change that is required.

3.4 Sample Size

Sample size is (n=31), prudently nominated so that they represent the understanding of the complete community (Skardu and surroundings). In order to achieve diversity of opinions, diversity in gender representation, generations, professions and educational background has been ensured. Though the sample size is small, yet it depicts the true feelings across gender, ages, professions and experience. Sample size allows developing deeper understanding of the issue and therefore, each correspondent has been given equal/ immense importance. No more sampling was conducted after 31 due to recurrence of answers and duplication of views.

3.5 Research Tool

'Interviews and Observation' remained the prime research tool. Interviews were conducted informally for which a questionnaire was formulated so that the answers remain to the point and focused. Individual's knowledge, experience and insights were explored and recorded. Observation technique was employed to understand the anomalies in weather and its affected fields including glaciers, snow/ rainfall, temperature etc. Use of both tools augmented the authenticity of data and underpinned the cogency of assertions.

3.6 Data Collection Procedure

Respondents were met personally and interviewed informally to allow a direct, however, very liberal interaction. This allowed opening up of respondents and answering freely without any barriers. Right at the beginning, the study and its objectives were declared to the correspondents so that they comprehend the purpose and give focused replies. Each interview was documented on the interview proforma to

ensure its availability later on. Living in the same area allowed long term observation of the altered weather behavior and its documentation upon each observation.

4. RESULTS AND DISCUSSION

Table I: Demographic Representation of the Interview Respondents (31 Respondents)

Demographics	Category	Frequency (n = 31)	Percentage (%)
Gender	Male	23	74.2
	Female	8	25.8
Age	18–25 years	5	16.1
	26–35 years	18	58.1
	36–45 years	1	3.2
	46–60 years	5	16.1
	Above 60 years	2	6.5
	Teacher	6	19.4
	Businessperson	5	16.1
Profession	Student	4	12.9
	Farmer	3	9.7
	Shopkeeper	3	9.7
	Housewife	2	6.5
	Grassroots Climate Field Representative	1	3.2
	Assistant Foreman	1	3.2
	Gardener (Mali)	1	3.2
	Government Employee	1	3.2
	Accountant	1	3.2
	Sarkardah	3	9.7
	Khaplu	13	41.9
	Skardu	4	12.9
	Youching	4	12.9
	Goma	3	9.7
Area of Residence	Chorbat	2	6.5
	Partuk	2	6.5
	Siksa	1	3.2
	Dao	1	3.2
	Marcha	1	3.2

Table-I represents the demographic representation of the interview respondents. Fourth demographic denotes the gender; wherein, out of 31 respondents 26% are female, whereas, remaining 74% are male. Second depicts the average age of the respondents which comes at 36 years (a great diversity with minimum age as 18 Years and maximum age as 77 Years). Third denotes the profession, wherein, individuals exhibit a great diversity of professions. Fourth depicts the area; here, correspondents belong to Skardu and surrounding areas of Skardu and Ghanche District.

Table-II: Results - Interviews (31 Respondents)

Question	Yes, n (%)	No, n (%)	Neutral, n (%)
Q1. Have you observed any changes in weather over the years?	31 (100.0)	0 (0.0)	–
Q2. Is the weather hotter now than it was previously?	30 (96.8)	–	1 (3.2)
Q3. Have you noticed any changes in snowfall or rainfall patterns?	29 (93.5)	2 (6.5)	–
Q4. Have you observed changes in glaciers or water sources?	30 (96.8)	1 (3.2)	–
Q5. Are you experiencing problems due to these environmental	31 (100.0)	0 (0.0)	–

changes?			
Q6. Do you believe these environmental changes have identifiable causes?	31 (100.0)	0 (0.0)	–
Q7. Do you think human activities (e.g., deforestation and pollution) affect the climate?	31 (100.0)	0 (0.0)	–
Q8. Have you adopted any measures to cope with these environmental changes?	31 (100.0)	0 (0.0)	–
Q9. Do people in your community take measures to protect the environment?	27 (87.1)	3 (9.7)	1 (3.2)
Q10. Do you believe additional support is needed to address future environmental challenges?	31 (100.0)	0 (0.0)	–
Q11. Do you think the construction of hotels and resorts is negatively affecting the natural environment?	25 (80.6)	6 (19.4)	–
Q12. Do tourists dispose of garbage irresponsibly, causing environmental problems?	25 (80.6)	5 (16.1)	1 (3.2)

Table-II represents question wise results based on respondent's responses (Detailed coding sheet appended in annexure)

5. FINDINGS

All respondents believe that a visible change in the weather has been witnessed over the years. Almost every individual regardless of age, experience or gender believes that it is getting hotter day by day. Almost all participants agree that they are witnessing decreased and untimely snowfall. Every respondent less one agrees that glaciers are melting and sources of water diminishing. Every participant acknowledges the fact that they are facing multiple problems. These problems include *shortage of water, farming issues/ crop damages, harsh weather, pollution effects, more flood, more diseases and landslides/ road blocks*. Every respondent thinks of more than one cause of climate change. Major causes include *over population, use of vehicles, machinery/ transport, tree cutting, global warming, garbage throwing etc.* Every respondent believes that human activities like *tree cutting affects the climate*. All respondents gave diverse opinions on handling the issues including *adaptation, self/ community measures, water conservation, tree plantation, stopping gases/ pollution, personal hygiene etc.* Maximum correspondents feel that a number of steps are being taken by the population and that is the sign of their resilience. Once asked about support or help maximum individuals talked about *building of dams, planting trees, increasing awareness, Government/ NGO support in training individuals and proper waste management etc.* Maximum respondents (80%) believe that *building lot of hotels and resorts is affecting the nature adversely* and same percentage believes that *tourists throw garbage* and it creates many problems.

6. DISCUSSION

Present research study explored the perspectives of Skardu locals on human-induced climate change and resilience in Skardu. Pakistan is a country that is adversely affected by the climate change despite its negligible participation in damaging the environment due to less industrial base etc. Moreover, Pakistan as a country lacks resources and wherewithal to fight against an ever incrementing and fast paced climate change. What supplements this is lack of knowledge and awareness by the population. In this term Skardu populace is better than the rest of Pakistan as most of them are involved with agriculture and many of them linked with tourism understand the phenomenon relatively better. Researchers undertook thematic analysis of 31 in-depth interviews of the locals conducted in a direct and informal way. Participants displayed a great range of age, professional experience and gender representation. Experienced participants link the climate change with their past. As per them it is the human activity like tree cutting, vehicles/ population growth etc that has contributed to climate change. Younger participants exhibited better modern awareness due to education and social media. While the older participants rely on personal experiences and traditional knowledge, the young ones talk about scientific and modernized approach.

The study has established a direct relationship between the *Independent Variable* i-e human induced climate change, the *Intervening Variable* (The Process) that are the outcome of the change in climate and the *Dependent Variable* i-e the effect (Resilience created in people and exploring different dimensions of resilience i-e environmental, social, economic and behavioral).

Research findings are in line with the previous international and local researches which have also identified the issues of environmental degradation, causes of the environmental change, what is causing the change and how it can be stopped and/ or reversed. These include aspects of individual awareness, community awareness/ actions and Government/ NGO actions. As per the previous studies also the reasons of climate change generally remain constant like global warming, tree cutting, urbanization, construction and most of them are the human actions. Respondents explained that that climate change is directly affecting many aspects of life including farming, water availability, etc. This has in turn led to financial strain, thus augmenting the overall issues. Sameer et al., (2020) in their study indicate that glacial melting is creating water imbalance thus leading to water scarcity. Older people say that winters are warmer than before and it does not snow as it used to be in past (Batool et al., 2016). Climate change is causing the GLOFs and this phenomenon is becoming a source of losses in terms of lives and land/ crops (Saif & Ali, 2025). Many people have witnessed more floods, landslides and storms (Hussain et al., 2016). People have also noticed a change in plants and animals; farmers see more pests, more diseases in plants and animals. Same is happening with humans (Bhatta et al., 2019). Ullah et al., (2024) in their study talked about tourism and impacts of climate change on the tourism. Most of the respondents have agreed that these changes are occurring due to human induced factors (Paudel et al., 2010 and Zaheer & Bano, 2014). Farhan et al., (2025) in their study talked about the localized communication that can help us in fighting against the aspect of climate change.

Living and coping up with the reality of climate change, locals established that there is an evident climate change. One of the respondents (Adeela Batool) stated that *'Gilgit Baltistan sees pretty dramatic changes across the year because of the mountains; It is not just the 4 seasons everywhere. The valleys and high mountains behave differently'*. As far as temperatures are concerned it is getting hotter. Gulshan Fatima stated that *'It is hotter as compared to before, especially during summers, earlier these areas were extremely cold but now the cold has reduced and temperatures are increasing day by day'*. People have also noticed a great change in snowfall and rain pattern. Fatima explains; *'Snowfall is less and rain is untimely'*. As per Zulfiqar Ali; *'Water sources are changing over time. Some streams and springs that once provided enough water are now drying up and have less flow'*. Najum says that; *'We are facing water shortages, floods, land slides and changes in weather patterns. These are affecting farming, tourism and daily lives.'* As per Kifayat Ali; *'These changes are mainly caused by global warming, excessive use of fossil fuels, deforestation, increased vehicle emissions and unplanned construction'*. Tajammul Hasnain says that; *'Human activities like deforestation, pollution and excessive fuel usage are affecting the climate and increasing temperatures.'* Gulshan Fatima and her family protect themselves from these changes by *'making small barriers near rivers. They also save water and support each other during difficult times.'* Whereas, Kifayat Ali and his community *'plant trees, avoid unnecessary cutting of forests and try to reduce pollution.'* Tajammul and his family/ friends feel that *'better water management, organized plantation programs, disaster preparedness and awareness about climate change are the support they need in future.'* Most of the people including Ateeqa Norren feel that *'it is not good to build so many hotels and resorts because damage is borne by everyone, however, earning is for few.'* They also feel that *'tourists through garbage and it creates multiple issues.'*

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Research found out that people on self-help basis are trying to solve these problems. Apart from individual efforts, community efforts are under progress also. People help each other during floods, farming etc People are of the opinion that they need government support and NGOs help to make

consistent/ self-sustaining systems as well as enhancing their awareness. The research also shows that local knowledge is very important and that they should form part of all the actions and their view should be given more importance and considered as a major stake holder. The research has also highlighted that adaptation strategies like water conservation/ preservation, organized plantation drives, farming methods change, construction of dams/ bunds etc will also be useful.

7. CONCLUSION

The study establishes the fact that Skardu populace have somewhat know how of climate change and that it is affecting the environment and lives. Regardless of their age, gender and experience, populace has noticed a visible pattern of change in weather, snowfall/ rains and glacial melting. As per locals these changes have been caused by multiple factors including global warming, deforestation, extensive urbanization, construction of hotels/ resorts, vehicles/ machinery and pollution. Human-induced climate change has caused many adverse effects on the environment that include water scarcity (mainly streams/ drinking water), flooding, land sliding leading to life and land/ crop losses, health and farming issues.

A positive outcome is the populace at individual level as well as communities are cognizant of the fact and they are undertaking efforts to restore their environment or at least stop the change by measures like enhancing awareness, planting trees, preserving water. They expect the Government and NGOs to make/ enforce environment laws, help build bund/ dams and run organized training/ awareness programs. People also expect the stake holders to understand and utilize their experience in the field.

7.1 Recommendations

Introduction of Climate Awareness Programs: Government and NGO led climate awareness programs should be organized for local communities and students.

Organized Tree Plantation Campaigns: Large scale/ larger patches tree plantation plan based on regaining and improving forest cover.

Policy Framework/ Legislation: Policy/ legislation and its enforcement on tree cutting, tourism, urban construction etc should be instituted by GoP and GoGB

Involvement of Locals in Decision Making: Local expertise/ experience and historical traditions should be given due respect and importance by involving them as stake holders in decision making and policy development.

Tourism Policy: A deliberate/ long term tourism policy should be instituted to allow sustainable tourism practices aimed at maintaining environment as well as becoming a source of livelihood for locals.

Dam and Bund Construction Projects: Dam and bund construction projects to be part of ADP so that losses to infrastructure/ land are minimized and perennial water availability is ensured.

Improving GB Disaster Management: More funds should be released and GBDMA should be improved on the lines of NDMA and other PDMA.

Launching of Regular Media Awareness Campaigns: Regular/ organized media awareness campaigns be launched to educate the people and improve their knowledge.

Collaborations: Local communities, NGOs and Government should collaborate to enhance resilience as well as ensure sustainable development.

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Conflict of Interest

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ANNEXURE

Table-III: Detailed Coding Sheet (31 Respondents)

Ser	Name	Age (Yrs)	Profession	Area	Gender	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10	Q-11	Q-12
1.	Adeela Batool	18	Student	Skardu	Female	Yes	Yes (hotter)	Yes	Yes	Yes (multiple issues)	Yes (climate change)	Yes	Yes (adapting)	Yes (community efforts)	Yes	Yes	Yes
2.	Fatima	74	Farmer	Youching	“	Yes	Yes (hotter)	Yes	Yes	Yes (multiple issues)	Yes (Population, machinery & transport)	Yes	Yes (self & community)	Yes (tree planting)	Yes (dam building & training)	Yes	Yes
3.	Ateeqa Noureen	27	Teacher	Chorbat	“	Yes	Yes (hotter)	Yes	Yes	Yes (water shortage)	Yes (less snowfall)	Yes	Yes	Yes (tree planting)	Yes (plant trees, save water, clean environment)	Yes	Yes
4.	Zakia Qurban	27	Teacher	Siksa	“	Yes	No (colder)	Yes	Yes	Yes (water shortage, crop damage, harsh weather)	Yes (tree cutting, vehicles, garbage)	Yes	Yes (water conservation)	Yes (tree planting)	Yes (clean water, awareness program)	Yes	Yes (but not everyone)
5.	Kaneez Batool	26	Teacher	Chorbat	“	Yes	Yes (hotter)	Yes	Yes	Yes (pollution, water shortage, load shedding)	Yes (climate change, global warming)	Yes	Yes (tree planting, saving water, light, clean environment)	Yes (trees)	Yes (tree plantation)	Yes	No (They don't)
6.	Farida Bano	26	House wife	Goma	“	Yes	Yes (hotter)	Yes	Yes	Yes (crop damage due to flood)	Yes (over garbage and Population)	Yes	Yes (water shortage, crop damage)	Neutral	Yes	Yes	Yes
7.	Sughra Batool	24	House Wife	Goma	“	Yes	Yes (hotter)	Yes	Yes	Yes (water shortage)	Yes (tree cutting and pollution)	Yes	Yes (saving water and protect self from extreme weather)	Yes (tree planting, save water)	Yes (build a dam across river)	Yes	Yes
8.	Gulshan Fatima	26	Grassroot Climate F.R	Goma	“	Yes	Yes (hotter)	Yes	Yes	Yes (water shortage, less snowfall due to change weather)	Yes (Climate change, pollution, increase temperature)	Yes	Yes (save water)	Yes (tree planting, reduce pollution and clean environment)	Yes (build a dam across river)	Yes	Yes
9.	M. Afzal	32	Asst	Youching	Male	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

Ser	Name	Age (Yrs)	Profession	Area	Gender	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10	Q-11	Q-12
			Foreman				(hotter)			(crop damage due to water shortage)	(tree cutting and pollution),		(tree planting)	(people not having awareness)	(awareness lecture to people)		
10.	Akram	22	Student	Skardu	“	Yes	Yes (hotter)	Yes	Yes	Yes (crop damage, due to flood)	Yes (Population, machinery & transport)	Yes	Yes	Yes (tree planting, control veh smoke)	Yes (Need understand technology)	No	Yes
11.	Qasim	20	Student	Skardu	“	Yes	Yes (hotter)	No	No	Yes	Yes	Yes	Yes	Yes	Yes (Need to build a road)	No	No (They don't)
12.	Asif	19	Student	Skardu	“	Yes	Yes (hotter)	No	Yes	Yes (water shortage)	Yes (change environment)	Yes	Yes (stoppage Gases & tree cutting)	Yes (planting tree)	Yes (awareness lecture to people about weather)	Yes	Yes
13.	M.Ibrahim	77	Farmer/ Agriculture	Youching	“	Yes	Yes (hotter)	Yes	Yes	Yes (crop damage due to flood)	Yes (Global warming, heavy machinery, transport)	Yes	Yes (self-help)	Yes (planting tree)	Yes (build a dam across river)	Yes	Yes
14.	M. Bashir	58	Gardener	Youching	“	Yes	Yes (hotter)	Yes	Yes	Yes (crop damage due to water shortage)	Yes (tree cutting)	Yes	Yes	No (people not having awareness)	Yes (awareness lecture to people)	Yes	Yes
15.	Anwar Ali	30	Sarkarda	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (Diseases occur)	Yes (Trees & crops affected)	Yes	Yes (Tree planting)	Yes Clean environment	Yes	Yes	Yes
16.	Ghulam Muhammad	54	Numberdar	Dao	“	Yes	Yes (hotter)	Yes	Yes	Yes (Diseases occur, flood)	Yes (crops damage, Road block)	Yes	Yes (personal hygiene, save pollution)	Yes (clean environment)	Yes (need Agriculture, protect yourself from an unclean environment)	Yes	Yes
17.	Ghulam Haider	31	Sarkarda	Partuk	“	Yes	Yes (hotter)	Yes	Yes	Yes (Diseases occur, crop damage)	Yes (change weather)	Yes	Yes (need agriculture, clean environment)	Yes (Clean environment)	Yes (need agriculture, planting tree, cultivate barren land)	No	Yes

Ser	Name	Age (Yrs)	Profession	Area	Gender	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10	Q-11	Q-12
18.	Muneer Abbas	34	Businessman	Partuk	“	Yes	Yes (hotter)	Yes	Yes	Yes (Diseases occur, crop damage)	Yes (Machinery, pollution)	Yes	Yes (Clean environment)	Yes (less use of veh, Clean environment)	Yes (Clean environment)	No	Yes
19.	Zakir Ali	31	Sarkarda	Marcha	“	Yes	Yes (hotter)	Yes	Yes	Yes (Diseases occur, flood)	Yes (pollution)	Yes	Yes (Clean environment)	Yes (less use of machinery, clean environment)	Yes (Agriculture, need help of forest department)	Yes	Yes
20.	Zulfiqar Ali	28	Teacher	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (water shortage, difficulties in farming)	Yes (environment change, tree cutting & increase smoke veh raising temperature)	Yes	Yes (planting tree, clean environment)	Yes (awareness lecture to people about climate change)	Yes (community efforts)	Yes	Yes
21.	Najum	30	Businessman	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (climate Change, water shortage, landslides, farming issues)	Yes (Global warming, pollution, deforestation)	Yes	Yes (Save water, avoid wasting electricity, planting tree, clean environment)	Yes (planting tree, clean tourist places, avoid cutting tree)	Yes (need awareness, planting tree, proper waste management system)	Yes	Yes
22.	Gayoor	27	Businessman	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (water shortage, crop damage, flood)	Yes (Weather changing, tree cutting, pollution)	Yes	Yes (save water, clean environment)	Yes (tree planting, save water, clean environment)	Yes (protect environment, save water, awareness lecture to people)	Yes	Yes
23.	Kifayat Ali	30	Businessman	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (Water Shortage, unexpected flood, crop damage, farming issues, road block due to flood)	Yes (Global warming, use of fossil fuel, deforestation,	Yes	Yes (save water, avoid waste, use resource carefully)	Yes (planting tree, reduce plastic use, keeps surrounding clean, save water)	Yes (awareness lecture, proper waste management, control construction, tree plantation)	Yes	Yes
24.	Shakir Ali	35	Businessman	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (water	Yes (tree cutting,	Yes	Yes (tree	Yes (tree	Yes (awareness	Yes	Yes

Ser	Name	Age (Yrs)	Profession	Area	Gender	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10	Q-11	Q-12
										shortage, pollution, disease occur)	pollution, over population)		planting, clean environment)	planting)	lecture to people)		
25.	Tajammal Hasnain	33	Teacher	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (water shortage, change weather, agriculture, flood, landslides)	Yes (Climate change, pollution, deforestation,	Yes	Yes (save water, avoid waste, planting trees,	Yes (tree planting, unnecessary cutting of forest, awareness lecture(	Yes (save water, tree planting, awareness lecture)	Yes	Yes
26.	Abdul Rahim	32	Teacher	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (land sliding, flood, water shortage)	Yes (weather changing, tree cutting, pollution)	Yes	Yes (clean environment)	Yes (tree planting, awareness lecture about clean environment)	Yes (avoid plastic use, tree planting)	Yes	Neutral
27.	Muhammad Ali	55	Government Employ	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (water shortage),	Yes (pollution)	Yes	Yes (use of stove)	Yes (clean environment, tree plantation)	Yes (tree plantation)	No	No
28.	Muhammad Iqbal	33	Accountant	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (water shortage)	Yes (changing weather)	Yes	Yes (tree plantation)	No	Yes (tree plantation)	Yes	Yes
29.	Ghulam Abbas	45	Shopkeeper	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (water shortage, farming issues, electricity issue)	Yes (heavy machinery & transport, over population, cutting trees)	Yes	Yes (use of stove)	Yes (clean environment, tree planting)	Yes (clean environment, tree planting)	No	No
30.	Ghulam Muhammad	52	Shopkeeper	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (water shortage, farming issues)	Yes (pollution, tree cutting)	Yes	Yes (tree planting)	Yes (clean environment)	Yes (Tree planting, clean environment)	Yes	Yes
31.	Muhammad Ali	60	Shopkeeper	Khaplu	“	Yes	Yes (hotter)	Yes	Yes	Yes (farming issue, flood)	Yes (over population, tree cutting)	Yes	Yes	Yes (tree planting, clean environment)	Yes (tree planting, clean environment)	Yes	No
Summary		Average Age	Profession	Area	Gender	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10	Q-11	Q-12
		36 Yrs	Students (4) Farmers (3)	Skardu (4)	Female (8)	Yes (31)	Yes (30)	Yes (29)	Yes (30)	Yes (31)	Yes (31)	Yes (31)	Yes (31)	Yes (27) No (3)	Yes (31)	Yes (25)	Yes (25) No (5)

Ser	Name	Age (Yrs)	Profession	Area	Gender	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10	Q-11	Q-12
			Teachers (6) H. wives (2) Grassroots- Climate (1) Asst Foreman(1) Mali (1) Sarkardah (3) Businessmen (5) Govt Employ (1) Accountant (1) Shopkeeper (3)	Chorbat (2) Siksa (1) Dao (1) Marcha (1) Partuk (2) Youching (4) Khaplu (13) Goma (3)	Male (23)		Neutral (1)	No (2)	No (1)					Neutral (1)		No (6)	Neutral (1)

Table-III represents the detailed coding sheet covering essential demographic aspects of interview respondents including their name, age, profession, area and gender. After detailed demographic details, answers of 12 questions by the respondents are listed mainly as Yes, No or Neutral. In addition, crux of their responses involving the main themes i-e Climate change, causes of the climate change, effects of these changes on the environment, resilience/ coping up methods being employed by the community and individuals, government/ NGOs etc support actions/ help required and helpful information available for future planning and awareness are covered in detail. The detailed coding sheet provides base for thematic data analysis to draw pertinent conclusions.

Table-IV: Thematic Analysis - 31 Interviews

<u>Sr No</u>	<u>Main Theme</u>	<u>Predefined Code</u>	<u>Meaning</u>	<u>Example Statement</u>	<u>Respondent Number</u>	<u>Research Question being answered</u>
1.	<i>Climate Change</i>	Weather Change	People notice the change in weather	<i>"A rapid (dramatic/negative) change is occurring"</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31	Q-1: What do the locals of Skardu think about climate change and its effects?
		Glacier Melting	Glaciers are melting fast	<i>"Ice is melting every year"</i>	1, 2, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 16, 17, 18, 19, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31	
		Temperatures (hotter/ colder)	Temperatures are changing rapidly	<i>"It is getting hotter than before"</i>	1, 2, 3, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31	
		Snowfall	Snowfall is decreasing	<i>"There is less snowfall than before"</i>	2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 16, 18, 19, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31	
2.	<i>Causes of Climate Change (Human Induced)</i>	Overpopulation	Population is increasing at a rampant pace	<i>"Population increase is a major issue"</i>	2, 24, 31	Q-2: What are the human induced environmental changes?
		Tree cutting	Trees are being cut continuously	<i>"People cut trees for wood and space for construction"</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31	
		Wood Burning	Timber burning is causing pollution/ climate change	<i>"Wood burning is causing global warming"</i>	7, 21, 25,	
		Vehicles/ Pollution	Vehicles are increasing everyday thus increasing pollution	<i>"Pollution is harming nature"</i>	1, 2, 4, 5, 7, 8, 9, 12, 13, 14, 18, 20, 21, 22, 24, 25, 26, 27, 29, 30, 31	
		Increased Tourism	Leads to over construction of hotels and resorts	<i>"Tourist throw garbage"</i>	1, 2, 3, 4, 5, 6, 7, 8, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23,	
		Urbanization and increased Hotels/ resorts	Roads and buildings affect nature adversely	<i>"Construction is increasing"</i>	2, 3, 4, 5, 7, 9, 12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 28, 31	
3.	<i>Effects on Environment</i>	Garbage accumulation	Garbage is accumulating	<i>"Garbage pollution" causes</i>	2, 3, 4, 6, 7, 9, 10, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 28, 31	Q-3: What is the effect of environment change on the daily lives of the people of Skardu?
		Water Scarcity	Less water available	<i>"Streams dry in winter"</i>	1, 3, 4, 5, 7, 8, 9, 12, 14, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30	
		Flooding	Floods are increasing in summers	<i>"Heavy flood damage to communication in frs, GLOF etc threats increased"</i>	1, 2, 6, 7, 8, 10, 16, 17, 21, 22, 23, 25, 26, 31	
		Land sliding	Agricultural land, life, resource and infrastructure losses	<i>"Landslides are increasing"</i>	2, 7, 10, 13, 18, 19, 21, 23, 25, 26	
		Contaminated water (Prone to diseases)	Water contamination on increase	<i>"Waterborne diseases are increasing"</i>	15, 22, 24	
		Farming Issues	Farming issues are increasing	<i>"Farmers grow less due to</i>	1, 4, 8, 20, 21, 23, 27, 29, 30, 31	

				land losses and water scarcity”		
4.	Resilience/ Coping up methods	Community Actions	Community support during problems	“People help each other”	2, 8, 11, 23, 24, 27	Q-4: How are the people of Skardu adapting to these challenges and contemplating responses? Q-5: Are there any solutions that are being implemented by the local populace?
		Self Help	Self-awareness	“People are aware and take care of the environment”	2, 8, 13	
		Tree Plantation	People and Government grow more trees	“Community and people plant trees”	9, 14, 15, 17, 20, 21, 25, 28, 30	
		Water preservation	Water storage	“People and community save water”	4, 5, 7, 8, 21, 22, 23, 25	
		Keeping environment clean	Focus on environment cleanliness	“People keep the environment clean”	5, 17, 18, 19, 20, 21, 22	
		Avoid spreading garbage	Garbage disposal mechanisms	“People and community make mechanisms for garbage disposal”	16, 23, 24, 25	
		Enhancing Awareness	Awareness enhancing programs	“Climate education training programs/ workshops are organized”	5, 9, 21	
5.	Support Actions/ Help Required	Bund/ dam building	Structural support required	“Government should build dams and bunds”	2, 6, 7, 8, 13	Q-6: Is there any support required from Government and other institutions/ NGOs?
		Government Help	Government support such initiatives	“Government enable and equip people”	6, 7, 8, 9, 15, 16, 17, 19, 21, 22, 23, 29	
		NGOs support	NGOs support the local populace	“NGOs teach people/ educate”	9	
		Organized Training/ Awareness	Climate education/ awareness programs	“Government and NGOs plan trainings”	2, 4, 9, 10, 12, 13, 14, 21, 22, 23, 24, 25	
		Policy framework/ Legislation	Policy and law support	“Government makes policy and legislation to reduce effects on environment”	21, 26	
6.	Future Planning	Protecting Environment	Need to preserve environment	“We should stop damaging environment”	3, 18, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31	Q-7: What is the useful knowledge available for future preparation and alertness?
		Future Plans	Long terms planning a must	“Long term plans involving all stake holders should be made”	2, 4, 5, 6, 7, 8, 11, 13, 16, 17, 19, 20, 21, 23	
		Future Awareness	People need more knowledge	“Individual and community awareness to be enhanced”	2, 4, 9, 10, 12, 13, 14, 20, 21, 22, 23, 24, 25	

Table-IV represents the thematic analysis involving six major themes (climate change, causes of climate change, effects on environment, resilience/ coping methods, support actions/ help required and future planning). Multiple predefined codes have been formulated for each theme with their meaning and example statement. In order to study the frequency of codes and statements respondent’s responses have also been linked. This method allowed ascertaining whether the research question gets answered completely or partially during the study.