

DOI: <https://doi.org/10.64672/IJIFR/26.03.13.07.026> PUBLISHED ON: MARCH 28, 2026

EQUITABLE WATER GOVERNANCE IN THE ERA OF CLIMATE CHANGE: ADVANCING CLIMATE JUSTICE THROUGH SUSTAINABLE WATER MISSIONS

Chandni Yadav ^{*1}, Anju Sharma ², Poornima Jain ³

¹ Research Scholar, ² Assistant Professor, ³ Professor

Department of Sociology & Political Science,

Dayalbagh Educational Institute, Dayalbagh, Agra, Uttar Pradesh-India

ABSTRACT

Aim: The study aims (1) to examine how equitable water governance contributes to climate justice in the context of climate change, (2) to assess the effectiveness of sustainable water missions and policy initiatives in ensuring equitable access to water resources across different socio-economic groups and as well as to evaluate awareness and implementation gaps in water governance policies.

Background: Climate change has intensified existing inequalities in access to water resources, particularly affecting marginalized communities. Inadequate water governance contributes to water scarcity, unequal distribution, poor water quality, and increased vulnerability to climate-induced disasters such as droughts and floods. These challenges undermine sustainable development and climate justice, especially in developing regions..

Research Methods: The research adopts a descriptive and analytical design using a quantitative approach. Primary data were collected through structured questionnaires from 200 respondents across six tehsils of Agra district, Uttar Pradesh, using a multi-stage sampling technique. Secondary data were gathered from government reports, academic literature, and institutional publications. Percentage analysis was applied to understand the proportion of respondents across categories such as perception of equity, awareness levels, and policy effectiveness. Data analysis was conducted using descriptive statistics such as frequency and percentage, along with comparative analysis. Cross-tabulation was used to analyze relationships between variables such as income level and access to safe drinking water.

Analytical Findings: Findings reveal moderate to low perceptions of equity in water governance, with nearly half of respondents perceiving water distribution as inequitable. A strong relationship between water inequality and climate vulnerability was observed, particularly among low-income groups. Access to safe drinking water showed significant socio-economic disparities, with low-income households experiencing the highest inadequacy. Awareness of government water policies was relatively low, and while sustainable water missions were perceived as moderately effective, their benefits were unevenly distributed across social groups, with marginalized communities receiving fewer advantages.

Conclusion: The study concludes that equitable water governance is essential for achieving climate justice. Although sustainable water missions have improved water accessibility, gaps remain in awareness, implementation, and inclusive distribution. Strengthening participatory governance, enhancing policy awareness, improving institutional coordination, and integrating climate resilience into water management are necessary to ensure sustainable and equitable water access for all.

KEYWORDS: Climate Justice; Water Governance; Sustainable Water Missions; Climate Change; Water Inequality; Environmental Sustainability.

PAPER CITATION:

Yadav, C., Sharma, A., Jain, P : "Equitable Water Governance in the Era of Climate Change: Advancing Climate Justice through Sustainable Water Missions", International Journal of Informative & Futuristic Research (IJIFR), Vol. (13) (7), March 2026, pp. 978-990. <https://doi.org/10.64672/IJIFR/26.03.13.07.026>

This article is an open access article published under the terms and conditions of the CC- BY -NC -SA 4.0 Creative Commons Attribution-Non Commercial- ShareAlike 4.0 International Public License. All copyrights reserved to the Authors & Journal Publisher. © Copyright Authors (IJIFR 2026).

1. INTRODUCTION

Water governance is a wide complex and multi-layered system, which means it is not just a single mechanism, but a composite array of structures associated with addressing issues related to water in an integrated manner. Therefore, it would be safe to undertake that water governance is an institutional mechanism in which all stakeholders have to work collectively to achieve the vision of sustainable water resource management. The notion of the water crisis has transformed considerably over the past years, mainly due to the increasing impact of anthropogenic climate change. The traditional view of the water crisis is interconnected to concerns like scarcity, while today it is related to issues like the quality, accessibility, and governance of water. The quality of water has deteriorated due to anthropogenic factors like industrial waste, untreated domestic waste, plastic waste, and consumption patterns. The problem is being complicated by factors like lack of awareness, enforcement, and infrastructure (UNESCO, 2023).

As a central, water governance is concerned with critical concerns such as how water resources are achieved, policies are framed and implemented, and responsibilities are communal among institutions. In India, different levels of water governance are activated at the central, state, and local levels. These levels have diverse responsibilities that impact of managing the water resources. For example, there are the ministries, regulatory bodies, and local-level institutions such as the Panchayati Raj Institutions that together impact of managing the water resources (NITI Aayog, 2021).

One of the foremost obstacles facing water governance is to address the various demands placed on water for usage in agriculture, industries, domestic, and for environmental protection. Urbanization and population growing the burden on scarce water resources. Climate change is additional critical issue that has carried uncertainties to the accessibility of water resources. For example, natural disasters as flooding & droughts, united with changes in precipitation patterns, have risen the vulnerability of water resources (World Bank, 2022). Besides, current policy frameworks are not climate-resilient and do not sufficiently incorporate adaptation approaches into water resource management. The ineffective as well as inclusive water governance structures are wide gaps in water service access, with marginalised and climate-vulnerable communities life affected. Consequently, water governance based on doctrines of equity, sustainability, and climate resilience is essential to address challenges.

1.1 Water Governance

The word "governance" commonly means the practices, structures, and foundations that are measures of decision-making and implementing policies. In other words, water governance is well-defined as "a concept that embraces the 'water policies, regulations, institutions, and sustainable practices that aim to confirm efficient utilisation and protection of water resources. Water governance emphasize on legal framework, its policies and institutional aspect. Sustainable practices are part of wisely use of water in a sustainable manner. Water governance also comprises coordination and collaboration amongst several stakeholders.

The main goal of water governance is to establish a balance between three groups: environmental sustainability, economic development, and social equity. Its objective is to promote equal access to water, sustain the supply of water, and address pressing issues like water scarcity, water pollution, and the increasing demand for safe and clean drinking water. There is no commonly agreed definition on what constitutes water governance, but the theoretical understanding of it may be removed from the works of several authors.

- Jeremy J. Schmidt and Nathaniel Matthews describe water governance as “the social and political structures of decision-making that connect water management to sustainability programs, balancing environmental, economic, and social well-being.” The meaning of water governance has a strong integrative focus, as it emphasises the concept of sustainability and stability in its definition.
- Beatrice Mosello has described water governance as a “multi-layer and adaptive concept, addressing the influences of climate change by combining integrated water resources management (IWRM) and

adaptive governance.” Water governance has a resilient focus on its dynamic and adaptive nature in addressing the impacts of climate change.

- Charles Batchelor (2003) has described water governance as a tool to address challenges like increased water demand, lack of accountability, and climate variability. He has also emphasised the importance of managing water ecosystems in a way that addresses poverty and uncertainties related to water resources. Furthermore, international organisations such as the Global Water Partnership (GWP), which was formed in 1996, highlight that water governance involves “how water resources are managed, how policy is implemented, and how institutional measures are structured

1.2 Water Governance in India

The structure of water governance in India is multi-tiered, with three tiers: central, state, and local.

- **Central Governance:** The central level water governance structure comprises the Ministry of Jal Shakti. This ministry is responsible for formulating policies, planning, coordinating, and developing water resources. This ministry plays a critical role in: formulating policies on water resources, promoting awareness programs, providing financial assistance to states, and solving interstate water disputes
- **State Governance:** Indian Constitution declares water a ‘State Subject,’ which means that the primary responsibility for the managing of water resources at the state level rests with the respective state governments. Each state has a water resource department to: plan and implement water-related schemes, ensure supply of water and sanitation services, frame policies and regulations at the state level, enact laws on the usage of water resources and their conservation.
- **Local Governance:** At the grassroots, local bodies as panchayat raj institutions and urban local bodies have a major role to play in water governance. The local bodies are involved in: implementation of water supply schemes, maintenance of local water bodies, community participation, ensuring equitable distribution at the local level

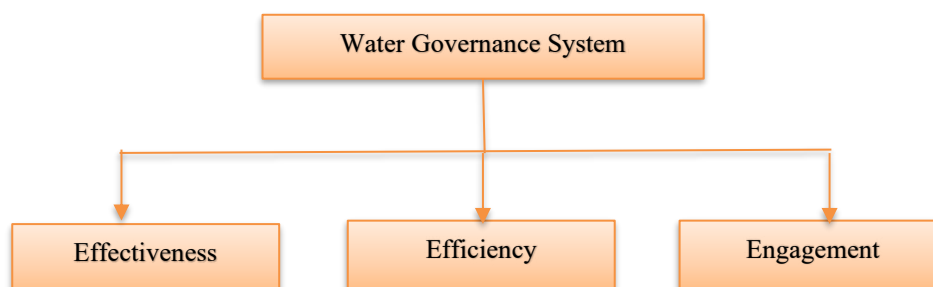


Figure 1: OECD Water Governance Principles Framework

Source: OECD. (2015): OECD Principles on Water Governance.

The principles of water governance OECD were developed in 2015, provide a holistic set of principles to measure and improve existing water governance systems. The OECD Water Governance Principles have three key dimensions: Effectiveness – Ensures proper allocation of roles and responsibilities, policy coherence, and capacity building to full-fill water-related goals. Efficiency – Emphasises the importance of optimal resource utilisation, which is achieved by ensuring proper data, financing, and regulatory mechanisms. Trust and Engagement – Emphasises the importance of transparency, accountability, and integrity in the governance processes.

This set of principles is widely used to measure the quality of governance and improve cooperation between different organizations. It is important in addressing complex issues related to water, which are often caused by climate change and socio-economic factors.

1.4 Climate Justice

The concept of climate justice is multidimensional in nature. It combines aspects of environmental sustainability with those of social justice and human rights. It is also focused on the idea that climate

change is not a matter of environmental sustainability but it is a matter of morality and politics, as it is seen that the causes of climate change is not even.

The main idea of climate justice is to promote equity in the fight against climate change. This is because developing countries and underprivileged communities are more vulnerable to the effects of climate change, such as water scarcity, weather events, and disruption of livelihoods (UNDP, 2023). The concept of climate justice is based on the opinion of 'common but differentiated responsibilities,' in which developed countries are more responsible for combating the impacts of climate change. Procedural justice (participatory justice in decision-making), Distributive justice (equitable sharing of resources), Recognition justice (recognition of marginalized communities). Moreover, it focuses on the links between climate change and socio-economic differences in income, gender, and geography. Intergenerational justice is also emphasised to sanction that future generations are not disadvantaged due to current environmental degradation.

1.5 Linkages between Climate Justice and Water Governance

Climate justice and water governance have a close relationship. This is because water is essential in ensuring environmental sustainability and human well-being. Climate change has affected the hydrological cycle. This has caused irregular rainfall patterns, droughts, floods, and poor water quality. All these issues have affected the poor. Therefore, water is essential in ensuring climate justice (United Nations, 2023).

Water governance is essential in ensuring the execution of climate justice. This is because it ensures the equitable distribution of water resources. Effective water governance ensures: inclusiveness in the decision-making process, transparency and accountability, equitable distribution of water resources, protection of ecosystems

In India, this relationship is particularly important in consideration of the country's dependence on agriculture and uneven distribution of water. The disadvantaged section of society in India's rural areas and small farmers face increased levels of water insecurity. The government's initiatives in this regard include the Jal Jeevan Mission and AMRUT. Success in these initiatives lies on the governance level (Ministry of Jal Shakti, 2022).

In addition to this, the integration of climate resilience in water governance is particularly important in consideration of future challenges. Sustainability and optimum use of water must include in the policy to ensure future water security. In conclusion, strengthening water governance is particularly important in consideration of climate justice. This would help to reduce inequality in society and ensure sustainable water governance in the face of climate change.

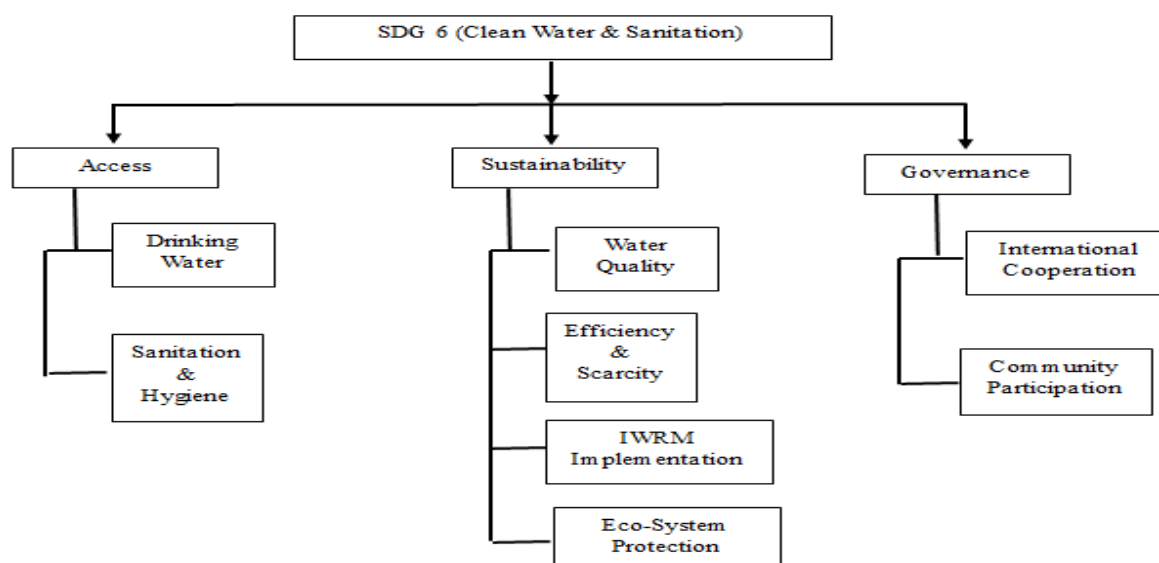


Figure 1.2 SDG 6 (Water and Sanitation) Framework

Source: United Nations. (2015). 2030 Agenda (World Transformation)

2. LITERATURE REVIEW

The interplay between climate justice and water governance has been an area of growing research attention in recent years, with a emphasis on the impact of climate change on the water insecurity. The literature has primarily revolved around five major themes, which are: climate justice and inequality, water governance frameworks, water injustice and issues related to distributive justice, adaptive and resilient water governance, and policy and institutional issues.

2.1 Climate Justice and Inequality: Recent research emphasises that, aside from its environmental dimension, climate change has a matter of justice and equity. A systematic review done by Arruda Filho et al. (2024) reveals that, there has been an expansion of research related to climate justice, with a specific focus on the inequalities between the north and south. According to researchers, the climate change has a disproportionate impact on marginalised communities because of their unequal circumstances, infrastructure, and adaptive capacity. The concept of climate justice includes distributive, procedural, and recognition justice as important aspects of addressing these inequalities, as emphasised by Clements (2024). Current research has also considered the aspects of gender and social issues in the concept of climate justice, which highlights the increased risks experienced by certain communities, especially women, because of unequal access to resources and decision-making processes.

2.2 Water Governance Framework: Water governance has been recognized as a main factor that determines sustainable water management. A systematic literature of 118 studies indicates that effective water governance involves coordination, participation, and institutional coherence to attain Sustainable Development Goal 6 (2021). Recent studies on water governance have shown that the water crisis is a governance crisis. A comparative study on water governance has identified that the success of water governance depends on contextual, design, and adaptive elements (2025). Moreover, literature has shown that effective water governance involves a multi-level governance approach, especially in developing countries. Fragmented institutional activities have been identified as a challenge to effective water management.

2.3 Water Injustice in the Framework of Climate Change : An increasing level of literature directly associates climate change with water injustice. In a recent systematic review (2026), which included 52 empirical studies from OECD countries, it was found that climate change was merged with water injustice: Distributional injustice (unequal access to water resources), Procedural injustice (lack of contribution in water resource decisions), and Recognition injustice (ignoring marginalised communities). A recent study on groundwater governance (2025) found that: Institutional arrangements and market-based instruments can create water injustices in access to water resources, particularly in agricultural economies. The argument that water governance needs to consider justice frameworks to address injustices in water governance is further supported.

2.4 Adaptive and Resilient Water Governance: Current research focuses on the importance of adaptive forms of governance in addressing the issue of water uncertainty caused by climate change. The socio-hydrology approaches (2025) emphasise the importance of integrating the social and environmental aspects in enhancing resilience in water management, particularly in regions highly affected by climate change, like South Asia. Research on the importance of governance attributes in enhancing resilience (2023) has recognized some key factors in building resilience in water management, like flexibility, learning, and stakeholder engagement, which are important in building resilience in water management. Legal and policy research (2025) has shown that building resilience in water management against the effects of climate change involves integrating adaptive measures in existing legal frameworks, particularly in developing economies with poor forms of governance.

2.5 Water & Governance Challenges: Literature has shown a growing trend towards the importance of inclusivity in the matter of water governance. In fact, a study published in 2026 in Nature Water highlights the importance of Indigenous involvement in water governance structures, which is minimal despite their importance water resource sustainability. Current reviews has shown that

participatory water governance is important in ensuring the legitimacy, effectiveness, and equity in the allocation of resources. However, most water governance structures have adopted a top-down approach, which is not conducive to community involvement and promotes inequality. Water conflicts have been on the increase due to climate change. In fact, a review published in 2025 shows that conflicts over water are often linked to poor governance, scarcity, and socio-economic inequalities. Lack of strong institutions leads to conflicts over water, lack of policy coordination makes societies vulnerable to conflicts over water; lack of climate-resilient policies makes societies unsustainable in terms of water resources.

3. RESEARCH METHODOLOGY

This research gives information regarding the research design, methodology, sampling design, and analysis conducted to analyse the aspects of water governance and climate justice. The methodology is reliable, valid, and systematic for the analysis of the collected data from the sample size.

3.1 Research Design: The research design of the study is descriptive and analytical. The descriptive research design is applied to understand the present status of the application of water governance practices and public participation. Similarly, the analytical research design is applied to understand the relationship between the application of water governance practices and the achievement of climate justice. The research is quantitative in nature, supported by primary data through questionnaires and interview.

3.2 Study Area: The research is conducted in the Agra district of the Uttar Pradesh region of India. The region is facing issues related to water scarcity, pollution, and inefficiency in water governance. To cover the study area comprehensively, the research consider all six tehsils of the Agra district.

3.3 Sample Design: The research is conducted using a sample size of 200 respondents from six tehsils of Agra district, namely as: Agra, Etmadpur, Fatehpur Sikri, Kirawali, Kheragarh, Bah.

3.4 Sampling Technique: The study has adopted a multi-stage sampling technique for collection of data. The steps involved in the sampling design are: First: Selection of the Agra district purposively because of its relation to water governance and climatic problems. Second: Selection of six tehsils of the Agra district to represent geographical area of the district. Third: Selection of respondents through simple random sampling from each tehsil.

Table 3.1: Distribution of Sample

Tehsil	Number of Respondents
Agra	40
Etmadpur	30
Fatehpur Sikri	35
Kirawali	30
Kheragarh	35
Bah	30
Total	200

Source: Researcher Compilation

3.5 Data Collection

Primary Data: The data for this research were collected by a structured questionnaire that mainly collected data about various aspects of water governance and climate-related factors. The questions designed to assess the awareness of people regarding water governance policies, their level of participation in water-related programs, and their views on water availability and its quality. The study also ensures the opinions of people regarding government initiatives related to water governance, as well as the problems related to climate change that impact water resources. The questionnaire was designed to collect quantitative data that is statistically significant.

Secondary Data: The data collected from several sources, such as Government Reports (Ministry of Jal Shakti, NITI Aayog), Research Papers/ Journals, Reports like UNESCO, World Bank, OECD, Books, and Official Websites

3.7 Data Analysis: The collected data is analysed with the help of statistical techniques:

- Descriptive Analysis: Frequency, Percentage
- Comparative Analysis: Tehsil-wise comparison

4. OBJECTIVES OF THE STUDY

- To examine how equitable water governance can contribute to climate justice in the face of escalating challenges in climate change.
- To assess the effectiveness of sustainable water mission and policy initiatives in providing equitable accessibility of water resources among different socio-economic classes.

5. ANALYSIS AND INTERPRETATION

Table 5.1 Distribution of Respondents (Tehsil-Wise)

Tehsil	Frequency	Percent
Agra	40	20
Etmadpur	30	15
Fatehpur Sikri	35	17.5
Kirawali	30	15
Kheragarh	35	17.5
Bah	30	15
Total	200	100

Source: Researcher Compilation

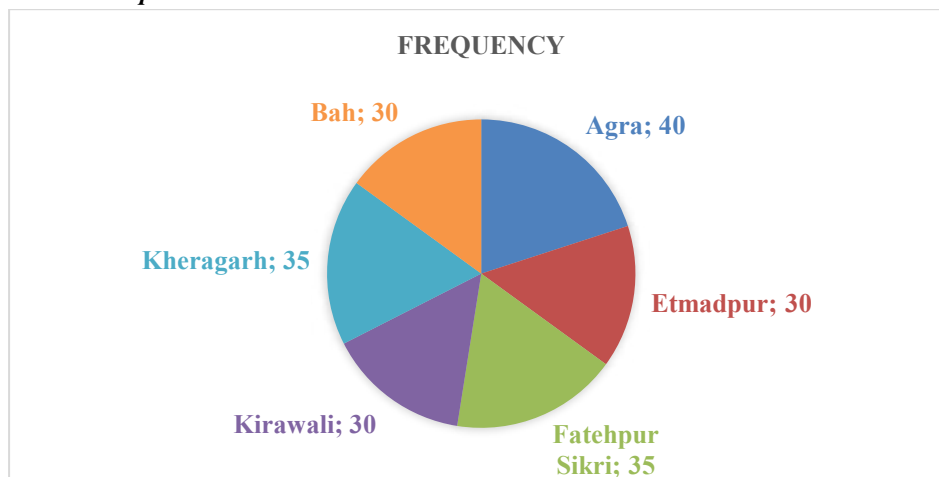


Figure 5.1: Distribution of Respondents by Tehsil

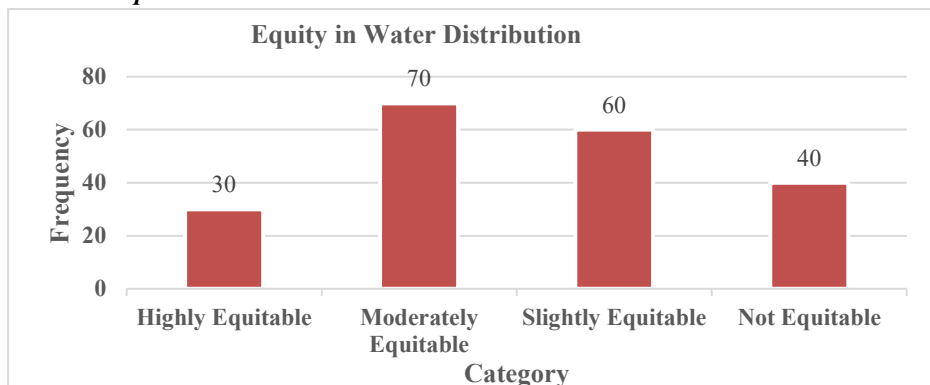
Source: Researcher Compilation

Interpretation: Fig. 5.1 shows the distribution of respondents in the six tehsils of Agra district. The highest proportion of respondents comes from Agra tehsil, which is 20%, while Fatehpur Sikri and Kheragarh have 17.5%. The proportion of respondents from Etmadpur, Kirawali, and Bah is 15%. This shows a balanced representation of relatively urbanized areas like Agra, and relatively rural or semi-rural areas like Bah and Kheragarh. Such a representation is important to understand the different scenarios in terms of water governance and climate issues in different areas. Therefore, the proportionate representation has added value to the reliability of this research, ensuring that the results on issues as the accessibility and effectiveness of water governance, and issues related to climate justice are comprehensive and unbiased to any specific area.

Objective 1 : To examine how equitable water governance can promote climate justice

Variable 1: Perception of Water Governance Equity**Table 5.2 Perception of Equity in Water Distribution**

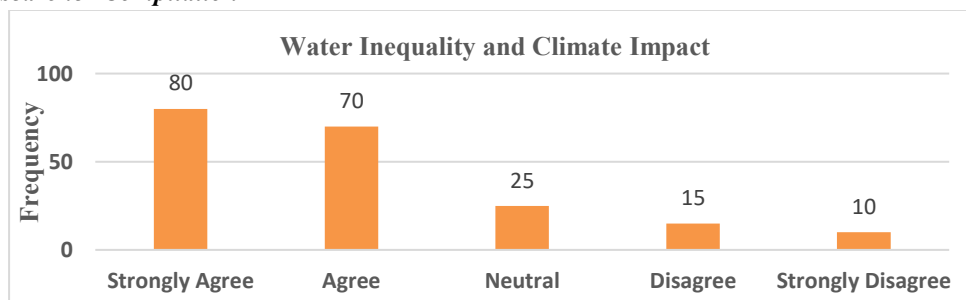
Category	Frequency	Percent
Highly Equitable	30	15
Moderately Equitable	70	35
Slightly Equitable	60	30
Not Equitable	40	20
Total	200	100

Source: Researcher Compilation**Figure 5.2: Perception of Equity in Water Distribution***Source: Researcher Compilation***Interpretation:**

The outcomes show that there are several opinions regarding the equity of water distribution while only 15% of the population favour it as highly equitable, 35% it as moderately equitable. This shows that the situation is favourable but not perfect. Though, it is interesting to notice that a significant number of people, 30% and 20%, focused it as slightly equitable and not equitable, respectively. This shows that half of the people are unsatisfied with the situation. It indicates that there are inequalities for the collection of water resources, which goes against the principles of climate justice. This is because climate justice advocates for equitable access to water resources.

Variable 2: Impact of Water Inequality on Climate Vulnerability**Table 5.3: Perceived Link between Water Inequality and Climate Impact**

Response	Frequency	Percent
Strongly Agree	80	40
Agree	70	35
Neutral	25	12.5
Disagree	15	7.5
Strongly Disagree	10	5
Total	200	100

Source: Researcher Compilation**Figure 5.3 Perceived Link between Water Inequality and Climate Impact***Source: Researcher Compilation*

Interpretation: The data shows that a substantial majority of the respondents understand the relationship between water inequality and climate vulnerability. This includes the fact that 75% of the respondents, which comprises 40% who strongly agree and 35% who only agree, understand that unequal distribution of water resources increases vulnerability, especially among marginalized and disadvantaged groups. On the contrary, a smaller number of respondents, those indicates 12.5%, are neutral, while only 12.5% of have a certain degree of disagreement. This, therefore, shows a strong public perception of the relationship between unequal distribution of resources and increased vulnerability that shows paramount of water governance.

Variable 3: Access to Safe Drinking Water across Income Groups

Table 5.4 Access to Safe Water (Income-wise Perception)

Income Group	Adequate Access	Inadequate Access	Total
Low Income	30	70	100
Middle Income	60	30	90
High Income	9	1	10
Total	99	101	200

Source: Researcher Compilation

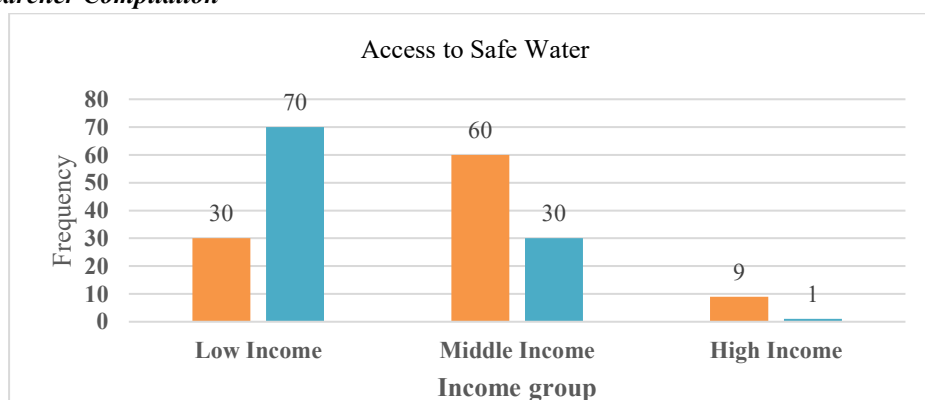


Figure 5.4 Access to Safe Water (Income-wise Perception)

Source: Researcher Compilation

Interpretation: The data illustrates that there are considerable inequalities in the distribution of safe water access. Most of the low-income groups have inadequate access to water, with a majority of 70% of the population suffering this issue. This shows to a considerable disparity in basic water availability. The middle-income groups have relatively greater access to water, with 60% of this population experiencing adequate access. Instead, the high-income groups face minimal scarcity of water, with only 10% of this population representing inadequate access. This highlights to considerable socio-economic disparities in the distribution of water. Thus, the results point out issues of distributional injustice, which suggests that a considerable relationship exists between water insecurity and income inequality.

The results remark that there are considerable inequalities in the distribution of water that exacerbate climate risks, especially for the economically weaker sections of society.

Objective 2: To assess the effectiveness of sustainable water missions and policy frameworks

Variable 4: Awareness of Government Water Policies

Table 5.5: Awareness Level

Awareness Level	Frequency	Percent
Highly Aware	25	12.5
Moderately Aware	65	32.5
Slightly Aware	70	35
Not Aware	40	20
Total	200	100

Source: Researcher Compilation

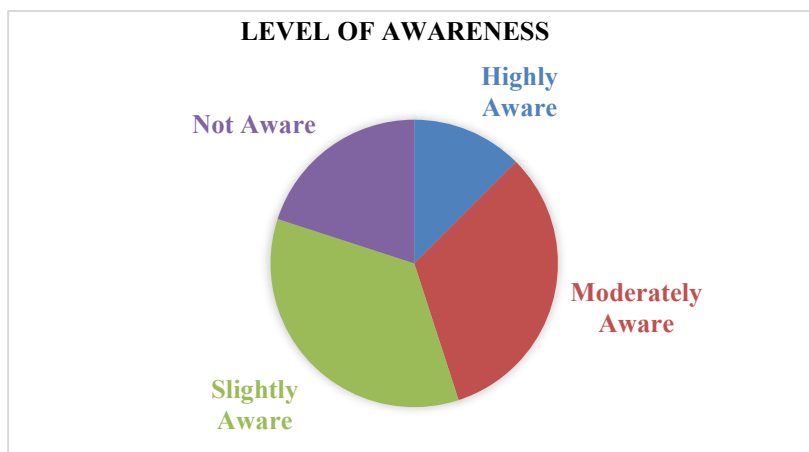


Figure 5.5: Awareness Level

Source: Researcher Compilation

Interpretation:

The information obtained from the result reveals that the awareness of water governance and its related policies among the respondents is quite low. Only 12.5% of the respondents have high awareness, followed by 32.5% who have a moderate level of awareness. A high percentage, 35%, of the respondents has only a slight level of awareness, pursued by those who have no awareness at all, which is 20%. This tells that more than half of the total respondents, i.e., 55%, have a low level of awareness. There is a strong need to rise the awareness of the public through effective awareness programs.

Variable 5: Effectiveness of Sustainable Water Missions

Table 5.6 : Perceived Effectiveness

Response	Frequency	Percent
Very Effective	35	17.5
Effective	75	37.5
Neutral	40	20
Ineffective	30	15
Very Ineffective	20	10
Total	200	100

Source: Researcher Compilation

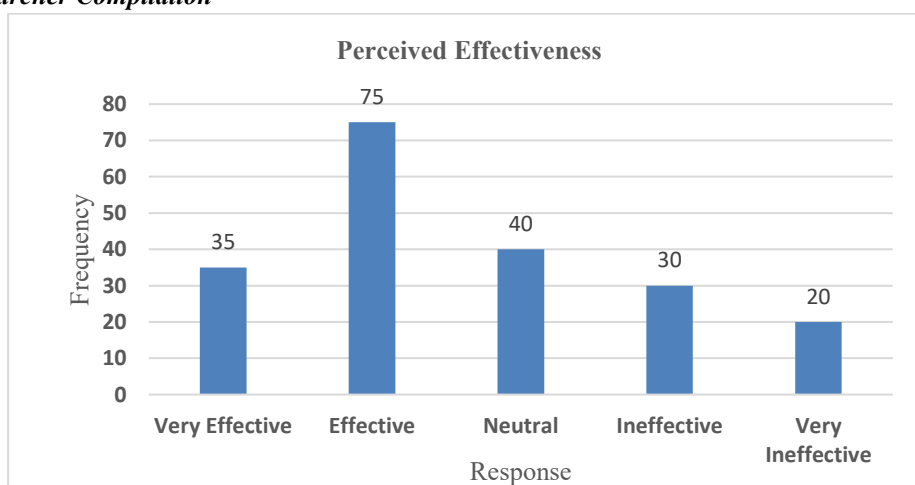


Figure 5.6 Perceived Effectiveness

Source: Researcher Compilation

Interpretation: This shows a moderately positive perception of policy effectiveness, with a majority of 55% comprised of respondents who believes the policies are very effective for implementation. The result shows a certain satisfaction level with the effectiveness of the water governance policies.

However, a considerable number of respondents are dissatisfied with the effectiveness of the policies, with 20% showing a neutral perception and 25% showing an ineffective perception. The difference in opinions shows inconsistencies in policy implementation and awareness at the local level. It represents that while the policies may be effective, their implementation may vary geographically.

Variable 6: Equity in Policy Implementation across Social Groups

Table 5.7: Equity in Policy Benefits

Social Group	Benefited	Not Benefited	Total
General	50	20	70
OBC	40	30	70
SC/ST	20	40	60
Total	110	90	200

Source: Researcher Compilation

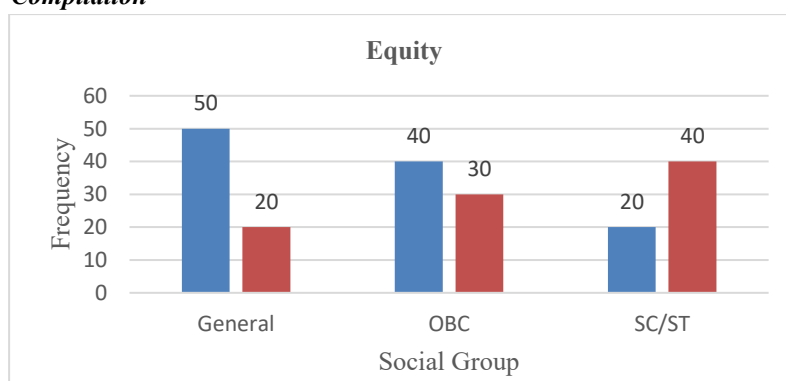


Figure 5.7: Equity in Policy Benefits

Source: Researcher Compilation

Interpretation: The data provided in Table 5.7 points to significant gaps in the distribution of policy benefits to various social groups. The highest benefit of the policy, i.e., 50 out of 70, is provided to the General category, and the OBC category receives a moderate benefit of 40 out of 70. On contrary, the SC/ST groups have the lowest benefit of the policy, i.e., only 20 out of 60. This clearly indicates marginalised sections of society are relatively excluded from the benefits of the climate policy. This may be a serious issue of concern regarding the inclusiveness of the policy. The findings show that the existing policies may not be effectively addressing the requirements of such groups, which may be acting as an impediment to the achievement of sustainability.

The analysis reveals that the inequality in the distribution of water resources is closely related to climate injustice. The study also reveals that there exist significant gaps in policy awareness and implementation that affects the efficiency of water governance initiatives. The inequality in the distribution of water resources also affects the marginalized communities in the society. Communities include the socially as well as economically disadvantaged. Therefore, to ensure climate justice need to improve the institutional mechanisms and also necessity to raise awareness to ensure that the marginalized section of the society benefited from the distribution of water resources. Sustainable water policies are available, but awareness of these policies and their implementation are lacking behind.

6. FINDINGS OF THE STUDY

6.1 Objective 1: To examine the ways through which equitable water governance could convey about climate justice

- Moderate to Low Perception of Equity in Water Governance: A majority of the respondents, i.e., 50%, perceive water governance as slightly equitable or not equitable, which shows a high degree of dissatisfaction with the distribution system.
- Strong Link between Water Inequality and Climate Vulnerability: A strong perception of the link between water inequality and climate change vulnerability exists among a majority of the

respondents, i.e., 75%.

- Geographical Inequality across Tehsils: The study reveals that respondents from rural or semi-urban areas, like Kheragarh and Bah, face more water-related problems compared to the Agra tehsil.
- Equitable water governance does not exist, and its absence increases the vulnerability of the population, especially those who are more disadvantaged, both at the economic and geographical levels.

6.2 Objective 2: For evaluating the effectiveness of sustainable water missions and policy frameworks

- Low Awareness Level Regarding Water Policies: The respondents' feedback reveals that more than 55% have low or no knowledge regarding water policies implemented by the government.
- Moderate Level of Effectiveness in Water Missions: Around 55% respondents found water missions effective, but 25% respondents found water missions ineffective.
- Inequitable Distribution of Benefits to Different Social Groups: The data suggests that SC/ST categories receive fewer benefits in comparison to "General" and "OBC."
- Inequitable Distribution in Water Policy Implementation at Local Levels: Although Jal Jeevan Mission is implemented in the region, respondents complain: Irregular water supply, Infrastructure-related issues, Lack of accountability. The respondents had more knowledge about water policies had better access to water facilities.

7. SUGGESTIONS AND RECOMMENDATIONS

In light of the findings, several policy-oriented and practical recommendations are proposed to strengthen water governance and promote climate justice in the context of increasing climate change challenges. First, there is a need to strengthen inclusive water governance frameworks by ensuring active participation of all stakeholders, particularly marginalized and vulnerable sections of society like SC/ST communities, small farmers, women and low-income households. In this context, decentralized water governance structures like panchayat raj institutions and urban local bodies should be strengthened. Second, the study emphasizes to enhance policy awareness and outreach. In most cases, government actions in water management, like sustainable water missions, are not able to reach their potential by lack of awareness among water users. Therefore, promoting initiatives to bridge this gap is important. Third, there is a necessity to enhance the effectiveness of policy implementation structures and also need to increase manpower to reduce workload. This is done by improving coordination among different levels of governments monitoring and evaluation systems. Transparency and accountability are important in this context to safeguard that benefits are extended to water users without any discrimination. Fourth, the study has recommended the use of equitable distribution strategies to guarantee equal access to water resources by different socio-economic groups in society. Special consideration should be given to vulnerable groups to address issues of inequality and climate justice. Moreover, the study has recommended the incorporation of climate resilience in water governance policies to address the uncertainties brought about by climate change. Such measures include the use of adaptive strategies like rainwater harvesting, irrigation, wastewater management, and conservation of local water bodies. Therefore, there is essential to advocate for the usage of data-driven decision-making strategies and technological innovations in the management of water resources. The use of Geographic Information Systems (GIS) and remote sensing techniques would greatly contribute.

8. CONCLUSION

This study aims to explore the importance of equitable water governance in promoting climate justice, as well as the effectiveness of sustainable water policies in ensuring equitable access to water resources across different socio-economic segments of society, with particular reference to Agra district.

The study has generated important research insights based on primary data collected from a sample of 200 respondents across the six tehsils of Agra district.

The study has established an important research finding, which reveals that water inequality remains a

critical challenge, as a large number of respondents have perceived the water governance system as inequitable. In particular, water inequality has emerged as a major challenge for low-income households, as well as for rural and semi-urban areas, including Kheragarh and Bah tehsils.

The study has recognized a statistically significant relationship between equitable water governance and climate justice, which reveals that inequitable distribution of resources, has increased vulnerabilities across different segments of society.

Thus, water governance has emerged as a critical dimension of climate justice, as equitable distribution of water resources has become a major determinant of resilience across different segments of society.

As far as policy effectiveness is concerned, the research has shown that government initiatives, like the Jal Jeevan Mission, have played a vital role in enhancing the quality of water infrastructure and accessibility. However, the usefulness of these policies is limited by a number of factors, like low levels of awareness, administrative issues, and differential implementation in social groups. The SC/ST groups have shown comparatively low levels of policy outreach.

Another important aspect highlighted the role played by awareness and information dissemination in policy effectiveness. The respondents with higher levels of awareness have shown higher levels of accessibility to water facilities, which means policy effectiveness is not just dependent on the quality of infrastructure, but on the quality of awareness and information dissemination.

Overall, the research illustrates that achieving climate justice is not just about having policy instruments in place, but about bridging the gap between policy and implementation, ensuring the equitability and sustainability of policy outreach in society.

The research concludes that equitable water governance is indispensable for achieving climate justice; hence, sustainable water management needs to transcend the development of infrastructure to more inclusive, transparent, and community-led approaches. The development of institutional arrangements, awareness, and vulnerable groups will be critical for developing a resilient and equitable water governance system in the face of increasing climate change challenges.

9. REFERENCES

- [1] Haeffner, M., Lave, R., Linton, J., Mukherjee, J., Ndiritu, J., Pacheco-Vega, R., Rusca, M., & Zwarteveen, M. (2024). Innovating a new knowledge base for water justice studies: Hydrosocial, sociohydrology, and beyond. *Frontiers in Water*, 6. <https://doi.org/10.3389/frwa.2024.1389030>
- [2] Intergovernmental Panel on Climate Change (IPCC). (2021). *Climate change 2021: The physical science basis*. Cambridge University Press.
- [3] Jepson, W., Budds, J., Eichelberger, L., Harris, L. M., Norman, E. S., O'Reilly, K., Pearson, A. L., Shah, S. H., Shinn, J., Staddon, C., Stoler, J., Wutich, A., & Young, S. L. (2017). Advancing human capabilities for water security: *A relational approach*. *Water Security*, 1, 46–52.
- [4] Melo Zurita, M. D. L., Thomsen, D. C., Holbrook, N. J., Smith, T. F., Lyth, A., Munro, P. G., & Baird, J. (2018). Global water governance and climate change: Identifying innovative arrangements for adaptive transformation. *Water*, 10(1), 29. <https://doi.org/10.3390/w10010029>
- [5] OECD. (2015). *OECD principles on water governance*. OECD Publishing.
- [6] Saikia, P., & Jiménez, A. (2023). Governance attributes for building water resilience: A literature review. *Water International*, 48(7), 809–838. <https://doi.org/10.1080/02508060.2023.2274162>
- [7] Schlosberg, D., & Collins, L. B. (2014). From environmental to climate justice: Climate change and the discourse of environmental justice. *Wiley Interdisciplinary Reviews: Climate Change*, 5(3), 359–374. <https://doi.org/10.1002/wcc.275>
- [8] Sultana, F., & Loftus, A. (2019). *Water politics: Governance, justice, and the right to water*. Routledge.
- [9] United Nations World Water Assessment Programme (WWAP). (2020). *The United Nations world water development report 2020: Water and climate change*. UNESCO.
- [10] Zwarteveen, M. Z., & Boelens, R. (2014). Defining, researching and struggling for water justice. *Water International*, 39(2), 143–158.