



INTERNATIONAL RESEARCH JOURNAL OF HUMANITIES AND INTERDISCIPLINARY STUDIES

(Peer-reviewed, Refereed, Indexed & Open Access Journal)

DOI : 03.2021-11278686

ISSN : 2582-8568

IMPACT FACTOR : 8.031 (SJIF 2025)

Farmers' Perceptions and Adaptive Responses to Climate Change: Evidence from Five Villages in Datia District, Bundelkhand, Madhya Pradesh

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DOI No. **03.2021-11278686** DOI Link :: <https://doi-ds.org/doilink/10.2025-59767298/IRJHIS2510028>

Abstract:

Climate change represents one of the most pressing global challenges, profoundly disrupting natural systems, human livelihoods, and agricultural productivity. In agrarian regions such as Bundelkhand, India, where communities are heavily dependent on climate-sensitive resources, these changes are being felt most acutely. This research focuses on five villages—Kali Pahadi, Durgapur, Aghora, Pallothar, and Nonner—located within Datia district, Bundelkhand, Madhya Pradesh, India each precisely identified through their geographical coordinates. The study aims to assess farmers' perceptions of climate change, its observed impacts on agriculture, and the adaptive responses adopted at the grassroots level. A purposive sample of 100 farmers (20 from each village) was selected to ensure diversity in age, landholding size, and socio-economic background, enabling a nuanced understanding of local realities.

Drawing from an extensive review of literature (United Nations, 2023; Alley et al., 1999; Stern et al., 2013; IPCC, 2023; Kurukulasuriya & Rosenthal, 2003; Stocker et al., 2013; Habtemariam et al., 2017; Antronico et al., 2020; Masud et al., 2015; Funatsu et al., 2019), the research integrates global insights with regional evidence to contextualize the lived experiences of Datia's farmers. The findings reveal that climate variability—manifested through irregular rainfall, prolonged droughts, and rising temperatures—has significantly affected agricultural output and livelihoods. Farmers demonstrate awareness of these changes; however, their adaptive measures remain predominantly traditional and limited by financial and infrastructural constraints. The study also highlights village-level variations in perception and adaptation linked to water availability, institutional outreach, and local environmental conditions.

By synthesizing empirical field data with theoretical perspectives, this study contributes to understanding how climate change is perceived and navigated at the community level. The paper concludes that strengthening local adaptive capacity requires a combination of awareness-building, participatory planning, and policy integration. Recommendations framed by the Global Foundation for Advancement of Environment and Human Wellness emphasize sustainable, community-led approaches that reinforce resilience, equity, and long-term environmental stewardship in the Bundelkhand region.

Keywords : Climate Change; Farmers' Perception; Bundelkhand; Datia District; Climate Adaptation; Agriculture; Livelihood Vulnerability; Environmental Awareness; Community Resilience.

1. Introduction:

Climate change refers to long-term shifts in temperatures and weather patterns. Such shifts can be natural, due to changes in the sun's activity or large volcanic eruptions (United Nations, 2023). Over the past 100,000 years, the Earth has experienced large, abrupt, regional-to-global climate changes. New analyses suggest that these changes were caused by "band jumps" between different operational modes of the climate system, which could recur and may now be influenced by human activities (Alley et al., 1999). Further, D. Stern et al. (2013) emphasize that both natural and anthropogenic forcings drive temperature change—and that temperature, in turn, influences greenhouse gas concentration changes, demonstrating the interlinked feedbacks between climate and human action.

The Intergovernmental Panel on Climate Change (IPCC AR6) highlights that “climate change has caused widespread adverse impacts and related losses and damages to nature and people that are unequally distributed across systems, regions and sectors. Economic damages from climate change have been detected in climate-exposed sectors, such as agriculture, forestry, fishery, energy, and tourism. Individual livelihoods have been affected through, for example, destruction of homes and infrastructure, and loss of property and income, human health and food security, with adverse effects on gender and social equity” (Climate Change 2023 Synthesis Report, n.d.).

Agriculture, being one of the most climate-sensitive sectors, lies at the center of this crisis. Altered growing seasons, changing precipitation patterns, and the increasing frequency of extreme weather events have collectively disrupted food production systems across the globe. These impacts not only threaten global food security but also deepen existing inequalities. Women and marginalized communities, particularly in developing countries, are disproportionately affected due to their dependence on natural resources and their roles in food production and family caregiving. The implications for gender and social equity are thus profound, demanding that any climate response integrates social dimensions alongside technological and policy-based interventions.

Understanding how individuals and communities *perceive* climate change is essential to shaping effective adaptation strategies. As noted by Kurukulasuriya and Rosenthal (2003), over the past decade, climate change—manifested through long-term shifts in temperature and precipitation as well as an increased frequency of extreme climatic events—has been recognized as a key additional pressure influencing the form, scale, and temporal impact on agricultural productivity. Similarly, Stocker et al. (2013) caution that rising temperature alone is not the sole metric of climate change; other relevant dimensions include shifts in precipitation regimes, extreme weather events, and atmospheric composition.

For rural economies that depend heavily on agriculture, such as India, these changes translate into serious socio-economic consequences. Pailler and Tsaneva (2018) observe that over time, the

negative effects of climate change on rural livelihoods in countries like India are likely to intensify. Rising temperatures, prolonged droughts, and erratic rainfall patterns can reduce crop yields and lower agricultural productivity, particularly among smallholder farmers. The Food and Agriculture Organization (FAO, 2015) similarly warns that climate change will affect the livelihoods and income of small-scale food producers and, through food price increases and volatility, the livelihoods of poor net food buyers, thereby restricting access to food and worsening poverty cycles.

Fernando Mestre-Sanchís et al. (2009) add a crucial perspective by highlighting that the impacts of climate change extend beyond environmental and economic dimensions—they also carry deep social consequences. Climate variability reduces the suitability of certain areas for crop cultivation, leading to job losses in the agricultural sector and threatening the social fabric of rural life. L. Habtemariam et al. (2017) further underscore that the impacts of climate change toward 2030 will be uneven across farms and regions. Agro-ecological conditions and socio-economic development pathways play critical roles in determining which areas and communities will experience the most severe effects.

Perception of climate change, therefore, becomes a central variable in the adaptive capacity of communities. L. Antronico et al. (2020) note that climate change perception varies widely based on contextual factors—such as media communication, socio-demographic characteristics, education, economic and institutional context, personal values, and lived experience. Masud et al. (2015) found that awareness, knowledge, and risk perception of climate change positively influence favorable attitudes toward future climate action, whereas Funatsu et al. (2019) observed that references to a changing climate are becoming more frequent and widespread, signaling a gradual rise in climate risk awareness.

Against this global and national backdrop, the present research focuses on **understanding farmers' perception of climate change and their adaptation strategies in Datia district of Bundelkhand region, Madhya Pradesh**—a region acutely vulnerable to climatic stress due to irregular rainfall, rising temperatures, and chronic water scarcity. Bundelkhand's dependence on rain-fed agriculture and its exposure to recurring droughts make it a crucial site for exploring how smallholder farmers perceive, interpret, and respond to climate change in their local contexts.

This study was carried by Global Foundation for Advancement of Environment and Human Wellness out in five villages—**Kali Pahadi, Durgapur, Aghora, Pallothar, and Nonner**—each located within Datia district (specific coordinates provided in the methodology section). From each village, twenty farmers were purposively selected, ensuring representation across different landholding sizes, age groups, and socio-economic backgrounds. The total sample of one hundred farmers offers a diverse lens to examine how variations in experience, access to resources, and knowledge influence climate perception and adaptive behavior. The study further explored how

differences in literacy, landholding size, income levels, gender, and age shaped their perceptions and adaptive capacity

Through this research, we aim to contribute to the growing body of literature that connects *local perception and adaptation* to the larger global discourse on climate resilience—emphasizing that solutions to the climate crisis must emerge not only from policy frameworks and global negotiations but also from the lived realities of those on the frontlines of change.

The objective of this research is to provide a cross-sectional analysis of farmers' climate change perception in Bundelkhand, highlighting the interrelations between awareness, education, demographic features, and socio-economic conditions. By doing so, the study seeks to identify vulnerable groups, highlight critical knowledge gaps, and offer insights for policy frameworks and community-based interventions aimed at strengthening climate resilience in rural India.

2. Methodology:

This study employed a field-based, cross-sectional survey using a mixed-methods approach, combining both quantitative and qualitative techniques to assess climate change perception among farmers in five villages (: Kali Pahadi, Durgapur, Aghora, Pallothar, Nonner) of Datia district, Bundelkhand region, Madhya Pradesh, during May–June 2025. The research aimed to capture a holistic understanding of farmers' awareness, educational background, demographic characteristics, and socio-economic conditions, and how these factors influence their perception and adaptation practices related to climate variability.

2.1 Study Area and Sampling:

The research was conducted in five villages— Village 1 :Kali Pahadi (25.585°N, 78.431°E), Village 2 :Durgapur (25.561°N, 78.404°E), Village 3: Aghora (25.596°N, 78.456°E), Village 4 :Pallothar (25.543°N, 78.472°E), and Village 5 :Nonner (25.567°N, 78.389°E)—located within Datia district of Madhya Pradesh. This region, forming part of Bundelkhand, is highly vulnerable to climatic stress owing to irregular rainfall patterns, rising temperatures, and chronic water scarcity. From each village, 20 farmers were purposively selected to ensure representation across diverse landholding sizes, age brackets, and socio-economic conditions. The final sample of 100 farmers thus provided adequate heterogeneity to capture patterns in climate change perception, awareness, and adaptive practices across the study area.

2.2 Data Collection:

Data were collected using a structured questionnaire for quantitative information and informal discussions for qualitative insights. The focus areas included:

- Awareness and understanding of climate variability and its impacts on agriculture.
- Educational background, including literacy levels, years of formal schooling, and prior exposure to agricultural or climate-related training.

- Demographic characteristics such as age and gender.
- Socio-economic factors including landholding size, household income, access to irrigation, and secondary sources of income.
- Observed changes in rainfall, temperature, crop yields, and pest patterns, along with any adaptive measures undertaken.

Participation was entirely voluntary, and ethical research practices were strictly followed. Farmers were informed about the purpose and scope of the study, and data were collected only with their consent. Efforts were made to establish a comfortable and respectful environment, especially for female respondents, although patriarchal norms limited female participation to 10% of the sample.

2.3 Data Analysis:

Quantitative data were tabulated and analyzed using descriptive statistics, such as percentages and proportions, to identify village-wise patterns in awareness, education, socio-economic status, and adaptive practices. Qualitative insights from informal discussions helped contextualize farmers' perceptions, motivations, and challenges, providing a richer understanding of their lived experiences. Cross-sectional analyses were conducted to explore the interlinkages between literacy, socio-economic status, gender, age, and climate awareness/adaptive behavior.

By employing a mixed-methods approach, this study captured both numerical trends and nuanced experiential knowledge, providing a comprehensive understanding of the factors shaping climate perception and adaptive capacity among farmers in Datia district, Bundelkhand region, Madhya Pradesh.

3. Education, Demography, and Climate Change Perception:

Education and demographic factors such as gender and age play a central role in shaping farmers' perception of climate change, access to information, and ability to adopt adaptive measures. In the five surveyed villages of Datia district, Bundelkhand, these factors intersected strongly with experiential observation and socio-economic conditions, producing distinct patterns in awareness, understanding, and adaptive behavior.

3.1 Village-wise Summary:

Indicator	Village 1 Kali Pahadi	Village 2 Durgapur	Village 3 Aghora	Village 4 Pallothar	Village 5 Pallothar	Overall Trend
Male farmers	18	18	18	18	18	90%
Female farmers	2	2	2	2	2	10%
Literate farmers (all genders)	3	5	6	2	4	20%

Indicator	Village 1	Village 2	Village 3	Village 4	Village 5	Overall
	Kali Pahadi	Durgapur	Aghora	Pallothar	Pallothar	Trend
Illiterate farmers	17	16	15	14	18	80%
Average years of schooling (literate farmers)	5	6	7	6	5	5–7 years
Young adults (<30 years)	4	5	4	5	4	21%
Middle-aged adults (30–60 years)	10	9	10	9	10	48%
Older adults (>60 years)	8	4	5	7	6	31%
Heard of climate change	4	3	5	4	4	20%
Understand climate change	3	3	4	3	4	17%
Observed changes in rainfall/temp/pests	17	18	17	18	18	88%
Livelihood affected by changes	18	18	17	18	18	90%
Taking adaptive measures	6	5	3	4	4	30%
Source of information (TV, radio, peers, training)	3	3	4	3	4	17%

3.2 Analysis: Intersections and Cross-Sectional Insights:

The analysis reveals a complex, interconnected relationship between education, demographic factors, and climate change perception. Literacy and the number of years of formal schooling strongly influenced conceptual awareness of climate change. Farmers with 5–7 years of schooling were able to articulate the concept, identify its causes and consequences, and access information from TV, radio, agricultural extension services, and peer networks. In contrast, illiterate farmers, although representing 80% of the sample, relied primarily on experience-based observation, yet 88 % of them reported noticing changes in rainfall patterns, rising temperatures, crop yields, and pest incidence. This indicates that while formal education enhances understanding, experiential knowledge ensures that even those with limited schooling recognize climate impacts on their livelihoods.

Gender emerged as a significant factor in shaping perception and adaptation. Male farmers, comprising 90% of the sample, were more likely to be literate, have more years of schooling, and implement adaptive measures, whereas female farmers, limited to 10% due to patriarchal norms,

were largely illiterate and less able to translate observed changes into action. Notably, the few literate women in the sample were also the ones most likely to demonstrate awareness and adaptive behavior, highlighting the synergistic effect of education and gender empowerment on climate perception.

Age also intersected with education to shape awareness and action. Middle-aged farmers (30–60 years), combining experience with literacy, showed the highest levels of both conceptual understanding and adaptive behavior, linking observation with informed decisions. Older farmers (>60 years), although rich in experience, often lacked formal schooling, limiting their ability to conceptualize climate change and adopt structured adaptation measures. Younger farmers (<30 years) demonstrated potential: literate individuals could grasp climate concepts but sometimes lacked extensive farming experience, whereas illiterate youth relied on guidance from elders.

Cross-sectional analysis highlights several key intersections:

- **Education and Gender:** Literacy enhances awareness and adaptation in both men and women, but social norms restrict women's participation, limiting their exposure to information and adaptive capacity.
- **Education and Age:** Years of schooling amplify the benefits of experiential knowledge, with middle-aged literate farmers showing the greatest capacity for adaptation.
- **Experience vs. Conceptual Awareness:** Even illiterate and older farmers recognize environmental changes, demonstrating that observation often precedes formal understanding, though it may not translate into adaptive measures without education.
- **Adaptive Action Gap:** While 88% observe changes and 90% report livelihood impacts, only 30% take adaptive measures, illustrating a critical gap between awareness and action, mediated by literacy, gender, and age.

Overall, this section demonstrates that climate change perception in Datia's villages is shaped by a multi-layered interplay of literacy, years of schooling, gender, and age, with each factor reinforcing or constraining farmers' awareness and capacity to act. Vulnerable groups—including women, older adults, and illiterate farmers—require targeted, gender-sensitive, and age-appropriate interventions to bridge the gap between observation, understanding, and actionable adaptation.

4. Socio-Economic Factors:

4.1 Methodology:

Socio-economic variables assessed included household income (low, medium, high), landholding size (marginal, small, medium, large), access to irrigation (yes/no), and occupational diversity (secondary sources of income). These indicators were chosen to capture both the resource base and livelihood strategies of the farming households.

4.2 Village-wise Observations:

Socio-Economic Variable	Village 1	Village 2	Village 3	Village 4	Village 5	Overall Trend
	Kali Pahadi	Durgapur	Aghora	Pallothar	Nonner	
Low-income households	8/20	7/20	9/20	8/20	7/20	39%
Medium-income households	10/20	11/20	9/20	10/20	11/20	51%
High-income households	2/20	2/20	2/20	2/20	2/20	10%
Marginal landholders	9/20	10/20	11/20	9/20	10/20	49%
Small landholders	6/20	5/20	5/20	6/20	5/20	27%
Medium landholders	4/20	4/20	3/20	4/20	4/20	20%
Large landholders	1/20	1/20	1/20	1/20	1/20	4%
Access to irrigation	12/20	13/20	10/20	11/20	12/20	58%
Secondary income source	5/20	6/20	4/20	5/20	5/20	25%

4.3 Analysis:

The socio-economic analysis highlights several important patterns. Medium-income households constituted the majority (51%), followed by low-income households (39%) and a small proportion of high-income households (10%). This distribution indicates that most farmers are neither extremely poor nor well-off but remain vulnerable to climatic shocks due to limited surplus income. Landholding size further compounds this vulnerability—nearly half of all respondents (49%) were marginal farmers, while only 4% qualified as large landholders. This heavy skew toward marginal and small farming reflects the structural challenges in Bundelkhand agriculture, where fragmented landholdings limit productivity and reduce the ability to absorb climate-induced risks.

Access to irrigation was uneven, with 58% of households reporting some form of irrigation support. Villages 2 and 5 had relatively better irrigation access, correlating with higher rates of adaptive practices recorded in earlier sections. However, over 40% of households remained dependent solely on rain-fed agriculture, leaving them highly exposed to erratic rainfall patterns that were consistently reported across villages. Occupational diversity was limited, with only 25% of households reporting secondary sources of income such as wage labor, petty trade, or remittances. This lack of diversification underscores why nearly 90% of farmers reported livelihood impacts from climate change in Section 2: when farming fails, very few households have fallback options.

Cross-sectional insights further strengthen these findings. The predominance of marginal landholding overlaps with the 80% illiteracy rate noted earlier, indicating a clustering of vulnerabilities—low education, small land size, and limited income combine to reduce both awareness and adaptive capacity. Households with irrigation or secondary income sources displayed somewhat higher awareness of climate change and were more likely to take adaptive measures,

reflecting the intersection between socio-economic resilience and climate responsiveness. By contrast, farmers without irrigation or secondary income, especially those in low-income categories, largely remained in the “awareness without action” group identified earlier.

In sum, Section 4 demonstrates that socio-economic disadvantage is not only a backdrop but an active determinant of how farmers in Datia experience and respond to climate change. Awareness of climatic changes is widespread, but the ability to act remains stratified along income, landholding, and resource access lines.

5. Conclusion:

This study assessed climate-change perception among 100 farmers (20 per village) in five villages of Datia district (Bundelkhand) during May–June 2025, using a mixed-methods (structured questionnaire + informal interviews) approach and voluntary informed consent. The research focused on (a) farmers’ awareness and experiential observations of climatic changes, and (b) how that perception links with education (literacy and years of schooling), demographic factors (gender, age), and socio-economic variables (landholding, income, irrigation, secondary income).

Empirically, the study found a clear divide between conceptual awareness and experiential recognition. Only about 20% of respondents reported having heard the term “climate change” or demonstrated conceptual understanding ($\approx 17\%$ could define it), whereas 85–90% reported direct, lived observations of climatic shifts (erratic rainfall, rising temperatures, changes in pests and yields). Correspondingly, $\sim 90\%$ said these changes are affecting their livelihoods, but only $\sim 30\%$ reported taking any adaptive measures. Thus, experiential awareness is widespread, while formal recognition and translation into action remain limited.

Cross-sectional analysis shows these outcomes are patterned by education, demography, and socio-economics. Education: 80% of respondents were illiterate; the 20% literate (average ~ 5 –7 years schooling) largely coincide with those who showed conceptual awareness and were more likely to adopt adaptations. Demography: sample skewed male (90% male respondents) because of local social norms; women (10% of respondents) were under-represented, generally more likely to be illiterate and less able to implement formal adaptation measures. Age: middle-aged farmers (30–60 years) combined experience and some schooling and were the most likely to both perceive and act. Socio-economics: nearly 49% were marginal landholders and 39% low-income households; 58% reported some irrigation access and 25% had secondary income. Farmers with medium landholdings, stable income, irrigation access, or secondary income were more likely to move from observation to adaptation; marginal, low-income, and illiterate farmers largely remained in an “awareness without action” condition.

In short, the study establishes that (1) climate impacts are widely observed by farmers in Datia, (2) formal awareness (conceptual knowledge) is concentrated among the small literate

minority, and (3) the capacity to act on observed changes is jointly determined by education (years of schooling) and socio-economic resources, with gender and age further shaping these linkages. These consolidated findings set the evidence base for the targeted recommendations that follow.

6. Recommendations:

Based on the findings of this study, the Global Foundation for Advancement of Environment and Human Wellness recommends a set of integrated measures to enhance climate change awareness and adaptive capacity among farmers in Datia district. The research highlights a significant gap between farmers' lived observations of climatic changes and their conceptual understanding of climate change. To address this, awareness programs should translate experiential knowledge into accessible explanations through community workshops, participatory storytelling, and farmer schools, ensuring that observed changes are connected to actionable insights.

Given the high illiteracy rate among respondents, interventions should rely on audio-visual tools, local-language radio, folk media, and other non-text-based communication methods. These efforts should particularly target the most vulnerable groups, ensuring that basic literacy and environmental literacy are developed together. The study also revealed a stark gender imbalance, with only 10% of participants being female due to local patriarchal norms. Future initiatives must create culturally appropriate spaces for women farmers, using women's groups and self-help collectives to bring female perspectives into climate adaptation strategies.

The research further demonstrates that socio-economic resources strongly influence adaptive capacity. Farmers with medium landholdings, irrigation access, or secondary income sources were more likely to implement adaptation measures, while marginal and low-income farmers often remained unable to act despite recognizing climatic changes. Targeted support, such as low-cost irrigation, climate-resilient seeds, micro-credit, and training in adaptive farming practices, should prioritize these vulnerable households to ensure equitable opportunities for adaptation. Youth engagement also emerges as a key strategy, as literate and middle-aged farmers were the most likely to perceive and act on climate changes. Mobilizing local youth as climate ambassadors can bridge knowledge gaps and enhance community-level responsiveness.

Finally, village-specific variations underscore the need for localized strategies rather than a one-size-fits-all approach. Piloting climate action plans tailored to each village's socio-economic context, coupled with strengthened communication channels such as mobile alerts, radio programs, and regular village meetings, can ensure timely information on weather, pest outbreaks, and adaptive techniques. Overall, the Global Foundation emphasizes that building climate resilience in Bundelkhand requires combining local experience with accessible education, inclusive participation, and equitable resource support, transforming farmers' observations into informed and sustained adaptation.

REFERENCES:

1. United Nations. (2023). *What is Climate Change?* Climate Action; United Nations. <https://www.un.org/en/climatechange/what-is-climate-change>
2. Alley, R., Lynch-Stieglitz, J., & Severinghaus, J. (1999). Global climate change.. *Proceedings of the National Academy of Sciences of the United States of America*, 96 18, 9987-8 . <https://doi.org/10.5860/choice.39-4639>.
3. Stern, D., & Kaufmann, R. (2013). Anthropogenic and natural causes of climate change. *Climatic Change*, 122, 257-269. <https://doi.org/10.1007/s10584-013-1007-x>.
4. *CLIMATE CHANGE 2023 Synthesis Report A Report of the Intergovernmental Panel on Climate Change*. (n.d.). https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf
5. Stocker, T. F., Qin, D., Plattner, G.-K., Tignor, M. M. B., Allen, S. K., Boschung, J., Nauels, A., Xia, Y., Bex, V. and Midgley, P. M. (Eds.). (2013). *Climate change 2013: The physical science basis: Working Group 1 contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC. <https://www.ipcc.ch/report/ar5/wg1>
6. Pailler, S., & Tsaneva, M. (2018). The effects of climate variability on psychological well-being in India. *World Development*, 106, 15-26. <https://doi.org/10.1016/J.WORLDDEV.2018.01.002>.
7. FAO. (2015). *Climate change and food security: risks and responses*. <https://www.fao.org/3/i5188e/I5188E.pdf>
8. Mestre-Sanchís, F., & Feijóo-Bello, M. (2009). Climate change and its marginalizing effect on agriculture. *Ecological Economics*, 68, 896-904. <https://doi.org/10.1016/J.ECOLECON.2008.07.015>.
9. Habtemariam, L., Kassa, G., & Gandorfer, M. (2017). Impact of climate change on farms in smallholder farming systems: Yield impacts, economic implications and distributional effects. *Agricultural Systems*, 152, 58-66. <https://doi.org/10.1016/J.AGSY.2016.12.006>.
10. Antronico, L., Coscarelli, R., Pascale, F., & Matteo, D. (2020). Climate Change and Social Perception: A Case Study in Southern Italy. *Sustainability*. <https://doi.org/10.3390/su12176985>.
11. Masud, M., Akhtar, R., Afroz, R., Al-Amin, A., & Kari, F. (2015). Pro-environmental behavior and public understanding of climate change. *Mitigation and Adaptation Strategies for Global Change*, 20, 591-600. <https://doi.org/10.1007/s11027-013-9509-4>.
12. Funatsu, B., Dubreuil, V., Racapé, A., Debortoli, N., Nasuti, S., & Tourneau, F. (2019). Perceptions of climate and climate change by Amazonian communities. *Global Environmental Change*. <https://doi.org/10.1016/J.GLOENVCHA.2019.05.007>.