Environment and Ecology Research 10(2): 284-293, 2022 http://www.hrpub.org
DOI: 10.13189/eer.2022.100218

Perception of Climate Finance: An Empirical Approach

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Received January 3, 2022; Revised February 12, 2022; Accepted March 15, 2022

Cite This Paper in the following Citation Styles

(a): *[1] Hariharan R., Senthil Kumar Arumugam, Seranmadevi R. , "Perception of Climate Finance: An Empirical Approach," Environment and Ecology Research, Vol. 10, No. 2, pp. 284 - 293, 2022. DOI: 10.13189/eer.2022.100218.*

(b): *Hariharan R., Senthil Kumar Arumugam, Seranmadevi R. (2022). Perception of Climate Finance: An Empirical Approach. Environment and Ecology Research, 10(2), 284 - 293. DOI: 10.13189/eer.2022.100218.*

Abstract Climate finance is an alternative financing source in which private and public at domestic and global levels invest their funds to support mitigation of and adapt to present and upcoming climate change. It is an enormous challenge since it is incredibly susceptible to climate impact. The main challenge lies in identifying risks of climate change, appropriate response measures, and prioritizing them to control climate change. The paper aims to determine the perception of climate finance among the public while assessing India's current situation concerning climate change. A well-structured questionnaire was prepared, and data were collected from 253 respondents in Chennai city from December 2020 to February 2021 using a convenience sampling method. A chi-square tool was used to examine the association between the demographic profiles of the respondents and the respondents' perception of climate change-related activities. Type of family, age, and number of family members are significantly associated with most statements connected to the perception of climate finance. The majority of the respondents had insufficient knowledge about climate change policies. Forty-two per cent of the respondents believed that the investment made in climate finance is used effectively for sustainable development. It explores the present scenario of climate finance in India during the Covid 19 pandemic period. The study results will be helpful to the social investment companies, and the regulators frame suitable strategic policies.

Keywords Climate Change, Climate Finance, Climate Resilience, Public Perception, Sustainability

1. Introduction

Climate finance (CF) refers to local, national, and even international money derived from public, private, and alternative sources to combat climate change mitigation and adaptation efforts. The finance uses climate change related activities, and sometimes specialists use it as 'green finance' or 'sustainability finance' or 'low-carbon finance [1]. CF is an alternative financing source raised from private and public for meeting climate change events. Green finance consists of CF and other environmental purposes needed for sustainable development, especially biodiversity and safeguarding natural resources. Sustainable finance is a broader concept of universal investment to create an economic, social, and environment-related sustainable ecosphere [2].

The need for climate financing has arisen due to sizable expenditures to cut emissions drastically. It is also critical for adaptation since many financial sources are required to adapt to the negative consequences of a changing climate and mitigate its repercussions. Climate change affects human health in many ways. Rising temperatures can overpower the human body in many ways and cause dehydration, heatstroke, and significant organ damages to people of all age groups. Air quality gets affected due to the burning of fossil fuels. Climate change has also been linked to wildfires known to carry particles that can penetrate deep into the lungs. Climate change is associated with extreme weather conditions like hurricanes and floods, which can cause immediate fatal consequences and lead to major injuries [3]. The involvement in climate change activities, the ability to avert and to deal with its outcomes massively differ among countries worldwide [4].

Financing for climate change mitigation and providing awareness among public are not adequate to under developed and developing nations.

Climate change can also cause damage to the country's economy. In 2017, a team of scientists and economists in the United States mapped out the potential economic damages that the Government could face, and they found out that if warming continued at the same rate, it could remove three to six percentage points from the country's GDP by the end of the century. To summarise, the greater the influence on the country's economy, the warmer it becomes. The 2016 Paris Agreement is one of the treaties governed by the UNFCCC (United Nations Framework Convention on Climate Change), aiming to keep worldwide average temperature changes below two degrees Celsius. Other goals of the treaty included improving the ability to adapt to the adverse effects of climate change while developing climate resilience that did not compromise food production and aligning financial flows with a low-carbon path. Under this agreement, each country had to determine, plan, and regularly report its contribution towards mitigating global warming. Although no mechanisms were enforced, the countries set a specific emissions target (higher than the previous target) by a particular date [5]. In simple terms, climate finance refers to funds directed to solving climate change issues and financing the costs of transitioning to a low-level carbon society.

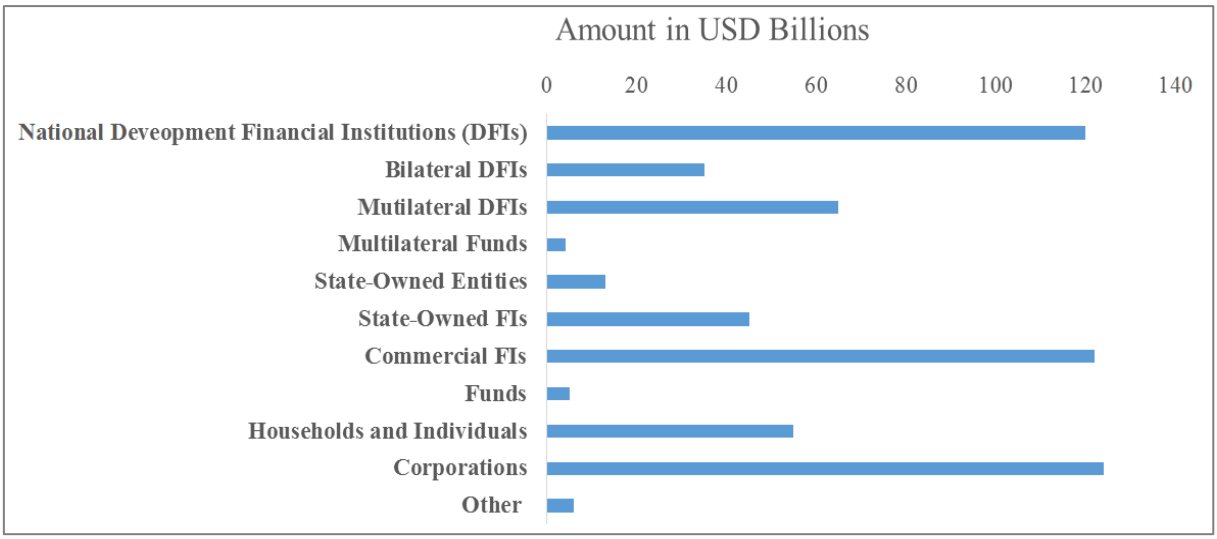
Research Problem

Due to the necessity for adaptation and mitigation of climate change worldwide, the phrase "climate finance" is gaining prominence. Many countries have come together to find a solution to mitigate and adapt to climate change. Actions like the Kyoto Protocol and Paris Agreement have come into the picture to enforce the same. Coming to the Indian context, India is one of the growing 'energy-thirsty countries' having significant developmental needs and is the world's third-largest emitter of greenhouse gases. The Government of India is taking various measures to meet the country's future needs. Renewable energy, water preservation, low carbon pathways to achieve zero net emissions are immediate actions towards climate change [6]. The discipline of behavioural economics (BE) is linked to this line of research and theory, and it proposes the context, especially how choices are presented to us, does indeed have a significant impact on human decisions. Cognitive biases, emotions, and social factors often impact behaviour in different ways throughout time and location. Global level study is required to understand the human behaviour into governments and regulatory body policy decisions on environmental sustainability and the perception of the public towards it. Hence, there is a need to research the awareness of climate finance amongst the public as an investment avenue and identify the challenges enterprises and governments face.

Review of Literature

The word perception represents a series of "psychological constructs, including knowledge, belief, attitude, involvement, concern, and risk observed" [7]. Climate change is a massive threat to the ecosystem [8]. Since 1981, there has been a significant contribution in the research on climate change and the perceptions among the public. Mixed levels of studies have been done using qualitative and quantitative methods. This paper primarily focuses on climate finance investment and public perceptions of it. The majority of the studies' findings explained that the public has partial knowledge of climate change and a low level of understanding on investments in these areas such as renewable energy, meat production, and eating habits, electronic waste management, etc. [7, 9-12]. In developed countries such as the USA, Japan, and Europe have ninety per cent awareness of climate change and risk perceptions than developing countries such as India, Pakistan, Bangladesh, developing African nations, etc. are having up to sixty-five per cent [8].

Studies are conducted exclusively to explore climate policy initiatives, opportunities available for climate finance, and hurdles to investing in [13]. Heike and Bulkeley [14] focused on the drivers, barriers, and modes of climate change governance in a few cities. His case study described limited leadership opportunities and a lack of knowledge to take bold decisions on climate finance investment. Their suggestions include integrating climate change across different policy domains, gaining political support along with finances, and that people should move out of the local authority's confines. They informed that to address the challenges of climate change effectively and the importance of collaborations across the city in more numbers. Also, the financial flexibility in climate finance investments and human capacity development is required to ensure that the public works to tackle this climate change issue. Kameyama et al. [15] illustrated the materialisation of climate finance investment towards the Asian region's low-carbon expansion. Also, the researchers examined implementing different financial policy instruments in the Asian area. It requires USD 125-149 billion annually to reduce greenhouse gas emissions by 2035. The role of the private sector and public investments in climate finance is essential in fulfilling climate change mitigation's long-term investment needs in developing countries [16].



Source: Climate Policy Initiative, 2021 [17]

Figure 1. Worldwide Climate Finance Flows in 2019-2020

To address the climate issue, all governments, cities, financial players, enterprises, and individual must work together. Developed countries agreed to mobilise USD 100 billion per year by 2020 from a range of sources to support developing countries' essential mitigation and adaptation needs. Figure 1 explains the climate finance investments by various types of organisations/intermediaries globally during 2019 and 2020 on average.

During 2009-2010, Broto and Bulkeley [18] examined a hundred towns worldwide to reveal a diverse mix of people, environments, governance systems, and climate change governance tools. The research experimentation on climate change is not particular to urban socio-economic conditions. Previous research studies explored the importance of climate governance because of the increase in the investigation of urban climate change. The public policies should incentivise such incentives by communicating risks and placing regulations to avoid shifting these risks onto the public. Researchers also recommended that public-private collaboration will help develop climate resilience and create business opportunities. Garg et al. [19] pointed out India's energy investment risks through a crude oil importing port and a western coast railway transporting coal cases. Their findings suggested that unmitigated climate risks be funded with adaptation funding, that climate parameters be continually monitored for adaptation measures to be implemented, and that sustainability initiatives be implemented alongside energy infrastructures. The public's perceptions of climate finance are essential for developing operational strategies in communication, self-governing policies and socially forceful technologies. Though the awareness among the public on climate change after the 1980s, the concern about climate finance investment varied across time and the universe [12]. Many research studies in various regions [20-25] concentrated on public perception of knowledge on climate change. This study fills the gap of researching climate finance investment, especially in the Covid-19 pandemic period, and it focuses on public investing in the stock market.

Climate Finance in India

Developing countries in today's world want developed countries to support low carbon emissions in their economy [26]. In contrast, developed countries wish emerging economies such as India to commit to sustainable growth instead. One way for these developed countries is by providing funds to marginal income countries for climate change initiatives. In a nutshell, that is climate finance. India gets dedicated funds from the World Bank, ADB (Asian Development Bank), or bilaterally. "In India, energy access and security are a priority. So much of India's climate plan is about scaling up renewable energy," stated Gireesh Shraimali, India's director at CPI.

India faces challenges like forming an institutional framework and funding to tackle climate change and take the required actions. The Central Government has already provided climate policies, but it is the responsibility of the states to identify and translate these national policies into actionable schemes and projects. Funding for the same has been flowing through the centre to the state or, later, through the regular budget. States like Gujarat and Madhya Pradesh have adopted various initiatives like residential rooftop solar plants, solar parks, and Climate Change Cell (CCC) to steer all climate actions within the state. India's GHG (Greenhouse Gas) strategy supports businesses in developing projects that are acceptable for funding while also assisting financial institutions in developing investment criteria [27] and funding

frameworks for low-carbon projects. India needs 2.5 trillion dollars to meet its climate action targets [28].

Objectives

The present study aims to ascertain the level of knowledge people possess about the concept of climate finance, study the public perceptions of climate finance, and identify the significant association between demographic profiles of the respondents and perceptions of climate finance.

Scope and Limitations

The study portrays the current situation concerning climate finance and identifies various factors affecting India's climate change. The objective was to gather opinions on the significant roles of the multiple institutions and determine the level of perception of climate finance and climate change among the public in Chennai city. The study was conducted from December 2020 to February 2021 during the Covid-19 pandemic. The answers received through the questionnaire could be biased and don't follow the same trend due to a lack of knowledge in this emerging topic. The study's sample size is 253, making it difficult to find an effective solution to the problem.

Hypothesis

The present study was conducted with a null hypothesis. It is proposed that the demographic variables and perception of climate finance are not significantly associated.

2. Research Methodology

Participants and Data Collection

Chennai city was preferred for study purposes since it has different cultural backgrounds and many investors living in that city. The study followed a descriptive research design. The research mainly focuses on gathering public views on climate finance. A well-structured questionnaire was framed to collect the data online using Google forms and offline using the convenient sampling method. The questions covered demographic profiles and respondents' opinions on the statements related to public knowledge and perception of climate finance. The pilot study was conducted with ten investors and experts in climate finance. Based on their inputs and suggestions, a questionnaire was restructured and issued 400 questionnaires among the public within Chennai city from December 2020 to February 2021. The country was facing a Covid-19 pandemic during the data collection period. Finally, the study considered 253 questionnaires, and these were complete in all aspects. Secondary data were collected through climate change based companies annual reports, data from the government web portal, climate change organisations, printed and e-resource research articles.

Statistical Design

Appropriate statistical tools were used to arrive at the findings with relevance to the research questions raised in this study and the hypothesis framed. Since the study was about public opinion of climate financing, percentage analysis was utilised to analyse the data. The association between public demographic factors and climate change perception was determined using the Chi-square test in the SPSS version 22 statistical package.

3. Data Analysis and Interpretation

Out of total respondents, an almost equal number of male and female respondents have given their perception of climate finance and climate change and its implementation in India. Table 1 describes the various demographic profiles of respondents. The majority of them are students (76%). Most of the respondents (70%) belong to a joint family. 147 (58%) respondents have their family income between two lakh and five lakhs. This shows that most of the respondents are coming under the middle-income group.

Table 1. Demographic variables of respondents

Demographic profile	Column A (t)	Count (N=253)	Percentage
Gender	Male	128	50.6
	Female	125	49.4
Native	Rural	5	2.0
	Urban	88	34.8
	Semi-urban	16	6.3
	Metropolitan	144	56.9
Type of family	Single parent	14	5.5
	Joint family	177	70.0
	Nuclear family	62	24.5
Number of members in the family	Up to 2	9	3.6
	Up to 4	208	82.2
	Above 4	36	14.2
Family income per annum	Less than 2 Lakh	15	5.9
	2 to 5 Lakh	147	58.1
	5 to 10 Lakh	76	30.0
	Above 10 Lakh	15	5.9
Residential status	Indian resident	233	92.1
	NRI	20	7.9
Occupation	Businessman	84	33.2
	Professional	40	15.81
	Homemaker	23	9.09
	Student	58	22.92
	Others	48	18.97
Age group	Up to 25 years	206	81.4
	26 to 35 years	24	9.5
	35 to 45 years	11	4.3
	Above 45 years	12	4.7

Source: Primary data

Table 2. Public perception of climate finance

Statements		Count	Percentage
How important is your investment in climate change?	Least important	4	4.21
	Neutral	63	66.32
	Highly important	28	29.47
	Total	95	100.00
Climate finance refers to financial resources paid to cover the costs of transitioning to a low carbon economy.	Strongly disagree	1	0.40
	Disagree	9	3.56
	Neutral	103	40.71
	Agree	114	45.06
	Strongly agree	26	10.28
	Total	253	100.00
Do you believe Government is doing its part in taking action for climate change?	No	103	40.71
	Yes	150	59.29
	Total	253	100.00
At which level do you feel changes should be made in order to have a strong impact on climate change in our country?	National level	91	35.97
	State level	38	15.02
	City level	62	24.51
	Neighbourhood level	62	24.51
	Total	253	100.00
Which sector, according to you, should take more initiative with respect to climate?	Private sector	124	49.01
	Public sector	129	50.99
	Total	253	100.00
What according to you is hindering the country's growth with respect to climate change?	The economic policy of the country	28	11.07
	Fiscal and budgetary policies of the country	83	32.81
	Insufficient knowledge about Climate Change policies	128	50.59
	Any other	14	5.53
	Total	253	100.00
Do you feel human beings are one of the reasons for the present climate scenario in our country considering actions like habitat destruction?	No	81	32.02
	Yes	143	56.52
	Only to a certain extent	29	11.46
	Total	253	100.00
The investments made in climate finance are being effectively used for the right purpose.	Strongly disagree	24	9.52
	Disagree	51	20.24
	Neutral	72	28.57
	Agree	79	31.35
	Strongly agree	26	10.32
	Total	252	100.00

Source: Primary data, SPSS Output

It is found from table 2 that more than two-thirds of the respondents have no opinion about the "How important is your investment in climate change?". The reason is that the public is not aware of climate change. Around 40.71% of respondents have expressed their opinion that Government is not taking appropriate action for climate change. It is essential to create awareness by Governments towards climate change and investment in climate finance. A little more than one-half of the respondents agreed to the statement "climate finance refers to financial resources paid to cover costs of transitioning to a low carbon economy". One-third of the respondents state that priority

should be given to national-level changes to impact climate change in our country positively. Also, two-thirds of respondents felt that neighborhood and city level changes are crucial for climate change in India. Both the private and public sector role is essential to take more initiative in climate change. 50.99% of the respondents have expressed that the public sector role is more necessary than the private sector for climate change. The majority of the respondents' option (50.59%) for the statement "hindering the country's growth for climate change" is insufficient knowledge about climate change policies.

Table 2 exhibits that 56.52% (143) respondents feel that human beings are one reason for the present climate scenario in our country considering actions like habitat destruction. Forty-two per cent of the respondents disagree with the statement "the investment made in climate finance is being effectively used for the right purpose". The respondents' demographic profiles such as gender, native, family type, number of family members, family income per annum, residential status, occupation, and age were considered to determine the association with perception of climate finance. Researchers have raised many questions about their knowledge and perceived level. They are aware of climate change and climate finance, the importance of climate change in India, its impact on a country's growth, and individuals' responsibility for contributing to climate finance. Tables 3, 4, and 5 explain the association between the respondents' various demographic profiles and their perception of climate change in India. The statistical significance at the five per cent level is considered to find out the association, and the same is compared with the chi-square results derived from SPSS output.

Table 3 revealed that out of eight questions related to climate change and climate finance investments, the gender variable associates significantly with the statement "Investment made in climate finance is effective". Other statements are not associated with gender variables. About the native variable, the three comments like "awareness on climate finance", "participation of human beings in climate change", "the investment made in climate finance are effective" are significantly associated with it. The variable family type is significantly related at a five per cent level of significance to most of the statements. Such statements are: How important is your investment in climate change, awareness of climate finance? Do you believe Government is doing its part in taking action for climate change? Which sector according to you should take more initiative concerning climate? and the participation of a human being in the present climate scenario. Hence, the null hypothesis is not accepted for these statements.

Table 3. Association between demographic variables (Gender, Native and Family Type) and perception of climate finance.

Statement	Gender			Native			Family Type		
	Chi-square	df	Sig.	Chi-square	df	Sig.	Chi-square	df	Sig.
How important is your investment in climate change?	0.117	2	0.943	2.284	6	0.892	11.082	4	0.026*
Climate financing is the payment of funds to cover the expenses of transitioning to a low-carbon economy.	4.134	4	0.388	33.436	12	0.001*	19.292	8	0.013*
Do you believe Government is doing its part in taking action for climate change?	0.634	1	0.426	1.672	3	0.643	8.430	0	0.015*
At which level do you feel changes should be made in order to have a strong impact on climate change in our country?	3.042	3	0.385	3.544	9	0.939	9.587	6	0.143
Which sector, according to you, should take more initiative for climate?	0.883	1	0.347	2.859	3	0.414	6.746	2	0.034*
What according to you is hindering the country's growth with respect to climate change?	7.695	3	0.053	14.765	9	0.098	7.541	6	0.274
Do you feel human beings are one of the reasons for the present climate scenario in our country considering actions like habitat destruction?	3.537	2	0.171	19.507	6	0.003*	24.530	4	0.000*
The investments made in climate finance are being effectively used for the right purpose	10.509	4	0.033*	26.087	12	0.010*	11.545	8	0.173

* Significant at 5% level of significance

Source: SPSS Output

Table 4. Association between demographic variables (number of family members, family income, residential status) and perception of climate finance

Statement	Number of family Members			Family Income			Residential Status		
	Chi-square	df	Sig.	Chi-square	df	Sig.	Chi-square	df	Sig.
How important is your investment in climate change?	2.096	4	0.718	8.623	6	0.196	.738	2	0.692
Climate finance refers to financial resources paid to cover the costs of transitioning to a low carbon economy.	12.343	8	0.137	26.207	12	0.010*	.980	4	0.913
Do you believe Government is doing its part in taking action for climate change?	2.837	2	0.242	4.854	3	0.183	2.221	1	0.136
At which level do you feel changes should be made in order to have a strong impact on climate change in our country?	6.384	6	0.382	10.983	9	0.277	3.578	3	0.311
Which sector, according to you, should take more initiative with respect to climate?	1.186	2	0.553	2.016	0	0.569	1.049	1	0.306
What according to you is hindering the country's growth with respect to climate change?	23.430	6	0.001*	14.990	9	0.091	2.343	3	0.504
Do you feel human beings are one reason for the present climate scenario in our country considering actions like habitat destruction?	12.656	4	0.013*	16.085	6	0.013*	2.899	2	0.235
The investments made in climate finance are being effectively used for the right purpose	10.125	8	0.256	13.407	12	0.340	0.762	4	0.943

* Significant at 5% level of significance

Source: SPSS Output

Table 5. Association between demographic variables (occupation, age) and perception of climate finance.

Statement	Occupation			Age		
	Chi-square	df	Sig.	Chi-square	df	Sig.
How important is your investment in climate change?	21.387	8	0.006*	18.153	6	0.006*
Climate finance refers to financial resources paid to cover the costs of transitioning to a low carbon economy.	18.074	16	0.320	24.581	12	0.017*
Do you believe Government is doing its part in taking action for climate change?	2.270	4	0.686	7.418	3	0.060
At which level do you feel changes should be made in order to have a strong impact on climate change in our country?	7.988	12	0.786	12.416	9	0.191
Which sector, according to you, should take more initiative with respect to climate?	9.658	4	0.047*	1.303	3	0.728
What according to you is hindering the country's growth with respect to climate change?	19.619	12	0.075	21.518	9	0.011*
Do you feel human beings are one reason for the present climate scenario in our country considering actions like habitat destruction?	18.585	8	0.017*	17.127	6	0.009*
The investments made in climate finance are effectively used for the right purpose	10.255	16	0.853	16.114	12	0.186

* Significant at 5% level of significance

Source: SPSS Output

The statements in Table 4 such as 'What according to you is hindering the country's growth for climate change? and "Do you feel human beings are one of the reasons for the present climate scenario in our country considering actions like habitat destruction?" are significantly associated with the number of family members at a five per cent significance level. Table 4 found a significant association between family income and knowledge on climate finance and the participation of human beings in the present climate scenario at a five per cent level of significance. Other statements are not associated with family income. The result also found that the residential status is not significantly associated with arguments raised on climate change and climate finance.

Table 5 says that the demographic variable 'occupation' is significantly associated with the statements "How important is your investment in climate change?", "Do you feel human beings are one of the reasons for the present climate scenario in our country considering actions like habitat destruction?" and "Which sector according to you, should take more initiative with respect to climate?". Also, the age of the respondents is significantly associated with statements related to awareness of climate finance, the importance of investment in climate change, opinion on factors hindering the country's growth regarding climate change, and the role of a human being in the present climate scenario at five per cent level of significance. The research results of Kabir and Rahman [29] said that only 54 per cent of the public from Bangladesh knew about climate change, such as high temperature and weather causing

climate issues. His results also support the present study that the demographic variables of the respondents, such as age, occupation, education, and income, were significantly associated at a one per cent significance level ($p<0.001$) with the perceptions of climate finance.

4. Conclusions

Climate finance is an area whose investor base is on the continuous rise. However, investment in climate finance isn't among the top investment avenues of an investor compared to bank deposits, insurance, and shares. Investments are currently being made in climate finance for two main reasons: creating a difference and becoming a safe investment avenue. Insufficient knowledge about the country's climate change policies, technological constraints, and lack of efficient functioning of various institutions were factors hindering the investments in climate finance. It affects the country's growth in terms of climate change and makes many countries reluctant to enter into climate change negotiations. The study found that two-thirds of the respondents have no opinion about the "How important is your investment in climate change?". Also, the public is not aware of climate change. Around 40.71% of respondents have expressed their opinion that Government is not taking appropriate action for climate change. Hence, the Government should take reasonable measures to create awareness towards climate change and investment in climate finance.

The study also revealed that the demographic variables age, occupation and family type are significantly associated with the statement". The demographic e as native, family type, family income, and age are significantly associated with knowledge on climate finance. Out of eight demographic variables, six variables such as native, family type, the number of family members, occupation, age, and family income are significantly e the statement "Do you feel human beings are one of the reasons for the present climate scenario in our country considering actions like habitat destruction?". Among all variables considered for the study, family type is significantly associated with five out of eight views taken for the task. Climate change has become a rising concern for many upcoming countries, including India. Both the private and public sectors must step up and mitigate it effectively.

Future researchers in this field can look at the increase in investments in climate finance and its impact on the country and whether climate finance will be one of the leading investment avenues for an investor, in addition, to insurance and bank deposits. Out of the total respondents, almost equal male and female respondents have given their perception of climate finance and its implementation in India.

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