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Analysis of level of perception and awareness of men and women farmers about climate change impact in coastal agriculture

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Abstract

Climate change is an environmental threat to all the sectors, especially the agricultural sector around the globe. This study investigates perception and awareness of men and women farmers about climate change impact in coastal agriculture. The study was conducted in the Marsaghai and Dwitiyalaya village of Kendrapara district and Sanagpur and Tirtol village of Jagatsinghpur district of Odisha state with a total sample size of 200. As this is a gender perspective research study, out of the total respondents 100 are men and 100 are women. The men and women respondents are selected by the process of random selection. The respondents' awareness and perception about climate change was assessed through a well-structured interview schedule by the process of personal interview. The study reveals that, 16% of the men have no awareness about climate change while in case of women farmers it is high i.e. 32% of them have not heard about climate change and why does it happens. 51% of men and 46% of women farmers were aware about the proneness of the area to flood, submergence of crops by flood water and soil erosion. Perception of men and women farmers are mostly consistent with the science of climate change except some respondents had misperceptions about some areas. Different kinds of awareness campaign, training programmes along with gender inclusive approach on climate change and agriculture can bridge the gap between science of climate change and awareness and perception of coastal farmers. Climate change information and its impact on different genders is very important for farmers as well as policymakers.

Keywords: awareness, perception, gender gap, climate change, crop cultivation, animal husbandry

Introduction

Climate change and agriculture are interrelated processes, both of which take place on a global scale, with the adverse effects of climate change affecting agriculture both directly and indirectly. Climate change is already affecting agriculture, with effects unevenly distributed across the world. Future climate changes will most likely affect crop production in low latitude countries negatively, while effects in northern latitudes may be positive or negative. Animal husbandry also contributes towards climate change through greenhouse gas emissions. Agriculture being one of the primary sources of livelihood of the country and the most climate centric activity, climate change is likely to significantly affect the key outcomes of agriculture systems and economic development. The Climate Risk Index 2020, an annual report by Germanwatch, ranks countries according to their vulnerability to extreme weather events. According to the report, India has also been badly affected, ranking fifth of 181 countries in the overall global vulnerability index in 2018, ranked first in terms of fatalities and second in the world in terms of losses in millions of dollars. Climate change is an environmental threat to all the sectors, especially the agricultural sector around the globe. India is one of the most vulnerable regions to extreme climatic events in developing world especially in Southeast Asia. India has detrimentally affected by the climatic variations due to its high exposure to extreme climatic events. Several studies have reported the farm households' adaptation and mitigation about climate change but there is very less knowledge available on the awareness and perception of farm households especially of women farmers about climate change in India. To have a clearer picture of the changing climate pattern, its extremities and its effect on coastal men and women farmers integrating gender disaggregated data into these kind of researches is the need of the hour. With regard to the above scenario, this study investigates perception and awareness of men and women farmers about climate change impact in coastal agriculture.

Methodology

The study was conducted in the Marsaghai and Dwitiyalaya village of Kendrapara district and Sanagbpur and Tirtol village of Jagatsinghpur district of Odisha state with a total sample size of 200. As this is a gender perspective research study, out of the total respondents 100 are men and 100 are women. The men and women respondents are selected by the process of random selection. The respondents' awareness and perception about climate change was assessed through a well-structured interview schedule by the process of personal interview. For the assessment of respondents' perception, modified Likert type perception scale developed by Manohar (2013) which covers various dimensions of climate change like certainty, causes, changes in climatic parameters and impacts on agriculture where respondents' response was recorded in a five point continuum. Descriptive statistics, frequency count, percentage calculation, item analysis are used to analyse the collected data.

Results

Knowledge helps people understand and address the impact of

global warming, increases "climate literacy" among young people, encourages changes in their attitudes and behaviour, and helps them adapt to climate change related trends. Education and awareness-raising enable informed decision-making, play an essential role in increasing adaptation and mitigation capacities of communities, and empower women and men to adopt sustainable lifestyles. Concerns of men and women farmers about climate change are the direct outcome of their awareness and level of knowledge which ultimately helps in planning their respective production activities and also in minimizing the risks and uncertainties associated with the agricultural works.

Men and Women farmers' awareness about climate change

Men and Women farmers' awareness on various dimensions of climate change, its effects and impacts, effects on agriculture and livestock were documented, analysed and presented in the following table.

Table 1: Distribution of Respondents based on awareness level of farmers (N=200)

Statements	Awareness level of Men (N= 100)			Awareness level of Women (N=100)		
	FA	A	NA	FA	A	NA
	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)
Climate change happens due to excessive burning of fossil fuels such as oil, coal and natural gas supply etc	31	53	16	23	45	32
Are you aware about the different impacts of changes in temperature, rainfall and wind velocity etc.	29	47	24	17	38	45
Changes in land use pattern, deforestation, land clearing, agriculture and other activities have increases CO ₂ emission which causes climate change.	28	39	33	11	35	54

The result of the finding shows that majority of the men.i.e.53% and women.i.e.45% farmers are aware about climate change and it happens due to excessive burning of fossil fuels. 31% of men and 23% of women farmers are fully aware of it. 16% of the men have no awareness about climate change while in case of women farmers it is high i.e. 32% of them have not heard about climate change and why does it happens. 47% of the men farmers and 38% of the women farmers are aware about the impacts of climate change in temperature, rainfall and wind velocity etc. whereas 29% of

the male farmers are fully aware of it and 24% of them are not at all aware about the different impacts of climate change. But in case of women 17% are fully aware of different impacts of climate change and majority of the women farmers' .i.e. 45% are not at all aware about it. While asking questions with more details about climate change and its cause majority of both men and women .i.e.33% and 54% farmers were not aware about it whereas 28% of men and 11% of female are fully aware of the causes of climate change.

Table 2: Climate change effects and impacts

Statements	Awareness level of Men (N= 100)			Awareness level of Women (N= 100)		
	FA	A	NA	FA	A	NA
	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)
Different types and intensities of extreme climatic events like prolonged and high temperature during summer, shorter, heavy fog and delayed onset of winter, low and erratic and unpredictable rainfall during rainy season, long drought spells, increased heat and cold waves are seen from last 10 - 15years.	38	51	11	35	60	5
Changes in rainfall pattern leads to severe water shortages and also flooding	27	59	14	32	57	11
Due to reduced soil moisture there is occurrence of land degradation and desertification.	12	37	51	7	47	46
There is reduction in the fresh water level in the river in summer seasons for human beings and livestock known as Water stress	43	51	6	59	38	3
Coastal areas are more prone to flooding, submergence and soil erosion causing deterioration of coastal ecosystem	47	51	2	45	46	9
Due to rise in temp. coastal ecosystem is adversely affected which results in extinction of species	32	44	23	28	39	33
The major climate change extremities in coastal areas are flood, tropical cyclones, high temperature in summer	23	69	8	34	57	9
It causes damage to coastal infrastructure, pisciculture and tourism.	41	53	6	23	47	30

From the above table, it is very clearly seen that majority .i.e. 51% of men farmers and 60% of women farmers are aware of the different types and intensities of extreme climatic events.38% of men and 35% of female farmers were well aware of types of extreme climatic events and 11% of men 5% of women farmers are not at all aware of the climatic extremities. When they were asked about the change in rainfall pattern and drought and flood occurrence most of the farmers were aware about the irregular rainfall pattern, water shortages and flood. 27% of men farmers and 32% of women farmers were fully aware about it and 14% of men and 11% of women farmers have no awareness about the change in rainfall pattern, water shortages and flood. Majority of the farmers .i.e. 51% of men farmers and 46% of female farmers have no awareness about the fact that reduction in soil moisture causes land degradation and desertification while 12% of the men and 7% of the female farmers have full awareness about the cause for land degradation and desertification. 43% of men farmers and 59% of women farmers are fully aware of the water stress which occurs in the summer season due to reduction in fresh water level in river. 51% of men and 38% of women farmers are aware about it.

6% of men farmers and 3% of women farmers have not heard about the term water stress at all. When the farmers were asked about the proneness of the area to flood, submergence of crops by flood water and soil erosion, majority of the respondents .i.e. 51% of men and 46% of women farmers were aware it while 25 of the men and 9% of the female have no awareness regarding it. Less respondents have full awareness regarding the relation of rising temperature with coastal ecosystem and extinction of species.i.e. 32% of the men and 28% women have full awareness about it while 23% of men and 33% of women have no awareness about it. Majority of the respondents .i.e. 69% of men and 57% of women farmers have awareness regarding the extremities that occurs in coastal areas like flood, tropical cyclones, high temperature in summer but 23% of men and 34% of women farmers have full awareness regarding it while 8% of the men respondents and 9% of the women respondents have no awareness about it. Facts like climate change causes damage to coastal infrastructure are known by majority of the respondents and only 6% of the men and 30% of women respondents have no awareness about it.

Table 3: Effect on agriculture and livestock

Statements	Awareness level of Men (N= 100)			Awareness level of Women (N= 100)		
	FA	A	NA	FA	A	NA
	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)
Agriculture (both crops and livestock) is extremely vulnerable to “Climate change”	49	50	1	43	50	7
Temperature rise is causing shift in crop growing and livestock rearing season	35	41	24	28	39	33
Also high temperature and high humidity reduces crop production yield and livestock fertility and milk yield	37	52	11	25	40	35
Indefinite and erratic rainfall causes loss in crop yield both in short run and long run	58	40	2	36	47	17
Increase in disease occurrence and pest infestation due to change in climate	48	40	12	31	39	30

The above table reveals that, 50% of both men and women farmers have awareness about the vulnerability of agriculture to climate change and 49% of men and 43% of women farmers have full awareness about it. 41% of men and 39% of women farmers have awareness about shift in crop growing and livestock rearing season due to temperature rise while 24% of men and 33% of women have no awareness about it.37% of men respondents have full awareness about reduction in crop yield and livestock fertility and milk yield due to high temp and high humidity while 11% of them have no awareness about it. Whereas in case of women respondents, only 25% of them have full awareness about it and 35% of them have no awareness about it at all. Majority of the men respondents’ .i.e. 58% and 36% of women farmers

have full awareness regarding the fact that indefinite and erratic rainfall causes loss in crop yield in both short and long run whereas 2% of the men and 17% of women farmers have no awareness about it. 48% of the men and 31% of the female farmers have full awareness about climate change and disease occurrence while 12% of the men and 30% of the women farmers have no awareness about it.

Men and Women farmers’ perception about climate change

Farmers’ perception on the following dimensions of climate change were analysed. Certainty, change in climate, its causes, concern and impacts etc are presented in the following table.

Table 4: Distribution of Men respondents based on Perception about Climate Change (N=100)

Statements	Awareness level of Men (N= 100)				
	SA	A	UD	D	SD
	f (%)	f (%)	f (%)	f (%)	f (%)
There is certainly change in temperature, rainfall and wind speed over the time period	33	47	5	13	2
I am concerned because it is a very serious problem and it has terrible effect on agriculture	26	52	3	15	4
According to me, Industrialization, heavy use of fossil fuels, deforestation etc. are the reasons for the rapid changes in temp., rainfall, wind velocity etc. leading to Climate Change	36	42	8	9	5
In my view, the rainfall nature and intensity has become irregular and scanty	48	42	4	4	2
In the last 10-20 years, there is remarkable increase in the heat waves drought occurrence and desertification of agricultural land.	41	36	12	7	4
I personally think that agricultural productivity is very much influenced by these factors and also these are the reasons for the low agricultural yield	53	39	2	3	3
I think in the upcoming years there will be land, resources and water scarcity or stress	24	47	9	12	8
In the next few years, agriculture and livestock of my region will be more adversely affected	43	47	2	6	2
I can foresee that the next 10-20 years the earth will face more desertification of arable land	21	32	14	25	8

The above table clearly indicates that nearly half of the men respondents' .i.e.47% of them agreed that over a period of time there is certainly change in temperature, rainfall and wind speed while 33% of them strongly agreed to it. 52% of the respondents have agreed to the fact that they are concerned about this serious problem and it has terrible effect on agriculture. From their perspective, majority of the men farmers' .i.e. 42% agreed that industrialisation, heavy use of fossil fuels, deforestation etc. are the reasons for climate change and 36% of the men farmers also strongly agree to it. About the irregular and scanty rainfall pattern most of the respondents' .i.e. 48% strongly agree to it followed by 42% of the farmers who also agree to it. Similarly, 41% of the men farmers and 36% of them strongly agree and agree to the fact

that there is remarkable increase in the heat waves, drought etc. in the last 10-20 years. Majority .i.e. 53% of the men farmers agree that climate change is the reason for low agricultural yield and productivity while 39% of them agree to it. 47% of the men farmers agree that in the upcoming years there can be scarcity of land, water and resources and 24% of them strongly agreed to that. 43% of the respondents strongly believe that agriculture and livestock of their region will be adversely affected by the climate change and 47% agreed to it. Majority of the men respondent .i.e. 32% agree to the statement that they think earth will face more desertification of arable land in the next 10-20 years and 32% of them strongly agree to it.

Table 5: Distribution of Women respondents based on Perception about Climate Change (N=100)

Statements	Awareness level of Women (N= 100)				
	SA	A	UD	D	SD
	f (%)	f (%)	f (%)	f (%)	f (%)
There is certainly change in temperature, rainfall and wind speed over the time period	38	35	7	14	6
I am concerned because it is a very serious problem and it has terrible effect on agriculture	19	32	15	11	3
According to me, Industrialization, heavy use of fossil fuels, deforestation etc. are the reasons for the rapid changes in temp., rainfall, wind velocity etc. leading to Climate Change	24	31	11	26	8
In my view, the rainfall nature and intensity has become irregular and scanty	22	31	19	21	7
In the last 10-20 years, there is remarkable increase in the heat waves drought occurrence and desertification of agricultural land.	45	43	5	5	2
I personally think that agricultural productivity is very much influenced by these factors and also these are the reasons for the low agricultural yield	43	41	6	8	2
I think in the upcoming years there will be land, resources and water scarcity or stress	38	35	7	14	8
In the next few years, agriculture and livestock of my region will be more adversely affected	39	27	9	18	7
I can foresee that the next 10-20 years the earth will face more desertification of arable land	34	28	13	16	9

The data in the above table clearly indicates that most of the women farmers.i.e.38% strongly agree to the fact that there is certainly change temp, rainfall and wind speed over time period and 35% of the also agree to it. Only 19% of the women farmers are strongly concerned about the climate change problem and its effect on agriculture followed by 32% of them who agree to it. 31% of the women respondents agree that Industrialisation, heavy use of fossil fuels and deforestation etc. are the reasons for climate change and 24% of them strongly agree to it. While 22% of the women farmers strongly agree to the fact that rainfall nature and intensity has become irregular and scanty 21% of them also disagree to it. Most of the respondents i.e. 45% strongly agree that in the last 10-20 years there has been remarkable increase in heat waves, drought and desertification of agricultural land and 43% of them also agree to it. 41% of the women think that climate change affects agricultural productivity and causes low yield and 43% of them strongly agree to it. More than half of the women .i.e.38% and 35% respondents strongly agree and agree to the thought that there will be occurrence of land, water and resources scarcity in the upcoming years respectively while 14% of them did not agree to it. 39% of the women farmers strongly agree that agriculture and livestock will be strongly affected by climate change in the next few years while 18% disagreed to it. 34% of the women farmers strongly agreed to the statement that the earth will face more desertification of arable land in the next 10-20 years and 28% of them agreed to it while 16% of them disagreed to it.

Discussion

The present investigation was aimed at assessment of men and women farmers' awareness about climate change, different causes, various reasons for it and impacts of climate

change on coastal agriculture. The present investigation also aimed to study the men and women farmers' perception about different dimensions of climate change like concerns, certainty, causes, changes in climatic parameters and its impact on coastal agriculture. While investigating, it was observed that majority of the men and women respondents were aware about the climate change phenomenon and its different effects, causes and impacts.

When the respondents were asked about causes, impacts, effects of climate change most of the respondents perceive that certainly the climate has changed over the years and it has adverse effect on agriculture, soil degradation and rainfall pattern. However, some of the men and women respondents find that climate change is not much of a serious issue and industrialization, use of fossil fuels is not the reason for change in climate.

Furthermore, in some statements the perception of women farmers regarding scarcity of water and resources, occurrence of flood and drought and desertification of arable land has strong implication for increase in drudgery of women farmers in the upcoming years due to climate change.

Conclusion

During the research study, it was observed that overall awareness and perception of men and women respondents were consistent with the climate change. The respondents have well awareness about climate change except in some areas where there is need of creating awareness. Perception of men and women respondents were consistent with the climate change science but a few respondents have misperception about certain issues. Different kinds of awareness campaign, training programmes along with gender inclusive approach on climate change and agriculture can bridge the gap between

science of climate change and awareness and perception of coastal farmers. Climate change information and its impact on different gender is very important for farmers as well as policymakers.

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