



CONSTRAINTS EXPERIENCED BY PADDY FARMERS IN ADAPTATION TO CLIMATE CHANGE

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Abstract

The study examined the constraints experienced by paddy farmers in adaptation to climate change. Among the 29 districts of Tamil Nadu, Nagapattinam district was selected to conduct the present study. This is situated in coastal area and very often subjected to natural calamities which were mainly reflected on the rice cultivation to the worst status. Total sample size of 200 respondents was selected through simple random sampling technique. The study revealed that High cost of farm land, non availability of water storage facility, non-availability of farm labour, poor information on early warning systems and high cost of farm inputs were the major constraints experienced by the paddy farmers in adaptation to climate change. Extending long term loans to small and marginal farmers on easy terms to purchase and develop agricultural land, creating on- or off-farm water storage systems, evolving labour saving techniques, proper early warning system and providing subsidies for farm inputs to the local farmers in the vulnerable areas would help the respondents to cope with climate change.

Key words : Climate change, Adaptation, Constraints, Paddy farmers

Introduction

Climate change is a long-term change in the statistical distribution of weather patterns over periods of time that range from decades to millions of years. Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period. Climate change may be due to natural internal processes or external forces, or to persistent anthropogenic changes in the composition of the atmosphere or in land use. (IPCC:2007). The growing problems of climate change are becoming more threatening to sustainable economic development and the totality of human existence (Adejuwon, 2004). The most obvious manifestation of climate change is the rising of average worldwide temperature, popularly termed as global warming. The average annual temperature of the Earth's surface has risen over the last century. Not only the temperature rising, but the rate of warming itself is increasing too. The mean global annual temperature increased between 0.4 to 0.7°C (Singh, 2008). In

ecological terms, this is a very rapid change.

Most of the countries are facing the problems of rising temperature, melting of glaciers, rising of sea-level leading to inundation of the coastal areas, changes in precipitation patterns leading to increased risk of recurrent droughts and devastating floods, threats to biodiversity, an expansion of plant diseases and a number of potential challenges for public health. Adverse impact on agriculture due to climatic changes will have effect on national economy and livelihood. Several global studies have indicated that India is particularly vulnerable to climate change, and is likely to suffer with damage to agriculture, food and water security, human health and cattle populations. Like most other developing countries, people in India are depending to a large extent on its natural resources for livelihood and economy. Any adverse impacts on these natural resources will have repercussion on the nation's livelihood security, economy and widen the gap between the rich and the poor. Though research initiatives are a foot in physical and biological sciences, it is imperative to assess the constraints experienced by paddy farmers in

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adaptation to climate change. An indepth probing to the constraints faced by the paddy farmers in the adaptation to the climate change and suggestions given by them would bring focus on the needed ameliorative measures.

Materials and methods

The choice for selection of the district had fallen on coastal ecosystems of Tamil Nadu state for the conduct of the present study. Coastal belts are more prone to devastating impact of climate change. The geographical setting of Tamil Nadu makes the state vulnerable to natural disasters such as cyclones, floods and earthquake-induced tsunami (Mascarenhas & Jayakumar, 2007). Among the 29 districts of Tamil Nadu, Nagapattinam district is very often subjected to natural calamities which were mainly reflected on the rice cultivation to the worst status. Since 10 years, the district has high range of variability in rainfall and temperature. The district is one among those districts having more area under rice cultivation. The district has eleven blocks, of which five blocks *viz.*, Thalainayar, Kuttalam, Mayiladuthurai, Kilvelur and Sembanar Koil were selected based on the maximum area covered under rice cultivation and high range of variability in rainfall and temperature. In order to select the villages for the study, the list of revenue villages in each of the five selected blocks was collected. Five villages from each of the selected blocks were identified purposively based on the maximum area under rice cultivation. The respondents for the present study were rice farmers from the selected villages. A sample size of 200 was fixed for the study. Sample of 40 rice farmers were selected from each of the 5 blocks by adopting simple random sampling method.

According to UNDP (2005), Adaptation is a process by which strategies to moderate, cope with and take advantage of the consequences of climatic events are enhanced, developed and implemented. The data on constraints experienced by the paddy farmers while taking adapting measures to climate change were collected under seven dimensions *viz.*, land constraints, poor information on climate change, constraints on farm inputs, irrigation, credit, labour, and technological constraints. To analyse the collected data the percentage analysis was used.

Results and discussion

Constraints faced by the paddy farmers while taking adapting measures to climate change were gathered and the results are presented in table 1.

Land constraints

High cost of farm land (66.00%), limited availability of land for farming (57.00%) and land tenure status

(54.00%) were the major constraints faced by the paddy farmers in the climate change adaptation measures.

High cost of farm land was considered as the foremost constraint expressed by the respondents. Similar constraint was also reported by Benhin (2006). The reason might be due to the fact that the world population is continuously growing at a rapid rate and at the same time the need for the habitat is alarmingly increase. Hence, to meet out this need the farmland is converted into urban uses which resulted in farm land shrinkage and high cost of farm land.

Poor information on climate change

From the table 56, it could be understand that nearly three fourth of the respondents reported that poor information on early warning systems (75.50%), lack of access to weather forecast technologies (74.00%) were the major constraints in the climate change adaptation measures and more than fifty per cent of the respondents felt that lack of information on short term climate variations (55.00%) and lack of information on long term climate change (59.00%) were the barriers to adaptation measures.

In the present information age, information problems could pose serious challenges to farmers coping strategies as they may not be aware of recent developments regarding climate change adaptations and the necessary readjustments needed. The lack of adaptive capacity due to constraints on resources such as the poor information on early warning system and lack of access to weather forecasts create serious gaps between the farmers and useful information that should help them in their farm work. Weather forecasts are supposed to guide farmers on climate variability so that they can make informed decisions and useful farm plans. However, the absence of the facility will undoubtedly make the farmers become ignorant of the weather situations and hence become vulnerable to the impact of changes in the climate and weather. This finding is in line with the findings of Ozor *et al.* (2010).

Constraints on farm inputs

The data in table 56 revealed that 66.00 per cent of the respondents felt that high cost of farm inputs was the major constraint followed by non-availability of timely farm inputs (55.00%). Purchase of inputs such as high yielding variety seeds, herbicides, fertilizers, etc., requires a considerable amount of money and as stated elsewhere most of the farmers belonged to medium farmer category, so the cost of these inputs may really be very high to them. This could pose threats to the coping strategies of the farmers. Reilly (1996) noted that climate change might

Table 1: Distribution of respondents according to constraints experienced in adaptation to climate change (n= 200)

S. No.	Constraints	Yes	%	No	%
I Land constraints					
1.	Limited availability of land for farming	114	57.00	86	43.00
2.	High cost of farm land	132	66.00	68	34.00
3.	Land tenure status decelerate the adaptation measures	108	54.00	92	46.00
II Poor information on climate change					
1.	Lack of access to weather forecast technologies	148	74.00	52	26.00
2.	Poor information on early warning systems	151	75.50	49	24.50
3.	Poor agricultural extension service delivery	54	27.00	146	73.00
4.	Lack of capacity of extension personnel to build resilience capacity of farmers on climate change	32	16.00	168	84.00
5.	Poor access to information source relevant to climate change adaptation	96	48.00	104	52.00
6.	Lack of information on short term climate variations	110	55.00	90	45.00
7.	Lack of information on long term climate change	118	59.00	82	41.00
III Constraints on farm inputs					
1.	High cost of farm inputs	132	66.00	68	34.00
2.	Non-availability of timely farm inputs	110	55.00	90	45.00
3.	Lack of information for input management	90	49.50	101	50.50
IV Constraints on irrigation					
1.	Non availability of water storage facility	185	92.50	15	7.50
2.	High cost of efficient irrigation systems	152	76.00	48	24.00
3.	High cost of water management infrastructure	125	62.50	75	37.50
4.	Poor supply of electricity	168	84.00	32	16.00
V Credit constraints					
1.	Adaptation to climate change requires more money	153	76.50	47	23.50
2.	Taking more time to get crop loan from the banks	152	76.00	48	24.00
3.	Low price for the produce in the market	107	53.50	93	46.50

*Continued.....**Continued.....*

S. No.	Constraints	Yes	%	No	%
4.	Delay in settlement of crop insurance claim	136	68.00	64	32.00
VI Labour constraints					
1.	Non-availability of farm labour	179	89.50	21	10.50
2.	Labour wage rate is high	149	74.50	51	25.50
3.	Minimum working hours per day	107	53.50	93	46.50
VII Technology constraints					
1.	Recommended rice cultivation technology with respect to climate change does not fit into the needs of the farmers	99	49.50	101	50.50
2.	Lack of technical guidance	85	42.50	115	57.50
3.	Difficulty in technology adoption	75	37.50	125	62.50

constitute significant addition to the stresses already borne by farmers such that adapting to it might be beyond their resource capabilities.

Constraints on irrigation

Under the dimension of adaptation constraints on irrigation, non availability of water storage facility (92.50%), poor supply of electricity (84.00%) and high cost of efficient irrigation system (76.00%) were the major constraints experienced by the respondents.

Most of the farmers felt that there was no storage facility for irrigation water. Most of the paddy farmers are resource poor and cannot afford to invest on irrigation technology for climate change adaptation so as to sustain their livelihood during harsh climate extremes such as flooding and drought. This finding is in line with the findings of Deressa (2008).

Credit constraints

It could be seen from the table 56 the respondents reported that climate change adaptation measures requires more money (76.50%), taking more time to get crop loan (70.00%), and delay in settlement of crop insurance claim (68.00%) were the constraints experienced under the credit dimension.

Climate change adaptation measures perceived as cost effective by the respondents because most of the paddy farmers had medium level of annual income. Lack of money hinders farmers in getting necessary resources and technologies which facilitated adaptation to climate change. Getting crop loan and crop insurance claim process has to undergo a series of systematic process which would consume considerable amount of time. Furthermore the process involves the participation of both

Governments at Central and State. This might lead to delaying of the process. This finding in accordance with the findings of Senthilkumar (2009).

Labour constraints

Non-availability of farm labour (89.50%), higher labour wage rate (74.50%) and minimum working hours per day (53.50%) were the constraints faced by paddy farmers.

The reason for non-availability of farm labour and higher labour wage rate might be rural people were migrated to urban areas due to various reasons like climatic disasters, job, education etc leads to labour scarcity. Because of labour scarcity, wages for labour were also increased. Mahathma Gandhi National Rural Employment Guarantee Act program is another important reason for labour problem because it was providing enough wage to rural people with minimal work compared to agricultural works. This finding in accordance with the findings of Bhuvaneshwari (2012).

Technology constraints

Recommended rice cultivation technology with respect to climate change does not fit to the needs of the farmers (49.50%), lack of technical guidance (42.50%) and difficulty in technology adoption (37.50%) were the constraints experienced in climate change adaptation measures as reported by the respondents.

Technological constraints are low in the climate change adaptation measures compared to other constraints. The probable reason for this result might be due to some of the respondents in the study area had minimum educational status and low level of adaptation behaviour which might have hindered them to comprehend the technology adoption. This finding in accordance with the findings of Shanmugasundaram (2007).

Conclusion

From this study it could be concluded that high cost of farm land, non availability of water storage facility, non-availability of farm labour, poor information on early warning systems and high cost of farm inputs were the major constraints experienced by the paddy farmers in adaptation to climate change. Extending long term loans to small and marginal farmers on easy terms to purchase and develop agricultural land, creating on-or off-farm water storage systems, evolving labour saving techniques, proper early warning system and providing subsidies for farm inputs to the local farmers in the vulnerable areas would help the respondents to cope with climate change.

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