Research Project on

FARM LEVEL ADAPTATION TO CLIMATE CHANGE: A COMPARATIVE STUDY IN TWO AGRO CLIMATIC ZONES IN TAMILNADU

Submitted by

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Summary of the Project

Climate change is a global environmental threat and development concern. Developing countries are the most adversely affected by the negative effects of climate-induced events because of their low level of adaptation. Responding to climate change through mitigation will take time and therefore adaptation becomes critical particularly where the ability to adapt is low. Negative impacts of climate change can be reduced through adaptation, which requires involvement of the local community. Adaptation to climate change involves changes in agricultural management practices in response to changes in climate conditions. It often involves a combination of various individual responses at the farm-level and assumes that farmers have access to alternative practices and technologies available in the region.

Common adaptation measures include diversifying crops, planting different crops or crop varieties, replacing farm activities with nonfarm activities, changing planting and harvesting dates, increasing the use of irrigation, and increasing the use of water and soil conservation techniques. The present study examines farmer's adaptation strategies to climate change in Tamilnadu based on a cross-section database of two agro-ecological zones in Tamilnadu.

The objectives of the study are i. to identify farmers' perceptions towards climate change adaptation measures taken in the study area; ii. to identify the determinants of farm-level adaptation strategies to changing climatic conditions; iii. to identify the constraints being faced by the farmers for applying the adaptation measures; and iv. to give suitable suggestions for the better implementation of adaptation techniques in agriculture.

The present study was conducted in two different agro – climatic zones in Tamilnadu based on cross section data coverage. For distribution of sampling multi stage random

sampling technique to be used. In the first stage two zones i.e Cauvery Delta Zone (Zone I) and Western Zone (Zone II) were chosen. In stage two districts from each zone, Such as Tiruchirapalli and Tanjavur in ZoneI and Karur and Erode for Zone II, totally 4 districts were selected. In the third stage, each districts covers 2 blocks, totally 8 blocks were chosen. In the last stage, of the 8 blocks, 75 farmers in each block are chosen. A total of 600 farmers holding different size of land have been chosen as sample respondents. The present study is empirical in nature and has been studied mainly by primary data. A pre tested interview schedule covering the aspects strategies and determinants of adaptation was administered to elicit the needed information. . The multinomial regression model was used to analyze the determinants of adaptation measures.

Major Findings of the study

Socio Economic characteristics

- Three fifth of the respondent (59.50percent) belong to the age group of 41 to 50 years followed by one fifth of the total respondent in the age group of 31 to 40 in each zone taken for the study
- Nine out of ten respondents(91.33 %) the farmers taken for this study are male.
- Four fifth of the respondents in this study belong to backward and most backward class community
- The size of the family is medium as majority of the farmer's number of family members are 4
- A vast majority had obtained the level of both primary and secondary level school education. The above two category together accounted for nearly 70 percent in both the zones. only 6.50 percent of the respondents had no formal education.

Details related to Land and Farming

- A simple majority (47.50%) of respondent's lifeline is coming from agricultural land.
- A vast majority are small and medium scale farmers since the land holding size for them is less than five acres . that land of irrigated agriculture is relatively higher than rain-fed agriculture in both the studying zones.

- More than fifty percent (55.33 %) of respondents are rearing Goat which is followed by 40.33percent have Milchy animal like Cow. The sheep is reared by 13.83percent of respondents
- For irrigation on the land of sample farmers, canal (49.83%) mode of irrigation accounted as high as than other sources. With regard to Zone level analysis Zone I is comparatively higher (70.33%) than Zone II (29.33) since the survey area of zone I located on the banks of river Cauvery.
- Paddy (34.05%) and Banana (18.50%) are the major irrigated crops whereas millets (11.17%) and Oil seeds (8.83%) accounted a significant proportion among the rain fed crops of cultivation in the study area.
- The farmers are well aware about the crop risk insurance. However very few farmers in both the zones took crop insurance scheme.
- Around four fifth of the study respondents had an outstanding loan. , a close to nine out of ten farmers in Zone I and seventy percent from zone II had outstanding loan amount at the time of survey. Local money lenders play a greater role in supplying agricultural credit to the farmers.

Knowledge and Awareness of farmers on Climate Change

- The survey data revealed that the farmers are well aware and could perceive the nature's changes in all the above aspects of climate variability. Almost all the farmers reported that they have noticed certain changes in nature which determine the crop cultivation.
- a vast majority i.e 78 percent in Zone I and 68 percent in Zone II reported that a higher frequency of seasonal droughts or mid season dry spells and late or early onset and ending of rainfall pattern also increased.
- With respect to temperature nine out of ten farmers observed that they are on increasing trend. With regard to flooding there was some difference noticed between the zones.
- Rainfall amount in both the zones yielded a significant below reported by 45 percent of farmers in Zone I and 52 percent in Zone II.
- A vast majority of the farmers in the two zone i.e 93 percent well known about the forecasted information of rainy season. The level of accuracy is moderate i.e some time accurate perceived by 53 percent of farmers in the study.

Effect of climate change on Agriculture

- According to the farmers taken for this study the most important damage caused by the changes in climate is the crop damage that they have experienced in their land. The result of the study in Table 4.16 indicated that a vast majority of farmers in both zones (70 percent in zone I and 60 percent in zone II) accepted that they face crop related issue due to climate variability
- A close to three fifth and four fifth of the respondent in zone I and II respectively reported that they were badly affected by seed related issues. The farmers reported that a great loss of seeds such as cereals and pulses as they noticed that burn germinating seeds.
- significant proportion the respondents reported that experiencing unpredictable and unreliable onset of monsoon along with reduction in the amount of rainfall shrinking their growing season.
- *I*t is really apparent to note that the climate change negatively affected the productivity and crop production in the study area. high temperature cessation and erratic rain caused to accelerate erosion in soil fertility and resulted to crop failure and low yielding.
- Majority of the farmers in the two regions unanimously agreed and acknowledged that the cost of cultivation has drastically changed in upward spiral mainly because of changes in climate variability.
- The fall in productivity of soil coupled with a reduction of crop production eventually lead the farmers more distress on their livelihood. The impact of climate change increases the farmer's vulnerability as they lose their natural assets such as crops and live stock upon which their livelihood depends.

Farmer's perception and determination on Adaptation on climate change

- Crop management technique is seen as most exercised technique of adaptation than others since 68 percent of farmers in Zone I and 58 percent from zone II reported favourably for this technique in their land. Next to it at an average of 44 percent applied agricultural intensification method of adaptation such as increased in

fertilizer, pesticides and applying improved seeds. three fourth exercised diversified income activities as a source of adaptation.

- Crop diversification is a high priority adaptation measure in both irrigated and rain fed crops in the event of climate change. , one third in zone I and three fourth in zone II exercised crop diversification methods. However a few percentage of farmers in Zone I and considerable number of farmers in Zone II (22% in zone I and 7.5 % in zone II) adapted the system crop rotation techniques.
- Out of the five methods, water diversity option, higher doses of fertilizer and pesticide as slightly as high than other methods. Among the respondents who opted for agricultural intensification adaptation, four fifth in zone I and more than four fifth in Zone II applied the diversity in water uses. Similarly more than 90 percent of the respondent acknowledged that they increase the fertilizer and pesticide to cope with the issue of crop pest and damage and to enhance the yielding
- Comparing with other adaptation techniques , the application of soil and water conservation scored very limited in the study region
- Seasonal of temporary migration provides them a respite in income source during the off farm seasons. an average of 95 percent of respondent resorted borrowing mainly from local money lenders to save the crops as well as meeting their family needs.
- nearly 40 percent of farmers in Zone I and 32 percent of farmers cited the main reason of constraint is lack of finance. Another big major constraint is limited knowledge in adaptation technique.
- The result of the multinomial model of regression revealed that Age education, family income, Farming experience and land holding size are the major determinant variables , which emerge statistically significantly, mainly crop management and agricultural intensification techniques of adaptation.

Suggestions

- The farmers in the study regions could perceive the climate variation without having scientific knowledge and know little about to cope up the mechanism of climate change on their land by applying their local knowledge. There is a need for an integration of local knowledge of climate variation policies to improve agricultural practices. In order to integrate local knowledge of farmers with the external and scientific based knowledge the development experts should find leverage points for integrating local knowledge for the benefit of the farmers.

- Improved provisions of financial services is paramount importance in order to cope up with the climate risks. Access to credit is an enabling factor for the sustainable agricultural development. One of the major constraint for farm level adaptation is affordability and easy accessibility of finance. The government can prioritise availability of credit through formal channels and this may enable them to secure the farm inputs inturn can raise the productivity of land.

- The study finds that majority farmers in the two study regions adopt historical way of adaptation such as crop diversification changing date of sowing and harvesting etc., since they possess limited knowledge of advanced techniques adaptation practise. Only few farmers exercise the advanced techniques such as soil conservation and wind erosion. Hence future policies need to address the way in which the farmers application of advances techniques . This should be based on different agro ecological conditions of the region.

- The availability of extension services is found poor in both the study regions. More specifically the reach out of extension services to small and marginal farmers is far from satisfactory. The government should intensify the provision of extension services by enabling field visit and increasing interaction between farmer and extension officers. The timely information given by meteorology department should reach out on time the farmers through extension officers in order to prepare them from the vagaries of rising temperature and the onset of monsoon hence they can reduce the vulnerabilities of climate change.

- Climate change awareness campaign are needed to sensitise the farmers about the climate change and its implication in order to facilitate the strategies of farm level adaptation. These strategies need to be intensified through participatory approach. The agricultural extension officers need to explain and apprise the farmers about seasonal climate and forecasting information which can be efficiently used to applied to the land of farmers.

- There is a need to increase the productive capacity of famers particularly smallholder farmers .Increase in productive capacity can augment the asset base of farmers in turn they take advantage of coping up with the climate risk and easy to take adaptation strategies.