Perceptions on Existing Delivery Systems on vulnerability and enhancing adaptive capacity in Climate Change in Udaipur District of Rajasthan

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Abstract

Agriculture and climate change are inextricably linked. Climate change threatens agricultural production through higher and more variable temperatures, changes in precipitation patterns, and increased occurrences of extreme events such as droughts and floods. It may also alter the quality of natural resources and adversely affect the livelihood of farmers. Agriculture is, however, also part of the solution, offering promising opportunities for mitigating Green House Gas (GHG) emissions through carbon sequestration, better soil and land use management, and increased biomass production**.** With the strengthening of Panchayat Raj system, the local level set up of developmental departments has to work under the Zila Parishad at district level, Panchayat Samiti at block level and Gram Panchayat at village level. The grass root level officials of various development departments coordinated and integrated efforts are helpful for the common goal of improved livelihood of the farming community**.**

Introduction:

Climate is an important determinant of the geographical distribution, composition and productivity of vegetation. Therefore, the climatic changes have profound implications for rural livelihoods, industry, biodiversity, soil and water resources and hence, Indian economy. The climate change induced effects would aggravate the existing stresses due to non-climatic factors, such as land use changes and the unsustainable exploitation of natural resources. Global climate change will increase the stress on agricultural systems by potentially decreasing yields at the very time when demand for food is growing dramatically. Like hunger, the stresses that arise from rapid climate change will fall most heavily on the poorest, the most vulnerable, and those least able to adopt new technology. Climatic extremes, not only with respect to the variability of the temperatures, but also increase in average temperatures coupled with erratic and low precipitation constitute the greatest risk to agriculture (Parry and Duinker 1990).

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The change in climate has two broad types of effects on agriculture; effect on the geographical limits to the regions where different types of crops and livestock can be Produced and effects on potential yields of crops and livestock in these regions. The effects include, increased growing season, extended margin of the potential cropping and grazing in mid-latitude regions, which may reduce the yield potential in core areas of current production as increased temperatures encourage more rapid maturation of plants and shorten the period of grain filling and extended geographic range of some insect pests. The effects also include, changes in crop types, irrigation management, fertilizer use, soil drainage and erosion and farm infrastructure. The climate change effect density of livestock population and yield.

Developing countries are particularly vulnerable to climate change, due to their often higher expo-sure to weather and climatic extremes and climate variability. Furthermore, their economies are often highly dependent on climate-sensitive resources, whereas their adaptive capacity is relatively low. It is predominantly the poor who will be affected disproportionately. Climate change affects key development sectors such as agriculture, water and human health (Satapathy2011).

The climate change impacts on agriculture will vary over time and across locations, depending on different agro – eco systems, farming systems, and production conditions. Likewise, strategies and measures for coping with those impacts will need to be adjusted to the variable circumstances of farmers in diverse agro – ecological situations. It is in this background, the present study with Farmers and Officials on "Perceptions on Existing Delivery Systems on vulnerability and enhancing adaptive capacity in Climate Change in Udaipur District of Rajasthan" and evolved constraints and suggestion for improvement was undertaken with the following objectives.

Objectives

(i) To understand the existing delivery systems of Udaipur district

(ii) To assess the farmers and officials perceptions on existing delivery systems, constraints and suggestion for improvement

Methodology

The Present study was conducted in Udaipur district of Rajasthan state. A detailed questionnaire was prepared and pre-tested in accordance with the methodological procedures of the study. The data from the two categories of respondents were collected with a pre-tested interview schedule from different stakeholders at village, tehsil and district level. A representative sample from officials' category and farmers in different agro ecological situations in the districts were selected. The opinion survey of 60 farmers as well as 51 field officials, functioning at different levels – village (34 officials), tehsil (9 officials) and district (8 officials) was carried out so as to ascertain the adequacy, performance and constraints in delivery system of institutional programmes. Secondary data were collected from the agriculture, allied and other departments.

Results and Discussions

Existing delivery system of Udaipur district.

The Udaipur district has the benefit of being the divisional headquarters of southern Rajasthan, strong set up for line departments and State Agricultural University to cater the needs of research and training needs, etc. The SAU set up is an added advantage to meet the training needs including specialized trainings in the areas of climatic change, energy application and so on.

Department of Agriculture:

The district has a strong set up under the Department of Agriculture. The mandate of the department includes transfer of technology for sustainable farming, improvement in crop productivity, crop diversification and value addition, cost-effectiveness, drudgery reduction (specially for women) in farmwork. The department organizes human resources development activities for practicing farmers and supporting field functionaries. The HRD programme for farmers includes one day field training for male and female farmers, institutional trainings at KVKs for two to three days and exposure visits for 7 to 10 days. The training themes include programmes for pulses, oilseeds, cereals, other crops, with technologies like IPM, INM, organic farming, vermin compost; sprinkler system for water use efficiency, use of improved implements, etc.

Department of Horticulture:

The department focus on: (i) To increase the area, production and productivity of fruits, vegetable, spices and floriculture crops; (ii) Introduction of high yielding, disease free and true to type varieties of fruits, vegetable, spices crops through layout of demonstration and minikits in the selected areas; (iii) Increasing the production of high quality grafted plants of mango, guava, aonla, ber, etc. nurseries and supply to the farmers; (iv) Training of farmers and extension workers to recent technology based on research for the area.

Department of Soil and Water Conservation:

The Department of Soil and water Conservation work with the stipulated goal of utilizing the land according to its capability; conservation of maximum possible rain water at place where it falls; putting adequate vegetal cover on the soil for controlling soil erosion, mainly during rainy season; draining out excess water with the safe velocity and storing it in ponds/anicuts for future use; maximizing productivity per unit area, per unit time and per unit of water; preventing gully formation and putting nalla bund and gully plugs at suitable intervals to control soil erosion and increase ground water recharge and safe utilization of marginal lands through alternate land use system.

Department of Animal Husbandry:

The department is responsible for the development of better resource base for animal husbandry sector so that the animal husbandry becomes a profitable enterprise for the farmers of the state. The local breed which are capable of withstanding the extreme climatic variations are preserved by the department. Apart from veterinary services, efforts are made for the supply of balanced diet for the animals. The conduct of animal fairs of local, regional and state level is managed by the department as it is the major means for the sale and purchase of animals in the state. The programmes like integrated livestock development, A.I. services, disease control, vaccination against foot and mouth diseases, poultry development programmes sheep and goat development programmes, fodder production etc. are also taken up by the department.

Department of Fisheries:

The perennial water bodies in the state provide opportunities for fisheries as a means of livelihood for atleast some sections of the population in selected areas. Udaipur district has many tanks and ponds including Jaisamand lake with a lot of potential for fisheries. The centrally sponsored programmes like Fish Farmer's Development Agencies (FFDAs) and the national programme for fish seed development are major programmes.

Department of Ground Water:

The ground water sources play a major role in the supply of rural drinking water as well as water for irrigation in the state. The department has two major wings, namely (i) Engineering Wing and (ii) Hydrological Wing. The Engineering Wing is responsible for drilling and blasting activities for government and private sectors and functions as a commercial unit. The hydrological wing is responsible for ground water survey, monitoring of ground water use, conduct of water balance studies, reporting to state government on policy issues and local ground water sources for private sector.

Department of Water Resources (Irrigation)

The planning, development, monitoring and maintenance of surface water resources is the responsibility of the water resource (irrigation) department. The mandate of the department includes: (i) planning and implementation of irrigation projects, (ii) maintenance of tanks, dams, canals for irrigation purpose, (iii) distribution of water for irrigation through canal system, (iv) irrigation revenue collection, (v) survey for new dams and recharging of ground water through reservoirs and tanks and (vi) to monitor and plan water distribution system for irrigation.

Department of Agricultural Marketing:

The Directorate has been entrusted with the responsibilities of implementing the schemes of marketing regulation, grading and quality control, market intelligence as well as administration of the staff of market committees. The responsibilities of developing new market complex, construction of rural link roads, rural primary markets and rural godowns continued with the board.

Cooperative Departments:

The cooperative system plays a major institutional role in the development of rural areas. The major cooperative institutional set up in Udaipur district include:

(i) Cooperative credit institutions
(ii) Rajasthan Tribal Area Development Cooperative Federation (RTADCF)
(iii) Dairy Development Cooperatives.

Maharana Pratap University of Agriculture & Technology (MPUAT), Udaipur

The bifurcation of Rajasthan Agricultural University and founding of MPUAT at Udaipur was a due appreciation of agro-economic and social requirements of South and South Eastern part of the state and to surmount difficulties of managing all agricultural

development programmes through teaching, research and extension education activities as per mandate set forth through a single University in the State. Besides, its establishment was deemed necessary to give fillip to location specific programmes befitted for wide variations in physiography including crops and cropping patterns, climate and edaphic conditions; forests, etc.

Farmer's perception on existing delivery system constraints and suggestion for improvement

The opinion survey of 60 farmers as well as 51 field officials, functioning at different levels – village (34 officials), block (9 officials) and district (8 officials) was carried out so as to ascertain the adequacy, performance and constraints in delivery system of institutional programmes. The analysis of the opinion of farmers on input delivery and rural services is summarized below:

Adequacy of Institutional Programme:

The sample farmer's response on the adequacy of institutional programme is given in Table -1.

Table -1: Adequacy of institutional programmes for supply of Inputs/rural services

(* N= 60)

S.No.	Item	Highly adequate	Adequate	Not adequate
(a)	**Agriculture**			
1.	Soil Testing	-	29	31
2.	Seed	-	51	9
3.	Fertilizers & Pesticides	-	59	1
4.	Farm Machinery	-	8	52
5.	Credit	-	25	35
6.	Transfer of Technology	-	08	52
7.	Marketing	-	-	60
(b)	**Water**			
8.	Water Conservation	1	27	32
9.	Minor Irrigation	-	-	60
(c)	**Animal Husbandry**			
10.	Animal Health	6	46	8
(d)	**Energy**			

S.No.	Item	Highly adequate	Adequate	Not adequate
11.	Conventional Energy	41	17	2
12.	Non-conventional Energy	-	19	41
(e)	**Marketing**			
13.	Market information	-	10	50
14.	Storage facilities	-	-	60
15.	Minimum support price	-	-	60

* N = No.of Respondents

The supply of conventional sources of energy in rural area has been the only services for which farmers expressed high level of satisfaction. The institutional programmes for the supply of inputs like seed and fertilizer and services like animal health moderate level of satisfaction was expressed by the farmers. On supply of inputs and services like soil testing, farm machinery, credit, transfer of technology, water conservation, non-conventional energy, market information, etc. majority of farmers felt inadequacy of these services. None of the farmers felt satisfied with the institutional arrangement for marketing of farm produce, services like minor irrigation, storage facilities and minimum support price for agricultural commodities.

Constraints in the Delivery System:

The major constraints faced by the farmers in the existing delivery system were ascertained and the responses are summarized in Table -2.

Table -2: Constraints in Delivery Systems

(*=Multiple response)

S.No.	Major constraints in delivery system	Number of respondents *
	Agriculture	
1.	Lack of good quality seed, fertilizer, pesticides, etc. at reasonable prices	34
2.	Lack of marketing facilities	29
3.	Scattered land holdings	14
4.	Lack of awareness and interest among farmers	14
5.	Lack of storage facilities	13
6.	Dominance of small holdings	7
7.	Lack of irrigation facilities	3

S.No.	Major constraints in delivery system	Number of respondents *
8.	Lack of communication facilities	3
9.	Lack of modern processing implements, and farm machinery	2
10.	Lack of modern technology	2
11.	Poor infrastructure	2
12.	Poor quality of seeds and pesticides	2
13.	The land scope being hilly	2
14.	Lack of information about better agricultural practices	2
	Water	
1.	Very high ground water depth	25
2.	Lack of water conservation projects	25
3.	Lack of any minor irrigation system	25
4.	Lack of good quality water (salty water)	10
5.	Lack of rainfall	9
6	Lack of awareness about minor irrigation system, water conservation practices, etc.	7
	Energy	
1.	Poor economic conditions	29
2.	Less availability and high cost	24
3.	Lack of knowledge and facilities (lack of awareness)	18
4.	Poor infrastructure	17
5.	Easy availability of firewood at free of cost	4
6.	Conventional energy more powerful than non- conventional	3
	Animal Husbandry	
1.	Dominance of local breed (lack of improved breed)	37
2.	Lack of veterinary facility at village level	31
3.	Poor marketing facilities	11
4.	Low price of milk and milk products	7
5.	Lack of good quality feed and fodder	8
6.	Low milk yield	6
7.	Lack of artificial insemination facilities	6
8.	Poor management and lack of knowledge	5

*=Multiple response

The major constraints in the delivery of inputs felt by the farmers included lack of quality of inputs like seed, fertilizer and pesticides (57%), lack of marketing facilities (48%) scattered land holdings (23%) and lack of awareness and interest (23%) **for agriculture**; high depth of ground water (42%), lack of water conservation and minor irrigation projects (42%) lack of good quality water (17%) and lack of rainfall (15%) **for water resources**; poor economic condition (48%), less availability (40%), high cost (40%), lack of knowledge and awareness (30%) and poor infrastructure (28%) **for energy resources**; and lack of improved breed (62%), lack of veterinary facilities (52%), poor marketing (18%) facilities and lack of good quality feed (12%) **for animal husbandry**.

Suggestions for Effectiveness of Institutional Programme:

The farmers suggestions for more effectiveness of on-going institutional programmes were recorded and is summarized in Table –3.

Table –3: Suggestions to make institutions and programmes more Effective

*=Multiple response

S.No.	Suggestions made	Number of respondents *
1.	Provide more good veterinary facilities and improved breed	24
2.	Provide storage and marketing facilities	23
3.	Provide cheap and improved quality inputs like seed, fertilizer etc.	20
4.	Transfer modern technology to farmer	16
5.	Provide awareness to farmers about watershed management	5
6.	Start water conservation projects	5
7.	Day to day contact with KVKs, extension workers Ag. Officer, etc.	2
8.	Provide credit to farmers	2
9.	Start artificial insemination programme at village level	2
10.	Provide irrigation facilities	2
11.	Change the traditional infrastructure and provide to technical knowledge about agriculture, animal husbandry and water	2

	conservation practices.	
12.	Provide climatic information to farmers by extension workers, Ag. Officer, etc.	2

The major suggestions made by the farmers to make the institutional programems more effective included provision of good veterinary facility and improved breed of animals, provision of storage and marketing facilities, supply of cost effective and quality inputs, effective transfer of technology, better awareness about watershed management and water conservation programmes.

Constraints in Availing Information from Line Department:

The farmer's perception on the major constraints standing in the way to easy access for information from line departments was also recorded and is given in Table –4

Table –4: Constraints in getting the information

*=Multiple response

S.No.	Constraints in getting information	Number of respondents
1.	Lack of illiteracy	27
2.	Lack of financial resources	20
3.	Lack of extension services	20
4.	Lack of awareness about new technology	20
5.	Lack of communication facilities	19
6.	Lack of knowledge about pest and disease management	5
7.	Poor infrastructure	4
8.	Improper power supply	4
9.	Lack of knowledge about climatic aspects	4
10.	Lack of weather forecasting facilities	3

The major constraints faced by the farmers in getting general information on agriculture and related areas included illiteracy (45%), financial resources (33%), lack of extension services (33%), lack of awareness about technology (33%) and lack of communication facilities (32%).

Official's perception in existing delivery system, constraints and suggestion for improvement

The analysis of the opinion of field functionaries on input delivery and rural services is summarized below:

Constraints in Delivery System:

The opinion of field functionaries on the constraints in delivery system is given in Table- 5.

Table -5: Constraints in delivery system

(No. of respondents *)

S. No.	Sector/Constraints	Village	Panchayat Samiti	District	Total
	Agriculture				
1.	Lack of awareness	13	-	-	13
2.	Inadequate staff	9	5	3	17
3.	Lack of information facilities	1	1	-	2
4.	Unfavourable climate	3	-	-	3
5.	Small holdings	2	1	-	3
6.	Marketing problem	8	2	-	10
7.	Non-availability of improved and cheap inputs	5	1	-	6
8.	Lack of knowledge of staff about market and price	2	-	1	3
11.	Lack of use of machinery, fertilizer, pesticides	2	-	-	2
	Water				
1.	Lack of awareness	5	3	-	8
2.	Inadequate number of water conservation project	5	-	-	5
3.	Erratic scanty monsoon	5	1	1	7
4.	Inadequate water management	2	1	1	4
5.	High depth of water table	2	-	-	2
6.	Insufficient budget	2	-	-	2

S. No.	Sector/Constraints	Village	Panchayat Samiti	District	Total
7.	Inadequate staff	2	2	1	5
8.	Poor economic condition of farmers	-	2	-	2
9.	No proper planning for use of water	1	1	-	2
	Energy				
1.	Poor economic condition of people	11	2	1	14
2.	Not using non-conventional energy due to high cost	8	-	-	8
3.	Lack of awareness	6	1	1	8
4.	Conventional energy sources are more powerful	4	1	1	6
5.	Lack of availability of non-conventional energy	3	-	1	4
6.	Poor infrastructure	-	3	1	4
	Animal Husbandry				
1.	Lack of hospital and medicines	11	6	-	17
2.	Lack of awareness	10	-	1	11
3.	Inadequate staff	8	2	1	11
4.	Non-availability of improved breeds	7	-	-	7
5.	Lack of artificial insemination facilities	6	-	-	6
6.	Lack of marketing facilities for milk	1	-	1	2
7.	Poor economic condition of farmers	-	1	1	2

(*=Multiple response)

The major constraints in the existing delivery system as reported by field functionaries included lack of awareness, inadequate staff, marketing problems and non-availability of inputs in agriculture; lack of awareness, inadequate number of water conservation projects and erratic and scanty rainfall and inadequate staff in water resources; poor economic condition, high cost and lack of accessibility of non-conventional sources of energy in energy; and lack of hospitals and medicine, lack of awareness, inadequate staff, non-availability of improved breeds and lack of artificial insemination facilities in livestock sector.

Suggestion to Take Delivery System More Effective:

The suggestions made by the field staff in order to make the delivery system more effective are summarized in Table -6.

Table -6: Suggestions to make delivery system more effective

(No. of respondents *)

S. No.	Suggestions	Village	Panchayat Samiti	District	Total
1.	Provide technical staff to improve awareness about marketing facilities prices and also animal husbandry	17	-	-	17
2.	Sufficient provision of budget	4	1	-	6
3.	Access to multimedia for increased awareness in new generation	3	1	2	6
4.	Conduct field demonstrations and field visits	3	-	-	3
5.	Provide weekly or monthly training for farmers	3	-	-	3
6.	Provide marketing facilities at village level	2	-	-	2
7.	Provide more facilities at village level	2	-	-	2
8.	Provide technical implements	2	-	-	2
9.	Fill vacant posts in agriculture, animal husbandry and agriculture marketing	2	2	1	5
10.	Awareness and training programmes must be formulated and executed for better results	-	-	4	4

*=Multiple response

The major suggestions made by the field functionaries in order to make the delivery system more effective included (i) provision of more technical staff to improve awareness about marketing facilities, price and animal husbandry, (ii) enhanced provision of budget, (iii) easy access to multi-media and I.T. areas by field staff, filling up of vacant positions in line departments, conduct of more field demonstration and field visits and regular training programmes for farmers.

Constraints in Getting Information:

The constraints faced by the field functionaries in getting information are listed in Table -7.

Table –7: Constraints in getting the information

((No. of respondents *)

S.No.	Constraints in getting information	Village	Panchayat Samiti	District	Total
1.	Illiteracy of the farmers	6	-	-	6
2.	Lack of awareness	5	-	-	5
3.	Unavailability of information channels like TV, Radio, telephone, internet, etc.	4	2	-	6
4.	Poor economic condition of people	3	-	-	3
5.	Lack of timely availability of information	3	-	-	3
6.	Inadequate staff to provide service	2	1	-	3
7.	Unavailability of modern information technology	1	-	3	4

*=Multiple response

The constraints in getting information related to agriculture and allied areas included illiteracy of farmers, unavailability of information sources like T.V., radio, telephone, internet, etc. lack of awareness, unavailability of modern information technology sources, poor economic condition, lack of timely availability of information and inadequacy of staff.

SUMMARY AND CONCLUSION

The present study indicated that there have been changes in the climate over the years in this district affecting, among others, agriculture, water and energy. Thus, the district is very much prone to vulnerability arising out of variations in climate from time to time. The analysis of delivery systems did bring out the extent of adequacy of the systems and services and the constraints as well. There is a need for measures to optimize the existing systems as also building up of alternate institutional mechanisms, which are more accessible and affordable. Though the farming community has been making its own efforts to adapt to the changing scenario, there is a need for interventions to help them cope up with the situation. In this context, the importance of integrated approach with systems perspective can hardly be over emphasized. The study report stated that to secure the livelihoods of rural poor and vulnerable communities by building and enhancing their adaptive capacity to better cope with adverse impacts of climate change and improves disaster preparedness.

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