Natural Resources Management Constraints in Farming in Eastern Uttar Pradesh - a Case Study

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ABSTRACT

Participatory Rural Appraisal (PRA) techniques were adopted to identify the natural resources management related constraints in farming in the Pithla village in Amaniganj Block of Faizabad District in eastern Uttar Pradesh. The study identified acute shortage of water for irrigation at the time of need as the most serious problem adversely affecting the agricultural production and productivity. Rapid expansion of salt affected soils (Usars) to the fertile tracts, degradation of productive farm lands and rapid depletion of ground water resources were some of the main natural resources constraints faced by the farmers. Due to poor institution-village linkages, the relevant research findings are not getting adopted in the field. There is an urgent need for active participation of government and non-government agencies in narrowing the gap between research and development. This would solve the problems of natural resource management and ensure enhanced agricultural production for the improvement of the socio-economic conditions of peasants of eastern Uttar Pradesh.

INTRODUCTION

About 70 per cent of the Indians living in 7 lakh villages are directly or indirectly dependent on agriculture (Anonymous, 1996). Despite significant increase in agricultural production during the last 50 years, the living conditions of Indian masses have not improved much for a number of reasons, the most important being the improper management of available resources (Anonymous, 1988, 1993).

The two basic natural resources for farming are land and water. The Indian Council of Agricultural Research (ICAR) and the State Agricultural Universities (SAUs) have developed many new and advanced farming techniques and methods to use the natural resources more efficiently. All, however, could not be disseminated to the vast targeted groups. This has resulted in a technological gap causing a poor and uneven development of agricultural sector (Bose, 1964; Verheij, 1966 and Gordon, 1965). Research without active participation of the beneficiaries is of little use. Researchers are to decide upon research priorities and identify mechanisms of dissemination and adoption of research results for solving the area-specific problems of natural resource management. The present study had the objective of

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identifying the natural resources management related constraints in farming, as faced by the farmers of a remote village Pithla in the eastern Uttar Pradesh, by adopting the techniques of Participatory Rural Appraisal (PRA).

METHODOLOGY

Village identification and location

The study was conducted in the village Pithla during the summer of 1995 as a part of 54th Foundation Course of ARS trainees in Field Experience Training lap of the course. Village Pithla falls under the jurisdiction of the Developmental Block Amaniganj, *Tehsil -* Milkipur, District Faizabad, Uttar Pradesh. The village is on the State Highway No. 15 (Faizabad-Rae Bareilly Road, 48 Km. From Faizabad) and is about 2 km from the Acharya Narendra Dev University of Agriculture and Technology, Kumarganj, Faizabad. It has a mixed population of various casts and sub-casts of different economic status. Majority of the villagers is farmers and some of them are artisans. Once it was a model village for technology dissemination in selected disciplines of agricultural sciences and technology. Later, some other villages were selected and Pithla was abandoned.

PRA and triangulation

PRA has emerged as the best method to study and identify the problems faced by rural people (Coughnevour, 1965 and Mascarenhas et al., 1991, van Veldhuizen et al., 1995). PRA is a means for collecting information, identifying and mobilizing the intended groups through their participation and also opening ways for them to participate in the decision making process, project designing, implementing and monitoring. Triangulation is the method of cross checking the information collected from an intended group

by comparing with those given by others. Different PRA techniques viz., Venn Diagram, Time Line, Time Trend, Activities Schedule, Matrix Ranking, Mapping etc. were used to study the socio-economic conditions, natural resources, cropping systems, problems faced by the farmers in animal husbandry and farming (Prasad, 1993; Mishra, et al., 1996). The problems of Natural Resources Management were analyzed by subjecting the information collected through surveys and verified by triangulation to standard treatments (Mishra, 1996; Singh, 1996).

Agroclimatology, land use and soil

Faizabad district has a total geographical area of 4111 km². It is classified as Semi-Arid with hot summer and cold winter. It receives an average annual rainfall of 1133 mm of which about 65 per cent falls during July – September. The average maximum, minimum temperatures and relative humidity have been recorded as 30.5⁰C, 18.2⁰C and 79.4%, respectively. Village Pithla has a geographical area of 344 ha. Some features of the land use pattern of the village Pithla and Faizabad district are given in Table 1. The land is fertile, well drained, and predominantly upland and the soil is sandy loam in texture. Soil physico-chemical properties of the village are given in Table 2.

Problem Identification

(A) Data Collection

Selection of the respondents and data collection: Ten key informants (KI) belonging to heterogeneous groups were identified. The major problems of land and water resources management, ranks and average extent of damage (AEOD, %) due to the individual problems, as perceived by the KIs, were listed. A group of 30 farmers were later

Table 1. Land use pattern of the village Pithla and district Faizabad (1992-93)

S.No.	Land Use Pattern	Village Pithla (ha)	Faizabad Dt. ('000 ha)
1.	Total cultivated area	270.0	296.000
2.	Land used other than agriculture	13.0	58.383
3.	Present fallow	-	28.350
5.	Other cultivated	26.0	14.392
6.	Waste land (Banjar)	-	11.830
7.	Salt affected land (Usar)	Trace	8.924
8.	Pasture land	-	2.142
9.	Forest	9.0	1.234

Source : Statistical Hand Book 1994. Deptt. of Agriculture, and Statistica, District Faizabad, U.P. and Revenue Records of 1992-93. *Tehsil* Milkipur, Distt. Faizabad, U.P.

Table 2. Detailed soil physico-chemical properties of village Pithla, Faizabad.

A. Geographical area by land type
Upland: 63.0%; Midland 22.0%; Low land 0.2%; Homested 6.8%

B. Area under different soil types

Soil type	Area (ha)	Percentage of total area
Sandy loam	90	29
Clay loam	83	27
Silty loam	70	23
Clay soil	40	13
Usar	26	8

C. Chemical Properties
PH: 7-8.5; Organic matter: 0.5-3 %; Available N: 140 Kg/ha; P_2O_5: 15 Kg/ha; K_2O: 7000 Kg/ha

Source: Revenue Records of *Tehsil* Milkipur and Deptt. of Soil Sci., N.D.U.A.T. Faizabad.

selected with the help of KIs and similar procedure of interviewing was repeated to collect the data.

Triangulation: The information provided by each of the groups other verified with others and finally cross-checked with the help of Government officials at Block and Tehsil levels.

(B) Data analysis

(a) Calculation of Rank Based Quotient (RBQ): The RBQ of different problems identified by interviewing the KIs and group of farmers was separately computed using the formula:

$$RBQ = \sum_{i=1}^{n} \frac{F*(n+1-i)}{N*n} *100 \qquad ...(1)$$

where, F = Frequency of farmers/ KIs for the ith rank of problem., and
N = Number of farmers; n denotes the number of ranks.

(b) Spearman's rank correlation coefficient (r): The Spearman's Rank Correlation Coefficient (r) was applied to the ranks of RBQ and AEOD for key informants and group of farmers to find out the significant differences among the ranks, using the formula:

$$r = 1 - \frac{6(\Sigma d^2)}{n(n^2 - 1)} \qquad ...(2)$$

where, d = the difference in the ranks between the KIs and farmers, and n = number of problems.

The problem ranking, RBQs of the problems, as perceived by a group of 30 farmers were done to verify the information supplied by a smaller group of Key Informants (KIs). By comparing the ranks of problems reported by KIs and the farmers the preferential rankings have been made. Since, all farmers are not affected by all the problems they have been able to give only the approximate values of the magnitude of damage from these problems.

(c) Magnitude of the problems (MP): The magnitude of the problems was computed as:

$$MP = RBQ * AEOD * NC \text{ or } NA \text{ or } NB \qquad ... (3)$$

where NA or NB or NC is the extent of the problems of different kinds and RBQ and AEOD are expressed in fraction.

(d) Magnitude of the problem at village level (MVP): This is similar to MP but the problems and the parameters of Eq. 3 are for the village level.

RESULTS AND DISCUSSIONS

The problems of natural resources management in farming and the Problem Identification Number (PIN) are listed in Table 3. The problems have been categorized in 5 main groups.

The ranking of the problems by KIs and the group of farmers and the average extent of damage (AEOD, %), as perceived by the farmers are given in Table 4. The Spearman's Rank Correlation Coefficient (r) values were calculated using Eq. (2) and are given in Table 5.

There are two sets of RBQ and AEOD in Table 4 and 5, with the average values shown in Table 5. If the RBQ and AEOD with respect to the Key Informants and the group of farmers do not differ significantly, then the average value is used for calculation of MP.

It could be inferred on the basis of the very high value of r (r = 0.9) that there was no significant difference in the ranks of the problems as reported by KI's and the farmers. The magnitude of the problems decide their final ranking. Table 6 reveals that the most serious problem faced by the farming community of the village is water scarcity, specially when it is needed, in contrary to the popular belief that the *usar* land expansion and salinity/alkalinity are the main constraints. Majority of the farmers are practicing rainfed farming but facing serious production losses due to erratic monsoon patterns. The resource-rich farmers have opted for boring deep tube wells. Due to high density of tube wells the well interference phenomenon and rapidly depleting water table has resulted into poor well yield and poor benefit-cost ratio of pumping ground water for irrigating cops in absence of any other source of assured water supply.

Table 3. Problems and their identification number.

Nature of problem	PIN
Water scarcity for irrigation.	1
Soil salinity, alkalinity, usar expansion and development.	2
Inefficient utilization and improper management of ground water due to poor know how.	3
Water and wind erosion of saline and saline-alkali soils.	4
Rain water harvesting and watershed management.	5

Table 4. Rank Based Quotient (RBQ, %), Average Extent of Damage (AEOD, %) and Rank of the Problems from Triangulation

Problem No	Ranks of the problems by 10 Key Informants					RBQ (%)	AEOD (%)	Ranks by the Group of 30 Farmers					RBQ (%)	AEOD (%)
	I	II	III	IV	V			I	II	III	IV	V		
1	6	3	1	-	-	90.0	35.0	15	11	4	-	-	87.3	25.3
2	3	5	2	-	-	82.0	30.0	12	14	4	-	-	88.0	25.3
3	1	2	5	1	1	62.0	20.0	3	5	19	3	-	65.3	24.0
4	-	-	2	5	3	38.0	10.0	-	-	3	19	8	36.7	13.4
5	-	-	-	4	6	28.0	5.0	-	-	-	8	22	25.3	11.8

Table 5. RBQ, AEOD and Rank of the Problems as Perceived in Triangulation

Prob. No.	RBQ (%)		di^2	r	Ave. RBQ (%)	Ave. AEOD (%)		di^2	r	Av. AEOD (%)
	KI**	Farmers				KI**	Farmers			
1	90.0	87.3	1	0.9	88.7	35.0	25.3	1	0.9	30.2
	(1)	(2)				(1)	(2)			
2	82.0	88.0	1		85.0	30.0	25.5	1		27.8
	(2)	(1)				(2)	(1)			
3	62.0	65.3	0		63.7	22.0	24.0	0		25.0
	(3)	(3)				(3)	(3)			
4	38.0	34.0	0		37.3	10.0	13.4	0		11.7
	(4)	(4)				(4)	(4)			
5	28.0	25.3	0		26.7	5.0	11.8	0		8.4
	(5)	(5)				(5)	(5)			

Note: * Figures in ( ) show their respective ranks. ** KI = Key Informants

Table 6. Magnitude and final ranking of various problems at the village levels

Problem No.	Av. RBQ (%)	Av. AEOD (%)	Village magnitude		Final Ranks of the problems
			Arial Extent (ha)	Magnitude (ha)	
1	88.7	30.2	292.0	78.2	I
2	85.0	27.8	26.0	6.14	III
3	63.7	22.0	50.0	7.0	II
4	37.3	11.7	100.0	4.4	IV
5	26.7	8.4	142.0	3.2	V

SUMMARY AND CONCLUSIONS

A PRA was conducted in the village Pithla of Block Amaniganj in the Faizabad district of U.P., to study the type and dimensions of the problems of natural resources management faced by the farmers. On the basis of the study, the following conclusions were drawn:

(i) The village faces acute water scarcity, especially in *rabi* cropping season. The availability of water for irrigation is inadequate in quantity and time, which adversely affects the productivity of various crops. The rainfall distribution is also erratic. Due to the non-availability of any perennial source of water such as stream or river and virtually non-existent facilities of water harvesting, dependence on ground water sources is high. The ground water table is rapidly depleting due to haphazard and indiscriminate boring of deep tube wells and continuously long hours of pumping. The problems of well interference is resulting into failure of the shallow tube wells, compelling the farmers to go for deeper tube wells requiring additional expenditure. Thus, due to inadequate water supply resulting from improper management of available water resources the farmers of the village are facing serious production losses each year. The SAU in the proximity and the local government department do not have a programme to advise the illiterate farmers on the techniques of rainwater harvesting and water conservation.

(ii) Apart from the problem of water scarcity for irrigation there are few more equally serious problems of slightly varying magnitude, the main being degradation of productive agricultural lands due to soil salinity and alkalinity and *usar* lands expansions. Farmers expressed serious concerns regarding the *usar* land expansion at an alarming rate endangering the fertile tracts. This problem needs rectification and checking with immediate effect.

(iii) The survey revealed that the farmers of this village in particular and this region in general are not well aware of new agricultural technological innovations and do not have access to new technology due to lack of information facilities. The government officials are frequently transferred and no NGO is present to help the farmers overcome their problems. The limited adoption of sprinklers, proper crop varieties, agro-forestry and horticulture may be attributed to the efforts of the SAU in the vicinity of the village. However, the farmers at large have not been motivated enough to adopt such technologies on their own and this is a major constraint in the village development. A strong Institution-Village linkage is thus needed to gear up the pace of development.

(iv) As far as the agriculture is concerned, the situation in the village reflects the conditions in the whole of eastern Uttar Pradesh resulting into the backwardness of the region. Immediate attention of planners and developers, therefore, is needed for its rapid growth and development so that the socio-economic stability and food security is restored in this backward area of eastern Uttar Pradesh.

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