

## Watershed Technology in Arid Zone of Rajasthan : Constraints Analysis

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### ABSTRACT

*Agricultural production in the state of Rajasthan is mainly dependents upon monsoon rains. Therefore, watershed development is very important. Efforts of the state government are encouraging the farmers in adoption of watershed technology for agricultural production and soil conservation. The study conducted in four districts of Jodhpur watershed region of Rajasthan aimed to find out the constraints faced by the farmers and the solution for effective implementation and adoption of watershed technology. The results of the study showed that constraints related to organization of various groups at watershed level were the most important perceived by farmers, second was the constraint related to soil and water conservation, followed by constraint in crop production, agro-forestry and dry land horticulture, household production system and livestock management. Proper and fair selection of watershed secretary and volunteers, publicity of constitution of all committees were the most important suggestions by farmers for adoption of technology for watershed development.*

**Keywords :** Watershed technology; Adoption ; Constraints.

Over very own survival on earth essential depends on two basic resources soil and water, nature's two valuable gifts to mankind. Mother nature gives protection to these resources through natural vegetation. This protection shield of land is distribution by our interference, making the soil susceptible to detachment and transportation. A no-care attitude and gross negligence coupled with our ever increasing needs and demands over the years have taken the problems to a threatening dimension. The watershed development must lead to people's self-reliance, self support and self esteem, if must enrich the life of the people and improve its quality at the grass root level. Land use adjustment is very vital to the implementation of watershed programmes. Meaningful and effective adjustment can be achieved only if landowners are aware of the advantages that will accrue. Through people's institutions people's action can be organized. It is necessary to develop local capabilities and local initiatives. Also the planning process must be decentralized if comprehensive watershed/micro watershed is to be carried out on regional or micro basis. Watershed approach to development of agriculture and rural areas in India is not a new strategy. It has been recognized ever since the 1930. But this was not an integrated approach of management. The approach to the Watershed programme as a strategy for overall development of rainfed areas in India was initiated during the period 1975 and 1983 on a pilot basis and it has been in operation since the Seventh Five year plan. Since long Watershed Development programme is being implemented in our country. It is a general experience that soil conservation structures are beneficial from soil and water conservation point of view. Also there is a good impact of these programmes in increasing the socio-economic level and living standard of the beneficiaries. The agricultural production in the state of Rajasthan is mainly dependent upon monsoon rains. Rainfall in Rajasthan is generally irregular, scanty, untimely and unevenly

distributed with prolonged drought periods.

The natural resources like soil, water and vegetation of the state are under tremendous stress due to ever increasing biotic pressures, pollution, deforestation, sand dune shifting, land degradation, lowering of water table and continuous drought. As a results there is prevalence of unemployment and poverty problems. Thus, to provide the much required thrust for development of the rainfed agriculture on watershed basis, the State Government setup a separate Department of Watershed Development and Soil Conservation in January, 1991. Despite the efforts of the state government adoption of watershed technology is not at par with the expectations. Hence, the present study was undertaken to understand the "Constraints faced by beneficiary farmers of NWDPR in adoption of watershed technology" and find solution through their suggestions for effective implementation and adoption of watershed technology.

### METHODOLOGY

The study was conducted in four districts of Jodhpur watershed region of Rajasthan. These watershed districts viz., Pali, Jalore, and Jodhpur were selected purposely because of comparatively higher number of watersheds and similar soil moisture conservation and cultivation practices. Two watersheds from each selected district were selected randomly. A total of six watersheds namely, Dhola and Desuri from Pali, Keswana and Sanchole from Jalore, Oshia and Phalodhi watershed from district Jodhpur were selected for the study. List of farmers of selected watershed who benefited under NWDPR were obtained from concerned Deputy Director/Unit office and 30 beneficiary farmers (BFs) from each selected watershed were selected randomly. Thus, a total of 180 beneficiary farmers comprised the sample for the present study. The degrees of severity of constraints faced by BFs were measured using structured

questionnaire. Some open ended questions were also asked to overcome the constraints and for effective adoption of watershed technology. The responses most important, important and less important and the score assigned were 3, 2 and 1 respectively. To find out the priority of each constraint, frequencies of the respondents were calculated and multiplied with the respective scores. The sum of scores under each category of response gave over all scores and ranks were assigned on the basis of mean scores.

## RESULTS AND DISCUSSION

### Soil and water conservation constraints faced by the farmers in adoption of watershed technology :

This part included various categories of constraints related to soil and water conservation, crop

production system and organization of various groups at watershed level which were faced by the farmers. Among soil and water conservation constraints, data in Table 1 depicts that the constraint 'high velocity' and low as well as erratic rainfall was having the highest mean score (2.53), hence, it was ranked first. The last rank was awarded to the constraint non-availability of good quality of equipments and implements at local level to construct conservation structures (1.94). The findings conform with the findings of Kumar and Malik (2005).

It could be inferred that high wind velocity and low as well as erratic rainfall was regarded as the most important constraint. This constraint was perceived by the farmers because rainfall in Rajasthan depends upon monsoon which generally remains abnormal, being

**Table 1. Relative importance of soil and water conservation constraints faced by the farmers in adoption of watershed technology**

Sr. No.	Constraints	MI	I	LI	TS	MS	R
1.	Non-availability of recommended grasses/plants for vegetative barriers and for sand dune stabilization	40	105	35	365	2.03	IV
2.	Poor repair and maintenance of soil and water conservation structures	50	75	55	355	1.97	VI
3.	High wind velocity; low and erratic rainfall	95	85	-	455	2.53	I
4.	Poor quality of equipment and implements at local level to construct conservation structures	49	69	62	347	1.93	VII
5.	Beneficiaries ignorant about the possibilities of maintenance	60	75	45	375	2.08	III
6.	Improper location of soil and water conservation structures	45	90	45	360	2.00	V
7.	Poor quality of structures created under the project	75	65	40	395	2.19	II

*MI=Most Important, I=Important, LI=Least Important, TS=Total Scores, R=Ranks*

irregular, scanty untimely, unevenly distributed with prolonged drought periods and wind storm. Non-availability of good quality of equipments and implements at local level to construct conservation structures was regarded as the least important constraint in the category of soil and water conservation which did not require special equipments to construct conservation structures.

### Crop production constraints faced by the farmers in adoption of watershed technology

Among crop production constraints, the data in Table 2 depict that poor irrigation facilities was awarded the highest mean score (2.53), hence, it was ranked first and the field trail cum demonstrations of recommended practices are not carried out effectively and convincingly at farmers' field (2.38) was ranked second. The last rank was awarded to the constraints 'lack of knowledge of chemical weed control' (1.75).

The findings conform with the findings of Singh and Sinha (2005).

It may be inferred that poor irrigation facilities among crop production constraints was the most important impediment. This might be due to non-availability of ground water for irrigation because water level has gone down. The second ranked constraints, 'field trial-cum demonstrations of recommended practices' are not carried out effectively and convincing farmers' field, might have been perceived because of lack of provision of subject matter specialist and extension experts in the Department of Watershed Development and Soil Conservation. Among the crop production constraints, the least important constraint as perceived by the beneficiary farmers was lack of knowledge of chemical weed control. This was due to fact that weedicides were costly and watershed personnel could not convince the farmers about the use of weedicides by and large farmers used physical method of weed control.

**Table 2 Relative importance of crop production constraints faced by the farmers in adoption of watershed technology (N=180)**

Sr. No.	Constraints	MI	I	LI	TS	MS	R
1.	Ineffective field trial cum demonstration	105	40	35	430	2.38	II
2.	Non-availability of drought tolerant varietal seeds at local level	65	75	45	390	2.17	IV
3.	Lack of timely, availability of plant protection measures	55	45	80	335	1.97	V
4.	Poor irrigation facilities	120	35	25	455	2.53	I
5.	Lack of crop insurance	70	85	25	405	2.25	III
6.	Lack of knowledge of chemical weed control	40	55	85	315	1.75	IV
7.	Lack of knowledge about fertilizer does and application	40	65	75	325	1.81	VI

MI=Most Important, I=Important, LI=Least Important, TS=Total Scores, MS=Mean Scores, R=Ranks

### Agro-forestry and dry land horticulture constraints

Among agro-forestry and dry land horticulture, the data in Table 3 indicate that the farmers felt that forestry area are destroyed by stray animals (highest mean score 2.47). The second and third ranks were awarded to the

constraints unscientific utilization of pastures (2.47), doubts on ownership of forest products (2.28). The least mean score (1.58) secured by the constraint was unwillingness of beneficiary farmers to take up protection and after care of orchards, hence, it was awarded last rank.

**Table 3 Relative importance of agro-forestry and dry land horticulture constraints (N=180)**

Sr. No.	Constraints	MI	I	LI	TS	MS	R
1.	Doubts on ownership of forest products	90	50	40	410	2.28	II
2.	Forestry areas destroyed by stray animals	110	45	25	445	2.47	I
3.	Lack of quick return from fruits and forest plants	60	75	45	375	2.08	III
4.	Unwillingness of farmers to take -up protection and after care of orchards	20	65	95	285	1.58	V
5.	Lack of efforts on preservation of natural grasses	30	60	90	300	1.67	IV
6.	Unscientific utilization of pastures	108	49	23	445	2.47	I

MI=Most Important, I=Important, LI=Least Important, TS=Total Scores, MS=Mean Scores, R=Ranks

‘Forestry area is destroyed by stray animals’ was observed as the most important constraint among the agro-forestry and dry land horticulture constraints. This might be due to the fact that there was no legal provision to control the stray animals. The second and third constraints, ‘unscientific utilization of pastures and doubts on ownership of forest products, might have occurred due to lack of knowledge about management and poor supervision and control over community resources. Unwillingness of beneficiary farmers to take up protection and after care of orchards was regarded as the least impotent constraint among agro-forestry and dry land horticulture constraints. This was mainly because the respondents’ farmers had interest in

obtained quick return from the crops and negligible area was under orchards. The findings confirm with the findings of Puroshotam and Singh (2005).

### Livestock management constraints

Among livestock management constraints, the data in Table 4 reveals that cowherds are unable to do veterinary work like surgery and scored the highest mean score (2.36). The second rank was assigned to the constraints ‘lack of knowledge about balanced feeding’ (2.08). The last rank was assigned to the adequacy of artificial insemination facilities (1.59). Since cowherds are low in literacy and trained only in A.I. work their inability was considered as major constrain.

**Table 4. Relative importance of livestock management constraints**

(N=180)

Sr. No.	Constraints	MI	I	LI	TS	MS	R
1.	Lack of animal fairs and exhibitions	50	85	45	365	2.02	III
2.	Difficult task to castrate the scrub bull	40	90	50	350	1.94	IV
3.	Lack of knowledge about balance feeding	65	65	50	375	2.08	II
4.	Inadequately trained cowherds	25	85	70	315	1.75	V
5.	Cowherds are unable to do veterinary works like surgical operations	90	60	35	425	2.36	I
6.	Inadequate A.I. facilities	20	75	85	295	1.64	VI

MI=Most Important, I=Important, LI=List Important, TS=Total Scores, MS=Mean Scores, R=Ranks

### House hold production system constraints

Among house hold production system constraints, lack of credit facilities having the highest mean score (2.33), ranked first (Table 5). The second third and fourth ranks were assigned to the constraint, low price of house hold products (2.19), lack of marketing facilities (2.03), and

inferior quality of house hold products (1.97) respectively. The last rank was assigned to the constraint lack of storage facilities (1.80). The most important constraint as perceived by the farmers was lack of credit facilities. This was mainly because the community was unaware about credit institutions and of banking facilities. The findings line with the findings of Sharma and Sisodia (2006).

**Table 5. Relative importance of house hold production system constraints**

(N=180)

Sr. No.	Constraints	MI	I	LI	TS	MS	R
1.	Inferior quality of household products	35	105	40	355	1.97	IV
2.	Low price of household products	90	35	55	395	2.19	II
3.	Lack of credit facilities	100	40	40	420	2.33	I
4.	Lack of storage facilities	50	45	85	325	1.80	V
5.	Lack of marketing facilities	70	45	65	365	2.03	III

MI=Most Important, I=Important, LI=List Important, TS=Total Scores, MS=Mean Scores, R=Ranks

### Constraints related to organization of various groups at watershed

The constraint of 'groupism and politics' at village level in selection of watershed secretary (Table 6) and volunteers scored the highest mean score (2.58) and ranked first. Second and third ranks were assigned to lack of involvement of whole community in the

formation of various groups (2.44) and only formalities were observed to constitute various groups/committees (2.39). Whereas the least mean score (2.11) was obtained by the constraint 'lack of active participation of local leaders' and was ranked seventh. The findings confirm with the findings of Dhadheech and Sisodia (2007).

**Table 6. Relative importance constraints related to organization of various groups at watershed level (N=180)**

Sr. No.	Constraints	MI	I	LI	TS	MS	R
1.	Lack of involvement of whole watershed community	110	45	25	400	2.22	V
2.	Groupism and politics at village level	120	45	15	465	2.58	I
3.	Lack of active participation of local leaders	60	80	40	380	2.11	VII
4.	Poor representation of women and backward classes	80	55	45	395	2.19	VI
5.	Constraints of various groups/committees among group members	105	50	25	440	2.44	II
6.	Unawareness among group members about their roles and responsibilities	100	55	25	430	2.39	III
7.	Lack of timely, organization of various group and meetings	90	60	30	420	2.33	IV

MI=Most Important, I=Important, LI=Least Important, TS=Total Scores, MS=Mean score R=Ranks

### Relative position of different categories of constraints:

To ascertain the relative intensity, comparison was made between various categories of constraints faced by the beneficiary farmers. Organization of various

group at watershed level was assigned the highest mean score (2.71), and ranked first (Table 7). The findings confirm with the findings of Sharma et al, (2007) and Rathore and Kalla (2003).

**Table 7 Relative position of different categories of constraints (N=180)**

Sr. No.	Constraints	No of statement	TS	MS	R
1.	Soil and water conservation	7	2440	2.69	II
2.	Crop production	7	2260	2.20	III
3.	Agro -forestry and dry land horticulture	6	2010	2.15	IV
4.	Livestock management	6	1890	1.86	V
5.	Organization of various groups at watershed level	7	2650	2.71	I
6.	Households production systems	6	1923	1.92	VII

TS=Total Scores, MS=Mean Scores, R=Ranks

The second, third, fourth, and fifth ranks were accorded to the categories of constraints 'soil and water conservation' (2.69), 'crop production' (2.20), 'agro-forestry and dry land horticulture' (2.15) and 'house hold production system' (1.92), respectively. The last rank was assigned to the 'livestock management' (1.86) constraint.

### Suggestions made by BFs for effective implementation and adoption of watershed

The BFs (95.56%) suggested that there should be proper and fair selection of watershed secretary and volunteers, wide publicity should be given before formation of various groups at watershed level (92.22%) of Table 8.

**Table 8. Suggestions made by BFs for effective implementation and adoption of watershed technology (N=180)**

Sr. No.	Suggestions	Number	Per cent	Rank
1.	Regular and timely training to farmers	138	76.67	XIII
2.	Organization of need based field trails	150	83.33	VIII
3.	Drought tolerant short duration variety to be developed	132	73.33	XVIII
4.	Conservation structures	137	76.11	XIV
5.	Improved and good quality of agricultural implements should be available at local level on subsidized	118	65.56	XX
6.	Strengthening of extension systems	128	71.11	XIX
7.	Easy and timely availability of credit	94	52.22	XXII
8.	Organization of animal health camp, fairs, completions, and breed improvement programmes	85	47.22	XIII
9.	Avoid conflict between users committee and gram panchayat	146	81.11	IX
10.	Control of stray animals	140	77.78	XI
11.	Cowherd to be trained in veterinary works	96	53.33	XXI
12.	Provision of incentives and rewards	89	49.44	XXIV
13.	Visiting schedule of watershed field functionary should be well informed to watershed farmers	134	74.44	XVII
14.	Facilities like advertisement, storage, marketing of house hold products	72	40.00	XXV
15.	Proper and fair selection of watershed secretary and volunteers	172	95.56	I
16.	Proper presentation of all rural communities (SC/ST/OBC and women etc).	136	75.56	XVI
17.	Wide publicity should be given before formation of various groups	166	92.22	II
18.	Rural institutions should actively participate in watershed activities	153	85.00	VI
19.	Mis-use of fund by field functionaries along with few watershed farmers should be stopped	148	82.22	VIII
20.	Work done or to be done in a financial years should be discussion alongwith head wise budget provisions in the gram sabha	154	85.56	V
21.	Regular and timely meetings of various group	136	76.11	XV
22.	Encouragement to plantation and pasture development work	157	87.22	IV
23.	More provision of vegetation work instead of engineering work	144	80.00	X
24.	Regular, timely visit of field functionaries	139	77.22	XII
25.	Encouragement and exploration of additional irrigation facilities	162	90.00	III

The third suggestion was for proper representation of all rural communities' (scheduled caste/scheduled tribe, backward classes and women etc., in organization of watershed groups (90.00%). About less than half of BFs suggested for easy and timely availability of credit facilities, provision of incentives and rewards to adopters of watershed technology,

organization of animal health camp, fairs, competitions and breed improvement programmes and facilities like advertisement, and storage and marketing for house hold products. The results confirm with the results of Arya and Singh (2006) and Singh and Sinha (2006).

## CONCLUSION

Constraints related to organization of various groups' watershed level were the most perceived constraint by farmers followed by constraints related to soil and water conservation, house hold production system and livestock management. The important suggestion made by the farmers were related to proper

and fair selection of watershed Secretary and Volunteers, publicity of constitution of various groups at watershed level, proper representation exploration of additional irrigation facilities, plantation, pasture development, fairness in use of budget, involvement of rural institution and need based demonstrations.

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