# ADOPTION CONSTRAINTS OF TRADITIONAL WATER HARVESTING TECHNOLOGY

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Water is major natural resource, which is limiting factor in the development of agriculture production. Therefore, it is necessary to adopt the water management technology for utilizing the available water resources. Rajasthan is the largest state in India having about 11 percent area of the country, whereas, water availability is only 1% of the country. The formidable Thar desert spread over 61 percent area of state and covering 2 lakhs square kilometers presently. It is extremely difficult condition for its population to survive especially due to non-availability of drinking water.

In Rajasthan, the traditional method of rain water harvesting can be one of the answers of the problems of perennial water scarcity for drinking purpose. To overcome the shortage of drinking water, a traditional method of water harvesting called TANKA is a useful alternative source. TANKA is a local name given to a covered underground tank generally made of masonary or concrete for collection and storage of surface run-off.

Water is the most precious commodity in the arid regions due to prevalence of unfavourable hydrometeorological conditions. In western Rajasthan, particularly in Jodhpur district, the quantity of water available from various sources such as surface water and ground water are not sufficient even for drinking purpose. Over and above the insufficient quantity, the groundwater is moderately to highly saline over a large area. People have been depending on rainwater harvesting (RWH) in the form of small ponds (Nadis), reservoirs, underground tanks (Tankas), Khadins etc. either for drinking purpose or for agriculture, since time immemorial.

The farming community in this region by and large, resides in scattered settlement (Dhanis) where sand dune, interdunal plains and undulating sandy plains are the dominant land forms. Under such circumstances it is inconceivable that organized water supply scheme will be a feasible proposition to fully meet the irrigation, domestic and livestock water requirements. Therefore, in this region traditional technique of rainwater harvesting by farm ponds('Tankas' in local parlance)is the only mode of meeting daily needs of water for the desert dwellers.

Water harvesting by means of farm ponds is used to even out the variation in rainfall supply by storing water for the period when supply is limited. Farm ponds of safe economic design to harvest surplus run-off has thus assumed greater importance.

Traditional methods of rainwater harvesting ranges from domestic use to supplemental irrigation for rainfed crops to support the settled life. It has, however been always integrated within a flexible multiple option strategies of resource use. According to individual's economic condition people have evolved their own method for tanka construction. Due to research and development efforts of Central Arid Zone Research Institute, Jodhpur, practically every *dhani* in this region now has one or more improved

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tankas mainly for domestic, livestock and life saving irrigation purposes. Considering the importance of Indigenous water management practices, present investigation entitled. "A study on Indigenous Water Harvesting practices of TANKA in Jodhpur district of Rajasthan" was undertaken with the objective–

- To study the constraints perceived by the respondents in using Water Harvesting Structures.

## METHODOLOGY

The investigation was carried out in Jodhpur district of Rajasthan which has highest number of indigenous water harvesting structure in the state. Out of 9 Panchayat Samities in the district, two namely Balaser and Sherghar Panchayat Samities were selected for the above study having maximum number of Tanka. Further, five village from each Panchayat Samities having highest number of water harvesting structures were selected for the study. 6 respondents from each selected village were randomly selected, thus in all 60 respondents were included in the experimental group of the study. Similarly equal number of non-adopters were selected from the study area. Thus the final sample size was 120 respondents. The data regarding constraints pertaining to adoption of improved water harvesting structures were collected with the help of interview schedule develop for this purpose. The collected data were coded, tabulated and analyzed.

## RESULTS AND DISCUSSION

The study revealed that there were four types of constraints perceived by the respondents, the result and discussion for which are given below:

The constraints which "put stackles on" in receiving the benefits of water harvesting structure were critically analysed in this section. In present context, the term constraints means all those barriers or barricades which came in the way of respondents in receiving the benefits of water harvesting structures. It is needless to mention that the extent of benefits to the respondents can be augmented by overcoming the perceived constraints. There may be innumerable constraints before the respondents, consequently they are not adopting the improved water harvesting practices to the extent as expected. Therefore, one of the objectives of the study was to find out the constraints being faced by the respondents in adoption of water harvesting structures. An attempt has been made to identify the economic, technical, socio-psychological and general constraints in adoption of water harvesting structures. The constraints perceived by the respondents have been presented under different headings as under :

**Economic Constraints**–A critical examination of data presented in table-1 reveals that "initial cost of constructing tanka is very high" was perceived as most important constraint by the adopter and non-adopter respondents by awarding first rank (M.P.S. 88.33 and 90.00) by respondents. This was followed by " loan facility is not available" and was given second rank by adopters with M.P.S. 75.00 and third rank by non-adopters with M.P.S. 80.33. The overall rank assigned to the constraint by the respondents was second with M.P.S. 79.9. Whereas, " Maintenance cost of tanka is high" was given third rank by adopters with M.P.S. 73.33 and non- adopter respondents gave fourth rank to it with M.P.S. 79.16 and when we talk of overall rank by the respondents, they rated it at third rank with M.P.S. 76.24.

Likewise, the constraint "subsidy is very less as compared to the investment" was given fourth rank by adopter with MPS 59.16 whereas, non-adopter respondents gave second rank to it with M.P.S. 82.50 and the overall ranking was fourth with M.P.S. 70.83. The least important constraints perceived by

the respondents of both categories was lack of information about sources of subsidy. The realization of these constraints might be because of the reason that study area had suffered from lack of rains from last 3-4 years, which resulted in poor socio-economic condition of the respondents so the constraints seems obvious.

**Table 1. Economic Constraints perceived by the respondents**

| S. No. | Constraints | Adopter | | Non-adopter | | Total | |
|---|---|---|---|---|---|---|---|
| | | MPS | Rank | MPS | Rank | MPS | Rank |
| 1. | Initial cost of constructing Tanka is very high | 88.33 | I | 90.00 | I | 89.16 | I |
| 2. | Maintenance cost of Tanka is high | 73.33 | III | 79.16 | IV | 76.24 | III |
| 3. | Subsidy is very less as compared to the investment | 59.16 | IV | 82.5 | II | 70.83 | IV |
| 4. | Lack of information about sources of subsidy | 44.16 | V | 56.66 | V | 50.41 | V |
| 5. | Loan facility is not available | 75.00 | II | 80.83 | III | 79.91 | II |

M.P.S. = Mean per cent score
* = Significant at 1% level of Significance
$r_s$ = Spearman rank correlation coefficient

$r_s = 0.69^*$

**Technical Constraints**–The data presented in table 2 reveals that "lack of transportation facilities to transport raw material in remote area" was expressed as one of the most important technical constraints and was ranked first by the adopters (M.P.S. 87.5) but it was given second rank (M.P.S. 88.33) by the non-adopter category of respondents. A reverse trend in ranking was followed in case of "lack of training to construct the tanka" constraint by the respondents of both adopter and non-adopter categories. The third important constraint perceived by the adopter respondents was "maintenance of tanka is technical, hence difficult" (M.P.S. 65.00) while in case of non-adopters respondents, they awarded it fourth rank (M.P.S. 74.16). Similarly, reverse trend was followed by both the category of respondents in case of constraints "difficulty in making large catchment area for the tanka" when we talk of overall ranking irrespective of category of respondents, "lack of transport facilities to transport raw material in remote area" constraint with M.P.S. 87.91 was given highest importance whereas, "difficulty in making large catchment area for the tanka" constraint with M.P.S. 65.83 was ranked at last.

**Table-2. Technical Constraints perceived by the respondents**

| S. No. | Constraints | Adopter | | Non-adopter | | Total | |
|---|---|---|---|---|---|---|---|
| | | MPS | Rank | MPS | Rank | MPS | Rank |
| 1. | Maintenance of Tanka is technical, hence difficult | 65.00 | III | 74.16 | IV | 69.58 | III |
| 2. | Lack of training to construct the Tanka | 81.66 | II | 89.16 | I | 85.41 | II |
| 3. | Difficulty in making large catchment area for the Tanka | 51.66 | IV | 80.00 | III | 65.83 | IV |
| 4. | Lack of transport facilities to transport raw material in remote area | 87.50 | I | 88.33 | II | 87.91 | I |

M.P.S. = Mean per cent score
* = Significant at 1% level of Significance
$r_s$ = Spearman rank correlation coefficient

$r_s = 0.50^*$

The problems relating to "maintenance of tanka is technical, hence difficulty " and " lack of training to construct the tanka" might have been due to lack of education and training about Water Harvesting Structures. Therefore, concerned department must organise more number of skill oriented training programmes for farmers as well as agriculture supervisors in collaboration with the scientists of central Arid Zone Research Institute (CAZRI),

Jodhpur. It will facilitate in enhancing the rate of adoption of water harvesting technology especially in the study area and will increase the use of traditional water harvesting technology in the area, which is a prime demand of today.

**Socio-Psychological Constraints Perceived by the Respondents**–Table 3 visualizes the socio-psychological constraints faced by the respondents. The table shows that "negative attitude of local leaders" was perceived as most important constraint with maximum M.P.S 86.66 and was accorded first rank by both adopter and non-adopter respondents with an MPS of 86.66 of each group. Likewise; "lack of education and motivation" was considered as the second most important constraint by both the groups of respondents with an MPS of 80.00 and 85.53 respectively and with an overall MPS of 82.76 and was assigned second rank by both the category of the respondents.

**Table 3. Socio-psychological Constraints perceived by the respondents.**

| S. No. | Constraints | Adopter | | Non-adopter | | Total | |
|---|---|---|---|---|---|---|---|
| | | MPS | Rank | MPS | Rank | MPS | Rank |
| 1. | This system deteriorate the quality of water of the Tanka | 36.66 | V | 77.5 | III | 57.08 | V |
| 2. | No cooperation of the community members | 57.5 | IV | 75.83 | V | 66.66 | IV |
| 3. | Negative attitude of local leaders | 86.66 | I | 86.66 | I | 86.66 | I |
| 4. | Joint family composition is hindrance in maintenance | 61.66 | III | 76.66 | IV | 69.16 | III |
| 5. | Lack of education and motivation | 80.00 | II | 85.53 | II | 82.76 | II |

M.P.S. = Mean per cent score
* = Significant at 1% level of Significance
$r_s$ = Spearman rank correlation coefficient

$r_s = 0.742^*$

The constraint "joint family is hindrance in maintenance" with MPS 61.66 was accorded third rank by the adopter respondents whereas, same constraint was accorded fourth rank by non-adopter respondents with an MPS 76.66 and on a whole this constraint was accorded third rank with an MPS 69.16. This was followed by " No co-operation of community member's" which was assigned fourth rank by adopter respondents with MPS 57.50 and fifth rank by non-adopter respondents with MPS 75.83 and on the whole this constraint was assigned fourth rank with MPS 66.66.

Finally " this system deteriorate the quality of water of the tanka " constraint was assigned fifth rank by adopter respondents with MPS 36.66 whereas, this constraint with MPS 77.5 was assigned third rank by the non-adopter respondents, and this constraint on whole was assigned fifth rank with MPS 57.08.

In the light of above findings regarding the constraints faced by the respondents it can be concluded that most of the respondents of both adopters and non- adopters had expressed more or less similar type of constraints in adoption of the water harvesting structures. The reason behind this might be due to the fact that people of the area are lacking in leadership and motivation by govt. functionaries and NGO to adopt improved water harvesting structures. Therefore, it is recommended that the state govt. as well as NGO's must take up such programmes which provides training to local leaders who can motivate the local people in adopting the improved WHS's which can serve to provide good quality of water to people.

**General Constraints**

Table-4 shows that inadequate publicity of the benefits of improved tanka technology constraints (M.P.S. 71.25) was most severe constraints as perceived by adopter and non-adopter respondents with mean percent score 62.50 and 80.00 respectively and was ranked first in the ranking hierarchy. The second

emphasis by the adopter and non-adopter respondents was given on " lack of motivating agencies in the area to adopt tanka technology in the village". This was followed by problem relating to "lack of provision of field visit by the farmers" and apathy towards Govt. programmes. These constraints were ranked third and fourth respectively by the adopter and non-adopter categories of respondents in the ranking hierarchy. The reason behind this ranking might be that govt. functionaries are not popularizing the benefits given by govt. in adopting improved water Harvesting structures and no motivating agencies are working in this field. It is also clear that farmers are not taken for field visits to see worth of improved v/s Indigenous Water Harvesting Structures. Therefore, it is recommended that govt. functionaries should organise camps in the villages with the help of documentary films so that the villagers can be shown the benefits of WHSs and their maintenance.It is also suggested that field visit or educational tours for the farmers should be conducted to show them live improved water Harvesting structures working in the areas. This will help our govt. agencies and rural people to fight against drought, which is in practice in every third year in western Rajasthan.

**Table 4. General Constraints perceived by the respondents**

| S. No. | Constraints | Adopter | | Non-adopter | | Total | |
|---|---|---|---|---|---|---|---|
| | | MPS | Rank | MPS | Rank | MPS | Rank |
| 1. | Lack of motivating agencies in the area to adopt Tanka technology | 58.33 | II | 78.33 | II | 68.33 | II |
| 2. | Inadequate publicity of the benefits of improved Tanka technology | 62.50 | I | 80.00 | I | 71.25 | I |
| 3. | Apathy towards Govt- programme | 30.83 | IV | 50.83 | IV | 40.83 | IV |
| 4. | Lack of provision of field visit by the farmers | 53.33 | III | 58.33 | III | 55.83 | III |

M.P.S. = Mean per cent score

* = Significant at 1% level of Significance

**Overall Constraints Perceived by the Respondents**–The data incorporated in table 5 shows that the economic constraints were perceived at the top priority and was accorded first rank by the adopter respondents with MPS 67.50 whereas, non-adopter respondents assigned second rank to the these constraints with MPS 72.66. When we talk of overall ranking it was assigned first rank. This was followed by the socio-psychological constraints for which adopter respondents have assigned 2nd rank with MPS 64.50 and same was accorded first rank by non-adopter respondents with MPS 80.50. When we talk of overall, it was assigned second rank with M.P.S. 72.50. Technical and general constraints were given less priority by both the group of respondents and were assigned third and fourth rank with MPS 61.83 and

rs = 1.00*

59.99 respectively. Ranking economic constraint at top might be due to the fact that the study area is facing drought in every third year and it has broken the backbone of rural people and made them economically poor so, without govt. help, it was not possible for them to construct improved water Harvesting structures at their own. At the same time socio-psychological barriers are coming in the way of implementation of improved water Harvesting structures programme in the study area.

It is suggested that govt. should make it compulsory that every house hold should have his own tanka to harvest rain water for his personal use. The beneficiary should be given handsome amount of help in form of subsidy to construct improved water harvesting

structures in the area. It is also recommended that CAZRI, C.T.E., Udaipur watershed department and other NGOs should motivate the people and local leaders and show them the worth of improved water harvesting structures in the study area.

**Table-5. Overall Constraints perceived by the respondents**

| S. No. | Constraints | Adopter | | Non-adopter | | Total | |
|---|---|---|---|---|---|---|---|
| | | MPS | Rank | MPS | Rank | MPS | Rank |
| 1. | Economical Constraints | 67.5 | I | 77.83 | II | 72.66 | I |
| 2. | Technical Constraints | 57.16 | III | 66.5 | III | 61.83 | III |
| 3. | Socio-psychological constraints | 64.50 | II | 80.5 | I | 72.50 | II |
| 4. | General Constraints | 53.83 | IV | 66.16 | IV | 59.99 | IV |
| | **Over all** | **60.74** | | **72.74** | | **66.02** | |

M.P.S. = Mean per cent score

* = Significant at 1% level of Significance

As far as technical constraints are concerned such functionaries should be involved in the field which can provide raw material for construction of tanka in the remote areas at govt. and NGOs level or at level of local leader or basic village institution. The provision of Bank loans for construction of tanka may be made by RRB'S and state cooperative Bank. which in turn will motivate people to adopt improved water Harvesting structures techniques easily and people would start harvesting rain water in their own tanka which are improved in nature. On the whole it was concluded that initial cost of constructing tanka is very high, there was lack of transportation facilities to transport raw material in remote area, negative attitude of local leader and lack of training to construct the tanka.

$r_s = 0.80^*$

## CONCLUSION

It is concluded that majority of the respondents had expressed lack of transport facilities to transport raw material in remote areas as one of the major technical constraint perceived by the respondents in using water harvesting structures. Hence, it is recommended that quality raw material should be provided in remote areas at govt. level so that maximum people can take advantage of it. The finding highlighted that there was lack of training to construct tanka. It is suggested that short duration training course in improved tanka construction technology must be organized at block level and latest technology must be imparted to the rural masons.

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