Training Package for Rain Water Harvesting

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ABSTRACT

*Water is the essential resource for sustaining life and environment. It serves in many ways to maintain life, health, vigour and social stability. Therefore, it is necessary to adopt the water management technology for utilizing the available resources. Rain water is the ultimate source of fresh water. Collecting rain water directly or recharging into the ground to improve ground water storage in the aquifer is called Rain Water Harvesting. In north western Rajasthan particularly in Bikaner district, the surface water and ground water are not sufficient even for drinking purpose. People have been depending on rain water harvesting structures in the form of small ponds (*Nadis*), reservoirs, underground tank (*TANKA*),* Kund *etc. All the traditional rain water harvesting systems are adopted by the people according to the specific needs and environment. The present study was conducted in two randomly selected villages (Nal Badi and Naurangdesar) in Bikaner panchayat samities with a sample size of 60 rural people.The study was conducted in two phases. In the first phase, training package consisting of variety of audio-visual aids like booklet, charts, flipbook, flash cards, posters,* phad*, folders and video programme were developed along with literature with the guidance of subject matter specialists. In second phase the developed training packages evaluated by experts and pre-tested with fifteen non-sample rural people. Data were collected through interviews. The schedule used for investigation was divided into four sections. First section included general information of the respondents, second section included sources of information, third section consisted of three steps; pre-trainning test exposure and post-trainning test and aimed at assessing the knowledge of respondents regarding rain water harvesting. Finally fourth step was to assess the constraints perceived by respondents in using rain water harvesting structure.*

Key word: *Training package, Rainwater harvesting constraints Traditional methods..*

1. Introduction

Water is the essential natural resource for sustaining life and environment. It serves in many ways to maintain life, health, vigor and social stability. Among all uses of water, its use for drinking and agriculture has been universally accorded the prime importance. People are now increasingly becoming aware of the importance of water for our survival and its limited supply. The human beings require water for various purposes. Most part of the earth's surface i.e. about 71% is covered by water. Out of the total volume of water available on the surface of the earth 97% is saline, 2% water is available in the form of ice and glaciers and only 1% is fresh and potable water. India is well endowed in the world in terms of average annual rainfall. Though India's average annual rainfall is 1170 mm. in the desert of western India, it is as low as100 mm. Hence it is necessary to opt for rain water harvesting measures for fulfillment of water requirement (*www.poljo.com/index. php?module= index... rain_water_harvest*). Rajasthan is the largest state in India having about 11% area of the country, whereas, water availability is only 1% of the country's. The formidable *Thar* Desert spready over 61% area of state are and and covers 2 lakh square kilometers presently. It is extremely difficult for its population to survive especially due to non–availability of drinking water (Pannu, 2008). Major part of our country has been facing continuous failure of monsoon and consequent deficit of rainfall over the last few years. Also due to ever increasing

population of India, the use of groundwater has increased drastically leading to constant depletion of groundwater level causing the wells and tube wells to dry up (*www.rainwater harvesting.org*).

The Rain Water Harvesting (RWH) is an important means to supplement our water need, to meet the demand for emergency water supply especially in view of increased climate variability and the possibility of greater frequencies of drought and floods in many areas.

The importance of water for every major aspect of development is fully recognized, but the right quality and quantity of water is difficult to obtain whenever required and whenever needed. Water harvesting is one of the most promising techniques for collection of excess runoff. Excess run-off can be utilized by collecting it in small dig out ponds during high intensity rainfall and then recycling it to meet the need of irrigation at critical stages of crop growth. There are two main techniques of rain water harvesting. Traditional techniques and structures used were underground tanks, ponds, temple tanks, check dams, weirs, pits, trenches, dug bells, hand pumps.

In Rajasthan, the traditional method of RWH could be one of the answers to solve 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 concrete for collection and storage of surface runoff. Rajasthan state comprises 32 districts and covers an area of 34 million hectare (mha). The state occupies an area of 12 MHa under rainfall cultivation and nearly 3.3 mha under irrigation. Out of the total irrigated area, nearly two third is irrigated by groundwater resources such as well and tube wells etc. Thus, over 90% of the state's cultivated area is dependent on rainfall, which is generally erratic and meagre. The surprising fact is that only 11% of the annual precipitation is available for harvesting in Rajasthan. The state government has made RWH mandatory for all establishments with a minimum area of 500 square meter in urban areas. RWH increases water security and is considered as the perfect solution to meet water requirements especially in the areas which do not have sufficient water resources. It helps in increasing the ground water level and also in improving its quality. It also helps in improving the overall floral system. It reduces the loss of top layer of the soil. If we capture the water directly we need not depend much on the water storage dams. RWH reduces the flooding on roads and further prevents it from contamination (*http://www.rainwaterharvesting.org/rural/improvised.htm000)*.

2. Methodology

The present study was conducted in purposely selected Bikaner Panchayat Samiti, because no such study has been conducted in that area earlier. This area was well known to the researcher and was easily accessible and the rain water harvesting practices taken under the investigation are generally used in the area.

There are six Panchayat Samities in Bikaner district namely; Bikaner, Kolayat, Lunkaransar, Nokha, Sri Dungargarh and Khajuwala. There are 240 villages in this Panchayat Samiti. Out of 240 villages, Nal Badi and Naurangdesar were selected randomly

Sixty rural people (Thirty from each village) who were ready to participate and cooperate for conducting present investigation were taken as sample. Different training methods regarding RWH were adopted.

Interviews were conducted to collect data from respondents concerning the knowledge of rural people about RWH. The following stages were followed:

a) Before exposure of training packages, knowledge of the trainees was assessed . Selected people were interviewed individually to find out the existing knowledge on different aspects of RWH with the help of interviews. This is named as pre-trainig test.

b) Five days training was given to sixty rural people of selected village. Training was given to them on the broad aspects of RWH with the help of developed training packages.

c) After 10 days of exposure of training packages, tests were conducted to find out the gain in knowledge on various aspects of RWH. This is named as post-training test.

3. Results and Discussion

In this section attempt has been made to find

out the effectiveness of developed training packages in terms of knowledge gained by the respondents. The results obtained have been discussed below:

1. Overall knowledge level of the respondents prior to training.
2. Overall knowledge level of the respondents after training.
3. Knowledge gained by the respondents
4. Comparison of pre-training and post training scores.

3.1. Overall knowledge level of the respondents in pre-training test

This section describes the existing preliminary level of knowledge of the respondents regarding selected aspects of rainwater harvesting before implementing the training package. An interview was conducted to test the knowledge level of the respondents individually and their responses were recorded before their exposure to training.

Data presented in Table 2 show that the highest score obtained by the respondents was 13 and lowest score was 8 with coefficient of range 0.24. Standard deviation of knowledge test in pre-training test was 1.10 and coefficient of variation was found to be 10.86%.

Data presented in the Table 3 reveal that in pre-training test majority of the respondents (61.67%) had medium level of knowledge with mean per cent score of 41.08, while 25% respondents had low level of knowledge with mean per cent score of 34.93 and 13.33% respondents had high level of knowledge with mean per cent score of 48.50. Knowledge level was categorized into high, medium and low, on the basis of mean and standard deviations.

3.2. Overall knowledge level of the respondents in the post-training test

This section describes the knowledge level of respondents after the exposure developed training packages by investigators.

Table 1

Rain Water Harvesting Training Specifications

Aspects of rain water harvesting	Types of training
Roof top rain water harvesting technology	Interactive lecture and group discussion
Information about rain water harvesting	Group discussion
Conservation of rain water harvesting into the ground	Interactive lecture and group discussion
Maintenance of rain water sources	Interactive lecture
Kitchen gardening by rain water harvesting	Group discussion and interactive lecture
TANKA method	Group discussion
Advantages of rain water harvesting	Interactive lecture
Proper storage and conservation of rain water	Lecture
Save drops of water, whole world is in your hands	Group discussion and interactive lecture
Traditional sources of rain water	Interactive lecture
Recharge of roof top rain water through hand pump	Interactive lecture
Importance of rain water harvesting in our life	Group discussion and lecture
Utilization of rain water by well	Interactive lecture

Data presented in the Table 4 indicate that in post- test highest score obtained among the respondents was 22 and lowest score was 14 coefficient of range 0.22. Standard deviation of knowledge was 2.40 and coefficient of variation was found to be 13.7%.

Data presented in Table 5 show that in post-training test majority of respondents (60%) had medium level of knowledge with mean per cent score of 72.56, followed by 25% respondents having high level of knowledge with mean per cent score of 85.07. Only 15% respondents had low level of knowledge with mean per cent score of 57.78.

3.3 Knowledge gained by respondents

This section describes the differential knowledge gained by the respondents and average score gained along with the coefficient of variation after exposure to developed training packages.

The data presented in Table 6 show that the highest score obtained by respondents was 12 and lowest was 5 and coefficient of range was 0.41. Mean and standard deviation of knowledge was found to be 8.23 and 1.73 respectively. Coefficient of variation was 21.02%.

Table 7 shows that 50% of respondents were in the category of medium knowledge gain with mean per cent score of 30.93 whereas 31.67% respondents were in the high level of knowledge gain with mean per cent score of 41.47. Only 18.33% of respondents were in the low category of knowledge gain with mean per cent score of 23.64.

4. Comparison of Gain in Knowledge

This section describes the comparison between pre-training test scores and post-training test scores to find out the effectiveness of developed training packages in term of gain in knowledge by the respondents. Paired 't' test was applied to find out whether there was significant gain in knowledge of the respondents.

Table 2

Knowledge scores in the pre-training test

N=60

Score Range of Knowledge	Coefficient of range	Average score	Standard deviation	Coefficient of variation (%)
8-13	0.24	10.13	1.10	10.86

Table 3
Distribution of respondents

N=60

Knowledge with score range	Frequency score	Percentage	Mean percent
Low (below 10)	15	25.00	34.93
Medium 10-11	37	61.67	41.08
High (above 11)	8	13.33	48.50

Table 4
Knowledge scores in the post-training test

N=60

Score Range of Knowledge	Coefficient of range	Average score	Standard deviation	Coefficient of variation (%)
14-22	0.22	18.37	2.40	13.7

Cont...

Table 5
Distribution of respondents by overall knowledge and mean per cent score of each category in post-training test

N=60

Knowledge with score range	Frequency score	Percentage	Mean percent
Low (below 16)	9	15.00	57.78
Medium (16-20)	36	60.00	72.56
High (above 20)	15	25.00	85.07

Table 6
Knowledge scores gained due to training

N=60

Range of Knowledge	Coefficient of range	Average score	Standard deviation	Coefficient of variation (%)
5-12 (7)	0.41	8.23	1.73	21.02

Table 7
Differential knowledge gained by the respondents

N=60

Knowledge with score range	Frequency score	Percentage	Mean percent
Low (below 7)	11	18.33	23.64
Medium (7-9)	30	50.00	30.93
High (above 9)	19	31.67	41.47

Table 8
Comparison of pre-training test and post-training test scoresl.

Category	Mean	Standard score	Mean per cent value	Calculated 't'
Pre-training test	10.13	1.10	40.53	
Post-training test	18.37	2.40	73.47	36.642**
Differential gain	8.23	1.74	32.94	

** Significant at 0.01 level of significance

Table 8 shows that after the exposure of training package a significant improvement was found in knowledge of the respondents as the pre-test mean per cent scores increased from 40.53. to 73.47 along with 32.94 mean per cent score gain in knowledge. It is seen from Table: 4(I) that the computed value of't' (36.642) was statistically significant at 0.01 level of significance.

5. Conclusion

Rain water is to be harvested to conserve and augment the storage of ground water, to reduce water table depletion, to improve the quality of ground water, and to arrest sea water intrusion in coastal areas. Rajasthan is the largest state in India having about 11% area of the country where water availability is only 1% of the country. Rajasthan is one of the water scarce states in India. At present 65% of agriculture is rainfed, which contributes 44% food grains, supports 40% of human population and two third of the livestock. People have been depending on RWH in the form of small ponds (*nadis),* reservoirs, underground tank *(Tankas), Khadins* etc. either for drinking purpose or for agriculture. Training refers to the acquisition of knowledge, skills, and competencies as a result of the teaching of vocational or practical skills and knowledge that relates to specific useful skills. The Training package exposed to the respondents yielded significant improvement in the knowledge of the respondents. Impact of training package in terms of gain in knowledge very significant. Significant improvement was found in knowledge of the respondents as the pre-training test mean per cent scores increased from 40.53 to 73.47 along with 32.94 mean per cent score gain in knowledge.

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