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## Dying Johads in India: Recapturing the Potential through Participatory Behavioural Analysis

### ABSTRACT

Present study was conducted to explore various behavioural dimensions of rural communities towards traditional water harvesting and groundwater recharge system of *Johads* (Earthen Ponds) in an area known as *Chaugawa* in Western *Uttar Pradesh* state of India. It is reported that about four to five decades back, *Chaugawa* used to be a seepage prone area due to very high water table, however, the situation is not the same now as people have to bore their tube wells and hand pumps as deep as about 80 feet. Present study establishes the links of depleted water table with current status of *Johads*. Since, they are common property, perception and attitude of the villagers towards them and motivation for their conservation was studied as these behavioural dimensions play a key role in management of any common property. An analysis of three components of attitude, i.e., cognitive (knowledge and awareness), Conative (actual initiative or action) and affective (emotional concern) towards restoration, conservation and management of *Johads* was made. A step wise strategy to motivate rural communities for recapturing the potential of *Johads* for raising the water table was suggested.

**Key words-** *Johads*, Motivation, Chaugawa, Traditional Water Harvesting, Attitude, Perception

### INTRODUCTION

Ancient Indians realized that human society couldn't grow without storing the monsoon water in the wet months for utilization in the dry months. Therefore, they grew the tradition of water harvesting in different forms in different parts of the country. Depending on the resources available, Indians, over time, developed a range of techniques to harvest every possible form of water. In several places, people constructed embankments to catch the monsoon runoff from a catchment area to collect water in the bed of the storage structure to allow collected water to seep down into the soil and give it enough moisture to take a good crop in the following dry period. In areas where land was not a limiting factor, people even developed customized rainwater harvesting structures. *Kundis* in *Thar* dessert of *Rajasthan*, are the best examples. They are the artificial wells that store runoff from an artificially prepared catchment surrounding them so that rainwater that falls on the catchment rapidly runs into the wells and gets stored.

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Water acumen of ancient people in other parts of India too, reflects in traditional water harvesting systems of Tanks in Deccan Plateau and hilly areas of *Kullu* and *Johads* (interconnected earthen ponds) in Gangetic Plains especially in western Uttar Pradesh (UP). Mishra (1995) while mentioning the importance of *Johads* also states that the concept of the *Johads* had been a part of the culture and the indigenous life support system for centuries in various parts of the country. Sheena (1998) mentioned that *Johads* also facilitate the soil conservation and improvement of the moisture content of the soil. The revival of this indigenous system of water harvesting could, therefore, form the basis for the overall development of the villages which have the agriculture based economy.

The example of ironic contrast between *Jaisalmer* and *Cherrapunji* places of India explains the potential of rainwater harvesting very well. *Jaisalmer* gets only about 100 mm of rainfall a year, yet able to collect enough water for itself while, *Cherrapunji* on the other hand, faces water shortage even after it receives more than 15000 mm of rainfall a year. Therefore, regardless of the quantity of water, mother nature provides, an area may have water woes if there is not a proper recharging system in place and the same is happening in many parts of the India and the world.

### STATUS OF DEVELOPMENTAL BLOCKS IN INDIA

Groundwater administration in India classifies developmental blocks in four categories named White, Grey, dark and "Over Exploited". The developmental blocks with annual groundwater draft less than 65% of available resource is classified as "white", whereas the developmental blocks with draft between 65% to 85% of available resource is classified as "grey" and those with 85% to 100% draft is classified as "dark" blocks. Further, the developmental blocks where annual groundwater draft has surpassed the annual recharge, means where annual groundwater draft is over 100% of water resource, those blocks has been identified as "Over Exploited" blocks (CGWB, 2000). Now, there are 337 developmental blocks, including *Gujarat*, *Andhra Pradesh* and *Maharashtra*, in India that have been declared dark blocks by Groundwater administration in India (CGWB, 2000). In *Andhra Pradesh*, out of total 1104 blocks, 30 have been declared dark. In *Maharashtra*, out of 1503 watersheds, 34 water sheds are dark while in *Gujarat*, out of total 18412 , 14 have the status of dark blocks.

As per a report of Central Ground Water Board published in the year 2000, out of total 895 developmental blocks, there were 41 developmental blocks that were declared Dark in UP only. Hence, in 4.58 % developmental blocks of UP, annual water discharge reached over 85% of annual water recharge potential in respective blocks. These figures indicate towards rapid development in groundwater extraction in the state of UP. Developmental block of Budhana situated in district Muzaffarnagar and developmental block of *Binauli* in district *Bagpat* in western UP, India are two such adjoining developmental blocks that have been declared "dark" by Central Groundwater Board of India.

### THE SITE

An area of about 500 square km, locally called as Chaugawa, having 24 villages situated near the boundary of the adjoining developmental blocks of *Budhana* and *Binauli*, is an area that has been severely affected by decline in groundwater table. The elderly people of the area said that the word “Chaugawa” has been derived from two words that are “*Chaua*” means Seepage and “*Gawa*” means Village. Hence, it is believed that a four to five decades back Chaugawa used to be a seepage prone area due to its water table as high as about 15 feet below ground level, as popularly known.

For rainwater harvesting and annual groundwater recharge, Chaugawa area had traditional system of various separate and interconnected earthen ponds called as Johads. The area, being in gangetic plains, has surface gradient so gentle that watershed practice that are generally used in undulating terrain would not be applicable in the area. Hence, arrangement for maximum harvesting of rainwater was made by interconnecting the Johads which, besides serving as main medium of groundwater recharge, make the water available in wells for drinking and irrigation need of the Chaugawa and discharges several other ecological functions in area. Wells and Johads always irrigated the Gangetic plains because the groundwater level was very high (Agrawal and Narain, 1998).

### Johads

Johads in the area were made by excavation of earth and dumping it on the banks around. Johads vary in shape, size (generally less than one hectare) and depth (about six meters). The numerous Johads were connected by a series of channels, which ran either below or above ground (Figure 1). Channels below ground level, locally called *Nullaha*, were interconnecting most of the Johads to facilitate the collection of rainwater by gravity and direct overflow of Johads in elevated areas to Johads in lower areas subsequently and finally drains into streams in the area. Hence, before draining excess rainwater to water stream and maximum groundwater recharging was achieved. The annual practices of de-silting maintained the capacity and value of these Johads structures in the society and at the same time kept the monsoon floodwater under control.

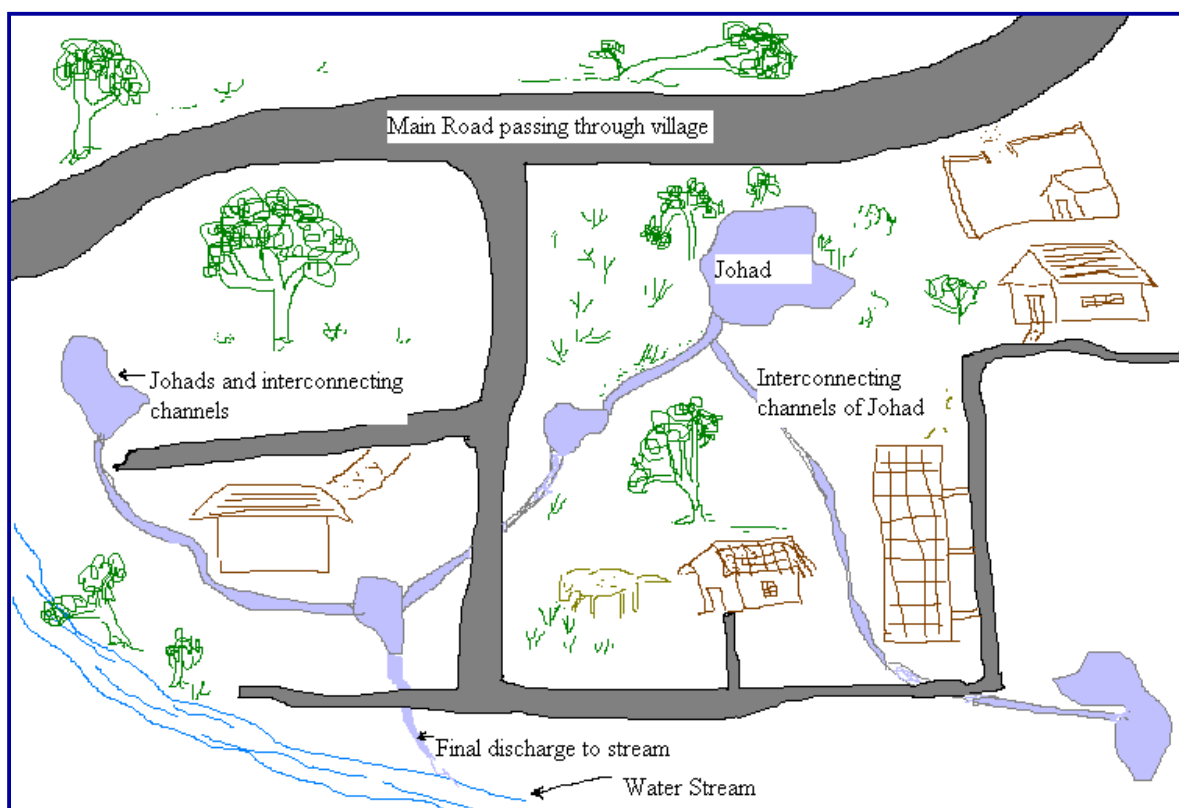


Figure 1: Conceptual View of Johads

The results of a pilot survey of five villages of *Chaugawa* area, conducted by a sugar mill operating in this area in the year 2003, reveals that about 50 % of total number of Johads registered in land records could not be found on the spot, means encroached upon completely. These Johads were mostly of smaller size and situated in between the village, as disclosed by the villagers. They also reported that the rising demand for land coupled with an increasing pressure of population has led to encroachment of Johads and groundwater table is plunging down with an alarming rate.

The declined water table, throughout the *Chaugawa* area, forced farmers to dig deeper and costly tube wells to yield sufficient water for irrigation. The involvement of high expenditure in digging deeper tube wells deprived marginal farmers off irrigation water and led to centralization of land resource as marginal farmers, in the scarcity of irrigation water sold off their land to big and rich farmers (Rao, 2003). Rainfall records of past 35 years show that rainfall has been in average range (835 – 860) all over western UP and in *Chaugawa* also. (Parthasarathy, 2001). Hence, it may reasonably be deduced that the reasons of drop in groundwater table have not been natural but anthropogenic. The first anthropogenic reason presumed to be a cause of present situation was the increased groundwater extraction. The second may decrease in rainwater harvesting and annual groundwater recharge efficiency of the area due to mismanagement of traditional Johads system in the area.

This traditional system of water harvesting is now dying, as most of the Johads have either been encroached upon by the villagers or getting dried by xerophication due to growth of hydrophytes (water hyacinth and other plants). The condition of most of these Johads today is deplorable. (Agrawal and Narain, 1998).

Looking at the above background, a study exploring various behavioural dimensions of the Johads was planned to recapture the potential of traditional rainwater harvesting and groundwater recharging system of Johads in Chaugawa area of western Uttar Pradesh by psychological analysis. Since, the perception and attitude of the people towards common property and motivation for its conservation are the key factors in the effective management of such property, a need to empirically explore the perceptions and attitudes of villagers towards the Johads in Chaugawa area were felt. This study was probably the first attempt to explore the ways what villagers themselves think fit to restore, manage and conserve the Johad system for future generations and undertaken to try out some motivational strategies, that can influence the attitude of the villagers for effective management of Johads in Chaugawa.

## METHODOLOGY

**Study site** -was Chaugawa area that was a cluster of 24 villages spread in an area of about 500 sq. km on the boundary of two adjacent developmental blocks of Budhana in district Muzaffarnagar and *Binauli* in district *Bagpat* of western UP, India (Figure 2).

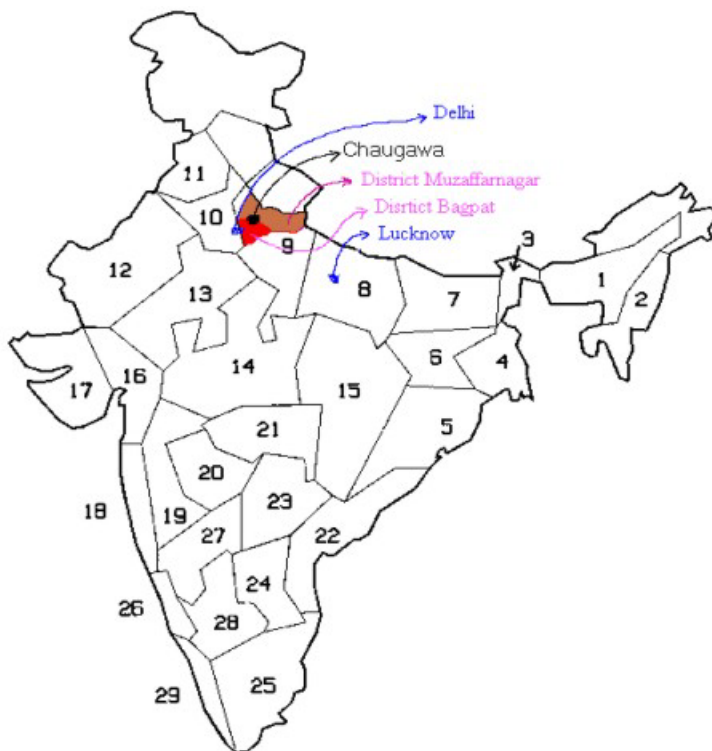


Figure 2: The Study site

The following facts lead to the selection of Chaugawa as a study site:

Chaugawa area is situated on the border of “*Budhana*” and “*Binauli*” that are two developmental blocks in western UP., that have recently been declared “dark” by Central Groundwater Board, India (CGWB, 2000).

As reported by the local residents of Chaugawa, this area once used to be seepage prone area due to its high water table. The water table in different villages of Chaugawa has depleted with an alarming rate of 1 to 1.5 feet per year in (TEIL, 2003). Installation of more numbers of private tube wells further aggravated the depletion of water table in the area and created the situation of crop failure and other associated problems. Since, population density of the developmental blocks *Budhana* and *Binauli* in western UP is quite high, *Chaugawa* area having 24 villages, provides the survival needs of over one Lac people who are mainly farmers and farm workers.

**Sampling** - A two-stage sampling procedure was adopted to collect the data for this study. At the 1<sup>st</sup> stage, an inter-village sampling was done at the village level. On the basis of maximum and minimum encroachment in the area of Johads, about 10% of villages were selected as sample.

In the second stage, an intra-village sampling was done to select the respondents for structured interview based on specially designed open-ended questionnaire, to analyse the needs of villagers and prepare the perceptual and attitudinal profile for psychological analysis. In this stage, voters’ list collected from Panchayat offices of sample villages was divided into groups of males and females. Then a representative sample of one to two percent adult villagers (both males and females above 18 years), subject to their willingness to participate and ability to provide required information, was selected randomly. Secondary data on traditional water harvesting system area of Johads registered in land records and information on study sites was collected from different sources like records of Village local body known as *Panchayat* and land records from another local village body known as *Tehsil* in developmental block *Budhana* and *Binauli*.

**Tools & Techniques** – Personal interviews were conducted with various key informants like elderly persons in villages, NGOs’ heads and heads of village local body to know about the study area in depth and design the questionnaire for preparing attitudinal and perceptual profile of the villagers. Field observations and focussed group discussions were also held to discuss the condition of the Johads in respective villages. Besides, structured interviews, based on the open-ended questionnaire, were also conducted.

## RESULTS -

**Condition of Johads** - Analysis of above techniques revealed that in 24 villages of Chaugawa 51.97 hectares area has been registered in the name of 140 Johads. Out of 24 villages surveyed, 13 villages were such where Johads area was found encroached upon by more than 60 percent (Figure 3). In three villages Johads were encroached upon completely leaving no sign and history on the ground. Only two villages could be found where Johads were in better condition and encroachment was below 20 percent.

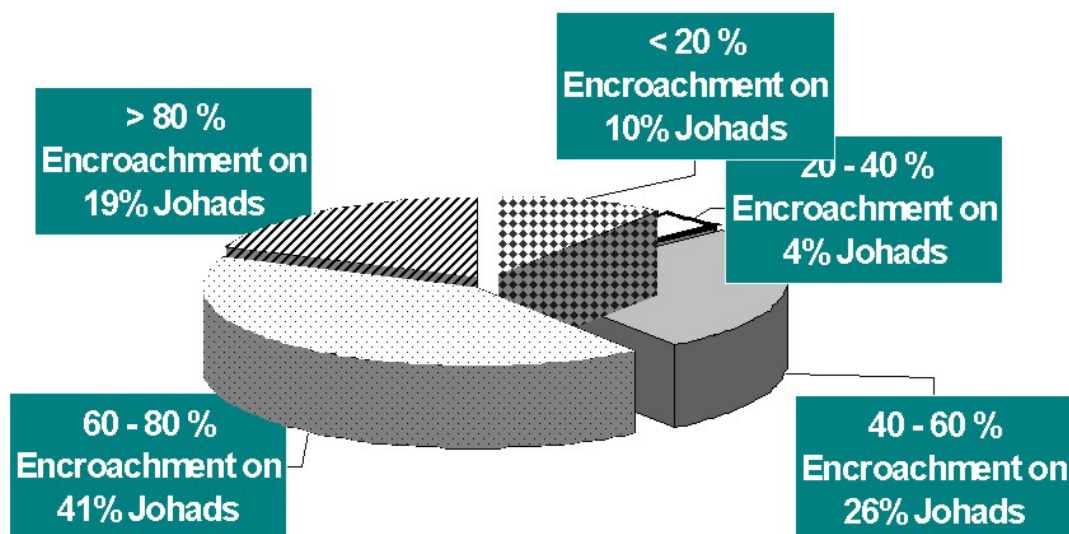


Figure 3: Condition of Johads in Chaugawa

If the figures are looked upon at whole Chaugawa level, 67 Johads out of total 140 recorded in land records could not be found on the spot during field survey. As reported by villagers, over a period of time, these Johads were either encroached by neighbors or filled with soil eroded from nearby area and xerofication due to overgrowth of water hyacinth. These Johads were mostly in-between the villages and specially in dense residential area. Villagers reported that neighbours encroached these ponds 10 to 15 years before only.

Condition of most of the Johads that could be found on the location as per registered in land records obtained from *Tehsil*, was deplorable. It was evident that there would not have been any annual cleaning since past few years. Water flow in most of the ponds was stopped due to heavy growth of water hyacinth. Channels connecting various Johads in and around village were found to be filled with soil and virtually dead in the sense of water carrying capacity.

**Need Analysis** - In Village A, which was selected on the basis of poor condition of Johads, the major sources of irrigation were tube wells and rainfall. Groundwater resources were fully developed and more than 95 % of agricultural land was irrigated by tube wells. For drinking water 100 % of the villagers depended on hand pumps and wells in the village as hand pumps were the major source of drinking water.

In the need survey, it was found that drinking water was the most important need followed by sufficient irrigation water and good agricultural land. The priorities of males of the village A were sufficient irrigation water followed by drinking water and good agricultural land. However, females' preferences were different all together.

Females of this village preferred firstly, the need of drinking water followed by facilities for health and sanitation and then the need for money in cash at third place. Need for sufficient irrigation water and good agricultural land was given last priority, unlike the needs of males in this village.

Village B was selected for better condition of its Johads. Respondent survey was conducted to gather some general information on the study area and for the analysis of needs of the villagers. In this village, it was found that sufficient irrigation water was most preferred need that was followed by need for good agricultural land and at third place need for market for farm products. Need for drinking water, like in village A, was not at priority in this village (Figure 4).

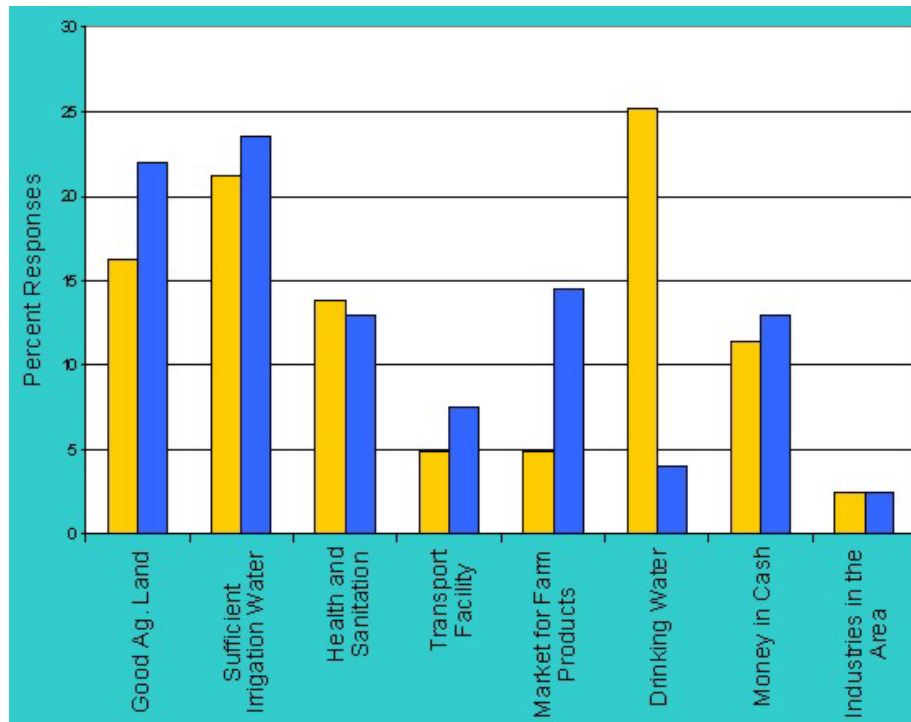


Figure 4: Comparative assessment of Needs in Village A and B

When needs of male of village B was compared with the needs of females in this village, males' most preferred need was sufficient irrigation water and females preferred facilities for health and sanitation at first. In village A, villagers' most preferred need was drinking water followed by sufficient irrigation water while the village B feels the need for sufficient irrigation water at first but drinking water at last.

**Psychological Analysis-** Perceptual and attitudinal analysis was conducted to know how local people view the traditional water harvesting system called Johad, based on their past experience with that system and present water situation in that area. It was intended to conduct the analysis of three behavioural components, i.e., cognitive, conative and affective, towards restoration, conservation and management of Johads in Chaugawa.

Cognitive component was intended to gauge the awareness, knowledge and information held by the individuals towards Johads in the area. It was found that 86 % of the respondents in the village A were aware of what exactly the Johads were. When asked that "since when Johads are prevalent in the area?", 75% of village A & 80% of village B respondents replied most expected answer that "since time immemorial". Knowledge of males and females regarding the number and area of Johads registered in land records for village A varied widely with



males having more factual knowledge (Right response % = 64% in comparison to females (Right response % = 36%).

The questions for affective component of attitude were designed to know about the feelings, beliefs, opinions, sentiments and emotions of the villagers towards restoration, conservation and management of Johads in Chaugawa area.

On the basis of overall average score of Likert scale, the attitudes of the village A towards Johads were analysed. The overall scale value of 1.48 indicates that villagers are not much concerned with Johads. However, male population of this village (overall scale value of 2.51) seems to be somewhat concerned with the conservation of traditional water harvesting system of Chaugawa area. Average scale value indicates that females of this village are not concerned at all for issues related to groundwater depletion and conservation of Johads.

Moreover in Village B, average scale value of 2.04 was found indicating a somewhat concern for conservation of Johads. The scale value of males was 2.7 a little higher than that of village A but females scale value was found to be 1.37 as against 0.57 in village A. The above results reflect that as ground water table of different villages of Chaugawa area has dropped by 40 to 50 feet in the past 50 years, the need of water for drinking and for irrigation has surfaced. It can be inferred from the results that villagers' top three prioritized needs included the need of water. As the water table of the area has dropped drastically in the past few years, residents of Chaugawa area have started recognizing it. In the villages where Johads have been neglected in past and subjected to encroachment, the need of water for drinking was at utmost priority and more critical than the need of water for irrigation. Thus, people have started recognizing Johads as groundwater recharging medium in most of the villages of Chaugawa, which can be considered as a positive sign.

Conative component covered the current activities of villagers for the cause of Johads and water management in Chaugawa. It intended to know what are the actions that the villagers are actually taking, beyond merely thinking and planning for the conservation of Johads. 61% of the villagers admitted not encroaching the Johads themselves, so there is no question of doing something for its conservation. A small section of village A replied with seriousness that reflected their actions in favour of Johads. It is important to note that no female responded to their questions. Moreover, 29% respondents of village B stated that in personal capacity, they are ready to provide voluntary labour for maintenance of Johads. It was a highly positive response that one third of the villagers were ready to participate in de-setting and periodic cleaning of Johads. Besides, a fare section of villagers also knew about the local political body (village Panchayat)'s drive of removing encroachments from Johads some time ago in which they fairly contributed and also the other programmes for maintenance of Johads.

### DISCUSSION

It is evident from the results of this study that the condition of Johads in a particular village has been reflected in the needs of the villagers. In the villages where Johads were in good condition, drinking water was not a problem as hand pumps of the area were in good condition and Johads were yielding water. Thus, people in such villages were not perturbed about the drinking water but for irrigation water as their crops were getting affected by the deficiency of water. In contrast, residents of the villages where Johads were not in good condition, people were perturbed about for drinking water. Other needs for the villagers, like need of good agricultural land, health and sanitation facility, money in cash were obvious needs if the local conditions and social norms are considered. Every body in an agrarian society would like to have larger and larger farm land. Needs for sanitation were in priority of females of the study area. Other needs like, transport facility and market for farm products were genuine needs but were replaced at the last priority by the more crippling needs of water.

Though there were many NGOs in the area registered formally, but either these NGOs were inactive or one man army runs for the personal profit. Organisation of a body of elderly people/senior citizens and local village leader could be made to monitor the restoration activities of *Johads*. The function of periodical maintenance of *Johads* can be done by organising voluntary labour programme. Such body of senior citizens and village leaders out of the *Chaugawa* area would be able to keep surveillance over and above the actions or inaction of village local body, known as *Panchayats* and work above the village level politics. This body would be able to take social action against the village leader and persons responsible for diminishing the value of *Johads* by holding the informal local body meeting.

Three such meetings of village local body heads of the area were facilitated during the study in three villages. Heads of 17 village bodies participated in these meetings. It was noticed that these efforts could send the message of *Johads*' conservation and coined a discussion on the issue of *Johads* in between senior citizens through out the *Chaugawa* area. The conduction of the study itself motivated villagers and revived their interest in *Johads*.

It was also felt that during the course of this study residents of sample villages started thinking that some programme is going on in their village for the solution of their water problem which worked as a motivating factor for the villagers. Hence, it may be reasonably deduced that the need for water was the consummatory need and motivational programme to address such issues was very much required.

**Motivational Strategy** -Needs Hierarchy theory propounded by Maslow (1943) argues that the needs which individuals pursue are universal across most populations and they are arranged sequentially in a hierarchical form. Once the lower needs are satisfied, individual moves up the hierarchy one level at a time and attempts satisfy the next higher order needs.

In *Chaugawa* area, people give top priority to drinking water that is their physiological need what they want to be satisfied at first. Secondly, most prioritised need was found to be need for sufficient irrigation water. It means, that they want their crop to be safe and in turn a financial safety for themselves. It may also be noted that, the need for sufficient irrigation was high in the villages of *Chaugawa* area where *Johads* were in good condition and hands pumps were yielding water thus, physiological or survival need for drinking water was satisfied. Hence, in such a village, people were at their second lines of needs, hierarchy i.e. need for

safety. In other villages, where residents are at second hierarchy of their need and want sufficient irrigation water, people may be motivated and keeping the issue of irrigation water in the centre of any programme may draw high level of participation. Then the need for belongingness comes at hierarchy. For the association of people with Johads for long term, it is necessary to involve people from the Chaugawa area in the programmes for Johads conservation.

A step wise motivational strategy for Chaugawa residents may be as drawn as below:

Step 1. Village wise small meetings and focussed group discussion with the residents of the Chaugawa on the issue of water problem.

Step 2. Motivating villagers for being gathered for the common cause

Step 3. Contact with some big NGOs and funding agencies to work in Chaugawa area for the conservation of Johads.

Step 4. Pressurising administration to take step to remove encroachment from the Johad .

Step 5. Organising meetings of noted personalities in the filed of social work and water like Magsaysay award laureate Rajendra Singh as his birth place also lies in *Chaugawa* area.

Step 6. Organisation of a formal or informal body of *Chaugawa*'s elderly people and local body heads to keep watch on the issues of *Johads* in the area being above the village level politics.

### CONCLUSION

It was found that there was a severe encroachment on Johads through out the *Chaugawa* and Johads were on the verge of extinction within next one to two decades if actions towards safeguarding the Johads have not been taken immediately. The groundwater table in different villages of *Chaugawa* also dropped by 40' - 50' in past 4 to 5 decades. Need for drinking water was at top especially in the villages where Johads have been neglected and faced severe encroachment.

Results show that the attitude of the male population in study area was concerned for the conservation of Johads and they also reported to be involved in periodical voluntary labour for cleaning of the Johads. Felicitation of such people will inculcate a feeling of belongingness in them which will, in turn, motivate people as a group for *Johads'* conservation. Though the needs of the residents of *Chaugawa* area were around the survival and safety needs, some attitude change and motivational programme may inculcate the feeling of belongingness too for Johads in villagers. Such attempts will gradually strengthen their belief that by conservation and effective management of Johads they are capable enough to manage their water problem and they will start feeling pride in living in the vicinity of Johads, their traditional water harvesting system. Villagers will thus reach at the stage of self esteem. Gradually they will start feeling pride in living in the vicinity of Johads and reach self actualization where they would not encroach Johads and conserve them for their sustainable future.

To conclude, there is a need for advocacy with district administration to conduct a official survey to match the figures of the geographical area registered as *Johads* with the area of Johads on the site at present and demarcate the area of all remaining Johads so that remaining area could be saved from any further encroachment. Those who have encroached upon Johads for their personal benefits should be served official notice to vacate the land. Other official/administrative exercise should be initiated so that any further encroachment may be checked, for the time being.

To sustain agriculture and maintain social harmony of *Chaugawa* area, any external agency/NGO should facilitate the organisation and constitution of a formal body of village heads and senior citizens from all over the *Chaugawa* area to keep a watch on the issues of *Johads* of *Chaugawa*, being over and above the village level politics. Attitude of people in *Chaugawa* concerned for the *Johads* should be utilized by organizing and motivating them for an anti-encroachment drive for conservation of Johads. The concerned attitude of *Chaugawa's* people towards Johads would lead to strong motivation for increasing the awareness level of villagers, specially the female population, towards role and utility of Johads. Only then, the conservation of this traditional water management system can be expected on a sustainable basis.

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