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Research Article

Water Audit: A Case Study of Hasapur Village, North Goa, India.

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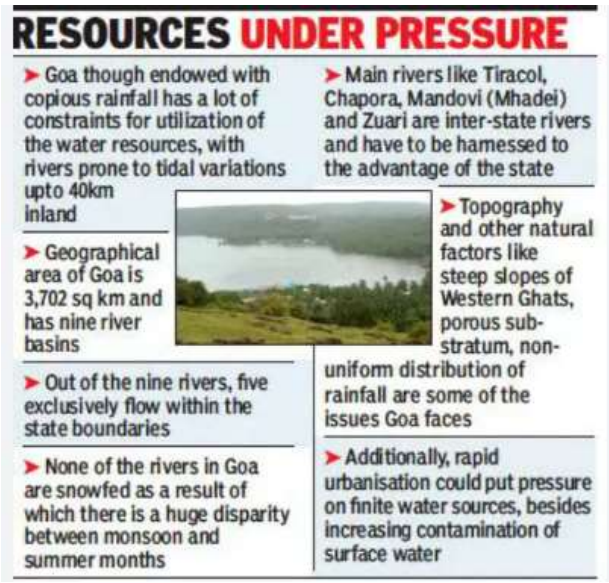
ABSTRACT

An analysis of an entity's water usage is called a water audit. The audit determines how much water is being used, how much is wasted, whether there are leaks, how much is used excessively, etc., and it pinpoints areas where water use can be cut. It assesses current treatment methods and systems critically and makes recommendations for improvements in utilization and efficiency. An audit provides advice on how to decrease water usage and waste, enhance treatment processes and methods, and provide cost-benefit assessments based on this extensive investigation and observations. It also suggests that a system be set up. The paper has analysed the concept of water audit at the grass root level with Hasapur Village of North Goa as a Case study. The availability of water, its usage, its facilitation is a process which needs to be refined with the object of optimising the available portable water. The study strongly recommends the need for mandatory water audit at the grass root levels so that the water crisis management gets facilitated with a positive framework

Keywords: Audit, Population, Resources, Water Smart Village, Recharge.



Introduction

India's natural resources, such as its water and land, are extremely unequal on a worldwide scale. With 2.4 per cent of the world's land area and 16 per cent of the world's human population, India has 20 per cent of the world's livestock population (GoI, 2017). India receives 4000 billion cubic meters (BCM) of precipitation on average annually, however there are only 1123 BCM of total annual utilizable water resource available. Above all, the fresh water crisis is severely affecting India and other third-world nations, mostly as a result of inadequate planning to manage their own fresh water reserves in aquifers and on the surface.(Krishan et al., 2016). It is not only due to rapid population growth, but also on account of many other factors such as rise in

per capita water demand arising out of continuous upward movement of living standards, increased reliance on irrigated agriculture, massive urbanization and industrialization. With the rapidly rising population and increasing needs of a fast-developing nation as well as the given impact of climate change, availability of utilizable water will be further restrained in future. There could also be deepening of water conflicts among different user groups. In these conditions, a water audit can be a useful management tool for reducing losses, maximizing multiple uses, and allowing significant water conservation not only in the irrigation industry but also in other water-using sectors including residential, commercial, and industrial. Water audits, under various different names, are being promoted increasingly as a key step towards effective and sustainable integrated water resource management.

A water audit is a "Systematic approach of identifying, Measuring Monitoring and Reducing the Water Consumption by various activities"(GoI, 2017).In other words, water audit is a systematic process of obtaining a water balance objectively by measuring the flow of water from the site of water withdrawal or treatment through the water distribution system and into areas where it is used and finally discharged. In other words, it is a method used to quantify water flows as well as quality in simple or complex systems, in order to reduce water usage and often saving money on otherwise unnecessary water use. Water auditing is a very important mechanism to conserve water, which is extremely necessary in the future as demand for water has been rising day by day.

Significance of the study on water Audit

- Water audit can help to reduce water losses and wastage, which can save money, energy, and environmental impacts. According to the World Bank, water losses in developing countries can range from 30% to 50% of the total water supply, and this can result in significant economic and social costs. Water audit can help to detect and fix leaks, improve metering and billing, and optimize water pressure and flow.
- Second, water audit can help to improve water quality and safety, which can protect human health and ecosystems. The physical, chemical, and biological characteristics of water, such as pathogens, pH, chlorine, and turbidity, can all be monitored and managed with the aid of a water audit. Additionally, it can assist in preventing and responding to pollution occurrences, such as spills, accidents, or sabotage, that result in contaminated water.
- Third, water audit can help to enhance water efficiency and productivity, which can support economic and social development. Water audit can help to measure and benchmark the water use and performance of different sectors, such as agriculture, industry, and domestic. The identification and implementation of water conservation and improvement strategies, such as water reuse, recycling, and harvesting, can also be aided by water audits.

Objectives of Study

1) To determine the Hasapur Village's water resources' current state
2) To evaluate water-related demand trends in the village
3) To identify improved resource management practices and policies

Research Methodology

The study has relied both on primary and secondary sources. In order to assess the methods and procedures used in water auditing by the Hasapur village in the Pernem taluka, north Goa, primary data was gathered using a structured questionnaire.

The sample consisted of 132 respondents (households). Secondary data was obtained from various reports, articles, websites and write ups given by the panchayat.

Review of Literature

Most of the studies have been carried out to analyse the significance of conserving the water with more emphasis on minimising the leakages in the usage of water not only by the consumers but also by the industries. Very few studies exist on the water audit meant for villages.

Das k. (2006), did an over view on drinking water and sanitation in rural Maharashtra in terms of its availability, quality and sustainability of fresh water used for drinking and domestic purpose. The study stressed on the need for effective supply chain management to avoid mis-use and wastage of water.

Sonvane R., Nagarnaik P.B, Thergaonkar V.P (2016), analysed water audit in India in terms of its effective management for minimizing loses, optimizing various uses and conservation of water not only in irrigation sector, but also in other sectors of water use such as domestic, power and in industries. They employed flow measuring equipment as a means of preventing water loss from a variety of sources, including raw water sources and conveyance systems that serve as sources for plant treatment and treated water storage systems on a regular basis.

Meyer S. (2006) examined the improvements and assessment of water auditing techniques of North America. The study's main objectives were to test, assess, and enhance the North American water auditing methodology.

A thorough analysis of the International Water Association's water auditing methodology was conducted, accompanied by case study illustrations.

Gannorkar R.A, khedikar I. (2014), did an over view on water audit of the whole world. They tried to find out the holistic approach towards total water resource, distribution and its efficient use to reduce the capital and operating cost as an added advantage over the optimized use of water resource with environment protection.

Roy P.K (2007) analysed the Water Conservation Measures for Sustainable livelihood of Rural Communities in West Bengal. He studied the rainwater harvesting process to capture and store for its efficient utilization and conservation to control its runoff, evaporation and seepage. He used the method of Salinity level nearby Piyali river featuring its spatial, diurnal and seasonal variation in order to find its suitability for agriculture.

Gandhi K. (2017) examined the Water Audit and Inevitability of water meter in Surat. The study examined the amount of water used in Surat buildings both before and after water meters were installed. Water meters, velocity water meters, compound water meters, multi-jet water meters, and other mechanical devices were used to measure the volume of water flow.

Jainer S. (2017) did an overview on water efficiency and conservation in urban India. The report envisaged on Historic water conservation practices in India, urban water management issues and opportunities and water efficiency and conservation measures.

Saxena D. (2017) analysed water conservation by traditional rain water harvesting system in Rajasthan. He tried to find out the traditional methods for water conservation in Rajasthan for development purpose. He used traditional method of harnessing surface water which may provide alternatives to solve the problem of water demand.

Kamari M., Singh J. (2016) examined on water conservation strategies and solutions in India. The report envisaged on water pollution, unavailability of drinking water, inadequate sanitation, open dumping of wastes in India. They used different method to solve the problem of water auditing such as use of saline water for irrigation, contour farming, and tippy tap for water conservation.

Kulkarni A.A, Patil A., Patil B. (2014) examined water audit in terms of water supply scheme in Shrivardhan. The study found that there is need to proper conservation and improving service level to the consumers of SMC. They used method of calculating cost recovering leakages and cost to leak detection.

Water Resources of Goa at a Glance

Goa is home to nine distinct river basins, which are typically combined with all west-flowing rivers from Tapti in Gujarat to Tadri in Karnataka. Basin area makes up only 6.62% of the nation's river basins, ranging from Tapti to Tadri, and 0.115% of all the river basins in Goa.(IWP, 2014). Terekhol, Chapora, Mondovi, and Zuari are interstate rivers; the remaining five of the state's nine rivers begin and flow entirely within state borders. Unlike many other rivers in North India, the rivers of Goa are not fed by snow. Hydropower production in Goa has relatively limited potential, and the state's rivers have very little water in them despite an annual rainfall that is far higher than the country as a whole.. (Narayana et al., 2015). Rivers frequently dry up and groundwater levels fall in the summer. Because of this, the state has one of the lowest rates of fresh water availability per capita in the country, even though it is situated in an area with some of the highest rainfall levels.

Further, the entry of seawater into large portions of Goa's rivers has resulted in elevated salinity levels. In this case, the state would soon have to treat saltwater in order to meet its drinking water requirements, particularly for its coastal regions. Since large segments of rivers cannot be tapped to meet drinking water needs, and natural resource availability stays constant even as Goa's population grows, the draft State Water Policy 2021 recommends that the state investigate the idea of desalinating sea water.

Most of the studies have been carried out to analyse the significance of conserving the water with more emphasis on minimising the leakages in the usage of water not only by the consumers but also by the industries. However, there have been hardly any studies undertaken to study the approaches of water auditing at the village levels. The study has analysed the approaches of Hasapur village in adopting if any the process of water auditing.

The study has analysed the village of Hasapur in the Pernem taluka of goa as a case for studying the concept of water auditing in theory and in reality. The people of this village are living in very peaceful manner and are having a very proud history. Agriculture is the main profession of this village. Its total population is around 1152 and there are 132 households in Hasapur village.

Discussion and Analysis

The analysis has been carried out with the help of a structured questionnaire, which surveyed 132 household respondents of the village of Hasapur.

Parameters in Water Auditing

Water auditing may be done on the basis of certain parameters. These are

a) Water conservation: Water quality, upkeep, inspection, routine maintenance, and leak repairs in pipelines and taps would all be taken into account under this criterion. The village must determine where their water supply comes from.

b) Rainwater Harvesting: The strategy involved setting up a rain gauge and rain recording system, putting rainwater harvesting into practice, and excavating rainwater harvesting pits across the community.
c) Renovation of Traditional and other Water Bodies/Tanks: This parameter covers a variety of topics, such as watershed development, land management, water management, reuse and recharge of structures, and groundwater recharge.
The analysis done has been explained as follows

Water Smart Village

A set of criteria was taken into consideration and the villagers and panchayat members were questioned in order to determine whether the community qualifies as Water Smart.

1) *Water Budget:* In order to gather information for the water budget, the following questions were asked: a) does the village understand the need to create a short-term, daily, weekly, monthly, and quarterly (seasonal) water budget; b) does the village already create these types of bills?
c)whether the village have rain gauge and rain recording system at various locations, d)whether the village have rainwater harvesting structures constructed for each area, e) If the village design and install contour trenches as per the local capacity, terrain, gradient of land, soil porosity and rainfall, f) whether the village design and install artificial ponds as per the local capacity, terrain, gradient of land, soil porosity and rainfall, g) if the village has designed and install roof top water harvesting structures as per the local capacity, terrain, gradient of land, soil porosity and rainfall

Table 1. Water Budget

Sr. no	Criteria	Responses (%)
1	Need to prepare water budget	39.4
2	Is water budget prepared	23.5
3	Rain gauge & rain recording system	18.2
4	Rain water harvesting structures	15.2
5	Contour trenches	15.2
6	Artificial ponds	18.2
7	Roof Top Water Harvesting	14.4
	Mean Value	**20.59**

Source: Calculated by Authors

Table 1 shows the extent of the water budget maintained by the village. It was found that in terms of the budget, the performance of the village in the management and the conservation of water were not satisfactory. Only 39.4% of the population felt the need for water budget. Further only 18.2% of the households affirmed the existence of the rain gauge and rain recording system in the village. The mean value of the parameters influencing the water smartness of the village was very poor (i.e.; 20. 59%).
In terms of Rain Gauge & Rain Recording System, water harvesting, contour trenches, artificial ponds etc. hardly any efforts were taken up in the village.

Table 2 Water Quantity and Quality Monitoring

Sr.no	Parameters	Responses (%)
1	Village intend for quality and recyclability	28.3
2	Water Usage on Basis of Quality and Recyclability	19.7
3	Regulation of use of ground and surface water	31.8
4	Rainwater harvesting	21.2
	Mean value	25.3

Source: Calculated by Authors
Table has done the analysis of the monitoring of quantity & quality of water in the village. The mean value (25.3%) of the sub-parameters influencing the monitoring of quantity & quality of Water in the village is very small. Further, only 28.3% of the village showed interest in improving the quality and the recyclability of the water. Therefore, with regard to water quality and quantity monitoring, very fewer efforts are taken by the villagers.

Table 3 Water Recharge Structures in the village

Storage tank or subterranean recharge structure capacity (in litres per thousand)					
S. No.	**Recharge**	**Storage**	**Capacity (In litres)**		**Remark**
			100-500	**500-1000**	
1.	Structure 1 (river)	Tank/lake/harvesting structure	NIL	NIL	100

2.	Structure 2 (canal)	Tank/lake/harvesting structure	NIL	NIL	29.5
3.	Structure 3(well)	Tank/lake/harvesting structure	NIL	NIL	10.6
4.	Structure 4 (tab)	Tank/lake/harvesting structure	51.5	48.5	100
5.	Structure 5(plant project)	Tank/lake/harvesting structure	NIL	NIL	73.5
6.	Structure 6(pump)	Tank/lake/harvesting structure	NIL	NIL	NIL

Source: Calculated by Author

The table 3 shows that majority of the people (93.2%), recharged the water by a fresh water stream. As many villagers use that water for domestic purposes (84.1) they witnessed and said that the water body contains fish and 62.2% of the population said that there is no floating solid waste in the stream and they use the stream water for various purpose except for drinking. Some of the population around 28.8% witnessed sewage water entering the water body. Majority of the people (76.5%) said that water body is not encroached.

Table: 4 The condition of the village's surface water bodies

Sr. No.	Parameters	Responses (%)
1	Does any freshwater stream replenish the water body?	93.2
2	Water body contain any fish	84.1
3	Water body have floating solid waste	37.8
4	Used or sewage water gets into the body of water	28.8
5	Is there encroachment on the body of water?	23.5
	Mean value	**53.5**

Source: Calculated by Authors

From the above responses we can infer that the status of surface water in not extremely clean, as more than quarter of the responses confirmed that the water in been polluted with dumping of solid wastes and encroachment.

Table 5: Portability of Water

Sr. No	Sources	Responses (%)
1	Is the well water portable?	57.6
2	Is the hand pump water portable?	21.2
3	Is the bore well water portable?	10.6
4	Is the overhead tank water portable?	17.4
5	Is the community water supply water portable?	65.91
6	Is it okay to consume unpurfled water?	67.4
7	Does the feed line have an unpleasant odour?	68.94
8	After purification, is tap water safe to drink?	85.6
9	Is the water in supply chlorinated?	78.3
10	Does the village have a water treatment plant?	69.7
	Mean	**54.265**

Table 5 represents the drinking water quality. The first source was well and 57. 6% of the people felt that well water was portable. While only 21. 2% people responded yes to the bore well water quality. Only 10. 5% people felt that the quality of the hand pump water was good and portable. A large number of respondents that is 65. 91% people said that the community water supply was of good quality. Surprisingly, 67. 4% people complained of foul smell in the water. Around 68. 94% people said that the water which they are consumed was safe without purification. Most of the people up to 85. 6% people said that it was safe to consume water after purification. 78. 3% of the people responded saying that the water was chlorinated. And lastly 69. 7% of the people agreed to the existence of the purification plant.

Table 6 Management of water

Sr..No	Parameters	Responses (%)
1	Installation of Water Meters at Dispensation of Bulk water (M1)	84.09
2	Monitoring of Water Use Meter every day(M2)	71.2
3	Installation of flow meters at all bulk water dispensation (M3)	65.91
4	Measurement of ground water on daily basis (M4)	53.03
5	Measurement of per minute pump-wise flow of water (M5)	53.03
6	Monitoring of hours of pumping of water(M6)	59.8
7	Measuring the extent of running the motor for withdrawal of water (M7)	56.06
8	Conduct of water audit every day (M8)	15.91
9	Preparation of water budget (M9)	32.6
10	The monitoring of the variations in water levels in the Overhead Tank by the local people (M10)	30.3
11	Authorities keeping an eye on the variations in water levels in the Overhead Tank (M11)	29.5
12	Villagers' estimated water use toward the end of the day (M12)	23.5
	Mean Value	**47.9**

Source: Calculated by Authors

Table 6 show the monitoring and the management of the water in the village in terms of twelve sub-parameters marked as M1, M2.....and M12. The analysis found that the village has on an average not shown satisfactory performance with regard to monitoring and management. Though there has been positive performance in terms of some parameters such as installation of water meters at the dispensation of the bulk water from ground water and pumps. However, in terms of water audit its performance has been very much below average as 84% of the surveyed households indicated that hardly any water auditing is done on day to day basis. The conduct of the village in terms of the preparation of the water budget (32.6%), monitoring of the water levels by the villagers at the starting point (30.3%) and by the officials at the end of the day (29.5%) and the estimation of the consumption of water on daily basis (23.5%) was also not satisfactory.
Thus it is very much important that the villagers and the officials consider this above mentioned issues so that the future is not compromised at the cost of present negligence.

Water Conservation

The villages' best water saving techniques can be used as role models by other organizations and communities. Water Conservation can be undertaken in a certain manner. Plumbing fittings and water taps need to be adequate in addition to having enough water. In addition to installing water-efficient toilets, fixing leaks in faucets and pipelines on a regular basis, planting native plant varieties, and water-saving plant selections are also urgently needed. Broadly there are seven criteria and sub criteria in each category, on the basis of which the water conservation efforts of the village can be seen. These are: a) Functional taps without leakage in the individual household toilets and other places in the village, b) Network of water pipelines – inspection and observation for leakages, c) Dual flush water-efficient toilets in public restrooms and private residences, d) Taps – sensor based or time, e) Availability of Recycled Water for Toilets Table

Table 7 Water Conservation

Sr. No.	Criteria	Parameters	Responses (%)
1	Each home's toilet and other locations in the hamlet have leak-free, functional taps.	A1 (5)	81.50
2	Water pipeline network: monitoring and checking for leaks	A2 (8)	46.12
3	Individual homes' water-efficient toilets and communal restrooms with dual flush systems	A3 (4)	38.06
4	Taps – sensor based or time	A4 (2)	0.00
5	Availability of Recycled Water for Toilets	A5	33.30
		Mean	**50.94**

Source: Calculated by Authors

: A1-Functional taps without leakage in the individual household toilets and other places in the village, A2-Network of water pipelines – inspection and observation for leakages, A3-Water Efficient Toilets in

individual households and community toilets equipped with dual flush system, A4-Taps – sensor based or time & A5-Availability of Recycled Water for Toilets

Table 7 shows the analysis of the Hasapur village in terms of its efforts in conservation of the water. The table has analysed parameters in terms of A1 (5), A2 (8), A3 (4), A4 (2) and A5 respectively. In terms of A1- Functional taps without leakage in the individual household toilets and other places in the village, the efforts of villagers are found to be very encouraging. 81.5% of the respondents said that the taps were in the individual households were functional without leakages. But were not very positive with reporting and replacement of leaking taps. Again, the frequency of visit of tap inspectors we not as much as required. With regard to A2- Network of water pipelines – inspection and observation for leakages, 46.12% indicated an average performance and said that lot needs to be done by the village at the earliest with regard to weekly checking of pipelines and hygiene maintenance. In case of A3- Water Efficient Toilets in individual households and community toilets equipped with dual flush system, was also very less which is 38.06%. Flush tanks with dual flush and efficient was not found much in the village. As far as A4- Taps – sensor based or time is considered, it was found that none of houses were seen using the sensor-based taps. Finally, in A5- Availability of Recycled Water for Toilets, the performance/efforts was not satisfactory as only (33.30%) of the households said that they were using recycled water for toilets.
From these findings we can conclude that the village was not having much idea about water conservation as most of the criteria considered were not fulfilled by the villagers.

Table 8 Recycling of water in village

Sr. No	Parameters	Responses (%)
1	Sampling And Analysis Of Wastewater (R1)	47.8
2	Plan For Recycling Wastewater (R2)	28.03
3	Method Of Collection Of Water For Recycling (R3)	23.5
4	Grey Water Or Non-Recycled Use Of Water(R4)	17.4
5	Used Water For Agriculture Purposes (R5)	23.5
6	Recycling Equipment Well Maintained (R6)	21.97
7	Wastewater Collected Daily (R7)	26.5
8	Collected Wastewater Recycled Daily (R8)	15.9
9	Percentage Of Wastewater Recycled (R9)	21.2
10	Wastewater Of RO Of Public Buildings (R10)	16.7
	Mean Value	**24.3**

Source: Calculated by Authors

Table 8 shows the analysis about the recycling of water in Hasapur village. It was found that that 52.2 % of respondents were not aware also as to whether analysis of waste water was done or not, 71.97% of people say that there is no plan yet done for recycling of waste water. Majority of the people said that there is no method of recycling for used water and grey water that is 76.5% and 82.6%. 23.5% use their waste water for agricultural purposes, 21.97% people say that recycling equipment's are well maintained. Most of the people said that waste water is not collected daily (73.5%) and 15.9% said that collected waste water is recycled and very less waste water is used for building purposes around 16.7% of the population in this village.

Table 9 Administration for Water Conservation

Sr. no	Administration for Water Conservation	Response (%)
1	Dedicated Staff for Water Maintenance (4)	50.20
2	Plugging Leakages (2)	25.40
3	Provision of Training (2)	24.61
4	Random verification of reports by village representatives	60.60
5	Reporting of subpar infrastructure and repair mechanisms (5)	51.82
6	Reporting and inspection formats on a daily, weekly, and monthly basis (6)	44.20
	Mean	**42.80**

Source: Calculated by Authors

Table 9 shows that the findings about the administration for the conservation of water. The mean values have been estimated for all these parameter for convenience. The study found that there was increase in random verification conducted by village representatives. On the other hand, there are fewer reports of subpar facilities and repair mechanisms. Of the respondents, 50.20% believe that maintenance is handled by specialized workers. The report's inspection is not up to par.

Findings of the Study

From the above study we can say that though water is the most important substance for preserving life and we as humans cannot survive, we do not sustain it properly. The preliminary water audit conducted gave an insight that no accurate statistics are carried out to know the quantum of lost water. It was found that there are hardly any studies under taken towards water auditing at village levels. In terms of water smartness, the performance of the village was not satisfactory. There has been poor monitoring of quantity & quality of water in the village. The water plant project situated in the village served the basis for the water structures like canal. There is a need for a proper approach to manage the portable water in the village. It was found that on an average, the water was portable in the village from sources like wells and community water supply except in cases of bore wells and hand pumps which were were not portable. Further majority of the households were of the view that water is safe for drinking only after purification. The village has on an average not shown satisfactory performance in monitoring and the management of water resource, though it has shown little better performance in terms of some parameters such as installation of water meters at the dispensation of the bulk water from ground water and pumps.

Conclusion and Suggestions

Water audits if conducted diligently, can provide a rational and a scientific framework that could categorize all the water used in the villages or cities. It is a tool that can overcome drought related problem, shortages leakages and losses of water. The approaches and the practices adopted by the villagers in Hasapur towards water auditing are not satisfactory. There is a need to create more awareness on the part of the water conservation agencies to explain the need to adopt water audit for better and effective water usage in terms of minimum losses so that it can be optimally saved for the future. The villagers were found to be showing efforts towards the conservation of the water on 50:50 bases. It was found from the analysis that the village lacked in terms of initiatives towards maintaining the village green. Furthermore, it was found that in terms of plant protection and its management it had asserted very satisfactory performance, but the mean value of the defined parameters such as use of bio pesticides, replacement plan for plants was very much unsatisfactory. The efforts towards the recyclability of the water was not satisfactory. The study found that on an average the performance of the village in the administration of the conservation of the water was not satisfactory. In terms of dedicated staff for maintenance, it was little satisfactory, but however in terms of plugging leakages there was negligence. The provision for training was found to be inadequate. A watershed program may result in the village's overall development. The development of livestock, agricultural productivity, and other aspects will all improve if the village's land and water resources are managed well. It is very much essential that all the villagers utilize the existing water resources available in the village in the most careful and efficient manner. For any programme to be successful, creation of awareness to needed to make attitudinal changes. Water conservation is a major issue that undoubtedly calls for public involvement. Water conservation requires widespread awareness and participation from every member of the village community.

Suggestions

- It is imperative that we acknowledge water conservation as a critical and extremely difficult issue. The nation offers a wide variety of water-saving strategies. Due to the extraordinary rate of industrialization and urbanization, as well as the widespread use of concrete, uncovered spaces are steadily disappearing, especially in metropolitan and semi-urban areas. This phenomenon is resulting in an annual drop in ground water recharge since there is less opportunity for rainwater to percolate to the earth during the monsoon.
- Building percolation tanks offers enormous potential for enhancing the water resources within the watersheds. Percolation tanks are those that collect and store surplus water runoff from low-lying locations to aid in replenishing groundwater supplies.
- The village can make use of efficient water use practices to conserve water in a particular area. This can include a) use of Sprinkler and Drip Irrigation Methods, b) by regulating the amount of precipitation that runs off the land, moisture can be preserved.
- Modifying the design of accessories like the flushing system, or tap if it is used in the households to reduce water requirement to best and optimal level
- Waste water recycling is essential for the preservation of valuable freshwater resources. Two separate water supply systems must be used, one for fresh water and the other for treated wastewater. Secondary uses for the treated sewage water include agriculture, gardening, and flushing toilets.
- People need to be made aware of the adverse effects of climate change. Rural community, which is dependent on agriculture and allied activities are most vulnerable to climate change impacts because of their greater dependence on climatic parameters.
- It is necessary to increase awareness level among the children and all the other stakeholders in schools and other educational institutions in the village about the importance of water and need for its conservation. Sensitizing and educating stakeholders on best use of water resources and efficient practices can lead to the protection of this scarce and a very precious resource.

A useful tool for evaluating water use, finding wasteful areas, and putting into practice efficient water management plans is water audit services. Water audits help appropriate water management across multiple industries by encouraging saving of water, cutting expenses, and supporting sustainable practices. Taking advantage of water audits can help ensure that our valuable water supplies are preserved for future generations.

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