
CONSTRUCTION OF BAMBOO ROOF LITERATURE REVIEW

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Abstract:- The great challenge for coming decades will be the task of scarcity of water. We know water scarcity is growing rapidly now days due to increase in population. After the study of detailed literature review of papers, in this project we sum up the useful conclusion drawn by the various authors from all over the world. In general it is commonly found that wasted rainwater and reduction in groundwater day by day is a all region problem. Many authors gave various traditional methods used in India. Some authors studied about parameter like workability and elastic properties of bamboo. This literature review becomes very useful in our project call Roof water Harvesting by using bamboo.

Keywords:- Rainwater harvesting, bamboo, economical, water scarcity

I. INTRODUCTION

In this paper we are studying and reviewing the system of root water harvesting by using bamboo. This literature will cover many aspect of rainwater harvesting system. In this literature we are going to study the material called bamboo, which we are using for constructing a roof. Various author published papers related to rain water harvesting in different region of India are studied. Some authors also gave the experimental work related to rainwater harvesting using many traditional and modern methods like use of sodium salt.

Significant conclusions are drawn after reviewing all the papers.

1.1 A Bamboo Treatment Procedure: Effect on The Durability and Mechanical Performance by Quoc-Bao Bui, Anne Cecile Grillet and Hoang-Duy Tran

Author studied the material bamboo and found out different method of treatment for bamboo in different condition (i.e. treatment in different temperature for different duration etc.) duration of treatment affect the property of bamboo (like moisture content, durability ,mechanical properties) to reduce the moisture content of bamboo we heated the bamboo to different temperature ranging between 100⁰C to 180⁰C. for different time duration of 1h,2h,3h and after that for cooling of bamboo used different cooling method (oven ,flax oil ,sunflower oil). While doing this process we investigated that we cannot heat the bamboo at the temperature of 180⁰C for 3 hours because it is too long treatment for bamboo endurance leading it to crack during cooling and bamboo may get degraded. On the other hand the bamboo which is treated without oil gave the more compressive strength and greater resistance from fungi than bamboo which treated with oil before testing.

As a conclusion author says that the specimen treated by heat without oil at 180⁰ c for duration of 1h to 2h and the cooled in sunflower oil gave us the best possible result.

1.2 Rainwater Harvesting in India: Some Critical Issues for Basin Planning and Research - By M. Dinesh Kumar, Shantanu Ghosh, Ankit Patel, O.P. Singh and Ravindranath

In India there are lots of RWH systems for most water scarce region of India. But those system have limited potential because of problems like -

The rainfall in that region is medium but the evaporation rate is high. The hard rock which underlies these region limits or constraints the growth of groundwater. These are several difficulties in economic valuation of RWH system due to the problem in increasing the hydrological impacts and various benefits. The economical development cannot be considered on the basis of individual benefits but rather on the basis of incremental benefiits. In many water scarce area there are various attempts are done to max the hydrological benefits of

rainwater harvesting and to make it economical. In many water scarce region the RWH system is distributing the hydrological benefits rather than increasing i .After all that we though that following steps should make the RHW system effective

- 1) Developing better understanding of hydrological condition.
- 2) Focusing on wet water saving
- 3) Enhancing the production of green water saving.

1.3 Roof-Top rainwater harvesting: Prospect for Shimla – By Abhinath Bansal and Mudit Mishra

As per the observations the ground water level is depleting and annual rainfall is going down. Fresh water is everybody's need which will not be fulfilled if the current trend continues so we need a system which can meet the demand up to some extent. Rainwater harvesting is a very good alternative for upcoming crises. The design shown here clearly suggests that roof rainwater harvesting with the calculated parameter are very compatible in the current scenario. The design done is based on storage fraction and demand fraction which may vary and optimization will have to be done to make it more applicable.

The world faces escalating demands for good quality water as current usage from surface and ground is outstripping supply. Even in those areas of the world that appear to have adequate water supplies, there are constant needs to balance existing supplies with ever growing demands. Rainwater harvesting systems intercept rainwater in hydrologic cycle through either natural and forms or artificial facilities. The small scale RHS does not involve the existing water right. And it has become one of the economical and practical measures for providing supplementary water supplies with its easy system installation.

1.4 Traditional system of water management in watersheds of Arunachal Pradesh – By S.K. Pattanaik, DSen, N. Kumar, O. Moyong and P. Debnath

Indigenous water management practice with Yet bung Longing and Linkum are widely use in east siang district of arunachal Pradesh since long back. There are abundance of stones, boulder, bamboo which are meticulously utilised for rising these two structure use for storing of water, irrigating the crop, laying of pipe, checking erosion loss, erecting a temporary bridge, etc. local Adi tribe have their traditional wisdom for constructing erosive nature of light textured soil of undulating and utilise the natural resources like soil and water.

The Adi tribe of Arunachal Pradesh is very rich in indigenous traditional knowledge in conserving natural resources. The Yetbung Lingang and Linkum are such traditional water conservation structures made up of locally available stones/ boulders, bamboo and tokopata and used to divert the perennial stream of the area for Panikheti and winter crop cultivation. The people of the watersheds of East Siang district have their traditional clarification for construction of these types of structures. Rainfall evaporation pattern of the study area also supports prolong crop growing season for widening arable land under the watershed. Scientific rationale of the study confirms the multifaceted advantages of such traditional practices.

1.5 Traditional Irrigation System: Bamboo dripping system in Meghalaya – By Phibankhamti Rynnga

Although Meghalaya is characterized by heavy rainfall, yet the concentration of precipitation is primarily limited to few months from May to September. Due to hilly topography most of the rain water is wasted as runoff and lot of soil erosion also occurs. Shifting cultivation is practiced in the state. The irrigation system in the state has not been developed yet. The application of chemical fertilizer application and use of HYV etc. are still not practiced by the tribal farmers. The various indigenous techniques of soil and water conservation development by local people are based on local conditions and resources.

Traditional Irrigation system proved to be an efficient irrigation system since time immemorial in hilly region of north east India. This region in general and Meghalaya in particular found the method to be the most sustainable one in terms of water harvesting and irrigation purposes. This present study explores the unique traditional understanding of the community in forms of constructing the framework of irrigation system using bamboos. The methodology, mechanism, construction and maintenance of the system from the source to the

destination is carefully discussed and emphasised and it is found out that this system that existed 200 years ago in Meghalaya is still practised till today in Southern slopes of Meghalaya and Jaintia hills districts.

1.6 Traditional Methods of Post Harvest Bamboo Treatment for Durability Enhancement – By Bebija L. Singha and R. K. Borah

Bamboos like all lingo celosia biomass are susceptible to biodegradation which reduce its durability. Post harvest preservation of bamboo culms is important for enhancement of its service life. But the durability of bamboo also depends on its age, species, moisture content, climatic condition and nutrient content. There is little information available under traditional preservation of bamboo in northeast India. This paper describes the traditional methods of preservation of Bambusa tulda by water soaking, curing and smoking. The efficacy of water soaking method was tested in the laboratory conditions It was found that soaking of bamboo in water for one month is optimum for enhancing the durability.

Bamboo is one of the most useful natural resources in many parts of world. It matures in 3-4 years in comparison to wood species which requires 25-80 years to attain maturity. Bamboo is a lignocellulosic biomass which is similar to properties of wood but with additional properties like easy workability, excellent strength, high elastic behaviour and resistance to abrasion. Due to its versatile properties it has been named as the most important sustainable and environmentally helpful crop on the earth.

1.7 Investigation of the Current Situation and Prospects for the Development of Rainwater Harvesting as a Tool to Confront Water Scarcity Worldwide – By Stavros Yannopoulos , Ioanna Giannopoulou and Mina Kaiafa Saropoulou

Water resources face severe pressures due to demographic, economic, social causes, environmental degradation, climate change, and technological changes on a global scale. It is well known that rainwater harvesting, a simple and old method, has the potential to supplement surface and groundwater resources in areas that have inadequate water supply. In recent decades, many countries have supported the updated implementation of such a practice to confront the water demand increase and to reduce the frequency, peak, and volume of urban runoff. These considerations motivate interest in examining the current situation and the prospect of further development of this method worldwide. The present paper aims at the investigation of the current situation of rainwater harvesting (RWH) as an alternative water source to confront water scarcity in various countries around the world.

Many countries are facing water shortages more and more growing as a result of the continued increasing demand for water from various competing users like domestic, agriculture, industry, and environment use, as well as because of urbanization, climate change, water pollution, and so on. All of these factors exert pressures on the existing water resources. One of the biggest challenges of the 21st century is to overcome the growing water shortage

1.8 Rainwater Harvesting And Management – Policy And Regulation In Germany – By T. Schuetze

This paper discusses the most important policies and regulations supporting the decentralized management, harvesting and utilization of rainwater in Germany. The development and implementation of specific policies and regulations contributed significantly to that trend. They also work as incentives for the development of advanced technologies and businesses as well as the widespread and growing implementation of measures for decentralized rainwater management, harvesting and utilization by public and private actors. This development can generally be associated with environmental and economic concerns related with required adaptation to changes in climate, demographic structures and infrastructures as well as climate resilience including flood control and drought resistance. The decentralized management of rainwater and its separation from combined sewer systems at the source is generally regarded as the state of the art and basic condition for sustainable municipal wastewater management

1.9 Sodium salt treated catchment for water harvesting – By Gary W. Frasier, Gordon R. Dutt and Dwayne H. Fink

Water harvesting plots showed that precipitation runoff efficiency from an area treated with asprays application of a sodium carbonate salt solution. Water harvesting is the collection of precipitation runoff from a prepared catchment surface for later beneficial use. It is a water supply technique that is technically feasible wherever there is precipitation. The collected water maybe used for a variety of purposes such as drinking water supplies for human and animals and for growing crop measured runoff from sprinkler evaluation of

treatment effectiveness was higher when distilled water was used than when using the local tap water. There is a need in both drinking water supply and runoff farming applications for a low cost catchment treatment which yields a moderate to high runoff percentage of the precipitation. One potential treatment which meets this criterion is sodium salt.

1.10 Making Water Management Everybody's Business: Water harvesting and Rural Development in India – By Anil Agarwal and Sunita Narain

Water is not only vital for human survival but is also the foundation for a sustainable biomass-based economy. Large-scale water development systems have also often led to inefficient and inequitable distribution of water resources and forced displacement of the poor. Major institutional, policy and technological initiatives are, therefore, required to ensure the efficient, socially equitable and environmentally sustainable management of water resources. The potential of water harvesting is enormous. With about five to 10 per cent of India's land area set aside for rainwater collection, most of India's irrigation and household water needs could be met for water harvesting to support sustainable rural development; there will need to be a change in the governance of water systems. A decentralised system of water management is required, in turn demanding a community-based system of natural resource management.

II. Conclusion

After making a detailed literature review it is a common conclusion that water scarcity in India and all over the world is a serious problem. Paper by author Quoc-Bao Bui et.al. said that variation in temperature of bamboo gives best result at 180°C. Author M. Dinesh Kumar et.al. gives various methods to RWH effectively. Author Abhinav Bansal et.al. proposed a solution regarding RWH using storage precaution and demand fraction method. Paper by S.K. Pattanaik et.al. gives ideas about traditional practices of Adi Tribes of Arunachal Pradesh. Paper by Phibankhamti Ryngnga gives an idea about bamboo dripping irrigation system in Meghalaya. Advantages of bamboo on account of workability strength, elastic behaviour etc. is given by Bebija L. Singha. Paper by Gary W. Frasier studied about use of sodium salt for rain water harvesting.

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