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WATER CONSERVATION FOR IRRIGATION IN HILLY AREAS

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Abstract
Water, generally known as a universal solvent is the most essential component of the biotic world. People living in plain and coastal areas can manage the water problems easily but the peoples in hilly areas face very severe problems due to lack of water resources. Many hilly regions as well as places like Jammu and Kashmir and many cold deserts faceunpredictable rainfall, recurrent drought and sometimes evacuate water resources. Due to these unfavourable conditions these areas undergoes low crop capitulate. Due to the need of water for agriculture and drinking purposes, conservation of water is very important. In hilly areas water is continuously creating a problem for community not only for agriculture use but also for drinking and domestic purposes. There are generally two main sources of water i.e. rainwater and spring water.Ground water is in very low quantity in these areas and is usually found at a greater depth. In hilly areas there is very low scope of tube wells, canals and even for lift irrigations. Due to this water conservation is very important. Generally, rainwater is harvested and utilised in irrigation and for domestic purposes. Roof-top water harvesting is the most efficient method to save water, it is economical and production can also be increased. For the transportation of water kuls and bamboo drip can be used as well.

Introduction
Although near to three fourth of earth is made of water, not all of it is acceptable for use. The water in the oceans and seas cannot be accounted as drinking water and meagre of it can be utilized for different purposes. As a decision, there is a consistent dearth of water that is neither good for drinking or domestic and industrial use. Places on the earth that have faced continued water shortage were able to defeat this problem by harvesting what little rainwater they received due to precipitation. This gradually started to spread to the areas where there was ample amount of rainfall. As a result, the exclusive day rainwater harvesting system wasestablished into areas. Using the rainwater harvesting system provides certain advantages to the community. First of all, harvesting rainwater approves us to better utilize a water resource. It is mandatory to do so since drinking water is not easily renewable and it helps in reducing misuse. Systems for the accruing of rainwater are based on simple applied science.

Water conserved in the rainwater harvesting system can be put to use for several non-drinking operations as well. For many families and small business man, this leads to a large reduction in their power bill. On an industrial point of view, harvesting rainwater can provide the ample amounts of water for many operations to take place, without having the reduction in nearby water sources.As such, there is no need for building new structures for the rainwater harvesting plant. Most rooftops work as a workable catchment area, which can be connected to the harvesting system. This also helps to reduce the impact on the environment by reducing use of fuel based machines.

In Kadavanchi village of Maharashtra, the production of crops is increased by 200%after they started rainwater harvesting. In hilly regions production can be also increased by rainwater harvesting which will ultimately results in increasing the economy of the area. Rainwater harvesting is the gathering and deposition of rainwater for reuse on the site as well as off-site, rather than allowing it to run away as a useless drain runoff . Rainwater can be collected from rivers , rooftop and in many places the water collected is directed towards a deep pit (borehole, shaft, or well) for preferably for ground water recharge, a collection tank with percolation, or accumulated from dew or fog with other tools. It's uses include water for recharging ground level, parks, gardens, livestock, fields, irrigation and for domestic use after proper treatment i.e., chlorination, and proper sedimentation and filtration usually adopted as a common layman practice which can be economical as well for the consumers.Around the 3rdcentury BC, the farmers in Baluchistan (now in Pakistan, Afghanistan and Iran), Kutch, India, used rainwater harvesting for agricultural fields. In past as well in Tamil Nadu , rainwater harvesting was done by Chola kings.Rainwater which came from the Brihadeeswarar temple which is located in Balaganpathy Nagar, Thanjavur in India, was collected in Shivaganga tank. In the later Chola duration, the Vīrānam tank has been built (1011 to 1037 CE) in Cuddalore district of Tamil Nadu to collect water for drinking and irrigation purposes. Vīrānam is the 16k.m. long tank with a capacity of about 41,500,000 m^3.Rainwater harvesting was done in Indian states like Madhya Pradesh, Maharashtra, and Chhattisgarh in the ancient days. Ratanpur, in the state of Chhattisgarh, has about 150 ponds which utilises most of its water in agricultural works.

There are generally two methods of harvesting rainwater:

Surface runoff harvesting

In urban regions rainwater flow away as surface runoff. This runoff could be collected and used for recharging aquifers by adopting specific methods as well as can be collected to be used in dry spells of the year in most of the hilly regions.

Roof-Top rainwater harvesting

It is a system collection of rainwater where it falls. In rooftop harvesting, the roof works as a catchments, and the rainwater is collected from the roof of the structures. It can also be collected in a tank or diverted to artificial recharge system. This method is economical and very productive and if implemented in an appropriate way helps in improving the ground water level of the area.

Methodology

The Himalayas hold the maximum mass of ice and snow outside polar areas and are the authority of the 10 biggest rivers in Asia. Fast reduction in the quantity of Himalayan glaciers due to climate change is happening. The declining effects of increase in temperatures and calamity of ice and snow in the region are affecting, for example, water available (amounts, seasonality), biodiversity, ecosystem boundary moves (tree-line movements, high-elevation ecosystem changes), and overall feedbacks (monsoonal shifts, loss of soil carbon) etc. Seasonal change will also have environmental and social stroke that will increase uncertainty in water source and agricultural production for human populations in Asian region. A natural understanding of climate change requires creatingregional and local-scale thesis so that reduction and adaptation commands can be determined and implemented. The challenge due to climate change in the Greater Himalayas can only be forwarded through increase in regional collaboration in scientific thesis and policy making .(Jianchu Xu et al., 2009).

The Himalayas "the terrace of the world" – contains the most comprehensive and harsh high altitude areas on planet, and the largest regions covered by glaciers and frozen water outside the polar regions. The region and its water sources play a chief role in global atmospheric circulation, biodiversity, rained and irrigated agriculture, and hydropower, as well as in the generation of commodities exported to sell worldwide. The water sources of this region are currently facing danger from a number of driving forces. Global warming is having a bad impact on the amount of snow and ice, which has serious implications for downstream water availability in both short and long term as up to 50% of the average annual flows in the rivers are contributed by snow and glacial melting. The warming in the greater Himalayas has been much greater than the global average: for example, 0.6 degrees Celsius per decade in Nepal compared with a global average of 0.74 degrees Celsius over the last 100 years. Changes in precipitation are equivocal with both increasing and decreasing direction in different parts of the region Such as high intense rainfalls leading to flash floods, landslides and garbage flows. There is a firm gap in the knowledge of the short and long-term connection of the impact of climate change on water and threats in the Himalayas, and their downstream river basins. Most studies have removed the Himalayan region because of its entangled topography and the shortage of sufficient rain gauge data. There is an essential need to close the knowledge void by building survey schemes for snow, ice, and water; downscaling climate models; implementing hydrological models to suppose water availability; and establishing basin wide plot which also take water requirement and socioeconomic development into detail. Climate change induced threats such as floods, landslides, and droughts will establish important stresses on the income of mountain people and downstream populations. Society will need to improve its adoption policies, and level structural difference that make adoption by poor people more challenging. It is necessary to set up local awareness, introduction, and method within familiar and eco-friendly systems as well as increasing the working of establishments' suitable for adoption. Sound science together with reliable, significant, correct awareness is important to help the improvement and utilization of sound program(Mats Eriksson et al., 2009).

The Himalayan mountain setup is the origin of one of the world's biggest supplies of fresh water. Main rivers include the Indus, Ganges, Brahmaputra, Irrawaddy, Salween, Mekong, and Yangtze. In some years one or more of these rivers and their tributaries cause destructive floods, yet their waters are also the root of one of the big need of population on earth. The massive hydroelectric potential is partly equal by the risky element of slope weakness, high sediment release, excess in flow, and accountability of design to seismic(Jayanta Bandyopadhyay And Dipak Gyawali,1994).

There are many methods which can be very well implemented in most *kuls* (diversion channels) to carry water from glacier to village. The *kuls* often span long distances, running down precipitous mountain slopes and across crags and crevices. Some *kuls* are 10 km long, and have existed for centuries. The *kuls* are naturally forming channels therefore it is possible to collect rainwater in hilly regions and divert and transport the water to the kuls which ends up in a reservoir situated at the low lying area of such a region. The kuls being natural are readily available as channels for transporting and therefore this method is cost effective. Such a method has been adopted in Sipti region of Himachal Pradesh which is a cold desert but however is known for agricultural works . Although this method is traditional but if used with modern ideology and methods the effect can be more promising.

Also with the arrival of remote sensing equipments and their inborn characteristics, it has been possible to develop a methodto compile agricultural field plan of a hilly region watershed by using geographical information systems (GIS). Many-seasonal (monsoon-Kharif and post-monsoon-Rabi) and multi-sensor remotely-sensed information have been used for developing a map of landuse pattern of the watershed. The converted classified images, and the applicable watershed resources, were input and preserved as specific layers in the GIS and then characterised, co-registered to a regular 30m grid. Information based rules were developed from the informed assumption of multi-disciplinary specialist and field correction, in addition to the knowledge local field use patterns. These rules were used to manage the data to disfavour various spectrally inseparable data's classes, determining the land use/cover categories of the Kharif season under the cloud and its shadow regions. By the help of such technique we can have a thorough study about the land use patterns of any hilly terrain to study about its basic topography and characteristics so that a proper and effective method for harvesting water can be used (Adinarayan &Ramakrishna , 1996).

Conclusion

If we store the rainwater collected from the rooftops of different building and surface area in a common storage tank rather than storing it in a separate one, which will ultimately result in reducing the cost . The low lying area can be utilized for the construction of big storage reservoir. In need, this water supplied to the agricultural fields through bamboo drips, kiaries or centrifugal pump. Syphon can also be used as an alternative method of water transfer.We are able to store large amount of water that is deposited in the low lying area in the large storage reservoir, thus ,we can supplement the capacity of primary canal used for irrigation in the times of scarcity and increase the crop productivity by a reasonable rate. Furthermore, it is possible in such area for the production of cash crops as water is available in ample amount. However, there are few other purposes of such a reservoir like water supply as a common outlet and preventing silting and erosion in low lying areas.

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