GEOTEXTILES IN RAINWATER HARVESTING

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Abstract

This paper deals with the According to basic road statistics in India 2018-2019, India has a total of 1.32 lakh kms of national highway roads and the estimated total of all roads throughout the country is 63 lakh kms. The annual rainfall in India is around 1236mm which is above world average rainfall of 990mm. It is being said by experts that the third world war would be for the water. Hence it is very important and necessary to save water. Since India is connected with longest roadways, the rainwater can be harvested and this will also enable to life of the roadways. In India, three ways of rainwater harvesting is followed, storing rainwater in collection tanks, recharging ground water aquifers, from roof top run off, recharging ground water aquifers with runoff from ground area. Flood water spreaders along road surfaces is a right away water harvest technique from road pavement.A well-graded and compacted ground will generate a conspicuous amount of runoff water.Asphalt-paved roads have a rainwater collection efficiency (RCE, or runoff coefficient) of 0.sixty 5 to 0.75 (ERA 2011).For an unpaved road, the RCE varies more, from 0.25 to 0.30 in semiarid areas to 0.eighty throughout heavy storms.This manner that if withinside the direction of the year rainfall is 500 mm, 350 m3 may be accumulated from a 20 m with the useful resource of the usage of 50 m stretch of paved road.In humid or sub-humid areas, due to the not unusualplace rain and higher soil moistures, the RCE from unpaved roads is higher.Runoff generated via the road ground can be diverted immediately to farmland, recharge areas, or storage ponds via the usage of drainage techniques.A now no longer unusualplace technique is to have a chain of floodwater spreaders alongside paved avenue surfaces.These will guide the runoff from the road ground to farmland immediately adjacent to the road and contribute to more soil moisture.These spreaders encompass low (30 cm) curved structures made from community fabric that can be used for collection.They are inexpensive to assemble but need to be rebuilt annually.There is legitimate scenario that water collected from paved avenue surfaces also can moreover have a immoderate percent of hydrocarbons and specific pollutants from traffic.This makes the usage of water from the road ground generally improper for human or animal consumption.The diploma of pollutants is a characteristic of site visitors depth and ordinary rainfall.Measurements had been made along a paved motorway section in Ethiopia, but the ranges of oil and grease had been now not detectable (Woldearegay 2016).Nevertheless, regions with heavy visitors need to be averted for direct avenue-water harvesting: the pollutants from hydrocarbons and oils may also restrict the reuse of avenue water.

1. Introduction

According to basic road statistics in India 2018-2019, India has a total of 1.32 lakh kms of national highway roads and the estimated total of all roads throughout the country is 63 lakh kms. The annual rainfall in India is around 1236mm which is above world average rainfall of 990mm. It is being said by experts that the third world war would be for the water. Hence it is very important and necessary to save water. Since India is connected with longest roadways, the rainwater can be harvested and this will also enable to life of the roadways. In India,

three ways of rainwater harvesting is followed, storing rainwater in collection tanks, recharging ground water aquifers, from roof top run off, recharging ground water aquifers with runoff from ground area. Flood water spreaders along road surfaces is a direct water harvest method from road pavement. A well-graded and compacted surface will generate a conspicuous amount of runoff water. Asphalt-paved roads have a rainwater collection efficiency (RCE, or runoff coefficient) of 0.65 to 0.75 (ERA 2011). For an unpaved road, the RCE varies more, from 0.25 to 0.30 in semiarid areas to 0.80 during heavy storms. This means that if during the year rainfall is 500 mm, 350 m^3 may be collected from a 20 m by 50 m stretch of paved road. In humid or sub-humid areas, due to the frequent rain and higher soil moistures, the RCE from unpaved roads is higher. Runoff generated by the road surface can be diverted directly to farmland, recharge areas, or storage ponds through the use of drainage techniques.

A common technique is to have a series of floodwater spreaders alongside paved road surfaces. These will guide the runoff from the road surface to farmland immediately adjacent to the road and contribute to greater soil moisture. These spreaders consist of low (30 cm) curved structures made of local material that can be used for collection. They are inexpensive to build but need to be rebuilt annually.

There is legitimate concern that water collected from paved road surfaces may have a high proportion of hydrocarbons and other pollutants from traffic. This makes the use of water from the road surface generally unsuitable for human or animal consumption. The degree of pollution is a function of traffic intensity and regular rainfall. Measurements were made along a paved highway section in Ethiopia, but the levels of oil and grease were not detectable (Woldearegay 2016). Nevertheless, areas with heavy traffic should be avoided for direct road-water harvesting: the pollution from hydrocarbons and oils may prohibit the reuse of road water.

2.1 Rain water harvesting

Rain water harvesting Roads have a major impact on the landscapes immediately surrounding them—determining the movement of water, sediment, dust and others .Roads have an critical effect on runoff due to the fact they frequently act as both an embankment or a conveyance system, bringing fundamental modifications to the herbal hydrology. These changes often have negative impacts: roads cause local floods and waterlogging along the Way, while the extra focused discharge from drains and culverts reasons erosion and sedimentation . This undermines the resilience of roadside communities, who lose crops or property or suffer health effects from road dust . However, this negative aspect can be reversed if roads are systematically used as instruments for rainwater harvesting . Thus, road harvesting can generate substantial positive impacts: more secure water supply, better soil moisture, reduced erosion and respite from harmful damage . In addition, rainwater harvesting leads to better returns to land and labour, and a higher ability of people, households and communities to deal with and prosper regardless of shocks and stresses . With the investment in roads in many countries exceeding that of any other programme, this is a large opportunity to improve the productive environment and increase the resilience of the population in the vicinity of the road.

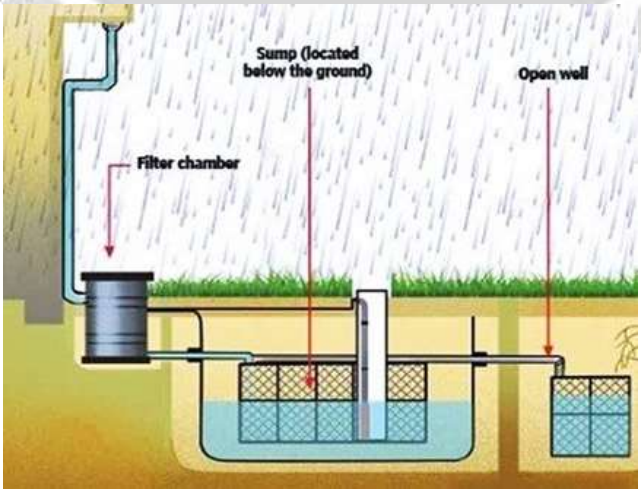

Fig.1. Rain water harvesting

2.2 Spreading Water from Road Surface and Culverts into Farmland

During rain events, road surfaces generate a large amount of runoff. In addition, a vast amount of water coming from the upper catchment passes through culverts and side drains. This water can be easily utilized by diverting it to nearby farmlands for supplemental irrigation.

Fig.2.: Spreading Water from Road Surface and Culverts into Farmland

2.3 Harvesting Water from Culverts, Side Drains and Depressions

Road drainage structures can be used not only for cross drainage but also to feed as the water source for borrow pits and storage ponds or for enhanced recharge areas such as infiltration ponds, swales and infiltrations pits.

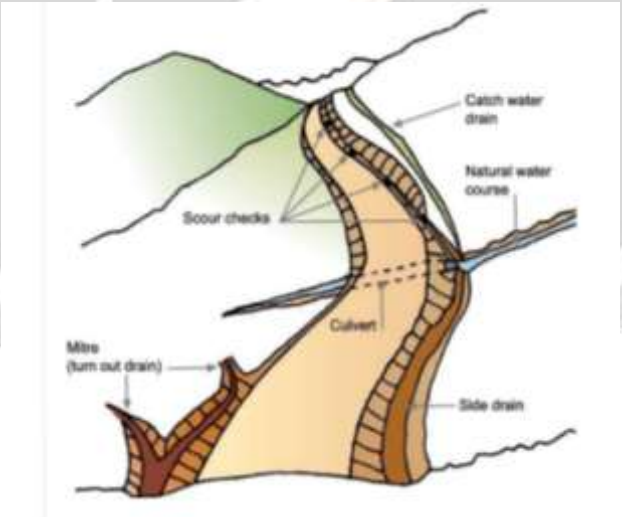

Fig.3. Harvesting Water from Culverts, Side Drains and Depressions

2.3. Gully Plugging for Recharge

When road drainage is not managed properly it can lead to the formation of gullies. Gully plugs are used to rehabilitate gullies and retain the sediments that would be otherwise washed away. Gully plugs are structural barriers that obstruct the concentrated runoff inside gullies and ravines.They are often temporary structures and are built to favour the establishment of a permanent soil cover and to effectively conserve soil and water.

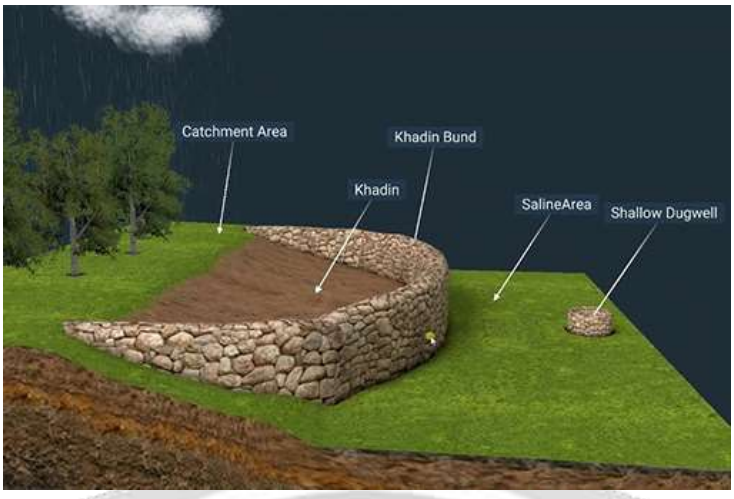

Fig.4. Gully Plugging for Recharge

2.4. Spring Capture

In mountainous areas, the excavation for road building purposes can open springs in mountain aquifers. These newly opened springs can damage cut slopes and erode. Reservoirs that are adequately dimensioned and have spillways facilities is a safe way to make available a source of water that otherwise would be lost. When the spring water is not of good quality, it can be diverted to infiltration structures such as ponds or swales.

2.5 Permeable roads

Topmix Permeable is a fast-draining concrete pavement, because it is capable of letting through around 36,000 mm of water/hour.it is made up of using a tiny pieces of crushed granite packed together known as 'no-fines concrete' it has 20-30% of void content which allows the surface water to drain out. Top mix concrete is effective in managing run-off from paved surfaces, prevent
contamination in run-off.It can be use in several application such as Road shoulders, Swimming pool decks, Alleyways, Driveways, Greenhouse floors. It cannot be used in heavy goods vehicles passed area bus routes. It is due to its strength. It can be used as three methods full infiltration partial infiltration full attenuation

Fig.5. Permeable roads

3.Conclusion

Thus the rain water harvesting from different areas is analysed.Rainwater harvesting is an powerful choice now no longer simplest to recharge the groundwater aquifer however additionally to offer ok garage of water for

destiny use.This paper attempted to consciousness at the sustainability and effectiveness of a rainwater harvesting device in phrases of quality.Energy conservation and associated decreased emissions are important elements of this system.Moreover, accelerated focus on water disaster has led rainwater harvesting to be proposed as a network facility.

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