International Journal of Recent Research and Review, Vol. IX, Issue 1, March 2016
ISSN 2277 – 8322

Water Harvesting Check dams in Rainfed Regions: A review article

Dr. Anil Kumar Gupta
Lecturer, Department of Agronomy
S.C.R.S. Govt. College, Sawaimadhopur, Rajasthan

Abstract-India's rain-fed regions are distinguished by irregular monsoon rainfall patterns, eroded and degraded soils with water and nutrient deficits, dwindling groundwater levels, and a poor resource base for farmers. Low and variable yields in rainfed locations with a significant yield gap are the main restriction. A severe threat to rainfed agriculture is also posed by climate changes, including extreme weather changes brought on by global climate change.Explanation about the all water harvesting dams in rainfed regions.

Keywords: Rainfed regions, farmers, dams

Introduction

Rainfall is the primary supply of water for agriculture in rainfed areas, although its utilisation efficiency for crop production is low and ranges from 30-45%. In a country like India that depends heavily on the monsoons, rainfall occurs over the course of 100 days and 100 hours, necessitating extensive runoff storage. The use of check dams as an alternative to natural streams in areas with access to them can help communities deal with climatic irregularities including mid-seasonal and terminal droughts and floods. Check dams are built to hold silt and rainwater on the upstream side. A suitable style of check dam can be chosen based on the size of the nala, its slope, the watershed area, and the severity of the issue. Temporary check dams made of locally available materials like brushwood, logs and planks are used in small streams and rivers. In the middle reaches of medium gullies, gabion check dams are preferred. In medium to large gullies transporting heavier runoff, particularly in lower reaches, permanent gullycontrol systems/water harvesting structures are used. Several researchers (Wani et al., 2007, Sharda et al., 2005, Joshi et al., 2005, Kumar et al., 2004; Dhyani et al., 2016) have reported on the impact of check dams on groundwater recharge, water availability, production, productivity, and livelihood improvement.

Temporary check dams

Gully stabilisation through vegetation is a challenging task. Temporary mechanical precautions are taken to stop the plantation from being washed away by heavy runoff that is necessary to develop the vegetation. Once grown, vegetation will be able to maintain the gully. Some of these mechanical devices or constructions include the following: a) Check Dams: (i) Temporary check dams, (ii) Brush dams and (iii) Semi-permanent check dams. Loose Rock Dam (b) c) The Log Wood Dam. In the 42 catchments or watershed's upper reaches, vegetative live check dams are built. The species of grass or baboo can be employed as a live or vegetative check.

Fig1. Bamboo plantation as live check dams in degraded Mahi Ravines of Gujarat

Earthen check dams:

Small earthen embankments placed over gullies or streams to slow down runoff, stabilise gullies and store runoff water are known as earthen check dams. The breadth, length, and bed slope of the gully, the estimated flow, and the intended plantations in the gully all affect the size of the gully plug/checkdam. The gully plug's/earthen checkdam's height is typically maintained at 0.9 to 1.5 metres, its top width at 1 metres for small gullies and 2 metres for medium gullies, its side slopes at 1:1, and its length at equal to the channel's width. The channel bed's gradient affects the spacing.Usually, gully plugs can be built every 30 metres for slopes of 3%. These might be built at the upper portions of the watershed or catchment. These check dams' advantages include stabilising gully beds and banks, depositing sediments and nutrients, storing water to increase soil moisture, and improving plant development. 80% less runoff and soil loss

Bori bund checkdam:

For the purpose of obstructing active and erosive first-order streams, bori bunds are a type of embankment built across gullies using polythene bags (empty cement or fertiliser bags). It is a practical way to reduce the pace of a stream's flow in any location. These structures can typically be built where earthen gully plugs are unable to control runoff flow. The gully's width, length, and bed slope, as well as predicted runoff and proposed plants in the gully, all influence the size of the bori bund. The bori bund is typically maintained with a height of 0.9 to 1.5 metres, a top width of 0.6 metres, side slopes of 1:1, and a length of the gully plug that is equivalent to the channel width. The channel bed's gradient affects the spacing. Typically, one bori bund can be built for every 30 m of slope. Minimum spacing and minimum height can be maintained to provide a consistent distribution of soil moisture throughout the plantations. Sand-filled entire gullies and medium gullies. The locations, where earthen gully plugs is not able to control the runoff flow (Rao et al., 2012). The stabilisation of gully beds and banks, the deposit of sediments and nutrients, the storage of water to increase soil moisture, and improved plant development are all advantages. 80 % less runoff and soil loss

Fig2.Earthen and bori bunds/sand bag checkdams

Permanent gully control/water harvesting structures

Gully is Under Permanent Control Buildings are needed in situations where temporary or vegetative constructions are insufficient. Permanent structures like masonry check dams, flumes or earth dams enhanced with vegetation are built to divert runoff over a significant portion of the gully. The three primary types of permanent constructions are chute spillways, drop inlet spillways, and drop spillways.

Drop spillway:

A weir structure is the drop spill way. Weir opening allows flow to enter, drop to roughly level apron or stilling basin, and then enter downstream canal. A drop spillway can be built from of gabions, reinforced concrete, plain concrete, rock masonry, and plain or reinforced concrete blocks. The spillway is a useful design for managing relatively low heads, which are typically up to 3.0 metres.

Drop inlet spillways:

An enclosed tube called a drop inlet spillway transfers water under pressure from above an embankment to a lower level. A drop inlet spillway's typical purpose is to carry some runoff through or underneath an embankment without causing erosion. It is a very effective construction for managing gully heads that are typically above 3.0 metres high. Spillways for chutes: A chute spillway is an open channel with a significant slope and a supercritical flow rate. It has an inlet, a portion that curves vertically, a canal that slopes steeply, and an outlet. In order to lower the necessary capacity, reinforced concrete is frequently utilised to build chute spillways and is especially popular for heavy overfall gullies and retention dams.

Brick/stone masonry check dams

In regions where natural streams are available in the lower portions of the watershed, brick/stone masonry check dams can be used as an alternative for runoff gathering and recycling to deal with climatic aberrations including midseasonal and terminal droughts and floods.Brick, stone, and masonry constructions are expensive to build, and because there is no plan or programme in place, it is difficult for these structures to be adopted. Check dams made of rubber and plastic are inexpensive and simple to build. These will make building more manageable. Watershed management schemes can readily adopt them for long-term rainwater collection and water management practises without having to pay a lot for upkeep.

Fig3.Brick, Stone masonry checkdams

Conclusion

In this study we investigated that India's rain-fed regions are distinguished by irregular monsoon rainfall patterns, eroded anddegraded soils with water and nutrient deficits, dwindling groundwater levels, and a poor resource base for farmers. Low and variable yields in rainfed locations with a significant yield gap are the main restriction. A severe threat to rainfed agriculture is also posed by climate variety, wheather changes brought on by global climate change.Explanation about the all water harvesting dams in rainfed regions.

References

1. Joshi, P.K., Jha, A.K., Wani, S.P., Joshi, L. and Shiyani, R.L. 2005. Meta-analysis to assess impact of watershed program and people’s participation. Research Report 8, Comprehensive assessment of watershed management in agriculture. International Crops Research Institute for the Semi-Arid Tropics and Asian Development Bank.21 pp
2. Kumar, V., Kurothe, R.S., Singh, H.B., Tiwari, S.P., Pande, V.C., Bagdi G.L. and Sena, D.R. 2004. Participatory watershed management for sustainable development in antisar watershed, Kheda, Gujarat under Integrated Wastelands Development Programme, Ministry of Rural Development, Govt. of India, New Delhi. Central Soil & Water Conservation Research & Training Institute, Research Centre, Vasad, 388306.
3. Sharda, V.N., Samra, J.S. and Dogra, P. 2005. Participatory watershed management programs for sustainable development: experiences from IWDP. Indian Journal of Soil Conservation
4. Wani, S.P., Sreedevi, T.K., Rockstrom, J. and Ramakrishna, Y.S. 2009 Rain-fed agriculture - past trend and future prospects. In Rainfed agriculture: Unlocking the Potential. Comprehensive Assessment of Water Management in Agriculture Series (S.P Wani., J. Rockström and T. Oweis, Eds),. CAB International, Wallingford, UK. pp. 1-35.