Importance & Principle behind the Construction of Check Dam in Microwater-Shed Areas – A Critical Review

Anupam Kumar and Kumar Nikhil

***Abstract*— Conservation of water and checking soil erosion is central to the attainment of economic as well as financial sustainability of dry land and agriculture. Integrated Watershed Development Programme, which is proposed by the Government of India, is a major policy instrument for achieving this goal. The importance of watershed development as a strategy of agricultural and overall rural development in rain-fed areas has been recognized in India for the past several decades, and in the recent years has grown exponentially. Recent check-dams constructed over the micro watersheds like the ones in Bidar, Ahmedabad, Latur, Guna, Tumkur, spanning throughout the length and breadth of the nation, and its successful implementation shows it's universal applicability.**

However, it is to be kept in mind that the implementation of check dam construction in a micro watershed based ecology dates back to the establishment of four dry farming research stations at Rohtak, Sholapur, Hyderabad and Bellary in early 30's, which led to the advancement in the recent technological augmentation.

***Index Terms*— Micro-watershed Area, Check Dams**

I. INTRODUCTION

First of all, we should have a better idea about the persistent use of the term check dam. So, a check dam is a solid structure, preferably made of concrete or in some cases (where current is less), masonry, which is constructed across a river to create a reservoir on its upstream. The section of the gravity dam is approximately triangular in shape, with its apex at its top and maximum width at bottom. The section is so proportioned that it resists the various forces acting on it by its own weight. Most of the gravity dams are solid, so that no bending stress (so that serviceability of the concrete along with its' reinforcement is increased) is introduced at any point and hence, they are sometimes known as solid gravity dams to distinguish them from hollow gravity dams in those hollow spaces are kept to reduce the weight.

Early gravity dams were built of masonry, but nowadays with improved methods of construction, quality control and curing, concrete is most commonly used for the construction of modern gravity dams. About 60 % of the total arable land in India is rain-fed and characterized by low productivity, low income, low employment with high incidence of poverty and a bulk of fragile and marginal land (Joshi et al. 2008). Rainfall pattern in these areas are highly variable both in terms of total amount and its distribution, which lead to moisture stress during critical stages of crop production and makes agriculture production vulnerable to pre and post production risk.

Anupam Kumar, Interim Trainee in EMG, CSIR-CIMFR, Dhanbad, Jharkhand, India & Student of School Of Civil Engineering at KIIT UNIVERSITY, BHUBANESWAR.

Kumar Nikhil, Principal Scientist, EMG, CSIR CIMFR, Dhanbad, Jharkhand, India.

II. WATERSHED DEVELOPMENT IN INDIA

In India, watershed development programme is taken up under various programmes launched by the Government of India. The Drought Prone Area Programme (DPAP) and Desert Development Programme (DDP), adopted watershed approach in 1987. The Integrated Watershed Development Board, National Watershed Programme in Rainfed Areas (NWPRA) under Ministry of Agriculture and Integrated Wastelands Development Programme in 1996 under Ministry of Rural Development and Employment. At present, on-going 4 Central schemes IWDP,DPAP,DDP and NWDPRA have been merged into a new scheme called ***Bhoomi Vikas Yojana*** under a common guideline (Guideline for Watershed Development, 1995 and revised in 2001) which envisages bottom-up approach. The main aim is to manage the land and water resources for sustained production

III. IMPORTANCE OF CHECK DAM IN MICRO-WATERSHED AREAS

Check dams can beneficial aspects which on needs to closely look, such as :-

- Irrigation helps in all-around increase fertility of the immediate area.
- Animal Husbandry can also be facilitated
- The silt collection can be used in farms all throughout the year as a possible substitute for chemical fertilizers and can be a better organic alternative to the same.
- The check dam system help to measure the gully erosion due to strong current of river channels.
- Check dam also prevents silting and thus, helps in reducing the augmented height of the lower levels.

IV. PRINCIPLES IN DESIGNING CHECK DAMS

Concrete dams are used more often than fill dams to produce hydroelectric power because gates (also called sluices) or other kinds of outlet structures can be built into the concrete to allow for water to be released from the reservoir in a controlled manner. When water for power, drinking water, or irrigation is needed downstream, the gates can be opened to release the amount needed over a specified time. Water can be kept flowing in the river downstream so fish and other wildlife can survive. Both concrete and fill dams are required to have

emergency spillways so that flood waters can be safely released downstream before the water flows over the top or crest of the dam and potentially erodes it.

Design issues which are highly important while designing of the check dam are :-

- Incorporation of spillways so that the over-burdened water can be released
- Earthquake Resistant Design
- Mix Design for the mass concrete
- Evaluation of foundation conditions and their foundations treatment
- Concrete production and placement system

Traditional concrete dams generally don't employ these designing issues which can late malign the compressive strength of the composite structure.

V. CONCLUSION

A consequence of the check dam construction is the creation of a new type of agriculture, which emerges as more and more food supplies are produced from the dam farmland.

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