

Watershed Management: Its Role In Environmental Planning And Management

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Abstract: Watershed is not only the hydrological unit but it is also related with the socio-political-ecological factors which plays crucial role in determining food, social, and economical security and provides life support services to rural people of any country. The Watershed Development Programme (WDP) initially envisaged as a measure for poverty alleviation and improved livelihoods has gained even greater importance in light of the worldwide recognition of its effectiveness in combating climatic change. The criteria for selecting watershed size also depends on the objectives of the development and terrain slope. A large watershed can be managed in plain valley areas or where forest or pasture development is the main objective. In hilly areas or where intensive agriculture development is planned, the size of watershed relatively preferred is small.

Keywords: Watershed, Watershed Management Approaches, Watershed Development Programmes, History of Watershed Development Programme Objectives of Watershed Development Programmes, Components of Watershed Development Programme.

I. INTRODUCTION :-

The agriculture (rain-fed) contributes 58 per cent to world's food from 80 percent agriculture lands (Raju et al. 2008). As a result of global population increase, water for food production is becoming an increasingly scarce resource, and the situation is becoming worse because of climate change (Molden, 2007). The rain-fed areas are the centre of poverty, malnutrition, food insecurity, water security, severe land degradation, and poor social and institutional infrastructure (Rockstorm et al. 2007; Wani et al. 2007). Watershed development program is, therefore, considered as an effective tool for dealing many of these problems and recognized as potential engine for agriculture growth and development in fragile and marginal rain-fed areas (Joshi et al. 2005; Ahluwalia and Wani et al. 2006). Management of natural resources at watershed scale produces multiple benefits in terms of increasing food production, improving livelihoods, protecting environment, addressing gender and equity issues along with biodiversity concerns (Sharma, 2002; Wani et al. 2003a,b; Joshi et al. 2005; and Rockstorm et al. 2007).

Effective use of land and water is fundamental to growth and sustainable development. The concept of watershed management has evolved to ensure effective use of both natural and social capitals. Thus, the watershed development programmes include land, water and human resources as essential components. The watershed programme is primarily a land based programme, which is increasingly being focused on water, with its main objective being to enhance agricultural productivity through increased moisture conservation and protective irrigation for socio-economic development of rural people (Joshi, et al. 2004, 2006). It has been essential in a country like India where majority of the population depends on agriculture and about 60 percent of total arable land (142 million ha) in the country is rain-fed. A large portion of the rain-fed areas in India is characterized by low productivity, high risk and uncertainty, low level of technological change and vulnerability to degradation of natural resources (Joshi, et al, 2004). Over the years, the sustainable use of land and water has received wider attention among policy makers, administrators, scientists and researchers. It is realized that sustainable development is synonymous to maintenance of productivity of natural resources and maintenance of ecological equilibrium. Kushwaha and et al. (2010, p.1479) noted that the concept of sustainable development has received much needed impetus after the Rio Conference in June 1992, mainly through the 27 principles on sustainable development and the action plan called Agenda 21 (UNCED, United Nations Conference on Environment and Development, Rio de Janeiro, 3–14 June 1992). The approach was followed up in a big way during the World Summit on Sustainable Development in 2002 at Johannesburg. The Summit re-emphasized the need for strengthening the three pillars of sustainable development, economy, society and the environment. The watershed forms an appropriate unit which links all these three components and has a direct bearing on human lives. The watershed approach is a system-based approach that facilitates the holistic development of agriculture, forestry and allied activities in the proposed watershed. It also forms an appropriate unit for analyzing the development-linked resource problems, designing the appropriate solutions of identified problems and eventually testing the efficacy of the measures taken up.

Watershed Development Programmes (WDPs) have been accorded high priority in India's development plans (Singh, 1991). These programmes have been initiated in India to improve and sustain productivity and the production potential of the dry and semi arid regions of the country through the adoption of appropriate production and conservation techniques. The WDP approach seeks to improve and develop all types of lands-government, forest, community and private lands- that fall within a particular watershed. It is a holistic approach to improve and develop the economic and natural resource base of dry and semiarid regions (Ninan and Lakshmikanthamma, 2001). The programmes have stressed upon improvement of wasteland, runoff reduction, water conservation and protective irrigation mechanism in all areas including desert prone areas and drought prone areas. Development programs, envisaged under its purview include almost every

activity which concerns land, water and biomass production. Experiences have shown that watershed as a base is very effective in use and management of land and water resources. With increasing awareness about the problems related to environment, use of watershed terminology is becoming popular and moreover in view of their potential for growth, improvement in income levels and augmenting the natural resource base of the disadvantaged regions of the country (Singh, 1991).

II. OBJECTIVES OF WATERSHED DEVELOPMENT PROGRAMMES (WDPS)

Watershed Development Programmes (WDPs) are among the very important programmes placed under the purview of Department of Land Resources (DOLR), Ministry of Rural Development (MORD). Three important schemes namely, IWDP, DPAP, and DDP are widely implemented by the State Governments with due priority. The DOLR has been committed in updating guidelines for these schemes with periodic inputs from Research Organizations, Voluntary Organizations, Technical Committees, Workshops and Seminars amongst others. Especially, the inputs from the C.H. Hanumantha Rao Committee and Parthasarathy Committee are quite popular.

Watershed development aims to balance the conservation, regeneration and use by humans of land and water resources within a watershed. Common benefits from successful watershed development projects include improved agricultural yields and increased access to drinking water. The overall attributes of the watershed development approach, by and large, are : promoting economic development of the rural area, employment generation, and restoring ecological balance (DOLR, 2006) other objectives are :

2.1 Environmental- For protecting vegetative cover for the whole year, to create ecological balance in the watershed area, protecting fertile top soil, utilizing the land based on its capabilities, in situ conservation of rain water, increasing ground water recharge.

2.2 Economic- It draws attention for increase in cropping intensity through inter and sequence cropping, maximizing farm income through agricultural related activities such as dairy, poultry, sheep and goat farming, improved and sustained livelihood status of the watershed community with special emphasis on the poor and women, etc.

2.3 Institutional-It includes formation of watershed committees and self-help- groups, establishing sustainable community organization, etc.

2.4 Social-It includes alleviation of poverty, awareness generation, improving skills of the local community, capacity building activities, women's participation in decision-making process, empowerment of the community, etc.

2.5 Equity-To develop equitable distribution of the benefits of land and water resources development and the consequent biomass production, involvement of village communities in participatory planning, implementation, social and environmental arrangement, maintenance of assets and to operate in a more socially inclusive manner.

III. COMPONENTS OF WATERSHED DEVELOPMENT PROGRAMME

The components of watershed development programme would include; (i) soil and land management (ii) water management (iii) crop management (iv) a forestation (v) pasture or fodder development (vi) livestock management (vii) rural energy management (viii) other farm and non-farm activities (ix) and development of community skills and resources. All these components are interdependent and interactive.

IV. HISTORY OF WATERSHED DEVELOPMENT PROGRAM IN INDIA

About 60 per cent of total arable land (142 million ha) in India is rain-fed, 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. Watershed development projects in the country has been sponsored and implemented by Government of India from early 1970s onwards. Various watershed development programs like Drought Prone Area Program (DPAP), Desert Development Program (DDP), River Valley Project (RVP), National Watershed Development Project for Rain-fed Areas (NWDPA) and Integrated Wasteland Development Program (IWDP) were launched subsequently in various hydro-ecological regions, those were consistently being affected by water stress and draught like situations. Entire watershed development program was primarily focused on structural-driven compartmental approach of soil conservation and rainwater harvesting during 1980s and before. In spite of putting efforts for maintaining soil conservation practices (example, contour bunding, pits excavations etc.), farmers used to plough out these practices from their lands. The integrated watershed development program with participatory approach was emphasized during mid 1980s and in early 1990s. This approach had focused on raising crop productivity and livelihood improvement in watersheds along with soil and water conservation measures. The Government of India appointed a committee in 1994 under the chairmanship of Prof. CH Hanumantha Rao. The committee thoroughly reviewed existing strategies of watershed program and strongly felt a need for moving away from the conventional approach of the government department to the bureaucratic planning without involving local communities. The new guideline was recommended in year 1995, which emphasized on collective action and community participation, including participation of primary stakeholders through community-based organizations, non-governmental organizations and Panchayati Raj Institutions (PRI) (GoI, 1994, 2008; Hanumantha Rao et al. 2000; DOLR, 2003; and GoI, 2008; Joshi et al. 2008).

Watershed development guidelines were again revised in year 2001 (called Hariyali guidelines) to make further simplification and involvement of PRIs more meaningful in planning, implementation and evaluation and community empowerment and guidelines were issued in year 2003 (DOLR, 2003). Subsequently, Neeranchal Committee (in year 2005) evaluated the entire government-sponsored, NGO and donor implemented watershed development programs in India and suggested a shift in focus “away from a purely engineering and structural focus to a deeper concern with livelihood issues” .

V. WATERSHED MANAGEMENT APPROACHES

There are two approaches related to Watershed Management :

5.1 Integrated Approach

This approach is related to the integration of technologies within the natural boundaries of a drainage area for optimum development of land, water, and plant resources to meet the basic needs of people and animals in a sustainable manner. This approach aims to improve the standard of living of common people by increasing his earning capacity by offering all facilities required for optimum production (Singh, 2000). In order to achieve its objective, integrated watershed management suggests to adopt land and water conservation practices, water harvesting in ponds and recharging of groundwater for increasing water resources potential and stress on crop diversification, use of improved variety of seeds, integrated nutrient management and integrated pest management practices, etc.

5.2 Consortium Approach

Consortium approach is related to the collective action and community participation including of primary stakeholders, government and non-government organizations, and other institutions. Watershed management requires multidisciplinary skills and competencies. Easy access and timely advice to farmers are important drivers for the observed impressive impacts in the watershed. These lead to enhance awareness of the farmers and their ability to consult with the right people when problems arise. It requires multidisciplinary proficiency in field of engineering, agronomy, forestry, horticulture, animal husbandry, entomology, social science, economics and marketing. It is not always possible to get all the required support and skills-set in one organization. Thus, consortium approach brings together the expertise of different areas to expand the effectiveness of the various watershed initiatives and interventions.

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