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A REVIEW ON WATERSHED MANAGEMENT CONCEPTS AND PRINCIPLES IN GUJARAT

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Abstract: ***This work has been aimed to shown the current situation of Gujarat state watershed development, also shown history of Indian watershed scenario. Watershed is not simply the hydrological unit but also socio-political-ecological entity which plays crucial role in determining food, social, and economical security and provides life support services to rural people. The criteria for selecting watershed size also depend 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: GSWMA, IWMP, watershed, watershed management

I. INTRODUCTION

The term "Watershed" strictly refers to the divide separating one drainage basin from another. Watershed can be defined as a geo-hydrological unit draining to a common point by a system of drains. All lands on earth are part of one watershed or other. Watershed is thus the land and water area, which contributes runoff to a common point. A watershed, is also called a "drainage basin", is an area in which all water flowing into it goes to a common outlet, such as the same river or reservoir. The watershed approach is a project based, ridge to valley approach for in situ soil and water conservation, afforestation etc.

At present, in India and in USA, the term watershed defined as land area from which water drains to one given point. In this context watershed is considered to be synonymous with catchment and drainage basin. One can visualize any small stream. It may be dry most of the year or, it may flow continuously. Water from a few hectares may drains into that small stream. This area of few hectares will then be its watershed. The land areas drained by the small streams are thus the sub watershed of the watershed of the larger stream. A watershed may be nearly flat land it may include hills or mountains or undulating terrain. The people and animals are part of the watershed community. All depend on the watershed and them in turn; influence, the condition of the watershed-whether it is good or bad. What happens in the small watershed also affects the larger watershed.

Watershed Development Programmed (WDPs) has been accorded high priority in India's development plans (Singh, 1991). These programmers 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.

II. INDIAN SCENARIO

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. The journey through the evolution of watershed approach evolved in India (Wani et al. 2005 and2006). 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 (NWDPRA) 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.

Table 1: Watersheds in India - Overview

1962 – 63	River Valley Projects – arrest silt
1970 – 71	Rural works prog – drought relief funds
1973 – 74	DPAP-Work by govt's soil conservation dept-scattered over larger areas
1974 – 75	WDPSCA – shifting cultivation areas
1977 – 78	Desert Development Programme (DDP)
1980s	ICAR model watersheds
1982	Swaminathan task force –watershed managementas principle
1985 – 86	RAS – reclamation of alkali soils
1987	Central Sanctioning Committee – SWC emphasis
1988 – 89	IWDP – integrated watershed dvmt programme
1989 – 90	NAEP - National Afforestation and Eco-Development project
1990 – 91	NWDPRA National Watershed Development Programme for Rainfed Areas
1993	IGWDP – later WOTR
1994	Technical committee on DPAP and DDP-integrated and people centred watershed development approach
1999 - 2000	WDF - Watershed Development Fund
2006	Parthasarathy Committee report

Ministry of Agriculture

Ministry of Environmental and forests

Ministry of Rural Development

Source: Watersheds in India: An overview (cont. from Nov. 1 Class) NRM class 25 Nov, 2006

III. GSWMA

Gujarat State Watershed Management Agency (GSWMA) is the nodal Agency for implementation of Integrated Watershed Management Programme (IWMP) in the state and its mandate includes planning for and development of all the watersheds of the state either directly or indirectly.

GSWMA is a Non-Profit making organization managed by the Board of Governors which consists of Principal Secretary, Rural Development as the Chairperson along with senior officers from Government of Gujarat.

The officials who run GSWMA are: the CEO, a team of professional experts of different subjects like Finance, MIS, Capacity Building, Monitoring and Evaluation, Scientific Planning, etc., and other Administrative Staff.

GSWMA is located at state capital Gandhinagar in Dr. Jivraj Mehta Bhawan. To carry out the IWMP at the district level, District Watershed Development Units (DWDUs) have been formed.

Vision

"To enhance the quality of life of the rural populace through sustainable, equitable and participatory Natural Resource Management."

Mission

"We work towards creating sustainable rural livelihoods in Gujarat through scientific and integrated watershed development approach.

We manage local natural resources like land, water and vegetation with active participation of the people and their institutions in a way that enhances employment and income opportunities for all, and the asset-less in particular.

We focus both on preservation of our natural environment and socio-economic development of the people."

Values and Principles:

1. Eco-friendliness
2. Centrality of people
3. Democratic decision making
4. Importance to Community Based Institutions
5. Equity
6. Gender sensitivity
7. Science and Technology for common man
8. Sustainability

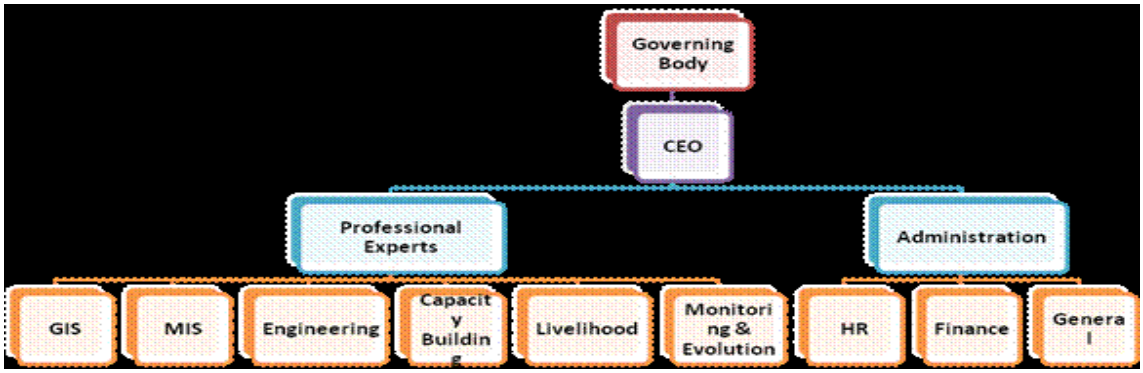

Figure 2: GSWMA structure is presented in the diagram

Source: http://gswma.gujarat.gov.in/organogram_GSWMA.html

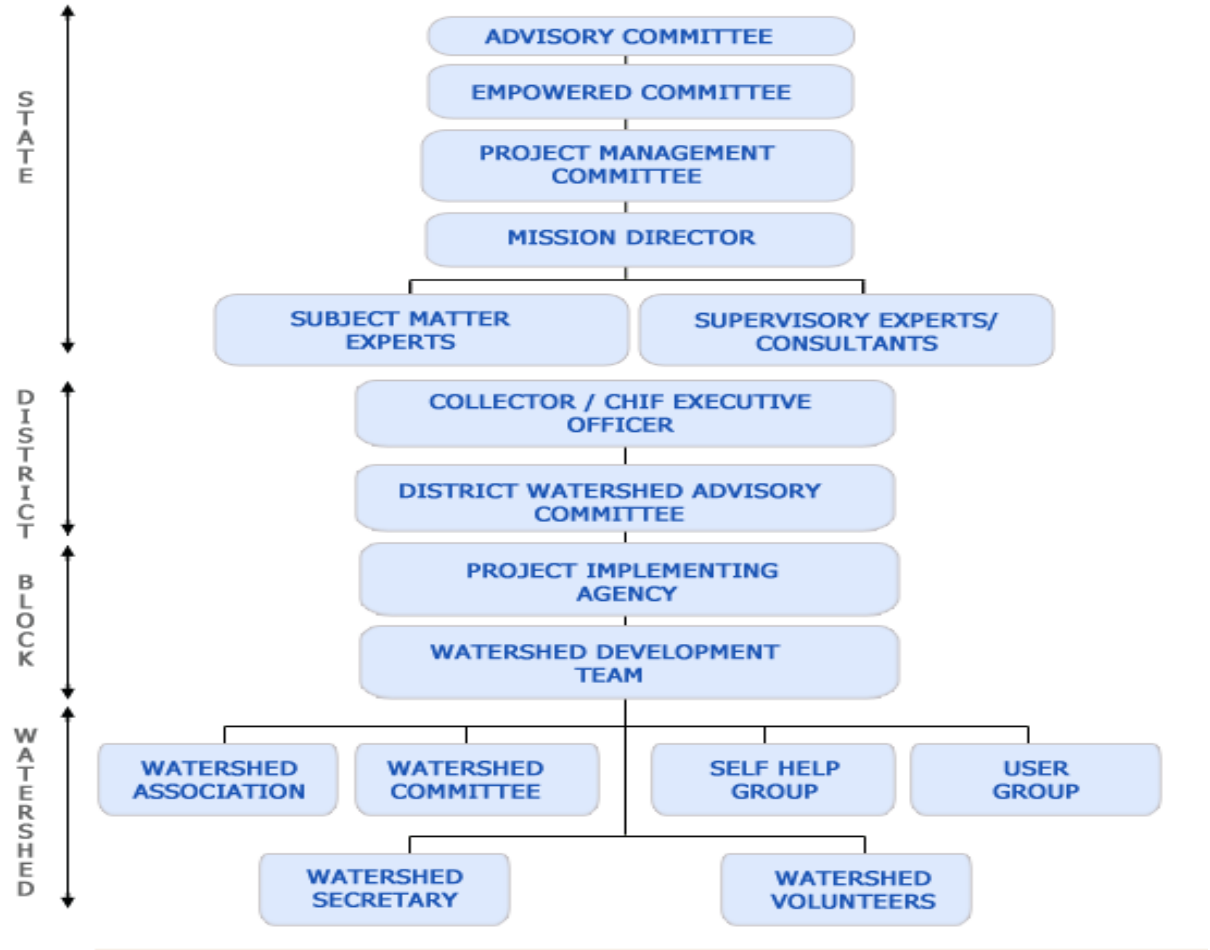

Figure 3: Organizational Breakdown structure (OBS) of watershed project in India

IV. IWMP

Integrated Watershed Management Programme (IWMP) is a modified programme of erstwhile Drought Prone Areas Programme (DPAP), Desert Development Programme (DDP) and Integrated Wastelands Development Programme (IWDP) of the Department of Land Resources. This consolidation is for optimum use of resources, sustainable outcomes and integrated planning. The scheme was launched during 2009-10. The programme is being implemented as per Common Guidelines for Watershed Development Projects 2008. The main objectives of the IWMP are to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as soil, vegetative cover and water. The outcomes are prevention of soil erosion, regeneration of natural vegetation, rain water harvesting and recharging of the ground water table. This enables multi-cropping and the introduction of diverse agro-based activities, which help to provide sustainable livelihoods to the people residing in the watershed area.

The salient features of IWMP are as below:

1) Set up of Dedicated Institutions with multi-disciplinary experts at State level - State Level Nodal Agency (SLNA), District level - Watershed Cell cum Data Centre (WCDC), Project level - Project Implementing Agency (PIA) and Village level - Watershed Committee (WC).
2) Cluster Approach in selection and preparation of projects: Average size of project - about 5,000 ha.

3) Enhanced Cost Norms from Rs. 6000 per ha. To Rs.12, 000/ha. In plains; Rs.15, 000/ ha in difficult/hilly areas
4) Uniform Funding pattern of 90:10 between Centre & States.
5) Release of central assistance in three installments (20%, 50% & 30%) instead of five installments.
6) Flexibility in the project period i.e. 4 to 7 years
7) Scientific planning of the projects by using IT, remote sensing techniques, GIS facilities for planning and monitoring & evaluation
8) Earmarking of project funds for DPR preparation (1%), Entry point activities (4%), Capacity building (5%), Monitoring (1%) and Evaluation (1%).
9) Introduction of new livelihood component with earmarking of project fund under Watershed Projects i.e. 9% of project fund for livelihoods for asset less people and 10% for production system & micro-enterprises
10) Delegation of power of sanction of projects to States.

V. WATERSHED MANAGEMENT

Watershed management is the rational utilization of the land and water resources for optimum production with minimum hazard to natural resources. It essentially relates to soil and water conservation in the watershed which means proper land use, protecting land against all forms of deterioration, building and maintaining soil fertility, proper management of local water for drainage, flood protection and sediment reduction and increasing productivity from all land uses.

Principles of Watershed Management

- Utilizing the land according to its capability.
- Adequate vegetative cover during the rainy season.
- Conserving as much rain water as possible where it falls.
- Draining out excess water and diverting it to storage ponds.
- Avoiding gully formation and checking at suitable intervals to control soil erosion and recharge ground water.
- Maximizing productivity per unit area, per unit time and per unit of water.
- Increase cropping intensity and land equivalent ratio through intercropping and sequence cropping.
- Safe utilization of marginal lands through alternative land use systems.
- Ensuring sustainability of the ecosystem benefiting the man-animal-plant-land-water complex in the watershed.
- Maximizing the combined income from the interrelated and dynamic crop-livestock-tree-labour complex over the years.
- Stabilizing total income and cutting down risks during aberrant weather situations.
- Improving infrastructural facilities with regard to storage, transportation and marketing

Benefits

- Arrests soil erosion
- Improves soil moisture
- Reclaims vast tracks of eroded land
- Reduces floods

- Recharges ground water
- Revives greenery

Criteria for selection of watershed projects

The following criteria may broadly be used in selection and prioritization of watershed development projects:

- Acuteness of drinking water scarcity.
- Extent of over exploitation of ground water resources.
- Preponderance of wastelands/degraded lands.
- Contiguity to another watershed that has already been developed/treated.
- Willingness of village community to make voluntary contributions, enforce equitable social regulations for sharing of common property resources, make equitable distribution of benefits, create arrangements for the operation and maintenance of the assets created.
- Proportion of scheduled castes/scheduled tribes.
- Area of the project should not be covered under assured irrigation.
- Productivity potential of the land.

Factors affecting watershed management

a) Watershed characters

- Size and shape
- Topography
- Soils
- Relief

b) Climatic characteristic

- Precipitation
- Amount and intensity of rainfall

c) Watershed operation

d) Land use pattern

- Vegetative cover
- Density

e) Social status of inability

f) Water resource and their capabilities.

Watershed Management Strategies

- PREVENTION STRATERGIES

- Those Aimed at Preserving Suitable Existing Land Use Practices

- RESTORATIVE STRATEGIES

- Those Targeting to Overcome Identified Problems or to restore conditions to a Desirable level both

- Environmentally and Politically

VI. CONCLUSION

Watershed is not simply the hydrological unit but also socio-political-ecological entity which plays crucial role in determining food, social, and economical security and provides life support services to rural people. The criteria for selecting watershed size also depend 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.

In this study we show the history of watershed program in India and GSWMA (Gujarat State Watershed Management Agency) it is a state level nodal agency who is working a watershed project in different district of Gujarat state. We also include watershed concepts and why necessary of this project for rural area. Watershed definition, need, control measure, objectives, practices, advantages, future scope and organizational structure of GSWMA these are all contents take in this study. We take different types of contents like a delineation of watershed, component, watershed management approach and methodologies, technical details, criteria for selection of watershed, fund flow and a watershed project success story in Gujarat state.

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