



Watershed Management Planning– approach of one solution to many problems

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Who We are & What for?



ICAR – IISWC (Formerly CSWCRTI)

HQ: Dehradun

Research centres

- Agra, UP
- Ballary, Karnataka
- Chandigarh
- Datia, MP
- Koraput, Odisha
- Kota, Rajasthan
- Ooty, Tamilnadu
- Vasad, Gujarat

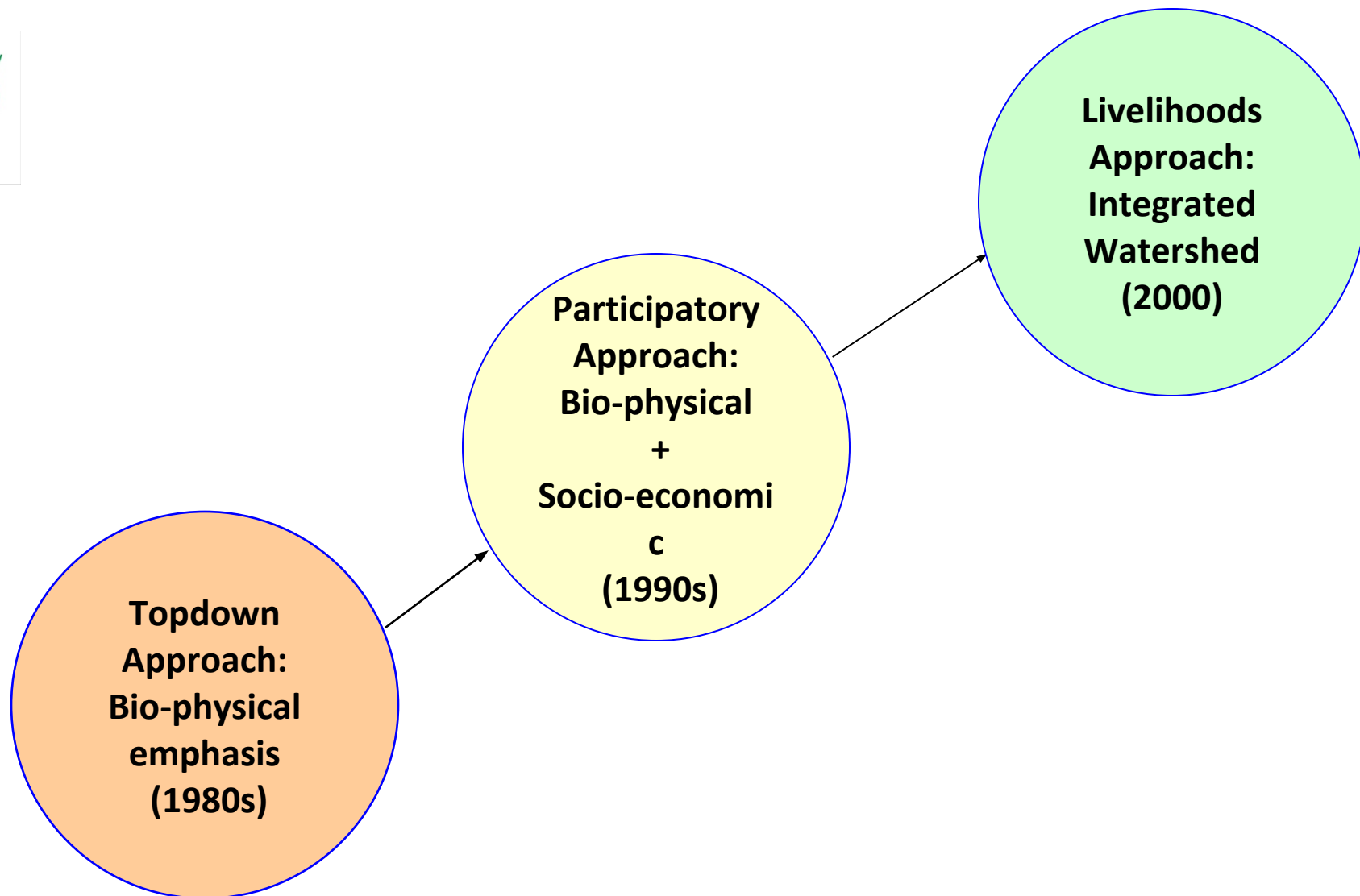
Mandate

- Research for management of land degradation in a primary production systems and rehabilitation of degraded lands in different agro-ecological regions of the country.
- **Co-ordinate research network for developing location-specific technologies in the area of soil and water conservation.**
- Centre for training in research methodologies and updated technology in soil and water conservation and watershed management.



Watershed management addresses -

- Soil - Soil degradation
- Water - Depleting ground water
- Vegetation (Crops/trees) - Low tree cover
- Input - Low use efficiency
- Livestock - Low productivity
- Landless - Livelihood
- Participation - Acceptability
- Sustainability - Declining resources
- Environmental security - Loss in biodiversity



Evolution of watershed concept in India



DEVELOPMENTS IN WATERSHED PROGRAMME PLANNING & MANAGEMENT



1. DDP, DPAP and IWDP followed the set of guidelines developed by Prof. Ch.Hanumatha Rao from 1994 to 2001
2. Revised 1994 Hanumantha Rao Committee Guidelines in 2001 and again in 2003 – HARIYALI Guidelines
NWDPRRA Revised Guidelines in 2000
(More participatory, sustainable and equitable)
3. Describes the problems of drylands and the emerging focus on Groundwater Recharge, Inclusive growth
4. Focus on Improving Rural Livelihoods through Participatory Watershed Development – IFS for enhancing income, productivity and Livelihood Security in a sustainable manner
5. 2006: NRAA was set up
S&WC, Watershed development and efficient water management – Key to sustainable development of Rainfed Area



Various studies pointed out **preoccupation with soil and water conservation** and relative neglect of issues relating to balanced use of Natural Resources and Livelihoods came to the fore.

6. Evaluation studies by various agencies reported **beneficial effects**; but **sporadic and intermittent**

Overall impact at the state and national levels inadequate

7. Common Guidelines for watershed development projects by NRAA applicable to all

8. Out of 329 m.ha., 146 m.ha degraded; 85 m.ha rainfed arable lands Degraded land under private/panchayat/revenue/forest – all these to be treated.

Thrust would be on *developing untreated areas*.

9. Fresh Frame Work

10. New Common Guidelines effective from 1st April, 2008.



FRESH FRAME WORK



- I. Delegating Powers to States**
- II. Dedicated Institutions**
- III. Financial Assistance to Dedicated Institutions**
- IV. Duration of the Programme 4 to 7 years**
Three phases: Preparatory
Works
Consolidation
- V. Livelihood Orientation – Integration of Livestock and Fisheries**
- VI. Cluster Approach – 1000 to 5000 hectares comprising cluster of micro watersheds, smaller size projects in hilly/difficult terrain areas**
- VII. Scientific Planning - Use of IT and RS in Planning, M and E**



VIII. Capacity Building – Training of all functionaries and stake holders on a war footing with definite action plan and requisite professionalism and competence

IX. Multi Tier Approach

Upper Forest and hilly regions – Implementation by Forest Deptt/JFMC

**Intermediate –
(Above Agril. Lands)**

**Treatment, Cropping Pattern,
Horticulture, Agro-forestry, etc.**

**Plains/Flat Areas –
(where farmers are
operating)**

**Concentration of labour intensive
works
Synergy with Employment guarantee**

Programmes



Phase	Name	Duration
I	Preparatory	1-2 years
II	Watershed works	2-3 years
III	Consolidated & withdrawal	1-2 years



I. Preparatory phase

- 1. Entry point activities like revival of common resources, drinking water; repair, restoration and upgradation of common assets like village tanks; productivity enhancement of existing farming systems.**
- 2. Development of village level institutions.**
- 3. Information Education and Communication activities.**
- 4. Baseline surveys and Hydro-geological survey of the watershed.**
- 5. Network of technical support agencies.**
- 6. Preparation of DPR.**
- 7. Working out detailed resource use agreements.**



II. Works phase

- 1. Ridge area treatment.**
- 2. Drainage line treatment with a combination of vegetative and engineering structures.**
- 3. Development of water harvesting structures .**
- 4. Nursery raising.**
- 5. Land development including *in-situ* soil and moisture conservation .**
- 6. Crop demonstrations.**
- 7. Pasture development, Veterinary services, and Fisheries development.**



III. Consolidation and withdrawal phase

- 1. Consolidation and completion of various works.**
- 2. Building the capacity of the community based organizations.**
- 3. Sustainable management of (developed) natural resources and up-scaling of successful experiences.**
- 4. Preparation of project completion report.**
- 5. Maintenance and protection of CPRs.**
- 6. Monitoring and evaluation of project.**
- 7. Promotion of agro-processing, marketing arrangements of produce and similar off -farm and informal sector enterprises.**



GUIDING PRINCIPLES



- 1. Equity and Gender Sensitivity**
- 2. Decentralization**
- 3. Facilitating Agencies**
- 4. Centrality of Community Participation**
- 5. Capacity Building and Technology Inputs**
- 6. Monitoring, Evaluation and Learning**
- 7. Organizational Restructuring**
- 8. Transparency and accountability**



Budgetary Component

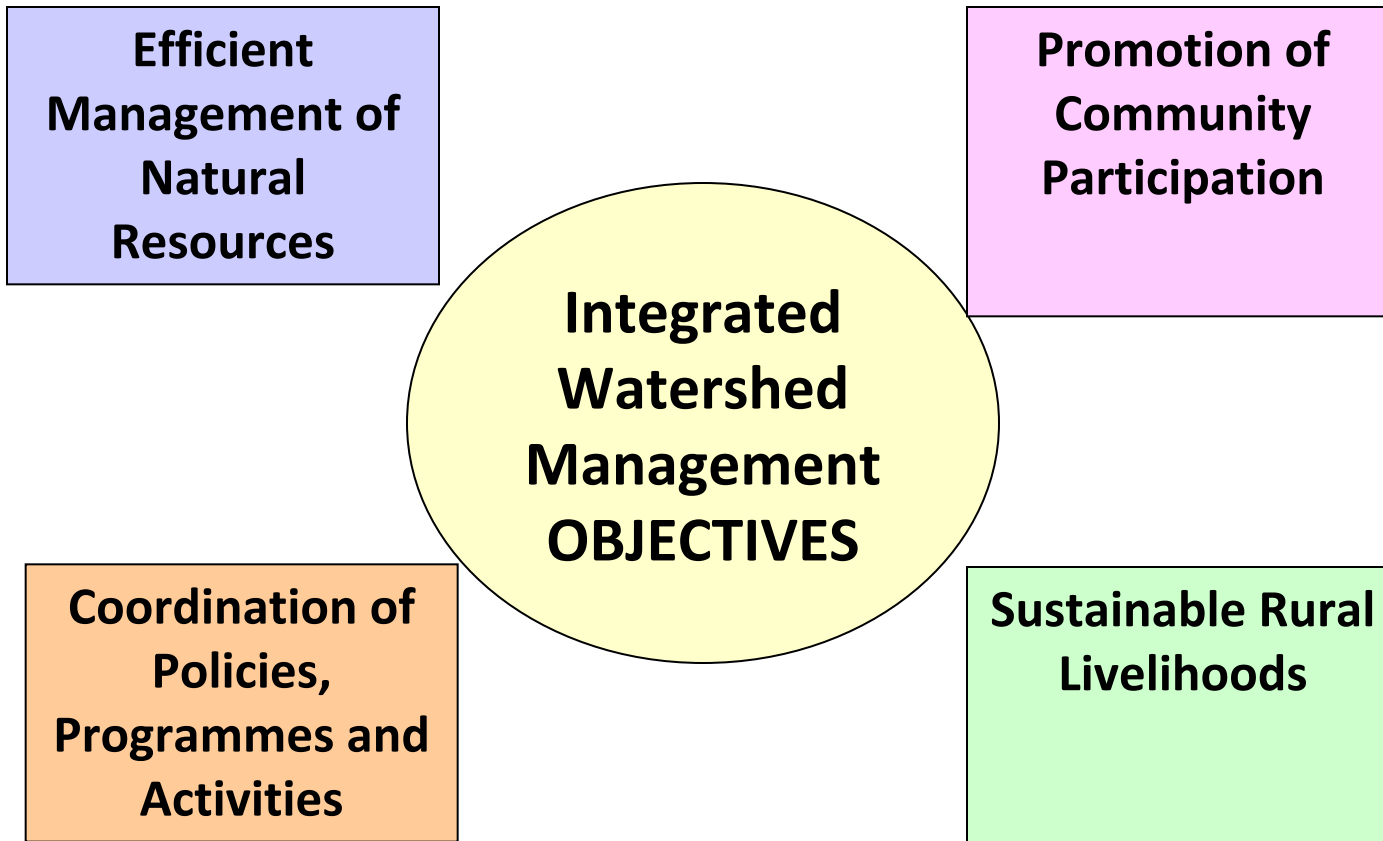
Budget component	% of the Budget
<ul style="list-style-type: none"> ▪ Administrative costs ▪ Monitoring ▪ Evaluation 	<p style="text-align: center;">10</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p>
<p>Preparatory phase, including:</p> <ul style="list-style-type: none"> ▪ Entry point activities, ▪ Institution and capacity building, ▪ Detailed Project Report (DPR) 	<p style="text-align: center;">4</p> <p style="text-align: center;">5</p> <p style="text-align: center;">1</p>
<p>Watershed Works Phase:</p> <ul style="list-style-type: none"> ▪ Watershed development works, ▪ Livelihood activities for the asset less persons, ▪ Production system and micro enterprises 	<p style="text-align: center;">50</p> <p style="text-align: center;">10</p> <p style="text-align: center;">13</p>
<p>Consolidation phase</p>	<p style="text-align: center;">5</p>
<p>Total</p>	<p style="text-align: center;">100</p>



In totality we can say,

- 1. Phase I is about watershed awareness, its' benefits along with PRA.**
- 2. Micro watershed (MWS) identification and its' resource study, and preparation of MWS plan including treatments (Phase II).**
- 3. Strengthening of Community organizations, implementation of WS activities on common and private lands, Non Farm Income Generating Programme Schemes (Phase III).**
- 4. Training in book keeping, maintaining registers, technology generation, networking and linkages with outside organizations, putting demands on government etc.**

Integrated Watershed Management Strategies



Goal: Productive and high quality agro-ecosystem

Broad criteria for 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 of another watershed that has already been developed or treated**
- **Willingness of village community to make voluntary contribution, enforce equitable social regulations for sharing of CPRs, make equitable distribution of benefits, make arrangements for operation and maintenance of assets created**
- **Proportion of SC/STs in the watershed**
- **Area of the project should not covered under assured irrigation**
- **Productivity potential of the land**



Watershed Planning (DPR)



- **Concept note (in principle) sanction leads to DPR**
- **Professional job**
- **Comprehensive**
- **Physical + technical + financial + institutional + social dimensions**
- **Relates baseline with expected outcomes through proposed interventions**



General Outline of DPR

- **Features of WS**
- **PIA Profile**
- **Experience of pilot project, if any**
- **Baseline data**
- **Proposed interventions**
- **Financial implications**
- **Technical designs**
- **Proposed CBOs and other institutions**
- **Social issues**
- **Withdrawal strategy**
- **Viability and sustainability**



Indications in Common Guidelines

- **Basis of selection of beneficiaries / work sites**
- **Costing of all works**
- **Interests, perceptions and priorities of women, dalits, adivasis and landless to be reflected**
- **WDT to facilitate DPR preparation**
- **Strong PRA a must**



Indications in Common Guidelines (contd...)

- **Net planning (plot / survey number wise)**
 - Land use; water harvesting structures, etc.
- **Institutional mechanisms for implementation of plans, participatory decision making, equity / sustainability of benefits, post project sustainability**
- **Definite role for Watershed Committee**
- **Specific details of work sites (ownership / survey number) including depiction in map**



Indications in Common Guidelines contd...

- **DPR must be in tune with district perspective plan**
- **Convergence with other schemes**
- **DPR to be summed up using logical framework analysis (LFA) that includes goals, purpose, outputs, activities, inputs, challenges and measurable indicators of progress**



Physiographic feature



- **Natural features of earth's surface**
- **Upland, hills, ridge,, plains, valleys.**
- **Delineation of watershed based on drainage network.**
- **SOI toposheet (1:50,000 scale) provides locations, drainage network, contour & surface water bodies.**
- **Slope, aspect and altitude are important terrain parameter.**
- **Use of GPS & GIS techniques or satellite or digital photogrammetry**



Soil Resources

- Remote sensing – Grouping of soils after ground truthing
- Remote sensing scene during May – No clouds
- Overlaying of cadastral map in GIS and preparation of thematic maps
- Soil fertility analysis
- SSNM based on crop



Climatic Resources

- **Rainfall (Daily/Weekly)**
- **Temperature**
- **R.H.**
- **Solar Radiation**
- **Wind speed & direction**
- **Geo-referencing of wells/ water bodies & water level recording**
- **Water budgeting & demarcation of groundwater aquifers (low, medium, high)**
- **Water surplus estimations for W H & recycling.**



Characterization of Production System

Annuals

- Land use statistics (area, production, of kharif, rabi & summer)
- Spatial distribution of different crops using RS and GIS
- Change in land use/ cropping intensity

Perennials

- NDVI (Pre & post watershed)



Characterization of Livestock Endowment

- Cows
- Buffaloes
- Bullocks
- Sheep
- Goat

(Pre & Post to detect change in composition)

- Feed & fodder development / use of CPRs
- Record the outputs (milk, meat, curd etc)



Also

- ✓ Details of expected/proposed User Groups & Self Help Groups,
- ✓ master tables for private land / common land activities,
- ✓ contribution to watershed development funds,
- ✓ information on soil and land-use, existing assets related to water harvesting, recharging and storage etc. needs to be provided plot-wise.



Also

- ✓ **Description of Proposed Interventions along with technical details and drawings certified by the WDT.**
- ✓ **Detailed Mapping exercises.**
- ✓ **Institutional mechanisms and agreements for implementing the plan, ensuring emphasis on participatory decision-making, equity and sustainability of benefits, and post-project sustainability.**
- ✓ **Expected Outcomes and Benefits, especially with respect to livelihoods for different segments, benefits to women and regeneration/conservation of resources, etc.**



Table: Milk productivity, crop productivity, soil loss and vegetation cover due to soil and water conservation measures in the watershed

Milk Productivity (l/animal/day)			
Sr. No.	Animal	Pre-project	Post-project
1	Cow	1.59	2.00
2	Buffalo	2.14	4.50
3	Goat	0.41	0.53
Average		1.38	2.34
Wheat equivalent yield (kg/ha)			
Bajani watershed (Year 2002)		1021	1340
Jigna watershed (Year 2014)		2257	4156
Soil loss (Mg/ha/yr)			
Agricultural land		8.30	3.70
Forest land		12.7	7.80
Culturable wasteland		10.0	4.50
Vegetation cover (per cent)			
		24.7	52.6



Cost: ₹ 1.89 lacs



Lat :25°39'25.70" N
Long: 78°16'54.83" E
Cost: Rs. 35.78 lacs

Lat :25°41'48.37" N
Long: 78°24'21.91" E
Cost: Rs. 34.65 lacs





What went and going wrong?



- One point investment instead of multiple points
- Faulty design
- Artificially created storage
- Piecemeal approach against the concept of IWMP (Now PMKSY)
- No Scientific approach
- No participation from stakeholders



Table: Conceptual options for C -ve farming systems farm household⁻¹ by different mitigation options (kg CO₂) in the Meerut district

Options	Hastinapur	Rajpura	Sardhana	Rohta	Mean
Agroforestry	7162 (318)	7507 (334)	4860 (216)	5101 (227)	6157 (273)
Balanced fertilization (10%)	383	203	108	185	220 (-)
Livestock management (10%)	876	390	398	607	568 (-)
Farm operations (10%)	110	148	75	118	113 (-)
Energy efficiency (25%)	310	295	220	286	278 (-)
					7336 (-1179)



Ponder over:

Soil sustains life on the earth requiring soil to be sustained or face the starvation.

Time to Talk

Or

✓ Time to Act



Thanks for your kind attention....

Any criticism most welcome



हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

Agrisearch with a human touch

Healthy Soils for a Healthy Life