

Watershed Management Programs for Increasing Land Productivity and Appropriate Withdrawal Strategies for Long Term Sustainability in Rain Fed Lands of India

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1 Introduction

The agricultural sector contributes about 28 per cent of GDP sustaining more than two-thirds of the country's population. The primary task before this sector is fulfilling the food needs of a growing population. Food grain production has kept ahead (2.5% p.a.) of population growth (2.1% p.a.), thereby maintaining food security. The demand for food grains is estimated to be about 232–235 million tonnes by 2015 and 260–264 million tonnes by 2030. Such an exploitation is likely to result in degradation of natural resources and loss in land productivity. Land capability based farmer demand driven Watershed Management is one strategy that increases & sustains land productivity on long-term basis without seriously damaging natural resource base. Focusing on the water resource development, emphasis has been laid on sustainability issues with the concept of whole watershed planning. Such an initiative underpins a shift in agricultural policy and a strong commitment in farmers of watershed management to increase and sustain the biomass production.

Watershed Development Approach to rainfed farming encompassed in the Watershed Areas' Rainfed Agricultural Systems Approach (WARASA) – Jan Sahbhagita Guidelines is a vehicle for achieving the twin objectives of enhancing production while simultaneously preserving the natural resource base. The thrust in the watershed approach is a low-cost; location specific technologies, which are practical and feasible, that can provide opportunity for local innovations rather than capital and chemical intensive farming.

Hence a "Common Approach for Watershed Development" was jointly formulated and adopted by the Ministry of Agriculture and the Ministry of Rural Development, Government of India (2000) incorporating the strength of their earlier first generation based watershed programmes. The restructured watershed programme provides for decentralization of procedures, flexibility in choice of technology and provisions for active involvement of watershed community in planning, execution, monitoring and evaluation so as to make it sustainable. Finance support for a Watershed Management Programme is finite and therefore withdrawal by the PIA at a particular stage is definite. Therefore sustenance of WSM after withdrawal is essential to assure optimal land productivity on a sustainable basis.

Guiding principles for watershed management

Sequences of activities and their operational modalities would vary from situation to situation. Hence the Guidelines are flexible so that the desired modification could be considered at different levels. The main elements of the guiding principles are: conservation of natural resources, integrated development of natural as well as social resources, *in situ* moisture conservation, sustainable farming system, adoption of ridge to valley approach, due emphasis on production enhancement activities for land owners and livelihood support for landless families, democratic decentralization in decision making, transparency in transactions, mobilization of the community at the village level, direct funding to the community, emphasis on "Government" participation in "Community's" plans, contributory approach to empower the community, building upon indigenous innovations, initiatives and ideas; equity for resource-poor families and empowerment of women, moving away from subsidy oriented development to self reliant development with monitoring and evaluation, convergence of activities/ schemes of Government and non-governmental organizations etc.

2 Withdrawal strategy

Research in Integrated Watershed development programs in different Agro-ecological regions over the past two decades clearly demonstrated increased and sustained land productivity till the PIAs functioned. However data with regard to sustainability after withdrawal by PIA's is scanty and needs to be collected and analyzed for formulating suitable withdrawal strategies. Though natural resources were improved and quality of resources of farmers were enhanced through Watershed Development Programmes, there was no strategy to maintain the technological inputs such as structures, systems etc. leading to damages after withdrawal by PIA. Hence there is an urgent need to evolve suitable withdrawal strategies to maintain and sustain watershed management activities particularly after withdrawal of finance.

3 Methodology

Twenty watersheds were selected in which the integrated watershed management practices were implemented and Project Implementing Agency (PIA) withdrawn at the end of the project period. The watersheds so selected were supported by National Watershed Development Programme for Rainfed Area (NWDPR), Min. of Rural Development (MRD), Indian Council of Agricultural Research (ICAR), Int'l Donors and Non-Governmental Organization (NGO). The authors interviewed PIAs and stakeholders of WMPs for various success levels. The data were collected from treated and untreated/control watersheds. Where a untreated/control watershed was not available, the pretreated condition of the treated watershed was adapted as control. The data so collected were analyzed and results presented.

4 Analysis of selected watershed case studies

Empowering the women as leaders of the working User Groups for various watershed interventions with a concept of "saving while earning" through executing land and non-land based works indicated high level of success. Savings increase the level of confidence and empower women to participate in decision-making. Since there is an in-built profit margin in any schedule of rates followed by Government Departments, and same was getting creamed-off by middle men/contractors. By executing works through Self-Help Groups (SHGs) ensures that the profit goes to the SHGs only. The payments are made according to the quantum of work done by the group through a simple estimate understandable by the people. The practice of muster role was abolished and the total payment for the work done by the group is measured, entered in the measurement book and payment is made through a crossed cheque in the name of SHG. The group then withdraws the money through a group resolution for making payments to the members based on work done by each member as recorded by SHG itself and the rest is saved as Group Corpus Fund, which is used for internal lending on interest as decided by the group again. They are encouraged to save almost to the extent of 50% of payment made to them as Corpus fund in the group. The practice of setting targets for works has been dispensed. The villagers themselves conduct their own Participatory Rural Appraisal (PRA) exercise; arrive at fixing the developmental activities to be taken up in the watershed, as per their absorption capacity. The works are then allocated to the self-help groups, mainly women. Regular training programmes were conducted for capacity building and for proper motivation of the women groups in executing the works and save while earning through executing the works to increase their credit base, ensured future maintenance and sustainability of the work done. Workshops were organized for all the women self-help groups where they shared their experiences. Such an activity motivated everybody to perform even better than what they have been contributing and provided feed back for tying-up loose ends.

In a similar NGO watershed at Ralegan Siddhi, community mobilization and organization along with much needed water for irrigation ensured subsequent participation, increased land productivity and sustainability, as evident from Table 1.

At Fakot watershed (Dehradun), also financed by Ford Foundation (implemented in 1979 and withdrawn in 1986), runoff and soil loss data were recorded with due Soil Conservation interventions.

Table 1 Impact of the NGO managed watershed, Ralegan Siddhi

| Item | Pre w/s Dev. Prog. | Current Status | Increasing rate |
|---|--------------------|----------------|-----------------|
| Cropped area (double cropping (Ha)) | 630 | 956 | 52 % |
| Cropping intensity, % | 98 | 164 | — |
| Inter cropping area, Ha | — | 65 | >100% |
| Use of improved seed, Ha | 50 | 860 | 17 times |
| Use of chemical fertilizer, tonnes | 8 | 83 | 10 times |
| Irrigation area, Ha | 56 | 447 | 8 times |
| No. of wells | 34 | 103 | 3 times |
| No. of community wells | — | 5 | > 100% |
| Average yield of village (As per cropped area) (lakh) | 6.7 | 128.2 | 19 times |
| Per capita yield (Rs.) (As per cropped area) | 445.6 | 6,465.7 | 14.5 times |

The data show that the soil loss reduced compared to the pre-treated watershed conditions. Also the dependency on forest for fodder and fuel reduced due to integrated watershed management and sustained even after withdrawal by the PIA. As withdrawal strategy the implementing Agency continued its association with the Farmers/ Beneficiaries with occasional visits to interact with the farmers.

Table 2 Indicators of sustainable development in a Fakot watershed

| Indicator | Pre-project period | At the end of project | After financial Withdrawal |
|--------------------------|--------------------|-----------------------|----------------------------|
| Runoff, per cent | 42.0 | 15.0 | 13.0 |
| Soil loss, Tonnes/ha/yr | 11.1 | 2.7 | 2.0 |
| Food crops (q) | 882.0 | 4,015.0 | 5,843.0 |
| Fruit (q) | Neg. | 62.0 | 1,962.0 |
| Milk (lit) | 56.6 | 184.8 | 237.6 |
| Floriculture (Rs.) | Nil | Nil | 120.0 |
| Cash crops | 6.5 | 24.8 | 202.5 |
| Animal rearing method | Heavily grazing | Partially grazing | Stall feeding |
| Dependency on forest for | | | |
| (i) Fodder (%) | 60 | 40 | 20 |
| (ii) Fuel (%) | 80 | 70 | 40 |

The SHGs were created to get over the limitations of rural banking system. The groups functioned by exerting cohesive moral pressure on its members to keep them from straying. It was noticed that the recovery of loans advanced by SHGs is far better than the recovery in conventional banking system, eg. Adilabad, Ramanathapuram and Ralegan Siddhi and several other watersheds. SHGs of landless villagers took up productive non-land based activities. One of formidable challenges of watershed development is to create in it a stake for the landless and marginally placed farmers.

The data collected from the watersheds were analyzed and presented in Fig. 1. It may be seen from the figure that cropping intensity increased by 25 %—50 % in case of 45 % of the watershed studies; BC Ratio registered between 1.0—2.0 in respect of 60 % of the watershed; migration from watershed villages reduced from 20 %—50 % in respect of 30 % of watersheds. However, watershed management activities sustained for more than 10 years in case of 20 % and 35 % of watersheds sustained between 5 to 10 years indicating viability of watershed management program in rain fed ecosystem. Augmentation of water resources through *in situ* moisture conservation and water harvesting on watershed basis was responsible for sustenance of watershed programs.

5 Watershed management without withdrawal strategy

Watershed management projects, where no specific withdrawal strategy has been noticed, the biophysical interventions disappeared from watersheds due to farmers unwilling to continue to maintain the structures. Interestingly, the farmer based Farm Ponds were not desilted in one watershed and allowed to continue to siltation. Similarly, in another watershed the terraces were maintained for their proper size and shape. This resulted restoration of pre-treated (degraded) status.

6 Recommended withdrawal strategies

- Intent to withdraw from watershed program may be let known to the stake holders at least two years before proposed withdrawal by the PIA. Withdrawal should be in a phased manner. The watershed activity in which farmers have gained confidence may be withdrawn first.
- The farmers must be made aware of finiteness of time frame of project and financial support and that the stakeholders have to take over one day.
- Constitute strong and committed Watershed Committees /Watershed Associations / SHGs to undertake watershed management programs. These Groups may be associated to maintain watershed infrastructure during the project life. Towards last one-quarter of life of the project, the maintenance component should rest with these groups only. Structures such as embankments, check dams and gully plugs etc should be supervised regularly and repaired as and when it is noticed, to save on cost.
- Capacity building at all levels of stakeholders to protect and maintain infrastructure created. This involves training of watershed committee members, visits to other successful watersheds and interaction with the farmers of successful watershed programs from other areas. Such a capacity building increases their level of confidence.
- Create institutions that would address equity and gender issues and care for the watershed assets after withdrawal. Institutions are required to strengthen backward (such as technology, credit, seeds & other inputs, linkages with Line Departments from the beginning) and forward linkages (make remunerative prices, grading, quality, storage, processing and transport).
- Develop effective leadership that would involve transparency in decision making and in fund utilization from the beginning and post project assets maintenance should be transferred to this leadership. Ensure, by and large, decision making participatory and capable of mobilizing the resources from the beginning of the project implementation process. The interest accrued from corpus fund should be used for maintenance and the fund should not be touched, as such.

Acknowledgment

The authors gratefully acknowledge the National Agricultural Technology Project, ICAR, New Delhi for providing facilities and funds for carrying out the study.

References

- Agnihotri Y., Mittal S.P. and Arya S.L. (1989). An Economic Perspective of Watershed Management Project in a Shivalik Foothill Village. *Indian Journal of Soil Conservation* vol. **17**, No.2.
- Mishra, P.R. *et al.* (1980). Operational Res. Project on watershed development for sediment, Drought, and flood control. *Tech. Bulletin, CSWCRTI, Res. Center, Chandigarh, India.*
- Mallik J.K. (1997). Growth of Agriculture in Independent India : 50 Years and After. *Reserve Bank of India Occasional Papers.* vol. **18**, 2 & 3 Special Issue (Jun-Sept).

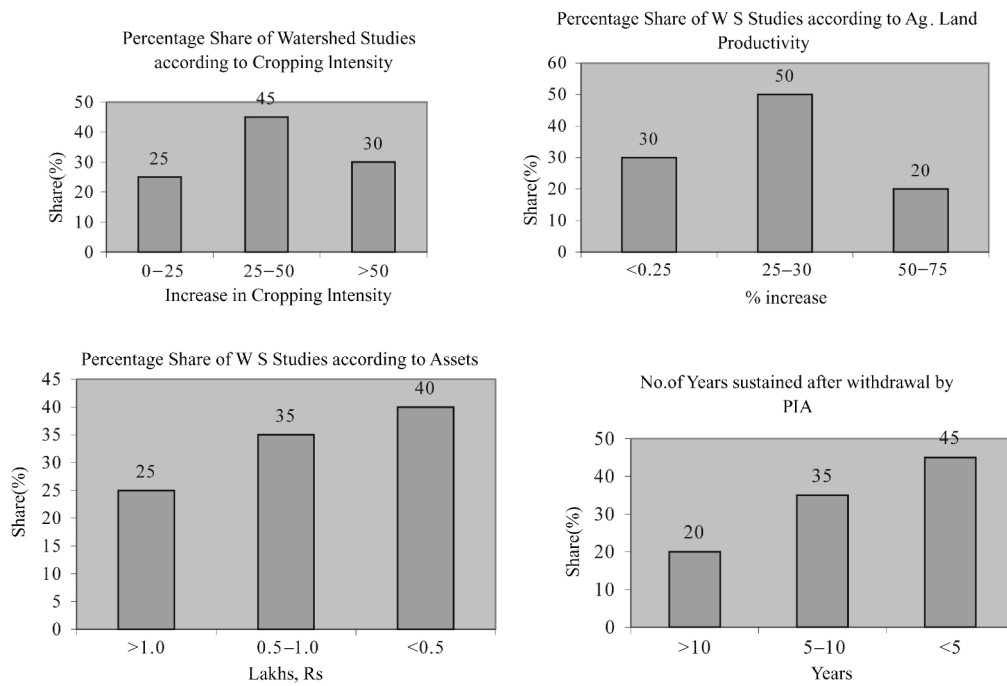


Fig. 1 Impacts of watershed management practices on land productivity and sustainability