South Asian Journal of Evaluation in Practice, Vol.1 No.2 October 2012, Pp.1-11

A New Approach to M&E for Development Effectiveness of Watershed Projects in India

B. K. Ranganath
P. G. Diwakar

Abstract Monitoring and Evaluation (M&E) in developmental projects is gaining a lot of importance in recent years and is undergoing transformation from conventional blueprint approach to participatory approach with emphasis on concurrent monitoring and learning aspects. Modern technological tools along with judicious mix of ground based observations have shown promise of a powerful strategy not only to monitor and evaluate objectively in an unbiased manner but also analyze causal effects and provide evidence of results on the ground. This paper presents the new approach adopted for monitoring and evaluation in Sujala Watershed Development Program of Karnataka, India. The uniqueness of the approach evolved in this project lies in the fusion of modern technologies like Remote Sensing (RS), Geographical Information System (GIS), Global Positioning System (GPS) and Management Information System (MIS) with conventional monitoring system, which makes a robust M&E system to provide state-of-the-art information for tracking the project progress, evidence based on outcomes and impacts. The evidence based monitoring and impact assessment using modern tools enabled the planners to apply corrective measures, maintain transparency and enforce accountability, besides making appropriate policy changes.

Key Words: Remote Sensing, Geographical Information System, Watershed Development, Process Monitoring, Impact Assessment

INTRODUCTION

Monitoring and Evaluation (M&E) in developmental projects has assumed greater importance in recent years. It has become an essential and indispensable tool for tracking the progress and performance of the project, streamlining the interventions and for assessing the impacts. The M&E system is expected to provide timely, reliable and relevant information reflect the true picture, propose corrective measures, measure and evaluate short-

term and long-term impacts, provide early warning signals on problems and inconsistencies, carry out thematic/evaluations at frequent intervals, share the best practices and lessons learnt, etc. The traditional approach of M&E is not as robust as desired and focuses mostly on physical and financial progress monitoring and does not address many of the above aspects.

Presently, the monitoring systems in India are undergoing transformation from blueprint approach to participatory approach with specific emphasis on concurrent monitoring and learning aspects. M&E system is becoming an integral part of the projects' day-to-day operations rather than a periodic offline activity. Performance-based M&E however combines the traditional approach of monitoring implementation with the assessment of results viz., outcome, impacts and sustainability. Modern technologies integrated with conventional monitoring system have shown promising results in effective monitoring of salient parameters of developmental projects (Ranganath, 1998). This paper addresses a new approach of M&E evolved and operationalized in one of the community driven, participatory watershed development project called "Sujala" in Karnataka.

SUJALA WATERSHED PROGRAMME

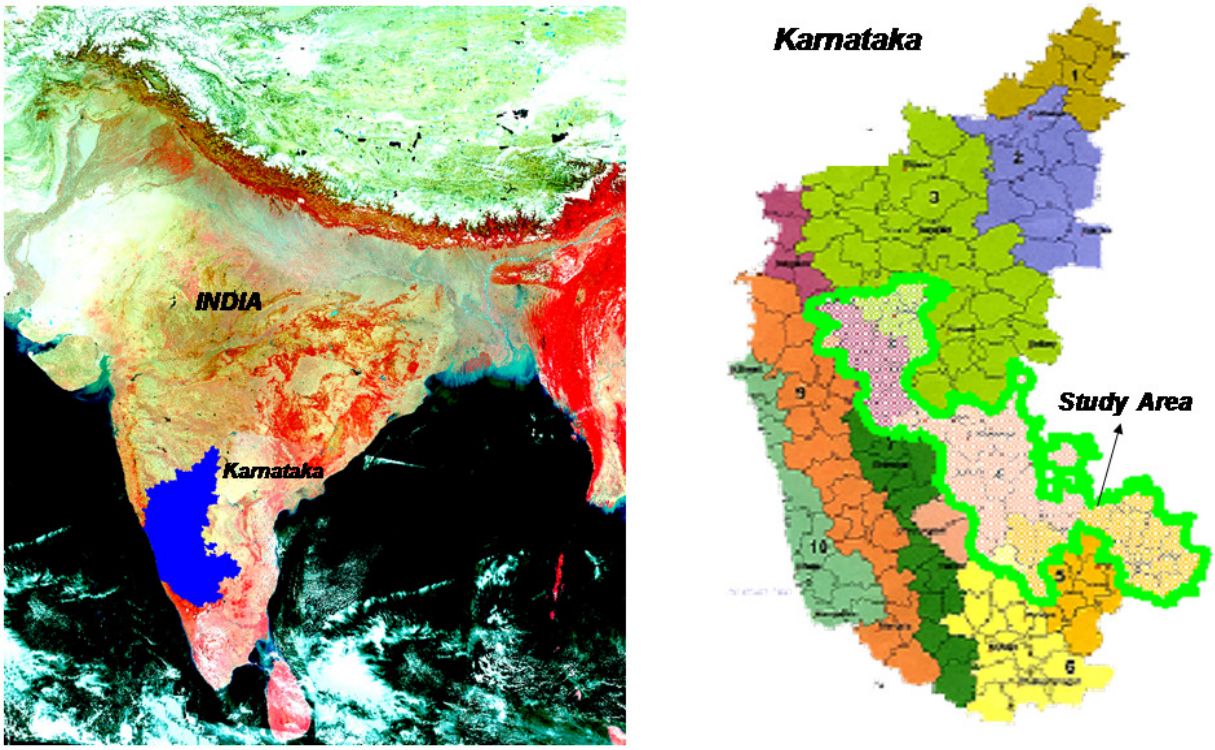

Figure 1: Location of Study Area

Sujala, a participatory watershed development and livelihood program, was implemented by Watershed Development Department, Government of

Karnataka with assistance from World Bank in five districts of Karnataka, viz., Kolar, Tumkur, Chitradurga, Dharwad and Haveri (Figure 1). The project was spread across seventy-seven sub-watersheds (SWS) covering an area of about 5.18 lakh hectares, benefitting about four lakh households (Anonymous, 2003). The communities were involved in participatory planning, implementation and maintenance of assets. While, non-government organizations (NGOs) facilitate social mobilization, University of Agricultural Sciences provided the technical know-how and Antrix Corporation, Indian Space research Organization (ISRO) was responsible for monitoring and evaluation of the project. The project was implemented in three phases during 2002 to 2009 time period in rainfed farming tracts of Karnataka, which are mostly drought prone with low productivity and extensive non-arable lands, characterized by high vulnerable group and Below Poverty Line (BPL) families.

MONITORING AND EVALUATION IN SUJALA

In general, the conventional monitoring system in watershed development programs tends to focus on physical and financial progress and do not concentrate on outputs, outcomes, impacts and sustainability. The utility of M&E for decision making and corrective measures/learning is low. In the present day context, an evidence-based monitoring system with robust indicators and an objective assessment is what is called for so as to increase the development effectiveness of the program.

In Sujala, Monitoring, Evaluation and Learning (M, E & L) was an inbuilt concept and an integral part of the project's day-to-day operations rather than a periodic off-line activity. It was considered as a management tool, not only for effective and efficient project implementation, but also for learning process. The M, E & L system with a blend of modern technology with ground-based monitoring systems provided information/feedback regularly on key issues, performance, social and environmental impacts and supported learning processes throughout the project period.

The uniqueness of the monitoring system evolved and adopted in Sujala project lies in the fusion of modern technologies like, RS, GIS, MIS, etc., with conventional ground-based monitoring system, which helped in micro-level plan preparation, concurrent progress/process monitoring and impact assessment at various stages of project planning and implementation.

Major Components

The major components of M, E & L in Sujala were concurrent monitoring involving Process Monitoring and Input/Output monitoring, and discrete monitoring dealing with impact assessment. While process monitoring was carried out through extensive field visits, input/output monitoring was facilitated through the development of a MIS. Impact assessment involved the use of both satellite remote sensing and field-based surveys.

Input/Output Monitoring

Physical and Financial Progress monitoring was done effectively through "Sujala Mahithi," a project specific MIS/GIS designed and developed by Antrix-ISRO. Deployed across all the project watersheds, the MIS helped to create systematic database, allowed user to query and analyze periodic field data and generate reports at different levels. The system maintained easily retrievable records and the information were generated on specific project components at State/District/Taluka/Sub-watershed/Micro-watershed level on a weekly/monthly basis.

"**Sukriya**" – Sujala Kriya Yojane, a bilingual software package was designed and developed to facilitate preparation of action plan at micro-watershed level. The package not only enabled quicker, uniform and systematic beneficiary-wise database creation but also provided scope for generating varieties of reports for analysis and assessment of the impact. The software enabled to categorize private land and common land activities, income generating activities, farm demonstrations, Community Based Organisation (CBO) activities, etc., for further analysis. The package significantly reduced the time taken for participatory planning processes and in preparation of Sujala Watershed Action Plans (SWAP).

GIS enabled solutions SuKriya Nakshe and Nakshe Vivara were developed for use at grass root level. SuKriya Nakshe allowed for about 150 different types of activities to be spatially depicted at micro-watershed level to prepare SWAP map on a pick and drop mode, for implementation and monitoring.

Nakshe Vivara, a map viewer tool, facilitated the display of various resource maps like land use/cover, soil, land parcel, with necessary legends and allowed overlay of user defined layers with specific query facility.

Process Monitoring

Concurrent process monitoring was carried out weekly to capture near real time information on the key project processes, constraints/gaps, quality of implementation works and reflect the same for decision-making/corrective measures. Some of the key processes monitored were awareness creation and sensitization, participatory rural appraisal, entry point activities, formation

and functioning of CBOs, capacity building, action plan preparation, environment and social screening, action plan implementation, income generating activities, operation and maintenance. The observations were provided as weekly/fortnightly/monthly reports for effective project management and implementation of corrective measures. The observations also recorded the outcomes of the interventions and their environmental and social implications.

As a part of process monitoring, evaluation of the functioning and performance of CBO, NGO, various training/capacity building programs and other project activities were carried out, besides specific thematic evaluations like women empowerment, equity, investment pattern, income generating activities, livestock, etc.

High-resolution satellite data from Indian remote sensing satellites namely Resourcesat and Cartosat were effectively used to monitor the implementation of the land treatment activities and assessing the changes in land use/land cover, cropping pattern, biomass and reclamation of fallow/barren land, etc. Implementation of activities like bunding, farm ponds, afforestation, agro-horticulture at the farm level (Survey number wise) were monitored on sample basis using the high-resolution temporal satellite data.

Impact Assessment

Impact assessments were carried out at pre-determined time intervals to establish the net contribution of the project to poverty alleviation, capacity building and natural resource regeneration. Impact was evaluated using a variety of qualitative and quantitative indicators before (baseline), during (midterm), end of the project (final). Impacts were also analyzed based on observations in the project and control areas. Judicious combination of conventional and remote sensing approaches were adopted, to generate a comprehensive benchmark data for monitoring and impact assessment, which includes temporal satellite imageries, household survey, participatory observations, focus group discussions, transect walks, MIS data, thematic and case studies.

Stratified multi-stage random sampling technique was adopted for data collection and monitoring (Figure 2). The sub-watersheds were randomly selected based on their agro-climatic zone, general land use and soils. Within each sub-watershed, three micro-watersheds were selected at random, representing ridge, middle and valley portions. Households were selected and sampled based on land holding class, i.e. marginal, small, big and landless using Probability Proportion to Size (PPS) criteria. To achieve acceptable accuracies of estimates, 10% sampling intensity was considered for data

collection and analysis. The data so collected was systematically analyzed keeping in view all the criteria of statistical sampling followed under the project for arriving at reliable results with 95% confidence interval.

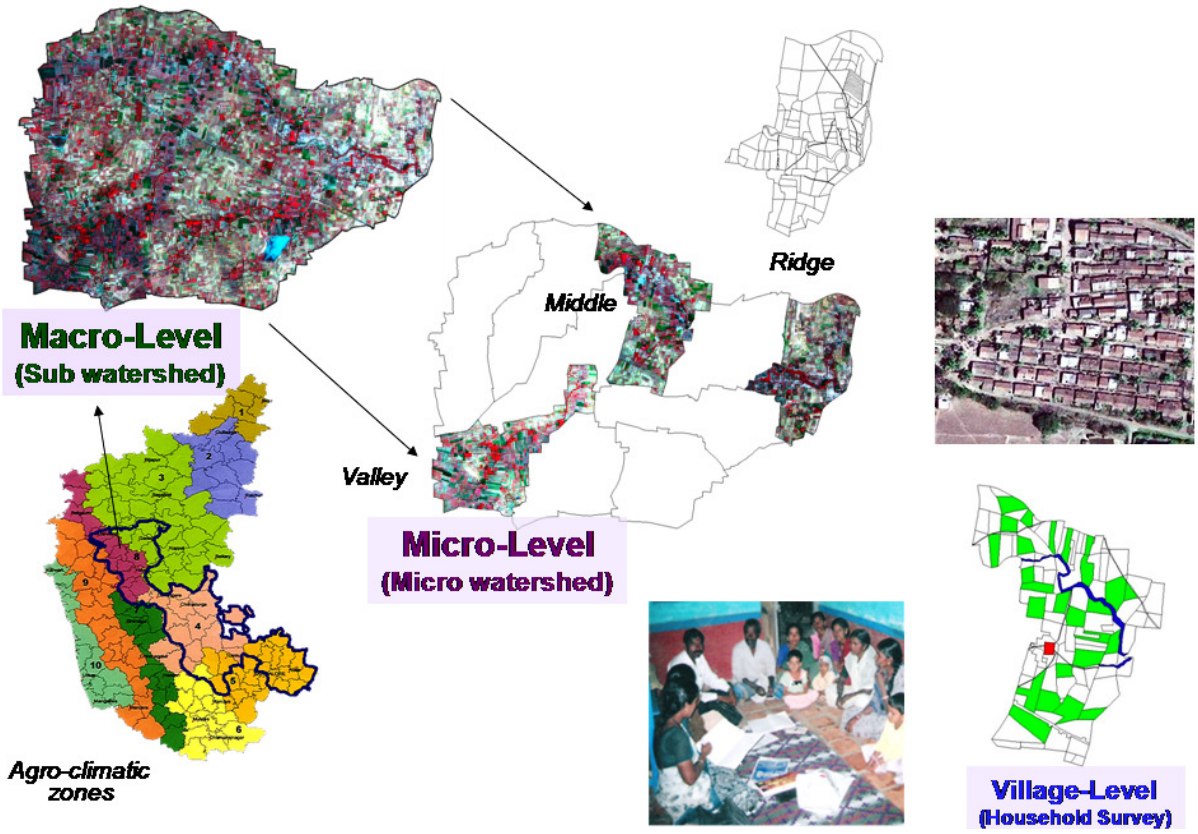

Figure 2: Sampling Approach

The impact assessment indicated that project investments had a measurable impact on the indicators describing the project development objectives (Figure 3). Difference-in-difference estimates between pre and post, and project and control data revealed positive changes in these indicators. The average crop yields were increased by 24% over the baseline and the cropping intensity increased from 129% to 144%. Cropping pattern from traditional food crops to commercial crops particularly pulses and oilseeds were recorded. Paradigm shift to agro-horticulture and forestry and reduction in non-arable lands was observed (Grant Milne, 2007). Improvement in ground water discharge from 250 to 325 gallons per hour and perennial water availability were observed. Satellite based runoff estimation indicated reduction in runoff volume varying between 7000 to 18000 cu. m. per ha across different agro-climatic zones.

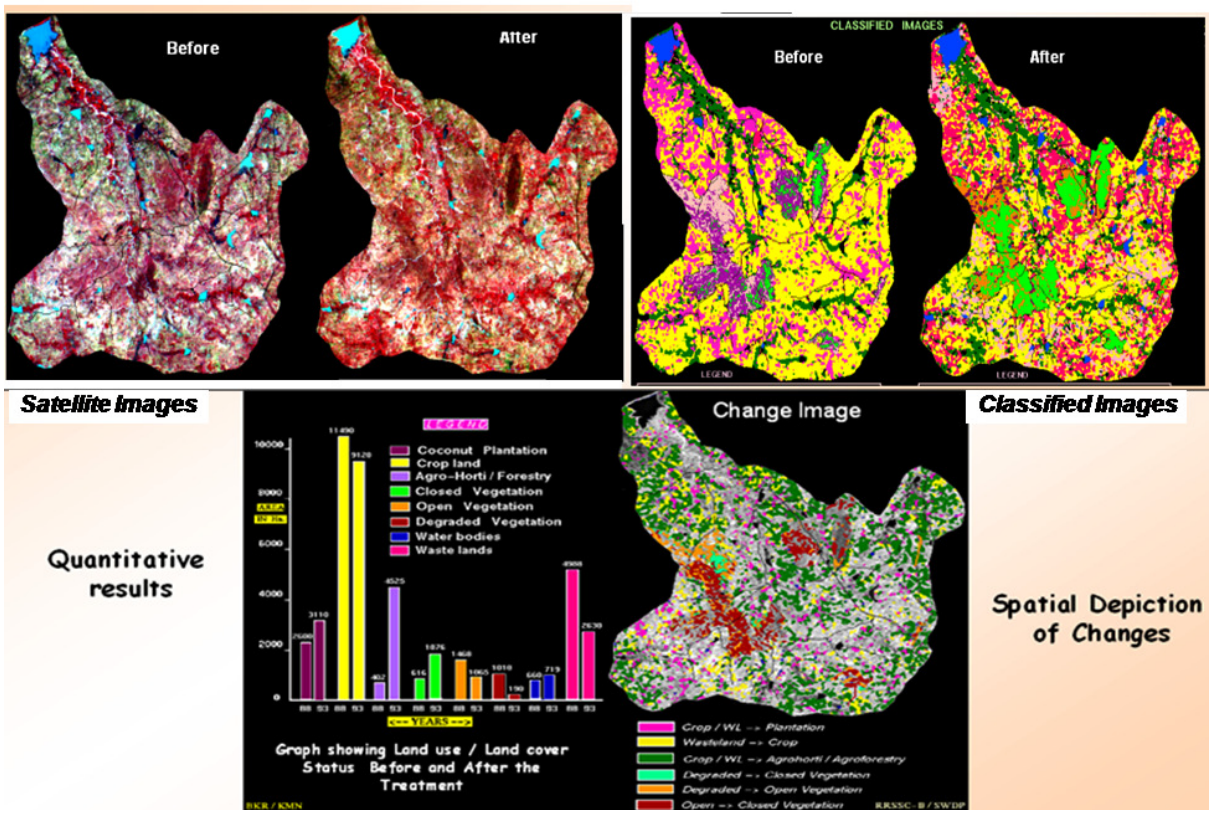

Figure 3: Impact assessment in Sujala

There was a considerable improvement in the household income in almost all categories viz., landless, marginal, small and big farmers, compared to baseline and end of the project (Table No. 1). Annual household income had increased by 24% due to employment opportunities created, income generating activities and improvements in agricultural productivity. Reduction was observed in the Below Poverty Line (BPL) families by 42% and migration from villages also reduced by 70%. The emphasis on livestock sector with door delivery and para vet services not only increased the number of livestock but also recorded increase in the milk production by 20% (Diwakar et al. 2008).

TABLE 1
HOUSEHOLD INCOME DETAILS BEFORE AND AFTER THE TREATMENT IN THE TREATED AND CONTROL AREA

Average of Annual Income (Rs) for Phase-II SUJALA Project (Difference-in-Difference estimates)

Zone	LHC	Control Area			Treated Area			B-A (%)
		Baseline (T1)	EOP (T2)	(T2-T1)/ T2*100 (A) (%)	Baseline (T1)	EOP (T2)	(T2-T1)/ T2*100 (A) (%)	
Central Dry Zone	LL	6,8000.00	12,066.67	43.65	9,100.00	20,950.00	56.56	12.91
	MF	14,900.00	22,000.00	32.27	20,253.00	40,961.11	50.56	18.29
	SF	24,400.00	41,250.00	40.85	25,700.00	56,125.00	54.21	13.36
	BF	31,600.00	33,500.00	5.67	42,200.00	1,10,711.36	61.88	56.21
		19,425.00	27,204.00	28.60	24,313.25	57,186.87	57.48	28.88
Eastern Dry Zone	LL	10,950.00	16,195.00	32.39	12,114.00	25,214.29	51.96	19.57
	MF	11,148.00	17,000.00	34.42	14,089.00	29,341.79	51.98	17.56
	SF	17,887.00	29,351.00	39.06	20,055.00	44,930.19	55.36	16.30
	BF	32,775.00	52,038.18	37.02	37,022.00	78,321.21	52.73	15.71
		18,190.00	28,646.05	36.50	20,820.00	44,451.87	53.16	16.66
Northern Transition Zone	LL	10,716.50	17,400.00	38.41	14,104.00	40,283.33	64.99	26.58
	MF	10,633.00	15,450.00	31.18	19,064.00	41,030.00	53.54	22.36
	SF	21,600.00	31,783.33	32.04	25,246.00	56,500.00	55.32	23.28
	BF	56,783.00	87,716.67	35.27	83,666.00	2,20,622.21	62.08	26.81
		24,933.13	38,087.50	34.54	35,520.00	89,608.94	60.36	25.82
Overall	LL	9,488.83	15,220.56	37.66	11,772.67	28,815.87	59.15	21.49
	MF	12,227.00	18,150.00	32.63	17,802.00	37,110.97	52.03	19.40
	SF	21,295.67	34,128.11	37.60	23,667.00	52,518.40	54.94	17.34
	BF	40,386.00	57,751.62	30.07	54,296.00	1,36,551.66	60.24	30.17
		20,849.38	31,312.57	33.42	26,884.42	63,749.22	57.83	24.41

LL (Landless); MF (Marginal farmer); SF (Small Farmer); BF (Big Farmer)

Source: 10% Households survey conducted in the treated and non-treated areas collected before the treatment (Baseline) and after the intervention

Dissemination/Feedback

M, E & L activities in Sujala were not standalone but closely linked to partners at all levels. It had established a network for collection of data on sample basis, synthesize the information and disseminate at various levels for learning among the project partners for adaptation and corrective measures. The information was disseminated informally/formally through the meetings/workshops by visual displays and oral presentations. Reports were generated to communicate the results and a compliance mechanism was established by the implementing authority. The evaluation findings and recommendations were also fed back to the decision makers for streamlining the activities and effect appropriate policy level changes. M&E ensured openness and wider access to evaluation results to increase credibility and usage.

Policy Changes

Some of the changes made by the implementing agency/donor, were with respect to payment system to NGO's, implementation of integrated approach, increased flow of funds to self-help group's (SHG), ban on machinery usage, adoption of MIS/GIS, refinement of capacity building modules, enhancing the forestry/horticulture plantations survival rate, etc. It was an end-to-end chain of events which helped the project to consistently sustain a reasonable good quality implementation.

Costs involved and Scalability of the M&E system

The M&E system for the entire Sujala project period cost 2% of the project budget encompassing satellite data cost, software development, and M&E by internal/external agencies. There is a huge potential for scaling up this model from state to national level, since lot of emphasis is being given by both state and Central government agencies to develop rainfed lands on watershed basis. The model was replicated in Andhra Pradesh community forestry project and presently it is being adopted in Prime Minister's relief program being implemented in six districts of Karnataka and Integrated Watershed Development Program (IWMP) of Ministry of Rural Development in states like Rajasthan, Karnataka and Andhra Pradesh. At international level, the best practices of M&E are being adopted in World Bank projects at Malawi, Sri Lanka and Bangladesh.

CONCLUSION

The new approach of monitoring and evaluation in Sujala project was a comprehensive system using modern technological tools combined with conventional ground monitoring system to provide information on input-output monitoring, concurrent process monitoring and impact assessments. This robust M&E system provided state-of-the-art information, generated useful databases and contributed significantly in bringing greater transparency and accountability in the project. The approach influenced decision makers towards adaptive management and enabled appropriate policy formulation improving the development effectiveness. An objective assessment through use of satellite imageries acquired at frequent intervals provided evidences of the land cover changes in the treated areas compared to control areas enhancing transparency and accountability. World Bank has acknowledged the M&E of Sujala as "Model of Excellence" and Global Best Practice.

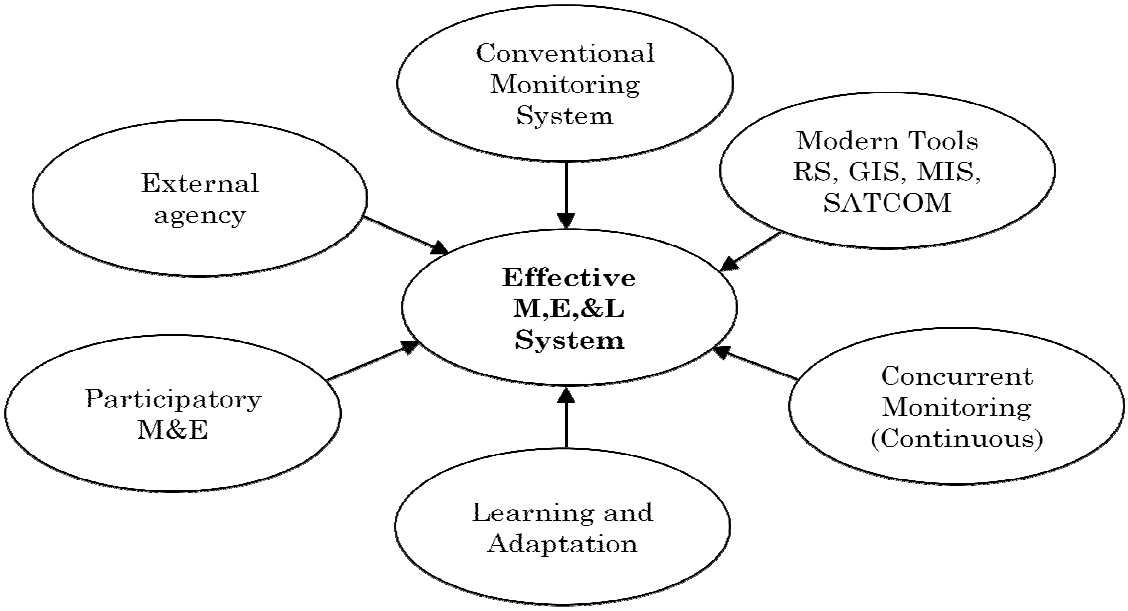

Figure 4: An Integrated M&E System

It can thus be said that an integrated approach of M&E (Figure 4) involving concurrent monitoring using both modern and conventional tools, with a component of participatory community monitoring, evaluation studies by external agency and with an emphasis on learning aspects will enhance the development effectiveness of the watershed programs.

REFERENCES

Anonymous (2003). *Sujala Watershed Project—Operation Manual.* Watershed Development Department Government of Karnataka, Bangalore.

Diwakar, P. G., B. K. Ranganath, D. Gowrishankar and V. Jayaraman (2008). "Empowering the Rural Poor through Earth Observation Products and Services – An Impact Assessment" *Acta Astronautica*, 63, pp 551 – 559.

Milne, Grant (2007). "Innovation in Participatory Watershed Development to Improve Natural Resource Productivity and Rural livelihoods." *South Asia-Livelihood Learning Series* 1, Note no: 3, World Bank, USA

Ranganath, B. K. et.al. (1998). Monitoring and Evaluation of Watersheds in Karnataka using Satellite Remote Sensing. Technical Report, ISRO-NNRMS-TR-98-98, ISRO Bangalore

Dr. Ranganath, B. K., Senior Scientist in Indian Space Research Organisation (ISRO), Bangalore obtained his PhD in Biodiversity from Bangalore University. His specialization is in the application of Geoinformatics in the field of natural resources management. He has been working on Monitoring & Evaluation since a decade and has developed a unique M&E model by blending technological tools with conventional ground based monitoring system which is acknowledged as Model of Excellence by the World Bank.
E-mail: bkranganath@hotmail.com

Dr. Diwakar, P. G. is the Director, Earth Observation Systems at Indian Space Research Organisation (ISRO), Bangalore. He is a computer software professional and specialized in Digital Image processing and MIS/GIS software development. He has also designed and developed databases and information systems for many applications. He has set up Digital Image processing and GIS facilities at several places in the country and also in Mauritius.
E-mail: diwakar@isro.gov.in

The Second Evaluation Conclave
Theme: "Evaluation for Development"
Venue: Hyatt Regency Kathmandu
Kathmandu, Nepal
Date: February 26, 2013- March 1, 2013

The second Evaluation Conclave will be held at Kathmandu during February 26, 2013- March 1, 2013.

Evaluation is particularly critical in the context of South Asia, home to complex social structures, high rates of poverty, gender discrimination, dynamic forces of globalization sweeping traditional societies and numerous development projects for the large populations of this region. Innovative evaluation approaches and practices are particularly important in such complex contexts. Though our focus is on the situation in South Asia, we will include broader experiences where comparative learning and lessons are offered. The theme 'Evaluation for Development' hopes to draw out and share innovations in methods, approaches, capacity building and use with a special focus on the participation of civil society, local institutions and persons who are affected by the various projects being evaluated. The Conclave hopes to provide a platform and encourages South Asian evaluators as well as others to share and learn from each other and contribute to evaluation field building in the region.

Crosscutting Themes
The Conclave will address issues of Participation, Practices, Policies and Utilization.

Sub-themes
The conclave will focus on the following sub-themes:
Poverty alleviation, Agriculture, Food Security and Nutrition, Gender and inequities, Environment, Governance and Social Accountability

Who is attending?
Over 400 global thinkers, government representatives, policy makers, donors, commissioners, members from evaluation associations, academicians, students and individual development as well as evaluation practitioners are expected to converge at the four-day event.

For more details please visit: www.evaluationconclave2013.org