IMPACT INDICATORS

An Alternative Tool for the Evaluation of Watershed Management

MICHAEL W. BOLL

WSM
भारत-जर्मन द्विपक्षीय परियोजना "जलग्रहण प्रबन्ध"
INDO-GERMAN BILATERAL PROJECT "WATERSHED MANAGEMENT"

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The boundaries shown in the map of India as illustrated in this book are merely indications of locations of areas.

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Cover photograph: An IGBP consultant uses participatory methods to evaluate water harvesting activities (Karkara, Bihar)

PREFACE

Traditionally watershed management has been associated exclusively with soil and water conservation. In recent years, the focus of watershed management has broadened, incorporating more holistic approaches that deal with the larger issues such as natural resource management and improving the livelihood of local people. Projects of this kind are becoming more common and are being implemented through different government departments as well as non-government organisations. Although most of these projects have been beneficial for natural resources and the people living within the watersheds, not enough attention has been given to the monitoring and evaluation of their environmental and social impacts.

The Indo-German Bilateral Project "Watershed Management" has now developed a tool kit to assist practitioners concerned with monitoring and evaluating watershed management projects. This book describes in detail a wide range of impact indicators. From these indicators a set of nine have been selected. This set was designed to evaluate program impacts and has been field tested by Dr. M.W. Bollom and his team. These indicators address the environmental and social impacts of watershed management projects, using a mix of extractive and participatory techniques. For each of these indicators a practical user friendly Project Evaluation Protocol (PEP) is enclosed.

It is my hope that the indicators and methodologies described in this book will be highly beneficial for any kind of development project concerned with evaluating the environmental and social impact of their activities.

G. Honore
German Project Coordinator

ACKNOWLEDGEMENTS

As is the case with many books, it is not really truthful to list my name as sole author. Many of the ideas and the data were given to me by other people. My most significant contribution has been to gather and organise these into a coherent whole. While it is not possible to list all of the people who have helped me, a few stand out. The Indo-German Bilateral Project "Watershed Management" funded this entire exercise. The original idea for this undertaking and much on-going inspiration was provided by Guy Honoré, the German Project Co-ordinator. Fellow professionals at the Indo-German Bilateral Project (E. Tideman, P.K. Das, S. Kumar and S. Yadav) guided my investigations, answered innumerable questions and corrected my many misconceptions. The Project staff (Lekha, Latha, and Arjun) provided me with much logistical support. Almost none of the field studies would have been possible without the work of my evaluation team members: Dr. K. Lavanya and Aparna Kanungo—they brought insightful eyes, analytical minds and local knowledge. During my field visits, the Project's partner NGOs (PRADAN in Bihar, SUTRA in Himachal Pradesh, and MYRADA in Tamil Nadu) gave generously of their time and answered many of my questions. In particular, S. Rajkumar of MYRADA offered me many insights into the reality of institution building. Thanks also to Dr. Kasturi Basu, whose savage red pen provided much needed editorial support. Finally, I must thank the people of the Karkara, Arki and Kattery watersheds. Without their generous inputs, I would not have been able to develop and test the indicator set described in this report. It is to them, and others like them all over the world, that I dedicate this book. I hope that the ideas contained in it will improve their lives, at least in some minor way.

CONTENTS

LIST OF ABBREVIATIONS

AED . . . . .Agricultural Engineering Department (Tamil Nadu)

Crore . . . .[Equal to Ten Million]

DVC . . . . .Damodar Valley Corporation

DM . . . . . .District Magistrate

FD . . . . . .Forest Department (Himachal Pradesh)

GoI . . . . . .Government of India

IGBP . . . . .Indo-German Bilateral Project "Watershed Management"

Lakh . . . . .[Equal to One Hundred Thousand]

MYRADA .[An Indian NGO, based in Karnataka State]

NGO . . . . .Non-Governmental Organization

PEP . . . . . .Programme Evaluation Protocol

PI . . . . . .Principle Investigator

PRA . . . . . .Participatory Rapid Appraisal

PRADAN . .[An Indian NGO, based in New Delhi, with offices in Hazaribagh, Bihar]

RVP/FPR . .River Valley Project / Flood Prone Regions

RWS . . . . .Representative Watershed

SUTRA . . .[An Indian NGO, based in Himachal Pradesh]

SMS . . . . . .Silt Monitoring Station

WTMS . . . .Water Table Monitoring Station

EXECUTIVE SUMMARY

Impact indicators can be used to evaluate watershed management programmes. After spending close to six weeks testing and refining the Programme Evaluation Protocol (PEP) under field conditions, it is quite clear that the nine selected indicators can be used to quickly, cheaply and easily measure a programme's physical and socio-economic impacts in rural watersheds.

- Exclusive of travel time, a team consisting of a principal investigator and two assistants was able to execute the preliminary PEP in two Representative Watersheds (RWSs) in less than three weeks.
- The indicator set requires very few tools, the most expensive of which was a small measuring stand. In addition, the research assistants required only three days of orientation before the actual field visit.
- It was important that at least one team member be a native speaker of each local language encountered. Other qualifications are a rural development or social science background and experience with participatory evaluations.
- Of the nine indicators in the set, four—*Height-for-Age, Consumer Durables, Use* and *Outsiders*—are highly recommended. Three more—*Soil Loss, Ground Water,* and *Replication*—are recommended with some reservations. This is because they do not meet all of the original selection criteria (i.e., that the indicators be fast, cheap and easy to use). Finally, it is recommended that *Attendance,* and *Social Capital* be further modified by practitioners due to reliability problems.
- The indicator set was tested in two Representative Watersheds of the Indo-German Bilateral Project (IGBP). The empirical findings generally show Kattery Watershed (Tamil Nadu) to be more socially and materially advanced than the Arki Watershed (Himachal Pradesh).
- The investments that have been made in Kattery are used more heavily. Investments in Kattery also appear to be more sustainable than those in Arki. This is partly due to the fact that the NGO in Kattery, MYRADA, has made significant advances towards building up the social institutions necessary to manage programme investments independent of IGBP support.
- Where change was recorded, it was directly linked to IGBP activities in only a few cases. Again, this is not surprising because the RWS Programme has been in operation for less than two years. Some activities have, however, already begun to demonstrate

their potential to bring about positive change. For example, the federation of self-help groups in Kattery have begun to address community watershed problems. In Arki the Forest Department's programme to plant sapling species in consultation with community groups and privatise grass cutting rights on government forest lands has improved the quality of both grass and the survival rate of saplings on that land.

1

INTRODUCTION

Natural resource management projects have traditionally been assessed through *benefit-cost ratios*. Calculating these ratios tends to be expensive, time consuming and difficult to implement. Computing these benefit-cost ratios requires that the total benefits of a project are divided by its total costs. If this ratio is greater than one, the project is considered a success. For example, if there is an investment of Rs. one lakh in an irrigation scheme and the benefits derived from it are worth Rs. two lakhs, then the benefit-cost ratio is two.

Internal rates of return are benefit-cost ratios that have been discounted for time. Discounting is extremely important because project investments are often separated from payoffs by large periods of time. For example, Rs. one lakh invested in a forestry project today may, after a sufficiently long period of time, produce Rs. two lakhs of return (benefit-cost ratio of two). The problem, however, is that it is not meaningful to compare Rs. one lakh invested today with Rs. two lakhs recovered thirty years from now. In all likelihood, Rs. two lakhs thirty years from now

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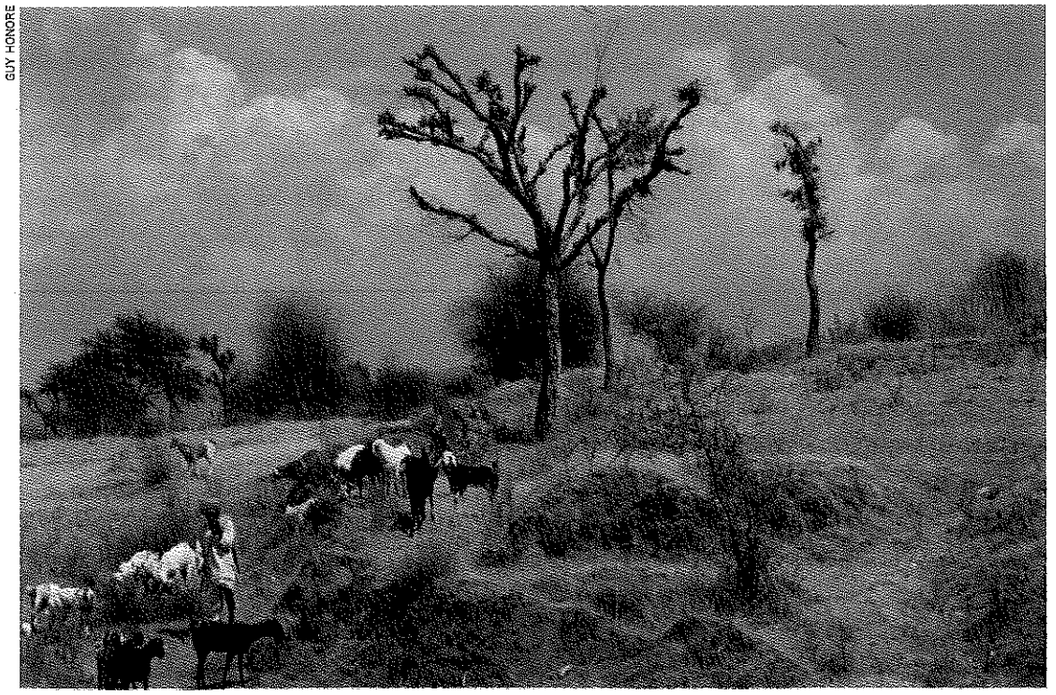


Degraded land (Burhapuran, Rajasthan)

will be worth less than what Rs. one lakh is today (i.e., a benefit-cost-ratio of less than one). For this reason, benefit-cost ratios are adjusted for time (or "discounted") producing internal rates of return.

Adjusting costs for time is in itself a difficult issue, but estimates can be made (often using long-term inflation or depreciation rates). It is more difficult to quantify project benefits (whether they are reaped today, or in three decades). The first difficulty lies in determining all project benefits. For example, what are all the benefits of an irrigation project? Would a list of benefits only include increased crop yields, or should it also include improvements in public health, lower migration rates, higher incidence of school attendance, changing gender relations, etc.? Even if all benefits are specified, taking exact measurements of these changes is often very resource intensive. In addition, there is the added problem that not all the benefits are easily quantifiable. How can the benefits of phenomena like changing gender relations be quantified? Yet benefit-cost ratios require quantification.

Indicators can be a fast, cheap and easy alternative to making the direct, quantified measures of project impacts needed for benefit-cost ratios and internal rates of return. Quite simply put, an indicator is a proxy measurement—one easily-measured phenomenon, which is closely related to a target phenomenon that is more difficult to measure. If some phenomenon can be measured directly, indicators are unnecessary. It is only when a direct measurement cannot be taken that an indicator needs to be employed. For example, one could directly measure the distribution of heights in a classroom of twenty co-operative children given the availability of an accurate metre stick. But what if the children will not co-operate or there is no metre stick available? Perhaps each child's height could be approximated relative to a chair in the classroom known to be exactly one metre high. Height in relation to the chair would then be an indicator of the children's actual heights.

P.K.DAS

Rehabilitation of degraded lands by Birhore tribals (Karkara, Bihar)

Indicators are also used to indirectly measure concepts that are abstract and/or complex. This is often the case in the realm of natural resource management. For example, how does one directly measure bio-diversity? The concept itself is quite abstract, and even when precisely defined, its direct measurement would be a Herculean task. In this case, the presence and vitality of one particular species might be used as an indicator of the entire region's bio-diversity. For example, in the American Pacific Northwest, the spotted owl population has been used as an indicator of bio-diversity in coastal forests.

This book presents indicators as an alternative to traditional methods of evaluation such as benefit-cost ratios. It is in no way suggested here that indicators replace benefit-cost analysis, only that indicators can be an extremely useful evaluation tool for watershed management projects. This is especially true when time and monetary resources are in short supply.

Background of this Book

In mid-1997 the Indo-German Bilateral Project "Watershed Management" (IGBP) commissioned a study to design an indicator set that could be used to evaluate the impact of its watershed management programmes. The hope was that the IGBP could develop an inexpensive and less time consuming way to assess the impacts of its RWS Programme. The resulting report was informed by a literature review of existing Indian and international thinking on impact assessment. In addition, IGBP organised a one-day workshop on impact indicators. It was attended by about thirty Indian and international experts in the fields of rural development and natural resources management.[1] The recommendations of the workshop participants were incorporated into the final report.[2]

In March and April of 1998 a team of three investigators (hereafter referred to

THE INDO-GERMAN BILATERAL PROJECT "WATERSHED MANAGEMENT"

The Indo-German Bilateral Project "Watershed Management" (IGBP) is an effort in technical co-operation between the Government of India (Ministry of Agriculture, Soil and Water Conservation Division) and the Government of Germany (Ministry of Economic Co-operation and Development). Established in 1989 with funding from the German Technical Co-operation (GTZ), the IGBP operates under the Government of India, Ministry of Agriculture's Flood Prone Regions / River Valley Projects (RVP/FPR) schemes. RODECO Consulting GmbH, a German consulting company, executes the project from its New Delhi office.

The IGBP's central mission is natural resource management. Towards that end, it works with the Government of India (GoI) to improve its erosion control efforts in rural India. Since the IGBP commenced operations, it has implemented hydrological monitoring activities to assist the GoI's efforts to measure progress made by on-going erosion control activities. In addition, the IGBP trains local field-level staff in hydrological monitoring and conservation practices. The project is currently carrying out these activities at 32 selected Silt Monitoring Stations (SMS) in eleven Indian states: Rajasthan, Uttar Pradesh, Himachal Pradesh, Orissa, Madhya Pradesh, Bihar, Andhra Pradesh, Tamil Nadu, Gujarat, Bihar and Maharashtra.

[1] "Workshop on Impact Indicators" sponsored by the IGBP (New Delhi, India), December 12, 1997.

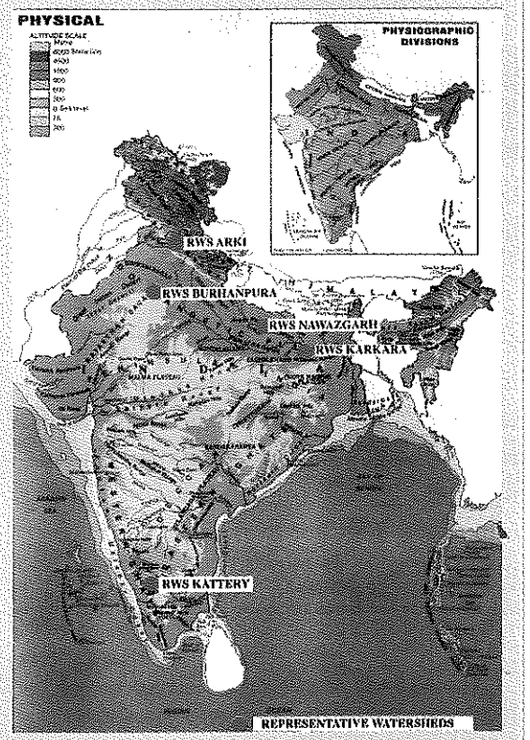
[2] Michael W. Bollom, "Impact Indicators: In Search of Fast, Cheap and Easy Indicators to Assess Physical, Social and Economic Change caused by Watershed Management Projects" (New Delhi: IGBP Technical Paper No. IGBP-WSM 86/98, 1998).

THE RWS PROGRAMME

In an effort to enhance the efficacy of soil conservation measures, the IGBP initiated a Representative Watersheds (RWS) Programme in 1992. Five watersheds were selected for this programme based on criteria that had been established by the All India Soil and Land Use Survey (AISLUS) by prioritising watersheds according to their severity of erosion. In each of the five Representative Watersheds, the IGBP has selected a partner NGO to work with towards the goal of building increased local awareness of natural resource issues and participation in IGBP activities.

The IGBP facilitates awareness and participation in watershed activities by creating a platform for co-operation and co-ordination between concerned State Government Departments and local NGOs. Together they should work to develop the watershed and protect its natural resources. The theory is that only through local participation can erosion control activities be effectively designed, implemented and sustained. RWS sites are located in Rajasthan (Burhanpura), Uttar Pradesh (Nawazgarh), Himachal Pradesh (Arki), Bihar (Karkara) and Tamil Nadu (Kattery). Four new RWSs will soon be included—one in Andhra Pradesh, one on Karnataka and two in Uttar Pradesh.

To date, all RWS activities are either in a pilot or demonstration phase—the Programme is experimenting with new techniques and/or demonstrating these techniques under new conditions. The long-term goal, however, is to create a sustainable and replicable programme. The techniques developed must be sustainable within the resource constraints faced by the Government of India and replicable in other watersheds for the programme to have long-term benefits. The IGBP's goal is to hand over a watershed management protocol that the GoI can replicate in other watersheds under its RVP/FPR schemes.



Map adapted from *An Atlas of India*

at the "evaluation team") tested a preliminary draft of the Programme Evaluation Protocol (PEP)—a manual offering detailed instructions for executing a set of nine indicators. The test evaluation was conducted in two IGBP watersheds, Arki in Himachal Pradesh and Kattery in Tamil Nadu. These evaluations were carried out with two goals in mind.

The first goal was to test whether the indicator set is able to function as intended. Informed by these field tests, the PEP has been modified. The PEP is presented in its entirety in Annex A of this book. It is intended to be a general, but detailed guide that can be followed by other programmes wishing to undertake a similar evaluation.

The second goal of the test evaluations was to gather data, which could be used to evaluate the RWS Programme and serve as a baseline for subsequent evaluations. Some of the more interesting findings are presented in the remaining chapters of this book, alongwith detailed discussions of the individual indicators.

II

WHAT MAKES A GOOD INDICATOR?

THE QUALITIES OF A GOOD INDICATOR

The difficulty with indicators lies not just in selecting ones that can be easily measured, but in selecting *valid* indicators—that is, indicators that are suitable proxies for the objectives ultimately being measured. Gauging the validity of an indicator can be difficult. For example, *The Economist* magazine has for several years used an indicator of foreign exchange rate volatility based on the local currency price of a Mcdonald's Big Mac® relative to the price in the United States. While *The Economist* itself presents arguments as to why this may not be a valid indicator (see box on following page), evidence suggests that the Big Mac® is a reasonably accurate predictor of exchange rate fluctuations.

Indicator selection is difficult in the realm of natural resource management because there is no universally agreed upon set of indicators. But, as a recent GTZ report (Heidrun Traeger 1997, 79) argues, the search for a universal indicator set leads to a "dead end" because the choice of indicators depends upon the objectives of the programme being assessed and the natural conditions under which the indicators are used.

This means that the indicators chosen need to be *programme-specific*. That indicators should only seek to measure change concerning project objectives is important. The point (which is very much linked to the issue of causality) is that if a programme does not seek to affect a particular phenomenon, one can hardly attribute changes in the phenomenon to that programme. For example, if a project aims to preserve biological diversity, it makes little sense to employ indicators that measure ground water quality. This may lead observers to believe that the project has been responsible for an increase in ground water levels that has occurred recently.

In addition, indicators by themselves (e.g., the number of spotted owls in a fixed geographical area) have little meaning. Indicators only have meaning in the light of *specified targets* and *threshold values*. For example, biologists might determine that bio-diversity is threatened when the number of spotted owl pairs in a one hundred square kilometre of forest falls below twenty. Targets and thresholds must be specified for all indicators.

Useful indicators must be *comparable* across time and space. In order to assess change in one case over time, a researcher must be able to ascertain whether current measurements show significant variance

THE HAMBURGER INDEX

For more than a decade, *The Economist*'s Big Mac index has provided a delectable guide to whether currencies are at their "correct" level. The Big Mac index is based upon the theory of purchasing-power parity (PPP)—the notion that a dollar should buy the same amount in all countries. In the long run, argue PPP fans, currencies should move towards the rate which equalizes the price of an identical basket of goods in each country. Our "basket" is a McDonald's Big Mac®, which is now produced in over 100 countries. The Big Mac PPP is the exchange rate that would leave hamburgers costing the same in America as abroad. Comparing actual exchange rate with PPP provides one indication of whether a currency is under or over-valued.

The first column in the table below shows local-currency prices of a Big Mac; the second converts them into US dollars. The average American price (including tax) is $2.42. China is the place for bargain hunters: a Beijing Big Mac cost only $1.16. At the other extreme, Big Mac fans pay a beefy $4.02 in Switzerland. In other words, the yuan is the most undervalued currency (by 52%), the Swiss franc the most overvalued (by 66%).The third column calculates Big Mac PPPs. For example, dividing the German price by the American once gives a dollar PPP of DM 2.02. The actual rate on April 7th was DM 1.71, implying that the Deutsche-Mark is 18% overvalued against the dollar. But over the past two years the dollar has risen nearer to its PPP against most currencies. The yen is now close to its PPP of Y121. Two years ago the Big Mac index suggested that it was 100% overvalued against the dollar.

Some critics find these conclusions hard to swallow. Yes, we admit it, the Big Mac is not a perfect measure. Price differences may be distorted by trade barriers on beef, sales taxes, or large variations in the cost of non-traded inputs such as rents. All the same, the index tends to come up with PPP estimates that are similar to those based on more sophisticated methods.Moreover, research by Robert Cumby, an economist at Georgetown University, suggests that a currency's deviation from Big Mac PPP can be a useful predictor of exchange rates. Over the past year, the Big Mac index has correctly predicted the direction of exchange-rate movements for eight of twelve currencies of large industrial economies. Of the seven currencies which changed by more than 10%, the Big Mac standard got the direction right in six cases. Better than some highly-paid currency forecasters. Investors who turned up their noses at the Big Mac index should now be feeling cheesed off.

THE HAMBURGER STANDARD	Big Mac Prices In local currency	Big Mac Prices In dollars	Implied PPP* of the dollar	Actual $ exchange rate 7/4/97	Local currency under(-)/over(+) valuation, ** %
United States * **	**$2.42**	**2.42**	-	-	-
Australia	A$2.50	1.94	1.03	1.29	-20
Brazil	Real 2.97	2.81	1.23	1.06	+16
Britain	£1.81	2.95	++ 1.34	++1.63	+22
Canada	C$2.88	2.07	1.19	1.39	-14
China	Yuan9.70	1.16	4.01	8.33	-52
Germany	DM4.90	2.86	2.02	1.71	+18
Japan	Y294	2.34	121	126	-3
Malaysia	M$3.87	1.55	1.60	2.50	-36
Mexico	Peso14.9	1.89	6.16	7.90	-22
Russia	Rouble11000	1.92	4545	5739	-21
Singapore	S$3.00	2.08	1.24	1.44	-14
South Korea	Won2300	2.57	950	894	+6
Switzerland	SFr5.90	4.02	2.44	1.47	+66
Thailand	Baht46.	1.79	19.3	26.1	-26

* Purchasing-power parity; local price divided by price in the United States. ** Against US dollar
*** Average of New York, Chicago, San Fracisco and Atlanta. ++ Dollars per pound

This story has been adapted from *The Economist* April 12, 1997 (75).

from previous measurements. In order to assess variation across cases, the researcher must be able to show variance longitudinally. Both attempts to measure change require indicators that produce easily comparable data points. This is especially true as data sets grow larger.

In order to facilitate comparison, quantifiable indicators are often preferred. This preference is because quantifiable indicators are often thought to be more *reliable* (i.e., they will produce the same results no matter who undertakes the evaluation or the conditions under which it is undertaken) and *replicable* (i.e., deployable at different programme sites and in different settings). While reliability and replicability are of the utmost importance, they do not require quantification. Indicators need only to be *explicit* (used here to mean "clearly defined and specified").

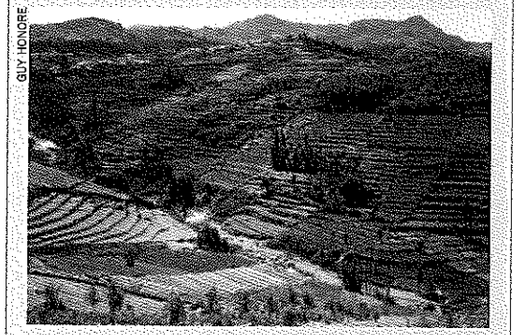
Given explicit specifications, qualitative/descriptive indicators are not necessarily inferior to numerical indicators. In fact, there are many instances when only qualitative indicators can be used. For example, odour, taste and colour might be the quickest, cheapest and easiest indicators to assess the quality of local drinking water. Odour is not directly quantifiable, neither are taste or colour. While some qualitative descriptions of water odour might be totally incomparable in nature (e.g., poems about the aesthetic qualities of different water samples), this does not need to be the case for all qualitative descriptions. Instead, a research protocol can clearly define a

THE OBJECTIVES OF THE RWS PROGRAM

New approaches to natural resource management work from the assumption that purely technical approaches are incomplete. Thus inspired, the RWS Programme is experimenting with a more holistic approach. This Programme began with the hypothesis that the needs and desires of local people must be incorporated into conservation efforts if they are to be successful. The theory is that successful conservation programmes require local knowledge and co-operation. These can only be obtained when local people feel that programmes are serving their needs. So while the end goal is still soil and water conservation, socio-economic development is a means to this end.

NATURAL RESOURCE MANAGEMENT

As already mentioned, the primary objective of the RWS Programme is natural resource management. In resource-poor countries like India, natural resource management is more concerned with the sustainable use and



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recharge of existing resources rather than with outright protection from use. Along with the interrelated goals of soil and water conservation, there is also a concern about the quality (e.g., salinity, productivity) of these resources. Another related issue is that of the local flora—tree cover in particular is important to soil and water conservation. Other issues of natural resource management (e.g., waste disposal, air quality, etc.), though accepted as important, are of secondary consideration.

POVERTY ALLEVIATION

In the socio-economic realm, the RWS Programme's main objective is poverty alleviation. As long as poverty per-

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THE OBJECTIVES (Cont.)

sists, natural resource management will remain a distant dream. Thus, poverty abatement is a means towards

natural resource management, and an end in itself. This very broad objective has been divided into the following subheadings.

Wealth augmentation

Poverty has many definitions, the most basic of which is a shortage of wealth, either in cash or kind. Without wealth, people have few choices and are forced to subsist using whatever means they can find in their surroundings. Such desperation often leads to environmental degradation. For the sake of sustainability, watershed management programmes need to focus on the physical needs (food, fuel products, timber, fodder, water supply) of local people, as well as income generating activities.

Economic equity

Vast amounts of wealth do little to offset natural resource degradation if only a few people have access to it. Resources must be distributed such that even the poorest people have access to them. Seeking to help the poorest of the poor first, the RWS Programme considers the needs of the landless labourers a priority.

Health

Improved physical health is a fundamental component of

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limited number of descriptive terms which would be employed to describe each water sample (e.g., sulphuric, brackish, etc.). Such a set of terms could be used to specify and compare the smell of water samples across space and time. If desired, such clearly specified qualitative indicators can, in the end, be numerically coded and used in a statistical analysis.

Indicators also need to be *precise* (i.e., finely calibrated) measures in order to be useful. An indicator may be a valid measure of some phenomenon, but if it fails to register anything except very large changes it is of little value. For example, the number of tractors owned in a village is an indicator of growing wealth among farmers, but such an indicator would fail to register small or even modest increases in income.

Even if an indicator is precise, it also needs to be *responsive*. That is, the indicator must register change soon after it has occurred. For example, the ratio of child height-for-age is an excellent measure of malnutrition, but the effects of malnutrition one season do not show up immediately in stunted growth—investigators will obtain such information only after several years.

Some authors argue that only "widely accepted" indicators should be used. The logic behind this argument is that if the consumers of an evaluation do not believe that the indicator is valid, or if they do not understand it, they will not accept the results of the study. This is a

good point, but it does not really support the argument that indicators need to be widely accepted. If the evaluation undertaken is only for the consumption of a select audience, only that audience needs to understand the indicators and accept them as valid. Care only needs to be taken to select indicators that the target audience will accept as valid. Regardless of how widely accepted the indicators are they should be devised with *ease of comprehension* in mind. Highly complex or abstract indicators will cease to have meaning, especially when the results are shared with lay audiences.

COMPOSITE VERSUS INDIVIDUAL INDICATORS

In a quest for extreme parsimony many composite indicators have been developed. Composite indicators amalgamate a wide range of information on different (but generally related) subjects into one index. A good example of this is the UNDP's Human Development Index (HDI), which combines information on rates of literacy, life expectancy and real per capita GDP to produce a single quantitative indicator of socio-economic development. While composite indicators are extremely easy to digest and compare, developing and computing them can be complex and time consuming. In addition, such indicators can be quite confusing and deceptive, given the manner in which the components of the index are combined.

The alternative is to use sets of individual indicators. Since one indicator by

THE OBJECTIVES (Cont.)

human development. Without health, human life is short and unpleasant. With good health, people are able to pursue improvements in their own lives and in their surrounding environment.

Education

Education improves the quality of a human life. It dispels ignorance and facilitates communication. Education

is also a tool for self-improvement. Through education, people are better able to understand the long-term goals of natural resource management and work towards them.

Gender parity

Countless studies have shown that when women benefit from a programme (in terms of improved environment, nutrition, education, capital availability, etc.) overall levels of socio-economic development increase. Informed by this knowledge, IGBP Principles state that, "Development of Self-Help Groups amongst women is expected to be a main activity of the NGOs".

SELF-HELP AND PARTICIPATION

The current thinking in the development field is that projects are most successful when they help people help

themselves. Once self-help is facilitated, aid is no longer necessary. The importance of local knowledge is ano-

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THE OBJECTIVES (Cont.)

ther reason why self-help and participation are so important—without participation at the planning stage, projects cannot be properly designed to suit local needs and desires. Finally, as a component of self-government and democracy, participation is an end in itself.

SUSTAINABILITY

Programmes that continue to operate after withdrawal of project monetary and/or technical supports are sustainable. To be sustainable, **projects cannot rely on subsidies**. Local people **must make contributions to projects that benefit them and they should** be able to carry out all programme tasks (hence, the need for participation in the earliest stages). In addition, projects must have access to some mechanism through which changing external environment and internal disputes can be resolved.

REPLICABILITY

The RWS Programme is a pilot programme. The ultimate goal, is to give the GoI a programme which can be implemented on a large scale. For this to happen, the programme must be replicable. Replicability is the capacity to duplicate programme processes and benefits in a new setting. This goes beyond sustainability towards issues of new capital investment and transferability of agency strategies.

itself is generally not enough to assess impact across all project objectives, especially when the project has broad goals, practitioners must use indicator sets. The set must be assembled such that it contains indicators that measure change in regard to all relevant objectives. These sets must strike a delicate balance between offering the maximum amount of information without overwhelming the consumer with too much data or exhausting project resources. The indicator sets need to strive for a state of what is termed "optimal ignorance", that is presenting the information necessary to evaluate impact, and nothing more.

LOCAL VERSUS NATIONAL INDICATORS

It is important to note that there are certain types of very familiar indicators, which are not appropriate for this undertaking. Watershed management programmes are generally located in micro-watersheds—sections of watersheds, which by themselves are relatively small. Many of the development indicators commonly mentioned in media reports and popular discussions of natural resource management are designed to measure impact at a national level. The HDI example discussed earlier is in this catagory. Such indicators are often calculated from estimates and projections based on national surveys and in the light of past trends. The indicator set developed here is concerned with change at the programme level. For this reason, national level indicators were not used here.

THE DIFFICULT ISSUE OF CAUSALITY

Employing a well-designed indicator set, investigators will be able to measure various aspects of change at programme sites. Often, however, it is difficult to determine whether the changes measured should be attributed to programme activities, or not. The physical and social phenomena being dealt with in natural resource management and the conditions under which they are being measured are far too complex to isolate causality using only indicators. In fact, using indicators alone, it is likely that investigators will draw misleading conclusions. This is because non-programme factors (e.g., large-scale economic, social and environmental fac-

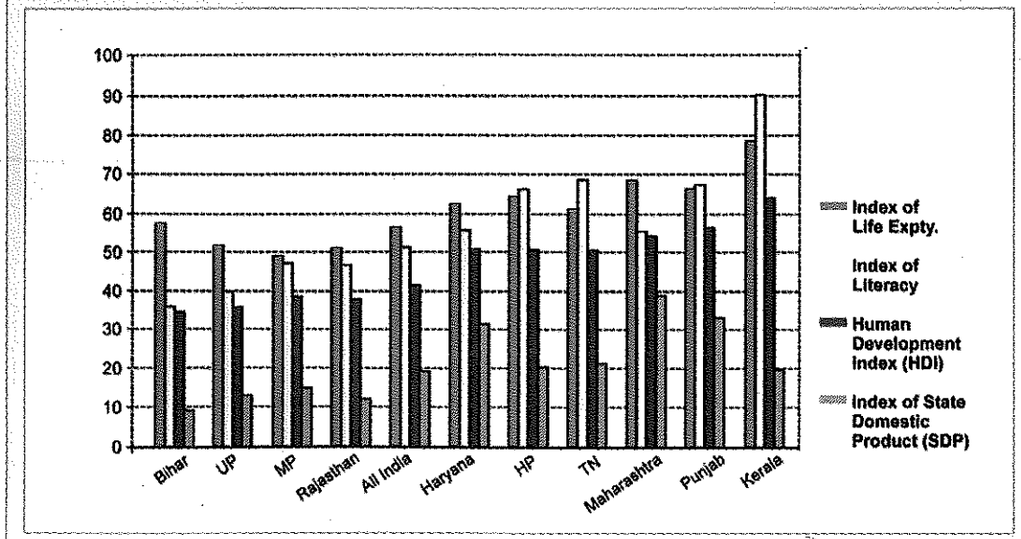
THE HUMAN DEVELOPMENT INDEX AND INDIA'S STATES

The United Nations Development Programme (UNDP) has developed and advocated the Human Development Index (HDI) as a tool to measure a country's achievements in the enhancement of human capabilities development. The HDI is constructed from three indicators: life expectancy at birth, to measure health status and longevity; educational attainment, to represent the level of knowledge and skills; and an appropriately adjusted real GDP per capita (in purchasing power parity dollars), to serve as a surrogate for command over resources. The Human Development Report (HDR) categorically identifies the above three parameters as essential, though not exhaustive, for choices at all levels of development. Many other opportunities remain inaccessible in their absence. While the HDI is the measure of overall levels of human development in society, it does not register distributional problems. For example gender disparities that exist, in education as well as life expectancy, cannot be determined from an HDI score. These issues are dealt with by other indicators, such as the Gender-related Health Index.

In the table below the HDI has been computed for some of the major states of India and the country as a whole, (on a composite index ranging from 0 to 100). The index gives equal weightage to three component indexes computed from the most recent data on 1) the expectation of life at birth during 1989-93; 2) the educational attainment of the population based on a combined measure of adult literacy levels in 1991 and the enrolment ratio in middle schools in 1993; and 3) the purchasing power parity price adjusted per capita net state domestic product for 1993, measured in dollar terms.

The HDI for India as a whole by this modification turned out to be 42.8. With an HDI value of 42.8, India ranks quite low in the comity of nations, 135 among the 174 countries studied by the UNDP. There is a good deal of variation in the HDI values across states. Kerala, with an HDI value of 62.8, ranks highest among the states. In the international scene, its HDI rank would place it at 105, above China (with an HDI of 60.9) and Egypt (61.1). The lowest HDI values were observed in Bihar (with an HDI of 34.1) and Uttar Pradesh (35.5). These low values are comparable to the HDI value of Nepal (33.2) as given in the 1996 HDR. These states would be ranked 150 and 151 at the international level. The states with an HDI score of more than 50 are Haryana, Himachal Pradesh, Kerala, Maharastra, Punjab, and Tamil Nadu. The states having scores below 40 are Assam and Orissa and the large Hindi-speaking states of the north: Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh.

This section has been adapted from the United Nations publication *India: Towards Population and Development Goals.*



tors) are often responsible for the observed changes.

According to a noted expert in the field of impact assessment, Krishna Kumar, one approach to the causality problem is to measure "net impact". This entails subtracting all impacts that are caused by external forces from any measured changes. However, Kumar counters that, "Experience shows that the two methodological strategies for measuring net impact—quasi-experimental design and statistical controls . . . have not proven practical for use in agricultural and rural development projects. Both strategies pose major conceptual and methodological problems that are difficult to resolve satisfactorily. Moreover, they require massive and expensive data collection efforts which must be conducted over extensive periods of time" (Kumar 1989, 6).

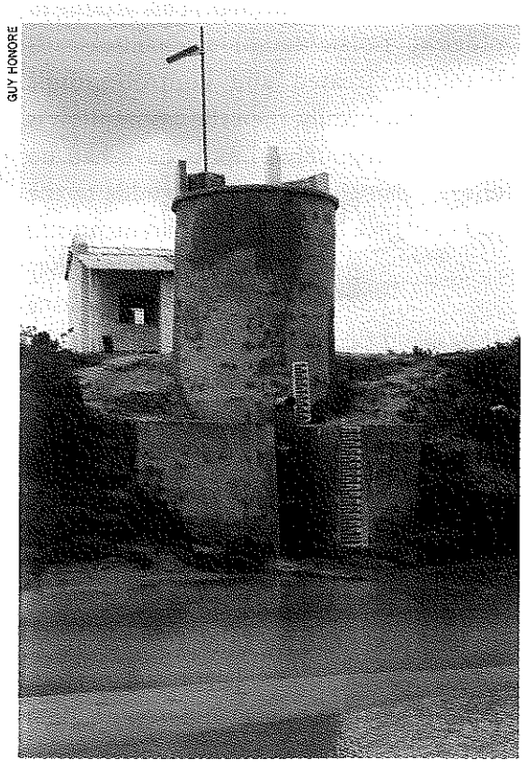
Kumar's solution to this problem is to supplement the data provided by indicators with qualitative studies. The indicators themselves provide information regarding the magnitude and direction of change. Qualitative studies can then determine whether these changes are attributable to project activities. Kumar (Ibid., 7) recommends essentially three different methods for carrying out such studies: 1) in-depth, unstructured interviews with key informants such as government officials, project management staff, beneficiaries, and local leaders; 2) community meetings and focus-group discussions with the same people; and 3) direct observation by experts. Such participatory methods rely on the premise that local people understand their own environment. While these techniques are not foolproof, they can help establish a resonable degree of certainty as to whether programmes are responsible for observed changes or not.

Whenever possible, this book supports Kumar's recommendations. When that is not possible (especially *vis-á-vis* phenomena that lay people do not readily observe, like erosion), the use of controls is necessary. Controls are often, however, expensive to use because they increase (often double) the number of measurements that must be taken. In addition, controls are often unable to filter out the effects of larger socio-economic trends.

III

METHODS OF DATA COLLECTION

The literature on monitoring and evaluation often assumes a dichotomy between so-called scientific or objective (quantitative) and subjective (qualitative) methods of data collection. This distinction should be rejected. There is no reason why qualitative observations cannot be objective and even quantifiable (nor is it inconceivable that quantitative measure could be subjective). To return to an earlier example, an investigator could objectively rate the odour, taste and colour of water against a well-specified qualitative scale. Such ratings could, if desired, be quantified in order to conduct statistical analyses. With this in mind, this book has chosen to divide research methods into "extractive" and "participatory" categories and argues that these methods can be used in a complementary fashion.


GUY HONORE

Silt Monitoring Station
(Korkara, Bihar)

EXTRACTIVE METHODS

Often referred to as "scientific" methods of data collection, these methods strive to maintain a distance between the investigator and the subject under investigation. The investigator's main role is that of an outsider, extracting information regarding some local phenomenon. This information collected by extractive methods is for the benefit of a distant consumer (a state department or a development agency), not the local people. The extractive researcher strives to maintain objectivity—a distance from the subjects in order to lessen bias. To these ends, extractive research methods favour quantifiable data. Quantification is also done to facilitate analysis across cases.

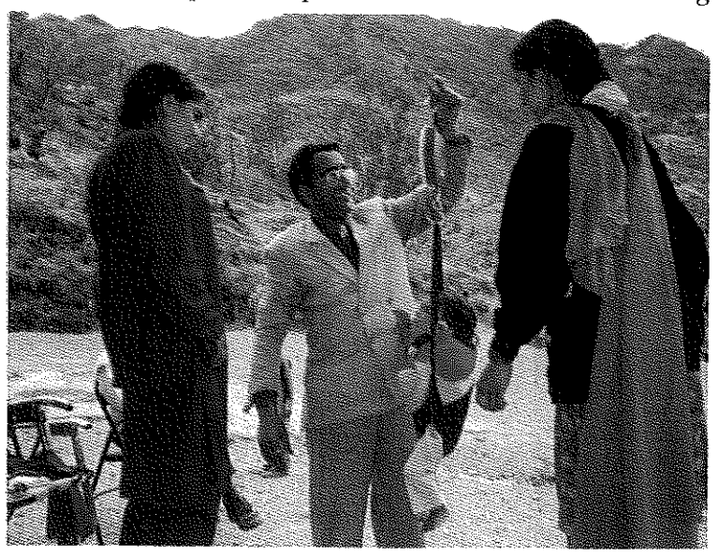
Strengths of extractive methods

Unlike much of the current thinking in the area of impact assessment, this book agrees that extractive methods tend to be less prone towards bias. Investigators measuring precisely defined, often quan-

tifiable phenomena are less able to introduce biases into their observations. Extractive methods are also less likely to be affected by local informants seeking to skew the results of the evaluation in some direction. This is because extractive indicators seek to measure concrete phenomena, not collect opinions in an open-ended, participatory fashion.

The quantified results of extractive research methods are also much easier to analyse and compare across cases. Purely descriptive case reports are nearly impossible to analyse in terms of variation across cases. Quantified results are also much easier for consumers to digest and more difficult to creatively interpret. A single, relatively simple table can display the quantitative data for large numbers of data points, all of which are very easy to compare with one another. With qualitative data, readers pressed for time may not find the time to read descriptive case studies or the descriptive comparisons.

MICHAEL BOLLOM



Weight-for-age is an extractive (and very quantifiable) indicator of health (Arki, Himachal Pradesh)

Weaknesses of extractive methods

Extractive methods can be very expensive and time consuming. Scientific studies require highly-skilled consultants to design and carry out. These studies may require the use of expensive tools, such as technical measuring devices, surveys, and computers. In order to scientifically measure change, studies need to be carried out over long periods, often requiring multiple visits to the same field sites.

Extractive, scientific methods also require the use of control groups. Control groups are populations (be they individuals, villages, rice fields), which are similar to the sample, but that are not treated by programme inputs. The scientific method requires that both sample and control populations are measured. This is done in order to isolate causal mechanisms. If both the treated and control groups behave identically, then the assumption is that the programme inputs have had no effect. Using control groups adds to the cost of measurement and may be difficult as they often require establishing relationships and setting up infrastructure in additional locations.

The most important criticism of extractive methods, at least from the perspective of this book, is that they encourage researchers to collect, analyse and report their data without reference to the context from which it

was gathered. Without local context, even the most precisely measured and analysed data may be grossly misinterpreted. For example, a researcher may be measuring male-to-female school enrolment ratios as an indicator of local prosperity. The logic of such an indicator might be that, as families prosper, they will send their girls to school for longer periods, thus bringing the ratio closer to one. If the ratio drops (and there are fewer girls to boys in school), observers will conclude that prosperity has decreased. The local reality may be quite different. If, in a particular culture, farming is considered women's work, families may be pulling their girls out from school to work more hours if fields are increasingly bountiful. The observer simply relying on extractive observations would not be able to know that he had totally misinterpreted the findings.

PARTICIPATORY METHODS

Participatory methods of project evaluation grew out of a dissatisfaction with more extractive methods. Participatory methods, attempted to circumvent the large time and resource requirements of scientific methods by relying more upon the knowledge that local people have of their own situations. For example, participatory researchers have shown that it is not necessary to return every year for years to examine trends in rice yields when local farmers can very quickly give fairly accurate estimates of these figures in a single morning!

Advocates of this approach argue that, in addition to being less temporally demanding, the methods require few fancy tools, aside perhaps a chalkboard or paper for diagramming. They maintain that, in addition, this methodology is not neces-

PARTICIPATORY APPROACHES

Rapid Rural Appraisal (RRA)

The RRA is a social science methodology that emerged in the early 1980s for applications in development co-operation. In it, a multidisciplinary team makes use of simple, non-standard methods and the knowledge of local people to quickly elicit, analyse and evaluate information and hypotheses about rural life and rural resources that are of relevance for taking action. RRA techniques are an attractive alternative to conventional survey methods when the aim is not to systematically capture precise figures through a typically time-consuming and cost-intensive undertaking, but rather speedy and action-oriented assessment of local knowledge, needs and potentials with an aim to elaborating strategies to resolve conflicts or investigate specific problems. They are also suitable for shifting the focus of conventional surveys onto essential aspects.

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Participatory Rural Appraisal (PRA)

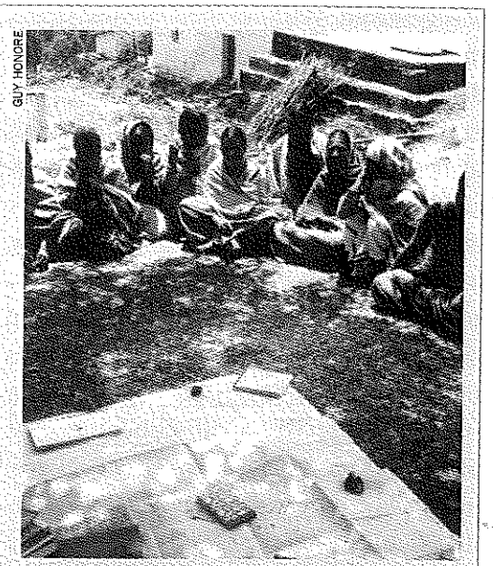
The PRA is a further evolutionary stage of the RRA approach. In it, emphasis is placed on empowering local people to assume an active role in analysing problems and drawing up plans, with outsiders mainly acting as "facilitators". Here it is no longer the external experts but rather the local people themselves who "own" the results of the study. This enables them to assume responsibility for implementing the activities based on them.

Adapted from Schonhuth and Kievelitz 1994, IX.

PARTICIPATORY TECHNIQUES

1. Review the secondary sources
2. Direct observation
3. Semi-structured interviews
   * Key individuals
   * Focus groups
   * Chain of interviews
4. Ranking and scoring of preferences, intensities, availabilities etc.
5. Construction and analysis of maps, models and diagrams
   * Social and resource maps
   * Topic and theme maps
   * Census maps and models
   * Transects (cross-sectional diagramming of land forms)
6. Diagramming
   * Causal, linkage flow diagramming
   * Time lines, trend analysis
   * Seasonal diagrams
   * Activity profiles and daily routines
   * Venn (or *chapati*) diagrams
7. Case studies and stories
8. Drama, games and role plays
9. Possible future and scenario workshops
10. Triangulation of data
11. Continuous analysis and reporting
12. Participatory planning, budgeting, monitoring, evaluation and self-surveys
13. Do-it-yourself (Outsiders being taught by insiders)

Adapted from Mikkelsen 1995, 71.



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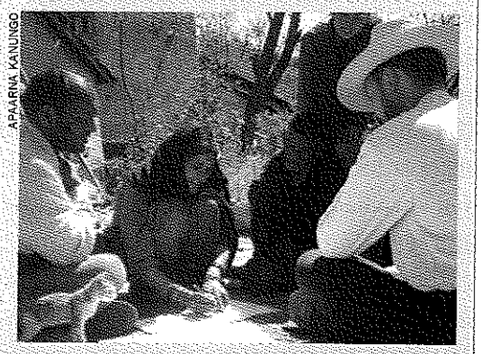


APAARNA KANUNGO

sarily inaccurate and subjective—information gathered in such a fashion is actually quite valid and reliable.

Participatory methods have also been advocated by those who believe that development work should be more democratic. Chambers (1994, 1983) and others argue that development workers have an ethical obligation to include beneficiaries at every stage of the aid process-planning, implementation and evaluation.

Strengths of participatory methods

There is no doubt that participatory methods offer investigators with tools to evaluate impacts very quickly. This is especially true when trying to examine change. Scientific methods, even when they are very quickly executed, usually require that multiple measures be taken over time and that controls are used. Participatory methods can be used to measure change in a single site visit, without the use of controls. They are also very Spartan in terms of the amount of equipment required.

Participatory methods solve the problem of decontextualized data as well. The data gathered using participatory methods are inherently contextualized. In addition, the activist nature of participatory methods is quite appealing from the standpoint of many organizations concerned with development—the goal of most development agencies and NGOs is not just to measure change, but to effect it. Allowing people to become involved in measuring and interpreting the programmes that affect them increases local understanding and involvement with programme activities.

Weaknesses of participatory methods

Despite the current love affair with participatory methods, they have many weaknesses. They are subject to biases of various sorts and are less reliable as a result. First, there is the issue of active manipulation. Beneficiaries, whether they are good-willed or wily manipulators, can turn group discussions to their own ends. Investigators themselves may have conscious or unconscious agendas that affect what they see, how they ask questions, and how they write their report.

Second, participatory methods at times face obstacles to participation. Local people may simply not want to participate—they could be suspicious or just too busy. Those who do participate may not represent a true sample of the local population—the old, the young and the unemployed are often over represented. Local power relationships may dictate that important issues are never discussed, or that those who would discuss them never attend a meeting. Local cultural considerations may also preclude women from talking or even ensure that only positive things are said in public to visiting *sahibs*.

Third, the results generated by participatory assessments tend to be less comparable because they are often ad hoc—when beneficiaries control the evaluation agenda, there is no telling what issues they will want to pursue. The bulky, qualitative reports produced by this method are often more difficult to consume than the tables and graphs produced through quantitative analysis.

Fourth, some phenomena are simply less easy to study using participatory methods. This is especially the case with very abstract issues, or issues of no immediate, tangible relevance to local people. For example, how reliable an estimate can local people give about the mineral content of their soils?

Finally, participatory methods may not be as inexpensive as originally argued. Just like traditional researchers, practitioners of participatory methods need to be highly educated and specially trained. Such experts are well paid. In addition, while participatory methods do not need to be carried out over multiple visits, the one necessary visit is still labour and time intensive.

THE CASE FOR USING MULTIPLE METHODS

In order to compensate for the weaknesses of both extractive and participatory methods, the complementary use of both is advocated here. Where possible, extractive, indicators should be used. Data from these sources can be easily aggregated,

analysed and communicated to experts and lay readers. It is not enough, however, to simply measure the programme impacts. Local participation is necessary to interpret the results of impact assessments. Local interpretations can verify extractively collected data and help locate causal mechanisms.

In addition and in the spirit of participatory development, extractive data should be combined with community-based reassessment of local problems. Effective natural resource management programmes must work closely with local people to be successful (i.e., only with local knowledge and participation can programmes be a success). Since local problems and preferences change over time, impact assessments should be used as an opportunities to re-establish contact with beneficiaries, asking them to give suggestions as to how programmes could be fine-tuned to accommodate mutating problems arising from changing perceptions.

Local interpretation of assessment findings can be done through PRAs or informal interviews with key informants. Both should be carried out with several different sorts of key informants (selected on the basis of wealth, status, gender and location) so that their responses can be triangulated. In addition, final reports should be shared with beneficiaries at large. This can be done through women's self-help groups, farmers groups etc. During these discussions the investigators should assess how local people interpret findings and how programmes could be modified to improve outputs.

IV

RATING INDICATORS

Given that there could be an almost infinite number of potential indicators to measure the impact of watershed management programmes, evaluators have the luxury of choosing ones that suit their unique needs. Most watershed management programmes, however, face resource constraints. For example, the current level of investment in the IGBP's RWS programme is approximately Rs5000/hectare (about DM229/hectare at the current rate of exchange). As such, the programme must be executable under tight resource constraints.

The following subsections are to be used in conjunction with the Survey of Indicators presented in Chapter V. Each subsection begins with a brief discussion of a particular resource constraint. A scale is then presented with which potential indicators can be scaled *vis á vis* this constraint. This is done so that various indicators can be compared in terms of resource demands.

EQUIPMENT COSTS

Equipment costs can vary greatly from indicator to indicator. An indicator whose use entails only observations or oral surveys requires no tools (apart from writing utensils). A silt monitoring station, on the other hand, requires expensive equipment that is also costly to maintain.

The table below, presents a scale for rating perspective indicators as to their potential equipment costs. These costs are rated against the total programme budget for a particular programme site.

RATING INDICATORS—EQUIPMENT COSTS

Rating	Conditions
++	No special tools required to use the indicator.
+	Tools with minimal costs (< .5% of total programme budget, or < Rs 25/ha). This is less than Rs 50,000 for a 2000 hectare watershed.
-	Tools with high costs (.5% to 3% of budget, or Rs 25/ha to Rs 150/ha). Rs 50,000 - Rs3,00,000 for a 2000-hectare watershed.
- - -	Tools with prohibitive cost (> 3% of budget, or > Rs 150/ha). This is greater than Rs 3,00,000 for a 2000 hectare watershed.

SKILL LEVEL

Regardless of the tools employed, some indicators are more difficult to execute than others. While many factors can make a tool more or less difficult to use, the ease of use is defined here in terms of the amount of training beyond literacy that is necessary to employ an indicator (which is different from the skill level necessary to design the indicator or to analyse the data from the indicator). For example, a literate villager can learn how to read a rain gauge and make data entries onto a table. On the other hand, conducting a Participatory Rural App-raisal requires a great deal of formal education, in addition to specialised training.

The following scale is used in the Survey of Indicators to rate perspective indicators with regards to the skill levels required of those who execute the indicator. Final analysis of the data collected must, however, always be carried out by trained professionals.

RATING INDICATORS—SKILL LEVEL

Rating	Conditions
++	Semi-skilled labour (costing approximately Rs 70 - 100 per day).
+	Skilled labour (costing Rs 100 - 150 per day).
-	College Graduates (Rs 200 - 500 per day).
- - -	Expert Consultant (Rs 1000 - 5000 per day).

MAN HOURS

It is possible for the use of an indicator to require no special tools or training to use, yet its use could still be labour intensive. For example, a relatively unskilled person can measure soil runoff in a stream with very simple tools. However, he must take two samples every hour, each of which must be filtered, dried and labelled. This must continue twenty four hours a day, especially during the monsoon months. Such an indicator is incredibly labour intensive.

The following table presents a scale that is used in the Survey of Indicators to rate perspective indicators as regards their total labour requirements.

RATING INDICATORS—MAN HOURS

Rating	Conditions
++	Use of the indicator requires < 1 man-day per watershed per year.
+	Use of the indicator requires approximately 1 - 2 man-days.
-	Use of the indicator requires 3 - 5 man-day.
- - -	Use of the indicator requires >5 man-days.

THE NUMBER OF FIELD VISITS REQUIRED

Resource requirements are also affected by the number of site visits required to execute an indicator. This is because travel and per diem costs in the field can be expensive. Some indicators can be fully deployed in just one site visit. This is especially true when participatory methods are used. Other, more scientifically-measured indicators require multiple site visits in order to record the changes that have occured over time.

RATING INDICATORS—FIELD VISITS

Rating	Conditions
++	The indicator can be fully executed (including tests for change) in 1 field visit.
+	Use of the indicator requires at least 2 field visits.
-	Use of the indicator requires 3 - 4 field visits.
- - -	Use of the indicator requires more than 5 field visits.

INTERACTIONS BETWEEN COSTS, SKILLS, MAN HOURS AND VISITS

These four factors combine to determine the total resource demands of a particular indicator. Labour costs are the product of the number of man hours required and the necessary skill level of that labour. Total costs are then a sum of this product with equipment costs and the number of field visits:

Total Costs = (Man Hours * Skill Level) + Equipment Costs + Field Visits

All else being equal, indicators with lower total costs are favoured.

RESPONSIVENESS—OBTAINING RESULTS AS QUICKLY AS POSSIBLE

While this is not really a monetary resource constraint, the issue of responsiveness is related to the efficient use of time. As such, perspective indicators are also rated concerning their responsiveness in the Survey of Indicators . Less responsive indicators register changes in the target objectives more slowly than do responsive ones. For example, while the effects of an erosion control programme will register almost immediately in terms of decreased soil loss, the effects of an poverty alleviation programme may take years to show up as it is measured anthropometrically.

RATING INDICATORS—RESPONSIVENESS

Rating	Conditions
++	The indicator registers change in the target objective almost immediately.
+	Change is registered within 6 months.
-	Change is registered within 1 year.
- - -	Change takes 3 years or more to register.

The table on the previous page presents a scale used to rate perspective indicators concerning their responsiveness.

MONITORING AND EVALUATING PILOT PROJECTS VS. PROJECTS AT THE DEMONSTRATION OR REPLICATION STAGES

Evaluating the impact of a pilot project is necessarily much more resource intensive than monitoring well established schemes. In the case of pilot projects, much more care must be taken to study its complex effects. With projects in the replication stage, project managers should already have a good idea of project impacts. At this stage managers should be more concerned with efficient implementation. This can be measured with far fewer resources and in less time. The tables in this book have been constructed with pilot projects in mind.

V

COMMONLY USED INDICATORS: A SURVEY

LITERATURE SURVEY

Given the objectives of watershed management, there are possibly an infinite number of indicators that could be used, some much more effectively than others, to evaluate programme impacts. The Survey of Indicators presents a collection of indicators that could be employed to measure changes concerning the objectives discussed in Chapter II. These indicators have been gathered from the available literature on impact assessment (see the Recommended Readings), from consultations with informed parties, as well as being created by the author. As per the discussions in Chapter IV, all indicators have been rated with regards to their equipment costs, training needs, total man-hours required, the number of necessary field visits as well as responcivness. These ratings are based only on the author's estimations.

This table was constructed so that other organizations could benefit from the results of IGBP-funded research. Given that indicator sets are programme-specific, it is unlikely that another organization, even one focusing on issues of watershed management, would be able to use the exact same indicator set proposed in this report. Other organizations should, however, be able to construct their own indicator sets by drawing from this table.

SURVEY OF INDICATORS

Objective	Criteria	Indicator	Sub Indicator	Equipment [1]	Skill [2]	Man Hours [3]	Field Visits [4]	Responsive [5]	Method [6]
Natural Resource Management and Environmental Protection — **Soil**	Quantity	soil runoff in local streams		- - -	++	- - -	- - -	++	S
		depth of top soil		+	-	-	+	++	S
	Physical quality	water infiltration rates		+	-	-	- - -	++	S
		water-holding capacity		+	-	-	- - -	++	S
	Chemical quality	fertility		+	-	- - -	- - -	- - -	S
		salinity	salinity of sampled fields	+	-	-	+	++	S
			hectares of land too saline to farm	++	-	-	++	- - -	P*

*As discussed in Chapter III, participant indicators can be fully executed in just one field visit. It is nevertheless true that results are generally better with multiple field visits.

1. Indicates the cost of the equipment needed to implement the Indicator. Measured on a scale of "++" to "- - -", with "++" signifying no special equipment needed. See Chapter IV for details.
2. An indicator is easy to use if it requires no special training on the part of the field staff. Measured on a scale of "++" to "- - -", with "++" signifying no special training needed. See Chapter IV for details.
3. An indicator requires little labour if the data collection can occur in one man day. Measured on a scale of "++" to "- - -", with "++" signifying very rapid data collection (inside of one day). See Chapter IV for details.
4. The number of field visits required to fully execute the indicator. "++" signifies that only one field visit is necessary, while "- - -" means at least five visits are required. See Chapter IV for details.
5. Indicates, on a scale of "++" to "- - -", how quickly the indicator registers changes in the target objective, with "++" signifying almost immediate results. See Chapter IV for details.
6. Indicates the data gathering method to be used, "S" for scientific/extractive methods, "P" for participatory methods. "E" signifies that either can be used. In the case that E is present, the scores in the other columns are for scientific methods. See Chapter IV for details.

SURVEY OF INDICATORS (Cont.)

Objective	Criteria	Indicator	Sub Indicator	Equipment	Skill	Man hours	Field Visits	Responsive	Method
Soil (Cont.)	Chemical quality (Cont.)	alkalinity	alkalinity of sampled fields	+	-	-	+	- - -	S
			hectares of land too alkaline to farm	++	-	+	++	- - -	S
		local fertiliser purchases		++	-	+	+	-	S
	Biological quality	presence of beneficial soil micro-organisms		+	-	-	+	++	S
		rate of organic matter composition		+	-	-	+	-	S

SURVEY OF INDICATORS (Cont.)

Objective	Criteria	Indicator	Sub Indicator	Equip-ment	Skill	Man Hours	Field Visits	Resp-onsive	Method
Natural Resource Management and Environmental Protection — **Water**	Quantity	ground water level		+	++	+	- - -	++	S
		water consumption per capita		++	-	-	++	-	P
		land area under irrigation		++	-	-	+	-	E
		flow patterns in local streams		+	++	- - -	- - -	- - -	S
	Quality	pH		+	-	-	+	++	S
		coliform		+	-	+	+	++	S
		dissolved oxygen		+	-	-	+	++	S
		waste water treatment coverage		++	-	-	+	++	S
		use of pesticides		++	-	-	++	++	P
		toxins in soil		+	-	-	+	++	S
		dissolved solids in soil		+	-	-	+	++	S

SURVEY OF INDICATORS (Cont.)

Objective	Criteria	Indicator	Sub Indicator	Equip-ment	Skill	Man Hours	Field Visits	Resp-onsive	Method
Natural Resource Management and Environmental Protection — **Flaura and Fauna**	Quantity	crop yields	produce volumes in local markets	++	-	++	+	-	S
			yields measurements	+	-	- - -	- - -	- - -	P
			land prices	++	-	+	+	- - -	E
			farmer production forecasts	++	-	- - -	++	++	P
			trader estimates of supply	++	-	-	+	-	S
			local wholesale prices of agric. commodities	++	+	++	+	- - -	S
		# animals kept		++	-	++	++	- - -	P
		animal productivity	e.g. # eggs produced	++	-	-	++	-	P
		land under irrigation		++	-	-	++	- - -	P
	Bio-diversity	species comp. & distrib.	presence of an indicator species	++	- - -	- - -	++	- - -	S
	Sustainable management of forest resources	tree cover		++	- - -	- - -	+	- - -	S
		wood harvesting intensity		++	- - -	-	++	- - -	P

SURVEY OF INDICATORS (Cont.)

Objective	Criteria	Indicator	Sub Indicator	Equip-ment	Skill	Man Hours	Field Visits	Resp-onsive	Method
Wealth	Income/wealth/ employment	ownership rates of various consumer durables		++	-	-	++	-	P
		consumption rates of specified non-durables	e.g., alcohol consumption *	++	-	-	++	+	P
		local daily wage rates (actually paid)		++	-	+	++	++	P
		size of land holding		++	-	-	+	- - -	E
		family without milk buffaloes or cows		++	+	-	+	+	E
		months of food sufficiency		++	- - -	-	++	++	P
		migration rates		++	- - -	-	++	- - -	P
		fertiliser consumption		++	-	-	++	-	P
		unemployment and under employment rates		++	-	-	++	++	P

*Inferior to measures of consumer durables because consumption of non-durables is easily forgotten or concealed.

SURVEY OF INDICATORS (Cont.)

Objective	Criteria	Indicator	Sub Indicator	Equip-ment	Skill	Man Hours	Field Visits	Resp-onsive	Method
Wealth (Cont.)	Income/wealth/ employment (Cont.)	loans taken from money lenders or banks — number and amount		++	-	-	++	-	P
		hours worked as wage labourer		++	-	-	++	++	P
		savings		++	-	-	++	++	P
	Housing	quality and size of residences		++	-	-	++	- - -	P
		floor area per person		++	-	-	+	- - -	S
		households with minimal shelter		++	-	-	++	- - -	P
	Physical plant and infrastructure	improved infrastructure in project area *		++	- - -	+	+	++	S
		investments in physical plant		++	-	++	+	++	S
	Misc.	family size >6		++	-	-	++	- - -	P

*It is important to only count investments for which the program is responsible.

A SURVEY OF INDICATORS (Cont.)

Objective	Criteria	Indicator	Sub Indicator	Equip-ment	Skill	Man Hours	Field Visits	Resp-onsive	Method
Gender Parity	Females are not in poorer health than males	height-for-age analysed along gender lines		+	-	-	+	- - -	S
		male-to-female population		++	-	-	+	- - -	E
		male-to-female life expectancy		++	- - -	-	+	- - -	E
	Equity in education	male-to-female school attendance (enrolment) ratio		++	-	+	+	-	E
		male-to-female highest grade in school attended		++	-	-	++	- - -	P
		male-to-female literacy rates		++	-	-	+	- - -	S
	Equity in wages	male-to-female wage rates		++	-	++	+	- - -	S
	Women in public life	women present at planning/ monitoring/evaluation meetings		++	+	-	++	++	P
	Equity in the home	increased share of household income goes to women		++	-	-	++	++	P
		increased decision making power for women in the household		++	-	-	++	++	P
Economic Equity	Distribution of income/wealth amongst beneficiaries	distribution of anthropometric measures	height-for-age	+	-	-	+	- - -	S
			height for weight	+	-	-	+	- - -	S
			arm circumference	+	-	-	+	- - -	S
		distribution of cons. durables		++	-	-	+	- - -	P
		distribution of land		++	-	-	++	- - -	S
		distribution of children enrolled in school		++	-	+	+	-	E

SURVEY OF INDICATORS (Cont.)

Objective	Criteria	Indicator	Sub Indicator	Equip-ment	Skill	Man Hours	Field Visits	Resp-onsive	Method
Health	Improved levels of nutrition	anthropometric measures	height-for-age	+	-	-	+	- - -	S
			height per weight	+	-	-	+*	- - -	S
			arm circumference	+	-	-	+	- - -	S
		household nutritional survey		++	-	-	+	++	E
		pregnant women with anaemia		+	-	+	+	+	S
		age when breast feeding ceases		++	-	+	+	- - -	E
		households with no cash crop for sale		++	-	-	+	-	E
	Medical care	percentage of children having received measles, TB and DPT inoculations		++	-	-	+	- - -	S
		access to health care		++	-	-	++	- - -	P
		patient to doctor/nurse/ paramedical ratio		++	-	++	+	- - -	S

SURVEY OF INDICATORS (Cont.)

Objective	Criteria	Indicator	Sub Indicator	Equip-ment	Skill	Man Hours	Field Visits	Resp-onsive	Method
Health (Cont.)	Hygiene	access to sanitation facilities		++	-	-	++	++	P
		access to safe drinking water		++	-	-	++	+	P
		time lost from work or school due to illness		++	-	-	++	++	P
	Fertility and mortality	fertility rates		++	-	-	++	- - -	P
		life expectancy		++	-	-	++	- - -	P
		infant mortality rates		++	-	-	++	- - -	P
		below five years mortality rates		++	-	-	++	- - -	P
		contraceptive use rates		++	-	-	++	- - -	P
		maternal mortality rates		++	-	-	++	- - -	P

SURVEY OF INDICATORS (Cont.)

Objective	Criteria	Indicator	Sub Indicator	Equip-ment	Skill	Man Hours	Field Visits	Resp-onsive	Method
Education	Literacy	literacy rates		++	-	- - -	+	- - -	S
		grade 5 graduates		++	-	-	+	- - -	P
		land area under irrigation		++	-	++	+	-	S
		school attendance rates		++	-	+	+	-	E
	Infrastructure exists for education	teacher to student ratios		++	+	++	+	-	S
		quality of school building		++	-	++	+	-	S
Participation	Beneficiaries help decide how project resources will be used	was original project planning done with PRA?		++	-	-	++	++	P
		have subsequent PRAs been conducted ?		++	-	-	++	++	P
		number of beneficiaries attending planning meetings		++	+	-	++	++	P
		frequency of planning meetings where beneficiaries are present		++	-	-	++	++	P
		do "expert" staff consult regularly with beneficiaries?		++	-	-	++	++	P
	Beneficiaries operate and manage project	presence of "outside" personnel/beneficiaries in project operations		++	- - -	-	++	++	P
		presence of "outside" personnel/beneficiaries in project management		++	- - -	-	++	++	P

SURVEY OF INDICATORS (Cont.)

Objective	Criteria	Indicator	Sub Indicator	Equip-ment	Skill	Man Hours	Field Visits	Resp-onsive	Method
Sustainability	Beneficiaries demonstrate demand for the project (s)	unit use rates		++	- - -	-	+	++	E
	Reliability of units	number of units in working order		++	- - -	-	+	++	S
	Cost sharing	percentage of beneficiary contribution to unit construction and maintenance		++	- - -	++	+	++	E
	Human capacity development	Do local people administer/manage the projects ?		++	- - -	+	+	++	E
		Is maintenance expertise locally available in the market ?		++	-	+	+	++	E

SURVEY OF INDICATORS (Cont.)

Objective	Criteria	Indicator	Sub Indicator	Equip-ment	Skill	Man Hours	Field Visits	Resp-onsive	Method
Sustainability (Cont.)	Institutional capacity	vitality of local NGOs	density of NGOs	++	- - -	-	++	++	P
			attendance rates at NGO meetings	++	-	-	++	++-	P
			average # of meetings per year	++	-	-	++	++	P
		Are local-level representative bodies functioning?	How often do panchayat bodies meet?	++	-	-	++	++	P
			attendance rates	++	-	-	++	++	P
		density of linkages between NGOs, bureaucracy and political organisations		++	- - -	-	++	++	P
		Are there regular meetings between NGOs, bureaucrats and/or political figures?		++	- - -	-	++	++	P
		How autonomous (administratively, financially) are project units?		++	- - -	-	++	++	P
		Is there a mechanism though which beneficiaries can modify the project (should conditions change and resolve disputes?)		++	- - -	-	++	++	P
		Are local project personnel familiar with and do they work with other local groups (NGOs, the state private firms and/or research institutes)?		++	- - -	-	++	++	P

SURVEY OF INDICATORS (Cont.)

Objective	Criteria	Indicator	Sub Indicator	Equip-ment	Skill	Man Hours	Field Visits	Resp-onsive	Method
Replicability	Community ability to independently expand services	facilities upgraded (without project support)		++	-	-	++	++	P
		additional facilities built (without project support)		++	-	-	++	++	P
	Transferability of agency strategies (Is the program at a pilot, demonstration or replicability stage?)	presence of specialised personnel		++	-	-	++	++	P
		Does the programme exist within local administrative framework, or is it autonomous?		++	---	-	++	++	P
		Does the programme have a specially provided and/or protected budget?		++	---	-	++	++-	P
		Does the program have a specially provided and/or protected budget?		++	---	-	++	++	P

VI

METHODOLOGY AND LOGISTICS

After spending close to six weeks testing and refining the Programme Evaluation Protocol (PEP) under field conditions, it was clear that it can be used to quickly, cheaply and easily measure physical and socio-economic realities in rural watersheds. In less than twenty working days an assessment team was able to execute the PEP in two representative watersheds. Of course, the field visits required substantial preparation. This chapter discusses in detail the methodological and logistical preparation necessary to execute the PEP.

SELECTION OF THE RESEARCH SITES

In order to give the PEP a thorough testing, the IGBP decided that it would be tested in two Representative Watersheds. Kattery RWS in Tamil Nadu and Arki RWS in Himachal Pradesh were selected.[3] Given the size of the watersheds (both in terms of area and number of residents) and the number of investments made by both the NGOs and the state departments, a comprehensive survey of the watersheds was not possible.

The question then arose, as to how the watersheds could be sampled such that the impact of RWS programmes could be evaluated? The common, scientific approach would have been to randomly select for evaluation a sample of villages within each watershed. A random sampling of villages would not have been meaningful, however, because the state departments and the NGOs have not spread their investments evenly within the watersheds. For example, to maximise effectiveness, MYRADA has chosen to focus its efforts on select villages of the Kattery Watershed. The purpose of the evaluation was not to determine the percentage of the watershed that has been treated, but to determine how successful the treatment has been.

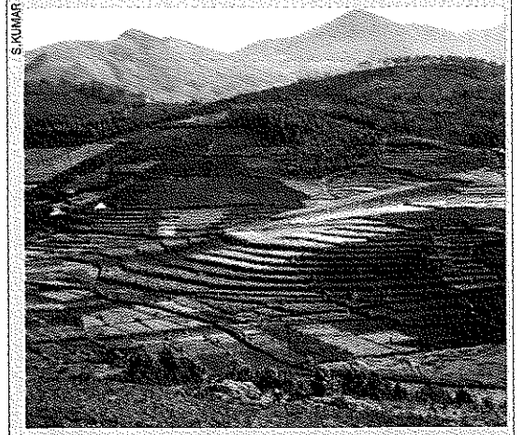
The decision was, thus, made to survey only those areas where work had been done. NGOs and state departments were each asked to choose a village that they thought represented their best efforts in the RWS programme. The logic behind this decision was that each organisation would be keen to show off its best work.

[3] These RWSs were selected based on two criteria. First, since the ultimate goal of the Protocol is to measure physical and socio-economic change, watersheds that have achieved the most progress were selected. Second, given that executing the Protocol requires the assistance of the partner NGOs and state departments, it was important that the evaluation team work in the watersheds where those organisations have shown the most competence. The consensus at the IGBP was that the Kattery Watershed in Tamil Nadu and the Karkara Watershed in Bihar topped the list in both categories so they were selected. Due to some last minute administrative problems, the Karkara Watershed had to be dropped. The Arki Watershed in Himachal Pradesh was chosen instead.

KATTERY RWS

The Kattery Watershed has a Government of India Erosion Priority Status of "Very High". It is located high on the upper reaches of the Nilgiri Hills of Tamil Nadu (2400 meters is the maximum elevation). The watershed is the

S.KUMAR



largest of the IGBP's five RWSs, with an area of just under 3000 hectares. Most of the watershed's inhabitants earn their living through the commercial production of green leaf tea and "winter" vegetables such as potatoes, carrots, cabbage and beets. Data from an earlier socio-economic survey (funded by the IGBP) indicates that twenty percent of the inhabitants own more than five acres of land or work in towns. Forty percent own from two to one half acre of land (such people must also engage in wage labour to survive). The remaining forty percent own less than one half acre of land, or are totally landless. In the realm of caste, sixty percent belong to the ibackward classesî category, while thirty percent fall in the category of "scheduled castes"

S.KUMAR

In addition, it was felt that they would be more co-operative with the evaluation if their "best", not their "worst" work, were scrutinised. This is a methodologically sound strategy that could be used elsewhere when organisations need quick, inexpensive evaluations. The goal of an evaluation is to determine the effects that investments have had. It is safe to assume that the NGOs and state departments will accurately pinpoint where their best work has taken place. The evaluation team can then conclude that all other investments have been less effective than the ones that are seen. The weakness of this approach is that the evaluation team will not be able to determine whether the conditions they have seen are representative of the other treatments that have been executed.

In practice the selection process proceeded somewhat other than planned. In Arki, the Forest Department did not comply with the request that they select a village. The NGO staff, therefore, was left to select the villages. The NGO staff, however, was unable to come to a decision (they appeared to lack leadership). As a result, the IGBP professional responsible for the Arki RWS "helped" them make the decision. With their approval, he selected three villages: Senj, Thamogi and Kolka. When the Forest Department officers were informed of this choice of villages, they showed no objections.

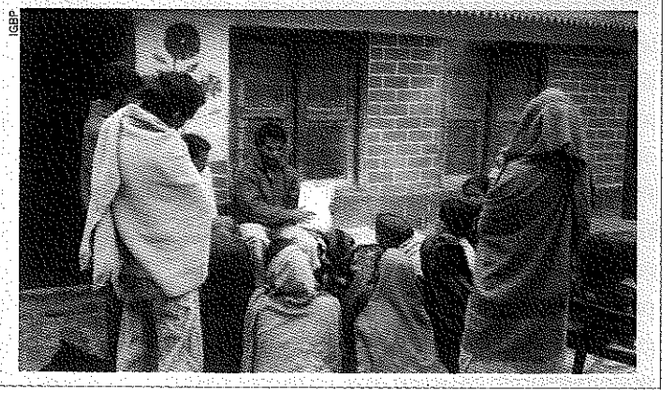
Officials from the Tamil Nadu Agriculture Engineering Department (AED) and MYRADA requested that the Evaluation Team change its survey criteria to suit

ARKI RWS

Like Kattery, the Arki Watershed has a Government of India Erosion Priority Status of "Very High". The Arki Watershed is located in the Himalayan foothills of Himachal Pradesh (elevation ranging from 800 - 1200 meters). It is the second largest watershed (2460 hectares) and the most difficult to traverse due to difficult terrain and a lack of roads. There is no socio-economic survey available on Arki. It is, however, widely agreed that most of Arki's inhabitants receive at least a part (if not much) of their income from family members who work for the state government, generally outside the watershed. Those remaining in the villages (mostly women, children and the aged) work the fields—which are more subsistence-oriented than commercialised—growing maize, wheat and some vegetables.

S.K. YADAV

IGBP



their situation. These two organisations are proud of the fact that they have worked together successfully. They suggested that surveys be conducted in one village where only MYRADA has worked, in a second where only the AED has worked, and in a third village where the two organisations have worked together. The evaluation team agreed and asked them to select villages in each category where they had done their best work. MYRADA gave the team a tour of its works in the watershed and asked it to choose. After some discussions, the team chose the sister villages of Salamoor-Dodanni as the example of MYRADA's solo efforts, and Mellodyarahatti as the village where MYRADA had worked with the AED. AED staff, however, gave the team little input (they were almost entirely uninvolved with the PI's reconnaissance visit). In the end, MYRADA also helped the team choose a village, Michael's Colony, where only the AED had worked. The AED did not object. In retrospect, however, Michael's Colony was probably not a village that the AED would have chosen as a showcase of their work had they given it some thought.

While the selection of sites within each RWS did not go as planned, this methodology is still recommended. In the future, evaluators simply need to be more adamant that the partner organisations choose the areas which represent their best work. The selection can be done much in advance, before the actual evalu-

ation process begins. Perhaps the partners can be prompted to make this choice with a preliminary letter.

SELECTING THE ASSESSMENT TEAM MEMBERS

In order to speed up the process of collecting data while in the field, an evaluation team should be assembled. The amount of data that needs to be collected has to be weighted against the burden of personnel management. Since the field tests discussed were only a trial evaluation, and many procedures were still uncertain, the decision was made to take only two other team members so that the PI could be closely involved at all steps. In retrospect, an evaluation team comprising three members was appropriate for the IGBP's watersheds. Data collection of the sort proposed is often a very personal process (i.e., sitting with people and asking them questions). For such a task, a large team would not have been appropriate.

IGBP

The evaluation team with members of SUTRA (Arki, Himachal Pradesh)

Team members were selected with an eye to certain skills, including language. Large amounts of the data needed to be collected through group discussions. Leading such discussions requires excellent oral language capabilities. Using translators during such discussions often destroys the natural flow and feeling of the exchange. Without an informal, conversational dynamic, informants are less willing to share their knowledge.

Keeping this in mind, the PI selected team members such that each was a native speaker of one of the local languages—Hindi in Arki and Tamil in Kattery. These language skills proved to be essential, especially when interacting with villagers who spoke minor dialects of the said languages (native speakers are best able to deal with such difficulties). It is highly recommend that evaluations relying upon informal interview techniques, especially group work, employ team members who are native speakers of the local language.

The gender of the team members was also an important consideration. Given the very wide division in gender roles in India, it is often difficult for male evaluators to work effectively with female beneficiaries in the watershed, and vice versa. Without female team members, any open discussions with local women would have been more difficult. In fact, a team of only male evaluators may not even be allowed to speak with female villagers alone. When conducting the stunting study, which requires the team members to work closely with children and their mothers, female team members were again preferred. On the other hand, some of the informal conversations which the PI needed to have with senior NGO and state department officials occurred in situations totally inappro-priate for women in India. In the light of these experiences, it is recommended that all evaluation teams have both male and female professionals.

The PI looked for team members with several other professional capabilities. Again, given the nature of the PEP, team members needed to have prior experience doing participatory assessments. On-the-spot acquisition and refinement of skills is better avoided. Also, much of the interviewing to be done was open-ended and concerned technical aspects of rural development. For this reason, team members needed to have some background in rural development issues.

Finally, the PI had mistakenly believed that in order to successfully carry out the stunting study, which requires the use of some medical equipment, team members needed to have some paramedical experience. This proved to be untrue. With a basic amount of training, stunting measurements can be taken by anyone with an eye for detail. Thus, paramedical experience is not necessary.

Taking into consideration language problems and the costs of travelling with a team, it is possible that a principal investigator may wish to find research assistants on site. This may be the best option if only one site is to be visited. If the evaluation is to be carried out at more than one site, this approach will necessitate multiple training sessions. Moreover, if multiple sets of research assistants are used, the PI will not be able to benefit from the comparative insights that team members offer. Finally, if the PI hopes to assemble an evaluation team locally, he should first make inquires into the local availability of qualified candidates.

RECONNAISSANCE VISITS

As recommended in the preliminary PEP, the PI visited each watershed prior to the actual evaluation. These reconnaissance visits served several purposes. First, since each RWS is unique, the PI needed an overall tour to get a feel of the RWS, especially as regards the individual activities that were being implemented there. The PI also needed to sit with the state department and NGO personnel to select the villages to be surveyed. These villages were then individually visited. This was done both to familiarise the PI with research sites and to gain the trust of the villagers. Finally, the PI arranged acceptable dates and a timetable for the actual evaluation with the NGO and state department. Once the basic framework and tentative schedule were in place, the PI prepared detailed questionnaires to be used during the evaluation.

In retrospect, the reconnaissance visits were not a worthwhile use of resources.

Multiple trips to each watershed, even if only by the PI, proved expensive. During this preliminary evaluation, travel accounted for a significant part of the total expenses. Yet, the benefits were not commensurate. At times the reconnaissance trips were even counter productive. Approaching this exercise as an operation that could be planned and executed in a highly structured fashion alienated a large number of people in the watersheds. A less structured approach would have been a more appropriate means to deal with issues like local holidays, bad weather, officials taking unexpected leave, etc.

In the end, all of the preliminary work could have been done during the first few days of the actual evaluation. In fact, the preliminary work would be an excellent way to familiarise the entire evaluation team (not just the PI) with the RWS. In the future, the entire evaluation team should simply make one, slightly longer visit to the watershed being surveyed. All necessary tasks can be accomplished during one visit.

WORKING WITH PARTNER STATE DEPARTMENTS AND NGOS

For the sake of objectivity, it is recommended that the PEP be executed by outside evaluators. Carrying out the evaluation will, nevertheless, require close collaboration with partner state departments and NGOs. For example, the evaluation team will have great difficulty commencing its research unless members from either the state department or the NGO provide local contacts. Without an appropriate introduction from someone known to them, local villagers as well as professionals and even government officials may be suspicious of the evaluators. Only after an introduction can information begin to flow freely.

Partner NGOs and state departments are also invaluable as sources of information about programme activities in the watershed. They are the actual executors of all activities, so they know exactly what and where the programme investments are, when they were made, with whose help, and so forth. The team must get this information from the partners themselves, especially if programme reports are inaccessible, incomplete or out of date. In addition, individual members of the partner organisations, who have a thorough knowledge of the activities, should be used as key informants regarding such complex issues as uncovering the emergence of new social capital. It is likely that members of the partner organisations will be called on to actually help in the evaluation process. In the interest of keeping the team small, the PEP specifies that certain assistants should be located in the watershed itself. For example, the "stunting" study requires the help of at least two assistants to manage the children being measured. Junior members of the partner organisations seem to be the most feasible candidates (they are educated, available, and often know the local children) for such work.

Working with partner organisations creates special problems, however. These organisations are concerned that evaluations show their work in a positive light.

THE FOREST DEPARTMENT AND SUTRA: PARTNER ORGANIZATIONS IN ARKI RWS

In the Arki Watershed, the Forest Department is the partner state department and SUTRA is the partner NGO. Arki RWS actually falls within the jurisdiction of two separate Forest Officers, one stationed in Arki and the other in Dharlaghat (the latter being responsible for the upper reaches of the watershed). Until now the IGBP has only worked with the Arki officer, although in 1998 work will begin in Dharlaghat. Each office is staffed by a Forest Officer and four or five Forest Guards.

The Forest Department has focused its efforts on forestry programmes and in the construction of erosion control structures. To speed up work on the forestry front, the Department has developed a nursery for saplings. This has been carried out on departmental land, and the saplings are also distributed among the inhabitants of the watershed. Newly planted lands are protected from overgrazing by the planting of "live fences"(rows of cacti-like plants). Some of the lands had to be cleared of a pest plant called "lantana" before the planting of saplings. Finally, the Forest Department has built a large number of loose boulder dams (called "check dams" by the Forest Department) to decrease stream velocity and capture silt.


S.K. YADAV

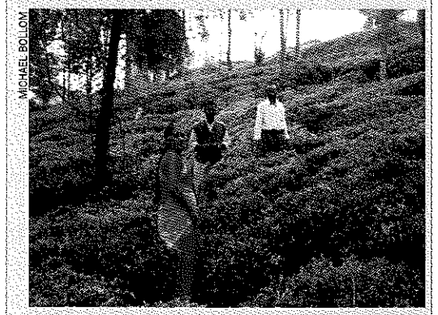
SUTRA is a regional NGO based in Jagjit Nagar, H.P. It began as a field office of the Rajasthan-based Social Work Research Centre, which was a leader in NGO-centred approaches to grassroots development in the 1970s. SUTRA has over time become autonomous and is now registered as a separate NGO. Most of its efforts are focused on organising and empowering women. SUTRA currently has four full-time staff stationed in Arki. SUTRA's efforts in Arki have been very wide-ranging (one might say, unfocused). It has made efforts to build up social institutions through self-help groups (in this case, only for women). It has also tried to set up a Watershed Federation. In addition to institution building, the NGO has implemented a series of activities, including training para-vets, constructing "smokeless" stoves in private homes, constructing compost pits and solar cookers. SUTRA has also done some work in the realm of social forestry, setting up sapling and nappier grass nurseries. They have also encouraged local villages to set up tree and fodder plantations on common lands.

If they are relied upon too heavily, they may (even if only unconsciously) bias the data collection in their favour. For example, during one of the participatory evaluations, NGO staff began to slide into the discussion when the intended participants (the villagers themselves) were not giving what NGO staff thought the villagers' answers should be. While this is a natural thing for them to do, as they have dedicated themselves to helping local people voice their desires and complaints, it biases the evaluation.

Thus, partner organisations should be worked with sparingly and with caution. The evaluation team may request their help (especially during the early stages), but should gradually distance them during sensitive phases of the data collection process. Such a strategy, followed too rigorously, is likely to create suspicion amongst all but the most self-confident partners. This is difficult to avoid. To deal with this problem, the PI worked out a two-fold strategy. First, he offered to include the partner organisations in some

THE AGRICULTURE ENGINEERING DEPARTMENT AND MYRADA: PARTNER ORGANIZATIONS IN KATTERY RWS

In Kattery, the IGBP works with the State of Tamil Nadu's Agriculture Engineering Department (AED) and an NGO called MYRADA. The AED has focused its efforts on physical, erosion control structures. It has also built check dams (structures designed to hold water), gabions (loose bolder construction to slow the flow of water and capture silt), and landslide control structures (in the form of stream retaining walls). It has also built community wells.



MICHAEL POLLOM

MYRADA is a nationally recognised NGO, based in Bangalore. While it began as an organisation dedicated to help resettle Tibetan refugees, it has since diversified. It is now well known as a pioneer in PRA techniques, which it now trains people to use. Four field staff currently staff the MYRADA office in Kattery. This MYRADA office has focused its efforts on building social institutions (they have also assisted with the building of physical structures such as community wells, paths and roads). MYRADA's institution-building efforts began with the formation of "self-help" groups of ten to twenty people from a single village. In an effort to empower women, MYRADA encouraged the formation of separate groups for women. Women's groups focus their efforts on savings, while the men's groups are oriented towards agricultural issues. Separate Village Infrastructure Development Committees (whose members are drawn from the self-help groups) are now being set up to deal with village infrastructure issues. Finally, a "Watershed Federation", with representatives from each self-help group, is now in place. This Federation is expected to manage all activities within the watershed, even after programme support is withdrawn.

of the evaluation work. For this, the PI carefully chose more objective measures less closely associated with the NGO's work. For example, NGO staff helped gather school attendance statistics. They also helped conduct the stunting studies.

When the partner's work was being directly evaluated, the PI tried to keep them busy with some other task, like gathering the enrolment data or simply helping elsewhere in the village. When this sidetracking was not possible, the PI simply explained to the partners that the evaluation team wished to gather some particular data by its own devices. It was not enough to let partners stand by silently; the PI had to insist that they leave the site when the team engaged in activities like participatory discussions. Just the physical presence of staff from the partner organisations affected what people said. In the context of working closely together, asking them to comply was difficult, embarrassing, and at times created ill will; yet it was necessary to do this.

At the same time, the evaluation team needs to keep in mind that its relationship with the partner organisations is not adversarial. Evaluators and partner organisations should all have the same goal—seeing that activities are being effectively implemented in the interest of beneficiaries. Operational separation is maintained for the sake of objectivity and professional integrity.

RECOMMENDED RESEARCH ITINERARY

Nine days each were allotted for the evaluations in Arki and Kattery (exclusive of travel time). This was enough time to complete all the required tasks. Recall, however, that nine days was exclusive of a reconnaissance trip, which the PI undertook earlier (and in the future should be omitted). Thus, a new timetable has been worked out to include the tasks that were accomplished during the preliminary visits. According to the PI's estimations, a baseline visit should take no more than ten days per watershed (exclusive of travel time). The table below shows one way of organising a research schedule.

The first three days (referred to in the rest of the text as "Gearing Up") have been left unscheduled. This allows plenty of time to get acquainted with people and places before actually beginning to gather data. Scheduling of site visits and finding the necessary research assistants should take place during these days. After this comes the "Field Visits", when data for *Ground Water, Height-for-age, Consumer Durables, School Attendance,* and *Social Capital* are collected. The "Stunting Study" can be carried out during or after the Field Visits, depending on how many people there are on the evaluation team. Once these two phases are complete, the "Participatory Sessions" can begin.

It needs to be kept in mind that these time estimates are liberal, so there is room for bad weather, unpredicted holidays, etc.

Follow-up evaluations will take longer, approximately fourteen days per watershed. This is because the indicators *Use* and *Outsiders* are time consuming. The table below shows one way of organising a research schedule. As in the previous table, the first three days are left open for orientation and organisation. Again, time estimates are liberal.

Note that the order in which some of the

POSSIBLE TIMETABLE FOR FIELD VISITS—BASELINE

Indicator	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Soil Loss*	Get acquainted with partners	General tour of watershed	Consultation with partners							Wrapping up loose ends
Ground Water				▬						
Consumer Durables								▬	▬	
Height-for-Age					▬	▬				
School Attendance					▬	▬				
Prepare Participatory Discussion							▬			
Social Captial					▬	▬	▬	▬	▬	
Particapatory Discussions of Extractively Obtained Data								▬	▬	
	GEARING UP			FIELD VISITS				PARTICIPATORY SESSIONS		WRAP UP

*Data should be supplied by project engineer before going to the field.

indicators are executed is important. While this method is an imperfect substitute for using controls, the PEP often suggests that causality be explored through participatory discussions of findings with beneficiaries. For example, villagers are likely to be able to tell evaluators why recorded levels of water in local wells is changing. But in order to use this method, all the necessary data must be gathered and tabulated before any participatory discussions take place. This means that the data for *Soil Runoff, Ground Water, Height-for-age, School Attendance* must be collected and analysed before the participatory discussions can take place.

Finally, all the time estimates given here do not include the extra time that will be required to use control groups.Controls help specify the causal mechanisms of change (i.e.,"Is our programme responsible for these improvements?"). Controls are less important for indicators like *Durables, Enrolment, Use, Outsiders* and *Social Capital,* where people themselves can tell evaluators the reasons that there has or has not been change. But when dealing with phenomena like soil erosion, which are less immediate to people's lives, controls are essential. Evaluators must decide for themselves how heavily they wish to rely on controls. Itineraries must then be adjusted accordingly.

POSSIBLE TIMETABLE FOR FIELD VISITS —FOLLOW-UP

Indicator	Day 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Soil Loss*														
Ground Water														
Consumer Durables														
Height-for-Age														
School Attendance														
Prepare Participatory Discussion														
Use														
Outsiders														
Social Captial														
Particapatory Discussions of Extractively Obtained Data														
	Get acquainted with partners	General tour of watershed	Consultation with partners											Wrapping up loose ends
	GEARING UP			FIELD VISITS							PARTICIPATORY SESSIONS			WRAP UP

*Data should be supplied by project engineer before going to the field.

VII

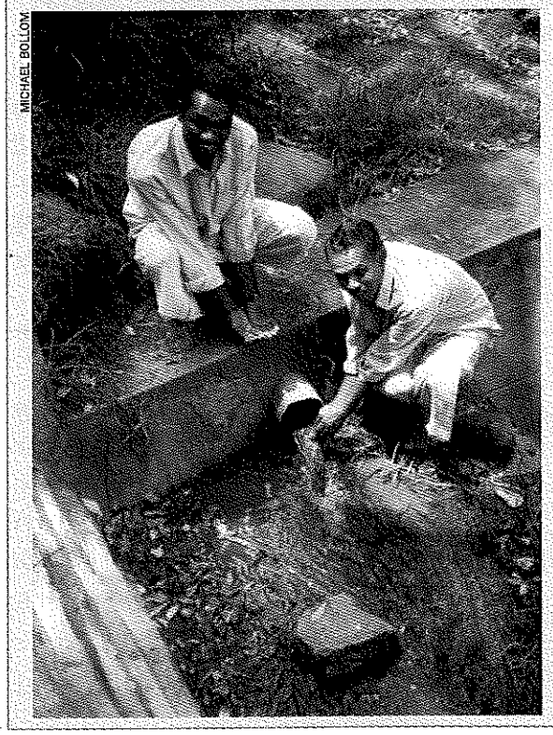
THE SELECTED INDICATOR SET

Nine indicators were chosen from the Survey of Indicators to create an indicator set for evaluating watershed management programmes. This chapter examines these nine indicators in detail. Each indicator is discussed in terms of the objectives towards which it measures progress and how it should be implemented in the field. Side boxes present the findings of the IGBP-sponsored evaluations that used these indicators.

THE FINDINGS: THE INDICATORS WORK!

In most cases, the evaluation team was able use the indicators to gather baseline data on the two watersheds. The findings generally show Kattery RWS to be more advanced than the Arki Watershed. In Kattery, the ground water levels were less erratic, the children here were taller and attended school longer. IGBP activities enjoyed generally higher levels of use and maintenance in Kattery, despite being less dependent on help from outsiders. In addition, institutions that can manage watershed issues are emerging in Kattery while they appear to have been stillborn in Arki.

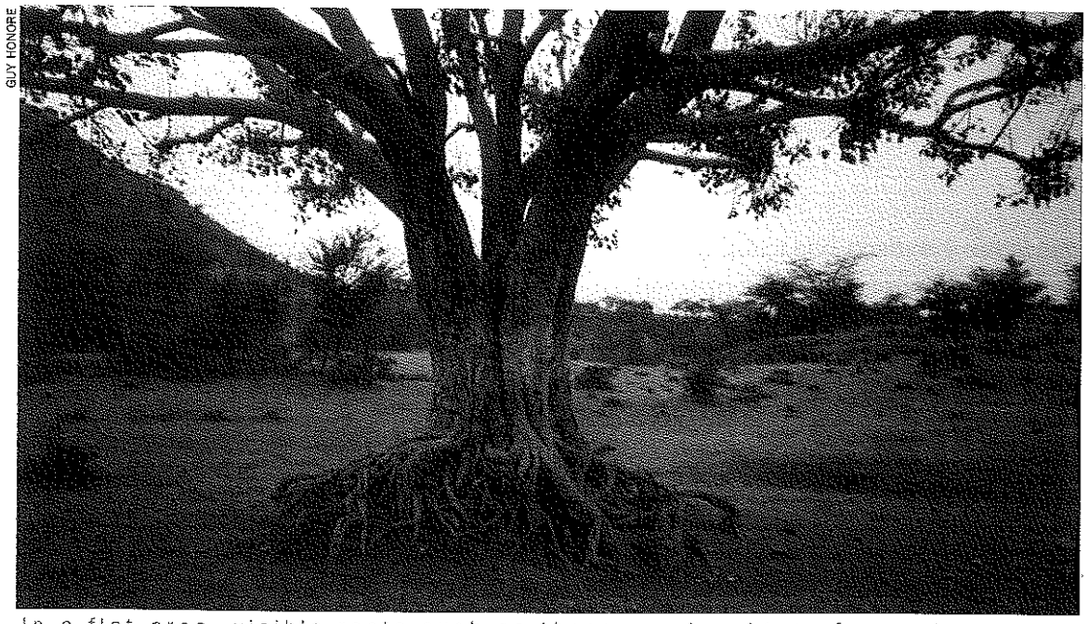
Findings with regard to the measurement of change are, not surprisingly, inconclusive. Most of the indicators in the protocol were not designed to measure change in a single site visit. Multiple evaluations over time are required. In order to look for conclusive evidence of change, another evaluation will have to be conducted several years hence.


MICHAEL BOLLOM

In a few cases, the evaluation team was able to gather data that tentatively document change, or the lack of it. For example, the team was able to obtain time series information on school attendance rates from school masters. This data actually demonstrates little change in school attendance rates over the last five years.

Even where actual changes were recorded, they generally could not be directly linked to IGBP activities. This is not surprising given that the RWS Programme has been in operation for less than two years. There are exceptions to this, however. In Kattery the increased wealth (more consumer durables) in one village was linked to MYRADA's efforts to develop a micro-finance activity. In Kattery there is also some evidence that the Watershed Federation (another MYRADA activity) has begun to serve as an institution which promotes and facilitates collective action *vis á vis* certain water-related issues.

GUY HONORE



In a flat area, visible roots such as these can be signs of an extreme erosion problem (Karkara, Bihar)

1. SOIL LOSS

While this indicator is resource intensive, both in terms of man-hours and equipment, it is recommended for continued use. This is due to the lack of a better alternative, and for the sake of continuity. (The IGBP has invested in the infrastructure to use this indicator and trained people to operate it. In addition, the Project has already accumulated large data sets.) This indicator seems impractical, however, for the replication stage of a programme when cost containment becomes more important.

Target Objectives

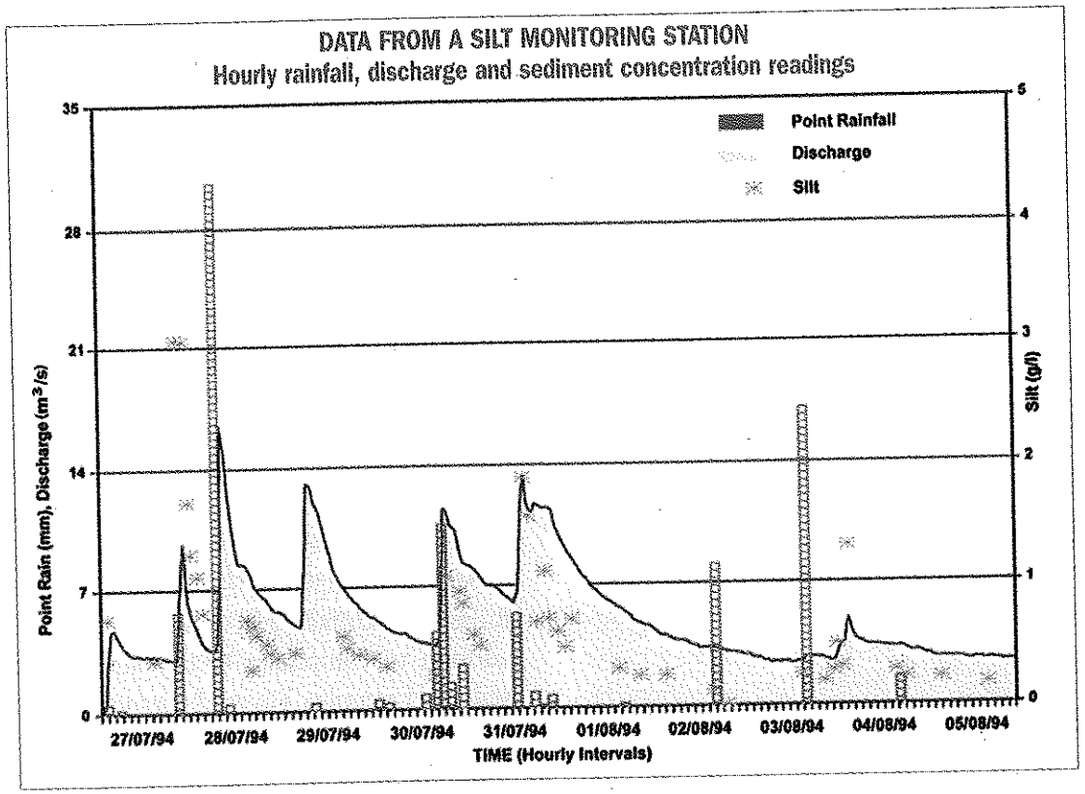
This indicator measures topsoil conservation. The assumption is that increased soil runoff in local streams indicates a higher rate of topsoil loss. In addition, the recharge of ground water resources can be inferred from this indicator—all else being equal, less topsoil being washed downstream implies that more rainwater is being absorbed into the ground, thus recharging the ground water supply. Soil runoff also indirectly measures the extent of vegetative cover—less topsoil runoff implies thicker vegetative cover (vegetative cover prevents runoff by reducing splash erosion and holding soil in place with roots).

Measurement Procedures

This is a complex undertaking that has been well-documented in Indo-German Bilateral Project manuals[4]. A very brief summary of the hydrological procedures is nevertheless provided here. The ultimate goal of the hydrological monitoring undertaken here is to collect data demonstrating: how much water runs off in the stream that drains the watershed for a given amount of rainfall, how quickly this occurs after a rainfall, and how much sediment is carried away by the runoff. To do this, a crew of silt observers must work around the clock to gather data on rainfall in the watershed, depth of the stream at the drainage point, stream velocity and sediment concentrations in the stream. The IGBP has built Silt Monitoring Stations (SMS) in each RWS in order to house the equipment necessary to take these measurements.

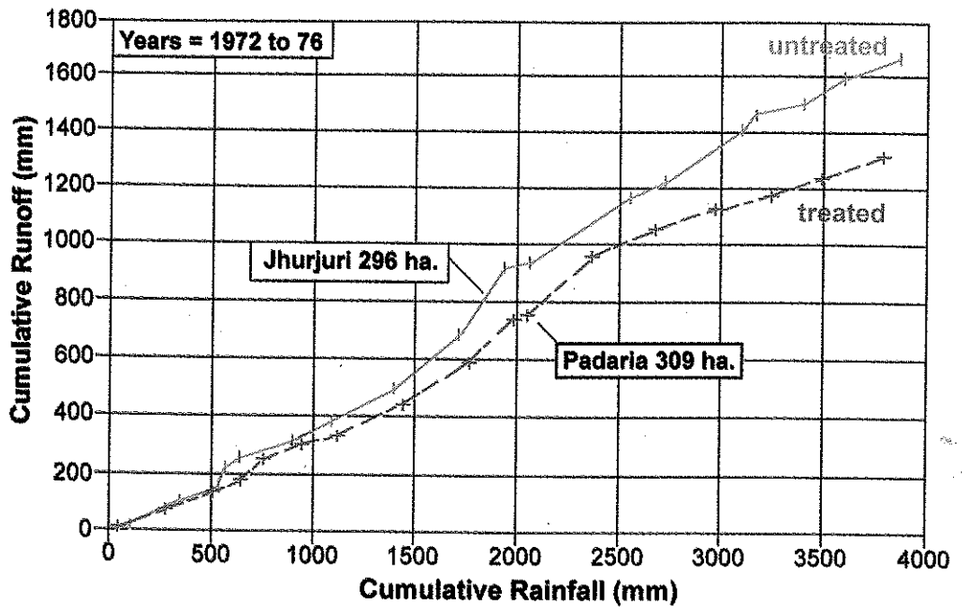
For an actual printout of some data that the IGBP collected from Kattery RWS, see the figure below. In this graph the spikes represent a period of rainfall, the continuous irregular curve represents discharge rate in the river, and the small stars represent silt concentrations in the river water. The area under the discharge curve represents the total discharge of water. Notice how discharge and increased silt loads follow periods of rainfall.

In order to demonstrate changing runoff rates, such data must be collected over very long periods of time (not less than ten years). Successful erosion control treatments will result in decreased levels of discharge (meaning more water soaks into the ground). If this is the case, then the discharge that does occur will be spread out over a longer period of time (i.e., the water drains more slowly). In addition, silt loads will be decreased.



[4] For technical details, see any of the following IGBP manuals: # 15/92: Collection and processing of automatically collected hydrological and sediment data - 'A' manual. • # 16/92: Collection and processing of manually collected hydrological and sediment data - 'M' manual. • # 17/92: Operation and Maintenance manual for sediment monitoring stations - 'O&M' manual. • # 06/92: Training manual for hydrological and sediment monitoring of small watersheds.

DOUBLE MASS PLOTS FOR TWO NEIGHBOURING WATERSHEDS



The figure above is a good example of time series data on two watersheds—one treated and the other untreated. This data, collected by the DVC near Karkara RWS long before the arrival of the IGBP, demonstrates that run off rates were reduced in the watershed that was treated.

Outlook and Recommendations

This indicator has many strengths. It produces valid, reliable data about soil (and water) conservation. It is also extremely responsive and sensitive — improved soil conservation will be evident in the fine-grained measurements taken during the very next rain. In its favour, very few (perhaps only one) monitoring stations are needed to take measurements for the area being treated. In addition, once the monitoring stations are in place, the measurements can be carried out by relatively unskilled labour. Finally, if meticulously carried out, monitoring this indicator can produce a very objective, and highly quantifiable database.

Unfortunately, this indicator is only suitable for evaluating pilot projects, not monitoring projects being implemented on a large scale. The indicator is very labour intensive. In an ideal situation, measurements must be taken every hour, twenty-four hours per day, three hundred and sixty five days per year. In order to carry measurements out properly, this indicator also requires the use of some expensive equipment — instruments to measure rainfall and stream flow in addtion to equipment to dry and weigh sediment samples. Given the remote, rural setting of most watershed programmes, maintenance of this equipment can be difficult. Poor maintenance and/or lax personnel will quickly corrupt databases. As with other scientifically measured indicators, this indicator also requires the use of controls.

Those desiring an indicator more suitable for monitoring might want to explore the use of remote sensing (i.e., satellite imagery). A series of satellite images taken over time can be compared to chart changing land-use patterns. Since satellite images (old and new) are often available (perhaps through the Remote Sensing Department of the local government) remote sensing would be fast and inexpensive. There may, however, be difficulties in obtaining such images if there are "national security" concerns involved. Such a method would also still require the creation of a computer model to interpret the images, and initial field visits to help create a key to the satellite images.

2. GROUND WATER

This indicator produced rich and graphic findings about ground water levels in and around the selected villages in each RWS. The local people who contributed to the results probably also benefited from the open discussions about their water resources. In addition, this indicator produces valid and reliable data. Nevertheless, it is doubtful whether this indicator, as executed, will be of use to many programmes attempting to measure changing ground water levels.

As executed, this indicator offers an insight into one of the limitations of par-

THE FINDINGS: SOIL LOSS

Unfortunately, the IGBP has been unable to collect the sort of data needed to demonstrate programme impacts. This is, in part due to the long time periods required to establish baseline data and post-treatment data. Most Silt Monitoring Stations (SMS) have been in operation for only five years.

Even when the SMSs have been in place for longer periods of time, data collection problems have undermined the integrity of the data sets. Collection problems have generally not been due to equipment failure, but because of labour problems. Every SMS is staffed locally, by literate farmers or school teachers. At times, the monitoring equipment used is too complex for these silt observers to handle, even after extensive and repeated training sessions.

More problematic, however, has been the lack of enthusiasm shown by the silt observers. For whatever reasons, data collection has not been carried out consistently, resulting in data gaps. Such gaps corrupt the data sets. (Hydrological data sets in India are particularly susceptible to corruption due to missing data points because the rains are generally short and intense, as are the runoff periods.) The result has been data sets that are too incomplete for meaningful time series analyses.

To compensate for these weaknesses, the IGBP has focused more of its energies on training of staff in hydrological monitoring. Unfortunately, while such training can build up the skills and knowledge of the hydrological assistants, it has little effect on motivation or professionalism.

GUY HONORE

ticipatory evaluation techniques—they are often not precise enough to measure the generally small levels of change that most programmes bring about. So, while this indicator is capable of measuring changing ground water levels, its metric is imprecise. If evaluators require that their measures be finely calibrated (in centimetres or millimetres, not metres) then this indicator needs to be executed in a totally different fashion.

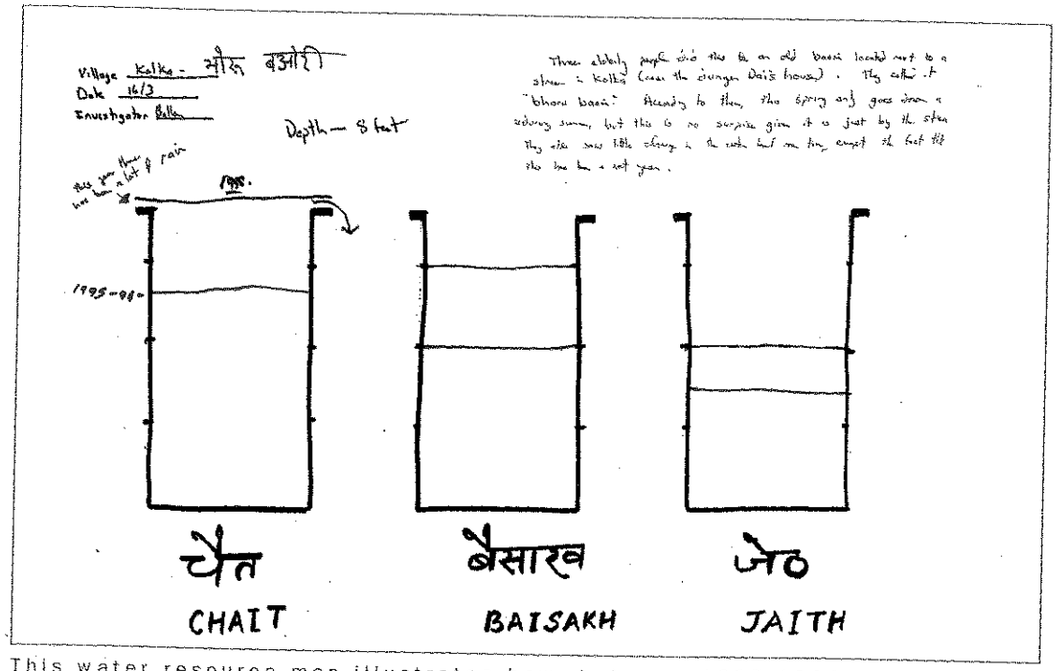
This section first discusses the indicator as the evaluation team executed it. It then concludes with a brief discussion of how this indicator could be altered to offer more finely calibrated results.

Target Objectives

This indicator measures ground water conservation. If ground water levels are maintained or augmented, then ground water resources are being sustainably utilised. In addition, this indicator indirectly measures topsoil conservation. All else being equal, a higher level of ground water is at least partially the result of less (or slower) water runoff. This, in turn, results in lower levels of topsoil erosion. Water table levels are also an indirect measure of vegetative cover. As previously stated, vegetative cover prevents runoff, thus recharging ground water, by checking splash erosion and by holding soil in place with roots. If ground water levels are being sustained, constant or increasing vegetative cover may be responsible.

Measurement Procedures

The preliminary PEP recommended that beneficiaries map out the changing water levels in a local well. The assumption is that the water level corresponds to the



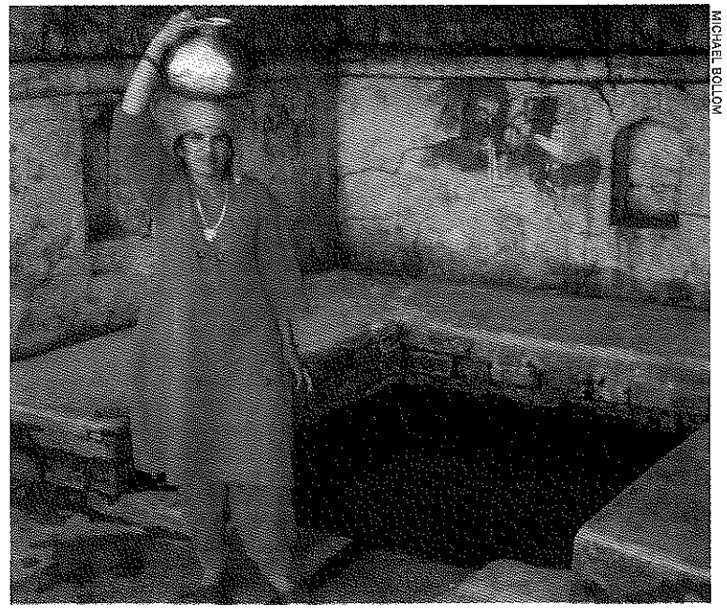
This water resource map illustrates how, between 1995-1998, ground water availability in a local well rose during the pre-monsoon months (Arki,H.P)

ground water level near by. The team proceeded to measure the water levels in selected wells through resource maps. The figure on the previous page is a copy of a resource map used in Arki. The open-ended rectangles represent the well in question, one for each month of the year. The hash marks along the sides of each "well" represent the one-quarter, one-half and three-quarter full points.

At the bottom of each "well" are the names of the months (first in the Devanagri Script, then in the Roman Script) as used by the local people. This map was developed with the help of SUTRA (*Chait* corresponds to the dates March 15 to April 14 on the Roman Calendar and the rest of the months follow in this sequence), in order to ensure that the team spoke in time terms understandable to local people. The same was done for the Kattery RWS with MYRADA.

Some of the effort to be sensitive to local cultures took an ironic turn in the latter watershed. In Kattery the team used the names of the Tamil months and wrote them in the Tamil script. But when these maps were used, many people developed confused expressions and began whispering amongst themselves. It turned out that many of them were not familiar with the Tamil names of these months, nor the Tamil dates. The team quickly modified the drawings to use the names from the Roman Calendar, which they understood! This underscores that many elements of the evaluation process have to be participatory—local people must be consulted during the process of formulating the indicators.

As recommended in the preliminary PEP, this indicator was supposed to be executed as part of the Participatory Sessions, after the Field Visits. Once in the field, the evaluation team realised that many people in the villages were totally unaware of the water situation in their local wells and springs. In Arki this was more so because the state government supplied piped water to many houses under a previous development activity. In Kattery, community wells were generally managed by a handful of people, who were responsible for pumping water from their community well to the community tank. The


MICHAEL BOLLOM

The water level in local wells can be used as an indicator of ground water resources (Arki, H.P.)

team's revised strategy was to speak with only those people who used the wells on a frequent basis. This took place during the Field Visit phase of the evaluation.

The selection of wells took place in a rather ad hoc manner. The team simply asked for the locations of wells that local people were using. The ones that could be found easily were chosen. These included large tube wells as well as tiny mountain springs. In the future, programme engineers should select the water sources to be monitored. Their decisions will be based on the knowledge of where programme impacts are expected.

In order to use the resource maps to their fullest potential, the team needed to gather a small group of people to fill them in. The process of gathering groups differed in each RWS. In Arki, the team waited near the selected wells in the morning and gathered groups of users (all women) for a resource mapping. In Kattery, the team sought out those people (all men) responsible for maintaining the well and pumping water.

The discussions began with questions about the well's depth, how long it had been there and how often the interviewees used it. When the team was certain that both the well and the group were appropriate, they then asked the people in these groups to draw coloured lines that represented the water level in their well during each month of the year. In the figure on page 52 this is represented by the upper (blue) line. Most of the groups spent several minutes deliberating amongst themselves before each line was drawn. By the time they had finished all twelve months, they generally appeared quite satisfied with what they had produced.

The preliminary PEP recommends that changing ground water levels should be measured through successive visits to the site, several years apart. The evaluation team nevertheless conducted an experiment to gauge whether change could be measured in a single site visit. The same groups of people were asked to draw a second (different coloured) line in each month to indicate what the water level used to be at some point in the past. Five years ago was suggested, but the team let them choose any time period that they could agree upon (so long as it preceded the IGBP's first investments under the RWS activity).

MICHAEL BOLLOM

Resource mapping is a participatory tool that can be used to measure ground water (Arki, H.P.)

THE FINDINGS: GROUND WATER

The resource maps document that the water levels in the Arki springs follow the pattern of the south-west monsoon. The water levels generally drop slowly in the months preceding the rains, although the spring in Thamogi begins to dry up by early winter. Every spring surveyed was dry in the month of *Jaith* (May 15 - June 14). The springs get replenished in the months of *Asar* (June 15 - July 14) and *Sawan* (July 15 - August 14).

All groups agreed that the water levels in their spring had dropped. In Senj, the water level had dropped from eighty percent full in *Baisakh* (April 15 - May 14) five years ago to about twenty-five percent today. Aside from this earlier drying of the spring, things have remained unchanged. In one of the Kolka springs, the water levels were less than half what they had been ten years back during the entire summer. After the rains, this spring continues to remain full. Water levels dropped by about a third in the other Kolka spring, but only during the three months preceding the rains. In Thamogi, the water levels only dropped during the winter months, from *Ashwin* (September 15 - October 14) until *Fagun* (February 15 - March 14). Current levels are about half of what they were ten years ago.

When asked to pinpoint the cause or causes of the falling water levels in their springs, most groups pointed to a drop in rainfall and loss of tree cover in the valley. No one mentioned any IGBP-funded activities.

In Kattery resource maps were collected from four villages—one map each from the sister villages of Salamoor and Dodanni and one from Thorajada. The team was not able to obtain a map in Mellodyarahatti because this village takes its water from an artesian well (which has no depth). Instead, the team did a mapping in Oranalli, where MYRADA has recently done some work. As in Arki, the resource maps in Kattery show local ground water levels following the pattern of the south-west monsoon. The ground water levels in Kattery fluctuate much less dramatically, however. Water levels drop slowly until June, after which they start rising and continue to do so until the rains end in September.

Only one of the four maps gave any indication that ground water levels had changed within common memory. The group in Oranalli drew lines showing that since ten years ago, the water in their well dropped from three-quarters to one-half full between mid-May until mid-August. Their explanation for this was a drop in the annual rainfall. There was no mention of programme investments in relation to the dropping water level.

The groups were able to discuss changing water levels without much trouble, and the team had confidence in the general trends that they illustrated (e.g., a well that used to be half full in June is now one quarter full). The problem, of course, is that memories fade quickly and events can be confused or conflated. If a programme wants to measure change, the resource maps would be more accurate if separate "before" and "after" maps were produced, several years apart.

While "before" and "after" resource maps would be sufficient to document change, they would not be able to determine the cause of the changes. The PEP suggests discussing findings with beneficiaries—local people often have a very good understanding of the world around them. In a strict scientific sense, however this is not enough. *Ground water,* like all the other indicators except *Use* and *Outsiders,* needs a control group to help determine whether, and if so to what extent, IGBP-funded activities are responsible for change. The evaluation team did not use controls during this evaluation. The added expense did not seem necessary given that the primary task was to test whether the indicators function as planned. All subsequent evaluations

should, however, carry out the same steps discussed above, and also draw comparisons with water levels in wells that are far away from any programme investments. Depending upon how programme funds are to be allocated, this could be outside the watershed, or in areas of the watershed that have not been treated.

Outlook and Recommendations

While the evaluation team was able to use a participatory version of this valid, reliable, sensitive, responsive indicator to measure ground water levels in the watersheds, it may be an overly blunt instrument to document change. People's levels of perception are not accurate for small changes. For example, in a well that is four meters deep, it is hard to believe that regular users will perceive change in water level that is less than fifty centimetres. Only a very ambitious development programme would hope to change an area's ground water level by fifty or more centimetres in just five to ten years!

Programme engineers need to be clear at the outset of a programme about how significant an impact they hope to have on the local ground water level. If the expected impact is fairly large (meaning easily perceptible to the human eye), then the above method should be preferred as it is quick and cheap to execute. In addition, the data are probably as reliable as any produced through technical instruments. In fact, in the light the discussion regarding data collection problems at silt monitoring stations, (see "The Findings; Soil Loss") the above method is probably more reliable.

If the project's expected impacts are small relative to the capabilities of the human eye, then another method of measuring ground water levels should be used. One possible method is to use a water level sensor to measure the depths in village wells. Such a method could be accurate up to less than a centimetre. Measurements could be taken from local wells, or special monitoring wells could be dug. While the former is less expensive, it is less reliable. The problem with such a low-tech methodology is that local people disturb the level of water in wells by drawing water from them. This could be avoided by taking readings early in the morning, before the day's first water is drawn out. A single such reading, however, would be of little use. Water levels in a well fluctuate from day to day and month to month. Readings need to be taken frequently, for the duration of the programme, as is done in the Silt Monitoring Stations. And as with the other extractive indicators, controls must be used. Taking the required number of readings will be expensive in terms of labour and, as mentioned, reliability is a problem. Procedures for using both the participatory and the extractive method are documented in the PEP.

3. HEIGHT-FOR-AGE

Executing the "stunting" study was the most enjoyable but chaotic segment of the evaluations. In most cases, measuring the children quickly became a village-wide event. Children, from infants to youngsters in school, were everywhere. Most were either fidgeting in apprehension of what was to come or smiling in satisfaction with the sweet that they had earned by holding still for a few minutes. All the while, parents, teachers and older children looked on with curiosity and often tried to become involved in what at times teetered on the edge of anarchy.

Target Objectives

Anthropometric indicators are generally broken into three sub-indicators—height-for-age (otherwise known as stunting), height-for-weight (wasting), and upper arm circumference. *Height-for-age* is selected here as the single best anthropometric indicator for health (primarily nutrition) because it registers long-term health status. This is because growth cycles, which are missed due to periods of poor health, cannot be recovered. This growth is simply foregone forever. Children who have foregone growth cycles will register as significantly shorter than statistically established averages. Height-for-weight and arm circumference both give information about current nutritional status only.

Height-for-age is also an indicator of wealth for the very poor. The very poor often spend any increased wealth on food, which will register as increased height. Following the same logic, distributional analyses of *height-for-age* along gender and class lines are indicators of gender and economic equity. Finally, *height-for-age* is indirectly a measure of soil and water conservation—in a rural community, improved health is often linked to the raw materials of farming.

Measurement Procedures

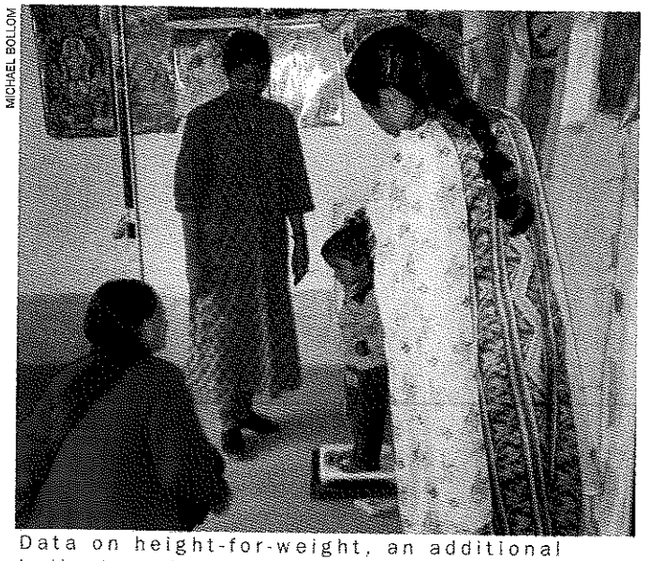
Children of known ages must be measured for height. Techniques for doing this are well documented and easily available, as are the international standardised tables that detail the distributions of height-for-age for children of different ages (for example, see the web page by Bender and Remancus, or the FAO manual listed in the Suggested Readings). A sample can be taken from several villages, randomly or in terms of representativeness. Children of particular age groups are measured and their heights noted. Since standardized tables of height-for-age measures are only applicable internationally up until

A small team can take precise height measurements quickly, easily and cheaply (Arki, H.P.)

puberty, younger children must be the ones measured.

The data collected is then analysed. Stunting is determined by counting the number of children who fall below two standard deviations of accepted norms. Gender parity is determined by analysing how the measurements for female children fare in comparison with males. Economic equity is determined by looking at the overall spread of the scores — if the standard deviation of the scores is high, equity is low.

When the evaluation team first arrived in the watersheds, they asked the partner NGO to schedule one day in each of the selected villages for the stunting studies.


MICHAEL BOLLOM

Data on height-for-weight, an additional indicator of health, can be gathered with a little extra effort (Arki, H.P.)

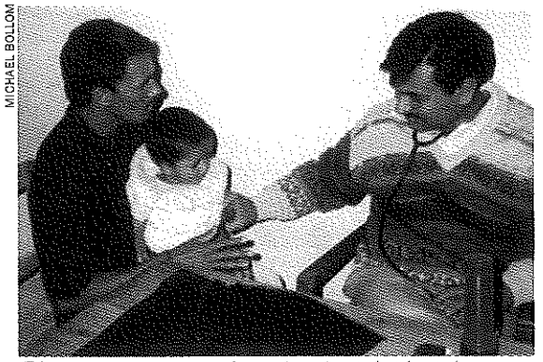
The team had to be careful to schedule visits when children were not in school, when mothers were not busy with their household chores, and when other, special activities were not taking place. On one occasion the team unknowingly scheduled the study on the day of a major festival in the village and before the study could even begin they were almost forced to join the village people in their raucous festivities! Generally, it worked best if the team arrived about mid-afternoon or on a Sunday. Three to four hours was enough time to process as many as fifty children.

While spreading the word about our forthcoming visit, the NGO informed parents that the team would need to know the ages of their children. While very few children in the watersheds had proper birth certificates, most parents did have vaccination cards that listed their children's date of birth. These cards were accepted as accurate since children begin their vaccination sequences within a few months after birth, when the date of birth is still fresh in the mother's memory. The team also accepted cases where the accompanying parent simply recited a birth date, if she or he seemed quite confident. In cases where the birth date seemed uncertain, the case was excluded from our database. [5]

[5] Our original plan was to calculate the children's ages using an ageing chart. Such a chart lists notable local events (whose exact dates are known) that occurred near the time that the children were born. A parent is then asked to specify how the birth of their child relates to these events. In this way the child's age can be estimated quite accurately. When the team was informed that the children in both watersheds had vaccination cards, this plan was abandoned. If birth records are not available, evaluators will need to devise a birth chart during the first few days of their stay in the watershed. This should be done with the help of local people and the NGO.

The preliminary PEP recommended that two-year-olds be measured. Given the small size of the villages being studied, the sample size would have been too small had this limitation been maintained. Instead, local people were told to bring children who were old enough to walk, up to five or six years old. In retrospect, it was a disaster to include children less than two years old. In the best cases they were unable to stand still; more often their shrieks of terror set off a chain reaction of crying which cascaded through to much older children who would have otherwise remained calm.

In order to encourage people to bring their children (and in the interest of giving something back to the community) the PI hired a local doctor to accompany the team on its site visits. The doctor's presence undoubtedly increased the level of participation in the study. The doctor was asked to bring the equipment and medicines that he thought was adequate to treat minor, childhood ailments. (The PI was also armed him with a large bag of sweets to put smiles on the little faces as they walked out of the chamber of horrors.) The doctor examined the children after the team had finished measuring them. In addition, he treated children too young for the study, whose parents had brought them because they knew a doctor was available. He treated older children and adults as well. Given the presence of the doctor, it seemed clear that almost every child between ages two and five was measured.[6]


MICHAEL BOLLOM

The presence of a doctor helped gaurantee a high rate of attendance at the stunting study (Kattery, T.N.)

In order to save on personnel costs, the PEP recommends that assistants for the stunting study be hired locally. This worked quite well, but some time was required to train the entire crew to work together. Measuring the heights of children is easy (as is measuring the weight, which was also done), but these measurements must be taken with consistency and precision for the data to be useful. This concern for detail needed to be instilled in the local assistants, who otherwise tended to treat the measurement sessions as a game, especially in the light of the carnival-like atmosphere of the whole undertaking. The training was imparted through a very short (less than an hour) practice session.

Finally, future evaluations need to set aside control groups. It may be more difficult to convince people in untreated areas to bring their children for measuring (they will not even know the NGO or state department people). The presence of the doctor (and the bag of sweets!) may compensate for this.

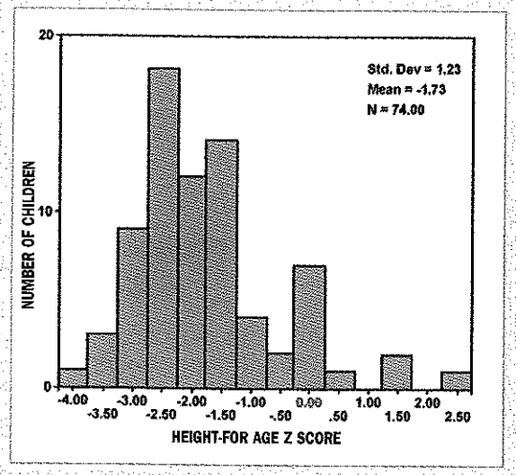
[6] This, of course, eliminates the possibility of any sampling error in the villages.

THE FINDINGS: HEIGHT-FOR-AGE

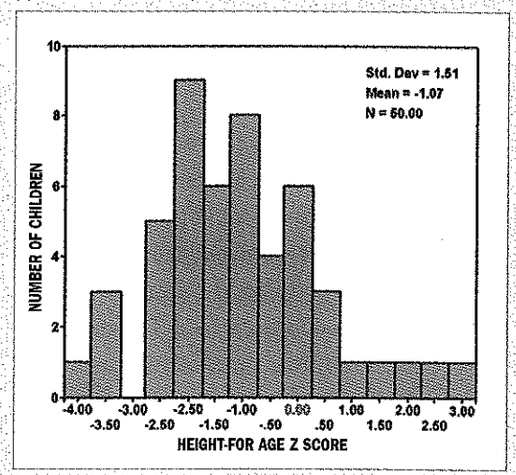
The findings were predictable in some respects and remarkable in others. Given the low levels of social development, especially in rural India, the assumption was that the children would, on an average, fall below international norms of height-for-age. The team's findings confirmed these expectations. In addition, most of the literature on social development in India maintains that there are stark inequalities along gender lines. This should register in measures of height-for-age—on an average, girls' heights should be farther below international norms than the boys'. The findings from this study do not support this.

The total sample size from both watersheds was 124, seventy-four of which were from Arki and the remaining fifty were from Kattery. Of the total, seventy-two were boys and fifty-two were girls. This is perhaps fifty fewer children than were actually measured. During the measuring process, certain cases were discarded. This was generally done for two reasons: when birth data information was uncertain and when the measuring process was not executed to the team's satisfaction.

Note that all the stunting data has been converted into "z-scores". (A child's height-for-age z-score tells us how tall a child is in terms of standard deviations above or below the international norm for his or her age.) This is to facilitate comparison across age groups and between the sexes. Conversion was done using growth reference curves developed by the American National Center for Health Statistics and the Center for Disease Control. (While the CDC is an American organisation, these growth curves are recommended by the World Health Organization for international use.) In all the following figures and tables, if a child's height-for-age z score is equal to zero, then his or her height is average by international norms. If the child's height-for-age is negative then the child's height is below average. A score of negative two or less means that the child is "stunted".



ARKI



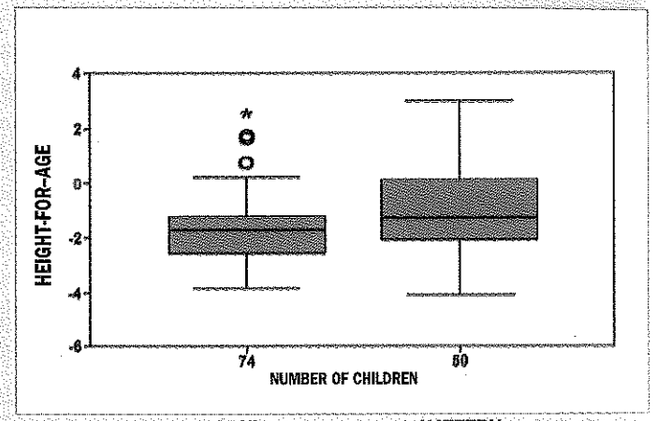
KATTERY

The above figures are histograms of the data sets for Arki and Kattery
These histograms show quite clearly that in both watersheds the children are far below international standards. In Arki, thirty-four children (forty-six percent) have scores of negative two or less. These children are stunted by international norms. In Kattery fourteen children (twenty-eight percent) are stunted.

COMPARING THE WATERSHEDS

A comparison of height-for-age in Kattery and Arki demonstrates that, on an average, Tamil children are healthier. The mean in Arki is -1.73, while in Kattery it is -1.07 (This difference is statistically significant (95% certainty). The Box-and-Whiskers plot on the facing page illustrates this point.

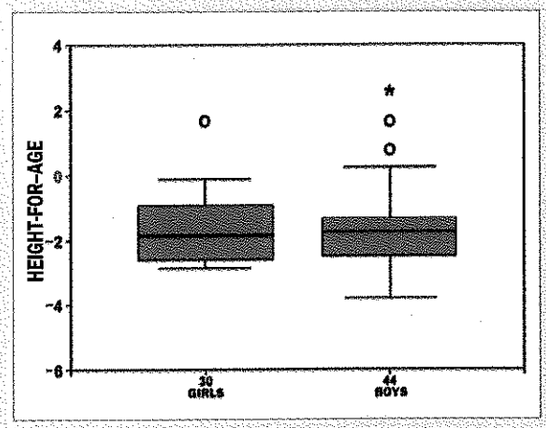
This difference between the watersheds is not surprising in the light of available information on the relatively higher levels of social development in Tamil Nadu.



ARKI KATTERY

While the evidence is inconclusive, some of the data presented thus far indicates a higher degree of social inequality in Arki. While the Arki histogram is not two-peaked (which would be a very strong indication of social inequality), the box-and-whiskers plot for Arki (see right) contains four outliers at the high end of the distribution. These outlying points represent children who are much taller than the rest of the sample. These children could simply be genetic anomalies. Given the size of the sample (seventy-four children were measured in Arki), it is unlikely that the presence of a few unusually tall children was not balanced by a few unusually short children. It is more probable that these outliers are the children of local elites. Such children would have the sort of superior access to nutritional resources necessary for them to grow taller than others around them.

COMPARING THE HEIGHTS OF GIRLS AND BOYS



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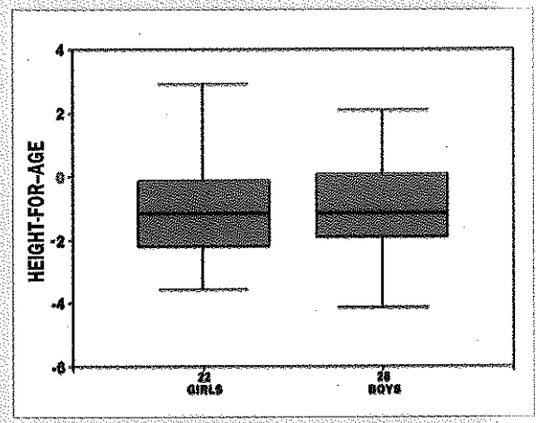


KATTERY

When the data are segregated by sex there is a counterintuitive finding—the girls in both watersheds are, statistically speaking, the same height as the boys. (That girls in Arki are slightly taller than boys is not statistically significant.)

That there is gender parity (at least in terms of health) in the selected watersheds is not so strange if we examine Indian social development statistics on a state-by-state basis. While India has national gender parity ratings far below most other countries, certain states do fare much better than others. Both Himachal Pradesh and Tamil Nadu are amongst the top five.

Unfortunately, the data collect during this round of research can tell us nothing about changes in nutritional status in the watershed since the IGBP began its work. This baseline data only tells us about the current situation. In order to look for change, a similar study will need to be carried out in the same villages after a few years (no less than three). The data collected at that time can then be compared with the baseline.

Outlook and Recommendations

Of all the indicators tested, this one has the potential to be the most powerful, especially when considered in terms of resource constraints. For a relatively small investment in time and monetary resources, an evaluation team can gather a fine-grained database that is rich in information on nutrition, social equity and gender equity. (For almost no added costs, the team can also take measurements for wasting, which offers added information about the same issues.) Only a few pieces of equipment need to be purchased (costing less than Rs. 12,000), and the executing staff do not need to have any special skills. The study can be carried out quite quickly (half a day per village), while freely available software (EpiInfo6 from the Center for Disease Control) makes analysis quick and easy.

According to international organisations like the World Health Organization, this is a valid measure of nutritional status.[7] Distributions of nutritional status can be examined to gain information on gender and social equity too. Unless an evaluation team has sampling difficulties (and if they follow the procedure discussed above, they will not), this is also a reliable indicator. The stunting and wasting data have the added bonus of being objective, so it is less subject to criticism of bias.

This indicator does have some weaknesses, however. It is not a responsive indicator—changes in the level of community health will take several years to show up in anthropometric surveys. In addition, height-for-age will not be an useful indicator of health or wealth in those communities that are already relatively healthy and wealthy (since human height eventually approaches physical limits). Finally, like all extractively executed indicators, controls are necessary for the proper implementation of this indicator. Nevertheless, the continued use of this indicator is recommended without any reservations.

4. OWNERSHIP OF CONSUMER DURABLES

Target Objectives

This indicator measures the level of wealth in a watershed. The assumption is that as general levels of wealth increase, the local population will purchase more consumer durables. The ownership of various, highly visible consumer durables is used as an indicator for several reasons. First, consumption levels of non-durables (alcohol comes to mind as an example) are difficult to determine as people often do not monitor or remember their consumption rates.

The second reason why this particular indicator has been selected is because people often wish to conceal their personal income. Highly visible consumer durables, especially the larger ones such as farm animals or bicycles, are difficult to conceal so they can be easily counted. The distribution of consumer durables is then used to measure economic equity. Indirectly, this indicator is also a measure of soil and water conservation. The primary occupation in every IGBP RWS is farming. It follows that increased levels of wealth are likely a result of increased farm outputs. Sustained increases in farm outputs are less likely when soil and water resources are being degraded. Whether increased income is the result of improved soil and water conditions will need to be determined during the PRA sessions.

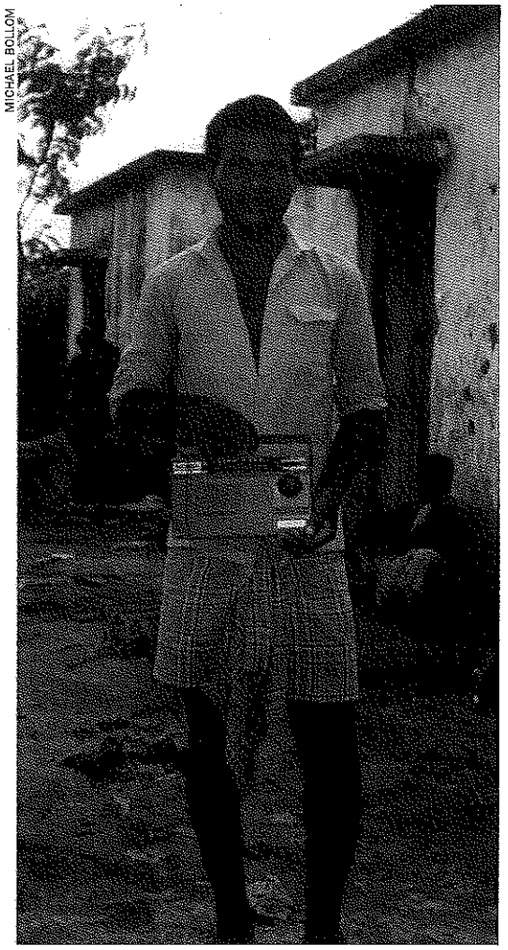
[7] Height-for-age as an indicator of health may face objections from people who do not believe that the heights of indigenous people can be compared to standardized tables constructed by the United Nations or the United States Department of Health. The basis of such an objection might be that local people are genetically shorter or taller than western people. According to research financed by the Food and Agricultural Organization of the United Nations this is not true (Bender and Remancus November 13, 1997). At least for the first ten years of life (through puberty) children throughout the world are the same height, all else being equal.

Measurement Procedures

Ownership of particular consumer items can be measured by a household survey or through a more participatory approach. The latter is recommended because it is faster, cheaper and more likely to uncover the truth. Obtaining figures of statistical significance does not require that the entire watershed be surveyed. Depending upon the number of villages, a sample of villages can be surveyed. If the villages in the watershed are very different in terms of socio-economic makeup, representative villages could be non-randomly selected. A skilled practitioner of participatory rapid appraisal techniques can assess the levels of ownership of various consumer durables in the village in a PRA session lasting no more than two hours.

The consumer goods surveyed need to be selected with local culture and levels of wealth in mind. Appropriate consumer goods to survey will be those that local people aspire to own, but are just out of their reach. For example, the number of snow shovels owned by Rajasthani villagers will probably not change even if their level of wealth increases dramatically. The goods surveyed must also be of the kind which others in the village would be readily aware of (e.g., a bicycle, more so than jewellery).

During the reconnaissance trips to the watersheds, the partner organisations were asked to help the PI assemble a list of consumer durables that a few people in


MICHAEL BOLLOM

People are generally willing to discuss their prized possesions (Karkara, Bihar)

the watershed possessed, but most aspired to own. The beneficiaries were told that when the evaluation team arrived, the team would survey these items in the selected villages.

Given the results of the evaluation team's survey, either the PI was not clear what he wanted, or the partners were not always in touch with the means and aspirations of the beneficiaries. In Arki, the list of durables included items such as a satellite dish! While a few people in Arki town may own such things, there was no evidence of them in the villages, and many people did not even know what a dish was. The list for Arki also included bicycles. Although bikes are within the financial reach of many villagers, they are of little use in Arki—most of the roads in the watershed are either too underdeveloped, too steep, or both.

In order to develop the best possible survey list of consumer durables, a group of local people must be consulted in the future. This should be done during the Gearing Up phase of the field visit. Evaluators must look for items that few own, but many would choose to own, given a modest increase in wealth. Such items will help evaluators measure change over time. If almost everyone in a village already owns an item, it is useless as a survey item. For example, if a village is already saturated with radios then it probably still will be when a second survey is executed several years hence. If this is the case, evaluators will not be able to register changing levels of wealth, even if they have occurred.

In one of the watersheds surveyed, a list of eleven durables was compiled, while in the other watershed the list contained eighteen items. In retrospect, the latter was a bit too lengthy to sustain the interest of the beneficiaries. Evaluators would be well served to survey between twelve and fifteen items. This number is still a bit large, but the original list needs to be longer. This is because some items may need to be withdrawn from the list during successive evaluations. For example, many people in Kattery presently want to own a mixie (blender). Five years from now, when a follow-up evaluation is being conducted, the mixie may have been superseded by a superior tool that does the work of a mixie and a grinder. If this were to happen, it would not make sense to continue surveying for mixies and the item would be omitted.

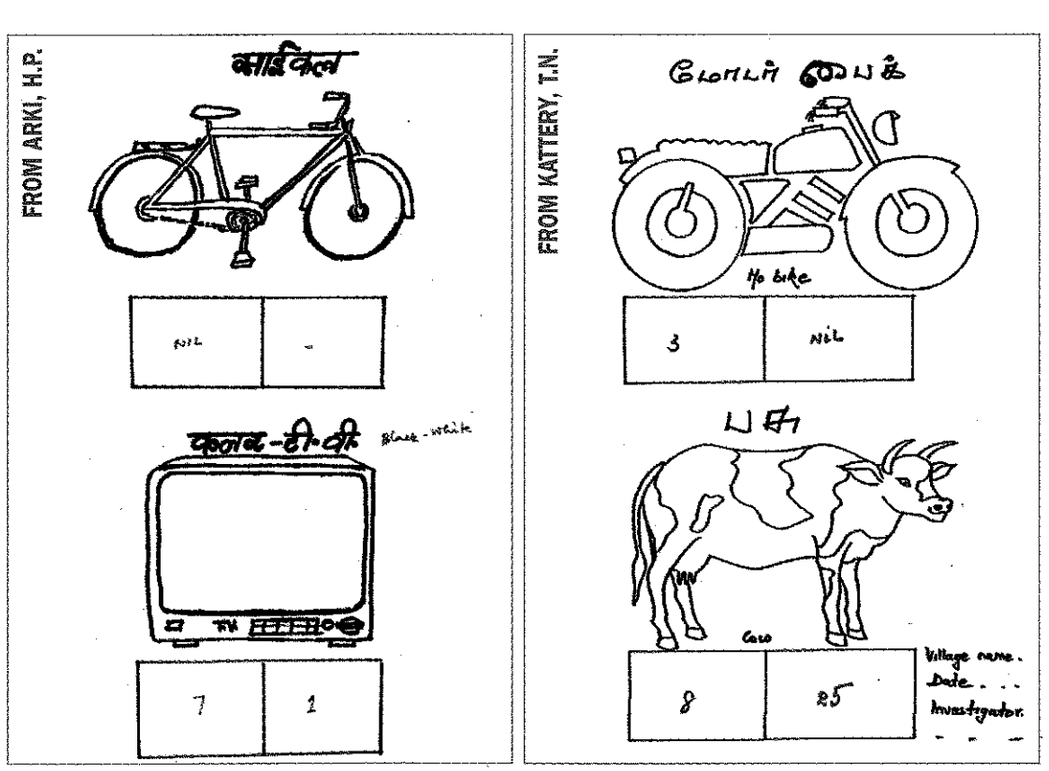
The lists of durables were then turned into pictorial surveys by an artist (no one on the evaluation team had the least bit of artistic inclination). The figure on the facing page shows a section from a survey done in Kattery and one from a survey done in Arki. Each item on the survey is represented by a separate picture. This is done both for illiterates as well as to stimulate discussion. In case the pictures were ambiguous, a caption was also included, in both the local language and in English. Since this book recommends that reconnaissance visits be dispensed with in the future, it is important that the evaluation team be prepared to construct these pictorial surveys in the field.

These surveys were used during the

Participatory Sessions. During the discussions themselves, it worked out best if the surveys are reserved until the end, when people were loosened up enough to talk about monetary issues. The team member leading the discussion asked the group to fill in the survey out together. They were asked to debate, one item at a time, how many of each are presently owned by the villagers. This number was then recorded, by one of the group members, in the left-hand box under each picture.

According to the PEP, time series data on changing ownership levels of consumer durables should be collected through periodic visits, several years apart. Despite this, the evaluation team made an effort to estimate changing levels of wealth by asking about past levels of ownership during the participatory sessions. After all items in our survey had been discussed once, the team asked the groups to go down memory lane and decide on how many of each item had been in the village a certain number of years earlier. While the team felt that the groups discussed the past with a great deal of confidence, the original approach is still recommended due to the frailty of human memory.

Given the uncertain nature of information gathered through group discussions, the team member leading the discussion was asked to rate her degree of confidence in the answers. She was asked to record on her own list if the group spoke with great certainty about the ownership rates of a



Pictures and labels help clarify the consumer durables being surveyed and stimulate group discussions

THE FINDINGS: CONSUMER DURABLES

The following table presents the findings for this indicator, broken down by watershed. While these are summary data, they are generally comparable (the data for each watershed is from the aggregation of results from three, similarly sized villages).

The data generally show Kattery to be more materially advanced than Arki. Where the same good was surveyed in both watersheds, there were almost always more of the same item in Kattery. There were two exceptions to this—telephones and black-and-white TVs. Of these, the latter is an inferior good to colour TVs, of which there are many more in Kattery.

Regarding change, only two items (cows and desi buffaloes) showed decreased ownership rates in both watersheds. Upon questioning, however, people in both Arki and Kattery related that they had not reduced their ownership of these animals due to monetary hardship. Instead, there has been a preference change in both watersheds, the result of which has made the ownership of these animals less desirable.

At the end of each participatory session the groups were asked to discuss what appeared to be their generally higher standard of living as compared to the earlier period surveyed. In Arki the answers generally related to changing employment opportunities with the state government (where most families earn their cash income). In Kattery, change was very closely related to the recent surge in the price of green leaf tea.

Only in one case did a group specifically link increased wealth to an IGBP-funded activity. In Salamoor Village (Kattery) the women's group spent a lot of time discussing their changing relationship with the local bank. As part of its empowerment programme, MYRADA has helped women's groups establish a client relationship with the local bank. Since the Salamoor group opened its account at the bank, the women have been able to supplement their own lending pool with a bank loan. They claim that this increased access to capital has allowed them to fund the purchase of some of their new durables. These funds have also helped fund agricultural improvements, which in turn led to increased incomes. This was mentioned by only one of the self-help groups in Kattery, but it was the last one that the team spoke with. Had they gone back to the other three groups and inquired about this phenomenon, it is likely that similar information would have been obtained, given that MYRADA had helped all the self-help groups obtain bank loans.

SURVEY OF CONSUMER DURABLES

Consumer good	Number of units: Present		Number of units: Past		Percentage change	
	Arki	Kattery	Arki[1]	Kattery[2]	Arki	Kattery
New or Tile Roof[3]	57	125	81	94	-30	63
Pukka House[4]	20	—	3	—	566	—
Cow[5]	41	42	14	80	192	-47
Desi Buffalo[6]	127	—	190	–	-33	—
Gas Connection	53	89	2	6	2500	1417
Bicycle[7]	5	—	4	—	25	—
TV (B&W)	49	30	10	6	390	400
TV (Colour)	2	38	0	10	NA	280
Cassette Stereo	51	98	6	25	750	292
Refrigerator	6	—	0	—	NA	—
Telephone	20	6	1	0	1900	NA

[1] Five years ago.
[2] Ten years ago.
[3] In Arki we asked about "tile" roofs; in Kattery the question was about "new" roofs.
[4] *Pukka* means finished, brick, or properly built, as opposed to a shack, or mud house.
[5] In Arki this item was specifically a Jersey cow; in Kattery it was not specified.
[6] The buffalo kept in Arki are mostly of a hill variety and are generally smaller. While *desi* means local, here it refers to the variety of buffalo from the plains.
[7] Includes motorcycles, scooters and mopeds.

particular item, or if their answers were tentative. For example, when one group of men got to the part of the survey that contained kitchen implements such as mixies and grinders, they openly admitted ignorance and told us to ask their wives. By rating the confidence in respondants' answers, we tried to control the reliability of the data—data deemed "too uncertain" by the interviewer were excluded from the final set.

When all the durables had been fully surveyed, the group was then asked to discuss the reasons for change. For example, why do fewer people own cows than they previously used to? How is it that there has been an explosion in the ownership rates of kitchen implements like grinders and mixers? If they answered that people have more money now, they were asked about the sources of the new-found wealth. Future evaluations may also want to use control groups to help pinpoint the mechanisms for changing levels of wealth.

Outlook and Recommendations

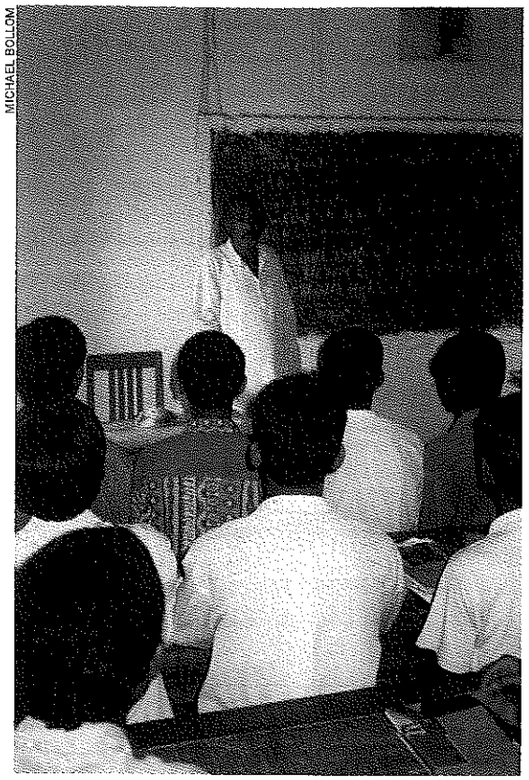
This indicator is highly recommended for future use. It allows evaluators to gather data on a very delicate issue (wealth). It is extremely inexpensive to implement, requiring only the purchase of poster paper and coloured pens. It also takes little time to implement—no more than an hour per village. The skills necessary to execute the indicator (the ability to lead a PRA in the local language) are somewhat sophisticated, but they are the same as the skills required for some of the other indicators in this set.

In addition, this indicator should be a valid measure of wealth for all but the poorest people. Given the nature of information obtained in group discussions, this data is also quite reliable. Reliability will, however, start to falter if the village is too large or the item surveyed for is too pervasive. For example, Mellodyarahatti in Kattery had almost seventy households. It was difficult for the groups to come up with accurate estimates of ownership for widely held items such as mixers.

To its detriment, this indicator is not very responsive—it takes time before beneficiaries transfer new-found agricultural wealth into consumer goods. In addition, this indicator will not measure changes in wealth at the very lowest rung of the economic ladder. Those most in need will first spend increased resources on food. After that, they will expend their resources on shelter and debt repayment. This problem is taken care of in part by using this indicator in conjunction with an anthropometric indicator (see the previous section). A survey of consumer goods also fails to register productive investment that come with increased wealth (e.g. the purchase of fertilisers).

5. SCHOOL ATTENDANCE

Due to unforeseen circumstances, the evaluation team was forced to collect the data for this indicator using a method other than the one that was proposed in the preliminary PEP. Then, obtaining data that could be compared between watersheds, across genders, and over time turned out to be much more difficult than expected. The reliability problem


MICHAEL BOLLOM

School attendance rates are an indicator of education (Karkara, Bihar)

leads to reservations about the utility of this indicator.

Target Objectives

This is a proxy measure for levels of education. In all but the worst cases, children become more educated the longer they attend school. Given that very poor people do not send their children to school, this is also an indicator of wealth—as the poor acquire more resources, they will send their children to school. The distribution of attendance data along gender lines also serves as an indicator of gender equity. Once again, this is an indirect indicator of soil and water conservation—in a rural community, the rising level of wealth necessary to attain higher levels of education is in most cases linked to the raw materials of farming.

Measurement Procedures

The original plan was to take a single day's attendance at all the schools that serve the selected villages. This would be accomplished by simply arriving (unannounced, if possible) at the schools in question, and requesting a head count. In the spirit of participation and sharing data, attendance figures should be discussed with the principal/director of the school at the time of collection. This person can offer an interpretation of the data.

Upon arriving in Arki and Kattery, the team was told that it would not be possible to take attendance at the local schools. In March, students all over India take their annual exams. The team's visits to both Arki and Kattery coincidentally overlapped with the local exam periods. An alternative plan was quickly developed. Instead of physically counting the students, team members asked to see the school's attendance registers for a recent date. It was decided that this date should be one prior to the exam period, because during exams attendance rates are unusually high (i.e., data needed to be collected for a "normal" day).

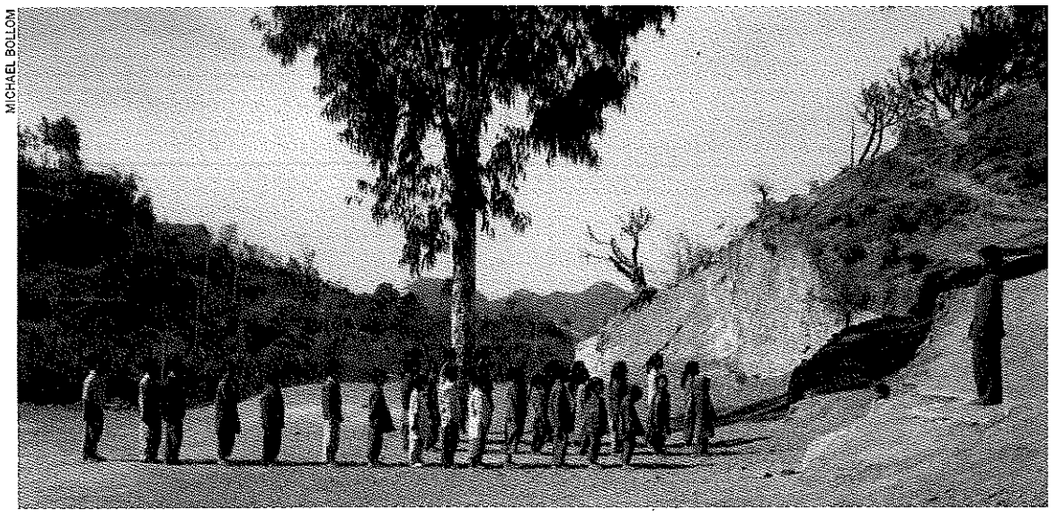
Almost all of the principals with whom team members spoke were quite helpful. After asking about the nature of the evaluation, many simply opened their attendance registers and let the team collect the needed information. Others went to their record keeping area and supplied the information to the team. This latter method of operation highlights the weakness of our alternative method—data supplied to the evaluation team by school administrators may be subject to tampering. (The same is true, probably even more so, of enrolment figures. This was the reason why attendance figures were preferred over enrolment records in the first place. [8])

Although the evaluation team did not actually carry out the head count method, visiting schools in Arki and Kattery gave rise to a concern about the invasive nature of the of the head count method. This problem was not evident when this method was first developed by the PI after his visit to Karkara RWS, Bihar. In Karkara the schools were fairly small and informal, as one might imagine village schools in a poor rural area to be. The secondary schools visited in Arki and Kattery were, however, much larger and more formally run. Had team members asked, the headmasters of these schools may have bristled at the idea of disrupting their classes to count the number of students, especially when the attendance had been already taken in the morning.

So both the methods of collecting attendance data have shortcomings. Head counts are invasive and official records can be falsified. If the local schools are small and informal, the head count method is recommended. If not, evaluators can attempt to be present during the normal morning attendance session (to do a parallel count). If neither of these options work, evaluators should use the daily attendance records that are available at the school.

Evaluators should attempt to mini-

[8] After collecting some enrolment figures in both Arki and Kattery, the original reluctance to use them was justified. One school in Kattery had offical absentee rates (enrolment minus attendance) of between twenty and forty percent. That this many students are missing for just the day is unlikely. It is more probable that many of these "absentees" are simply on the enrolment roster, but they do not really attend school.


MICHAEL BOLLOM

Morning is a good time to quickly determine the day's attendance at school (Arki, Himachal Pradesh)

THE FINDINGS: SCHOOL ATTENDANCE

The PEP recommends that changing enrolment rates be determined through periodic visits to the watershed. The evaluation team nevertheless attempted to gather some data on change. They asked school administrators to furnish attendance data for a date in the past, which could be compared with the present figures. This did not work very well. First, some of the schools did not have old attendance records. Those schools that did furnish old attendance figures did not give figures for the same dates. (In Arki, the old attendance figures were from three totally separate school years, none of which were from the same year supplied by the administrators in Kattery.) This made the figures incomparable. The decision was made to exclude these figures from the findings.

Below are school attendance data from the two watersheds for the given dates. The data appear to indicate that the attendance ratio of girls to boys is better in Kattery. This ratio is generally greater than one in Kattery and always less than one in Arki. The greater gender equity in Kattery is in keeping with the high social development ranking of Tamil Nadu.

Due to data collection problems, however, the PI is reluctant to claim that the data is valid or reliable. The evaluation team had intended to collect school attendance data that could be compared, from grade to grade and across genders. In retrospect, this was not probably done properly. This is because the local school systems are highly fractured. Children from the same village (even the same family) often go to different schools, which can be located in widely dispersed locations. This geographic dispersion of schools makes it difficult to use attendance figures from local schools as a proxy for the number of children from that village going to school.

An example, can be cited from Michael's Colony (Kattery). In addition to the government school, there is also a Catholic school in Michaelis Colony. This Catholic school serves only girls, from first through tenth standard. The school attracts children from many other villages besides Michael's Colony (the only village which was surveyed in that part of the watershed). There is no comparable school for boys in Michael's Colony so only local boys go to the local school. The fact that the Catholic school brought in a sizeable number of girls from neighbouring villages skewed our attendance data in Kattery. Thus, a false picture emerged that more girls attend ninth and tenth standards in Kattery.

Such problems made it difficult to make accurate surveys of attendance rates for the watershed. In the future an evaluation team should collect attendance data from all schools in a watershed that serve the grade levels of interest (in this case the ninth through twelfth standard). This should ensure the most complete count. Yet, even this may not be enough as some children may commute outside of the watershed, as was the case in Kattery.

The team was under the impression that they had taken a full survey of schools serving the ninth through twelfth standards in both Arki and Kattery, yet the attendance figures collected are so erratic that they are hard to believe. According to the data there are 521 eleventh and twelfth grade students in Arki, as opposed to 239 in Kattery. But Kattery has a larger overall population so there should be more children in school! It is also disheartening to note how steeply enrolment rates appear to drop off in Kattery. These figures cannot be correct, since most people in the Tamil Nadu watershed agreed that almost all students in Kattery finish tenth standard and over two thirds of those finish twelfth. Perhaps the team overlooked some schools in the watershed.

School Attendance Rates

Grade	Arki (16/2/98)		Kattery (2/12/97)	
	Boys	Girls	Boys	Girls
9	139	110	163	214
10	124	113	102	167
11 (10+1)*	165	88	85	65
12 (10+2)*	141	127	41	48

*The school system in Arki is such that the 11th and 12th grades are referred to as "10+1" and "10+2"

mise their counting work whereever possible. For example, in Arki the team began by visiting all the schools that served the selected villages, first through twelfth standard. After several informal discussions with both villagers and an elementary school principal, it became apparent that all this work was not necessary. Informed people told the team that, apart from exceptional cases, all students in Arki go to school until tenth grade. After this, attendance rates begin to decline, more so for girls. Hearing this, and confirming it at several elementary schools, plans to visit the remaining primary schools were cancelled, and efforts were focused on secondary schools. In retrospect, the decision to investigate only the grade levels from which attendance begins to fall below one hundred percent was a great time saver.

Outlook and Recommendations

This indicator can still be a useful tool. Given the data collection problems discussed above, however, only a guarded recommendation is offered. Attendance is certainly a valid measure of schooling (although whether it is a measure of literacy or education is an issue which we will not attempt to address here). School attendance is also a fast, cheap and easy indicator for measuring education. It requires very little time, no special equipment and can be carried out with low levels of training.

This indicator is not, however, particularly reliable. Attendance on any one day is subject to many factors, including the weather, festivals and cropping patterns. As such, attendance figures gathered even on two successive days might be quite different. For this reason, it is still recommend that the data gathered be discussed with an administrator—he or she will know if the attendance on a particular day is unusual or not. (If a high degree of reliability is required, then enrolment figures should be used instead.) Another weakness of this indicator is that it requires the use of controls.

Given the host of problems discussed above, (and in the box on the facing page) it might be quicker, less expensive and easier to skip the head counting and simply gather information on school attendance rates as part of the Participatory Sessions. The evaluation team collected more information about school attendance rates during the PRAs than while collecting the attendance data, and the latter took five or six times as much effort as the former!

6. USE AND MAINTENANCE

This indicator (referred to in the rest of the text as *"Use"*) is very closely associated with the indicator *Outsiders*. For this reason, many of the comments made here will also apply to *Outsiders*. The text will make clear which statements apply to both.

Use and *Outsiders* are the process indicators in this set. They do not attempt to measure the impact that a programme's activities have had. Instead, they give some idea of how successfully the activities themselves are functioning. With such information, evaluators can better

Activity	Level of Use	Level of Maintenance
Forest Department		
Nursery	Heavy (past) Disuse (present)	High
Plantation	N.A. (The plantations will not be ready to bear fodder or fuel for many years.)	Moderate
Live Fencing[1]	Moderate.	Moderate
Lantana Clearing[2]	N.A.	Poor
Check Dam[3]	Moderate	Poor
Village Development Committees[4]	Disuse	N.A.
SUTRA		
Smokeless stove	Heavy	High
Stove Technician (Mistry)	Moderate	N.A.
Solar Cooker	Disuse	Poor
Para-vet (Dunger Dai)		N.A.
Nursery—Napier Grass	Unknown	Unknown
Napier Grass Plantations	N.A.—The grass must first fully establish itself	N.A.—The grass is being left to fend for itself.
Nursery—Sapling	Light	High
Compost pit	Light	High
Women's Groups[5]	Light	Low
Watershed Federation[6]	Light	N.A.

[1] Rows of cactus-like plants that surrounding some piece of generally agricultural land. It is supposed to prevent unrestrained grazing by cattle.

[2] Lantana is a pest plant that needs to be cleared in order to make room for more desirable species. It must be cleared several years in a row before it is completely destroyed.

[3] Loose bolder structures designed to catch silt that is suspended in flowing water. Check dams also act to slow the velocity of flowing water, thus preventing additional erosion.

[4] Village-level committees that are supposed to be the Forest Officer's vehicle of participatory development in the villages.

[5] Groups of women set up at the village level. The intention is to empower women, both economically and politically.

[6] A federation of the self-help groups in the watershed.

Activity	Level of Use	Level of Maintenance
AED		
Check Dam[7]	Moderate	Moderate to Low
Gabion[8]	Heavy	High to Poor
Community Well[9]	Heavy	High
Retaining Wall[10]	N.A.	High
MYRADA		
Community Toilet	Heavy	High
Bridge[11]	Light	Moderate
Path to Temple[12]	Moderate	Moderate
Community Well	See Above	See Above
Tank Cleaning[13]	N.A	Unknown
Self-Help Group[14]	Heavy	High
Village Infrastructure Committe[15]	Not yet fully implemented	—
Watershed Federation[16]	Heavy	High
Stream Nala Widening[17]	Not yet occured	—

[7] In Kattery, the term "check dam" refers to masonry structures built across small waterways. They are designed to hold water for up to several months after the rainy season.

[8] Same as check dams in Arki, but these are held together by a wire mesh.

[9] This activity is being implemented with MYRADA. The AED builds the dam, but MYRADA helps with the placement process, purchases the pump, installs it and electrifies it.

[10] A masonry structure build on the side of a large stream to prevent erosion from the bank.

[11] A concrete foot bride to a temple located across a small stream from the main road.

[12] A concrete footpath was built from the village school, down a steep hill, to an important village temple.

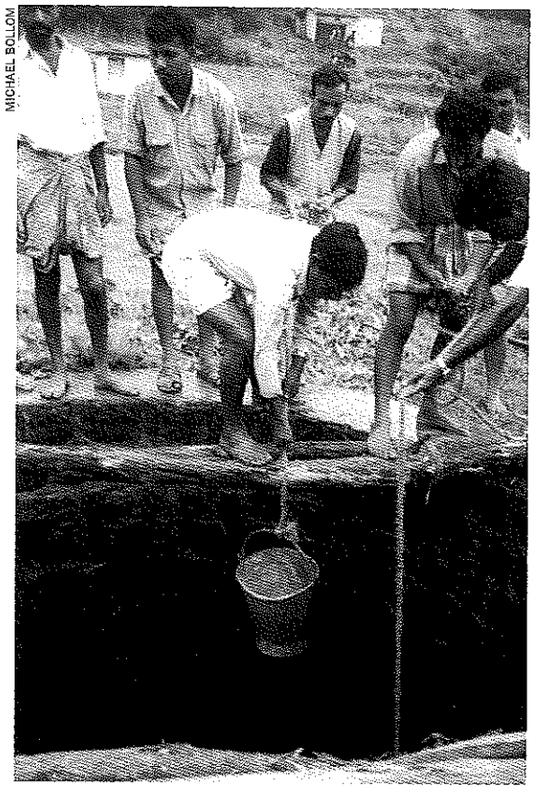
[13] MYRADA organised the cleaning and repairing of a village water tank.

[14] Groups set up at the village level to deal with local problems. Men and women have separate groups. One of the primary focus of these groups has been to facilitate personal savings by using a micro-finance type program.

[15] Village-wide organisations to deal with infrastructure in the villages.

[16] This was originally formed by the AED, with a fairly random selection of people some of whom were not even from the watershed. This organization became defunct quite quickly. The Federation has since been revived by MYRADA. It is now a federation of the self-help groups in the watershed.

[17] The Watershed Federation (with the help of MYRADA) is working with the AED to widen and deepen the main nala (drainage stream) in the valley. Work on this activity has not yet begun.


MICHAEL BOLLOM

Villagers maintain their community well (Kattery, Tamil Nadu)

understand the mechanisms through which programmes have affected the treatment area, and also in some manner predict the future impacts.

Target Objectives

This indicator measures project sustainability. If many of the units that have been installed under some activity are not functioning or improperly maintained while outside support is still coming in, it is likely that even fewer will function after outside support is withdrawn. Such an activity is not sustainable.

Measurement Procedures

The execution of this indicator is highly time consuming. Determining the extent to which programme activities are being used and maintained requires that members of the evaluation team visit at least a sample of units from every activity in the watershed. During the test evaluation this entailed a lot of travelling, much of it over difficult terrain. Even though the PI elected not to visit all installed units, the travel time required to execute this indicator consumed over one third of the Field Visit phase of the evaluation. If an evaluation must be completed very quickly, investigators may prefer to omit this indicator.

During his reconnaissance trips the PI gathered lists, from both the NGO and the state department, of all activities being implemented in each RWS. In future evaluations, this should be done during the Gearing Up phase. Plans must then be made to survey all the activities in order to determine how frequently they are being used and how well they are being maintained. At this point sampling becomes an issue. During the present evaluation, if an activity had only a few units in the watershed, the evaluation team surveyed all of them. If this was not possible, only those units in the selected villages were surveyed. For some activities, so many units existed that even this was not possible. In such cases, random visits were made to the units.

Before going to the field, evaluators must define the terms "heavily used", "lightly used", "well maintained' and "poorly maintained" for each activity. For example, the evaluation team decided that smokeless stoves used for cooking everyday be defined as "heavily used".


MICHAEL BOLLOM

In order to qualify as "heavily used", smokeless stoves needed to show evidence of daily use (Arki, H.P.)

Explicit definitions prevented qualitative appraisals from becoming too subjective.

Developing these definitions can challenge the imagination, especially when it is difficult to determine what it means to "use' or 'maintain" units of a particular activity. For example, how does one use a check dam? In such cases, only levels of maintenance can be checked for. Definitions of both use and maintenance should be formulated in consultation with the people who have designed the activity.

Outlook and Recommendations

This indicator gave the evaluation team a clear understanding of how well the IGBP's work is proceeding, on an activity-by-activity basis. While it relates little about the Project's impacts, it is essential for understanding the mechanisms through which the Project is making an impact.

This indicator is a valid, if only partial, measure of programme sustainability—when units in an activity are being heavily used and highly maintained it is very likely that the activity is sustainable. While it is not perfect, this indicator is also sufficiently reliable. A single field visit may miss periods of high or low use. To circumvent this the procedures for this indicator combine a field survey with participatory discussions. In addition, this simple indicator requires no special equipment to use and, because it is a purely participatory indicator, it does not require the use of control groups. For these reasons this indicator is strongly recommended, except in the case of extreme time constraints.

7. DEPENDENCE OF PROGRAMME ACTIVITIES ON OUTSIDERS

Like *Use, Outsiders* is a process indicator that provides information about the sustainability of a particular activity. While *Use* gives information regarding use and maintenance of units in an activity, *Outsiders* tells evaluators whether the operation and maintenance of an activity is dependent upon outside expertise, funding, etc. If it is, the activity will probably cease to function after project funds dry up.

In many cases, deciding whether someone is an "outsider" is quite easy. A foreign consultant brought in from abroad is an outsider. In some activities, however, the definition of who is actually an outsider can be difficult. Essentially, an "outsider" is someone who would not be involved with an activity were it not for programme funding. This can even include local peo-


MYRADA

While it is important that this check dam be maintained, desilting has only occured under the organisation and direction of outsiders (Kattery, T.N.)

ple who carry out certain tasks under the employ of the programme. For example, in Arki one of the SUTRA staffers is a young woman who has always lived in the Arki watershed. In all the activities analysed she is an "outsider" in the sense that she will cease to carry out her current responsibilities once the IGBP withdraws it's funding and the SUTRA office shuts down.

Target Objectives

If a project's local programmes are operated and/or managed by outside personnel, then levels of active local participation are lower. In addition, the presence of outsiders is an indicator of project sustainability and replicability. If local people cannot manage and operate an activity by themselves, it will eventually collapse when outside support is withdrawn. In addition, if an activity can be run without the help of outsiders, it is also more likely to be widely replicable in other areas.

Measurement Procedures

Gathering the data involves informal discussions with people who use and/or operate units from all NGO and state department activities. The visits for *Use* and *Outsiders* should be undertaken simultaneously. While investigating use and maintenance issues, the evaluation team asks questions regarding the people who keep each particular activity in operation. This involves obtaining answers to a series of questions: Who operates the units of this activity on a day-to-day basis (and where do they come from)? Who maintains them? Who supplies the spare parts? Where do the finances for on-

THE FINDINGS: DEPENDENCE ON OUTSIDERS*

ARKI		KATTERY	
Activity	**Dependence on Outsiders**	**Activity**	**Dependence on Outsiders**
Forest Department		**Agricultural Engineering Department**	
Nursery	High	Check Dam	Medium
Plantation	Medium	Gabion	High
Live Fencing	Medium	Community Well	Low
Lantana Clearing	Medium	Retaining Wall	High
Check Dam	High		
Village Development Committee	High		
SUTRA		**MYRADA**	
Smokeless Stove	None	Community Toilet	None
Stove Technician (Mistry)	Low	Bridge	None
Solar Cooker	Medium	Path to Temple	None
Para-vet (Dunger Dai)	High	Community Well	Low
Nursery (Napier Grass)	High	Tank Cleaning	N.A.
Napier Grass Plantation	Medium	Self-Help Groups	Low
Nursery (Sapling)	High	Village Infrastructure Development Committees	Medium
Compost Pit	None	Watershed Federation	Medium
Women's Group	High	Stream (Nala) Widening	High
Watershed Federation	High		

*at the time of evaluation

going operations come from? If group action is necessary, who organises it? The answers to many of these questions require follow-up interviews with the people named, in order to determine why they are present in the watershed and who pays their salaries. Information gathered in the field are then verified during the Participatory Sessions, which take place later.

Outlook and Recommendations

Participation and sustainability are very difficult concepts to concretise and measure. Like *Use*, this is a valid, if partial, measure of both—if the operation and maintenance of an activity is not dependent upon outsiders, then the activity has a much higher potential for survival when the programme funds cease. Given a thorough investigation of who operates and maintains an activity, this indicator should also be fairly reliable. While various evaluators may begin their investigations with different units, their questions should lead them to similar answers regarding those responsible for operation and maintenance of the overall activity.

Outsiders is, along with *Use*, a time-consuming indicator. On the other hand, no special equipment is required. Time constraints aside, this was a very important indicator for understanding the sustainability of a project's various activities. If, however, time constraints are severe, and if information about processes is significantly less important in comparison to studying impacts, it should be omitted from the indicator set.

8. REPLICATION

Target Objectives

This indicator is a measure of replicability. If local people replicate some programme output without support, it implies that there is a local demand for the units, a willingness to pay for them, and the necessary skills to construct, use and probably maintain them. In such a case, the programme is definitely replicable, at least in the surrounding areas. It is also likely to be replicable in other locations with similar geo-climatic conditions and socio-economic resources.

Measurement Procedures

The methodology for this indicator is rather ad hoc. Evaluators simply need to scan for and inquire after evidence of programme outputs that have been upgraded or replicated without project support. Inquiry is probably the best starting point, especially for information regarding replication, because copying of programme units may be taking place in remote areas, or areas outside of programme coverage. Any leads should be followed up and personally confirmed by evaluators. While gathering data on replication, evaluators should also inquire about facilities that have been upgraded or modified. All leads should be personally confirmed. Evaluators should also look for evidence of up-gradation and modification when they are conducting surveys for the indicators *Use* and *Outsiders*.

Outlook and Recommendations

To its credit, this indicator is fast, easy and requires no special tools to execute. Given the nature of what is being investigated, it also makes little sense to use a control group with this indicator (cutting expenses even further). Although it is a valid indicator (at least for smaller activities), it will be of little use *vis á vis* resource-intensive activities. It is simply not realistic to think that local people will have the capacity to finance and execute activities that require large investments such as check dams or community wells. These are activities which, at least in the Indian context, can only be implemented by the state, or large NGOs.

Another weakness of this indicator is that it is not particularly reliable. It relies too much upon luck—evaluators must be told by some informed party that a case of replication exists, or the evaluators must stumble upon the replicas themselves.

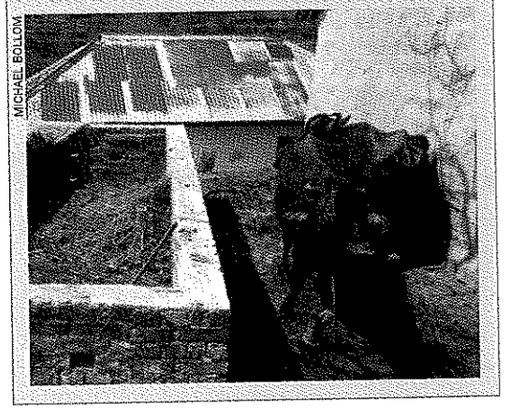
In addition, this is only an incomplete indicator of replicability. Replicability depends upon many factors, including geography, climate, level of development, socio-economic institutions and the structure of the state. Even if an activity is being replicated in the watershed being evaluated, this does not mean it is replicable elsewhere. An evaluation can only conclude that a activity is potentially replicable.

In the end, this indicator is recommended, but only for want of a better alternative. Other monitoring and evaluation specialists would be well served to either expand upon this indicator, to make it more reliable and applicable to a wider range of activities, or develop a new one.

THE FINDINGS: REPLICATION

Having mixed feelings about the utility of this indicator, the PI asked the evaluation team to abandon it after a few days in the field. Although confidence in this indicator has been restored, there are nevertheless no findings to report. One, isolated case study is worth relating, if only as an example of how findings from this indicator might appear.

A farmer in Kolka village, Arki RWS built an almost exact duplicate of the SUTRA compost pit in that village. (Like the original, this one was only being used to store cow manure.) When the SUTRA staff was asked about this copycat pit, they said that its owner was now asking to have the IGBP reimburse him at the rate paid for the SUTRA compost pit. It seems that SUTRA paid handsomely for itís original pit. The copycat farmer built his pit much more cheaply with an eye to the profit he could make if reimbursed at the SUTRA rate. This is less a case of authentic replication than an attempt to manipulate development aid for personal profit.


MICHAEL BOLLOM

9. SOCIAL CAPITAL

While the indicators *Use* and *Outsiders* produce information that is crucial to the determination of sustainability, they do not address the issue of social organisation and mobilisation. When programme investments are on common land or public land (which is generally the case), then they are, in practice, owned simultaneously by everyone in the watershed, and

by no one[9]. Commonly owned resources are difficult to manage and maintain. In the absence of some norms or institutions, there is no way to prevent over use, ensure maintenance, solve disputes, etc. Solutions to these problems must be found if a programme investment is to be used sustainably.

Post-Independence India has not provided strong, decentralised political institutions to manage local soil and water resources. Appropriate government departments generally exist at the state level, but these are largely distant bureaucracies, not local democratic institutions. Under the IGBP's overall plan, partner state departments and NGOs were supposed to co-operate towards the goal of building up the sort of social capital that could locally manage watershed issues (Honore and Chaturvedi, 1997).

As defined here, "social capital" can be any organisation or institution that facilitates group co-operation towards a social goal.[10] Anything from an interest group or chamber of commerce to a village council or political party can act as a vehicle of social organisation and mobilisation. Even if the indicator *Social Capital* only incorporates such easily identifiable organisations, measuring its strength would be difficult. Should evaluators count the number of such organisations, the attendance at the organisations' meetings, or the number of meetings that they hold? Although this would be difficult, it could be done. But are these even relevant pieces of information? Just because organisations exist and hold meetings, it does not mean that they have any capacity for social mobilisation?

This problem is made even more complex by the nature of Indian politics, where social organisation and mobilisation often occurs through what are called "demand groups"—loosely organised pressure groups that spring up around some contentious issue, then quickly disappear after the conflict has subsided.[11] Because demand groups are usually in the dormant stage, it is not possible to measure their strength through a survey of existing social organisations.

Measurement Procedures

With these ideas in mind, the evaluation team began to develop an indicator of social capital while working in Arki RWS. Instead of focusing on processes (i.e., groups, meetings, attendance), the team looked for outcomes. Investigations revolved around the question: Had local citizens recently confronted any watershed related problem (i.e., had there been any instances where groups of local citizens attempted to solve some soil and/or water conservation problem)? This would be used as evidence that social capital exists.

[9] I am quite aware of the distinction between common and public property. In India, however, the state is often very removed from the management of public lands, in which case public and common lands are treated very similarly by local people

[10] Ideas about social capital have been drawn largely from Robert D. Putnam's *Making Democracy Work* (Princeton: Princeton University Press, 1993).

[11] The term "demand group" was coined by Rudolph and Rudolph in their book *In Pursuit of Lakshmi* (Chicago: University of Chicago Press 1987).

THE FINDINGS: SOCIAL CAPITAL

No instances of social capital were uncovered in Arki. Even the women's groups and their federation had engaged in almost no meaningful social or political activities. The people of Arki RWS on the whole seemed to have little idea that they could act together to solve their water problems. For example, while conducting a water resource mapping at the spring in Senj village, several women related how five or six years ago this spring used to run dry in the summer months. This was, of course, an inconvenience for them. Their solution, however, was to walk two kilometres away to a different spring during the summer. Had there been some social capital in this village, these women might have pulled together, either to fix the problem themselves or force some government agency to do so for them.

In Kattery, on the other hand, the evaluation team uncovered at least five instances of people uniting to address water issues. In each case, the social capital that was chronicled was being built up by MYRADA. Two of these stories are worth recounting, in detail, as they illustrate how local people can address their own water problems if properly empowered.

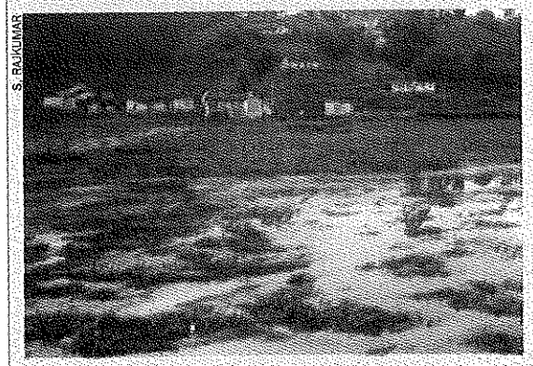
The Leaky Water Pipe

Mellodyarahatti Village relies upon an artesian spring for much of its drinking water. The water is piped from its source at the spring to a storage tank up hill from the village, about 500 metres away. From there it is distributed through pipes to the village. A little over a year ago, the pipe from the spring to the tank began to spring leaks. Unable to fix these leaks themselves, the villagers of Mellodyarahatti attempted to solve this problem as a group. They worked through the Village Infrastructure Development Committee (VIDC), which had recently been formed with the help of MYRADA. With MYRADA's direction (but not assistance), representatives of this Committee have successfully lobbied appropriate government authorities. New pipes have already been delivered and installation technicians are on their way.


MICHAEL BOLOM

Widening the *Nala*

The main *nala* (stream) that drains Kattery watershed is subject to periodic floods. This is because many who own land adjacent to the *nala* have slowly encroached upon the flood plain. The *nala* is now only a few metres wide in most places, with a meter-high embankment to keep the water flowing along its course. Heavy monsoon rains cause the *nala* to breach its embankments and floods the area around Palada Village, often resulting in great financial losses for many of the farmers.


S. RAJKUMAR

Since being revitalised by MYRADA, the Watershed Federation has addressed this issue, with some success. Prior to 1992, individual petitions to widen and deepen the *nala* had occasionally been submitted to the District Magistrate (DM) in Ooty, but nothing came of them. In 1993, the AED had proposed *nala* widening under the RVP, but the Ministry of Agriculture and the IGBP rejected it.

Then on the night of October 15, 1997 there was a big flood in the valley near Palada. The Federation evidently had made some preparations for this event. At six o'clock the next morning members of the Federation informed the newspapers, the panchayat, the DM, the and AED that they were going on a hunger strike until the issue was looked into. Local newspapers covered the story. The DM promptly came to review the situation. He asked the AED to make surveys and submit proposals. The proposal submitted has been accepted by the DM and is now awaiting the chief minister's approval.

Since many people did not really understand the issue of soil conservation, the team chose to focus on water issues, which are more concrete and of immediate importance to local people. Villagers were asked about problems they may have had with water. When the team uncovered some water problem, they asked how it was dealt with. The team was looking for verifiable stories of groups who had come together and successfully addressed some water problem. Appropriate cases were followed up and noted down in detail.

Outlook and Recommendations

This indicator is a valid measure of social capital—if people have demonstrated the ability to pursue grievances regarding watershed issues, then social capital is present. Unfortunately, this is not a reliable indicator. The questions that the investigators need to ask are necessarily vague, so respondents may not always understand what the evaluation team is looking for. In addition, not everyone in a watershed may even be aware of the social capital that exists. If evaluators do not interview the right people, they will not gain the necessary information.

In addition, it may be difficult to determine change with this indicator. If *Social Capital* was previously non-existent in a baseline survey and then it registers in a subsequent survey, evaluators are safe in assuming that change has occurred. Evaluators can also assume that change has occurred if identical types of social capital are found in the ìbeforeî and ìafterî surveys, but the intensity of the social capital has changed. If, however, one or more forms of social capital were found during a baseline survey, but completely different ones are found in a subsequent survey, evaluators will not be in any position to determine if the level of social capital has increased or decreased. It is very difficult to say whether one type of social capital is stronger than another.

While the indicator is inexpensive to use in terms of equipment (absolutely none is required), it must be executed by someone with a sophisticated understanding of social capital, local society, governmental structures and the programme being evaluated. In addition, this person must be a skilled interviewer, although local language capabilities are not essential for such interviews.

Finally, this indicator cannot be executed with any great speed. It involves much open-ended interviewing with various types of people—from farmers to local government officials. In addition, many of these interviews require subsequent discussions with additional informants. These interviews can, however, be carried out concurrently with other parts of the evaluation. Since it is a participatory indicator, it does not require the use of controls.

This indicator is recommended with reservation. It is the best available alternative for measuring the existence of social organisation and mobilisation. It can be abandoned if a more reliable and less time consuming alternative is developed.

VIII

CONCLUSIONS

Indicators work! After testing and refining the Programme Evaluation Protocol under field conditions, the Principal Investigator does not hesitate to claim that this indicator set can be used to measure physical and socio-economic realities in rural watersheds, although not always as quickly, cheaply and easily as originally hoped. Exclusive of travel time, a team consisting of the PI and two assistants was able to execute the preliminary PEP in two Representative Watersheds—Arki in Himachal Pradesh and Kattery in Tamil Nadu—in ess than twenty days. This was done with very few expensive tools and with research assistants who had received very little special training.

Of the nine indicators in the set, four—*Height-for-Age, Consumer Durables, Use,* and *Outsiders*—are highly recommended. Two more—*Soil Loss* and *Ground Water,* —are recommended with some reservations. This is because they do not meet all of the original selection criteria—that the indicators be "fast, cheap and easy to use". (For example, both *Soil Loss* and *Ground Water* are labour intensive and a final analysis can only be undertaken after years of data collection.) Finally, while they are usable in their present forms, it is recommended that *Attendance, Replication* and *Social Capital* could be further modified due to reliability problems. The following table contains summary information about the individual indicators.

In general the findings with regards to the impacts of the IGBP programme are inconclusive. This is not surprising given that most of the indicators were not designed to measure change with only a single site visit. Where change was recorded, it was directly linked to IGBP activities in only a few cases. Again, this is not surprising because the RWS Programme has been in operation for less than two years.

Some activities have, however, already begun to demonstrate their potential to bring about positive change. For example, the federation of self-help groups set up by MYRADA in Kattery have begun to address community watershed problems. In addition, the Forest Department's programme in Arki has improved both sapling and grass quality. The Forest Department has done this by choosing the tree species to be planted on plantation lands in consultation with local villagers and by granting grass harvesting rights on these lands to inhabitants of nearby villages.

As a final note, it is important to repeat that the point of this book has not been to claim that indicators are a monitoring and

FINAL EVALUATION OF THE INDIVIDUAL INDICATORS

Indicator	Objectives Measured	Validity[1]	Reliability[2]	Precision[3]	Respons.[4]	Equip. Costs	Training[5]	Man Hours[6]	# Field Visits?[7]	Further Refine?	Comments
Soil Loss	Topsoil conservation	++	++	++	++	---	++	---	---	N	Highly labour intensive
Ground Water (participatory method)	Ground Water conservation	+	+	---	++	++	-	-	++	N	Not Recommended —Metric too imprecise to be of use in most projects.
Ground Water (scientific method)	Ground Water conservation	++	++	++	++	---	++	---	---	N	Highly labour intensive
Height-for-age	Health, Wealth, Gender parity, Social equity	++	++	++	---	+	-	-	+	N	Slow to measure changes in objectives.Not useful in areas with pre-existing levels of socio-economic development.
Consumer Durables	Wealth, Social equity	++	+	++	-	++	-	-	++	N	Less useful in extremely poor areas.
School Enrolment	Education, Gender parity	++	-	++	-	++	-	-	++	Y	Collection of comparable time-series data sets difficult.
Use and Maintenance	Sustainability, Replicability	+	+	-	++	++	---	-	++	N	Low validity due to incompleteness of the indicator.
Outsiders	Sustainability, Replicability	+	+	-	++	++	---	-	++	N	Low validity due to incompleteness of the indicator.
Replication	Replicability	+	-	-	-	++	---	+	++	Y	Very incomplete indicator.Not valid for relatively expensive schemes.
Social Capital	Sustainability	+	-	---	++	++	---	-	++	Y	Limited reliability. Incomplete indicator.

In this table, the superior rating (whether that means highest validity or lowest equipment costs) is represented by "++". This is followed by "+" and then "-". The most inferior rating is always represented by "- - -".

[1] How well does indicator measure the objectives?
[2] Results not dependent upon identity of the investigator.
[3] How fine grained is the indicatoris metric?
[4] How quickly does the indicator register changes in the objectives being monitored?
[5] The level of training, skill or education necessary to implement the indicator.
[6] The total time necessary to implement the indicator.
[7] Regardless of the man hours, how many field visits are necessary to fully implement the indicator?

evaluation panacea. They are simply one of the many tools that are available. The strength of this method is its economy vis á vis time and monetary resources. For this reason, small programmes may prefer it. Most indicators do not, however, offer the sort of precision and detail that can be obtained through a full benefit-cost study. Nor are all indicators as easy to execute, as originally imagined. Just as with traditional, benefit-cost analyses, most of the indicators discussed here must be executed by college graduates or professional consultants.

The hope is that programmes and monitoring and evaluation specialists will now be able to benefit from the IGBP experiences. Those interested in carrying out a similar evaluation can follow the simple guidelines set out in the Programme Evaluation Protocol (presented in Annex A).

RECOMMENDED READINGS

Arya, Swarna Lata and J.S. Sharma. 1995. *Socio-economic Implications and Participatory Appraisal of Integrated Watershed Management Project at Bunga.* Chandigarh: Central Soil and Water Conservation Research and Training Institute Research Center.

BAIF Journal. 1997. "A Study of the Inter Relationship between Livelihood, Development and Health". *BAIF Journal* [Pune, India] 17:2 & 3 (13-15) 1997.

Barrow, C.J. 1997. *Environmental and Social Impact Assessment: An Introduction.* London: Arnold.

Batiwala, Srilatha. 1994. *Women's Empowerment in South Asia: Concepts and Practices.* New Delhi: Food and Agriculture Organization.

Beaton, B., A.Kelly, J.Devany, R. Martorell, and J. Mason (eds.). 1990."Appropriate Uses of Anthropometric Indices in Children: A Report based on an ACC/SCN Workshop." Geneva: UNIES.

Bender, Bill and Sandy Remancus. *Anthropometric Tutorial.* Anthropometry Resource Center (Funded by FAO/SADC project GCP/RAF/284/NET). http://www.od.com/anthro/tutorial/tutoc.html (downloaded November 16, 1997).

Bollom, Michael W. 1998. "Impact Indicators: In Search of Fast, Cheap and Easy Indicators to Assess Physical, Social and Economic Change caused by Watershed Management Projects". New Delhi: Indo-German Bilateral Project "Watershed Management" (Technical Paper No: IGBP-WSM 86/98).

Casley, Dennis J. and Krishna Kumar. 1987. *Project Monitoring and Evaluation in Agriculture.* Baltimore: Johns Hopkins University Press.

1988. *The Collection, Analysis and Use of Monitoring and Evaluation Data.* Baltimore: Johns Hopkins University Press.

Chambers, Robert. 1994. "Participatory Rural Appraisal (PRA): Analysis and Experience." *World Development* 22, 9: 1253-1268.

1983. *Rural Development: Putting the Last First.* New York: Longman Scientific and Technical.

FAO. 1992. *Sociological Analysis in Agricultural Investment Project Design.* Rome: Food and Agricultural Organization.

1990. *Conducting Small-scale Nutrional Surveys: A Field Manual.* Rome: Food and Agricultural Organization.

GTZ. 1996. "Process Monitoring (PrM): Work Documentation for Project Staff". Eschborn, Germany: GTZ.

GTZ and SDC. 1997. "International Workshop on Sustainable Land Management: Guidelines for the selection of Indicators and Monitoring Methods (Workshop Proceedings)." No place of publication.

Gautam, Madhav. 1996. "Development of a Tool for Impact Assessment on Beneficiaries in Food for Work Projects." Working Paper No. 2 in 'Rural Community Infrastructure Works Programme'. Kathmandu: GTZ— Food for work.

Honore, Guy. 1996. "Strategy and Approach" New Delhi: Indo-German Bilateral Project "Watershed Management".

Honore, Guy and K. Chaturvedi. 1997. "Joining Hands: Enhancing collaboration between Government Organizations, Non-Governmental Organizations and People." New Delhi: Indo-German Bilateral Project "Watershed Management."

International Institute of Rural Reconstruction and FAO Regional Office for Asia and Pacific. no date. (circa 1996). Resource Management for Upland Areas in Southeast Asia. No place of publication listed.

The IUCN International Assessment Team. 1997. *An Approach to Assessing Progress Toward Sustainablity.* Gland, Switzerland: ICUN.

Kerr, John M., Dinesh K. Marothia, Kata Singh, C. Ramasamy, and William R. Bentley (eds.). 1997. *Natural Resource Economics: Theory and Application in India.* New Delhi: Oxford University Press.

Kumar, Krishna (ed.). 1993. *Rapid Appraisal Methods.* Washington D.C.: World Bank.

1989. Impact Indicators: General Issues and Concerns A.I.D. Evaluation, Occasional Paper No. 30. Washington D.C.: United States Agency for International Development.

Milllesen, Britha. 1995. *Methods for Development Work and Research: A Guide for Practitioners.* New Delhi: Sage Publications.

Muthiah, S. (ed.) 1990. *An Atlas of India.* New Delhi: Oxford University press

Narayan, Deepa. 1993. *Participatory Evaluation: Tools for Managing Change in Water and Sanitation.* World Bank Technical Paper No. 203. Washington D.C.: The World Bank.

Picciotto, Robert and Ray C. Rist (eds.). 1994. *Evaluation and Development: Proceedings of the 1994 World Bank Conference.* Washington D.C.: World Bank.

Putnam, Robert D. 1993. *Making Democracy Work: Civic Traditions in Modern Italy.* Princeton: Princeton University Press

Rudolph, Lloyd and Susanne. 1987. *In Pursuit of Lakshmi: The Political Economy of the Indian State.* Chicago: University of Chicago Press.

Schänhuth, Michael and Uwe Kievelitz. 1994. *Participatory Learning Approaches: Rapid Rural Appraisal Participatory Appraisal, An Introductory Guide.* Rofldorf (Germany): TZ-Verlagsgesellschaft.

Schmidt, U. 1993. *Participatory Impact Monitoring.* Eschborn, Germany: GTZ.

Smith, Thomas B. 1985. "Evaluating Development Policies and Programmes in the Third World" *Public Administration and Development* 5 (129-144).

Srinivasan K. And Abusaleh Shariff. 1997. *India: Towards Population and Development Goals.* Delhi: Oxford University Press (for United Nations Population Fund.)

Stephens, Alexandra. 1990. "Participatory Monitoring and Evaluation: Handbook for Training Field Workers." Bangkok: Craftsmen Press.

Thompson, John and Jules N. Pretty. 1996. "Sustainability indicators and soil conservation: A participatory impact study and self-evaluation of the Catchment Approach of the Ministry of Agriculture, Kenya." *Journal of Soil and Water Conservation* (July — August).

Traeger, Heidrun. 1997. *Indicators of Sustainable Land Management: A Literature Review.* Eschborn, Germany: Gesellschaft füßr Technische Zusammenarbeit (GTZ).

United Nations Department for Policy Coordination and Sustainable Development, "Indicators of Sustainable Development: Framework and Methodologies." gopher//gopher.un.org/00/esc/cn17/1996/backgrnd/INDICATO (Downloaded on November 15, 1997).

United Nations Development Programme. 1997. *Human Development Report,* 1997. New York: Oxford University Press.

Valadez, Joseph and Michael Bamberger. 1994. *Monitoring and Evaluating Social Programs in Developing Countries: A Handbook for Policymakers, Managers and Researchers.* Washington D.C.: The World Bank.

World Bank. "Designing Project Monitoring and Evaluation" http://www.worldbank.org/html/oed/lp008.htm (Downloaded November 13, 1997).

1997. *Expanding the Measure of Wealth: Indicators of Environmentally Sustainable Development.* Environmentally Sustainable Development Studies and Monographs Series no. 17. Washington D.C.: The World Bank.

1996. *Social Indicators of Development,* 1996. Baltimore: The Johns Hopkins University Press.

1994. *World Development Report: Infrastructure for Development.* New York: Oxford University Press.

A

PROGRAMME EVALUATION PROTOCOL

The following pages contain detailed guidelines for executing the nine indicators in the indicator set. Each indicator is discussed in terms of the following parameters:

* Required Team Members (Number and Skills)
* Necessary Tools and Support
* Total Time Required to Use the Indicator
* Frequency of Use
* Sequence of Use
* Sampling
* Procedures and Methods
* Data Matrixes and Questionnaires
* Data Analysis
* Presentation of Results

This detailed protocol is a modified version of the preliminary PEP, which was originally designed to help structure pilot evaluations in Arki RWS, Himachal Pradesh and Kattery RWS, Tamil Nadu. The PEP has since been modified in the light of these field experiences. It is presented here in a manual format so that others may quickly and easily use it as a rough guide for organising their own evaluations.[1]

[1] Please note: The sample data matrixes and questionnaires listed in the PEP are not intended to be used in a recipe-like fashion. Instead, the protocol has been designed with a probing, sceptical, observant investigator in mind. The investigators should use the protocol as rough maps to guide the formulation of their own evaluation.

It is also important to realise that the sample questions are not to be taken literally; they are only guides to the questions that need to be answered. In the field, investigators should ask these questions as they see fit. They will need to observe their surroundings with a critical eye. In addition, these questions should be administered as open ended interviews, not structured surveys. For example, an investigator may ask beneficiaries how often a particular hand pump is used. For whatever reasons, the answer given may be, "Every day". Yet, an observant investigator may see that the hand pump is frozen with rust. In such an instance the investigator will not simply note down that the hand pump is used regularly. Instead, he will pursue the issue further in order to uncover the clearest possible understanding of actual level of use of the hand pump . In the end, the investigator may have to disregard answers that are obviously false and proceed with his own observations. The investigator must be similarly inquisitive when conducting key informant interviews and/or participatory sessions.

PREPARING TO CARRY OUT THE EVALUATION

ASSEMBLING AN EVALUATION TEAM

1. Assistants should have rural development or social science backgrounds.
2. Assistants should have experience conducting interviews, and participatory evaluations.
3. Choose team members with local language needs in mind. There should be a native speaker of every language in which a participatory evaluation will be conducted.
4. Team members do not need any medical background to conduct the stunting study.
5. Since much of the work to be done is qualitative (and does not require repetitive survey work), the team should be kept as small as possible.

PURCHASING NECESSARY TOOLS

Executing the Evaluation Protocol requires the use of very few specialised tools. Those tools which are required should generally be available in most international capitals. Given the sometimes remote nature of field sites, all tools should be purchased prior to the actual visit. The following is a list of tools (see the individual guides for details):

- Poster paper
- Coloured Pens/Markers
- Record books
- Height or length boards
- Floor scale for measuring weight
- Flat board (along with 4-6 wedges and a level)
- Stunting software (i.e., EpiInfo6)
- Statistical software (i.e., SPSS)
- Still camera
- Hydrological Instruments
  - 5 automatic rain gauges
  - water level sensor
  - data logger
  - current meter
  - stop watch
  - set of stick gauges
  - turbidity sensor
  - Punjab bottle sensor
  - data collection form sheets
- Silt Laboratory Equipment
  - set of sieves
  - electronic balance
  - drying oven
  - record books
- Data Processing Equipment
  - PC plus printer
  - data reading unit
- Miscellaneous Equipment
  - dumpy level

SELECTING VILLAGES TO EVALUATE

1. If random sampling is not possible, let the NGO and state department select the villages.
2. Upon arrival in the watershed, ask the NGO and state department to choose one or two villages where they believe their work has had the most positive impact.
3. Make preliminary visits to these villages to determine if they are suitable.
4. From the pool of villages selected by the NGO and state department, choose the number of villages which the evaluation team has time to survey.

WORKING WITH PARTNER NGOS AND GOVERNMENT DEPARTMENTS

1. Partner organisations are concerned that evaluations show their work in the best possible light.
2. If they are relied upon too closely, they will (even if only unconsciously) bias the data collection in their favour.

3.Thus, partner organisations should not be overly relied upon and should be worked with cautiously.
4. Partners must be used as liaisons for entering the villages, but after this they may need to be kept at a distance.
5. When gathering data indirectly related to the partner's work (for example, the stunting study), the partner may be asked to give assistance.
6. When a partner's work is being directly evaluated (especially with executing the indicator *Use*) the partner must be kept away.
7. In order not to offend anyone, attempt to give partners alternative tasks to do, instead of dismissing them.
8. Ask them to help gather more objective data, which is not easily manipulated. For example, partners could help gather school attendance figures.
9. It is important that the results of the evaluation be shared with the partner organisations.

SETTING UP A RESEARCH ITINERARY

1. It is a better use of resources to make one long visit to the watershed, instead of two or more short visits.
2. The visit can be broken up into five component phases: Gearing Up, Field Study, Stunting Study, Participatory Sessions, and Wrapping Up.
3. The five components should be executed in this order. See the two calenders in Chapter IV for suggested itineraries.
4. One or two extra days should be built into the research timetable to compensate for unexpected holidays, bad weather, equipment breakdown, etc.
5. The initial evaluation should be significantly shorter than successive visits because the indicators *Use* and *Outsiders* are omitted.
6. With an extra day built in, the baseline evaluation should take about ten days and follow-up evaluations take about fourteen (exclusive of travel time).

SOIL LOSS

Data to be collected extractively.

Data to be collected:

- Rainfall at several points in the watershed.
- Water level and water velocities at the outlet of the watershed.
- Sediment concentration at the outlet of the watershed.
- Cross section of the river where the water level is being measured.

The sediment load of the river, that is the volume of sediment carried out by the river during a given time period, is a proxy for the erosion rate in the watershed. To eliminate climatic changes, data must be collected continuously during monsoon for several years (minimum 7-10 years). Furthermore, a control watershed outside of the project area has to be monitored in order to pinpoint the impact of the Programme activities. Hence, a very expensive and long-term effort, which is only justifiable for projects with major financial input.

TEAM MEMBERS (NUMBER AND SKILLS)

1. A Hydrologist: will establish Silt Monitoring Stations (SMS), train and supervise local observers. The hydrologist will also be responsible for analysing and publishing data.
2. Three Silt Observers: Since the SMS are to be operated 24 hours a day during the monsoon, three silt observers must be hired locally. They will be trained by the hydrologist to perform their duties.

NECESSARY TOOLS AND SUPPORT

1. SMS consisting of a stilling well with housing for the instruments and a small building (2 rooms) for the silt laboratory.
2. Hydrological Instruments:
* 5 Automatic Rain gauges
* 1 Water level sensor
* 1 Data logger
* 1 Current meter
* 1 Stop watch
* 1 Set of stick gauges
* 1 Turbidity sensor
* 1 Punjab bottle sampler
* Data Collection form sheets

3. Silt Laboratory Equipment
* Set of Sieves
* Electronic Balance
* Drying oven
* Record books.

4. Data Processing Equipment
* 1 PC plus printer
* 1 Data Reading Unit

5. Miscellaneous Equipment
* 1 Dumpy level

Data has to be collected during the monsoon at half hour intervals, twenty-four hours a day. Data should be collected from the watershed before the programme starts its activities and from nearby watershed where the programme will not be active. In this manner, controlled, time-series data can be collected.

TIME REQUIRED TO USE INDICATORS

A minimum of seven to ten years are required to accumulate a sufficient amount of data.

FREQUENCY OF USE

Daily

SEQUENCE OF USE

The Silt Monitoring Stations should be operational preferably one or two monsoons before the programme starts.

PROCEDURES AND METHODS.

This is a complex undertaking that has been well-documented in the Indo-German Bilateral Project's manuals.

15/92: Collection and processing of automatically collected hydrological and sediment data - 'A' manual.
16/92: Collection and processing of manual collected hydrological and sediment data - 'M' manual.
17/92: Operation and Maintenance manual for sediment monitoring stations - 'O&M' manual.
06/92: Training manual for hydrological and sediment monitoring of small watersheds.

SAMPLING

Sampling is not an issue regarding the placement of the SMS. There need be only one SMS in each watershed. It is located at the point in the watershed past which all drainage flows. As mentioned under the "Frequency" section above, silt samples are taken from in front of this SMS once every half hour, twenty-four hours per day.

In order to carry out all the necessary calculations for this indicator, total rainfall in the watershed must be calculated. This requires the placement of approximately five rain gauges. These should be evenly distributed throughout the watershed (preferably near the residences of teachers or educated farmers who are willing to take readings).

FINAL PRESENTATION AND ANALYSIS

The data collected from the SMS should be presented in a table like the following sample taken from an IGBP Report*

Rainfall-Runoff Rates (Q/R) for Individual Events - 1996

Watershed	No.	Event	Total rain (mm) R	Total Discharge (mm3) Q	Peak Rain Intensity (mm/hr)	Peak Flow (m)	Q/R (%)	Max. Silt Conc. (g/l)	No. of Silt Samples
Banha, Bihar	1	July 1996	250.8	2318603	54.1	2.530	52.7	5.811	46
(1751 ha)	2	Aug. 1996	448.6	5670210	NA	2.324	72.0	3.190	60
	3	Sept. 1996	97.3	877354	NA	1.123	51.0	9.826	25
Haripura Raj.	1	21/7-25/7/96	100.6	155280	22.8	0.684	9.5	NA	0
(1612 ha)	2	16/8-17/8/96	130.5	400594	45.7	1.316	19.0	2.133	8
	3	1/9-6/9/96	149.5	301500	NA	1.296	12.5	9.526	6
	4	14/9-15/9/96	33.8	136495	31.6	1.063	25.1	1.979	4

The key column on this table is Runoff Ratio (Q/R). This figure represents the percentage of the watershed's total runoff that flows past the SMS. If this percentage is high, less rainfall has been absorbed by the ground and more has run into the local streams. The logic is that more runoff leads to more erosion and less ground water recharge. When enough data has been accumulated, a time-series analyses of the Runoff Ratios can be undertaken. If erosion control treatments are successful, the Q/R ratio will decrease in value.

Data must also be collected for monthly sediment loads (not shown in the above table). Once again, when enough data has been accumulated, a time series analysis can be executed. Like the Q/R ratio, the values for this variable should decrease if treatments are successful.

*Guy Honoré and S.Kumar, "Analysis of Rainfall and Runoff Data of Project Watersheds", IGBP Technical Publication, 76/97, 1997

2A GROUNDWATER LEVEL FROM PARTICIPATORY RESOURCE MAPS

This is a quick, easy, inexpensive way to measure ground water levels in selected areas of a watershed. This indicator assumes that the water level in local wells can be used as a proxy measure for ground water in that locality. Through participatory discussions with frequent users of local wells, researchers can map the water levels in local wells.

While the results obtained by this method are accurate and reliable, they are not precise. If evaluators need fine-grained results, this method will be of little use to them. They may wish to use Indicator 2B instead.

TEAM MEMBERS (NUMBER AND SKILLS)

1. Hydrologist. At the outset of the programme, the hydrologist will select the wells to be monitored. His decision will be based on expectations of where programme impacts should be felt.
2. Social Scientist. The social scientist will periodically monitor the water levels in these wells. This will be done with resource maps in a group participatory session.

NECESSARY TOOLS AND SUPPORT

1. A water resource map (see Chapter VII). These can be drawn by hand.
2. Coloured Pens

FREQUENCY OF USE

The data for this indicator will be collected during periodic evaluations.

TIME REQUIRED TO USE INDICATOR

Making a water resource map should take no longer than one hour per well.

SEQUENCE OF USE

The resource mapping should be done during the "field visit" portion of the evaluation. The social scientist can visit the selected wells when he is collecting data for the "Use" and "Outsider" indicators.

SAMPLING

Ground water levels will be monitored in the selected villages. The hydrologist will determine the number and location of the wells necessary to monitor the water table in each locality. The social scientist will conduct participatory sessions in the village nearest the test wells.

PROCEDURES AND METHODS

1. The hydrologist selects the wells to be monitored at the outset of the programme.
2. The social scientist visits the selected wells during his periodic evaluations.
3. The social scientist gathers a group of three to eight people who frequently use the well.
4. The people are asked to fill in a water resource map for this well.
5. The social scientist asks the participants to explain why water levels are the way they are.
6. On repeat visits, the social scientist will ask the beneficiaries to explain any variations between the old and new maps and the cause/causes for the apparent changes?

DATA MATRIXES AND QUESTIONNAIRES

See Chapter VII for an example of a water resource map. (These should be drawn to match local conditions.) Data can be stored on the resource maps-one for each well surveyed.

FINAL PRESENTATION AND ANALYSIS

1. Summarise the individual and aggregate findings from the water resource maps.
2. Discuss instances of change.

If desired, the results of the resource maps could be coded and turned into data that could be analysed and presented graphically.

2B GROUND WATER LEVEL USING TECHNICAL MEASUREMENTS

For this indicator, the data on local Ground Water levels is to be collected extractively. The water level in local wells is taken as a proxy for the ground water level. Hydrological assistants will collect data on local water table levels everyday, at fixed times, at selected sites. This data is then analysed for changes over time. In order to locate causal explanations for empirical observations, the results of this analysis will then be the subject of participatory discussions.

TEAM MEMBERS (NUMBER AND SKILLS)

1. Hydrologist. The hydrologist will establish ground water Monitoring Stations (GWMS) and see to their staffing. The hydrologist will then periodically collect and analyse the data.
2. A team of Hydrological Assistants. These assistants must be hired locally (e.g., teachers, or literate farmers) as they will need to perform their duties on a daily basis over long periods.
3. Social Scientist. The social scientist will discuss the hydrologist's data with the beneficiaries through participatory sessions.

NECESSARY TOOLS AND SUPPORT

The tools required depend upon the approach taken. If the programme chooses to bore its own wells to construct GWMS, construction equipment will be necessary. This protocol is written under the assumption that, for reasons of cost minimisation, programme managers will choose to monitor the water table level in selected existing wells. In this case, the following equipment will be needed:

1. Water level sensor
2. Five rain gauges (these can be the same five used to measure Soil Loss).
3. Record book.
4. In order to make contacts in the selected villages, the social scientist will need to arrive with a representative of the partner NGO or state department.

FREQUENCY OF USE

The empirical data for this indicator must be collected continuously, on a daily basis. This data must be transmitted to the project headquarters periodically for storage and analysis. This collection must occur for at least two years before investigators can begin to measure change.

Participatory sessions (to interpret the extractively collected data with beneficiaries) should take place along with the periodic evaluations that take place every three to five years.

TIME REQUIRED TO USE INDICATOR

Executing a single depth measurement should take no more than five minutes.
Participatory discussions of the empirical data should last no longer than thirty minutes per well.

SEQUENCE OF USE

If the GWMS are in place, the latest empirical data is gathered and analyzed before the Assessment Team arrives at the site. Participatory discussions of this data will occur towards the end of the assessment, when all of the participatory sessions are conducted.

SAMPLING

Water table levels will be monitored in the select villages. The hydrologist will determine the number and location of the wells necessary to monitor the water table in each locality.
The social scientist will conduct participatory sessions in the village nearest the test wells.

PROCEDURES AND METHODS

1. The hydrologist selects the wells to be monitored.
2. Water Table Monitoring Stations (WTMS) are established (using the water level sensors). Control WTMS should also be established.
3. The hydrological assistants monitor ground water levels on a daily basis and record it in their record books.
4. Hydrological assistants will also monitor the rates of rainfall.
5. The hydrologist collects and analyses this data.
6. Based on this data, the social scientist discusses change in water table levels at the participatory sessions.

DATA MATRIXES AND QUESTIONNAIRES

SAMPLE DATA MATRIX

Village: Frequency of Monitoring:
Well #: Observation Team Members:

	TOTAL RAINFALL	AVERAGE DEPTH OF WATER BELOW GROUND LEVEL
JANUARY		
FEBRUARY		
MARCH		
APRIL		
MAY		
JUNE		
JULY		
AUGUST		
SEPTEMBER		
OCTOBER		
NOVEMBER		
DECEMBER		

QUESTIONS TO BE ASKED AT PARTICIPATORY SESSIONS

1. In the wells that we have been monitoring, the water table has [changed in this _____way] over the last several years. Is the same true in your other wells?
2. What may have caused this?
3. Has there been an unusually large amount of rain recently?
4. Have more people been pumping water (for domestic use or irrigation)?
5. Have new wells been dug in the area?
6. [Search for other possible explanations]

FINAL PRESENTATION AND ANALYSIS

1. Present the empirical data from the WTMS in tables and as graphs.
2. Discuss these in detail.

2 HEIGHT-FOR-AGE

While the main aim of this indicator is to gather data about stunting (low height-for-age), measurements for incidence of wasting (low height-for-weight) can also be easily taken. For this reason, the stunting team will record the heights, ages and weights of children in the selected villages. In addition, the mothers of the children measured can be asked some basic health questions. Together, this data will provide a broad-based picture about the health of the children in the watershed.

TEAM MEMBERS (NUMBER AND SKILLS)

1. Stunting Team Leader. This person will be in charge of leading the stunting team, which will include four other members. Keeping in mind the amount of time required to execute this indicator, it is recommended that the PI should not take on this responsibility. The stunting team leader need not be a medical professional. Any person with an eye for detail and who is fond of children can carry out this work. Since the stunting team leader will be working with village women, a woman is best suited to take on this responsibility.
2. Stunting Assistant #1. This person will work closely with the stunting team leader to carry out the hands-on work of the stunting study (taking body measurements and recording them). Again, this person does not need to be a medical professional. Like the stunting team leader, this person is part of the permanent evaluation team.
3. Stunting Assistant #2. Will help with handling the children. To be hired as required at the individual programme sites.
4. Stunting Assistant #3. Will handle crowd control. Will be hired at the individual programme sites.
5. Team Doctor. A doctor will accompany the stunting team in the field. This doctor will cater to the minor medical needs of the children and adults who attend the stunting session.

NECESSARY TOOLS AND/OR SUPPORT

1. Height/Length Board. These can be purchased locally or they can be ordered from UNICEF or Perspective Enterprises. The FAO and the American Center for Disease Control also distribute blueprints for those who want to construct their own. All this information is available in the "Anthropometric Tutorial".[2]

[2] Bill Bender and Sandy Remancus. "Anthropometric Tutorial." Anthropometry Resource Center. http://www.od.com/anthro/tutorial/tutoc.html (November 16, 1997).

2. Scale. Same as above.
3. Flat Board. To be used as a stand for the scale.
4. A level and several wedges. To ensure that the board, and hence the scale, is level.
5. Spreadsheet questionnaires (sample provided in a later section).
6. Permanent markers. To mark the skin of those children who have been measured.
7. Medications (to be determined by the Team Doctor).
8. Stunting Software. This is needed to turn the raw data into Z scores (using internationally accepted distributions of height-for-age). EpiInfo Version 6 is in the public domain and is currently available free of charge from the World Health Organization Information Services (WHOIS). It can be downloaded from the World Wide Web at www.cdc.gov/epo/epi/epiinfo.html
9. Statistical Software. EpiInfo also has statistical capacity, but it is very difficult to use and lacks options. It was much easier the re-enter the data into a commercial statistical package such as SPSS (EpiInfo has no export capabilities) and analyse it there.
10. A guide provided by the NGO and state department to act as liaison in the villages.

FREQUENCY OF USE

Data for this indicator will be gathered in periodic campaigns. Campaigns should be carried out no more frequently than every three years.

TOTAL TIME REQUIRED TO USE INDICATOR

The stunting team will be able to measure approximately seventy-two children per day, if the team takes five minutes per child, and if they can work six hours per day. Unless a village is particularly large, the Team should be able to finish a village in one day. The number of villages to be surveyed depends upon other considerations.

SEQUENCE OF USE

This indicator should be executed towards the middle of the visit. It cannot be done right away because the team must first schedule the visits and then make preliminary visits to the villages. The indicator cannot be executed at the end of the visit, or the team will not be able to discuss the results at the participatory sessions.

SAMPLING

There will be no sampling. The team will simply measure all children in the selected villages.

PROCEDURES AND METHODS

1. Organise the necessary equipment before going to the watersheds.
2. Train the permanent stunting team members.
3. Upon arrival in the watershed, inform the partner NGO and state department that anthropometric information will be collected from the selected villages. Ask them to arrange time for the study.
4. Ask the NGO or state department to help hire a local doctor and two assistants.
5. Conduct a mini-training session with the entire stunting team.
6. The stunting team leader should visit the selected villages at least once before the stunting study is to be conducted there. Such a visit can be made while collecting data for other indicators such

as *Use* or *Outsiders*. This is both to select a site to conduct the measurements, as well as for becoming acquainted with the local people.
7. On the day scheduled for the study, arrive at the selected village at least an hour early. This is to confirm that the site is appropriate and to set up the equipment.
8. The stunting team leader will work with Assistant #1 to measure the heights and weights of the children. Assistant #1 can take the actual measurements while the team leader can record the information (matrix provided below).
9. Assistant #3 will assist with handling the child being measured.
10. While the measuring is taking place, the stunting team leader can ask the mother a series of questions (provided below). We dispensed with this step because it created confusion and because children were often too restless.
11. After the measurement process, the child's parents have the option of taking the child to visit the doctor.
12. During this whole process, Assistant #4 acts as gatekeeper. On several occasions we had difficulties with curious onlookers causing the children to become more anxious. Crowds and noise also made it difficult for the team members to communicate details of the measurements. It is best if everyone except the child being measured is kept at a distance. To satisfy people's curiosity, we took measures of all those interested after all the children had been measured.
13. As the gatekeeper, Assistant #4 was also placed in charge of handing out sweets to children who were on their way out. This was a gesture of goodwill, as well as an incentive to stop those yet to be measured from becoming too anxious.

DATA MATRIXES AND QUESTIONNAIRE

SAMPLE DATA MATRIX

NAME	GENDER	AGE*	WEIGHT	HEIGHT
CHILD 1				
Child 2				
Child *n*				

* This should be in months. In the event that birth records are not available, the team should be ready to ask this question in terms of local events. See the "Calendar of Local Events" that follows.)

QUESTIONS FOR THE MOTHERS

1. Which immunisations have the child received? When?
2. How many siblings?
3. Have you lost any children since this child was born?
4. Before this child was born?

SAMPLE CALENDAR OF LOCAL EVENTS (For visit to Bihar)				
	1998	1997	1996	1995
January (Pongal)				
February (Shivratri)				
March (Holi)				
April				
May (Heat)			General Elections	
June (Monsoon)				Big Flood
July (Sowing)				
August		Death of village headman		
September (Harvest)				
October (Diwali)				
November				Temple opened
December				

DATA ANALYSIS

1. Feed the data for height, weight, age and gender into EpiInfo.
2. Calculate stunting (height-for-age) and wasting (height-for-weight) Z-scores. These are standardised scores based on standard deviations from established norms for age and gender.
3. Calculate the percentage of stunting and wasting in the population. The percentage of the population which is stunted and/or wasted is itself an indication of poverty.
4. Calculate the variation between the means and stunting (wasting) rates of girls and boys. Inequalities between girls and boys are an indication of gender inequality.
5. Calculate the standard deviation of the Z-scores. A large standard deviation indicates high social inequality.
6. If it is possible to analyse the data in the field, the results of the data should be discussed during the participatory sessions.
7. After the second time that stunting and wasting studies are done in the same village, the data can be compared for changes over time.

FINAL PRESENTATION AND ANALYSIS

1. Present the stunting data in a table similar to the following:

	Sample size	Mean z-score*	Mean z score girls:boys	Standard deviation of z-scores	Standard deviation girls:boys
Watershed A					
Watershed B					
Watershed n					
Aggregate					

*As explained in Chap.VII, z-scores are the standardised height measurements

2. The same should be done for the data on wasting.
3. In addition, histograms of stunting and wasting z-scores should be presented (for aggregate figures, as well as by watershed and gender-wise figures). This will act as an indicator of social equality (or inequality). If the scatter plot has a normal distribution, there is social equality. A multi-peaked scatter plot indicates social inequality. Large standard deviations are also indicators of high social inequality.
5. The above data should then be discussed qualitatively.
6. Discuss the quality of the "sample" (the number and characteristics of the people who participated in the participatory discussions).

4 SURVEY OF SELECT CONSUMER DURABLES

The evaluation team will conduct a survey of select consumer durables using resource maps. Participatory methods will be used to construct and fill in these maps. Change will be determined through repeated surveys using the same resource maps, several years apart.

TEAM MEMBERS (NUMBER AND SKILLS)

1. Social Scientist. The social scientist will assess the level of consumer wealth in the watershed. He will do this using pictorial surveys in the participatory sessions.
2. One Assistant. The social scientist will probably need to have an assistant present to take notes during the participatory discussions. Leading a discussion and taking good notes at the same time is almost impossible.
3. An Artist. If at all possible, one of the team members should be hired with an eye towards a minimal level of artistic ability. This person will draw the pictorial surveys.

NECESSARY TOOLS AND SUPPORT

1. Large sheets of poster-like paper for the pictorial surveys.
2. Coloured pens to draw the surveys, and to fill them in.
3. In order to make contacts in the selected villages the investigator must arrive with a representative of the local NGO or state department.

FREQUENCY OF USE

The data for this indicator will be collected during periodic evaluations.

TOTAL TIME REQUIRED TO USE INDICATOR

It is difficult to pinpoint how long it takes to use this indicator because it is executed during the participatory sessions, along with many other indicators. A survey of ten items should take thirty to sixty minutes.

SEQUENCE OF USE

This indicator should be implemented towards the end of the field visit when the other participatory work is over.

SAMPLING

If possible, multiple surveys of consumer durables need to be conducted in the selected villages.

Each session should focus on a different segment of the village community (e.g., men, women, low caste, upper caste). This could be difficult, however, given how exhausting participatory sessions can be.

PROCEDURES AND METHODS

1. With the help of NGO staff and others knowledgeable about local realities, choose 10 to 15 consumer goods that most local people do not own, but aspire to do so. These goods should not be so expensive that the villagers have no realistic hope of owning them in the next five to ten years.
2. The artist will then draw pictorial surveys containing pictures of each of these items (refer to Chapter VII for an example).
3. Make as many photocopies of these maps as needed.
4. During the first several days of the field visit, conduct a preliminary visit to each of the intended sites. Propose a group discussion and gauge the reaction.
5. During the participatory sessions, the social scientist will inquire about local ownership rates of the select consumer durables.

DATA MATRIXES AND QUESTIONNAIRES

SAMPLE DATA MATRIX

Village name (hamlet name): Date:
Investigator Guides:
Names and identity of the Participants: Translator:
1. 5.
2. 6.
3. 7.
4. 8.

Consumer Good	# in the Village	Confidence Level of Response*	# Before**	Confidence Level of Response
Good A				
Good B				
Good C				

* The investigator must rate his degree of confidence that the answers are correct. This rating will be obtained through listening to the confidence of the respondants' answers and their body alnguage. Ratings are "++" (very confident), "+" (Confident) and "—" (Uncertain).

** This information is to be gathered during the participatory session. when the survey is conducted again in a few years, this question will not be asked as previous rates of ownership will already be known.

ADDITIONAL QUESTIONS TO BE ASKED

1. How else do people spend their money?
2. How has this changed in the last __ years?
3. Why do we see the changes in ownership patterns that we do?
4. Where have people managed to find the resources to purchase the additional goods?

DATA ANALYSIS

1. Compare ownership rates between the various villages, and watersheds.
2. Calculate changing ownership rates for the various consumer durables.

FINAL PRESENTATION OF RESULTS

1. Present the following ownership matrix, first for the individual villages and hamlets, then in an aggregate matrix.

SAMPLE REPORT MATRIX

Village name (hamlet name): Date:

Consumer Good	**# in the Village**		**Confidence Level**		**# Two Years Ago**		**Confidence Level**		**Percentage Change**	
	Vill. A	Vill. B	Vill. A	Vill. B	Vill. A	Vill B	Vill. A	Vill. B	Vill A	Vill B
Good A										
Good B										
Good C										

1. Interpret the data.
2. Include the interpretations that the beneficiaries themselves offered of the data, especially regarding change and sources of income.

5 SCHOOL ATTENDANCE RATES

The evaluation team must determine how many students are attending school and until which grade level they attend. Separate figures will be kept for girls and boys so that gender equity in education can be analysed.

Attendance figures can be gathered in two ways. First, the evaluators can ask administrators at the schools visited to share attendance records with them or they can actually count the numbers of children present on the day of the visit. The latter is more time consuming, but the former may be less accurate (due to poor record keeping or conscious manipulation of records). This protocol recommends that evaluators gather their own attendance data, but the latter procedure may be preferred under certain circumstances.

TEAM MEMBERS (NUMBER AND SKILLS)

1. Social Scientist. One social scientist will be able to measure the number of children attending the local schools. The same person will also be able to interview the on-site administrators about attendance rates. During the participatory sessions, this person (or whoever else is conducting the PRA) will be able to ask questions about attendance rates.

NECESSARY TOOLS AND/OR SUPPORT

1. This indicator requires no special tools.
2. In order to legitimise the school visits, the investigator must arrive with a representative of the local NGO or state department.

FREQUENCY OF USE

Data for this indicator will be gathered through periodic assessment campaigns (every three to five years).

TIME REQUIRED TO USE INDICATOR

A single school visit should take no more than two hours (both to count the students, and discuss the findings with the administrator). Total time requirements depend upon how many schools need to be visited.

SEQUENCE OF USE

This indicator can be executed at any time before the commencement of the participatory sessions. It is suggested that these measurements be taken in conjunction with measurements for *Use, Outsiders* and *Replication*. The reason for this is that all three indicators require touring the same areas, and covering the same ground twice can be time consuming and wasteful.

SAMPLING

Unless there is a very large number of schools, all schools in the treated areas of the watershed should be visited. If the watershed is too large, then only those schools that serve the selected villages should be surveyed.

PROCEDURES AND METHODS

1. In order to reduce the amount of work required, the social scientist should attempt to determine until approximately what age most children in the area attend school. He can then restrict his survey based upon this information. For example, if informants report that most children attend till the eighth standard, then the social scientist does not need to visit any school that serves students only up to the sixth standard.
2. The social scientist will tour the watershed, visiting all schools in the treated areas. If there are too many schools in this area, survey only those schools that serve the villages selected for evaluation.
3. If possible, the social scientist should arrive unannounced.
4. He should request permission from the director/principal to count the number of students attending school on that particular day.
5. The social scientist should count the students, keeping separate records for each grade level and for the gender of the students.
6. After the data has been gathered, the social scientist should talk to the director/principal about the findings.
7. Finally, the findings should be discussed at the participatory sessions.

DATA MATRIXES AND QUESTIONNAIRES

SAMPLE DATA MATRIX

School Name: Location:
Principal: Date:
Investigator: Guide:

	Girls	Boys
Grade 1		
Grade 2		
Grade 3		
Grade 4		
Grade n		

QUESTIONS FOR SCHOOL ADMINISTRATORS

1. [Show the administrator the counts taken.] Do you think these numbers represent your average attendance?
2. If not, what is different about today?
3. [Given that many administrators will claim that the current day's attendance is unusually low, the investigator must assess the administrator's explanation. Is it "highly believable", "believable", or "unlikely"? These ratings should be made in consultation with other local contacts such as NGO and state department staff.
4. How many students usually attend?
5. Has this number changed over the last ___ years?
6. How many students attend regularly? Seasonally? Irregularly?
7. Estimate the number or percentage of children in your school district that do not attend more than once per week?
8. Why don't they attend?
9. Under what conditions might they start to attend?
10. According to our count the ratio of boys to girls is ____ to ____. Is this average?
11. Has this ratio changed in the last three years?
12. What would it take to get more girls to attend school?

QUESTIONS TO BE USED IN THE PARTICIPATORY SESSIONS

1. What percentage of the local children aged ___ attend school?
2. The local principal's estimate is that ____ percent of the local students do not attend school. Do you agree with this estimate?
3. Why don't children go to school?
4. Under what conditions would they do so?

5. The principal's estimate is that there are ____ more boys than girls attending school. Why is that so?
6. Under what conditions would more girls attend school?

DATA ANALYSIS

1. Calculate the ratio of boys to girls for each grade, each level (primary, middle, and high school) and as a whole.
2.If time series data is available, calculate the changing attendance rates.

FINAL PRESENTATION AND ANALYSIS

1.The numeric data should be presented in a matrix (see below).
• First, separate matrixes should be presented for each watershed, then a combined matrix should be presented to facilitate comparison.
• In each matrix, present the number of students in each school, in each village, and in total.
• Present ratios of boys to girls in each school, village, and the total.

SAMPLE DATA MATRIX
(this is for one watershed)

	Village A				**Village B**				**Total**	
	School A		School B		School A		School B			
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Grade 2										
Grade 3										
Grade 4										
Grade 5										
Grade 6										
Grade 7										
Grade 8										
Grade 9										
Grade 10										
Grade 11										
Grade 12										
Total										

2. Follow up these matrixes with qualitative discussions of the data.
3. Make sure to include a ratio of the numbers of students attending to an estimated number of students who are absent.
4.Then discuss responses given to issues addressed through the questionnaire.

6 UNIT USE AND MAINTENANCE

The evaluation team will measure if the investments made by the programme are being used and/or maintained. Investigations will take place at the level of the "unit". A unit could be anything from one hand pump if the activity in question is to install hand pumps or a unit could be one self-help group if the activity is to facilitate the formation of such groups. Definitively determining whether a unit is actually in use and/or being maintained is difficult, but reasonably accurate assessments can be made.

TEAM MEMBERS (NUMBER AND SKILLS)

1. Social Scientist. The social scientist will tour the watershed, evaluating the units which have been installed.

NECESSARY TOOLS

1. This indicator requires no special tools.
2. A representative of the NGO and/or the state department must take the social scientist to the various programme sites.

FREQUENCY OF USE

The data for this indicator will be gathered through periodic evaluations. It makes little sense for such assessments to take place before a gap of three years.

TOTAL TIME REQUIRED TO USE INDICATOR

This depends upon many factors including how difficult the terrain is. Most importantly, it depends upon the number of activities, and units in each activity. If there are many activities and if each activity has installed many units, this indicator can be extremely time consuming to implement. In order to conserve time, we tried to take samples such that we could survey one village per day.

SEQUENCE OF USE

This indicator should be implemented at the same time as *Outsiders* and *Ground Water,* since all three require touring essentially the same large areas of the watershed. All indicators should be executed during the Field Study so that they can be discussed at the Participatory Sessions.

SAMPLING

If an activity has only a very few units in the watershed, all of them should be surveyed. If this is not possible, only those units in the selected villages should be surveyed. For some activities, so many units existed that even this was not possible. In such cases, we attempted to visit units as randomly as possible.

PROCEDURES AND METHODS

1. Obtain a complete list of all activities being implemented in the watershed. This should be obtained before arrival, or during the Gearing Up phase. Make certain to consult both the NGO and the state department.
2. For each activity, define a "heavily used", "moderately used", and an "under used" unit. Do the

same in terms of maintenance. If possible, this should be done in consultation with the people who designed the activities.
3. Tour the watershed, visiting all the installed units.
4. Visually inspect units.
5. Take photographs of units which are being used and properly maintained, as well as those which are not.
6. Speak with available beneficiaries about the use and/or maintenance of units (see the questionnaire which follows).
7. Interview NGO and state department staff members about the findings (see the questionnaire which follows).
8. Discuss findings at the participatory sessions (see questionnaire below).

DATA MATRIXES AND QUESTIONNAIRES

SAMPLE DATA TALLY

Activity:

DEFINITIONS	RATIO OF UNITS IN THIS CATEGORY
"Heavy use":	
"Light use":	
"Disuse":	
"Well Maintained":	
"Moderately Maintained":	
"Poorly Maintained":	

* Include photographic illustrations for each of the above.

QUESTIONS FOR BENEFICIARIES

1. Who uses these units?
2. How often?
3. Under which circumstances?
4. Why is it not used any more? (to be asked if the unit isn't used)
5. Who is in charge of maintenance?
6. Who actually does the work?
7. What do they do?
8. How often?

QUESTIONS FOR NGO AND STATE DEPARTMENT PERSONNEL

1. ____ percent of the units in _____ activity do not seem to be in use, or only in "light" use. Why?
2. [Discuss particular cases.]
3. Who is responsible for maintaining the units?
4. ____ percent of the units in the _____ activity do not appear to be well maintained. Why?
5. [Discuss particular cases.]

QUESTIONS FOR THE PARTICIPATORY SESSIONS

1. ____ percent of the units do not seem to be in use, or only in "light" use. Why?
2. Who uses these units?
3. How often?
4. Under which circumstances?
5. Why is it not used any more? (to be asked if the unit isn't used)
6. Who is responsible for maintaining the units?
7. ____ percent of the units do not appear to be well maintained. Why?
8. Who is in charge of maintenance?
9. Who actually does the work?
10. What do they do?
11. How often?

DATA ANALYSIS

Calculate percentages from the above data matrix.

FINAL PRESENTATION AND ANALYSIS

1. Present the data matrix, including percentages.

	Total units installed	Units in heavy use	Units in light use	Units in disuse	Units well maintained	Units moderately maintained	Units poorly maintained
Activity A							
Activity B							
Activity C							

2. The above matrix should be modified to show change when the evaluation is done for a second time.
3. Present the results of the questionnaires.
4. Discuss and illustrate with sample cases.

7 THE PRESENCE OF OUTSIDERS IN PROGRAMME OPERATIONS

Evaluators must determine who actually runs, manages and administers units installed by various programme activities. Are they done by the local people themselves, or by "outsiders"? Determining whether or not a person is an outsider can be difficult. This protocol defines "outsiders" as those people who would not carry out their duties were it not for programme funds. Such people in all likelihood leave after programme funds dry up. Employing such a logic, a local bank manager who came from the big city is not an outsider. This is because this manager (or his replacement) will remain in the watershed after the Project has withdrawn. An employee of the NGO, even if he/she is a life-long residents of the watershed, is, however, defined as an outsider.

TEAM MEMBERS (NUMBER AND SKILLS)

1. Social Scientist. The social scientist will be responsible for determining who actually runs local programme operations.

NECESSARY TOOLS AND SUPPORT

1. This indicator requires no special tools.
2. A representative of the NGO and/or the state department must take the social scientist to the various programme sites.

FREQUENCY OF USE

The data for this indicator will be gathered through periodic evaluations, carried out approximately every three years.

TOTAL TIME REQUIRED TO USE INDICATOR

Refer to the same section in *Use*.

SEQUENCE

Refer to the same section in *Use*.

SAMPLING

Refer to the same section in *Use*.

PROCEDURES AND METHODS

1. In order to determine who actually runs the programme, visit a sample of units from each activity.
2. Interview local users, workers and managers. Ask them who operates and maintains the unit (see the questionnaire which follows).
3. Visit central funding/support/administrative offices and ask similar questions (see the questionnaire which follows).
4. Attempt to meet the people who are supposedly operating and maintaining the units. Determine if these people are in some way supported by the Project. If the the reply is positive, they are "outsiders".
5. Ask similar questions at the participatory sessions (see the questionnaire which follows).

DATA MATRIXES AND QUESTIONNAIRES

QUESTIONS FOR BENEFICIARIES (WHERE APPLICABLE)

1. Who runs this programme unit on a day-to-day basis?
2. If any maintenance is required, who directs that it be carried out?
3. Who actually does the work?
4. If there is any dispute regarding the use or maintenance of this unit, how is it solved?

QUESTIONS FOR NGO AND STATE DEPARTMENT OFFICERS

1. Who runs the programme units on a day-to-day basis?
2. If any maintenance is required, who directs that it be carried out?
3. Who actually does the work?
4. If there is any dispute regarding the use or maintenance of this unit, how is it solved?
5. Is there any mechanism through which future planning for this programme can be carried out?
6. How does it function, and under whose leadership/authority?
7. Is the use of this unit, or the planning for the future of this programme carried out in co-ordination with any other local, state or national group?

QUESTIONS FOR PARTICIPATORY SESSIONS

1. Who runs the programme units on a day-to-day basis?
2. If any maintenance is required, who directs it to be carried out?
3. Who actually does the work?
4. If there is any dispute regarding the use or maintenance of this unit, how is it solved?
5. Is there any mechanism through which future planning for this programme is carried out?
6. How does it function, and through whose leadership/authority?

FINAL PRESENTATION OF THE DATA AND ANALYSIS

1. Present that data matrix below and discuss it in detail.
2. Illustrate as many of the boxes as possible with qualitative detail.

SAMPLE DATA MATRIX

Who Does the Work:

Beneficiaries, NGO Staff, State Department Staff, or no one?

	Day-to-day Operation and Administration	Maintenance	Planning and Co-ordination	Dispute Resolution
Programme A				
Programme B				
Programme C				
Programme D				

8 UNITS UPGRADED OR REPLICATED WITHOUT PROGRAMME SUPPORT

The evaluation team will search for evidence of programme investments being upgraded or replicated without programme support. Investigations will take place at the level of the "unit". The team will use observation and interviews with key informants to locate examples of upgraded or replicated units. A unit is "upgraded" if it is expanded beyond its original size, capacity or capability. A unit is "replicated" if a new unit (one that never existed previously) is put up.

TEAM MEMBERS (NUMBER AND SKILLS)

1. Social Scientist. The social scientist will interview and observe locate examples of programme units which have been upgraded or replicated.

NECESSARY TOOLS AND/OR SUPPORT

1. Still camera.
2. A representative of the state department and/or the NGO must accompany the investigator to existing programme units. These same people should help the investigator track down reports of upgraded or replicated units.

FREQUENCY OF USE

The data for this indicator will be collected during periodic evaluations, conducted every one to three years.

TOTAL TIME REQUIRED TO USE INDICATOR

This has the potential to be a very time consuming indicator. It will take investigators three to five days to complete the touring necessary to verify instances of upgradation and/or replication.

SEQUENCE OF USE

This indicator should be implemented at the same time as *Use* and *Outsiders*, since all three require touring essentially the same areas of the watershed. All three indicators should be executed at the beginning of the field study so that the findings can be discussed at the participatory sessions.

SAMPLING

There is no sampling for this indicator. The investigator must look for all cases in and around the watershed.

PROCEDURES AND METHODS

1. The social scientist will inform the state department and NGO guides that he is looking for instances of self-funded upgradation and replication of programme units. It may be helpful if this is done before arrival in the field.
2. The evaluation team will tour the entire watershed, tracking down reported cases.
3. The social scientist will take notes describing cases of upgradation and/or replication (see the questionnaire that follows).
4. A still camera will be used to document the physical appearance of unaltered, upgraded, and/or replicated units.
5. The results of these field investigations will be discussed at the participatory sessions (see the questionnaire that follows).
6. The team should follow up on any additional reports of upgradation and/or replication that surface at the participatory sessions.

MATRIXES AND QUESTIONNAIRES

SAMPLE DATA MATRIX

Programme: Total units installed in surveyed area:

Definition of terms for this programme

"minor upgrade"
"major upgrade"
"partial replication"
"full replication"

	Minor Upgrades	Major Upgrades	Partial Replications	Full Replications
Village A				
Village B				
Other Villages				

*** Snap photographic examples for all boxes in the matrix.

QUESTIONS TO ASK AT SITES OF UPGRADATION AND/OR REPLICATION

1. How long has this unit been in operation (in its present form)?
2. How does it work?
3. Who "built" it?
4. Who financed it?
5. Why was it built?

QUESTIONS TO ASK AT PARTICIPATORY SESSIONS ABOUT UPGRADATION AND/OR REPLICATION

1. _____ unit was upgraded and/or replicated. Who did the work? Who financed it?
2. Why was it done without Programme support?
3. Why don't more people do this?

DATA ANALYSIS

All that is required is a simple tabulation of findings.

FINAL PRESENTATION OF RESULTS

1. Present data in the following matrix form.

Sample Data Presentation

	Units Installed	Minor Upgrades	Major Upgrades	Partial Replicationsa	Full Replications
Activity A*					
Activity B					
Activity C					

* For each activity, the terms "minor upgrade", "major upgrade", "partial replication", and "full replication" must be defined in a footnote.

2. Follow this up with a qualitative discussion of the matrix.
3. In order to convey the clearest possible picture to the reader, sample photographs should be included.
4. Present a summary of the participatory sessions as they clarify the above data.

SOCIAL CAPITAL

This indicator is a late addition to the PEP. It was developed and tested in the field. Of all the indicator guides, this is by far the most open-ended. This is because the definition of social capital may vary considerably from programme to programme (various sorts of social capital will require different documentation methods).

TEAM MEMBERS (NUMBER AND SKILLS)

Social Scientist. The social scientist will need a clear understanding of the concept of social capital, in addition to knowledge about local social and governmental structures. He or she must also have the ability to conduct unstructured interviews.

NECESSARY TOOLS AND SUPPORT

1. No special tools.
2. A liaison from the partner NGO and state department.

FREQUENCY OF USE

This indicator should be executed at the outset of the programme. There should be a gap of four to five years before it is used again. The delay between evaluations is quite long because social capital takes a long time to germinate and grow.

TIME REQUIRED TO USE INDICATOR

This cannot be specified. The evaluation team should spend whatever extra time that is available to investigate the existing level of social capital in the watershed.

SEQUENCE OF USE

Research for this indicator will be executed throughout the period of the evaluation.

SAMPLING

Begin with the selected villages, and gradually attempt to cover the whole watershed.

PROCEDURES AND METHODS

1. Even before arrival in the watershed, evaluators should begin to ask about local government structures, and watershed management institutions.
2. During the course of other discussions (e.g., water resource mappings, field visits to programme activities) the evaluators will inquire about water problems that local people have recently faced. What are the problems? How have they been dealt with? By whom?
3. Follow up carefully any potential leads. The details of complex social events can quickly get lost or change when they are retold a number of times. Locate the actual people involved and obtain the details from them.
4. Carefully note down the details of stories about local people working together to solve watershed problems.

DATA MATRIXES AND QUESTIONNAIRES

Questions must be based on the types of water-related problems that are encountered locally.

1. What problems related to water were encountered in the recent past?
2. How have people dealt with them?
3. Who were the active parties?

FINAL PRESENTATION OF DATA AND ANALYSIS

This is a qualitative variable, so there will be no tables, charts or graphs. Instead, the final report should contain detailed, descriptive accounts of the social capital uncovered in the watershed. This should comprise of general descriptions, as well as any case studies that may have been done.

B

GUIDING PRINCIPLES

The following set of guiding principles are prepared to serve the State Government Departments (SGD) and Non-Governmental Organizations (NGO) in developing their plans and proposals and to serve while implementing the IGBP's RWS Programme:

1. The SGDs and NGOs will elaborate jointly on an annual basis a plan of action and keep each otherinformed on the progress of their work on a regular basis.
2. The SGDs and NGOs must maintain their focus upon soil and water conservation activities, that are of central concern and importance to this project.
3. No activity of SGDs and NGOs must cause harm or damage to the natural environment or cause further natural resource degradation.
4. The programmes and activities should also focus on the needs and problems of landless farmers (on a priority basis).
5. Development of networking Self Help Groups with strong womenís participation is expected to be a main activity of the NGOs.
6. Assets and infrastructure created by NGOs should be in the name of local institutions which have strong female participation.
7. The partner organisations should not promote economically unviable activities which focus on improvement of livelihood conditions and depend thus primarily on subsidies and sponsorship.
8. Beneficiaries of the programme are expected to make contributions by way of cash, kind or labour. No activities with immediate direct tangible benefits must reach the beneficiaries totally free of costs.
9. State Government Departments and NGOs are expected to work mainly in their field of experience.
10. Within a given watershed, the NGO should begin its activities ahead of the SGD, having a lead time for preparing the community, explaining the objectives and mobilising their participation, preferably 1 year.
11. The activities must be based on principles of sustainability, equity and social justice. The partner organisation must strike a balance between developing community resources and providing individual benefits. Individual benefits to rich farmers that perpetuate the resource gap between the rich and the poor are to be avoided. Greater emphasis should be laid on developing community infrastructure and resources. Access of poor farmers/ villagers over such facility must be ensured.
12. The long term perspective of the State Government Departments and Non-Government Organisation should be the development of a watershed committee in which all main socio-economic groups of the watershed will be represented and which will take care of watershed management activities beyond the project period.

Indicators are proxy measures of phenomenon that are difficult to measure directly. Indicators function as a quick, inexpensive, and easy-to-use alternative to traditional measures of project impact such as benefit-cost ratios and internal rates of return.

This book chronicles the Indo-German Bilateral Project's experiences in India using a set of nine indicators to evaluate its Representative Watershed Programme. This indicator set is designed to measure progress towards the objectives of natural resource management and livelihood enhancement as well as estimate project sustainability and replicability.

In the hope that others can benefit from the IGBP's experiences, detailed information is presented in the Programme Evaluation Protocol as to how this nine-indicator set can be implemented under field conditions. The Protocol also lays out how data can be recorded and analysed.

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