



M S SWAMINATHAN RESEARCH FOUNDATION

3rd Cross Street, Institutional Area, Taramani, Chennai 600 113, INDIA

Tel: +91- 44 -2254 1229, 2254 1698, Fax: +91- 44 - 2254 1319

Email: executivedirector@mssrf.res.in, Website: www.mssrf.org

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Knowledge and Impact of Participation

KNOWLEDGE AND IMPACT OF PARTICIPATION

Technical Analysis of a Knowledge Survey

V. Arunachalam, Akshaya K. Panda, Ancy Thomas,
G. Shanthi, C.K. Sathya and V. Arivudai Nambi



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Foreword

The report of the Burndtland Commission (1987) titled "Our Common Future" underlines the importance of environmentally sustainable development. I have often said that for a better common future, we need a better common present. Unfortunately, humanity's Ecological Footprint, i.e. its demand on nature is currently exceeding by 25 per cent global biocapacity, i.e. nature's ability to meet this demand. This indicates that the current global level of consumption of natural resources is not sustainable. India represents approximately 6 per cent of the world's ecological footprint, 4 per cent of the world's biocapacity and 17 per cent of the world's population (Global Footprint Network, 2008). According to the analysis of the Global Footprint Network, India's growing ecological debt is the result of both increasing population and increasing per capita consumption of resources, particularly of non-renewable energy. If we are to reverse this situation and enhance our biocapacity there is need for concurrent attention to education, social mobilization and regulation.

An important educational tool is participatory knowledge management and research jointly with local communities. MSSRF initiated 8 years ago a programme for this purpose in the Koraput region of Orissa largely inhabited by tribal families. These families are rich in culture and have conserved agro-biodiversity with love and care. Thus, this region is a veritable mine of valuable genes in rice, medicinal plants, tubers, pulses and other crops. Recently, the Govt. of India presented the Genome Savior Award to the local community for their invaluable contributions to agro-biodiversity conservation and enhancement.

MSSRF started Participatory Plant Breeding (PPB) activity in this area at the beginning of this century. The aim of the PPB programme is to combine modern genetic knowledge with the traditional wisdom and practical experience of farm families. PPB also involves Participatory Knowledge Management, leading to a win-win situation for both scientists and tribal families. The present book summarises the results and experience gained through this partnership. The leader of the team Prof V Arunachalam is one of the most distinguished geneticists of India. During this work, he has identified himself totally with tribal women and men in Koraput and Kalahandi. An immediate practical outcome of this joint field research is the development of the Kalinga Kalajeera variety of rice which fetches premium price and is in good market demand. I wish to thank Prof Arunachalam, Akshaya K. Panda, Ancy Thomas, G Shanthi, C K Sathya and V Arivudai Nambi for their total dedication to mobilizing the power of partnership with local communities. I hope this publication will stimulate widespread interest in PPB as well as in Participatory Knowledge Management. This is the pathway to environmentally, socially and economically sustainable development and thereby towards a

better common present and future. Also, such close partnership with both plants and their conservers will help to foster the concept that non-violence to nature should become a non-negotiable human ethic.



M.S. Swaminathan
Chairman
M.S. Swaminathan Research Foundation
Chennai

Preface

Participatory Plant Breeding (PPB) is an expanding science of plant breeding for the people. For the past decade, I have been privileged to organize and lead a project in PPB in the tribal lands of the Jeypore tract, Orissa, for the benefit of tribal farmers. As a first experience, it was quite refreshing and rewarding. Not only did it give me the opportunity to appreciate the depth of traditional knowledge tribal people have been preserving over years, it also gave me leads to understand the science behind the tradition. It was amazing to see the enthusiasm with which tribal farmers conducted participatory experiments in their own fields without expecting incentives. Slowly, men and women farmers participated in discussions in order to understand the basics behind the modifications we suggested to their traditional practices of rice cultivation. The zeal with which women learnt and practised selection of seeds from main and healthy panicles in the fields around maturity was remarkable.

The international rice year, 2004, also marked peak PPB activity in Jeypore. In the same year, an intern chose to work with our unit at MSSRF, Chennai, to complete a dissertation for an MBA course. We thought this would be a good opportunity to design and execute an exhaustive survey with the main objective of assessing the knowledge of tribal farmers in Jeypore (Koraput). A scientist from MSSRF, Jeypore, was assigned to guide the intern. Taking time and resource constraints into account, we chose six villages in Koraput for the survey. In Kalahandi, another district of Orissa, MSSRF had undertaken other interventions to empower the poor in the area of food security, and six villages were chosen from this area too in order to compare knowledge among farmers.

Though the time slated for the survey was short, the intern and the scientist collected meticulous data. A small portion of that data was analyzed using simple tools and the intern could submit a good dissertation. The raw data sheets were placed in archive.

When two research fellows (co-authors in this book) joined me, I initiated a fresh look into the data with their help. We found it possible to look at the data from various angles of enquiry. The survey questionnaire ranged over quite some areas including PPB, Village Seed Banks, awareness of MSSRF interventions and benefits to the people. We felt that the survey responses, despite the effusive form of narrated text, could be used on new models. We thought it possible to derive indicators of the impact of PPB intervention.

The summarization of response data used by the intern was found deficient in many respects. Hence we had to scrutinize the data *ab initio*; after this strenuous exercise, the data were recast in a form amenable for answering relevant enquiries. Even then it was found more suitable to draw qualitative inferences that could be subjective and admit variation among different researchers. This exercise took about six months. Yet, I was optimistic that the methodology could be refined to make it possible to draw strong and defensible inferences.

This optimism grew strong and I determined to evaluate the responses from a different perspective, assigning to each farmer a knowledge score. But no clue was readily available to settle upon a method. As has been made clear in the book, this survey did not record responses to any question using pre-assigned scores like 1-Poor, 2-Fair, etc. This made the search for a method still more tenuous. Several of our preliminary attempts landed on questionable premises. But they helped us to vigorously pursue our efforts to quantify responses. After a number of trial and error attempts, we settled on a new method of filtering key words from narrative responses; we succeeded but only after about seven months' effort.

Once the quantification process was satisfactory, we had to dig into various statistical methods to locate an appropriate process. Finally we chose binomial scores as the most efficient for this survey.

After zeroing in on the right methodology, the responses had to be reordered to fit into the new method; a software had to be developed and checked for its application and customized to the needs of various enquiries we desired to make.

When this software started working efficiently, we could compute knowledge scores for each responding farmer. Using another software I had developed earlier, we could undertake multiple range tests and rank farmers on their knowledge scores.

Further work on moulding the results into a presentable format and its writing as a book took time; thus a total effort over two years has made this book possible.

I owe a lot to Prof M. S. Swaminathan, Chairman, MSSRF, for his constant and compassionate encouragement, enabling me to lead the PPB project for over a decade. But for him, I would not have entered the new field of Participatory Plant Breeding.

The Swiss Agency for Development and Cooperation (SDC) contributed significantly to these efforts by funding a project consistently over a decade and providing me a position of SDC Programme Advisor for the last two years. I acknowledge the concern shown for the success of the project and encouragement given by Mr. François Binder, Country Director, SDC India, and the abiding interest shown in the project activities by Mr. K.R. Viswanathan, Team Leader. Dr. N. R. Jagannath, Programme Officer, has been associated with this project from its start, and has always guided us to view the project in its various dimensions and provided advisory help that proved to be very useful. I have greatly benefited by my association with him. I gratefully acknowledge the considerable pains he took to critically go through the first draft of the book and suggest valuable modifications.

Many colleagues located in various site offices, particularly Jeypore, Kolli Hills and Wayanad, have interacted with me positively in the SDC project, which was an asset to my learning process.

My special thanks should go to Dr. V. Arivudai Nambi, Project Coordinator of the SDC project who has been a consistent source of support and encouragement in all my endeavours.

I have been greatly benefited by stimulating discussions with Mrs. Swaminathan on various topics including some relevant to this book that I'd like to specially acknowledge.

The tribal farming communities of several hamlets of Jeypore merit my profuse thanks for their willing cooperation and their participatory efforts in scaling up rice landrace cultivation. The rice landrace, *Kalajeera*, genetically purified and further developed by Jeypore's tribal farmers to commercial scale has become highly popular. Recently, this variety was named *Kalinga Kalajeera* and its further propagation handed over to the Government of Orissa. The participatory role of Jeypore tribal farmers in this achievement is a tribute to their hard work and a source of satisfaction to me.

My sincere appreciation is due to Ms. Sandhya Sundar for her meticulous editing of the script.

Canara Printers, Chennai who took the burden of converting our typescript into this book form deserve my sincere appreciation for their patience and diligent processing of this book.

To cherish my memorable association with Genetics, Plant Breeding, Biodiversity and Participatory Plant Breeding, I dedicate this book to two illustrious and outstanding scientists of great calibre:

1. The late Prof. B. R. Murty who initiated me to Genetics and Plant Breeding and continued to be my affectionate teacher throughout his life
2. Prof. M.S. Swaminathan, Chairman, MSSRF, for his valuable advice and guidance in various facets of my official career and beyond, and for his compassionate concern for my welfare always.

Chennai
November, 2008

V. Arunachalam
Technical Program Advisor
M.S. Swaminathan Research Foundation
Chennai

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Abbreviations

ANOVA	Analysis of Variance
C	Set of 113 sampled farmers from Koraput and Kalahandi
D	Set of 63 sampled farmers from Koraput
DMRT	Duncan's Multiple Range Test
FKH	First-level knowledge holders
FYM	Farmyard manure
H	High
HYV	High-yielding variety
K	Set of 50 sampled farmers from Kalahandi
KNSR	Knowledge score [presented as (actual KNSR * 1000)]
L	Low
LR	Landrace
M1	Medium 1
M2	Medium 2
MMC	Modified method of cultivation
MSSRF	M. S. Swaminathan Research Foundation
OC	Other castes
PPB	Participatory plant breeding
PRA	Participatory rural appraisal
PTA	Participatory training and awareness
SC	Scheduled caste
SDC	Swiss Agency for Development and Cooperation
SHG	Self-help groups
SKH	Second-level knowledge holders
ST	Scheduled tribe
TK	Traditional knowledge
TMC	Traditional method of cultivation
VSB	Village seed bank

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Knowledge and Impact of Participation

Technical analysis of knowledge and management of agro-resources in two tribal districts of the state of Orissa in India

Where is the wisdom we have lost in knowledge?
Where is the knowledge we have lost in information?
T. S. Eliot (1934)

Information today is enormous.
Communication is powerful and pervasive.
The result is an ocean of information.
Raising information to Knowledge is arduous.
Do we then lose Knowledge in Information?

Sharpen Knowledge, mould it by personal experiences, and gain Wisdom.

But an ocean of knowledge amidst overflowing information impedes this process.

Do we then lose Wisdom in Knowledge?

Maybe Eliot's elegant words of 1934 are still valid and worth logical scrutiny!

In the above, there is an assumption that individuals are capable of absorbing information, and that they live in an enabling environment which allows them easy information access. Those assumptions could be true for a large part of the global population. But in India there is a large population still driven by an ancient culture and a tradition lived through hundreds of years. There are people who live in areas far away from the world of modern developments. They remain impoverished of information. A majority of them are illiterate and economically poor. But they possess a wealth of Traditional Knowledge (TK) that has been passed on from generation to generation. They have little motivation, and access to information and the opportunity to assimilate it are seldom available. They remain with no voice amidst the privileged and powerful. They live within the confines of ancient knowledge and a static and restricted livelihood.

We deal in this book with one such class, the tribal people of the state of Orissa in India.

Preamble

Surveys as areas of enquiry for prognosis of situations over time or of interventions are commonly used and fall broadly into the following pattern: Questions are asked, the responses to enquiries compiled and collated, and broad answers to specific questions extracted. Often, inferences are extrapolated to a broad range of like situations. The process is mainly a textual analysis of responses.

But efficient surveys would pay serious attention to the following prerequisites:

- the subject area of enquiry
- the target population and target locations
- a comprehensive coverage of the variation in populations
- a sampling design including optimal choice of respondents
- a designed enquiry through a questionnaire

Such a survey would then admit of a designed analysis of responses leading to justified inferences clearly demarcating the boundaries of application. A careful scan could light a path to progress.

Knowledge has different connotation in different contexts. It could be, for example, the knowledge of a subject like Biology, knowledge of an event that took place in the recent past, knowledge about the conduct of an individual in times of stress and the like. What this book deals with is the knowledge of tribal people in two specific districts of Orissa. Tribal people have unique traditional knowledge that includes various areas relevant to their livelihood such as agro-diversity of food crops (rice and millets, for example), natural resources in their habitats and the like.

Among individuals belonging to the same population knowledge can show significant differences. The economic and social strata of families, the patterns of their livelihood, and the opportunities they get are some important factors influencing their knowledge. The environment (social, cultural, educational etc.) plays a further role in the status of their knowledge.

Measurement of knowledge in absolute terms is intangible because the knowledge of the person attempting to measure the knowledge of another will itself be a serious constraint. Even IQ (intelligence quotient) measurement suffers negative recommendation for the same reason, because the questions to test IQ are restrained by the IQ of the examiner; such an IQ test could fail to elicit the intelligence of the examinee, which, in principle, could far exceed that of the examiner.

In light of the above illustrations, attempts can at best be made to assess the knowledge of individuals on a comparative scale.

In situations like that of the tribal people in the two districts of Orissa, surveys and responses to the survey questionnaire can help to measure their knowledge (we use the term knowledge to denote comparative knowledge throughout this book). The habitats of those tribals are endowed with fertile natural ecologies and rich biodiversity, especially of crop resources.

Koraput district (and Jeypore tract) is reckoned as a secondary centre for the origin of rice, the staple food of tribals, and is credited with once having had about 2000 landraces of rice. The tribal people are highly traditional and a majority of them are not educated formally. But they have rich traditional knowledge passed on by their ancestors. They have been conserving various landraces of rice and cultivating several to meet their consumption needs. They have, in the process, developed their own methods of rice cultivation. In addition, they have been utilizing other natural resources like forest products for their livelihood requirements. It would therefore be instructive to assess their knowledge in various areas.

The tribals in these districts were finding it difficult to sustainably produce sufficient quantities of rice from their small land areas. The M.S. Swaminathan Research Foundation (MSSRF), with generous funding from the Swiss Agency of Development and Cooperation (SDC), stepped in to address this problem in 1998. To start with, a few locations in the Jeypore block of Koraput district were selected, and the productivity of rice was sought to be improved in participation with the people using the path of Participatory Plant Breeding (PPB). After about five years, this work showed notable signs of progress in rice production and in its wake in the livelihoods of the people. It was found desirable to assess the impact of PPB in the recorded progress in Koraput.

The second district, Kalahandi, faced a different situation in that the tribal people there were unable to access the benefits of Government measures targeted towards food security and poverty reduction. There was also a need to supplement such measures with community grain banks at the village level. People could deposit surplus grains in such banks, and the pooled grain resources could be distributed to the needy in the villages on buy, borrow or gift basis as decided by the people management committee of the grain bank. Another unit of MSSRF worked in Kalahandi to address the problems using Participatory Training and Awareness (PTA) as the main intervention. In their training sessions, the benefits of PPB derived by Koraput farmers were also disseminated periodically.

One would expect that the MSSRF interventions, PPB in Koraput and PTA in Kalahandi, would play a role in improving the livelihood of the tribal people in those districts. Such improvement would have helped them to sharpen their knowledge in addition to helping them gain more.

It was felt that it would therefore be interesting to assess the impact of PPB and PTA interventions in improving the knowledge of tribals in relevant areas.

This book, [Knowledge and Impact of Participation](#) is the result of such an assessment, which essentially used a designed survey and responses by selected people to a designed questionnaire. It reports a precise and novel analysis of peoples' responses.

It is also important to highlight the major features that distinguish this book from those dealing with similar topics:

1. Tribal farmers following an ancient tradition have seldom had experience in answering a detailed questionnaire. The questions were therefore diversified to cover a number of areas they were conversant with to retain their enthusiasm to respond. They were given full freedom to provide answers in their own way, narrative or concise. No prompting or providing leads was allowed so that their thinking or continuity in responses was not disrupted.
2. A popular and fundamental statistical reasoning based on Binomial Distribution was selected after an intensive search, which helped to quantify responses and enabled statistical analysis.
3. A process was devised to filter keywords from descriptive responses and to classify them as Type 1 and Type 2 responses (this nomenclature has no relationship with Type I and Type II errors of Statistical Inference Theory).
4. Most importantly, we did not know in advance what should be the optimal response to any question and so the number of keywords. This restrained comparison of the keywords of an individual's response against those of an optimal response. The method of invoking binomial proportions to solve this problem was novel.
5. The binomial proportions were normalized using the arcsin transformation for statistical analysis.
6. The knowledge scores provided quantitative data for analysis of variance and multiple range tests of mean values, using which precise inferences were drawn.

The book is written in a semi-technical language, restricting technical jargon. In addition, technical details of binomial proportions have been explained in simple language using examples to aid easy comprehension.

The book is open to any reader interested in investing the required time and mind to understand a novel method of scoring knowledge and drawing justified inferences.

The book clearly delineates the boundary within which the results are valid. The deficiencies in the survey, distribution of respondents, number of sampled villages and gaps in responses have been clearly highlighted. Likewise, the restrictions imposed on the analysis and inferences are presented and discussed.

Leads to an ideal survey have also been presented. It has been made clear that even with meticulous planning, deficiencies are inevitable, and only proper statistical analysis and logically defined inferences can account for them.

Finally, this book is more an illustration of modeling and analysis of surveys, particularly quantification of responses and the associated benefits of precise inferences using an actual case study. It is our ardent wish that this book encourages readers of various disciplines to apply the principles and methodology in their own studies and thus further mission-oriented research.

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Introduction

We understand, in general, 'Information' as used in day-to-day parlance. A web search reveals that information has been derived from the word 'inform'. Therefore, information is the act of informing, or giving form or shape to the mind. Information is anything relevant to the universe that concerns us. It is message received and understood: in other words, the sum total of what has been perceived, discovered, or inferred.

Ordered and organized information is Knowledge. It reflects competence with facts, truths, and principles. It is most often based on personal experiences and cultural inheritance. It can only be stored in one's mind. It is personal and tacit.

The distinct difference between Knowledge and Information is elusive. There seems to be no single agreed definition. Plato defines it elegantly as 'justified true belief' (JTB). Awareness or familiarity gained by experience of a fact or situation, and expertise and skills acquired by a person through experience or education provide the basis for JTB. The major differentiation between Knowledge and Information in the simple words of Foskett (1982) is: 'Knowledge is what I know; Information is what we know.'

Through the ages people have gathered, through long experience, vast information that led to knowledge based on JTB. Such people in India include a large number of tribes residing in natural habitats located far away from main cities, and who are largely unaware of modern culture and developments. The elders among them, including farmers, healers, midwives, fishermen and hunters have been acknowledged as sources of knowledge. Such knowledge is stored in peoples' memories in various forms such as stories, songs, folklore, dances and the like, and has largely not been documented. Being a part of their tradition, it is shared in close circles mostly orally and at times through naturally occurring events. Traditional Knowledge is not confined to tribal groups or original inhabitants of an area or rural people; in fact, any individual can possess TK. Unique to one the who holds it, it is passed on, mostly orally, to family members and thus from generation to generation.

1.1 Knowledge

We can look at Knowledge from another angle. JTB suggests that there are two major universes, Truth and Belief, which can be represented by two sets (Fig. 1). Their intersection

would then be Knowledge. Obviously, Knowledge encompasses parts of both Truth and Belief.

Traditional Knowledge is seen then as an important subset of Knowledge. Today TK is under high stress from over-riding modernity and slowly getting eroded.

Two kinds of knowledge are reported. One is explicit knowledge that can be expressed in words and shared in the form of data, and so can be transmitted formally. The other is tacit knowledge that is highly personal and hard to formalize.

Beliefs, perceptions, ideals, values and mental models, also part of TK, belong to this category (Edvinsson and Malone, 1997).

Knowledge is precious and has the potential to find solutions to intricate problems of a varied nature. In particular, TK has served well the cause of local communities and indigenous people in their decision processes.

Linden (1991) has observed that indigenous people have developed innumerable technologies and arts over ages. They have 'devised ways to farm deserts without irrigation, and produce abundance from rain forest without destroying the delicate balance that maintains the ecosystem; they have explored medicinal properties of plants and, in short, acquired an understanding of the basic ecology of flora and fauna.' Much of this expertise and wisdom has already disappeared; once lost, this knowledge cannot be reconstructed.

Ancient people have gained TK through local or traditional ways of natural resource management. For example, they use their own methods of managing different species, and employ crop rotation and other ways of maintaining soil health. Likewise, they respond to ecological and environmental changes. Such traditional systems reflect adaptive management and feedback learning improves them (Berkes, Colding and Folke, 2000).

Tribal communities are an important group of ancient people. They have TK of varied depths. They reside in habitats with a richly endowed ecology and biodiversity. In particular, such areas are ecological niches for agro-diversity. They provide valuable crop resources in the form of cultivable local varieties and potential landraces (LRs), which are traditional varieties of crops grown in specific ecologies using traditional practices over a long time. Their respect for their culture and religious rites is absolute. They preserve ancestral wisdom and religiously follow family customs.

But tribal people suffer on several fronts, specifically from insufficient food grains, including

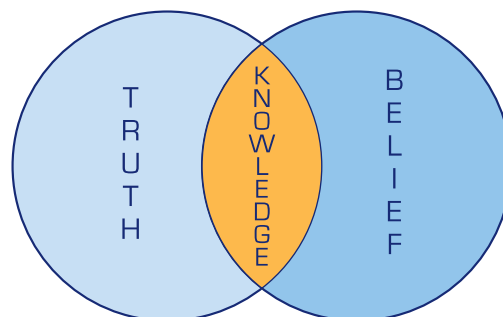


Fig. 1. Knowledge as intersection of Truth and Belief

rice, and lack of money to buy them from open market. They continue to farm their lands using TK. Such traditional methods of cultivation used to give good yields in earlier times. Of late, severe climatic stresses, long periods of drought and untimely rains causing floods have become regular. Farmers reaping productive harvests became irregular and few. A small land base, low agricultural productivity and low income drove tribal farmers to moneylenders, trapping them in a vicious circle of exploitation. Consequent social discontent and unrest provide fertile ground for continuing poverty. They continued to battle poverty, for example, with the meagre wages they earn through off season, non-farm work like construction labour. Some of them whose lands had irrigation sources took up cultivation of High Yielding Varieties (HYV). Though inadequate, some money was earned through buy-back procurement facilities offered by the Government. But continued chemical fertilization and chemical control of insect/pests started telling on their once-fertile soils. This got compounded by poor management of their lands amidst natural calamities like flood, drought and cyclone. The consequent negative impact on conservation resulted in accelerated depletion of LRs.

Yet tribal people keep unstinted faith in their tradition. They continue to use specific LRs of rice for family rites, festivals or religious functions. Despite poverty, they continue to raise small quantities of such LRs in their backyard. This is one basic avenue by which precious LRs of rice are still conserved (Table 1). But LRs, in general, are dwindling in number, threatening agrobiodiversity in those areas.

Table 1. Some valuable LRs conserved by tribal farmers of Orissa

Rice Variety	Predominant Quality	Important for	Maturity (Month)
Kalakrishna	Scented	All festivals	January
Tulsi	Scented	Chaitra Parva	April
Machchakanta	White slender, short grains, good taste	Manabasa and Lakshmi Puja	November
Mer	Black grains with medicinal properties	Annual ceremony of forefathers	November
Haladichudi	White slender, long grains, good taste	Shakti Puja	December
Deulabhoga	Bold, short grains, mild scented	Temple deities worship	December

Source: V. Arunachalam, 2001

1.2 Tribal Population in the State of Orissa

The tribal population in India consists largely of scheduled tribes and scheduled castes. More than half the 697 notified scheduled tribe populations in India are concentrated in the states of Madhya Pradesh, Chattisgarh, Maharashtra, Orissa, Jharkhand and Gujarat. The largest number of scheduled tribes, 61, lives in Orissa; in addition, a high percent of the tribal population (52%) fall below the poverty line (For a list of tribes, see Annexure 1). The 2001 census shows low social, economic and prosperity indicators for people below the poverty line. Therefore, livelihood-generating activities within their own areas and based on locally available resources must take priority (Government of India Census, 2001).

Koraput, Bolangir and Kalahandi are three districts of Orissa with a high tribal population and low literacy (Box 1). According to the estimates of the 55th round of the National Sample Survey conducted in 1999 - 2000, the incidence of rural poverty was high, at 87.14%. The three districts have therefore been rightly classified as poverty-syndrome districts. But in those districts, respect to tradition and ancestral knowledge is quite high. Rice is the staple food of the people, who prefer LRs for consumption because of its cooking properties and taste. They also grow traditional varieties of other crops, like millets, sorghum and groundnut. They have good knowledge of LRs, for they have been associated with cultivation of LRs for many years. They pass on this knowledge on agro-diversity and cultivation practices to their family and others as a tradition. Yet this knowledge-base is not opaque; it gets profoundly influenced and improved by their interaction with nature and environment. Their knowledge would consolidate and widen if the science behind the tradition were to be explained to them in a way that they can comprehend. It would pave the way for further intervention to improve their lot. Their participation in such initiatives would serve to sharpen their knowledge.

BOX 1

Tribes in India

It is a nebulous task to define tribes of India precisely. Madhava Menon et al. (1996) described the tribe as 'a social group with territorial affiliation; endogamous, with no specialization of functions with respect to tribal leaders, hereditary or otherwise; united in language or dialect; recognizing social distance from other caste structures; following tribal traditions, beliefs, and customs, illiberal of naturalization of ideas from alien sources; and above all, conscious of a homogeneity of ethnic and territorial integration'. Marker traits can hardly be found to identify various tribal populations. Yet a number of characteristics like language, social organisation, religious affiliation, economic patterns and geographic location are used for identification.

The tribes of Orissa have high socio-cultural similarities that characterize the concept of tribalism. They lived outside the realm of development of Indian civilization for centuries, a reason why they possess ancient cultural features. They live in remote hilly regions and speak a language of their own.

Most tribal habitats of Orissa are endowed with eco-specific traits, cultures and customs. Despite speaking a variety of languages, tribal people preserve their social customs and values, and continue to have close association with Mother Nature. Rich folk songs and dances, art (including tattoo), craft and music specify their tribal culture.

Tribes tend to form self-sufficient economic units. Often they practise swidden farming—clearing a field by slash-and-burn methods, planting it for a number of seasons, and then abandoning it for a lengthy fallow period—rather than the intensive farming. Cash crops, such as cotton or castor grown in tribal villages in fertile soils are of high quality. Nontribal traders nearby buy such produce for a cheap price and make huge profits in their areas. To maintain the supply chain, they lend money to tribal farmers at exorbitant interest. When the farmers face continuous aberrant weather and production loss, they become economically vulnerable. Such situations lead to proliferation of poverty.

Several tribes living in villages or settlements near the periphery of forests use forest resources for their food, fuel and general livelihood. Government policies on forest reserves have impacted such tribal livelihood adversely.

The tribal economy is subsistence-oriented, based mainly on collecting, hunting, and fishing.

Most of the tribes of Orissa practise agriculture in some form or the other, and others have a vital stake in agriculture. They have formulated rituals before every operation like sowing and planting. They also follow a strict time table and do the operations in a particular month and day. Sometimes this proves to be a mismatch with the fluctuating weather.



In our study, the sampled farmers belonged to Bhumia, Paroja, Gadaba, Domb, Kandha and Rana tribes. We describe below in a few lines the tribes, Bhumia, Paroja and Gadaba and two other popular ones, Bonda and Juang as illustrative examples.



Bhumia tribes are common in Koraput, including Jeypore, Phulbani, Gangam and Sundergarh districts. They choose a person as the head of the village known as `Mukhia` who takes charge of administration and control. Bhumias are credited with ardent participation and remarkable contribution to the freedom struggle. Fairs and festivals occupy a place of high importance to them.



Paroja tribes have developed a cultural and social heritage that they preserve against external influences. They live in many regions of the state including Jeypore. Paroja is also called by

different names: Paraja or Parja. Parojas live together and maintain cordial relations. Both male and female wear colourful dresses. The beauty of the women stands out by the beautiful ornaments including nose rings and hair clips they wear.

Gadaba or Gadava, as it is originally called, are a primitive tribe classified as mundari or Kolarian on linguistic grounds. Gadava, literally means a person who carries loads on his/her shoulders. They speak a mundari dialect, called Gadava after a tribal name. They are a tribe of agriculturists, labourers and hunters. Gadavas in the hills are also employed as bearers of palanquins. This tribe is found Malkangiri and also in Koraput, Kalahandi, Sundergarh, Gangam, Sampalpur, and Boudh Phulbani districts of Orissa. They like to marry within their relations. Cultivation and cattle rearing is the means of their livelihood.



The Bondo tribals are another important tribe who live in villages situated on hill-tops or hill slopes with forest all around. Each house is constructed by the family members themselves and properly maintained.



Both men and women use scanty clothes, covering the lower part of the body in full and the upper part partially. They are fond of ornaments irrespective of sex and age. They largely depend on the forest for food, fuel, fodder and construction material. From being primary food gatherers, they have taken slowly to agriculture. They practise both shifting and settled cultivation.



Another significant tribe living in villages mostly on the plains is the Juang. Their language, an individual dialect, highly influenced by Orissa, has incorporated several Oriya words. Therefore, the Juang people can converse with each other in fluent Oriya. They retain their originality and ethnicity. They practice both 'settled' and shifting cultivation within their defined land boundaries. Apart from cultivation, they also engage in weaving, tailoring, etc.



Sources

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1.3 Participation

Participation has been looked at from different angles in published literature. It has been explained as the process of 'equitable and active involvement of all stakeholders in planning, implementation, monitoring, evaluation and analysis of development activities'. It is also seen as an iterative process, implying that participation is dynamic. Varying in range from participating in simple consultations to joint decision-making to self-management it is an important step to identify the values and needs of different stakeholders, especially those usually excluded from decision-making. Participation would make local knowledge available and ensure that interventions improved the lives of stakeholders as they wished without major disturbance to their ways of life. (<http://www.worldwildlife.org/bsp/publications/africa/biome/participation.pdf>).

A number of case studies have observed that participation and experience would positively contribute to knowledge among participants. For instance, a study conducted in the state of Karnataka during 2005 - 2006 on sustainable cultivation in sugarcane revealed that among 17 variables studied, farming participation and experience, management orientation and achievement motivation contributed positively to the knowledge of respondents (Maraddi et al., 2007).

In another study, a group of farmers were given training on breeding rice and vegetables over several years in a Participatory Plant Breeding - Farmer Field School programme. More than ten groups of farmer-plant breeders were formed and spread in the whole region. The programmes opened farmers' minds, stimulated their curiosity, enhanced their creativity and enriched their knowledge and practices in managing the ecosystem (Winarto and Ardianto, 2007).

The environment department of the Government of Maharashtra in a study on 'Living with risk in urban habitats', reported that participation by people within local environments educated them about their environment and improved their knowledge of disaster risk as well as providing the measures necessary for disaster and risk management ([http://envis.maharashtra.gov.in/envis_data/newsletter/August/ Living with risk in urban habitats](http://envis.maharashtra.gov.in/envis_data/newsletter/August/Living%20with%20risk%20in%20urban%20habitats)).

Small-scale farmers were found to be part of the knowledge generation, validation and spread processes when they tried out a wider basket of options integrating what they knew. Such activities restored their confidence, sense of valid questioning, choosing sensible alternatives, making sound decisions and their capacity to face new situations (LEIS INDIA, 2006). Another intervention recorded that participatory facilitation of GIS was of great value in enhancing local knowledge and its use (Minang and Mccall, 2006). Berkes et al. (2000) observed that a diversity of local or traditional practices for ecosystem management, such as multiple species

management, resource rotation and other ways of responding to ecological surprises, provided social mechanisms that included a number of adaptations for the generation, accumulation and transmission of knowledge.

All such studies thus confirm that participation would definitely improve the knowledge of participants.

Varying levels of participation and their implications are elegantly described in the literature (See Annexure 2). Seven types of participation have been projected five of which are driven by pre-conceived ideas, priorities and action plans. In all of them, people do participate but remain passive participants, modulating those pre-conceived ideas but unable, in the true sense, to voice their crucial priorities or work on them. For example, in 'participation for material incentives', farmers who received them would suspend concurrently necessary and expected action with the withdrawal of incentives. Such participation fails to achieve sustained implementation of welfare measures and remains a futile, theoretical exercise. On the other hand, the interactive participation of scientists and people is mutually reinforcing. It enables participants to examine and prioritize problems in the light of the programme log frame. It helps to plan people-consonant strategies that can be undertaken by the people themselves. In the process of discussing problems and feasible solutions, both scientists and people come to learn of little-known and action-starved areas for potential intervention (including diverse natural resources, ecologies of habitats, factors that negatively impact location-specific bio-resources carrying novel and rare characteristics). When attended to, real benefit accrues to the people. It is important to search for feasible solutions to such problems through pilot participatory studies that can help both people and scientists to consolidate their capacity for comprehension and absorb new knowledge. Self-mobilization (See Annexure 2), which culminates in fruitful and efficient utilization of knowledge towards a secure livelihood, is reported to be the most important type of participation.

MSSRF has been concerned with providing a secure livelihood to the poor and particularly the tribal people of Orissa. It has chronicled natural resources like rice in tribal areas in the Koraput district. In 1998, the Swiss Agency for Development and Cooperation (SDC) funded MSSRF to work on biodiversity conservation (especially rice), its effective utilization and enhancement of equitable benefit to the people. Improving grain yields of rice in farmers' fields was a crucial need highlighted by farmers. Participatory Plant Breeding (PPB) as a scientific tool was considered appropriate to meet the need. PPB is usually implemented by scientists in such cases across the globe by breeding high yielding strains using local varieties of rice and testing their adaptation and farmers' preference in farmers' fields. Participation by people is enlisted only in the course of testing. In a way, this participatory process is restricted to using farmers' fields as test sites. Such a procedure has been in vogue in India in the popular 'All India

Coordinated Trials' for releasing any newly bred variety. In Jeypore, PPB was practised with the total participation of farmers and scientists in every step of development (more details in § 2.2.1).

Likewise, in Kalahandi district, emphasis was on awareness to people of entitlements provided by the Government and ways of their beneficial utilization. Help was extended to establish relevant institutions that could benefit under- and unprivileged people. In those developmental processes, MSSRF involved people in the awareness and training programmes (more details in § 2.2.2).

It is then fair to hypothesize that participation by people in development programmes could consolidate and expand their knowledge. The study reported here has incorporated a carefully developed questionnaire eliciting the current knowledge of tribal people and also those stemming out of the participatory interventions, participatory breeding and participatory training and awareness. We present in the following pages the results of the analysis of this survey.