Working Paper No. 81
January, 2010

# Local Knowledge and Agricultural Sustainability: A Case Study of Pradhan Tribe in Adilabad District

K. Anil Kumar

CENTRE FOR ECONOMIC AND SOCIAL STUDIES
Begumpet, Hyderabad-500016

# Local Knowledge and Agricultural Sustainability: A Case Study of Pradhan Tribe in Adilabad District

**K. Anil Kumar**


## ABSTRACT

For centuries, farmers have planned agricultural production and conserved natural resources by adopting indigenous knowledge. The development of indigenous knowledge systems, including management of natural environment, has been a matter of survival to the people who generated these systems. With the rapid environmental, social, economic and political changes occurring in many areas inhabited by indigenous people, comes the danger that the indigenous knowledge they possess will be overwhelmed and lost forever. Tribals in developing societies have evolved location-specific knowledge gained through close interaction within natural and physical environments and cultural adaptation, which are now recognized to be more eco-friendly and sustainable. Up to the 1980s, these tribal farmers were considered laggards. These days however, the increasing attention and scientific research have made it possible to recognize such farmers as innovators, based on their unique practices in the field of sustainable agriculture.

In this backdrop, the study aims at understanding the importance of such farmers' knowledge and role in sustainable agriculture among the Pradhan Tribe in Adilabad District. The paper presents some empirical data from the Pradhan Tribe of Andhra Pradesh which highlights the community's indigenous agricultural knowledge and the changes over time. These custodians of indigenous knowledge and world view practices play a very important role in agricultural development. They have evolved and adopted several mechanisms for land, soil and crop management including natural pest control. The study was conducted in the year 2008 at different times. The Pradhans are still subsistence farmers, who primarily depend on agriculture. Subsistence economy and food security of the Pradhans depends mainly on cultivation in the fields and kitchen gardens. They cultivate pulses such as turichi dhar (red gram) and mungachi ghar; vegetables such as beans, tomato and pumpkin; and millets such as jowar, in the fields for consumption. The study concludes by recommending that indigenous knowledge and practices are useful for sustenance. Before such precious knowledge gets lost, it would be wise to protect and promote indigenous knowledge and wisdom widely for self sustenance in order to reduce poverty and hunger among indigenous people.

**Acknowledgements**

This paper is based on an ongoing project titled "Indigenous Environmental Knowledge and Sustainable Development", under plan project of Centre for Economic and Social Studies funded by Foundation for Rural Development. The author gratefully acknowledges this support. An earlier version of this paper was presented at 4th Inter-Congress of Indian National Confederation and Academy of Anthropologist (INCAA) during February 21-23, 2009, organized by Dept of Anthropologist, University of Hyderabad. Theme of the Seminar was "Anthropology in India: Current Epistomology and Future Challenges". I am thankful to the organizing committee Members of the seminar for giving me the opportunity to present the paper. I am thankful to all the participants for their valuable comments. My sincere thanks to Prof. K. K. Misra, Prof. N. Sudhakar Rao, Prof. P. Venkata Rao, Prof. R. Siva Prasad, and Dr. M. Romesh Singh seminar Panal members for giving their significant comments during the presentation. My sincere thanks are due to Dr. VNVK Sastry ex Director TCR&TI who was discussant of the paper in the Seminar. I thank for his detailed comments on the paper. Last but not least I am thankful to Rajakumari Kandukuri for editing this paper.

# Local Knowledge and Agricultural Sustainability: A Case Study of Pradhan Tribe in Adilabad District

K. Anil Kumar*

## Introduction

Traditional agriculture is believed to have been sustainable. This stimulates conservationists to analyze and, if possible, benefit from the wisdom of indigenous knowledge; at least what has remained from it or can still be remembered by local people. The reason for such a search is clear: world population is steadily increasing; poverty is growing and natural resources are degrading (Barkin, 1995). Some 550 millions of the 1,370 million hectares of global arable lands have suffered degradation as a result of non-sustainable cultivation (GLASOD, 1991; DCID, 1993).

The Green Revolution technologies, which partly solved the problem of food and fibre needs, appeared to be too expensive, as the costs of technology transfer, soil erosion and loss of plant genetic materials that were resistant to diseases are high (Davis and Ebbe, 1993). Traditional agriculture, as it was originally applied, can neither be fully resumed nor would it satisfy the food needs of the increasing world population. It is however useful to preserve and mobilize local knowledge, which reflects expertise in and understanding of the environmental aspects gained over thousands of years.

About 8 percent of the Indian population belongs to a category listed as "Scheduled Tribes" enumerated in the Schedule to Article 342 of the Constitution of India. Tribal people have been seen to be strongly associated with the forests, hills and remote areas, practicing a unique lifestyle, having a unique set of cultural and religious beliefs. Central Indian tribal homelands, comprising roughly 100 districts and running across the belly of the country, are home to roughly 55 million tribal people - more than 70 percent of

* K. Anil Kumar is an Assistant Professor of Anthropology at Centre for Economic and Social Studies, Hyderabad. Email: anilonline1@rediffmail.com

India's tribal population. Notwithstanding the rich vegetation and good rainfall, this belt is home to one of the largest concentrations of rural poverty in the world.

The Eastern Ghats is one of the major natural resource bases of India and is the homeland of about more than 60 tribal communities with a population of over 11.5 million. The north-eastern Ghats, covering Andhra Pradesh, western and southern Orissa and Chhattisgarh, is the homeland of about 6.5 millions tribes, representing 45 ethnic communities from 3 racial and 4 linguistic groups. Most of these tribal groups (80%) live in inaccessible mountain valleys, hill tops and in plain forest areas with diverse lifestyles and eco-cultural practices, based on their belief in nature, world view and indigenous knowledge. For millennia, tribal communities have lived in forests and survived on hunting and gathering. The tribal economy is subsistence economy, which is mostly agro-forest-based. While agriculture and animal husbandry are the major economic basis for land-owning families, animal husbandry and collection of minor forest products, herbs and non-timber products are the major income sources for marginalized and landless families. However, with growing population and resource pressure, the region is now witnessing a rise in livelihoods based on settled farming.

Third world agriculture is characterized by fragile and difficult environments (Chambers *et al.,* 1989). According to the Brundtland Commission's categorization of agricultural systems (WCED, 1987), three systems are recognized: First, *Industrial Agriculture*, characterized by large farm units, high capitalization, high input-independent and often times, subsidies-supported; second, *Green Revolution Agriculture*, characterized by a mixture of small and large farms which exploit high-yielding varieties with complementary inputs; and third, *Low Resource or Resource-Poor Agriculture*, characterized by small farm units, fragile soils, rain dependency and minimum inputs. Indian tribal agriculture belongs to the third category.

Tribals in developing societies have evolved location-specific local knowledge gained through close interaction within natural and physical environments and cultural adaptation, which are now recognized to be more eco-friendly and sustainable. Up to the 1980s, these tribal farmers were considered laggards. These days however, the increasing attention and scientific research have made it possible to recognize such farmers as innovators based on their unique practices in the field of sustainable agriculture. To examine the importance of such farmers' knowledge and role in sustainable agriculture, the study was conducted in a purposively selected village of Pradhan Tribes in the Adilabad District, Andhra Pradesh, India.

**Traditional Knowledge and Sustainable Development Concept**

The adjectival word "indigenous" means "belonging to a place, native" (Oxford English Dictionary). Thus Indigenous Knowledge (IK) can be defined as a corpus of knowledge belonging to a particular geographical area. Native knowledge, traditional knowledge, cultural knowledge and civilization knowledge are synonymous terms. It is unique to a given culture, society or a country. "It is seen to contrast with knowledge generated within the international system of universities, research institutions and private firms" (IK papers, 2005). According to Grenier (1998), IK is "unique, traditional and local knowledge existing within and developed around specific conditions of women and men indigenous to particular geographic area". It is stated that "indigenous knowledge system is a cumulative body of knowledge and belief, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment" (Kumaran, Dissanayake and Norbert, 2007, P. 2).

One of the salient features of IK is that it is a knowledge developed by tribal or rural communities living in a particular geographic location. These early tribal groups are generally referred to as aboriginal people. However, the term IK does not refer only to the knowledge of aboriginal people. Nakata (2002) states the notion that IK refers to indigenous people's knowledge does not reflect the current usage of the term. According to him, "indigenous people's knowledge could be considered a subset of what is more broadly referred to as 'indigenous knowledge'" As any other knowledge system, IK is also not static and limited only to that particular area where it is originated. It can be observed that IK produced in one particular area or country has transmitted to other areas or countries through travellers and traders. Another important characteristic is that IK is passed down from generation to generation mostly by the word of mouth and to a lesser extent through writing. It is basically an oral tradition.

"Traditional knowledge" and "sustainable development" are contested terms, with widely varying definitions and interpretations. Traditional Knowledge (TK) or other synonymous terms such as indigenous knowledge and local knowledge generally refer to the long-standing information, wisdom, traditions and practices of certain indigenous people or local communities. In many cases, traditional knowledge has been orally passed for generations from person to person. Some forms of traditional knowledge are expressed through stories, legends, folklore, rituals, songs, art, and even laws. Other forms of traditional knowledge are often expressed through different means. One distinction that is often made between TK and modern or "western" knowledge is that unlike the latter, TK does not separate "secular" or "rational" knowledge from spiritual knowledge, intuitions and wisdom. It is often embedded in a cosmology, and the

distinction between "intangible" knowledge and physical things is often blurred. Indeed, holders of TK often claim that their knowledge cannot be divorced from the natural and cultural context within which it has arisen, including their traditional lands and resources, and their kinship and community relations. It is important to emphasize that TK is not, as often perceived, a static phenomenon, but one that is constantly evolving with changes in the internal and external environment of the community concerned.

There are several definitions of the term Indigenous/local knowledge. Some authors use just one part of the sentence: Indigenous knowledge or local knowledge (Dei et al 2000, Semali & Kincheloe 1999). Others used the combined form: Indigenous/local knowledge (Flora 1992, Kloppenburg 1991, Warren et al 1995, among others). In this paper, I will use the combined term indigenous/local knowledge. There is no standard definition of indigenous knowledge (IK). However, there is a general, understanding as to what constitutes IK. Broadly, it is variously regarded as ethno-science, folk knowledge, traditional knowledge, local knowledge, people's knowledge, among others. Warren (1987) defined IK as a local knowledge that is unique to a given culture or society. According to Rajasekaran (1993), IK is the systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments and intimate understanding of the environment in a given culture. Furthermore as Maurial states "Indigenous knowledge is *local* because it is the result of the quotidian interactions in indigenous people's territories" (1999:63); or in Dei et al.'s words, "indigenous knowledges are those acquired by local peoples through daily experience" (2000:19). To Haverkort and de Zeeuw (1992), IK is the actual knowledge of a given population that reflects the experiences based on traditions and includes more recent experiences with modern technologies. It is also described as a non-conventional body of knowledge that deals with some aspects of the theory, but more of the beliefs, practices and technologies developed without direct inputs from the modern, formal, scientific establishment; in this case, towards the management of farms (Chambers *et al.,* 1989; Gilbert *et al.,* 1980). IK has, therefore, evolved through "unintended experimentation", fortuitous mistakes and natural selection by farmers, and arises from the practical judgement and skill needed to survive in a fragile soil system (Aina, 1998; Moss, 1988) by a number of environmental challenges (Adedipe, 1983; Adedipe, 1984). What is clear from all of these perspectives is that, over centuries, farmers are knowledgeable about their resources and the environment in-so-far as these govern their farming practices, and cultural heritage.

The indigenous communities played an important role in generating knowledge based on the understanding of their environment, devising mechanisms to conserve and sustain their natural resources and establishing community-based organization that serve as a

forum for identifying problems and dealing with them through local-level experimentation, innovation and exchange of information with other societies (Warren, 1992). Observation of nature and through elementary reasoning based on such observation, the communities have accumulated a store of working knowledge concerning the effects of certain elementary mechanical processes, the apparent movements and functions of some of the heavenly bodies, the habits and haunts of animals and birds, the properties of plants, fruits and flowers, barn and roots, the nature and qualities of different kinds of soils and variations of weather (Roy, 1928). Indigenous knowledge is historically constituted (emic) knowledge instrumental in the long-term adaptation of human groups to the biophysical environment (Purecell, 1998).

Kloppenburg remarks that local knowledge is the "knowledge contained in the heads of farmers and agricultural workers"(1991: 520). Flora draws the relation of indigenous knowledge to the development of technologies: "Part of indigenous knowledge consists of technologies developed over decades of adjusting farming systems to local agro-climatic and social conditions. And in some circumstances, local knowledge also consists of knowing how to keep conditions of productivity over the long run, rather than maximizing productivity in years of optimal conditions" (1992:94). In Semali & Kincheloe's words "Indigenous knowledge reflects the dynamic way in which the residents of an area have come to understand themselves in relationship to their natural environment and how they organize that folk knowledge of flora and fauna, cultural beliefs, and history to enhance their lives" (1999:3).

The term "Sustainable Development" (SD) first came to vogue in the report of the World Commission on Environment and Development, *Our Common Future.* It was defined as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs". Many limitations of this definition have been pointed out, including that it is predominantly anthropomorphic (focusing only on how development should sustain human needs, and not considering the needs of other species), that it does not adequately take equity into account, and that it is in this form not possible to operationalise. A more detailed definition is that it is a collection of methods to create and sustain development which seeks to relieve poverty, create equitable standards of living, satisfy the basic needs of all people, and establish sustainable political practices, while ensuring that there are no irreversible damages to natural resources and nature. Whatever the definition, countries and communities realize that SD can be operationalised only through a set of indicators and criteria for assessing the impact of development processes and projects. Following up from a number of international conferences and treaties on the subject, several countries have begun to use these to gauge whether they are on the path of sustainability (e.g., for United Kingdom, see http://www.sustainable-development.gov.uk).

The backbone of a tribal subsistence-based economy is agriculture. On the basis of topography, agro-ecology and their racial and cultural backgrounds, tribals have adopted diverse (sometimes area and community specific) agricultural practices with their time-tested indigenous knowledge and technologies, and have integrated several related world view (spiritual) practices. The community living in the study village possesses knowledge about agriculture, pest management, soil fertilization, multiple cropping pattern, food preparation and so forth. They recognize both natural and super natural forces and agencies shaping human destiny and seek to utilize them for their benefits according to their needs. The paper presents some empirical data from the Pradhan Tribe of Andhra Pradesh which highlights the community's local agricultural knowledge. These are generated in the immediate context of the livelihood of the people; it is a dynamic entity that undergoes constant modification as the needs of the communities change.

**Traditional Agricultural Knowledge**

Interplay between biological variation and selection make crop and natural evolution similar to one another, but the two differ by virtue of the role of "conscious" selection by humans in crop evolution. Conscious selection implies knowledge systems about the crop and its environment, which are subsets of the more general traditional knowledge and indigenous knowledge (e.g., Ellen et al. 2000). While "traditional knowledge" and "indigenous knowledge" are not synonymous, they share many attributes, such as being unwritten, customary, pragmatic, experiential, and holistic. The terms are frequently used in the same context to distinguish the knowledge of traditional and indigenous communities from other types of knowledge, such as the knowledge of scientific and industrial communities (Ellen et al. 2000). Indeed, the primary distinction between traditional and indigenous knowledge pertains to the holders rather than the knowledge *per se*. Traditional knowledge is a broader category that includes indigenous knowledge as a type of traditional knowledge held by indigenous communities (Mugabe 1999). While traditional knowledge has emerged in international discourse on new legal mechanisms (Wendland 2002), indigenous knowledge is a term long in use by anthropologists and other investigators of non-industrialized societies (Ellen et al. 2000), and because of this history, indigenous knowledge enjoys a more elaborated discussion and definition than the more inclusive term. While Kongolo (2001, 357) observes that "(t) traditional knowledge is rarely defined within the national, regional, and international frameworks," indigenous knowledge has been extensively analyzed by ethnobotanists and others (e.g., Berlin 1992), so it behooves us to utilize the analysis of indigenous knowledge to grapple with traditional knowledge.

Traditional knowledge is associated with folk nomenclatures and taxonomies of plants (Berlin 1992) and the environment (Ellen et al. 2000) and in practical domains such as

disease etiology (Berlin and Berlin 1996), and agricultural practices (Brush 1992). Distinguishing between indigenous knowledge and other knowledge systems has proven to be problematic (Agrawal 1995), but anthropologists and others have argued that a number of criteria can be used to differentiate the two forms. Indigenous knowledge's characteristics include (1) localness, (2) oral transmission, (3) origin in practical experience, (4) emphasis on the empirical rather than theoretical, (5) repetitiveness, (6) changeability, (7) being widely shared, (8) fragmentary distribution, (9) orientation to practical performance, and (10) holism (Ellen and Harris 2000).

*These same characteristics apply to traditional knowledge.*

The primary development of crops and cropping systems occurred with traditional knowledge before the relatively recent discoveries of agricultural chemistry and crop biology, and most of the world's farmers still rely on traditional knowledge. The current hyperbolic growth of agricultural production may rely on formal science, but it is built on foundations developed by traditional farmers. While the accomplishments of traditional knowledge are unquestioned, its characteristics pose severe obstacles for its valuation and protection by indigenous people and outside interests such as conservationists, indigenous rights activists, and rural development agencies. Indeed, outside efforts to value, promote, and protect traditional knowledge appear inevitably to distort it and its social context (Dove 1996).

A severe obstacle to valuation and protection is the disarticulation of different types of knowledge when that information is local, orally transmitted, practical, and fragmentary in distribution. Agricultural knowledge is comprised of numerous substantive domains - soil types, pests, pathogens, environmental conditions such as rainfall and temperature patterns, and crop genotypes – as well as management domains – irrigation techniques, soil amendments, planting patterns, pest control, weed control, and, crop selection to name a few. Brookfield (2001) adds organization as a third domain that includes tenure arrangements, resource allocation, and dependency on alternative production spheres. These domains are demarcated by distinct lexicons and nomenclatures such as crop variety names or terminology for management practices. Traditional knowledge is rife with "covert categories" (Berlin 1992) and unlabeled, intermediate domains (Brush 1992) that may link substantive and management domains but require intensive research to understand.

The fact that traditional knowledge is orally transmitted and changeable creates problems in identifying truly local and autochthonous knowledge (Dove 2000). The fact that traditional knowledge is local, empirical, and holistic suggests that indigenous people don't have to worry about consistency over wider areas, as plant collectors and geneticists

must. Since variety names are orally transmitted, repetitive, widely shared, and fragmentary, name lists cannot be used directly to estimate genetic diversity or population structure above the farm level (Quiros et al. 1990). Capturing the knowledge in a single domain by collecting its nomenclature, such as crop variety names, is relatively easy but of limited use. Linking nomenclatures of substantive domains to one another and to management domains is complicated by the inherent qualities of localness, oral transmission, and fragmented distribution. The best studies showing linkage between different domains (e.g., crop diversity and local ecological conditions) are executed in single communities or micro-regions (e.g., Bellon and Taylor 1993). Linking multiple domains, such as crop type, soils, and plant diseases, or showing how domains are linked across regions is daunting and generally not attempted in research on traditional agricultural systems.

Awareness of indigenous/local knowledge (IK/ LK) has been steadily gaining ground in the academic world, both within the social as well as in the natural sciences. "A growing number of scientists and policy makers are aware of the contribution indigenous knowledge (IK) can make to a more sustainable development" (Viergever 1999: 341). IK also seems to be relevant to the scientific world for a number of reasons including issues of protection of biodiversity (Iwanaga 1998), the effects of Intellectual Property Rights (IPR) over the rural communities (RAFI 2000, RAFI/ UNDP 1995), and the fact that IK could be used as the starting point in the construction of a truly alternative agriculture (Flora 1992, Kloppenburg 1991). Due to these reasons, research and development institutions (R&D) started to include in their agendas not only the term, but also all its implications.

Some centers have become involved in looking at IK as a key component of sustainable agricultural practices; others have been in charge of researching and cataloguing existing IK. The Center for Indigenous Knowledge for Agriculture and Rural Development (CIKARD), established in 1987 at Iowa State University, is an example of the latter. CIKARD "focuses its activities on documenting and preserving the indigenous knowledge of farmers and other rural people around the globe" (Warren and McKiernan 1995:426). Inside of the Consultative Group on International Agricultural Research Centers (CGIAR), the incorporation of local/indigenous knowledge in the generation of technology started when some technologists from the International Potato Center (CIP) in Peru, worked with local farmers to develop storage technologies for potato seed (Fujisaka 1995). IUCN (The World Conservation Union) "concludes that indigenous people who live in intimate contact with their major resources could provide much of the intellectual raw material for a shift to sustainable societies" (McNeely 1995:448). This "raw material" cited by McNeely is nothing different than indigenous knowledge,

the knowledge resulting from the co evolution -"intimate contact" in the author's words- between human beings and their resources.

Some authors remark that it is important to pay attention to the fact that: "Actually existing science is bound to capitalism ideologically, epistemologically and financially" (Kloppenburg 1992:104). This "science" bound to capitalism in different forms could threaten the survival of the local/indigenous knowledge. In this paper, i will use the definition of indigenous knowledge as the knowledge that is inside of the agricultural workers and that is related to a given locality (Kloppenburg 1991, Maurial 1999, Warren and McKiernan 1999). As Viergever (1999:333) states "some of the knowledge held by indigenous peoples may lead to commercial applications." Many authors argue that indigenous/local knowledge is the starting point in the "construction" of an alternative agricultural science. "Material resources for the reconstruction of a "successor science" are to be found in the "local knowledge" that is continually produced and reproduced by farmers and agricultural workers" (Kloppenburg 1991:519). Kloppenburg (1991) also argues that there must be a "deconstructive" process in the "reconstruction" of an alternative science applied to the agricultural process. A truly alternative agriculture "would move farmers into knowledge creators" (Flora 1992:95). In order to achieve a "truly just and sustainable agriculture", it is necessary to recognize that knowledge has multiple sources (Flora 1992, Kloppenburg 1992). Prakash (1999) proposes the "deconstruction" of modern knowledge system or "modern Science" and the inclusion not only of the well known "science for the people" term, but "science by the people" which includes the traditional or indigenous systems of knowledge. Mwadime (1999) devotes attention to terms such as "reconstruction" and "deconstruction" of knowledge. He argues that the only way to curb the crisis in food production in Africa is through the deconstruction of the current "education systems" and the reconstruction including local knowledge systems and farmers in the whole knowledge generation system. In Latin America, biodiversity fairs are evidence that IK not only maintain an important level of biodiversity but assure food security and sustainability of farmers' agriculture (Scurrah et al., 1999).

**Geographical Details**

Adilabad District is the northern-most district of Andhra Pradesh. It is bounded on the North by Yavathmal and Chandrapur districts, East by Chandrapur, West by Nanded District of Maharashtra State and on the South by Nizamabad and Karimnagar districts of Andhra Pradesh. The most important river that flows through this district is the Godavari, which forms the southern boundary of the district. Other important rivers in the district are Penganga, Wardha and Pranahitha. The Kadam and Peddavagu are tributaries of the Godavari. There are rivulets like Santhala, Swarna and Suddavagu

which crisscross the district. The district ranks first in revenue from minerals as it is well endowed with reserves of coal, iron ore, limestone and clay.

According to the 2001 Census, the population of the district is 24,89,437, of which the rural population accounts for 16,00,903 or 76.87%. The district has shown a population growth rate of 27.05% during the last ten years. The population of the SCs and STs is 7,32,432, which is 35.17% of the total population; particularly, the tribals constitute a population of 4,16,511, which accounts for 16.73% of the total population. The male and female ratio is 50.15% and 49.5% respectively and the percentage of literacy in males and females is 29.89% and 7.5% respectively.

Adilabad District is predominantly inhabited by eight different tribal groups with a total population of 4,16,511 spread over 650 villages, with Utnoor as the headquarters for Integrated Tribal Development Agency (ITDA). Table 1 shows the major tribal communities dwelling in the district.

**Table 1: Tribal population in Adilabad District**

| S. No. | Name of the Tribal Community | Population |
|---|---|---|
| 1. | Gonds | 2,08,200 |
| 2. | Lambadas | 79,620 |
| 3. | Kolams | 27,157 |
| 4. | Koyas | 24,140 |
| 5. | Pradhans | 17,850 |
| 6. | Mannes | 10,934 |
| 7. | Aandhs | 6,532 |
| 8. | Thotis | 1,420 |

The total number of workers is 9,34,3365, constituting 44.93% of the total population as against the state average of 45.27%. Out of the total number of main workers, 34.09% are cultivators and 34.88% are agricultural labourers. The literate persons in Adilabad District are 5,78,226, forming 27.8% of the total population as against the state average of 37.8%.

**Climate**

The climate of the district is characterized by hot summers; the climate is generally dry except during the south-west monsoon season. The year may be divided into four seasons: the cold season from December to February, followed by the summer season from March to May; the period from June to September constitutes the south-west monsoon

season, while October and November form the post-monsoon season. The rainfall in the district, in general, increases from the south-west towards the north-east. About 85% of the annual rainfall is received during the south-west monsoon season, i.e., from June to September. July is the peak rainy month. The normal annual rainfall of the district is 1,044.5 mm.

Relative humidity is high during the south-west monsoon season. The air is generally dry during the rest of the year. During the south-west monsoon season the sky is heavily clouded. There is rapid decrease of clouding in the post-monsoon season. During the rest of the year the sky is mostly clear, or slightly clouded. The cold weather commences towards the end of November when the temperature begins to fall rapidly. December is generally the coldest month, with the mean daily maximum temperature at about 29°C and the mean daily minimum temperature is about 15°C. Winds are light to moderate with some strengthening in the period from May to August. The period from March to May is the hottest season with the mean daily maximum temperatures at about 42°C and a mean daily minimum temperature at about 28°C. The days are intensively hot and on individual days the temperature may go up to about 46°C; the lowest recorded temperature is about 8.3°C during December.

**Irrigation and Rivers**

The area irrigated is rather limited although the major rivers like the Godavari, Penganga, Pranahitha and Wardha flow along the borders, while the tributaries such as Kadam, Peddavagu and Santhala flow within the district. The total irrigated area accounts for 11.5% of the total cropped area, while the relative percentage of the state is 37.3%. The main sources of irrigation in the district are canals and tanks. About 35% of the irrigated area is irrigated through canals from Kadam, Swarna, Santhala, Khanapur and Sadarmat, and about 28.3% is irrigated with tanks.

**Forest**

The forest area of the district is about 6,944.5 sq km and forms nearly 43% of the total area. Except in Mudhole, erstwhile *taluk* on the west, the forest is well distributed and the local population gets all its requirements of timber and fodder from the forests. The forests on steep hill slopes are maintained for the protection of the soil and no vegetation is normally exploited. The accessible forests in the plains as well as gentle slopes are under intensive management and are exploited systematically under different silvicultural systems suitable for the locality. The important sericultural systems of forest management followed are selection-cum-improvement, coppice with reserves and clear felling.

### Soils

The soils of the district are predominantly black cotton. Black soils comprise 80%, while red soils comprise 15% and sandy soils comprise 5%. The pH of the soil is normal to alkaline (7.0-8.0). The total amount of soluble salts is within normal range. Organic carbon content of the soil is low to medium. Available phosphorus is low - less than 20 kg per hectare, whereas available potassium is medium to high (more than 300 kg per hectare).

### Agriculture

The geographical area of the district is 40,04,035 acres; and the land use under different types is:

| | |
|---|---|
| Forest: | 42.8% |
| Land put to non-agri uses: | 3.7% |
| Net area sown: | 35.4% |

The net area sown in the district is 35.4% of the total geographical area while for the state the relative percentage is 40.2. The percentage of the area sown more than once to the net area sown in the district is 23%, and it is far below the relative percentage of the state, viz., 15.7%, which speaks of the existing lack of cropping pattern in the district. The southern part of the district consisting of Nirmal, Luxettipet, Khanapur and surrounding mandals are fairly developed agriculturally, owing to the availability of irrigation facilities.

### Cropping Pattern

The major crops grown in the district during *kharif* are cotton, maize, jowar, Soya bean, red gram, and paddy, and those grown during *rabi* are jowar, maize, wheat, paddy, Bengal gram, sesame, sunflower, safflower and groundnut. As shown in Table 2, cotton has been the most widely grown crop in the district. Almost every tribal farmer and other farmers in the plains cultivate cotton during the *kharif* season. A large extent of cotton is cultivated under rainfed conditions. The next important crop in Adilabad is red gram. While jowar is mainly cultivated in hilly areas by tribal farmers, paddy is cultivated in the plains. Over the past five to ten years Soya bean has been grown widely in the district.

### Agro-Ecological Situations:

Adilabad District may be divided into the following six agro-ecological situations:

Table 2: Areas and Estimated Yield of Agriculture Crops for 2002

| S. No. | Crop | Areas Sown in (ha) | Estimated Yields (kg/ha) |
|---|---|---|---|
| 1. | Paddy | 58,641 | 3,852 |
| 2. | Jowar | 39,364 | 1,453 |
| 3. | Maize | 23,433 | 2,545 |
| 4. | Red gram | 40,954 | 330 |
| 5. | Green gram | 15,632 | 210 |
| 6. | Black gram | 19,955 | 548 |
| 7. | Other pulses | 1,265 | 250 |
| 8. | Soya bean | 30612 | 900 |
| 9. | Cotton | 1,68,530 | 650 |
| 10. | Turmeric | 4,555 | 3,000 |
| 11. | Chilli | 3,869 | 2,552 |

**Agro-Ecological Situation-1: Black Cotton Soils-Rainfed-High Rainfall**

Under this situation, the majority of the district's cultivated area is covered with black cotton soils with a high rainfall of 1000 mm and above. The main crops cultivated under this rainfed situation are cotton, Soya bean, jowar, maize, black gram, green gram, red gram in *kharif*; and jowar, coriander and safflower in *rabi*, grown after the pulses in *kharif*. The present study area belongs to this agro-ecological zone. The total number of mandals in this situation are 28 with a cultivable area of 2,89,928 hectares.

**Agro-Ecological Situation-2: Black Cotton Soils-Medium Rainfall**

Under this situation, the type of soil is black cotton with a medium rainfall of 950 to 1000 mm and the cultivation is mostly under rainfed conditions. The major crops covered in *kharif* under rainfed conditions are cotton, black gram, green gram, red gram and Soya bean; and in *rabi* the crops cultivated are jowar and safflower taken up after harvest of black gram and green gram. The total number of mandals in this situation is 24 with a cultivable area of 52,488 hectares.

**Agro-Ecological Situation-3: Red soils-Rainfed-Medium Rainfall**

Under this situation, the soil type is red soil with medium to high rainfall, rainfed conditions are prevailing. The crops grown are maize, jowar, black gram green gram, red gram in *kharif*. In the eastern parts of the district during *rabi*, jowar is cultivated with residual moisture. The total number of mandals in this situation is 27 with a cultivable area of 37,956 hectares.

**Agro-Ecological Situation-4: Irrigation Tanks**

Under this situation, most of the soils are red soils. Tanks are filled by monsoon rains from June to October. Only paddy crop is cultivated under this situation in *Kharif*. *Rabi* paddy is also cultivated under some tanks where the water is sufficient for second crop. The total number of mandals in this situation is 32 with a cultivable area of 17,305 hectares.

**Agro-Ecological Situation-5: Irrigation Canals**

The following are the six irrigation projects existing in the district:

| Name of the Irrigation Project | Cultivable Area (in acres) |
|---|---|
| 1) Sri Ramsagar Project | 34,000 |
| 2) Swarna Project | 8,945 |
| 3) Jurala Project | 8,500 |
| 4) Sathnala Project | 24,000 |
| 5) Vattivagu Project | 24,500 |
| 6) Chelimelavagu Project | 6,060 |
| **Total** | **1,64,005** |

Under this situation, the majority of the soils are red soils. Crops grown are paddy, turmeric and maize. The total number of mandals in this situation is 8 with a cultivable area of 64,131 hectares.

**Agro-Ecological Situation-6: Lift Irrigation- Wells/Bore Wells**

Almost all types of soils are covered under this situation and a wide range of crops are grown such as paddy, jowar, cotton, chilli, maize, turmeric, groundnut, vegetables and other horticultural crops. The total number of mandals in this situation is 25 with a cultivable area of 21,120 hectares (C. Raghava Reddy, 2006).

**The Pradhans**

According to the Ethnologue (Gordon, 2005), the Pardhan People live in four states in India: Andhra Pradesh (Adilabad District), Madhya Pradesh (Seoni, Mandla, Chhindawara, Hoshangabad, Betul, Balaghat, and Jabalpur districts), Maharashtra (Bhandara, Garhchiroli, Nagpur, Wardha, and Yavatmal districts), and Chhattisgarh (Raipur and Bilaspur districts). The majority of the Pradhans are found today in the State of Maharashtra. However, the District of Adilabad is Andhra Pradesh is home to a substantial group of Pradhans. The Ethnologue (Gordon, 2005) classifies Pardhans as Dravidian, South-Central, Gondi-Kui, Gondi language. Other speech varieties listed

in the Gondi group are northern Gondi, southern Gondi, Khirwar, Maria, Dandami Maria, Eastern Muria, Far Western Muria, Western Muria, and Nagarchal.

The Pradhans inhabit the areas of Adilabad District in Andhra Pradesh. The word Pardhan or Pradhan in Sanskrit means "chief minister" or "his agent". Marathi is their native language. Pradhans or Pardhans are traditional bards to Gonds and recite mythologies, folk tales and songs of their Gods and Goddesses at various festivals, ceremonies and fairs for which they are paid in cash or kind. This patron-client relationship comes from generations. The Gonds call them "Patadi" meaning singer or genealogist. Their population according to the 1991 Census is 20,387. The Pradhan community is divided into four *Phratries* and they possess similar clans of Gonds and Kolams community. The four *Phratries* in the Pradhan Tribe are *Sath Deve* (seven deity group), *Saha Deve* (six deity group), *Pach Deve* (five deity group), and *Char Deve* (four deity group). Each *Phratry* is further divided into exogamous clans. Monogamy is highly preferred among the community though polygamy is in vogue. They follow the following six types of procedures for acquiring mates: marriage by negotiations (*Khaja Khobra*); marriage by capture (*Darun Taktna*); marriage by service (*Gharjavai*); marriage by intrusion (*Seewar Java*); marriage by love and elopement (*Darun parala* or *Darun parali*); and marriage by exchange (*Seelad choding*). Widow re-marriage is called "*Pat*" and the widow is to marry younger brother of her deceased husband. If there is no younger brother, she has to marry a man from the same clan of her deceased husband. Divorce is common among the Pardhans and is permitted by the village council, "*Panch*". Inheritance of property is in male line only. If a man dies without male children, his property goes to the nearest kinsman in his male line, i.e., brothers or brother's son. Cross-cousin marriages are customarily celebrated. The economic conditions of Pardhans were linked with those of their Gond patrons in the past. Each Gond community retained one Pardhan family as a traditional bard. The bard is regarded as an emissary of the local deity, and brings blessings to the family he visits. However, the economic ties with the Gond community were gradually disrupted, and now they have become settled cultivators. Their staple food is jowar.

**Methodology**

The study was conducted in Jamni Village of Jainad Mandal. Jamni is located about 22 kilometers from Adilabad Headquarters on the way to Saathnala Project. It has an all-weather motorable road. Adilabad is one such district where the maximum number of Pradhans live. The village selected is a representative village where more than 50% of the population is Pradhans. The method applied for the study was ethnographic approach, an important research tool. A schedule was prepared for collection of data on general information at the household level from the Pradhans inhabiting the village.

The schedule consisted of questions ranging from the family details to cultural practices of the people; the village political system, religious system, economic system, social system and interrelation with the outside world. After the general data, specific data regarding agricultural knowledge was gathered from interviews, focus group discussions and informal discussions with key informants in the village.

The total population of the village is 1,706, out of which 856 are males and 850 are females. In the village, 1,211 people belong to Scheduled Tribes (615 men and 595 women); and 14 people belong to Scheduled Castes (7 men and 7 women).

The life of the Pradhans is sustained almost entirely by the tillage of the soil and thus agricultural activities are deeply embedded in their culture. Cooperation of supernatural forces is considered so essential for the success of agriculture that their energy apart from the one put into cultivation of crops is directed towards appeasing Gods through a complex of rituals. They believe that the fertility of seed grain is reinforced by the blessing of Gods and sprinkled blood of sacrificial animals.

**Land and Agriculture Management Practices**

Land is the basis for agriculture, the main economic activity of the community in the study village. They possess elaborate knowledge on the type of land needed for different types of crops to be grown. The farmers of these village classify agriculture land into three types namely *gairan/veerani/patar*, a light and rocky soil found on the flat hilltops; *bharak/gaargoti/chelkar*, a light soil reddish in colour but finer, found in the plains and in hilly country on the gentle slopes; and *Ryagard/Kanar*, a heavy black soil, popularly known as *Regar*. The main crops grown during the rainy season are jowar (*jawari*), maize (*makai*), red gram (*turi*), horse gram and cotton (*kapus*). Rice (*dhan*) is grown under assured irrigation facilities during the rainy season.

**Cropping Pattern in the Village**

The major crops grown in the village are *kapus* (cotton or *Gossypium spp*.), jawari (jowar or *Sorghum bicolour*), Soya bean (*Glycine max.L.*), turi (red gram or *Cajanus cajan*), makai (maize or *Zea mays*), *mung* (green gram or *Phaseolus vulgaris*), *udiad* (black gram or *Phaseolus mungo*) and *tir* (til or *Seasamum indicum*). Jowar is the staple food of the Pradhans and it is grown exclusively for household consumption. After meeting the household requirement, the remaining crop produce is sold in the market. On an average, their produce of jowar ranges from 6-10 quintals per year. The next important crop grown widely by every farmer is red gram. It is also grown for household consumption and for sale in the market. Red gram is sown along with jowar as a mixed crop. Another crop that is considered the lifeline of the tribal farming is cotton. Cotton has been

grown for the past three to four generations in the area. The rest of the village's cultivable land is used for growing *dhan* (rice or *Oryza sativa)*, *Barbate*, *Harbara* (engal gram), *motel kudatha*, *gavu* (wheat), *dane* (coriander), *rail mouri* (mustard) and vegetables. Some part of the land is left fallow for cattle grazing. Almost every tribal farmer in the village cultivates cotton during *kharif* season. A large extent of cotton is cultivated under rainfed conditions. The next important crop grown is red gram, while jowar is mainly cultivated for subsistence by the farmers. Over the past five to ten years, Soya bean is being grown widely in the village.

About fifty years back the extent of area under different crops used to be as follows: Jowar mixed with red gram used to be grown in 40% of the cultivable area. Cotton used to be grown as a sole crop in about 25% of the area. Rice, green gram and black gram used to be grown in the remaining land. It is important to note that only 2% of the land was used for rice cultivation. Some area used to be left fallow for cattle grazing. It is evident that jowar was a preferred crop than cotton. Food security was the main consideration. Cotton was grown for the little cash it used to earn. Yields of all the crops were low and hence the acreage of jowar also might be higher. As the productivity increased with the usage of better varieties the cropping area under jowar must have come down. This was replaced by cotton.

However, over the years, there has been a considerable change in the cropping pattern. Now, the present cropping pattern centres around crops that fetch money in the market. Cotton with red gram as intercrop is grown in 50% of the total cultivable area. This is a substantial increase (about 100%) in the extent of area cultivated. Soya bean with green gram is grown in 40% of the total area and rest of the crops like jowar and til are grown in only 10% of the total area. It may be surmised from this cropping pattern that cotton has been occupying a prime place in the order of priority of crops among the Pradhans. It is also important to note that Soya bean has been recognised as another important cash crop by the Pradhans and its area of cropping has been on the rise. In fact, some farmers prefer Soya bean to cotton as the former is considered is less risky. At the same time, the area under jowar cultivation has been on the decline.

Jowar is one such crop that has been cultivated since many generations. It is the main staple crop of the community. Now, though cultivated on a less area, jowar still occupies an important place in the choice of crops by the community. In other words, it is considered auspicious as per the tradition to start the sowings in the new season with jowar crop. It is grown along with red gram, green gram or black gram. After every six to seven rows of jowar one row of any gram crop is sown. Presently, the jowar varieties sown are JK-22, Mahyco-9.

When compared to the earlier years, the yield of jowar has been on the decline due to introduction of cash crops such as bt cotton and Soya bean. The small and marginal farmers are still growing jowar without using fertilizers and pesticides. Jowar is sold @Rs.400 per quintal.

In this area, cotton is considered as "white gold" as it fetches much-needed cash. Earlier, it was grown as a single crop. Seeds were purchased from the traders in exchange for jowar from the nearby town, i.e., Adilabad. Fine mud and ash were applied to it before sowing, and it was sown behind the plough. However, the yield was very low, in the range of 1.5 to 2 quintals per acre.

Cultivation of cotton crop was started during the 1960s. At the same time, hybrids such as M-4 of Mahyco company were released and the farmers started using them. It was reported that at the same time, spraying of pesticides and application of fertilizers also started during that time. In 1995, Mahyco-1 variety of cotton was used for sowing. In 2004, they reported good yields in cotton to the extent of 5 quintals per acre. It was also reported that the cost of cultivation also started to rise with the increasing number of sprayings and pest attack. The major pests reported by them are boll worm. In 2005, it was reported that cotton yielded only 1 quintal per acre due to incessant rains. Now they spray pesticides on cotton crop at least 3 times. The pesticides used are monocrotophos and quinalphos. With increasing cost of cultivation and declining yields, the farmers are incurring losses and are landing in debt. Cotton is generally sold at Rs.2,000 per quintal.

Soya bean, which emerged as an important cash crop to the tribals, is being grown since 1993. It was introduced by the government agencies and the farmers were offered 30 kg of seed free of cost along with fertilizers such as DAP and Urea. In 2004, it fetched good yield to the extent of 10 quintals per acre. It was sold at Rs.1,000 per quintal. It was observed that Soya bean is preferred by the farmers because of its short duration, so that they can raise two crops in a year, and the pest infestation is very less compared to the cotton crop. In fact farmers, expressed willingness to replace cotton with Soya bean in future. Presently Soya bean is grown as a mixed crop along with red gram in 40% of the total cultivable area.

Red gram, like jowar, is another important crop for the Pradhans. It is cultivated for household and market purposes. Though red gram has been grown without using fertilizers and pesticides in the past, it has become unavoidable since 1995 due to the damage caused by the Lepidopteran Pests. Farmers have been spraying rogor, monocrotophos, endosulphan, etc., to control these pests. The sprayings are limited to one, or at the most, two. However, it is not as intensive as on cotton. Moreover, farmers

spray pesticides on cotton after using it on the cotton crop. Leftovers are used for spraying.

**Agricultural Implements**

The Pradhans still use simple tools and implements that are easily available for various farm operations. These are either obtained from the market or made with help of local specialists such as carpenters and blacksmiths.

Almost every family has its own collection of agricultural implements and does not depend very much upon others. The number of each type of implements however, varies from family to family according to the landholding size. The larger the landholding, more is the number of implements. The number of ploughs to be yoked to a pair of bullocks possessed by a family is the indication of the size of landholding of the family. At present, it is also observed that some families use power levellers or hire for the preparatory tillage of their fields. Table 3 shows local agricultural implements used by farmers.

**Table 3: Local Agricultural Implements used by Farmers**

| Local Names | English Names | Operation |
|---|---|---|
| *Kuradi* | Axe | Cutting trees |
| *Pawda* | Spade | Collecting soil |
| *Naagar* | Wooden plough | Tillage/ploughing |
| *Vakhar/Dawara/Dundi* | Its like plough (harrow) | Cleaning weeds after ploughing |
| *Sabbal/Kudal* | Crowbar | To dig up the earth |
| *Toapla* | Bamboo basket | Caring goods or grains |
| *Era* | Sickle | Reaping and sowing cotton |
| *Kurpi* | Small sickle | Weeding |
| *Sarata* | Made of hollow bamboo pipe | Sowing cotton |
| *Soup* | Bamboo mat | Threshing |
| *Bailgadi* | Bullock cart | Transportation |
| *Datya* | | Seeding |
| *Tipan* | Sowing harrow | Seeding |
| *Tobni* | Digging stick | Seeding |

The commonly-used implements are plough *(naagar)* used for ploughing the field, crowbar *(sabbal)* used for digging big areas of the field. Sickle *(era)* and hand-axe *(kuradi)*, are utilized for cutting purpose. Spade *(pawda)* is used for gathering the waste. Large bamboo flat fan *(soup)* is used as winnowing fan. A large wooden forked flail is used for threshing. Bullock cart is used for carrying the agricultural produce. For storing the grains they use big bamboo containers (*dola*). All these are common implements which they manufacture themselves with the help of carpenters and blacksmiths. They use different kinds of timbers for manufacturing different implements. The year of the Pradhan calendar includes the following months.

**Pradhans' Months and Corresponding Months of the English Calendar**

| | |
|---|---|
| *Duradi/Durari* | (February-March) |
| *Chaita/Chait* | (March-April) |
| *Bhawe* | (April-May) |
| *Bur Bhawe* | (May-June) |
| *Akadi/Akari* | (June-July) |
| *Pora/Pola* | (July-August) |
| *Akurpok* | (August-September) |
| *Divali* | (September-October) |
| *Kart* | (October-November) |
| *Sati* | (November-December) |
| *Pus* | (December-January) |
| *Mahon* | (January-February) |

The preparation of soil begins in February. On the piece of land where jowar and cotton are grown as main crops, harrowing is done first and the remnants of the old crops are removed from the field. Then small bushes and grass in the field are dug out with a *vakar*. Harrowing is done three times. Cotton sowing is done using *dusa/tisa* with the help of *sarata* (sowing implement) in the second or third week of June after receiving sufficient rains. Two pairs of bullocks are yoked to pull the *dusa* and three pairs are used in the case *tisa*. A man or woman sows the cotton seeds through *sarata*. Jowar is sown either in the last week of June or in the first week of July after cotton sowing has been completed. A *tipan* is used for sowing jowar. *Tipan* is pulled by two pairs of bullocks. Weeding of cotton and jowar is generally done four to five times. Cotton harvest starts in October. Jowar is harvested from November. Cotton is plucked by the women in a week or in a fortnight. Thus, six to eight pluckings of cotton are done in the season. When jowar is ready for harvest, the plants are cut and kept in the

fields for a week or so, for getting completely dry. Then the corns of jowar are taken to the threshing ground. Threshing is done with the help of bullocks or in some cases, the grains of jowar are taken out by the labourers by beating the corns with sticks. After winnowing, the produce is taken home.

**Rituals Associated with Agricultural Activities in the Village Community**

The main agricultural season begins in *Duradi/Durari* (February-March). The stubbles of the previous crops and dry grass are removed with a plough-like implement called v*akur*. Then by using the ordinary plough (*nagar*), the soil is ploughed deeply. Generally, men take up this work while women collect stubbles, rubbish, etc. During the months of *Chaita/Chait* (March-April) and *Bhawe* (April-May) ploughing continues. With the first showers in the month of *Bur Bhawe* (May-June), the feverish activity of sowing starts with grand religious rites. Ritual and sowing are two inseparable acts in the sense that the Pradhans believe that invoking divine power is a must to ensure good yields. Rites associated with sowing are an elaborate affair, which are described briefly here.

On the occasion of first sowing two rites are performed, namely, a sacrifice for the Mother Goddess and a sacrifice for the guardian deity of the village. The Mother Goddess whose sanctuary lies away from the village is offered a grey chicken, millets and seeds that are to be sown in the coming season. The priest of the village, along with a few villagers, carries them to the Goddess. Seeds of all kinds that are to be sown in the season are carried and offered to the deity. The prayer before the deity focuses on good yield without any harm to the farmers from the wild animals and snakes. After the prayer the fowl is sacrificed and cooked alongside millets. The cooked millets and fowl's liver are offered to the altar. The seed grains offered to the deity are collected back and distributed among all the villagers in the evening. This entire ritual is known as *Beej/ Wija*, which means seed.

On the same night, another ritual is performed, which is known as *Iddri/ Widri*, at the sacred posts of the village guardian deity. A heap of millets is offered to the Mother Earth in an act that is interpreted as cleansing the Mother Earth that became unclean with the fire and ashes of the last crop. The seed grain is in turn distributed among the villagers.

In the evening, after this ceremony at the village guardian, six villagers are selected to perform the crucial rights of the night. These six men collect the millet offered by the headman and grind using the stone mill. The millets are cooked at the headman's house and taken to the village deity along with an egg-laying hen. There the hen is sacrificed and cooked. After offering the liver and meat to the deity along with the millet, it is

brought back and eaten by them under a *mahua* tree. The same night, the selected six men collect the seed grains of millet and jowar offered during the *Iddri/Widri* ritual at the sacred post and make as many parcels as the number of households, using a small amount of the seed grain and place the parcel in the roof of each household with great secrecy. The parcel of seeds are collected by the each household the next morning and mixed with the seed that is to be sown in the field. This is treated sacredly as they believe that it brings good yields.

*Mohtir/Mohtur*, the actual first sowing rite, is carried out the next morning. It is done on a community basis. All the men along with their wives, children and other household members go to the nearest fields soon after sunrise. There the cooked millets along with the liver of the sacrificed fowl are offered at the altar made with a heap of millets. The entire family prays together seeking God's help in good fortune. They all eat the cooked millets and liver and start sowing. The head of the family takes a handful of seeds and prays facing the east. Then he throws the seed on the cleared ground. All the members follow this act. Then the men and women cover the seed with tree branches in order to keep off birds. The basket of seed is then packed and taken home.

Immediately after having a ceremonial breakfast, all the men and women move into the fields for actual sowing. After offering sweetened cooked *dal* to the God and departed elders, they take up the task of ploughing. Their prayers are centred upon blessings for good crop and good luck. While the husband ploughs the field the wife follows the plough with seeds which are sown behind the plough. The act of ploughing and sowing is to be done by the husband and wife and not by brother and sister. The act of ploughing is seen as a sexual act and the cooperation of brother and sister amounts to incest. The first sowings are always of jowar crop. The next crop to be sown is cotton.

By the middle of *Sati* (November-December), millets are ready for harvest. The millet is reaped by both men and women. The rite of reaping precedes the actual reaping operation. The rite involves cutting of five ears of jowar and tying them to the threshing pole. A chicken may be sacrificed or cooked food is offered to the Mother Earth and the clan deities for their blessings and help. After all the ears of jowar are reaped, the farmer sacrifices a fowl and drags the bleeding carcass of the fowl around the threshing floor. Then the liver is roasted and offered to the god and the meat is cooked.

The threshing of jowar is accompanied with appropriate rite of praying the gods, particularly, Lakshmi for grain, cattle, earth. Only in case of jowar the rite of threshing floor is performed. In this, the heap of threshed jowar is decorated with implements and offered with sugar and *dal*.

By the end of *Sati* (November-December), even cotton crop gets ready for picking. Cotton is picked and taken to the village and packed in bags or baskets ready for marketing. Traditionally, the farmers maintained their crop varieties by keeping household seed stocks and by obtaining seed through inter-generational and intra- and inter-community exchanges. But now, some of these customary networks have either been disrupted or no longer exist in the community.

Besides crop cultivation the Pradhans maintain home (*saand*) or kitchen gardens (*vangoda*). The Pradhans manage a simple and small farm in homesteads, where various vegetables, such as *tamate* (tomato) *mirchi* (chilli), *vaange* (brinjal), *valache senga* (bean), *bendi* (ladies finger), *karle* (bitter guard), *makai* (maize) and *kakdi* (cucumber) are grown. Waste drainage water from the kitchen is used to start seedlings. Ashes and sweepings from the household and domestic animals' manure are normally spread in the garden. The waste water, ash and animal bedding make the soil around the homestead fertile. It is not surprising that a kitchen garden, though small in total area, is an important part of the overall production system and has successfully been used as an entry point into the enhanced productivity of the farming system. Vegetables grown by the Pradhans in their kitchen garden are *mirchi* (chilli or *Capsicum anum/solanum sp*), *tamate* (tomato or *Lycopercicum esculentum*), *vange* (brinjal), *dhodke* (ridge gourd), bendi (lady finger / *hibiscus esculentus*), *valache senga* (beans or *Dolicus lab lab*), *kaddu* (bottle gourd), *toandrya* (*Coccinia sp*.), *karle* (bitter gourd), *kakdi* (cucumbers), *poapai* (*Carica papaya*/papaya), *nimbu* (lemon), *kohare, varka, valkat, gavaracha shenga, katwal, barbate* and *dane*.

In the study village, most people have vegetable kitchen gardens, where they grow vegetables and fruits, where the size of the garden is very small in size - less than half an acre. These vegetables are used for household consumption and also some of them sold in the market. Generally they grow in the rainy and winter season. The vegetables, which are grown in the garden, are usually sufficient for household consumption.

The Pradhans collect dung (*kaath*) and carry it to their farms. In the first place, the farmers pile up the dung, household garbage and ashes together. When the dung rots, they are the best fertilizers. According to informants, wet dung is more effective than the dry dung because of the fact that the rain makes the dung to drip on the land. As a matter of fact, many farmers smear wet dung on their land so that the land will be able to grow good grass and crops. For this matter, the farmers build cattle pens on different parts of their land. According to the villagers, using manure is good for yielding crops.

They also spend some amount of money on seeds and fertilizers. Seeds of all crops are purchased from the nearby town. Sometimes seeds of jowar and red gram are provided by the ITDA through the Agricultural Department on subsidy. Hence, investment on

cotton seeds is very high when compared to other crops. Again, fertilizer usage is much more on cotton crop than any other crop. Though farmers apply fertilizers to jowar and red gram, it is done after meeting the requirement of the cotton crop. On cotton, the farmers never compromise on inputs. They prefer to purchase the best seeds and apply full doses of fertilizers. Almost the entire quantity of pesticides purchased is exclusively meant for cotton. There is minimal to no usage of pesticides on other crops. However, some of the farmers of the village say that they would compulsorily spray any pesticide on red gram and sometimes on jowar too. Nevertheless, this was contradicted by other small farmers assembled in the meeting. They said that they would never apply any pesticide on food crops like jowar and red gram. It can be surmised that usage of fertilizers and chemicals is largely confined to cotton by a majority of the farmers. However, the use of the pesticides on other crops is very limited. At the same time, a few farmers have been following input-intensive agriculture which includes usage of fertilizers and pesticides on all the crops. The Pardhans generally do not mortgage standing crops but sometimes they mortgage cattle, ornaments and their household utensils - in times of financial difficulties - with moneylenders, on personal security. It may be noted that those respondents engaged in agriculture as the main economic activity, occupy a significant position in the tribe.

**Conclusion**

Agriculture has been the main source of livelihood of the Pradhan community in the village. Agriculture being practiced by the farmers of the village is still rooted in traditional notions of divine blessings for a good crop and the practice of appeasing rituals is still continued. Agriculture is not just an enterprise for livelihood but a socio-economic and cultural activity. While agriculture revolves around seasons, the socio-cultural life of the tribal farmers in the region revolves around agriculture. However, many beliefs and religious rituals are now giving way to rational thinking in the cultivation of the crops.

Perceptions about the use of pesticides and fertilizers vary between the rich and poor farmers. While rich farmers favour and practice use of pesticides and fertilizers on all the crops, the small farmers do not. This is because they believe that as long as the blessings of the village deity are with them, pests cannot cause any damage. However, the latent reason may be that these farmers do not want to increase the cost of cultivation by application of fertilizers and pesticides for a moderate increase in the yield.

In the village, crops such as jowar and other grams are produced for household consumption, whereas cotton is grown for market purpose. However, this has undergone significant changes over the years. The Pradhans who have been influenced by Government and NGO's Programmes and the non- tribal's way of cultivation of lands

have accepted the use of improved seeds, fertilizers, and introduction of new cash crops. The most outstanding trend observed in the village is the shift from a primarily food-based system of cropping to commercial cash crops. Adaptation of modern agricultural practices such as using fertilizers and other pesticides are becoming popular in the village. Seed and pesticide production have paved way into the deeper parts of this tribal land. It was observed in the study that while input-intensive (usage of pesticides and fertilizers) cultivation is rampant in cotton, other crops like jowar and grams are grown at sustenance levels. Most of the small farmers, who constitute the majority of the tribal farmers, do not use pesticides and fertilizers on other crops except cotton. Apart from economic reasons, cultural and religious norms deter them from using pesticides and fertilizers on other crops. Traders, who offer inputs such as seed, fertilizers and pesticides have donned the role of traditional moneylenders and have become an inseparable part of the tribal economy. Socio-cultural and religious norms are still associated, though weekly, with cultivation practices.

The study concludes by recommending that the local knowledge of cultivating of subsistence crops is useful for sustenance. It is important to recognize that indigenous/ local knowledge supports the survival of cultural and biological diversity.

Subsistence output supports the farmer and his family in the form of daily food items and his domestic animals in the form of fodder derived from the by produce of the crops raised. Small farmers should give more importance to subsistence crops rather than cash crops. The cash crops require more money investments. Debts to banks and moneylenders substantially increase. The pressure to repay loans takes a high toll on the emotional and mental well being of the families. In the attention and attraction to cash crops, the farmers are losing the knowledge and importance of the subsistence crops. Before such precious knowledge gets lost, it would be wise to protect and promote indigenous knowledge and wisdom widely for self sustenance in order to reduce poverty and hunger among indigenous people. The practice of cultivation of a majority of the crops without using fertilizers and pesticides is a good sign because it is environmentally sustainable and subsistence based. However, the stiff competition among the private players and the absence of effective state machinery in the field of agriculture may prove to be disastrous to these farmers as they may be lured into using fertilizers and pesticides over a period. Hence, instead of encouraging the farmers to adopt input-intensive agriculture the state departments must advocate the cultivation of crops organically.

## References


Adedipe, N.O. 1983a. A Functional Modality for the Improvement of Agro-Nutritional Quality in Rural Nigeria. In: *Rural Nigeria: Development and Quality of Life*. U. Igbozurike and R. Raza (eds.), 91-97. ARMTI. Seminar Series No. 3. Agricultural and Rural Management Training Institute, Ilorin, Nigeria. pp. 308.

Adedipe, N.O. 1983b. Strategies for Increasing Food Production in Nigeria, 109-116. In: *Nutrition and Food Policy in Nigeria.* T. Atinmo and L. Akinyele (eds.). National Institute for Policy and Strategic Studies, Jos, Nigeria, pp. 447.

Adedipe, N.O. 1984. Environmental Considerations of Shifting Cultivation in Africa and the Task of Universities, A.H. Bunting and E. Bunting (eds.). Proceedings of the International Workshop on Shifting Cultivation: Teaching and Research at the University Level, July 4-9, 1982. University of Ibadan, Nigeria. Food and Agricultural Organization, Rome, pp. 192.

Agrawal, A. 1995. Dismantling the divide between indigenous and scientific knowledge. *Development and Change* 26: 413-439.

Aina, P.O. 1998. Soil and Water Resources: Their Conservation, Management and Constraints to their Utilization for Sustainable Development in South-Western Nigeria, 79-83. In: *Africa's Natural Resources Conservation and Management Surveys.* Baidu-Forson, J.J. (ed.). United Nations University/ Institute for Natural Resources of Africa, Accra, Ghana, pp. 141.

Bellon M. R. and J. E Taylor. 1993. Farmer soil taxonomy and technology adoption. *Economic*
*Development and Cultural Change* 41: 764-786.

Berlin, B. 1992. *Ethnobiological classification: Principles of categorization of plants and animals in traditional societies.* Princeton, NJ: Princeton University Press.

Berlin, E. A. and B. Berlin. 1996. *Medical ethnobiology of the Highland Maya of Chiapas, Mexico: the gastrointestinal diseases.* Princeton, NJ: Princeton University Press.

Brookfield, H. C. 2001. *Exploring agrodiversity.*, New York: Columbia University Press.

Brush, S. B. 1992. Ethnoecology, biodiversity, and modernization in Andean potato agriculture. *Journal of Ethnobiology* 12: 161-85.

Chambers, R., A. Pacey and L.A. Thrupp (eds.). 1989. *Farmers First: Farmer Innovation and Agricultural Research*. Intermediate Technology Publications. London, pp. 218.

(CGIAR) International Agricultural Research Centers CGIAR Secretariat, The World Bank, MSN G6-601, 1818 H Street NW, Washigton, DC 20433 USA

(CIKARD) Center for Indigenous Knowledge for Agriculture and Rural Development, 318 Curtiss Hall, Iowa Sate University, Ames, Iowa 50011, USA

(CIP) International Potato Center, Av. La Molina 1895, La Molina, Lima, Peru, Apartado 1558, Lima 12, Peru

Davis, S.H. and K. Ebbe (eds.), 1993. Traditional Knowledge and Sustainable Development. Environmentally Sustainable Development Proceedings Series No. 4. The World Bank, Washington, D.C.

Dei, George Jerry Sefa, Budd L. Hall and Dorothy Goldin Rosenberg. 2000. Indigenous Knowledges in global contexts: multiple readings of our world. OISE/UT Book/ University of Toronto Press. Toronto.

Gilbert, E.H., D.W. Norman and F.E. Winch. 1980. Farming Systems Research: A Critical Appraisal. MSU Rural Development Paper No. 6; Department of Agricultural Economics, Michigan State University, East Lansing, Michigan, USA.

GLASOD, 1991. World map of the status of human-induced soil degradation. An explanatory note. ISRIC, Wageningen, The Netherlands.

DCID (Development Cooperation Information Department), 1993. Sustainable land use. Development Cooperation, Ministry of Foreign Affairs, The Netherlands. Sectoral policy document No. 2. 66p.

Dove, M. R. 1996. Center, periphery, and biodiversity: a paradox of governance and a development challenge. In Valuing local knowledge: Indigenous people and intellectual property rights, S. B. Brush and D. Stabinsky (eds.). Washington, DC: Island Press.

Dove, M. R. 2000. The life-cycle of indigenous knowledge, and the case of natural rubber production. Pages 213-251 in Indigenous Environmental Knowledge and its Transformations, ed. R. Ellen, P. Parkes, and A. Bicker. Amsterdam, the Netherlands: Harwood Academic Publishers.

Ellen, R., P. Parkes, and A. Bicker (eds.). 2000. Indigenous Environmental Knowledge and its Transformations. Amsterdam, the Netherlands: Harwood Academic Publishers.

Ellen, R. and H. Harris. 2000. Introduction. Pages 1-34 in Indigenous Environmental Knowledge and its Transformations, R. Ellen, P. Parkes, and A. Bicker (eds.). Amsterdam, the Netherlands: Harwood Academic Publishers.

Flora, Cornelia B. 1992. "Reconstructing agriculture: The case for local knowledge". Rural Sociology 57 (1): 92- 97.

Fujisaka, Sam. 1995. "Incorporating farmer's knowledge in international rice research" Pp. 124-139 in Warren, D. Michael, L. Jan Slikkerveer and David Brokensha (Eds.). The cultural dimension of development: Indigenous knowledge systems. London: Intermediate Technology Publications.

Gordon, Raymond G., Jr. (ed.). 2005. *Ethnologue: Languages of the World, Fifteenth edition*. Dallas: SIL International. Online version: http://www.ethnologue.com.

Grenier, Louise, 1998. Working with Indigenous Knowledge: A Guide for Researchers. IDRC, Ottawa.

Haverkort, B. and H. de Zeeuw 1992. Development of Technologies towards Sustainable Agriculture: Institutional Implications. 231-242, In: *Agricultural Extension: Worldwide Institutional Evolution and Forces of Change*. W.M. Rivera and D.J. Gustafson (eds.). New York: Elsevier Science Publishing Company. Kegan Paul International, New York, USA.

Indigenous Knowledge Pages (2005). http://www.ik.ik-pages,net

Iwanaga, Masa. 1998. "*In situ* conservation and the development process" Pp.vi in Jarvis, Debra I. and Toby Hodgkin (Eds.). Strengthening the scientific basis of *in situ* conservation of agricultural biodiversity on-farm: options for data collecting and analysis. Proceedings of a workshop to develop tools

and procedures for *in situ* conservation on-farm, 25- 29 august 1997, Rome, Italy. International Plant Genetic Resources Institute, Rome. Italy.

(IUCN) International Union for Conservation of Nature, Rue Mauverney 28, Gland 1196, Switzerland

Kloppenburg, Jack. 1991. "Social theory and the de/reconstruction of agricultural science: local knowledge for an alternative agriculture." Rural Sociology 56 (4): 519-548.

Kloppenburg, Jack. 1992. "Science in agriculture: A reply to Molnar, Duffy, Cummins, and Van Santen and to Flora." Rural Sociology 57 (1): 98-107.

Kongolo, T. 2001. Towards a more balanced coexistence of traditional knowledge and pharmaceuticals protection in Africa. *Journal of World Trade* 35: 349-361.

Kumaran, T. Wasantha, Dissanayake, Lakshman and Norbert, S. Antony 2007. *Indigenous Knowledge Systems and Sustainability: An Appraisal towards Resource Development*. Kumaran Book House, Colombo.

Moss, R.P. (ed.). 1988. *The Soil Resources of Tropical Africa*. pp. 226. Cambridge University Press, U.K.

Maurial, Mahia. 1999. "Indigenous knowledge and Schooling: a continuum between conflict and dialogue" Pp. 59-77 in Semali, Ladislaus M. and Joe L. Kincheloe (Eds.). What is indigenous knowledge? Voices from the academy. New York and London. Falmer press.

McNeely, Jeffrey A. 1995. "IUCN and indigenous peoples: how to promote sustainable development" Pp. 445- 450 in Warren, D. Michael, L. Jan Slikkerveer and David Brokensha (Eds.). The cultural dimension of development: Indigenous knowledge systems. London: Intermediate Technology Publications. UK.

Mwadime, Robert K. N. 1999. "Indigenous knowledge systems for an alternative culture in science: the role of nutritionists in Africa" Pp.243- 267 in Semali, Ladislaus M. and Joe L. Kincheloe (Eds.). What is indigenous knowledge? Voices from the academy. New York and London. Falmer press.

Mugabe, J. 1999. Intellectual property protection and traditional knowledge: an exploration in international policy discourse. In *Intellectual property and human rights*, World Intellectual Property Organization. WIPO, Geneva.

Nakata, Martin. 2002. Indigenous Knowledge and the Cultural Interface: Underline Issues at the Intersection of Knowledge and Information System. *IFLA Journal*. 28 (5/6)

Oxford English Dictionary.

Prakash, Mahdu Suri. 1999. Indigenous Knowledge systems- ecological literacy through initiation into people's science Pp.157-178 in Semali, Ladislaus M. and Joe L. Kincheloe (Eds.). What is indigenous knowledge? Voices from the academy. New York and London. Falmer press.

Purecell, T.W. 1998. Indigenous Knowledge and Applied Anthropology. *Questions of Definitions and Human Organisation*. Vol. 57. No. 3. pp. 257.

Quiros, C., S. B. Brush, D. S. Douches, K. S. Zimmerer, and G. Huestis. 1990. Biochemical and Folk Assessment of Variability of Andean Cultivated Potatoes. *Economic Botany* 44: 254-266.

RAFI. 2000. In search of higher ground: the intellectual property challenge to public agricultural research and human rights and 28 alternative initiatives. The occasional paper series. Vol 6. No.1.

RAFI/ UNDP. 1995. CSOPP Documents: Conserving Indigenous knowledge-Integrating New Systems of Integration. Web Site. http://www.undp.org/csopp/

Raghava Reddy, C. 2006. *Ethnographic Account of Cultivation Practices among Gonds of Andhra Pradesh*. Winrock International. India.

Rajasekaran, B. 1993. A Framework for Incorporating Indigenous Knowledge System into Agricultural Research and Extension Organizations for Sustainable Agricultural Development in India. PhD. Dissertation. Iowa State University, Ames, Iowa.

Roy, S.C. 1928. *Oraon Religion and Customs*. Gyan Publishing House, Delhi.

Scurrah, María, Edith Fernández-Baca, Raúl Canto, Enma Nuñez, Edgar Olivera and Noemí Zúñiga. 1999. Learning about biodiversity in Peru. ILEIA Newsletter. 15(3-4): 26-27.

Semali, Ladislaus M. and Joe L. Kincheloe (Eds.). 1999. What is indigenous knowledge? Voices from the academy. New York and London. Falmer press.

Viergever, Marcel. 1999. "Indigenous Knowledge: an interpretation of views from indigenous peoples". Pp.333- 359 in Semali, Ladislaus M. and Joe L. Kincheloe (Eds.). What is indigenous knowledge? Voices from the academy. New York and London. Falmer press.

Warren, D.M. 1987. Linking Scientific and Indigenous Agricultural Systems, pp. 153-170, In: *The Transformation of International Agricultural Research and Development*. J.L. Compton, (ed.). Boulder: Lynne Rienner Publishers, Boulder, USA.

Warren, D.M. 1992. Indigenous Knowledge, Biodiversity Conservation and Development. Paper Presented in International Conference on Conservation of Biodiversity in Africa: Local Initiatives and Institutional Role. from Aug 30-Sept. 3, Held in Nairobi, Kenya.

Warren, D. Michael, L. Jan Slikkerveer and David Brokensha (Eds.). 1995. The cultural dimension of development: Indigenous knowledge systems. London: Intermediate Technology Publications. UK.

Warren, D. Michael and Gerard Mckiernan. 1995. 'CIKARD: a global approach to documenting indigenous knowledge for development Pp.426-434 in Warren, D. Michael, L. Jan Slikkerveer and David Brokensha (Eds.). The cultural dimension of development: Indigenous knowledge systems. London: Intermediate Technology Publications. UK.

WCED. 1987. Our Common Future. World Commission on Environment and Development. Oxford University Press, U.K.

Wendland, W. B. 2002. Intellectual property, traditional knowledge and folklore: WIPO's exploratory program. *International Review of Industrial Property and Copyright Law* 33: 485-504 and 606-621.

## Current RULNR Working Papers

| Working Paper | No. |
|---|---|
| Mining in Forest Areas-Problems, Causes and Concerns: A Review<br>*Prajna Paramita Mishra, M.Gopinath Reddy, July, 2009* | *1* |
| Organic Farming : Status, Issues and Propects - A Review<br>*B. Suresh Reddy, July, 2009* | *2* |
| Dam and Displacement: A Review<br>*K. Anil Kumar, December, 2009* | *3* |
| An Explorative Study of the Implementation of the Forest Rights Act 2006: A Case of Western Ghats Region, Kerala, India<br>*Jyothis Sathyapalan, December, 2009* | *4* |

**Current Working Papers**

| Working Paper | Paper No. |
|---|---|
| Reflections on the Women's Empowerment Approaches, Evidence and Ways forward: The Case of Andhra Pradesh<br>*S. Sudhakar Reddy, K.S. Reddy and P. Padmanabha Rao, September 2009* | --- 80 |
| Trade Unions and Business Firms: Unorganized Manufacturing in West Bengal<br>*Deepita Chakravarty, August 2009* | --- 79 |
| A Study of Forest Rights Act, 2006 in Andhra Pradesh: An Assessment of its Major Features and Issues in Implementation Process<br>*M. Gopinath Reddy, K. Anil Kumar, Naga Raju Chikkala* | --- 78 |
| Poverty and Household Size: Facts and Statistical Artefacts<br>*N. Krishnaji, July 2009* | --- 77 |
| Fertility Transition in India: Development and Diffusion<br>*N. Krishnaji, January 2009* | --- 76 |
| Public Health Priorities in India<br>Insights from Changing Patterns of Death by Region, Gender and Age<br>*N. Krishnaji, August 2008* | --- 75 |
| Girl Children in Domestic Service: The Case of West Bengal<br>*Deepita Chakravarty, Ishita Chakravarty, June 2008* | --- 74 |
| Population Pressure and Labour Intensification: An Indian Historical Perspective<br>*N. Krishnaji, April 2008* | --- 73 |
| Turnaround of Indian Railways 2004-06 - A Case Study<br>*S. Mahendra Dev, G. Alivelu, March 2008* | --- 72 |
| Inclusive Growth in Andhra Pradesh:<br>*Challenges in Agriculture, Poverty, Social Sector and Regional Disparities*<br>*S. Mahendra Dev, March 2007* | --- 71 |

**Some Books from the CESS**

Ratna Reddy V (2009), *"Water Security and Management: Ecological Imperatives and Policy Options", Academic Foundation, New Delhi and CESS, Hyderabad.*

Mahendra Dev, S. Ravi. C, and Venkatnarayana, M. (eds), 2009, *"Human Development in Andhra Pradesh: Experiences - Issues and Challenges", CESS Publication, Hyderabad.*

Mahendra Dev, and Chandrasekhara Rao N, (eds), 2009, *"India Perspectives on Equitable Development", Academic Foundation, New Delhi.*

Mahendra Dev, S (2008), *"Abhivrudhi Pedarikam" (in Telugu), Praja Shakti Book House: Hyderabad.*

Mahendra Dev, S. and K.S.Babu (eds.). (2008) *"India's Development: Social and Economic Disparities", Manohar Publishers, Delhi.*

Mahendra Dev, S. and K.S.Babu (eds.). (2008): *"India: Some Aspects of Economic and Social Development", Academic Foundation, New Delhi.*

Ramachandraiah, C., Guus Westen and Sheela Prasad (eds.). (2008). *"High-Tech Urban Spaces: Asian and European Perspective"s. Manohar Publishers, Delhi.*

Mahendra Dev, S (2007), *"Inclusive Growth in India: Agriculture, Poverty and Human Development" Oxford University Press: New Delhi.*

Ratna Reddy V and Mahendra Dev S (eds), *"Managing Water Resources: Policies, Institutions and Technologies", Oxford University Press, New Delhi, 2006.*

C.H. Hanumantha Rao and S. Mahendra Dev (CESS, 2003). "**Andhra Pradesh Development : Economic Reforms and Challenges Ahead**".

S. Mahendra Dev, K.P.Kannan and Nira Ramachandran (eds).(IHD and CESS, 2003) "**Towards a Food Secure India: Issues and Polices**".

B.P.R. Vithal and M.L. Sastry, (CESS and Manohar, 2002) "**The Gadgil Formula**".

Jasveen Jairath". (CESS and Concept, 2001) "**Water User Associations in Andhra Pradesh (Initial Feedback)**".

S. Subrahmanyam, M. Jagadeswar Rao, R. Nageswara Rao and C. Ratnam, (CESS and Booklinks,1995)"**Bovine Development in Andhra Pradesh Development : Analysis of Regional Variations**".


**CENTRE FOR ECONOMIC AND SOCIAL STUDIES**

BEGUMPET, HYDERABAD - 500 016, ANDHRA PRADESH - INDIA

Telephones : 040-23402789, 040-23416780, Director's Ph : 65570480

Website: www. cess.ac.in, E-mail: postmaster@cess.ac.in Fax: 040-23406808

**Rs. 25/-**