

Sustainable Soil and Land Management Under Shifting Cultivation in Orissa

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Shifting cultivation, a primitive system of agriculture, the first step in transition from food gathering and hunting to food production is nearly 9000 years old agricultural practice and believed to have started during Neolithic period. It is prevalent not only in India but in other countries of Asia, Africa, South America and Australia. This is extensively practised by the tribals throughout the tropical and subtropical region. In India, about 5.0 million tribal families are practising this system on 4.37 million hectare of land covering 11 states (table-1).

TABLE-1
SHIFTING CULTIVATION IN DIFFERENT STATES OF INDIA

State	Tribal Families (Million)	Total Area (Million hectare)
Andhra Pradesh	0.11	0.15
Arunachal Pradesh	0.43	0.21
Assam	0.31	0.31
Bihar	0.23	0.19
Madhya Pradesh	0.19	0.38
Manipur	0.36	0.26
Meghalaya	0.61	0.47
Mizoram	0.40	0.19
Nagaland	0.19	0.12
Orissa	2.00	1.60
Tripura	0.19	0.49
Total	5.02	4.37

Source : Shifting cultivation in India, ICAR

It is evident from the table that, Orissa is a major state adopting this practice. The distribution of area under different districts of the state is as under.

TABLE-2
SHIFTING CULTIVATION IN DIFFERENT DISTRICTS OF ORISSA.

District (Undivided)	Area (ha) Estimated by land Sat.1.
Mayurbhanj	7303.40
Keonjhar	40638.20
Sundargarh	8190.74
Sambalpur	41781.00
Bolangir	1795.40
Dhenkanal	5121.20
Koraput	30651.16
Phulbani	20995.66
Kalahandi	5861.40
Ganjam	21680.30
Total	184018.46

Source : "Agriculture in Orissa" by D.Lenka.

It has got different names by different hill tribes such as Biringi or Danger in Phulbani, Dhenkanal and Bolangir, Dahi or Koman in Keonjhar and Sundargarh; Jhum by Kharias of Mayurbhanj and Kudki or Kuduchas in Kalahandi. But the term *Poduchasa* is widely used. This practice is followed by 20 types of tribal communities including Bhuiyan, Juanga,

Kandha, Erengakola, Kutiya, Buniya, Saura, Jatapa, Paraja, Gadaba, Kamar and Koya. The land and soil characteristics under this cultivation are given in the table (3).

TABLE-3
CHARACTERISTICS OF LAND AND SOIL
UNDER SHIFTING CULTIVATION

Land

Climate	: Tropical, subtropical
Slope	: Steeply sloping
Drainage	: Excessive
Surface Stoniness	: Moderate to strong
Relief	: Undulating

Soil

Depth Class	: Shallow
Parent Material	: Colluvium of laterites, Khondalite, Granite, Kniss
Mineralogy	: Ferratic Siliceous
Particle size	: Sandy Skeletal
Temp-regime	: Iso hyper thermic
Soil reaction (pH)	: Acidic
Ground water	: >5m
Surface texture	: Sandy
Erosion	: Very severe
Water holding capacity	: Low
Class of soil	: Typical Haphustalfs, Rhodustalfs, Kandic & Rhodic paleustalfs, Aeric Haphustalfs.

Source : "Soils of Orissa for optimizing land use" by NBSS & LUP (ICAR) Nagpur.

The soils are poor, infertile with low water holding capacity situated on sloppy land. This system involves the cultivation of crops on a patch of cleaned forest area vicinity to their settlement. Trees and bushes are cut during November-January, allowed to dry and burnt by fire. Before the onset of monsoon seeds are sown or dibbled. Different crops grown are millets, cereals, pulses and oilseeds mixed or rarely separated. In one patch, this process continues for 2-3 years till the fertility runs down. Then, the patch is abandoned and a new site is selected for the purpose. The abandoned patch regenerates, become fertile but the original forest flora, fauna and ecology are never restored. The tribals came back to this patch after 20-30 years. This period is called a podu cycle. Due to demographic pressure this period has come down to 3-4 years in Orissa. The fertility status never build up during the short period. Due to cutting and burning of trees and bushes properties of soil change as given in Table-4.

TABLE-4
CHANGE OF SOIL PROPERTIES DUE TO
SHIFTING CULTIVATION

Soil characteristics	Before burning	After burning	End of crop cycle
pH(1:2)	5.1	5.5	4.2
OC(%)	0.13	0.25	0.05
Available P	3.3	5.5	1.2
Available K	210	570	40.0
Exchangeable Ca (mc/100g.)	7.15	9.46	2.82

Source : "Waste land management" by V.V. Dhruvanarayan (ICAR).

It is evident from table-4 that at the initial stage of shifting cultivation the fertility status of soil increases with hike in soil pH towards

neutrality facilitating availability of plant nutrients. The combined effect helps better crop production only for 3-4 years. Then the fertility status declined making it unsuitable for raising crops, the land almost converted to barren.

Effects of Shifting Cultivation

Shifting cultivation causes loss of flora and fauna which includes precious species of tree plants, shrubs, medicinal plants and minor forest products. The harmful effects of it is seen extensively in areas of Koraput, Keonjhar, Phulbani and Ganjam districts. After podu not even a single blade of grass grows. The ill effects can be summarised as follows :

- i) It is an easy method of deforestation.
- ii) The wild animals loss their shelter.
- iii) Springs below the hills dry up.
- iv) Causes heavy flood in the rivers below.
- v) Increases water / moisture scarcity for plants, animals and human being.
- vi) Siltation to the tanks, nallas, river and reservoirs.
- vii) Ecology is disturbed and distored which never restored.
- viii) Soil erosion : The problem of soil erosion due to shifting cultivation is very serious in Orissa. The quantum of soil erosion varies from 84 to 170 t/ha. year in bare fallow. The intensity of erosion depends on slope, soil characteristics, crop coverage, depth of soil and rainfall pattern etc. It has been estimated from an experiment that, in an average 7-10 t/ha. year surface soil is lost along with plant nutrients.

Loss of soil and nutrients due to erosion per year.

Particulars	Loss (q/ha)	Loss Rs.(Approx)
Surface soil	70-100	-
O.C.	1.0	1000.00
N	0.12	300.00
P	0.05	125.00
K	0.32	320.00
Other nutrient	0.45	500.00
Total		2245.00

Control Measures

The system of shifting cultivation can not be avoided completely but should be discouraged. The alternate substitute for the system should be advocated among the tribals. Approach for the process can be done in following ways.

1. Physical, 2. Agronomic, 3. Socio Economic

Physical :

It deals with the development of infrastructure facilities keeping the climatic and physiographic situation in view. The objective is to control soil erosion, development of a fertile land with many fold uses and conservation of rain water. It includes

- * Contour bonding (30% slope)
- * Graded bonding 30-60% slope
- * Bench terracing (60-100% slope)
- * Contour ditches (71500 mm annual rainfall)
- * Grassed water ways-spill ways
- * Water harvesting structures, ponds.

Agronomic :

Management of different crops to get good harvest and fulfil the need of tribals are aimed at. The various steps followed are :

- Contour plowing : Plowing across the slope

- Selection of crop variety
- Integrated nutrient management including more organics and Bio-fertilizers.
- Mixed farming : poultry, dairy, piggery, fishery, goatery, apiary, mushroom and cultivation of medicinal plants.

Socio-economic

The rationale behind the persistency of this system in the part lay in its compatibility with physio-social environment of sparse population, community land tenure system, undulation, poverty, meagre resources, illiteracy etc. with the tribal people. It may not be possible to stop shifting cultivation overnight but the tribals can be persuaded and educated

to adopt modern technologies for their resources on a sustained basis.

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WIPRO TO COME TO ORISSA IN A BIG WAY

An MoU was signed between WIPRO Ltd. and the IT Department of the Government of Orissa on 21st Dec, 2004 for starting Software Development and BPO Services Centre of WIPRO at Infocity, Bhubaneswar.

WIPRO, one of the largest IT companies of international repute has committed for development of an integrated centre covering software and IT enabled services in the Infocity over an area of approximately 30 acres. Work on the first phase of this centre, which would comprise atleast one unit with a capacity of 1000 – 1500 people, is expected to start next year and would be completed within two years. It is expected that this centre will have world class amenities with supporting infrastructures such as auditorium, training facilities, residential hostels, indoor and outdoor facilities apart from core Information and Communication Technology (ICT) infrastructure required for various services to be offered by this centre.

The State Government has committed to provide necessary infrastructural support and to facilitate all clearances required for implementation of the project through its single window organization, namely Orissa Computer Application Centre, backed by the Department of IT.

Bhubaneswar has already emerged as an important I.T. centre in India over the last ten years. During the current year, the growth in software exports from Orissa is likely to exceed 40% and touch Rs. 500 crore. With the setting up of the WIPRO facilities and arrival of few other IT majors, the Infocity, Bhubaneswar is all set to cross Rs. 1000 crore export mark in IT and related services within the next three years.

The MoU for the IT venture of WIPRO was signed by Mr. Tamal Dasgupta, Corporate Vice President & Chief Information Officer, on behalf of WIPRO and Shri A.K. Tripathy, Commissioner-cum-Secretary, IT on behalf of the State Government in the presence of Shri Naveen Patnaik, Hon'ble Chief Minister of Orissa, Shri Surjya Narayan Patro, Minister, Information Technology, Energy & Tourism and Dr. Subas Pani, Chief Secretary, Orissa.