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A study on traditional agroforestry practices existing at Bastar region of Chhattisgarh

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Abstract

A survey has been conducted in different areas of Bastar region for knowing the traditional or different agroforestry systems performed by the people of this region. These areas are Tekameta, Neeyanar, Jharumar, Kangoli, Tokapal, Keslur, Marenga, Telimarenga, Hatguga, Aadawal, Bhatpal, Bastar, Lamni, Dimrapal, Dharampura, Neeyanar, Jagdalpur, Aasna, Kolchur, Nakti semra, Kumhrawand, Bakawand etc. The reason behind the agroforestry studies of the Bastar region is to know the traditional & existing agroforestry practices of Bastar region. To know present status of agroforestry and awareness of the people about agroforestry in Bastar. To know the different land use system and tree management, tree-crop combination, interaction and diversity in this region. And also to aware the farmers about the proper land use or agroforestry practices and proper selection and tree-crop management and also providing suggestion for difficulties which they are facing in their farm.

So, Some of the silent findings of the agroforestry models that are existing in this Bastar region are Agrisilviculture with one of the very good combinations of trees like *Shorea robusta*, *Tectona grandis*, *Acacia spp*, *Phoenix sylvestris* etc. Agrosilvopastoral with combination of crops with trees like *Albizia spp*, *Leucaena leucocephala*, *Ficus racemosa* etc. Agri-horti-silviculture practices with many fruit trees and multipurpose trees like *Cocos nucifera*, *Caraya papaya*, *Musa acuminata*, *Mangifera indica*, *Anacardium occidentale*, *Embellica officinalis* etc.

Keywords: Agrisilviculture, Agrosilvopastoral, Agri-horti-silviculture, Aquaforestry, MPT's (multipurpose trees), Woody hedgerows etc.

Introduction

Bastar people also have the tradition of planting trees around the agricultural land and villages as a boundary plantation since from the ancient past. They are also aware of the soil holding capacity of the tree around the farm and somewhere they also follow the intercropping; as they know about the benefit of the tree as windbreak, shelter for the humans and livestock's etc. as shelterbelt were also known. They follow the traditional practice and also the proper utilization of many trees and its products as of economical, medicinal & multipurpose value e.g. *Diospyros melanoxylon*, *Tectona grandis*, *Shorea robusta* and *Azadirachta Indica*, *Cleistanthus spp*, *Moringa oleifera*, etc. They also have the traditions of worshipping trees and the tribal dances perform around these trees are symbolic of the intimate ethnic bias to protect trees had considerable socio, ethnic and religious backing. Agriculture system in *Bastar* is an integration of crop production and livestock raising. Other components of ecosystem affecting agriculture are the constancy of water supply, the stability of soil fertility and existence of forests, which constitute an integral part of farming system.

2. Objective:

Main objectives of this Research are:

1. Information of different agro forestry practices in the Bastar district.
2. To know the different tree species or social forestry trees and its status in the farm and in other agro forestry systems.
3. To know the total area of the field of agro forestry practices and total plantation area of the trees in the field etc.

3. Methodology:

On the basis of survey conducted on the different areas of Bastar district and asking frequent questions to the farmers, general discussions and reflection of this above study.

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3.1 Primary data collection:-A survey was conducted by us in the farm fields of different areas of Bastar region and a general discussion was done with the farmers in the field, So the data collection for proper diagnosis and design for agroforestry of Bastar district in the following steps.As we are local or indigenous people of the district, it is easy to interact with them and we are aware of the different areas found in this region.So, this is the questionnaire what we have prepared for this survey ;

- ❖ Firstly, the questions regarding the farmers and its farm area was asked i.e.; name of the farmers and name of the place or location, age, education level , area of their land(in acres)
- ❖ Then, regarding the annual and biennial crops they are growing in the field their local names and what's the reason for producing that crops i.e.; for food , good production, soil fertility improvement, source of income and what are major obstacles during growth of this crop What kind of tree species have you planted in your farm and what is the role they are playing in your farm like control erosion, soil fertility improvement , source of timber , source of firewood , food, fodder, fuel and shade and shelter etc. And what type of agroforestry is present in your farm.
- ❖ What are the challenges you are facing in planting trees in the farm and like lack of knowledge of species selection, inadequate resources, inadequate irrigation facility, pest and disease problem, poor market prices or any other etc. and what kind of fertilizers and insecticide and pesticide you are using in your farm.
- ❖ Then question is regarding their annual income and any other information if they want to give us regarding the field etc.
- ❖ What is that the perception of the farmer regarding the trees in their farm or land area , their benefit and disadvantage and in future what kind of trees they want to plant their farm or land and their general information or awareness about agroforestry and its techniques .
- ❖ This all data was collected in the field and applied in the study and following result and discussion was done on this basis. The survey is done almost all directions of

Bastar districts i.e.; north, south, east, west of the district.

3.2 Secondary data collection; Secondary data were collected from the various sources and records life reports published by related projects, maps, journals, publications, relevant literature were also consulted in the library and the relevant websites to make better understanding and interpretation.

4. Result and Discussion:

4.1 Prediagonostic Apraisal Of Biophysical Resources

Bastar District is a district of the state of Chhattisgarh in Central India. Jagdalpur is the district headquarters. Bastar District is bounded on the northwest by Rajnandgaon district, on the north by Kondagaon, on the east by Naurangpur and Koraput districts of Orrisa state, on the south and southwest by Dantewada district , and on the west by Gadchiroli district of Maharashtra state. Bastar region is situated between 17° 46' and 20° 34' North latitude and 80° 15' and 82° 15' East longitude and at an altitude of 2000 ft. In the early centuries, during the British rule and even today Bastar is a mysterious and very attractive land because of its primitive culture.

4.1.1 Climate: Bastar has a monsoon type of hot tropical climate. It has mean annual temperature of 24.5 degree Celsius. It enjoys three distinct seasons of dry early summer, wet late summer and winter. Most of the rainfall is caused by the Arabian Sea branch of south-west monsoon.

Rainfall status of the Bastar district: Bastar is mostly covered with forest hence, the rainfall in this area is also good. And, we can see that most of the farmers still depend on monsoonal rain for agriculture and rainfall is very necessary for the tree growth also. Rainfall and precipitation are necessary to determine the average humidity of the area or climate determination. So; rainfall status of the Bastar district, of the year 2009, by Govt. of Chhattisgarh is given below.

Table 1: Rainfall status of the Bastar district.

Rainfall Normal RF (mm)	Normal Rainy days (Number)	Normal Onset	(Specify week and	Month)
SW monsoon (June-Sep):	1121.5	55	10 June	15 –Sep
NE Monsoon (Oct-Dec):	114.8	7		
Winter (Jan- March)	43.3	4		-
Summer (Apr-May)	124.8	9		
Annual	1402.40	72		

Source: Agricultural Statistics 2009, Commissioner land records, Raipur, Govt. of Chhattisgarh

4.1.2 Soil of Bastar

The region is characterized by red soils formed by the weathering of metamorphic and Granite rocks. The soil is thin in uplands and relatively deep in low lands. It is converted into the laterite soil on the uplands. The heavy

rainfall and shifting cultivation are mainly responsible for large-scale soil erosion. The soils are mainly poor in quality and humus contents. Major soils that are found in bastar region are given below by govt. of Chhattisgarh.

Table 2: Major soils of Bastar.

MAJOR SOILS (Common Names Like Red Sandy Loam Deep Soils Etc)	AREA ('000 Ha)	Percent (%) Of Total
Entisols (Bhata)	132.40	26.6
Alfisols (Dorsa)	282.49	56.7
Entisols/ Inceptisols (Matasi)	82.99	16.7
Bharri	71.00	14.3
Associated Vertic & Vertisols (Kanhari)	0.0	0.0
Total	497.88	

Source: Directorate of Agriculture, Govt. of Chhattisgarh

Table 3: Different Agroforestry Practices Prevailing In Bastar Region.

Area Of Bastar Region With Its Farm Area (In Acres)	Agroforestry Practices	Trees	Annual Crops		Irrigation Facility.	Total No' Of Trees Per Acre
			Rabi Crops	Kharif Crops		
Bastar (Bhatpal) (8 Acre)	AGRISILVICULTURE (Intercropping; boundary plantation)	<i>Phoenix sylvestris, Careya arbore, Acacia mangium, Azadirachta indica, Psidium guajava, Carica papaya, Mangifera indica, Tamarindus indica linn etc.</i>	<i>Capsicum annum, Solanum lycopersicum, Abelmoschus eschulentus, Zea mays.</i>	Oryza sativa,	Irrigated by borewell	12
Tekameta (5 Acre)	AGRISILVICULTURE (Intercropping; boundary plantation)	<i>Acacia mangium, Psidium guajava, Carica papaya, Mangifera indica etc.</i>	<i>Zea mays, Allium cepa, Raphanus sativus, Saccharum officinarum, Amaranthus tricolor, Citrus limon, Vinga unguiculata</i>	Oryza sativa, Zea mays	Irrigated by borewell	14
Tekameta (4 Acre)	AGRISILVICUTURE (Alley cropping, live fences), AQUAFORESTRY	<i>Leucaena leucocephala, Tamarindus indica, Acacia spp, Mangifera indica, Albizia spp., Ziziphus mauritiana, Phoenix sylvestris</i> NEAR TO POND: - <i>Ficus racemosa, Syzygium cumini, Mangifera indica, Ziziphus mauritiana, Phoenix sylvestris</i>	<i>Lagenaria siceraria, Cucumis melo, Cucurbita maxima, Allium cepa, Zea mays.</i>	Oryza sativa	Irrigated by Pond	15
Hatguda (5 Acre)	AGRISILVICULTUE (Boundary plantation & multipurpose trees species) AGROSILVOPASTORAL	<i>Azadirachta indica, Diospyros melanoxylon, Dendrocalamus strictus, Cocos nucifera, Musa acuminata, Anacardium occidentale, Emblica officinalis.</i>	<i>Saccharum officinarum, Solanum melongena, Abelmoschus eschulentus, Vinga unguiculata, Pisum sativum, Solanum lycopersicum, Capsicum annum, Coriandrum sativum, Brassica juncea</i>	Oryza sativa	Rain water	10
Lamni (8 Acre)	AGRISILVICULTURE (Boundary plantation)	<i>Mangifera indica, Musa acuminata, Carica papaya, Eucalyptus cinerea.</i>	<i>Arachis hypogae.</i>	Oryza sativa	Irrigated by borewell	9
Neyanar (3 Acre)	AGRISILVICULTURE (Boundary plantation)	<i>Eucalyptus cinerea, Ficus racemosa, Leucaena leucocephala.</i>	<i>Abelmoschus esculentus, Capsicum annum.</i>	Oryza sativa	Rain water	10
Aadawal (7 Acre)	AGRISILVICULTURE (Intercropping, multipurpose tree species)	<i>Mangifera indica, Syzygium cumini, Psidium guajava, Artocarpus heterophyllus, Musa acuminata.</i>	<i>Zea mays, Triticum spp.</i>	Oryza sativa, Triticum aestivum	Irrigated by borewell	12
Jharumar (Bakawand) (3 Acre)	AGRISILVICULTURE (Boundary plantation)	<i>Mangifera indica, Pongamia pinnata, Dendrocalamus spp., Moringa oleifera</i>	<i>Zea mays, Allium cepa.</i>	Oryza sativa	Rain water	12
Kangoli (3 Acre)	AGRISILVIPASTORAL (Boundary plantation and multipurpose tree)	<i>Tectona grandis, Anacardium occidentale, eucalyptus spp, Azadirachta indica, Dalbergia latifolia, Mangifera indica, Saraca Asoka</i>	<i>Abelmoschus eschulentus, Amaranthus tricolor.</i>	<i>Oryza sativa, Triticum aestivum</i>	Rain water	13
Dimrapal (9 Acre)	AGRISILVICULTURE, AGRI-HORTI-SILVICULTURE, MPT's.	<i>Mangifera indica, Acacia mangium, Tectona grandis, Cocos nucifera, Eucalyptus spp, Syzygium cumini, Moringa oleifera, Pithecelobium dulce</i>	<i>Saccharum officinarum, Zea Mays, Abelmoschus esculentus, Solanum lycopersicum, Solanum melongena.</i>	Oryza sativa	Irrigated by borewell	25
Keslur (4 Acre)	AGRISILVICULTURE (Boundary plantation)	<i>Phoenix sylvestris</i>		Oryza sativa	Rain water	10
Marenga	AGRISILVICULTURE	<i>Eucalyptus spp., Tamarindus indica, Musa acuminata,</i>	<i>Saccharum officinarum,</i>	Oryza	Rainwater	10

(4 Acre)	(Boundary plantation and MPTs) AGRISILVOPASTURE	<i>Carryota urens, Manilkara zapota</i>	<i>Vinga unguiculata</i>	<i>sativa, Triticum aestivum</i>		
Tokapal (3 And A Half Acre)	AGRISILVICULTURE (Boundary plantation)	<i>Phoenix sylvestris</i>		<i>Oryza sativa</i>	Rainwater	9
Dharampuara, Jagdalpur (13 Acre)	AGRISILVICULTURE, AGRI-SILVI-HORTICULTURE, AQUAFORESTRY	TREES NEAR TO FARM- <i>Acacia auriculiformis Psidium guava, Tectona grandis, Cocos nucifera, etc.</i> TREES NEAR TO POND: <i>Cocos nucifera, Anacardium occidentale, Mangifera indica, Caraya papaya etc.</i> OTHER TREES:- <i>Punica granatum, Anacardium occidentale, Emblica officinalis, Manilkara achras, Mangifera indica, Psidium guava, Terminalia Arjuna, Tamarindus indica, Terminalia bellerica, Litchi chinensis etc</i>	<i>Saccharum officinalis, Cucumis melo, Cucurbita maxima, Amaranthus tricolor, Lagenaria siceraria, solanum lycopersicum etc</i>	<i>Oryza sativa</i>	Irrigated by pond & borewell	30
Aasna (2 Acre)	AGRISILVICULTURE (BOUNDARY PLANTATION)	<i>Eucalyptus spp.</i>		<i>Oryza sativa, Zea mays</i>	Rainwater	5
Kolchur (3 Acre)	AGRISILVICULTURE (BOUNDARY PLANTATION)	<i>Melina arborea, Ficus racemosa.</i>		<i>Oryza sativa, Zea mays etc</i>	Irrigated by borewell	10
Bastar (Paintripara) (1 Acre)	AGRISILVICULTURE (Boundary plantation)	<i>Azadirachta indica, Pongamia pinnata, Eucalyptus spp., Anacardium occidentale, Albizia spp, Tamarindus indica, Careya arborea etc</i>	<i>Zea mays</i>	<i>Oryza sativa</i>	Irrigated by borewell	30
Kolchur (2 Acre)	AGRISILVICULTURE (Boundary plantation)	<i>Tectona grandis, Mangifera indica, Cocos nucifera, Eucalyptus spp.</i>	<i>Lagenaria siceraria, semi(common name).</i>		Irrigated by canal	9
Nakti Semra (5 Acre)	SILVOPASTORAL SYSTEM	<i>Cocos nucifera, Musa acuminata, Mangifera indica, Caryota urens, Artocarpus heterophyllus, Gmelina arborea, Acacia auriculiformis, Dendrocalamus spp., Tamarindus indica, Eucalyptus spp., Pongamia pinnata, Anacardium occidentale, Acacia mangium, Punica granatum.</i>			Rainwater	40
TOKAPAL-2 (5 ACRE)	AGRISILVIHORTI-CULTURE	<i>Cocos nucifera, Musa acuminata, Mangifera indica, Phoenix sylvestris, Tectona grandis, Artocarpus heterophyllus, Eucalyptus sp.</i>	<i>Zea mays, Saccharum officinarum etc, Solanum lycopersicum, Abelmoschus esculentus</i>	<i>Oryza sativa, Triticum aestivum</i>	Irrigated by canal	20

4.3 Description of the Agroforestry Practices That Is Found In Bastar Region

4.3.1 Agrisilviculture: It was practiced in almost all parts of the Bastar region. Here, people use to follow the traditional agroforestry practices like planting trees in the farm boundary, borders of home compound, intercropping such as alley cropping etc; they also act as a wind break and shelter-belt in this system. According to farmer, the practice primarily evolved due to the need of protecting crops and vegetables from animals and humans besides their protective function, live fences have been providing fuel-wood, fodder and food for the household needs. It contributes to enrich the soil fertility, and somewhere it also as bee forage and i.e. why it is also good source for Apiculture. Various species were found to be having potential role to fulfill the needs of a farmer. The most common species are *Phoenix sylvestris.roxb*, *Careya arborea*, *Acacia auriculiformis*, *Acacia mangium*, *Tectona grandis*, *Cocos nucifera*, *Azadirachta indica*, *Dalbergia latifolia*, *Mangifera indica*, *Saraca asoka.etc*.

4.3.2 Silvopastoral System (trees + pasture and/or animals):

Silvopastoral systems were found as most prominent agroforestry practice in the area. Silvopastoral systems were characterized by integrating trees with forage and livestock production. Traditionally, Silvopastoral systems involved grazing livestock in wooded rangeland and incorporating trees in pastures for shade and timber. This type of agroforestry practices existed and found at the Nakti semra, Hatguda, Paintripara and Parpa area of Bastar district during the survey study Silvopastoral systems were found as most prominent agroforestry practice in the area. Silvopastoral systems were characterized by integrating trees with forage and livestock production. Traditionally, Silvopastoral systems involved grazing livestock in wooded rangeland and incorporating trees in pastures for shade and timber. This type of agroforestry practices existed and found at the Nakti semra, Hatguda, Paintripara and Parpa area of Bastar district during the survey study.



Fig.2: Boundary plantation of *Tamarindus indica* with *Capsicum spp.* in the farmer's field at Bastar



Fig.3 Boundary plantation of *Tectona grandis* in farm field of *Arachis hypogae* in the lamni area at Bastar.



Fig 4: This is a pasture land of Paintripara at Bastar block



Fig 5: Grazing goats in the pasture land of Hatguda area at Bastar district

4.3.3. Agrosilvopastoral System (Trees + Crops + Pasture/Animals): Agrisilvopastoral system is found in many parts of Bastar District but mostly in the area where the cattle's are also being raised with farming. The tree species like *Albizia* spp, *Acacia* spp., *Leucaena leucocephala* are being raised in the farm field which has a very high nutritive fodder value and other multipurpose use.



Fig 6: is an Agrisilvopastoral farm field with various MPT's found at Bastar Block



Fig.7. *Leucaena leucocephala* raised with agricultural crops.

4.3.4 Home gardens: This is one of the oldest agroforestry practices, found extensively in high rain fall areas in tropical south and south-east Asia. Many species of trees, bushes, vegetables and other herbaceous plants are grown in dense and apparently random arrangements, although some rational control over choice plants and their spatial and temporal arrangement may be exercised. Most home gardens also support a variety of animals (cow, buffalo, bullock, goat, sheep) and birds (chicken, duck). In some places pigs are also raised. Fodder and legumes are widely grown to meet the daily fodder requirements of cattle. The waste materials from crops and homes are used as fodder/feed for animals/birds and barn wastes are used as manure for crops. In many places of Bastar region this type of practice can be

seen some of the examples in the survey are Hatguda, Aadawal, Kangoli, Nakti semra etc. They have different livestock's such as cows, buffaloes, goat etc and some birds also like chicken and ducks etc. And the trees for fodders are *Leucaena leucocephala*, *Ficus racemosa*, *Musa acuminata*, *Artocarpus heterophyllus*, *Mangifera indica*, *Anacardium occidentale*, *Hevea brasiliensis*, *Carica papaya*, *Moringa oleifera* etc. and nearby area with grasslands is also present for their grazing. Some of these tree species have good economic value and also eaten and used by the peoples in different vegetables and pickles etc.



Fig 8 This is a home garden of Nakti semra of different layers and multipurpose tree species like *Mangifera indica*, *Musa acuminata*, *Cocos nucifera* etc



Fig. 9 is a home garden of Nakti semra of different layers and multipurpose tree species like *Mangifera indica*, *Musa acuminata*, *Cocos nucifera*, *Moringa oleifera* etc.



Fig. 10 Shows very good Aquaforestry at Dharampura, Jagdalpur



Fig. 11 shows the multipurpose woodlots of Telemarenga area of Bastar with various multipurpose trees, shrubs and plants.

Aquaforestry & Multipurpose wood lots: The main or primary role Aquaforestry in agroforestry is fish production and bund stabilization around fish-ponds. In this system various trees and shrubs preferred by fish are planted on the boundary and around fish-ponds. Some tree leaves are used as forage for fish like *Moringa oleifera* etc. This type of agroforestry system can be seen in many places in Bastar district specially in the pond area near to the farm and Multipurpose woodlots are those in which special location-specific MPT's are grown mixed or separately planted for various purposes such as wood, fodder, soil protection; soil reclamation et like *Tectona grandis*, *Shorea robusta*, *Dalbergia sissoo*, *Eucalyptus spp.* etc and also at many places of Bastar various economic and medicinal importance plant are also grown in this like *Chlorophytum spp.*, *Curcuma decipiens*, *Withania somnifera*, *Andrographis paniculata*, *Rauvolfia serpentine* etc along with many fodder grasses in the Tele Marenga area of Bastar region. *Tectona grandis* is a valuable timber tree and its old leaves are sometimes used as forage for cattle's and Van Haldi is medicinal important plant and many fodder grasses are also present in this land.

5. Suggestion To The Farmers

So, these are some of the Agroforestry practices going on in Bastar district with their various components like trees, crops, shrubs, animals, soil, climate, area etc. Here are some of the problems faced by the farmers in agroforestry management and in tree planting. Some of the suggestions given by myself to apply in their for proper management and development of their farm or land:-

- 1) Selection of the tree species should be beneficial and it should be supportive to the soil, climate also. The farmer can afford such trees and it should be beneficial from all sides like economical, food, fodder, fuel etc. if any indigenous trees are having these qualities then it is well and good to plant it in the farm.
- 2) Weed is the major problem faced by the farmers not only in Bastar but also in whole India. So, by proper weedification should be done in proper time.
- 3) Government is providing subsidies for the proper irrigation in the field so they should be aware of that kinds of programmes and consult to their nearby agriculture centre or proper govt. source.
- 4) Maximum farmers of this Bastar region are unaware of the agroforestry techniques and they are following the traditional agroforestry practices like boundary plantation, intercropping. Likewise they are also unaware of the agroforestry management like thinning, pruning, root pruning of trees in proper time etc. so I suggested to practice all this management tools in their farm and selection of proper tree species and also, like selection of small leaf tree species that can be soon decomposed into the litter the soil and in shade they can plant shade loving plants etc.
- 5) Introduction of organic farming must be given in the farm & safe & proper use of insecticide and pesticide in their farm i.e. in all crops and trees etc to prevent them from disease.

6. Conclusion

Agroforestry can be seen in almost all the parts of the Bastar region, though the people are not much aware of the new techniques and management of agroforestry practices but they are definitely following the old traditional practices like Boundary plantation, Intercropping, Aqua forestry, Home gardens etc. Involvement of woody or tree species in the farm field is good and beneficiary to the optimum level only if the farmer implies it with the proper knowledge of management and selection of Tree-crop combination. Some of the farmer's especially poor and small farmers lack this management skill and not getting proper profit and their ideology regarding the placement of trees in the farm is negative i.e.; they do not want trees in their farm.. Some of them are suffering from inadequate resources and do not have efficiency for the proper management of the trees in the farm. So, these are some of the major obstacles or problems in applying agroforestry practices. Beside this, many educated and skilled farmers are planting trees inside and outside their farm and practicing many Agroforestry practices like Boundary plantations, Hedge row intercropping etc. and getting optimum production and also improving their soil fertility. They are fulfilling all the basic requirements from this Agroforestry practices like food, fodder, and fuel etc. and also getting extra benefit or income.

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