Impacting Livelihoods through Institutional Innovations: Income and Food Security from the Indian Forest Rights Act

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Contents

Abstract

This study analyses primary level household and village data collected from forested areas in three states in India for mapping the potential of The Forest Rights Act (FRA), 2006 in addressing poverty alleviation and income generation needs of tribal and forest dwelling communities. The Forest Rights Act, 2006 is as an institutional innovation that seeks to restore the rights of forest dependent households, whose customary and hereditary rights have been eroded over the years. Tribal populations are among the poorest in the country today. The analysis establishes the continued significance of access to land and forest resources in impacting livelihoods, including food security, through multiple pathways. It emerges that proper implementation of the FRA has the potential to address poverty alleviation for this historically disadvantaged population, constituting a critical juncture for the economy. It can potentially impact thorough multiple channels including the de-escalation of tensions arising from lost customary rights.

I. Introduction

There are large numbers of forest dwellers in India[1] the majority of who reside in states with poverty levels well above the national average. They have been central to concerns and debates over forest management in India. Over the past several decades, it has been argued that they have been increasingly deprived of their rights to access and use of forests. Advocates of recent forestry sector policy initiatives such as Social Forestry and Joint Forest Management have professed a deepening concern for the livelihoods of forest people; yet, the outcomes of these initiatives indicate that whilst forests may be improving under state-initiated, participatory programmes, forest dwellers livelihoods have not improved appreciably. In some cases, it has worsened through increased regulation and reduced local control and access (Springate-Baginski and Blaikie 2007). Debates over the need for overarching reforms in forest policy and governance in India indicate a polarisation of positions among scholars: one group views forest dwellers as central to any sustainable management programme for forests while another, , holds the opinion that that forest conservation requires that forest dwellers are made less dependent on forests and re-located elsewhere.

Over time, the tenure and bargaining positions of forest dwelling communities have been steadily weakened with the implementation of various Acts. Combined with developmental pressures on land availability, these have led to the extinction of use rights or the conversion of rights into concessions and privileges, and the expropriation of common property lands
The rights of the tribals over their traditional land holdings have gradually been extinguished leading to insecurity of tenure and fear of eviction (Eighth Report, 2008). More simply put, tribal communities, which enjoyed traditional and customary rights on forests and forestland, have been widely dispossessed of their hereditary lands. Paradoxically, they are caught between displacement threats for reasons of forest conservation and displacement which arises from development initiatives such as construction of dams.

Continued displacement and migration of forest people has led to hardships for many, who have added to the numbers of the "informal sector" in the economy lacking in access to formal sources of credit and alternative means of income generation. The inadequacy of the existing institutional structure in addressing the increasing marginalisation of forest dwellers, led to a demand for reforms that ought to redress the "historical injustice" suffered by these communities. The Forest Rights Act 2006 (FRA) is an institutional innovation that seeks to restore rights to forest dependent households. As always, the success of this enabling legislation will depend on its implementation.

The settlement patterns and location of many tribal communities calls for innovative initiatives such as outreach/mobile units to facilitate benefits from government programmes such as the Integrated Child Development Scheme, Midday Meal, and Targeted Public Distribution System which can directly impact upon their poverty and livelihoods capabilities. The National Rural Employment Guarantee Act for instance would be a useful means of generating resources for the tribal communities when the projects are located near tribal habitations, and at the same time are not in conflict with the forest department. While forest dwellers have been left out of the formal sector employment and processes of economic growth, they have not been impacted positively by the above mentioned socially oriented welfare initiatives either. What is worrisome is that policies that were presented as addressing their livelihood needs such as the Joint

[1] The term forest dweller is used throughout this paper in a broad sense to include both forest inhabitants and forest adjacent inhabitants. A substantial part of forest dwellers are tribal populations.

Forest Management initiative has had limited impact, and had no legal basis from which rights could be asserted (A lack of integrating livelihoods into regeneration programmes for forests has persisted. Little convergence across developmental schemes has been achieved for forest dwellers, due to restrictive legal provisions in forestry laws. It is in this context, that the FRA's potential to be different is to be noted.

This paper analyses the institutional determinants of poverty amongst forest dwellers and the potential of the FRA in helping achieve poverty alleviation and food security. It draws upon field study in areas where the FRA implementation process is now ongoing in order to understand the likely pro-poor growth implications of the Act.

The livelihood implications are explored on the basis of field data collected through a survey of 22 villages spread over three states in India (9 in West Bengal, 6 in Andhra Pradesh and 7 in Orissa). Villages were sampled purposively from 14 districts to reflect a range of scenarios. A total of 459 forest households were interviewed in a primary survey. Forest dwellers in the selected study areas are composed mostly of tribal (ST) population and some Scheduled Caste (SC) population.

The paper is organised as follows. Section II details the vulnerability, poverty and forest dependency issues in the current context of the Indian economy. Section III presents a discussion of the academic challenges in understanding the FRA as an institutional innovation and Section IV moves on to the specific objectives and methodology of the study. Section V presents insights from descriptive data analysis, and the motivation for focussing on food security as a key impact variable. Section VI contains a discussion of the results from an econometric model probing food security and its determinants for those likely to be impacted by the Act while Section VII concludes the paper.

II. Poverty, Vulnerability and Forest Dependency

Recent data on poverty in India reveals that tribal communities, particularly in rural areas of the country are easily amongst the most deprived and disadvantaged. The Indian economy's fight against poverty, hunger and environmental degradation has found recent expression through various initiatives such as Bharat Nirman, National Common Minimum Programme, National Rural Health Mission and legislations such as the National Rural Employment Guarantee Act and the Forest Rights Act. There is a renewed overall focus on using social sector commitments to measure whether development-oriented programmes are working towards their stated objectives. Goals 1 and 7 of the Millennium Development Goals (MDGs), to which India is committed, also require eradication of poverty and ensuring environmental sustainability. The baseline for defining the targets adopted in the MDGs (1990) coincides somewhat with the start of the recent period of economic reforms in India (1991). The National Common Minimum Programme and the Tenth Plan had sought to reflect these developmental priorities, and the Eleventh Plan seeks to give further voice through the adoption of several monitorable targets for an inclusive growth strategy. Among the twenty seven targets identified at the national level, thirteen can be disaggregated at the state level. These targets are in turn categorised into 6 categories, including one on "income and poverty".

A review of the progress on MDGs (UN 2006) found "clear signs of hope' for meeting these, alongside reasons for serious concern for disparities that were found to continue to exist both between and within countries. Indian states differ vastly in terms of biophysical, social and economic parameters. There is also a

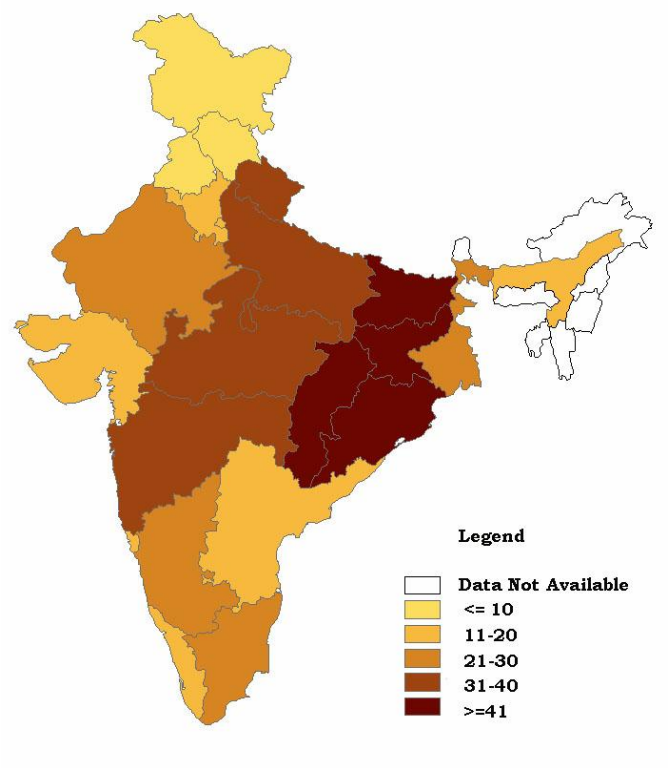
great deal of diversity in terms of the threshold levels of income at which different communities within states are situated. STs and forest dwellers in general, are amongst the most deprived communities, with very low levels of income, and most households falling below the poverty line.

This section looks at poverty amongst forest dwelling tribal populations in three states: Andhra Pradesh, Orissa and West Bengal. Economic markers in the post reform period reveal economic growth in these states. However, disparities clearly emerge when development indicators in these states are disaggregated by social categories. The indicators include those essential for ensuring a minimum quality of life such as income, health, education, and access to potable water. It has also been noted that the rising share of casual workers in the economy comprises mostly of ST and SC population, amongst whom the landless casual workers are the poorest (Dasgupta and Thorat 2009).

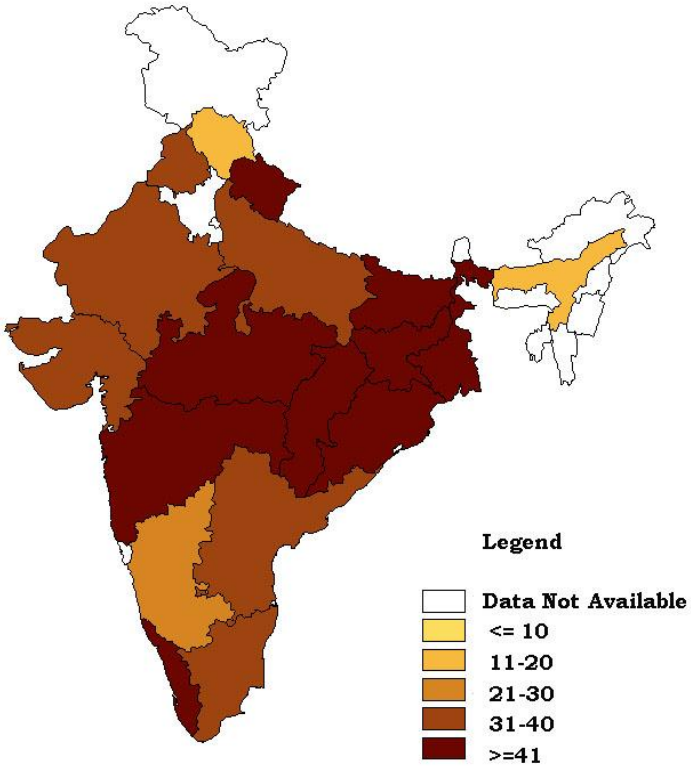
Map 1 shows the proportion of population below the poverty line in different states across India while Map 2 provides the proportion of poverty among rural tribal population in these states. It is seen that states with high tribal populations account majorly for the average levels of poverty seen in a state. A high correlation is found between the two. At the state level, the broad indicator for income poverty across social categories is provided in Table 1.

In the Indian context, Scheduled Castes (SCs) and Scheduled Tribes (STs) and in some cases the Other Backward Castes (OBCs) are considered as socially disadvantaged groups, which have a higher probability of living under adverse conditions and poverty (Nayar 2007, Gang, Ira, Sen and Myeong-Su Yun 2002). To quote from the 11th Plan document "….a major weakness in the economy is that the growth is not perceived as being sufficiently inclusive for many groups, especially SCs, STs, and minorities. …… The lack of inclusiveness is borne out by data on several dimensions of performance."

Map 1: Percentage of Population Below Poverty Line in Indian States (2004-05)



Map 2 Percentage of Rural Tribal Population Below Poverty Line in Indian States (2004-05)



An equity or rights-based perspective to human well being prioritises principles of justice as more important than utilitarian or instrumental arguments and thereby seeks to support and empower the poor rather than making them subject to external interventions in their name. It demands all possible efforts in promoting social inclusion as a key to achieving universally accepted human development goals (Dasgupta and Thorat 2009). The FRA exemplifies such a rights-based approach to the development of forest peoples, and may represent a landmark in improving their legal position. .

The tribal population of the country was 8.2% of the total population, as per the 2001 Census, indicating a growth rate of a little less than 25% in absolute numbers over the period 1991-2001 It is a matter of grave concern that poverty among STs has actually increased, primarily in rural areas. Table 1 summarises state-wise data on tribal populations. *The absolute numbers of poor have in fact increased in several states over the same period, including Orissa.* It is of particular significance to the present study that the 11th Plan also notes that the SC and ST population suffers from multiple deprivations, particularly in terms of inequitable asset ownership such as land. Their health, nutrition and education indicators are much worse than the rest of the population, indicating higher relative deprivation. In rural India, data for 2004-05 clearly reveals a high degree of correspondence between high levels of poverty among SCs, STs and overall poverty. It is to be noted that even *states which have low overall poverty levels, such as Gujarat, Andhra Pradesh and Kerala also report high poverty levels for STs.* Andhra Pradesh is one of the states selected for this study. *West Bengal, another state selected for the study, shows higher poverty for the SCs, who form a sizeable portion of the forest dwelling community in the state.*

Table 1: Population Percentage under BPL by Social Groups (2004-05)

State Name	Rural			Urban		
	SCs	STs	Overall	SCs	STs	Overall
Andhra Pradesh	15.4	30.5	11.2	39.9	50	28
Assam	27.7	14.1	22.3	8.6	4.8	3.3
Bihar	64	53.3	42.1	67.2	57.2	34.6
Chattisgarh	32.7	54.7	40.8	52	41	41.2
Delhi	0	0	6.9	35.8	9.4	15.2
Gujarat	21.8	34.7	19.1	16	21.4	13
Haryana	26.8	0	13.6	33.4	4.6	15.1
Himachal Pradesh	19.6	14.9	10.7	5.6	2.4	3.4
Jammu & Kashmir	5.2	8.8	4.6	13.7	0	7.9
Jharkhand	57.9	54.2	46.3	47.2	45.1	20.2
Karnataka	31.8	23.5	20.8	50.6	58.3	32.6
Kerala	21.6	44.3	13.2	32.5	19.2	20.2
Madhya Pradesh	42.8	58.6	36.9	67.3	44.7	42.1
Maharashtra	44.8	56.6	29.6	43.2	40.4	32.2
Orissa	50.2	75.6	46.8	72.6	61.8	44.3
Punjab	14.6	30.7	9.2	16.1	2.1	7.1
Rajasthan	28.7	32.6	18.7	52.1	24.1	32.9
Tamil Nadu	31.2	32.1	22.9	40.2	32.5	22.2
Uttar Pradesh	44.8	32.4	33.4	44.9	37.4	30.6
Uttaranchal	54.2	43.2	40.8	65.7	64.4	36.5
West Bengal	29.5	42.4	28.6	28.5	25.7	14.8
India	36.8	47.3	28.3	39.9	33.3	25.7

Source: Eleventh Plan, Planning Commission, Government of India.

Poverty also continues to be closely related to the proportion of SC and ST population in the different states of India. There is a need for institutional mechanisms that embody targeted interventions to take note of the differing baselines across social groups and within states. In the three states that form the basis for the current analysis, Orissa, West Bengal and Andhra Pradesh, rural poverty among STs is higher than the state average by 30%, 14% and 19% respectively. As Dasgupta (1993) had noted environmental economics and the economics of destitution are tied to each other in an intricate web. This has become a stark reality in the case of forest dwellers in India, who have increasingly faced relative destitution while the economy has flourished in an aggregative sense.

Table 2 summarises the social composition across districts selected for the present study. It clearly indicates that these districts have tribal populations well above the national average of 8.2% as per the 2001 census. The exception is Andhra Pradesh, in which three of the selected districts have significantly lower tribal population, although the rights deprivation scenarios are quite relevant here.

Table 2: Distribution of Population by Social Category in the Selected Districts

State Name	District Name	% of SC pop.	% of ST pop.	Total population
West Bengal	West Midnapore	16.4	8.3	5193411
	Jalpaiguri	36.7	18.9	3401173
	Bankura	31.2	10.4	3192695
	Darjeeling	16.1	12.7	1609172
	Purulia	18.3	18.3	2536516
	West Bengal	**23**	**5.5**	**80176197**
Orissa	Deogarh	15.4	33.6	274095
	Nuapada	13.6	34.7	530524
	Bargarh	19.4	19.4	1345601
	Sambalpur	17	34.5	928889
	Kandhamal	16.9	52	647912
	Orissa	**16.5**	**22.1**	**36706920**
Andhra Pradesh	Adilabad	18.5	16.7	2488003
	Visakha	7.6	14.5	3832336
	East Godavari	18	3.9	4901420
	Kurnool	17.8	2	3529494
	West Godavari	19.2	2.5	3803517
	Andhra Pradesh	**16.2**	**6.6**	**76210007**

Source: Census, 2001

III. The FRA as an Institutional Innovation

Theory on common property resources has been a major basis for understanding livelihoods and income generation from forests... theory on understanding forest management, has been intricately linked to the development of theory on the commons (Ostrom 1990, 2001, 2005, Bromley 1989, Baland and Plateau, 1996, 2003, Dasgupta 1993). In the *de jure* sense of CPRs, forests in India are largely owned by the government. However, in the *de facto* sense, various access and use rights exist, making them akin to CPRs

Concerns of efficiency in resource management, including co-operation, distribution, enforcement and long run sustainability have been central to the literature on the commons. The tradition has been one of focussing on property rights in the discourse on economic approaches for efficiency in managing forestry institutions; this, in turn, leads to an understanding of the evolution of institutions on the basis of the rules that promote the development of institutions. There have been substantial theoretical developments over the last three decades with the use of game theory by economists and political scientists, demonstrating that co-operative outcomes can be sustained through socially constructed incentives.

Theory on collective action shows that beneficial outcomes on CPRs can be achieved, where there is a credible threat of punishment that can be enforced by the state or any other external enforcer. Game theoretic models have also demonstrated the possibility of unequal sharing of benefits in repeated games, even where the players may have been initially sharing benefits equally. Thus, agents can be locked into equilibrium strategies in repeated interactions which are unfair. Theoretically, any distribution of resources can be achieved and maintained in a long run dynamic game (Dasgupta 2005, Fudenberg and Maskin

1986). Socially constructed incentives, and the enforceability of these incentives, become central then in determining what outcomes are achieved across actors.

Viewed from this perspective, the FRA can be seen as an institutional innovation that legitimises socially constructed incentives, underpinning them with the threat of credible punishment by the law of the land[2]. The FRA is distinctly different from earlier policy initiatives since it represents a legally based reform of rights.

There are 2 main sets of rights to be gained in the FRA. These can be classified as (a) land rights (private and/or communal) including for past illegal eviction/displacement and (b) community rights including collective management of common (or community) forest resources; rights over common property resources such as produce of water bodies; grazing rights (for both settled and nomadic communities); rights over 'habitat' for PTGs; other customary rights and usufruct ('ownership') rights over NTFPs. The latter could be in the nature of either community or individual rights.

The FRA can potentially impact livelihoods and livelihood security through channels such as: elimination or reduction of rent seeking and harassment, providing incentives for land and forest investments to raise productivity, facilitate access to formal credit (with the help of supportive mechanisms), and facilitate the inclusion of these communities in development programmes (such as for forest villages). As an Act, it could have the potential to impact bargaining powers of different actors.

The sustainability of the process will depend upon the extent to which the Act is able to empower these marginalised communities so that they are able to increasingly merge with the formal sector, with the help of improved economic positions and access to education or skill development. For instance, access to credit can be facilitated to ensure investment in land or human capital. The property rights issues need to be thought out, since the right to land is an inalienable one, where for instance, one can cultivate but not sell or rent it out. Mechanisms that facilitate credit for cultivators and the adequacy of collateral will need some re-assessment of notions of collateral as far as these households are concerned. Convergence with programmes, such as the National Rural Employment Guarantee Scheme, where support can be obtained for land development also need to be worked out.

While the theory of CPRs helps in understanding the reasons for the positive potentials of the FRA in increasing economic output and efficiency of institutions, it is inadequate in explaining the dynamics of many real-world forestry institutions from a longer term perspective. Institutions are embedded within specific political contexts, and any change in the rules has distributional implications. A historical institutionalist perspective could for instance offer an option for judging the success or otherwise of the implementation of the Act, once it reaches full implementation. The Act could potentially prove to be a critical juncture providing the space for change, for transition to substantially higher levels of economic well being for forest people. On the other hand, implementation may not escape 'path dependency' from the entrenched power structure and locally embedded institutions. The present paper confines itself however to the evaluation of the potential impact of the Act, which was in its initial phase of implementation at the time of the study.

[2] However, the actual success of the Act would lie in its implementation, in a manner that does not erode well functioning, local institutions, where such pre-existing institutions do exist.

IV. Study Objective and Methods

Objective of the Study

The key research questions being raised here are as follows. Can the FRA lead to poverty alleviation and pro-poor growth? If the forest dwellers gain secure tenure and entitlements, will it help in sustained poverty alleviation and income growth? The objective is therefore to understand the potential for the FRA to make a difference to the livelihoods of forest dwellers and for poverty alleviation, based on the baseline data and information made available through the survey.

Sampling and Data

The Sampling Frame

The *target population* for this study is the various forest-rights deprived groups and individuals. The sampling is done at three levels: regions within states, hamlets/ villages and households.

States Selected for Study

Three states were purposively selected for the study - West Bengal, Orissa and AP. The chosen states become relevant and representative for the study context as they represent a range of administrative arrangements during the colonial period which determined many of the current rights deprivation scenarios which the FRA seeks to address.

Regions Within States

At the regional level agro climatic criteria are used to stratify the sample. This criterion embodies in itself variations in type of forest cover, the nature of forest dependency, and the administrative basis for rights. Table 3 provides a summary description of the states in terms of the relevant agro-climatic divisions in these states.

Table 3: Agro-climatic divisions in Study States

State	1	2	3
West Bengal	Hills	Plains	Mangrove
Orissa	Coastal	Inland ---- North west (Plateau)	South West (Plain)
A.P.	Coastal	Arid (Rayalseema)	(Plateau) Telengana

Subsequently, sscenarios of forest rights deprivation were identified and listed for each region. Study sites were subsequently selected through purposive sampling, to ensure representation of the major scenarios present in the region. The major scenarios and study sites are listed below for each state.

West Bengal

- North: Forest villages, protected forests, 'encroached' land, national parks / sanctuaries
- Southwest: 'encroached', rights deprived during West Bengal Estate Acquisition Act and conversion into protected forests, JFM issues, sacred groves, earlier evictions

Orissa

- West: Forest village, CFM , Sanctuary, Displacement villages
- South: PTG, Shifting cultivation, Unsurveyed

Andhra Pradesh

North*:* Scheduled area
Tribal: 'Sub-plan' areas
Plains: Non-scheduled areas

Village Cluster / Hamlet level Sampling

Once the study sites had been identified on the basis of the forest rights deprivation scenarios the hamlets falling into each category were identified. Random sampling was done to select hamlets. The target was to have adequate representation of villages/hamlets, ensuring a minimum of at least one hamlet covering the criteria listed above. The Gram Sabha was used for defining the boundaries for the village / cluster.

Household Sampling

Having selected hamlets for the research, PRA meetings and key informant interviews were used to develop a subjective wealth ranking exercise on the basis of which all the households were stratified. The selection of individual households was done through proportionate random sampling. Table 4 below presents a summary of the selected sample for the study.

Table 4: Summary of Selected Districts, Villages and Households

State	Village	District	Number of households
West Bengal	Bagghora	West Midnapore	13
	Bera	West Midnapore	8
	Buxa Road	Jalpaiguri	25
	Hillejhora	Darjeeling	20
	Kulam	Bankura	44
	Paintrishe Permanen	Darjeeling	20
	Saldih	Purulia	12
	Sirsi	West Midnapore	20
	Tiliabhasa	Purulia	14
Orissa	Brahmanimal	Deogarh	21
	Kantapada	Nuapada	24
	Lambipalli	Bargarh	18
	Loyendi		11
	Sarbejal	Sambalpur	23
	Gopalpalli		21
	Thakurpalli	Deogarh	26
Andhra Pradesh	Cheruvuguda	Adilabad	11
	Goppulapalem	Visakha	24
	Koruturu	West Godavari	25
	Pamuleru	East Godavari	13
	Panasanapalem	East Godavari	44
	Nagaluty	Kurnool	22

Methodology[3]

Data collection took place over a period of six months in 2008 in the three states. The quantitative data was gathered at both the household and the village level by administering two interview schedules. The village schedule was for key informant interviews while the household one was administered to all the households selected in the sample for the study.

The data has been analysed at two levels. The first section below report's findings based on simple analytics and descriptive data. The second section uses an applied econometric technique to gain further insights on the potential of the FRA in impacting the livelihoods of the poor. The purpose of the model is to understand the drivers for pro-poor growth amongst forest dwellers based on baseline data by looking at determinants of food security and cultivation. Food security is a situation that exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (State of Food Insecurity 2001).

The current UPA government is in the process of enacting a Right to Food legislation. Article 21 of the constitution which provides a fundamental right to life and personal liberty has also been repeatedly interpreted by the Supreme Court as enshrining within it the right to food. India today ranks 66th among the 88 countries surveyed by the International Food Policy Research Institute in composing the Global Hunger Index (2008), although it is the world's second fastest growing economy. In this scenario, it is only fitting to consider what the determinants are for ensuring food security which is a key marker of the presence / lack of vulnerability among poor populations. It is essential to look into the determinants of what constitutes sustainable options for food security among tribal populations. The FRA's potential to achieve this can be a crucial factor in promoting its implementation.

Econometric Model

The Heckman selection model is used for modelling the quantitative household level data. A food security function is estimated using the Heckman selection technique, fitting a regression model with selection by using full information maximum likelihood estimation. This technique helps us overcome the problem of not being able to observe food security for those who do not cultivate land in the survey period in our sample.

The model is based on the logic that certain factors determine whether a household cultivates land, perhaps a mix of factors within the household's choice set and those which are given to the household. For instance, the household may consider that the returns to being in alternative occupation are higher than the returns from cultivation. Thus, the decision to cultivate is not a random one, and it would be incorrect to use the Ordinary Least Squares method. Food security is observable only for those who are actually in cultivation. For the others, this variable is not observable, although there are underlying decision-making processes based on the returns from cultivation. Meaningful solutions to such models can be found if there are some variables that affect the chances for

[3] This study is part of a larger study which looks at several aspects of the FRA. A mix of qualitative and quantitative research methods was used. The study team was multidisciplinary and the field teams had expertise in gathering both qualitative and quantitative data. This paper is based primarily on an analysis of the quantitative data which was gathered at both household and village levels.

observation (of being a cultivator household) but not the final outcome (of having food security or the lack of it).[4] Alternatively put, we observe the extent of food security only for those for whom the production of food at home exceeds the alternative return from other occupation. In econometric terms, this would mean that the variable, months of food security from own production, is truncated.

The model is therefore formulated in terms of two equations: a selection equation – a probit estimation (takes a value of 1 if a household is a cultivator household, 0 otherwise) to explain the decision of whether to go in for food security through own cultivation or not, and a regression equation to explain the months of food security that are obtained, observable only for those for whom the selection equation takes a value of 1.

Model:
Selection equation: $z_i^* = w_i \gamma + u_i$; $z_i = 1$ if $z_i^* > 0$ and 0 otherwise

Regression model: $y_i = x_i\beta + \varepsilon_i$; observed only if $z_i = 1$

$(u_i, \varepsilon_i) \sim$ bivariate normal $[0, 0, 1, \sigma_\varepsilon, \rho]$ where ρ is the correlation between e_i and u_i[5].

V. Key Insights from Descriptive Data Analysis

Vulnerability to poverty has been defined in various ways. The options available to households for making a living, and, the ability of households in coping with the risks that they face while making a living is central to the idea of vulnerability. The primary survey conducted among the households in the selected villages provides data on several socio-economic variables affecting their access to a sustainable livelihood and the ability to cope with risks associated with it.

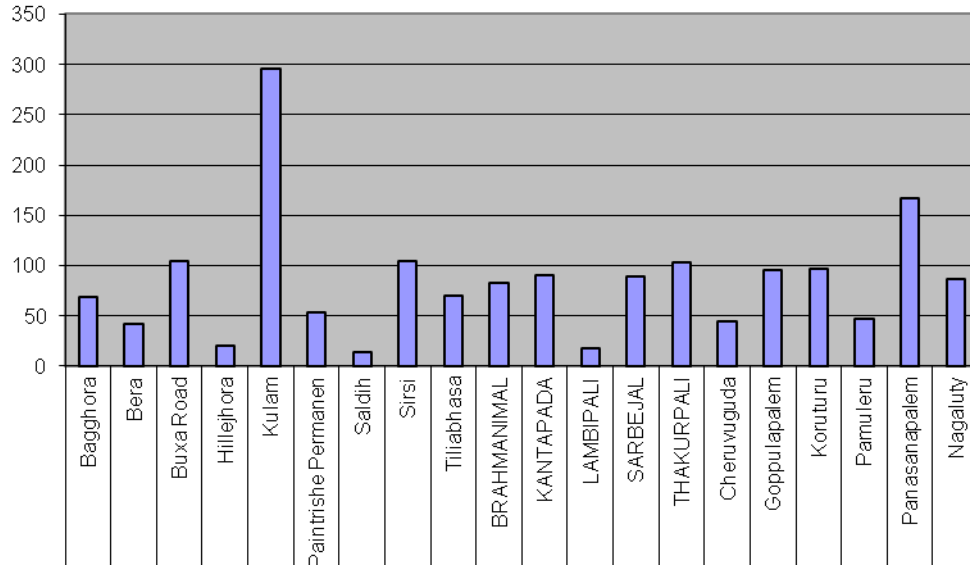
Using quantitative data, one is able to draw inferences on the livelihood behaviour and its determinants. We present below some preliminary insights on key variables that serve as markers for assessing vulnerability among the sampled households.

Village Characteristics

The number of households (graph 1) in each of the villages surveyed and their distribution (graph 2) among the two major social categories, SC and ST, is shown in the figures below.

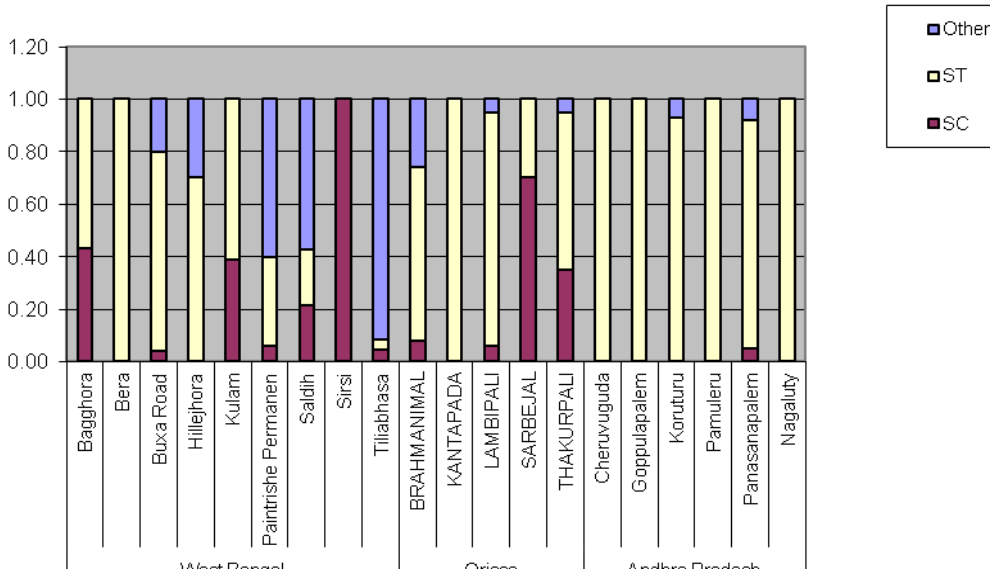
[4] See Greene, *Econometric Analysis* (2003), Stata software manual (2003) for theoretical details of the model and estimation method respectively.
[5] It follows that standard regression techniques would yield biased estimates when $\rho \neq 0$. Heckman provides consistent, asymptotically efficient estimates for all the parameters in such a model. In actual estimation, a likelihood ratio test of the independence of these equations (testing for $\rho = 0$) with the corresponding chi-squared statistic is done.

Graph 1 : Number of Households in Villages



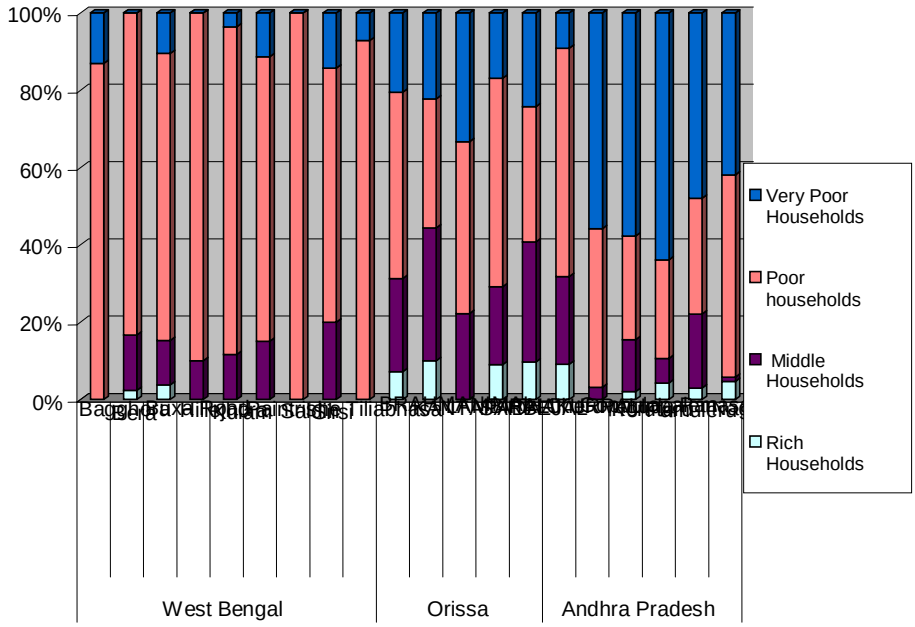
While the size of the villages is typically small with most villages having less than 100 households, Kulam and Panasanapalem are a typical with relatively larger number of households. While in Andhra and Orissa, tribal households dominate, in West Bengal there are significant numbers of SC households as well among forest dwellers.

Graph 2 Social Categories in the Villages



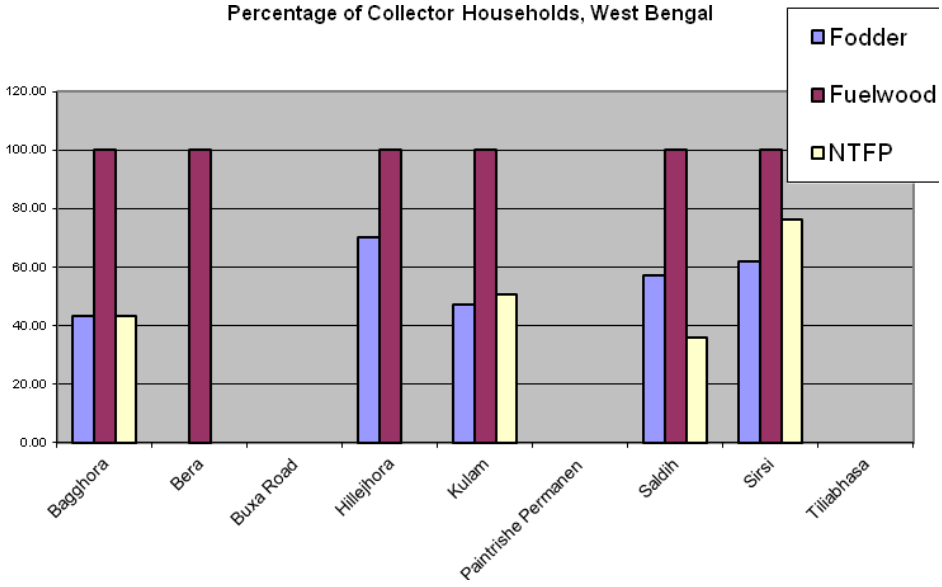
A subjective wealth ranking method was developed for each village in the dataset. The distribution is presented in graph 3. Although Andhra Pradesh has the highest per capita net state domestic product, in the selected tribal study villages, the proportion of very poor households is the highest, as compared to Orissa and West Bengal.

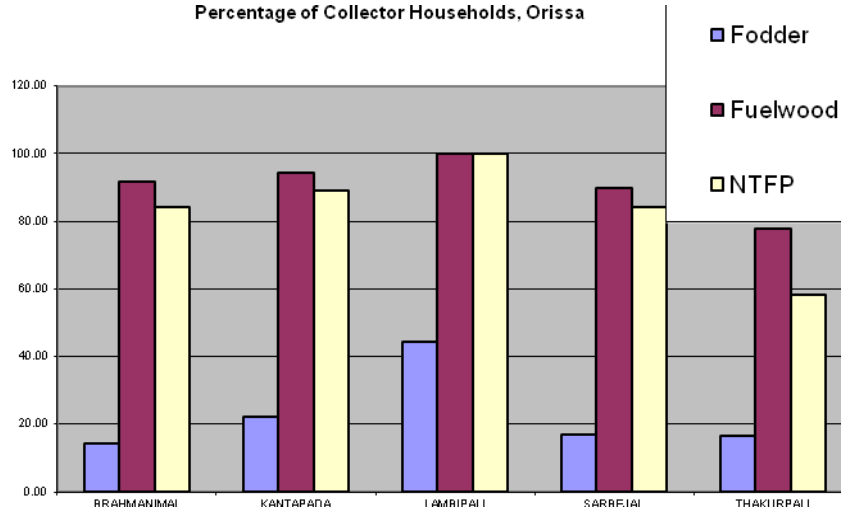
Graph 3 Wealth Ranking in the Villages

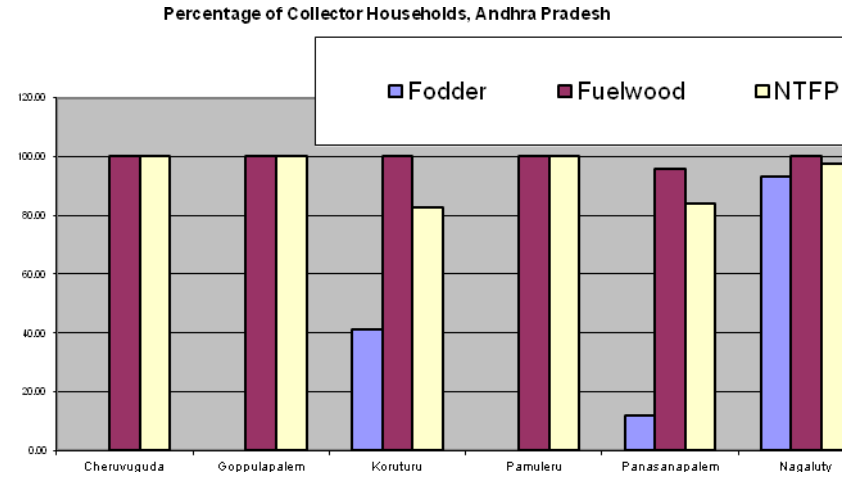


The proportion of households engaging in fuelwood collection is expectedly high across all the three states, while the proportion of households collecting NTFPs is much higher in Andhra, followed by Orissa and relatively much less in West Bengal (graph 4)

Graph 4 Percentage of households collecting fodder, fuelwood and NTFPs







Poverty

- Village Development

These villages have poor access to infrastructure in general although slight variations are seen in the three states (figure 1). In terms of a basic access variable, in Andhra and Orissa, 80% of the selected villages have access to an all-weather / metalled road, in West Bengal the figure is much lower at 55%. In terms of another basic infrastructure variable, primary schools are available in Andhra Pradesh and Orissa to a lesser extent, however, West Bengal falls short with less than half of the villages having a primary school.

It is prudent to remember that poor access to infrastructure has implications for the ability to sustain livelihoods and in building capacity to handle threats to livelihoods in terms of human capital investment and access to alternative sources of livelihood. We note that 50% of the population is illiterate while another 25% is educated only till the primary schooling level.

- Income Poverty

It is found that about 40% of the households have per capita income and per capita expenditure below Rs. 300 per month. If the N. C. Saxena Committee's (July 2009) recommendations are to be considered, approximately 75% of the households are below the Rs. 700 monthly per capita level, both for income and expenditure. This is an indicator of their poverty. The standard Planning Commission cut-offs (at Rs. 356 for rural India) would imply poverty for approximately 45% households whereas the Saxena Committee recommendations would mean that up to 75% are in poverty.

- Food security

Alternatively, considering food security as an indicator of vulnerability, we find that 25% households have food security for just 4.5 months, 50% for 7.5 months and the average across the entire sample in the three states is about 7 months in the year.

Land, Forests and Access to Credit

- Land occupied / cultivated without title

There has been considerable debate over the actual amount of land that is occupied without tile and is commonly described as "encroached" by the Forest Department. Using the term 'encroached' conflates those households who have customary hereditary claim to the land and those that have more recently moved onto it. Much of this land is likely to come up for claiming under the Act. Although we do not have complete data on communal lands, some inferences can be gathered from the data that has been collected in the survey, based on the individual household's reporting of the data[6]. In all 262 households out of the total sample of 459 households provided data on the amount of land occupied without title. *While 25% of the households reported 0.6 acres or less, even up to a total of 75% households reported having occupied up to a maximum of 3 acres, in many cases much less than that. The overall average for the sample is 2.12 acres.* While there is a negative relationship between land and livestock, the correlation gets stronger as the relatively larger land cultivators are removed from the dataset.

- Forest based livelihood

It was found that in terms of cash earnings, the share of forest based income in total household income was reported to be less than 15% for the majority of

[6] Note that this was, to the extent feasible, verified using hand held GPS devices by the field teams.

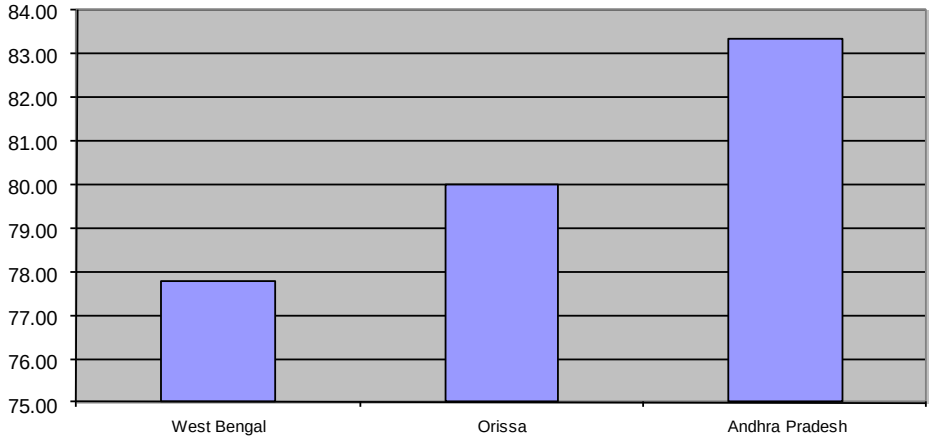
the households. Up to in fact 75% of the households earned cash from forest products, which constituted 25% or less of the household monthly income. However, this is only a partial picture of the dependence on forests in meeting livelihood needs since it captures only the monetised part of forest based inputs to the household, quite apart from reporting concerns. It also does not include the value of other ecosystem services from forests, which maybe complementary towards their livelihood related activities.

The relevance of the forests in supporting livelihoods in terms of fuelwood (in the absence of other forms of energy for cooking, heating and lighting), fodder collection for livestock and collection of NTFP for self-consumption is substantial. In terms of occupational profiles, while 48 household heads report collection activity from forests to be their primary occupation, for 53 households collections constitute the main secondary occupation for adult earning members.

• Village Access and NTFP Collections

A village facilities score was attempted using principal component analysis. This variable sought to capture the "access" aspect of households by taking into account the facilities available to a village. The 5 facilities that were considered include availability of an all weather road, bus stop, PHC / ICDS centre, primary school and PDS outlet in the village. A village got a score of one for each facility that it had and 0 for those which it did not. Subsequently a principal components analysis was done and a score was thereby generated, as a proxy for capturing the access effect. Except for West Bengal, a highly significant positive correlation was found between the village access score and the number of households collecting NTFP (0.93 and 0.89 for Orissa and Andhra Pradesh respectively). The overall correlation was 0.7 (5% level of significance). This has livelihood implications for the forest dwellers, particularly in terms of the significance of claiming communal rights. It is also of interest to note that most of the villages have a forest management body, although the functioning varies

Graph 5 Percentage of Surveyed Villages having Forest Management Bodies



widely (Graph 5).

- Access to Credit

There is a significant and positive relationship between (a) borrowings from banks / SHGs (as against private money lenders) and the income level of the household (b) between total amount of land cultivated and the amount of loan obtained. There is also a significant positive correlation between the loan

amount and the months of food security that a household is able to enjoy. However, the correlation between amount of land cultivated and food security is relatively less significant. This seems to reiterate the story that formal sources of borrowing are linked to land holdings and incomes, while private lenders meet the credit needs of the more disadvantaged in terms of assets. There also emerges a similarity with the argument being made at the national level for Indian agriculture, that credit is the major constraining factor for growth in agricultural productivity and incomes. However, we are unable to locate a strong positive correlation between borrowings from formal institutions and land cultivated under legal ownership (such as *patta*) as opposed to land which is encroached. Probably, the confounding factor is that access to credit depends also on the ease of availability of such formal institutional credit, which is a major constraint in these areas.

VI. Inferences on Food Security

The findings in this section are based on an econometric estimation as discussed in the Methodology section. The dependent variable in the food security estimation is the number of months of food security that a household reports from its own cultivation. For the selection (or cultivation) equation the explanatory variables used are: age of head of household, education of head of household[7], per capita monthly income, share of forest based income in total household income. For the regression equation (or food security) the explanatory variables used are amount of borrowings, land cultivated, whether head of household is literate, and the inverse of the dependency ratio.[8] Table 5 presents some summary statistics on the variables used in the estimation. Table 6 presents the results obtained from the estimation of the Heckman selection model. The results indicate that food security improves if:

- the access to credit is higher
- the extent of land cultivated is higher (expectedly)
- the level of literacy is greater
- household dependency ratio is lower

A household is more likely to be primarily a cultivator household if:

- the age of the head of the household is higher
- the level of education (below primary) is lower
- the share of forest based income in total income is higher
- the per capita income is lower

[7] The educational attainment of the head of the household is converted into a categorical variable for ease of estimation and interpretation. On average, the heads of household in the sample are not even literate, and thereby belonging to one of the most vulnerable groups in society as per this indicator.

[8] Certain other variables found to be important in other studies could not be used meaningfully in the regression due to econometric problems such as highly significant correlations across variables. Social category of the household (whether SC/ST) for instance had very little variation in the dataset.

Table 5: Summary Statistics for Variables used in Model Estimation

Variable Name	Number of Observations	Mean
Age of Head (in years)	459	44.54
Agricultural land Cultivated (in acres)	347	3.04
Food Security (in number of months)	404	7.43
Total Borrowings (in Rs)	246	5362.44
Share of Forest Based Income in monthly household income (percentage)	250	17.14
Education (0=illiterate, 1=literate, 2=primary, 3= higher)	459	0.92
Occupation (0=cultivation, 1=labour, 2=collection, 3= business/service/other)	459	0.86
Monthly Per Capita Expenditure (Rs.)	433	403.09
Inverse Dependency Ratio (number of earners/ number of dependents)	390	1.35
Per Capita Income (monthly, in Rs.)	432	612.77

Table 6: Results from Heckman Selection Model for Determinants of Food Security

Wald Chi2(4) = 5.75 ; Prob > chi2	*0.00*
LR Test of Independent Equations (rejects null hypothesis rho=0) ; Chi2(1)=18.91 Prob>Chi2	*0.00*
Regression model dependent variable: Number of Months of Food Security *Independent Variables:*	*Coefficient Values*
Total Debt	0.000023
Educational level (dummy for illiteracy)	-1.17
Inverse dependency ratio	0.58
Land Cultivated	0.244
Selection Equation:	
Educational level (dummy for primary and below)	0.42
Share of forest based income	0.014
Monthly per capita income	-0.002
Age of Head	0.013
Andhra Pradesh state dummy	significant
Orissa state dummy	insignificant

Note: All the coefficient values are significant at 95% level of confidence.

While these results are intuitively appealing as they confirm to expectations in most cases, it is worthwhile to dwell on a few inferences that can be drawn from these results in the specific context of the study.

The results, on which households are likely to be cultivator households in our specific context, are clearly vulnerability markers such as illiteracy and low per capita income. Further, an alternative formulation, replacing share of forest based income instead of the inverse of the dependency ratio in the food security equation produces a negative, significant relationship although the debt variable becomes weaker. The reason being that there is a significant negative correlation between the proportions of forest based income and the amount of borrowings by a household. Food security, therefore, is likely to be lower among those who depend more on forest based collections for cash income. This, despite the fact, that there is a higher probability of such households being cultivator-households. The reasoning being that it is not only the amount of land that is cultivated, but also the amount of credit that the household has access to that determines the food security position for the household. Note that even if credit is used for non-agricultural purposes, at the household level it could play a role in determining the amount of self-consumption that the household can opt for.

Thus access to land and access to credit are key determinants in improving the poverty situation in forest dweller households. The FRA therefore definitely has the potential to impact positively on poverty among forest dweller households. More so, on the poorest amongst these households, who are likely to have lower access to credit and a higher share of forest dependency in meeting their livelihood needs.

VII. Conclusions

The basic research question that the paper started with was whether the institutional reform could actually result in promoting improved livelihoods for the households involved. Can implementation of the Forest Act actually deliver tangible rights to productive land and forest assets to the poor?

It is obvious that tackling poverty remains a huge challenge for the economy with regard to tribal populations, quite irrespective of the economic growth experienced at the aggregative level in the recent past. The analysis in the paper clearly reveals the continued significance of access to land and access to forest resources in determining food security for forest dwellers. Food security is the primary concern for policy makers seeking to address poverty alleviation. The FRA if implemented properly clearly has the potential to place the economy on a new path of economic development, which takes care of the poverty of one of the historically disadvantaged sections of the population. This would indeed constitute a critical juncture. However, its success will depend on its implementation, particularly so in the context of a heterogeneous and culturally diverse society, which has experienced increasing inequality in recent years. The primary cause of poverty in the case of tribals has been their alienation from land due to various reasons, including the eminent domain of the state expressed primarily through the regulation and functioning of the forest department and land administration policies. Large developmental projects have also run into controversies because of their implications for displacement of tribals and disruption of their livelihoods without adequate resettlement and rehabilitation. To the extent that the FRA can help in not just restoring livelihoods, but more importantly, can be the means of leveraging productive investment and credit, it can contribute to poverty alleviation. It can do so in several ways, including the de-escalation of tensions that have arisen due to the loss of customary rights.

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