Paper presented in

Seventh Biennial Conference

Indian Society for Ecological Economics (INSEE)

Global Change, Ecosystems, Sustainability

December 4-8, 2013

Host:
Tezpur University

Cohost:
OKD Institute of Social Change and Development

Erosion of Common Pool Land Resources in India: Role of socio-economic inequalities [1]

Sneha Thapliyal
Doctoral Candidate
Public Policy
IIM Bangalore
Bannerghatta Road
Bengaluru: 560076, India
Email: sneha.thapliyal09@iimb.ernet.in

[1]Submitted for The Seventh Biennial Conference of The Indian Society for Ecological Economics (INSEE) on "Global Change, Ecosystems, Sustainability". This is a working paper from the author's doctoral dissertation. Please do not cite or publish without author's permission.

Erosion of Common Pool Land Resources in India: Role of socio-economic inequalities

Abstract

Decline in Common Pool Land Resources (CPLRs) intensifies the vulnerability of rural population, particularly the rural poor, in the developing nations. Thus, it is crucial to examine the factors that contribute to the erosion of CPLRs. We investigate the effect of socio-economic inequalities on the loss of CPLRs attributed to privatization. Using the nationally representative data for India collected by National Sample Survey Organization in 1998, we analyse two outcomes for land under Commons at village and district level: (a) whether or not land is lost to privatization, and (b) the area of such losses. Our main findings are that (i) higher economic inequality leads to greater likelihood of erosion of CPLRs, (ii) higher social inequality measured for Scheduled Castes in a region increases the likelihood of CPLR loss while higher social inequality measured for Other Backward Castes increases the extent of area lost, and (iii) greater proportion of landless households belonging to backward castes increases the likelihood of CPLR loss and the relative area lost. Given that our results encompass varied forms of CPLRs with different institutional regimes across 15 agroclimatic zones in India, the findings have crucial implications for Commons' management policies in the developing world.

Keywords: Common Pool Land Resources, Privatization of Commons, Socio-economic inequalities, India, NSSO.

1 INTRODUCTION

Substantial decline has been consistently recorded in Common Pool Land Resources (henceforth CPLRs) over the last three decades in the developing nations. For instance, land under CPLRs was approximately 21.55% of India's total geographical area in 1980 [25] which reduced to 15% in 1998 [45]. Such erosion has severe consequences for the rural population since the Commons play a pivotal role in rural economies. Significant contributions of CPLRs to rural livelihoods include complementary roles such as extraction of resource units (for example timber, fodder and non-timber forest products) [21], supplementary roles in agriculture [34] and as safety nets in times of stresses owing to agrarian crises or natural disasters [56]. Furthermore, since rural poor depend more on Commons than non-poor [22, 33, 34], erosion of CPLRs exacerbates the vulnerability of the rural poor. It is, thus, imperative to understand the underlying factors leading to erosion of CPLRs.

CPLRs may decline in quality (i.e. deteriorating ecological sustainability) or in extent (i.e. decrease in area under Commons). Ecological sustainability of CPLRs has been the focal point of research on Commons. Scholars have analysed how varied forms of governance regimes, local institutional arrangements, and the factors that result in successful collective action within communities, affect the ecological outcomes of Commons (see [7, 40] for review). On the other hand, the factors contributing to the loss of areas classified as CPLRs are largely unexplored. Such erosion becomes even more important to investigate as a considerable proportion of CPLRs' area lost is attributed to privatization [29, 32, 35]. More specifically, area under CPLRs is often diverted to lease for agriculture and non-agricultural purposes [34, 41], legalized encroachments by rural households [51] and for government policies on redistribution of land among poor households [25].

As is characteristic of restricted resources, CPLRs are continually subjected to contested priorities of social actors in physical boundaries and ownership. The results of struggles to own and control these resources are often determined by the embedded social and economic hierarchies existing within a village *internally*, and within larger administrative units across states *externally*. Recent contributions to scholarship on Commons address the effects of socio-economic inequalities on local institutions and, hence, on Commons' ecological outcomes [3, 10]. Yet, research on impact of inequalities on one of the most significant drivers of CPLRs' loss, i.e. privatization, remains rare. To address this gap, we investigate two key questions: (a) Is the likelihood of loss of CPLRs higher in areas with greater socio-economic inequalities? (b) Do socio-economic inequalities determine the extent of such area lost? We use the 54^{th} round of data collected by National Sample Survey Organization (NSSO) in 1998 on CPLRs across India for the analysis.

Inequalities exist along diverse dimensions [60], including economic, social, political, and gender inequalities. Each of these inequalities has potentially different impacts on environmental outcomes [30]. Interactions between these outcomes make it difficult to discernibly assess the effects of inequality if measured along a single dimension. This complexity is also attributed as one of the reasons behind limited consensus on the role of inequality in environmental outcomes [10]. The unique dataset we use allows us to address these concerns. We estimate both, economic (measured using Gini based on land holding of rural households) and social inequality (measured using Social Heterogenity Index based on the social group of the households) within a village. In addition, we account for proportion of female-headed households and sex ratio within a village to address gender inequalities. We do not account for political inequality as we do not have the required information. However, political and economic inequalities have been noted to have a high degree of correlation. Hence, we consider that our chosen measure of economic inequality proxies for the political inequalities to a certain degree.

Specifically in the Indian context, greater proportion of the case studies focus on the pastures of arid regions and forests in the Himalayan belt [8, 40]. To broaden the scope of analysis, we examine varied types of CPLRs in India including grazing land, forests, threshing floors, and barren land. Fifteen agro-climatic zones across the country are also factored in to the analysis in order to account for the different ecological systems that CPLRs are embedded in.

Results show that one percentage point increase in Gini index for land-holding based inequality within villages increases the likelihood of CPLRs being privatized by around 5 percentage points. Also, higher social inequality measured for Scheduled Castes within villages is associated with approximately 5 percentage points increase in the likelihood of loss of land under Commons. One percentage point increase in the social inequality measured for Other Backward Classes in a district leads to about 12 percentage points increase in the extent of area lost. Higher proportion of landless households belonging to backward social groups increases the likelihood of and the relative area of CPLR loss. This is indicative of elite capture of land resources.

The rest of the paper is arranged as follows: section 2 gives a background to CPLRs in India, section 3 discusses the role of socio-economic inequalities in loss of CPLRs, section 4 discusses the data and empirical strategy, section 5 discusses the results and section 6 concludes.

2 COMMON POOL LAND RESOURCES IN INDIA

A subset of Common Pool Resources, CPLRs in the Indian context primarily include village forests, community pastures, community threshing floors and barren lands. *Coarse-grained* classification of CPLR governance regimes in India includes state controlled, co-managed between state and communities, community managed and privately owned [7]. After the re-orientation of natural resource management policies in 1990s, including National Forest Policy of 1988 and Joint Forest Management guidelines of 1990, the institutional shift towards community driven initiatives has been observed across majority of the states [8]. However, substantial proportions of CPLRs continue to be under state management regimes with only minor and differential usufruct rights accorded to the communities. For instance, of the 70.4 million hectares of forests in India in 2000, 53.6 million ha was government administered and 11.6 million ha was community administered [61]. It is important to note that of the four bundles of user rights associated with Commons' use namely, access and withdrawal (right to enter and obtain 'products' of the resource), management (right to regulate the use pattern and transform the resource), exclusion (right to determine who will have access and how that right may be transferred), and alienation (right to sell or lease either or both of the rights to management and exclusion) [55], communities in India mostly have only access and withdrawal rights for CPLRs. Management, exclusion and alienation rights are only present in some community-managed regimes such as Forest Protection Committees. There has been extensive research on communities that exercise two or more of these rights, especially in pastures and forest management, but research exploring fate of other types of CPLRs (such as waste lands and threshing floors) is few and far between (exceptions include [11]. This mandates a deeper understanding of dynamics played out in CPLRs, including the ones where communities only have the right to access such natural resources.

Aside from the ecological services, Common Pool Resources contribute an estimated

US$ 5 billion annually to the rural economy in India [22]. This includes extraction of resource units including fuel wood, fodder and a variety of non-timber forest products (NTFPs) such as fibre, bamboo, medicinal herbs, oils, resin, gum and honey for consumption and sale. At the national level, average annual collections per household from CPLRs were estimated to be worth Rs. 693 in 1998, with 48% of rural households reporting collection of any material [45]. Ratio of average value of collection from CPLRs to monthly consumption of households of rural households for the same period was 3.02% (Table T8, [45]). Various micro-studies estimate the contribution of CPLRs to rural poor households to be between 12% and 23% [21, 34]. While some case studies evaluating household dependence on CPLRs in India find that poor benefit more from CPLRs [33], others find that the poor benefit more in relative terms and the rich benefit more in absolute terms [43, 47]. In addition to the supplementary role in rural incomes, CPLRs also play a complementary role in rural livelihood strategies. For instance, CPLRs foster off-season activities, sustenance during drought, additional crop activities, and provide fodder for additional cattle and source of raw material for handicrafts. CPLRs, such as grazing lands, also provide inputs to households' agricultural production [36]. Furthermore, CPLRs act as vital source of inputs for the poor especially during the lean or pre-harvest seasons and in times of stress [56]. Consequently, usufruct rights contribute to the income of poor households and also have notable redistributive effect [22]. Hence, CPLRs play an important role in the rural economy and are critical to livelihood strategies of the rural poor.

Decline of CPLRs

A steady decline in area under CPLRs has been recorded in India over the last three decades. In his study of 21 districts across 7 states of western and southern India, Jodha [37] observed a decline ranging from 26% to 54% in CPLRs between 1950s and 1980s. Pasha [47] noted a loss of 36% to 24% in area under commons in Karnataka

between 1970 and 1990. Using reclassification of land-use statistics, Chopra [27] assessed area under CPLRs to be 21.55% of India's total geographical area in 1980-81. Country-wide survey conducted in 1998 estimated that CPLRs reduced to 15%, with loss of area ranging between 1-32% in across various districts [45]. Salman and Munir [54] find that CPLRs were 34.38% of the land in Uttar Pradesh in 1950-51 which declined to 14.3% in 2005 , with the loss in area for the last decade of the assessment period reported to be 20,765 ha. Given the nature and extent of dependence of rural population on CPLRs in India, such erosion of CPLRs has severe implications for rural livelihood strategies.

3 COMMON POOL LAND RESOURCES AND INEQUALITIES

Role of socio-economic inequalities has been extensively discussed in the literature as determinants of successful collective action and, consequently, of ecological sustainability. Economic hetereogenity - including inequality of wealth, income or economic opportunity within a community [24] - has been found to have positive [9, 59, 60], negative [46], U-shaped [16, 17] and ambiguous [12, 13] impacts on successful collective action. Similarly, while some studies observe a negative effect of socio-cultural heterogeneity on collective action [17, 52], others do not associate it with either higher or lower levels of collective action [48, 58]. Some scholars also argue that similarities in goals [39] and sense of community as symbolic capital [28] enable better resource allocation despite economic and caste heterogeneity. Elaborating on the key distinction between successful collective action and provisioning of collective goods, Ruttan [53] finds that the "ambiguous effect", as determined by Baland and Platteau [12, 13], refers to negative effect of economic inequality on the former and indeterminate effect on the latter. Economic inequality may have a positive effect on provisioning when the economically advantaged individuals gain from providing the collective goods or when actions of one or few individuals provide

sufficient positive externalities to provide good for all [9, 53]. Using a game theoretical model, Bardhan and Ghatak [18] find that asset inequality lowers the total provision of public goods and lowers total extraction from Commons. Our paper develops on the role of socio-economic inequalities in provisioning of collective goods. However, our focus is on the property rights status of CPLRs as opposed to their ecological sustainability. We consider the provisioning of collective goods to be averting erosion of CPLRs. Scholars have documented that socio-economic characteristics of communities determine households' access to Commons [1, 2], even if property rights exist [49, 50]. Even in regions (usually Common forests) where traditional community management regimes are recognized or co-management regimes are in force, access to natural resources is not homogeneous across the regimes or equal for all households within a region [44]. Such community-based institutions, whether formally constituted or as informal aggregations of individuals, are often transformed by group actions within villages [31, 38]. For instance, considerable conflict over resources is recorded, particularly between very poor women and better-off farmers [19, 20]. Thus, the fundamental source of power of actors within the village to appropriate CPLRs benefits is derived from their economic and social status. In addition, management rights for most forms of CPLRs rests with the village institutions such as *panchayats*. Capture of these local-level institutions by village elite [23], i.e. land-rich households belonging to higher social castes, manifests as distinct trends in encroachments on CPLRs in the favour of the elite [34, 47, 51]. Fuzzy nature of land records in developing countries also serves as incentive to encroach on land and subsequently privatize it [41]. Furthermore, village elites possess the technological means necessary for large scale encroachments. Their influence in the village councils and local administration also increases the likelihood of such encroachments being legalized. Moreover, since the village elites do not depend on CPLRs for subsistence, conversion of CPLRs towards any use with direct or indirect potential benefits to them would be a favoured option. These socially powerful groups of actors may prompt the local administration to draft and implement policies towards the use of land for other purposes. Hence, we posit that

higher socio-economic inequalities within a village would reinforce both, actual ease of legalized encroachments and elite capture of decision making process within the local and state level institutions, thus leading to a greater loss of CPLRs. However, in more homogeneous communities, it is likely that CPLRs are protected for collective benefits. Externally, broader economic and political agendas operative within administrative units often lead to outcomes in the other extreme end of the property rights spectrum i.e. privatization. Given that legal ownership of most forms of CPLRs rests with the state governments in India, CPLRs may be reclassified by the state to aid its developmental agenda including land redistribution policies, introduction or augmentation of existing industrial set up, infrastructure etc. Diverse actors in governing at multiple scales (including legitimate representatives of the state, community leaders or corporate representatives) exploit unevenness of formal and informal bundle of powers (as defined by [50]) to mediate access to land [62]. For instance, historical bureaucratic appropriation of traditional historical rights of local communities restricted the availability of land access to Commons [15, 37]. Vested interests of economically powerful stakeholders acquiring the land, such as corporations, would also influence policies of state governments. We posit that regions with greater proportion of marginalized population will not be able to counter such land acquisitions as they are weak social actors in the political bargains. In contrast, even when policies are formulated to aid the socio-economically backward classes, execution of such ameliorative measures often does not achieve the desired goals. For instance, abolition of feudal system and subsequent land reforms has been recorded to benefit the better-off households to a greater extent than the poor [36, 37]. Even when land under Commons was redistributed to poorer households, they often disposed of it due to lack of technical skills and complementary inputs to put it to productive use [32]. Thus, we posit that higher socio-economic inequalities within an administrative region increases the likelihood of CPLRs being converted to private property.

4 DATA

National Sample Survey Organization (NSSO) conducted the first countrywide survey to estimate size, nature and utilization of Common Pool Resources in India in their 54^{th} Round. The survey period was between January 1998 and June 1998 and consisted of two schedules pertaining to CPLRs: household level (Schedule 31) and village level (Schedule 3.3) surveys. Schedule 31 contains information on key household characteristics, CPLR dependence, and cultivation practises. Schedule 3.3 contains information on size of CPLRs, rights of access within these CPLRs and infrastructural facilities in the village surveyed. Two-stage stratified sampling design was adopted by NSSO in data collection. In total, 78,990 households were interviewed for the survey. Collection of data on the size of CPLRs was based on the *de jure* concept i.e. CPLRs within the boundary of the village which are formally (i.e. by legal sanction or official assignment) held by village panchayat or a community of the village. The *de facto* concept was used for collecting information on use of CPLRs. This included areas nominally held by the village and used by the community by convention irrespective of ownership. The survey also provides disaggregated information at the state level in terms of fifteen agro-climatic zones namely Western Himalayas, Eastern Himalayas (include North Eastern Hills) and Bramhaputra Valley , Lower Gangetic Plains, Middle Gangetic Plains, Trans-Gangetic Plains, Upper Gangetic Plains, Central Plateau and Hills, Eastern Plateau and Hills, Western Plateau and Hills, Southern Plateau and Hills, East Coast Plains and Hills, West Coast Plains and Hills, Gujarat Coast Plains and Hills, Western Dry Region and All Islands.

We use pooled data from Schedule 31 and 3.3 to map household characteristics to the First Sampling Units (cluster of villages within a district) for our primary analysis. The detailed household level information (Schedule 31) was aggregated at the First Sampling Unit (FSU) level and merged with characteristics of the villages within each FSU (Schedule 3.3). This dataset has 4917 FSUs across the Indian states, out of which 678 FSUs recorded decrease in CPLRs between 1993 and 1998. Information on FSUs within

a district was further collapsed to mean values of control variables for each of the 480 districts surveyed. We also analyse the erosion of CPLRs at the district level.

FSU characteristics

Characteristics of villages within the FSUs include *de jure* area under different types of CPLRs, namely pastures, village forest and woodlot, threshing floors and waste lands. For each of these types of CPLR, rights of use are recorded for the villages surveyed. NSSO records access rights as following: a) no right of community use in any part; b) some area for community use and the area is owned and managed by a tribal community; c) some area for community use and the area is owned and managed by a non-tribal community or more than one community; d) partly reserved for come communities and partly for all villagers; and e) entirely for all villagers. Area under forests, including reserved, protected and unclassed forests, managed by state Forest or Revenue Department are also recorded. Whether or not village has a forest within 2 kms of its boundaries is also taken into account. Access rights to these forests include: a) no right, b) restricted to collect a few NTFPs, c) collection of a large number of minor forest produce permitted, and d) other less restrictive right of use.

In addition, we include dummies for three broad management regimes: Forest Department, Panchayats and Revenue Department. We also use information on village level institutions for natural resource management such as presence of Joint Forest Management or Village Forest Protection Committees. To account for infrastructure at the village level, we use dummy variables for presence of bus stops, post offices and primary schools within 2 kms of the villages within FSU. We also use presence of land leased to any individual or corporation not belonging to the village as a proxy for the land-use related policies within the administrative unit. Access to markets has been recorded in literature to impact extraction from CPLRs. Following Chopra [25], we use the presence of metalled road within 2 kms of the villages as a proxy for access to markets. Based on Tarui [57], we also account for access to credit, using presence of commercial, cooperative

or rural bank within 2 kms of the village as a proxy variables.

We also use district level information on the colonial land tenure regimes [14], i.e. *Zamindari* (landlord-based), *Mahalwari* (village-based), *Raiyatwari* (individual-based), Princely and Mixed to account for historical property rights institutions. Land tax was one of the major sources of revenue for the colonial regime in India. Institutionalizing state control over land was a significant trend during the British regime, with nearly all cultivable land under one of these alternative systems. This historical context has bearings on CPLRs‘ outcomes in multiple ways. As Banerjee and Iyer (2005) demonstrate, these institutions have had an impact on the agricultural investments and productivity, as well as investments in health and education in the post independence period. Landlord based systems fare the worst in terms of agricultural investments and land productivity. This would, presumably, cause the population in such regions to have greater dependence on CPLRs. Banerjee and Iyer (2005) also note that these land tenure regimes led to differences in distribution of wealth and political power. Again, regions with landlord-based system witnessed a persistently higher economic inequality pre and post-independence and arbitrary powers in the hands of the village elites. Such entrenched inequalities and power dynamics would also manifest as elite capture of the CPLRs and act as incentives to encroach.

Household level characteristics

Information on landholding and social group of the households within each FSU is used to estimate the economic and social inequalities indices respectively for that FSU. Other important variables include primary occupation, net area under cultivation, amount of extraction from CPLRs (in kgs.), ownership of cattle and possession of own dug or bore well. Female members of the households are often the group most directly dependent on CPLRs and subsequently are adversely impacted by appropriation of natural resources by state or individuals [4, 5]. However, gender inequality, based on deeply embedded social

Table 1: **Descriptive Statistics**

Variable	Observations	Mean	Std. Dev.	Min	Max
Whether or not land reduced between 1993 and 1998	4917	0.14	0.34	0	1.00
Relative area reduced between 1993 and 1998	678	0.46	0.40	0	1.00
District level variables					
Average annual rainfall of the district from 1993 to 1998 (in mm.)	4917	5593.7	2136.4	1.3	12512.7
Historical land tenure regimes:					
Village-based system (Mahalwari)	4917	0.19	0.39	0	1.00
Landlord-based systems (Zamindari and Malguzari)	4917	0.19	0.39	0	1.00
Mixed	4917	0.16	0.36	0	1.00
Princely	4917	0.17	0.37	0	1.00
Individual-based system (Raiyatwari)	4917	0.16	0.37	0	1.00
FSU Characteristics					
De jure area classified as threshing floors (in ha.)	4917	0.06	0.51	0	18.40
De jure area classified as barren sites (in ha.)	4917	0.26	1.37	0	43.48
De jure area classified as grazing lands (in ha.)	4917	0.14	0.64	0	14.17
De jure area classified as village forests (in ha.)	4917	0.08	0.76	0	25.00
Area classified as Reserved, Protected and Unclassed forests (in ha.)	4917	60.60	430.34	0	14835.00
Presence of Reserved, Protected or Unclassed forest					
within 2 kms of the villages within FSUs	4917	0.30	0.46	0	1.00
Sex ratio of the FSU	4917	0.05	0.03	0	0.47
Presence of local body for CPLR management	4917	0.04	0.19	0	1.00
Whether SCs were allowed to access CPLRs	4917	0.72	0.43	0	1.00
Whether specific areas were reserved for SCs	4917	0.01	0.08	0	1.00
Whether specific areas were reserved for STs	4917	0.0020	0.05	0	1.00
Whether specific areas were reserved for OBCs	4917	0.0022	0.05	0	1.00
Presence of commercial, cooperative or rural banks					
within 2 kms of the villages of the FSU	4917	0.37	0.48	0	1.00
Presence of self-help groups					
within 2 kms of the villages of the FSU	4917	0.21	0.40	0	1.00
Presence of higher secondary school					
within 2 kms of the villages of the FSU	4917	0.22	0.41	0	1.00
Presence of metalled road					
within 2 kms of the villages of the FSUs	4917	0.74	0.44	0	1.00
Presence of Post Office					
within 2 kms of the villages of the FSU	4917	0.69	0.46	0	1.00
Presence of bus stop					
within 2 kms of the villages of the FSU	4917	0.66	0.47	0	1.00
Whether land was leased to individuals or groups					
not belonging to the villages within the FSU	4917	0.16	0.37	0	1.00
Area under such lease (in ha.)	4917	1.68	13.11	0	590.00
If majority of HHs within FSU report use of CPLRs for fuelwood and fodder	4917	0.67	0.47	0	1.00
If majority of HHs within FSU report use of CPLRs for NTFPs	4917	0.51	0.50	0	1.00
Household characteristics					
Size of HHs	4917	5.09	1.16	1	37.63
Whether HH owns cattle	4917	0.56	0.29	0	1.00
Whether the HH is female-headed	4917	2.43	0.56	0	6.81
Occupation of HH head:					
Self-employed in agriculture	4917	0.36	0.26	0	1.00
Self-employed in non-agriculture	4917	0.11	0.13	0	1.00
Agricultural labour	4917	0.30	0.23	0	1.00
Non-agricultural labour	4917	0.09	0.15	0	1.00
Others	4917	0.14	0.14	0	1.00
Net sown land (in ha)	4917	0.76	0.81	0	9.38
Total fodder extracted from CPLRs (in kgs.)	4917	3.12	10.30	0	168.06
Total NTFPs extracted from CPLRs (in kgs.)	4917	1.29	19.57	0	946.89
Total fuelwood extracted from CPLRs (in kgs.)	4917	7.04	16.36	0	497.50
Whether rights to tree pattas are given to households	4917	0.00	0.05	0	1.00
Whether the HH was prevented from using CPLRs in the last year	4917	0.02	0.11	0	1.00

norms operate both within and outside households in a community, often keeps women away from any deliberations at community or household level [6]. In order to address this crucial axis of inequality, we account for the sex ratio within the FSU and also use a dummy variable for female headed households.

Chopra and Dasgupta [25, 26] have used the household level data (Schedule 31) for the states of Bihar, Karnataka, Madhya Pradesh and Maharashtra in a static household decision-making model to understand whether households collect forest products for sale or consumption for income diversification and not just subsistence. Menon and Vadivelu [42] examined the differential use and dependence on CPLRs across agro-climatic zones and of households with different sizes of operational land holdings for the entire country.

Measuring Inequalities

While game theoretical models have used differences in wealth as a key indicator of group inequality (for eg. [9, 12]), research exploring the relationship between economic inequalities and ecological outcomes of CPLRs also uses relative rankings given by households within the community [10] or categorizes households based on size of land holdings [2]. Nonetheless, a significant body of literature uses Gini coefficient based on landholdings as the measure of economic inequality (for eg. [17]). We estimate the Gini coefficients for each FSU and district based on total land held by households within that FSU and district respectively to measure economic inequality. To estimate social inequalities, we use the Social Heterogeneity Index (SHI) [59] for each of the three socially backward groups Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Classes (OBC) and general caste at FSU level and district level. As a measure of social inequality, this index estimates the probability that two randomly selected households from one FSU will not belong to the same social group. The index varies from 0 to 1, 0 being pure social equality and 1 representing extreme social inequality.

$$SHI_{ifs} = 1 - \sum_{s=1}^{n} (P_s)^2$$

where, SHI_{ifs} is social heterogeneity index representing the plausibility that two households randomly selected from the FSU f within a district i do not belong to the same social group s; P_s is the proportion of sample population belonging to social group s.

Table 2: Loss of CPLRs and inequality indices across Indian states

State	De jure CPLR Area in 1998 (in thousand ha.)	Area reduced between 1993 and 1998 (in thousand ha.)	Gini	Social Heterogenity index for OBCs	Social Heterogenity index for STs	Social Heterogenity index for SCs
Andhra Pradesh	698.4	23.2	0.79	0.88	0.94	1.00
Arunachal Pradesh	67.5	0.5	0.65	0.99	1.00	0.39
Assam	26.9	1.1	0.58	0.96	0.99	0.96
Bihar	182.8	5.1	0.72	0.84	0.95	0.99
Goa	2.0	0.0	0.85	0.98	1.00	1.00
Gujarat	786.6	1.7	0.75	0.96	0.99	0.96
Haryana	32.8	0.7	0.78	0.92	0.93	1.00
Himachal Pradesh	80.0	0.0	0.59	0.99	0.94	1.00
Jammu and Kashmir	46.0	1.1	0.51	0.99	0.99	1.00
Karanataka	360.4	7.9	0.69	0.96	0.97	0.99
Kerala	185.2	0.0	0.71	0.82	0.99	1.00
Madhya Pradesh	768.2	5.0	0.63	0.90	0.97	0.92
Maharashtra	661.0	10.5	0.74	0.98	0.96	0.99
Manipur	22.6	0.0	0.51	0.96	1.00	0.78
Meghalaya	55.0	1.4	0.53	1.00	1.00	0.11
Mizoram	347.4	2.2	0.77	0.99	1.00	0.29
Nagaland	686.7	17.9	0.44	1.00	1.00	0.09
Orissa	135.6	15.0	0.66	0.92	0.96	0.94
Punjab	10.1	0.4	0.83	0.99	0.83	1.00
Rajasthan	1053.1	25.3	0.65	0.96	0.96	0.97
Sikkim	51.8	0.0	0.65	0.93	0.99	0.93
Tamil Nadu	526.5	1.8	0.80	0.71	0.93	1.00
Tripura	10.6	0.0	0.70	0.97	0.93	0.98
Uttar Pradesh	311.6	27.9	0.66	0.88	0.93	1.00
West Bengal	40.4	2.5	0.71	1.00	0.88	1.00

EMPIRICAL STRATEGY

We have two outcome variables of interest: whether or not loss in CPLRs was recorded in the last 5 yrs and the relative area reduced between 1993 and 1998. The first is a dummy variable for the FSU taking the value of 1 if the land decreased between these 5 years. For all such FSUs where CPLRs did decrease, we run our second set of models with the relative area reduced between 1993 and 1998 as the dependent variable. We calculated the CPLR area in 1993 for each of the FSUs and districts by adding the area reduced to the total *de jure* area under all forms of CPLRs recorded respectively.

Relative CPLR area reduced = (CPLR area in 1993-CPLR area in 1998)/CPLR area in 1993

The basic OLS model is as follows:

$$\triangle CPLR_{if} = \beta_0 + \beta_1 Inequalities_{if} + \beta_2 VillageCharacs_{if} + \beta_3 HHCharacs_{if} + \epsilon_{if} \quad (1)$$

where, $\triangle CPLR_{if}$ is whether or not land reduced (0 or 1) in the FSU or relative area reduced within that FSU $Inequalities_{if}$ including Gini coefficients and social heterogeneity indices for SCs, STs and OBCs for the FSU f within district i; $VillageCharacs_{if}$ include the characteristics mentioned in section 4.1.1 of villages constituting FSU f within district i; $HHCharacs_{if}$ include the characteristics mentioned in section 4.1.2 of the households within villages for that FSU and district

5 RESULTS

We discuss the results for the FSUs and districts below.

FSU level analysis

Results (refer to table 3) indicate that increase in Gini index by one percentage point results in approximately 5 percentage point increase in the likelihood of loss of CPLRs. This leads us to infer that higher economic inequality results in the few better-off households within villages to dominate decision-making processes within village organizations and affect Commons' outcomes. Similarly, with one percentage point increase in Social Heterogenity Index for SCs, the probability of loss of CPLRs increases by 5 percentage points. In other words, lower proportion of SC households in the village increases the probability of CPLR erosion. Smaller number of SC households within a village makes

them minority actors. Given the historical socio-economic disparities, it is likely that such households within the FSUs do not have the required power, often wielded by socio-economic status, to oppose any form of land diversion. Increase in proportion of landless households working as agricultural labourers also increases the likelihood of loss of CPLRs by 25 percentage points. This, again, indicates that FSUs with greater proportion of weak social actors witness greater losses in CPLRs. These results are indicative of elite capture of land resource.

FSUs where land was leased to individuals or corporations not belonging to the village were less likely to lose CPLRs. A plausible explanation would be that these entities have acquired land in the FSU for some developmental project. Hence, it is more profitable for households within such FSUs to seek direct benefits from such establishments as opposed to encroaching on CPLRs. We also find that the likelihood of erosion of Common land was lower by three to five percentage points for the FSUs with complete access to any form of CPLRs.

With regard to relative CPLRs' area lost within FSUs (refer to table 4), we find that unit increase in Social Heterogenity Index for OBCs increases the proportion of area lost by 12 percentage point. Of the three backward social groups in India, OBCs are a majority (nearly 27 % of the sample households). Thus, discernible impacts of social inequalities on area under CPLRs are observed for this social group in the data. Interestingly, we find that FSUs with greater proportions of non-poor land owners (2-5 ha), decreases the extent of loss. This can be explained by near lack of power differential in a FSU with majority of households with similar sized land holdings.

District level analysis

The first dependent variable, i.e. the binary variable for land reduced at FSU level, represents the proportion of FSUs that recorded loss within the district. Estimators for economic inequalities are not significant in determining whether CPLRs loss was recorded or the area lost within districts (refer to table 5). However, increase of one percentage point in households with 2-5 ha of land increases the likelihood of loss of CPLRs by 39 percentage points. This is expected as the non-poor households do not depend on Commons for subsistence and would favour diversion of this land to other purposes. These households also have a greater influence in village institutions and, hence, more likely to successfully legalize encroachments. Similarly, greater proportion of landless agricultural labourers decreases the likelihood of loss of CPLRs by 34 percentage points. With few households in the district owning most of the private land, the incentive to encroach or favour other forms of diversion decreases. Interestingly, increase in landless ST households increases area under CPLRs by over 200 percentage points. STs asserting their rights on Common land as a group in areas dominated by them is a plausible explanation for this finding. Much like social dynamics with FSUs, greater proportion of backward classes within a district would make them strong social actors. This could translate into ability to either take control of land as groups or tp legalize encroachments. Also, a percentage point increase in land leased to individuals or groups outside the FSUs within the district increases the likelihood of CPLR eroded in the district by 19 percentage points. Contrary to the FSU level analysis, higher proportion of land leased to non-FSU entities within a district would drive up the market value of the CPLR. This would increase the incentive to encroach on CPLRs for sale purposes.

Table 3: **Loss of CPLRs within FSUs**

Dependent variable: Whether or not land reduced in the FSU between 1993 and 1998						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	OLS	OLS	OLS	OLS	OLS	Logit
Gini coefficient for the FSU	-0.0103	0.00104	-0.00591	0.00191	0.0502*	0.996***
	(0.0275)	(0.0279)	(0.0280)	(0.0284)	(0.0282)	(0.372)
Social Heterogenity Index for of SCs within the FSU	0.0531**	0.0453*	0.0492**	0.0504**	0.0541*	0.529*
	(0.0226)	(0.0242)	(0.0233)	(0.0251)	(0.0278)	(0.312)
Social Heterogenity Index for of STs within the FSU	0.0129	0.00677	0.0214	0.00486	-0.00951	-0.0922
	(0.0292)	(0.0301)	(0.0300)	(0.0305)	(0.0350)	(0.353)
Social Heterogenity Index for of OBCs within the FSU	-0.0111	-0.00986	0.0142	0.00334	-0.00198	-0.110
	(0.0202)	(0.0210)	(0.0206)	(0.0211)	(0.0247)	(0.240)
Interaction variables:						
Proportion of population belonging to SC or ST group					-0.206	-1.773
					(0.174)	(1.852)
Proportion of population belonging to SC or OBC group					0.0448	-0.0987
					(0.191)	(1.555)
Proportion of population belonging to ST or OBC group					-0.164*	-1.621*
					(0.0897)	(0.847)
Proportion of population belonging to SC, ST or OBC group					1.016	9.559
					(1.801)	(14.93)
HHs belonging to general social group with 2-5 ha. of land					0.0142	0.180
					(0.0673)	(0.754)
HHs with 2-5 ha. of land and self-employed in agriculture					-0.00767	-0.247
					(0.0472)	(0.576)
HHs with 2-5 ha. of land and self-employed in non-agriculture					-0.269	-2.394
					(0.216)	(2.968)
Landless SC HHs					0.0898	0.503
					(0.0684)	(1.044)
Landless ST HHs					0.0643	0.733
					(0.0526)	(0.623)
Landless OBC HHs					0.0157	0.115
					(0.0570)	(0.711)
Landless HHs working as agricultural labourers					-0.250***	-2.789***
					(0.0491)	(0.633)
Agroclimatic zone controls	No	No	Yes	Yes	Yes	Yes
State controls	No	Yes	No	Yes	Yes	Yes
Observations	4,917	4,917	4,917	4,917	4,917	4877
Wald chi2(127)						908.48
Log pseudolikelihood						-1605.88
R-squared	0.098	0.134	0.114	0.143	0.151	0.1833
Robust standard errors in parentheses						
***** p<0.01, ** p<0.05, * p<0.1**						

Table 4: **Area under CPLRs lost within FSUs**

Dependent variable: Relative loss of CPLR area in the FSU between 1993 and 1998					
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS
Gini coefficient for the FSU	0.103	0.0560	0.0711	0.0652	-0.0530
	(0.0995)	(0.107)	(0.104)	(0.108)	(0.113)
Social Heterogenity Index for of SCs within the FSU	-0.0237	0.00272	-0.00381	4.64E-05	0.0652
	(0.0622)	(0.0618)	(0.0572)	(0.0586)	(0.0643)
Social Heterogenity Index for of STs within the FSU	-0.0447	-0.0395	-0.0339	-0.000201	0.119
	(0.0908)	(0.0924)	(0.0914)	(0.0938)	(0.106)
Social Heterogenity Index for of OBCs within the FSU	0.0272	0.0324	0.0156	0.0426	0.123*
	(0.0532)	(0.0613)	(0.0541)	(0.0624)	(0.0678)
Interaction variables					
Proportion of population belonging to SC or ST group					-0.569
					(0.472)
Proportion of population belonging to SC or OBC group					0.0916
					(0.361)
Proportion of population belonging to ST or OBC group					-0.0916
					(0.247)
Proportion of population belonging to SC, ST or OBC group					-1.229
					(3.943)
HHs belonging to general social group with 2-5 ha. of land					-0.417**
					(0.205)
HHs with 2-5 ha. of land and self-employed in agriculture					0.248
					(0.170)
HHs with 2-5 ha. of land and self-employed in non-agriculture					-1.467**
					(0.647)
Landless SC HHs					0.350
					(0.410)
Landless ST HHs					0.683***
					(0.237)
Landless OBC HHs					0.284*
					(0.148)
Landless HHs working as agricultural labourers					-0.269
					(0.208)
Observations	678	678	678	678	678
R-squared	0.543	0.561	0.569	0.585	0.600
Robust standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

Table 5: **District level analysis**

DEPENDENT VARIABLES	Proportion of CPLRs loss			Relative area lost		
	(1)	(2)	(3)	(4)	(5)	(6)
Gini coefficient for the district	-0.100	-0.0705	0.0713	-0.300	-0.0704	-0.517
	(0.140)	(0.145)	(0.157)	(0.343)	(0.411)	(0.504)
Social Heterogenity Index for of SCs within the district	0.0889	0.0975	0.0631	-0.00555	0.0366	0.136
	(0.0625)	(0.0747)	(0.0856)	(0.156)	(0.213)	(0.284)
Social Heterogenity Index for of STs within the district	-0.0908	-0.0510	-0.195	-0.273	0.207	0.586
	(0.196)	(0.229)	(0.298)	(0.529)	(0.625)	(0.816)
Social Heterogenity Index for of OBCs within the district	0.0614	0.0680	0.0685	0.130	0.659**	0.380
	(0.0780)	(0.0963)	(0.122)	(0.197)	(0.311)	(0.447)
Interaction variables						
Proportion of population belonging to SC or ST group			1.053			1.502
			(1.007)			(2.451)
Proportion of population belonging to SC or OBC group			0.493			1.306
			(0.722)			(2.072)
Proportion of population belonging to ST or OBC group			-0.00128			-1.476
			(0.472)			(1.159)
Proportion of population belonging to SC, ST or OBC group			-4.560			-15.85
			(10.64)			(21.16)
HHs belonging to general social group with 2-5 ha. of land			0.152			-0.0716
			(0.308)			(0.922)
HHs with 2-5 ha. of land and self-employed in agriculture			0.389**			0.913
			(0.195)			(0.734)
HHs with 2-5 ha. of land and self-employed in non-agriculture			-1.090			-0.676
			(1.135)			(3.876)
Landless SC HHs			-0.144			0.332
			(0.287)			(0.836)
Landless ST HHs			-0.284			2.066***
			(0.252)			(0.782)
Landless OBC HHs			0.192			0.244
			(0.221)			(0.690)
Landless HHs working as agricultural labourers			-0.339*			-0.809
			(0.178)			(0.655)
Agroclimatic zone controls	No	Yes	Yes	No	Yes	Yes
State controls	No	Yes	Yes	No	Yes	Yes
Observations	480	480	480	268	268	268
R-squared	0.391	0.489	0.521	0.643	0.717	0.743

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

6 CONCLUSIONS

The crucial role of inequalities in redefining and reorganizing land rights and, thus, increasing the vulnerabilities of marginalized actors in developing nations is frequently acknowledged in the academic debates on political economy of land acquisition and in mainstream reportage. That the elite determine the access to natural resources, even in regions where community-based natural resource management is practised, is also well documented. Despite the obvious implications of such dynamics on Commons, substantial academic literature on empirical investigations aimed at determining the impact of inequalities on the loss of CPLRs is lacking. Including both internal and external factors that have been recorded to have bearings on CommonsâĂŹ outcomes, the principal focus of this paper is twofold. The first is to assess if areas with greater socio-economic inequalities have a greater likelihood of land acquisition by private entities in India. The second is to explore whether socio-economic inequalities affect the extent of CPLR area lost. Our estimations show that higher economic inequalities within a region lead to a 5% increase in the likelihood of loss of CPLRs across Indian states. Higher social inequalities for specific social groups increase both, the likelihood of loss of CPLRs and the area lost. Furthermore, privatization of CPLRs would further cement existing inequalities and encourage more encroachments by rural elite in anticipation of eventually receiving title to the land. The magnitude of the results and potential long term consequences suggest that existing inequalities in a region ought to be considered as a serious caution when policies on Commons' land are drafted.

Establishing causal relationship between inequalities and erosion of CPLRs is fraught with concerns of endogeneity. For instance, time-invariant community characteristics and land-related policies of the government might have non-trivial impacts on CPLRs-related outcomes. Increase in commercialization in a region might increase inequalities by generating lop-sided benefits and further disenfranchising the poor. Simultaneously,

it is also possible that CPLRs are being diverted for these commercialization initiatives. Such omitted variables can lead to inconsistent OLS estimators. Moreover, as CPLRs are a major source of income for the rural poor, loss of CPLRs might increase the economic inequality within a region over time. We intend to explore instrumental variable approach in the next iteration to address these endogeneity concerns in our cross-sectional data.

References

[1] Bhim Adhikari. Poverty, property rights and collective action: understanding the distributive aspects of common property resource management. *Environment and Development Economics*, 10(1):7–31, February 2005.

[2] Bhim Adhikari, Salvatore Di Falco, and Jon C Lovett. Household characteristics and forest dependency: evidence from common property forest management in Nepal. *Ecological Economics*, 48(2):245–257, 2004.

[3] Bhim Adhikari and Jon C. Lovett. Institutions and collective action: Does heterogeneity matter in community-based resource management? *Journal of Development Studies*, 42(3):426–445, 2006.

[4] Bina Agarwal. "bargaining" and gender relations: Within and beyond the household. *Feminist economics*, 3(1):1–51, 1997.

[5] Bina Agarwal. Conceptualising environmental collective action: why gender matters. *Cambridge Journal of Economics*, 24(3):283–310, 2000.

[6] Bina Agarwal. Toward freedom from domestic violence: the neglected obvious. *Journal of Human Development*, 8(3):359–388, 2007.

[7] Arun Agrawal. Common Property Institutions and Sustainable Governance of Resources. *World Development*, 29(10):1649–1672, 2001.

[8] Arun Agrawal. Forests, governance, and sustainability: Common property theory and its contributions. *International Journal of the Commons*, 1(1), 2007.

[9] Jennifer Alix-Garcia. An exploration of the positive effect of inequality on common property forests. *Journal of Development Economics*, 87(1):92–105, 2008.

[10] Krister Andersson and Arun Agrawal. Inequalities, institutions, and forest commons. *Global Environmental Change*, 21(3):866–875, August 2011.

[11] Jennifer Baka. The political construction of wasteland: Governmentality, land acquisition and social inequality in south india. *Development and Change*, 44(2):409–428, 2013.

[12] J.-M. Baland and J.-P. Platteau. Wealth Inequality and Efficiency in the Commons Part I: the Unregulated Case. *Oxford Economic Papers*, 49(4):451–482, October 1997.

[13] Jean-Marie Baland and Jean-Philippe Platteau. The Ambiguous Impact of Inequality on Local Resource Management. *World Development*, 27(5):773–788, May 1999.

[14] Lakshmi Banerjee, Abhijit Iyer. History, institutions, and economic performance: The legacy of colonial land tenure systems in india. *The American Economic Review*, 95(4):1190–1213, 2005.

[15] P. Bardhan. Analytics of the institutions of informal cooperation in rural development. *World Development*, 21(4):633–639, 1993.

[16] P. Bardhan and J. Dayton-Johnson. *Heterogeneity and commons management.* Department of Economics, University of California, Berkeley, USA, 2000.

[17] Pranab Bardhan and Jeff Dayton-Johnson. Unequal irrigators: heterogeneity and commons management in large-scale multivariate research. *The drama of the Commons*, National Academy Press Washington, DC:87–112, 2002.

[18] Pranab Bardhan and Maitreesh Ghatak. *Inequality, Cooperation, and Environmental Sustainability.* Inequality and collective action. Princeton University Press, 2007.

[19] T. Beck. Common property resource access by the poor and class conflict in west bengal. *Economic and Political Weekly*, 29(4):187–196., 1994.

[20] T. Beck. *The experience of poverty. Fighting for respect and resources in village India.* London: IT Publications, 1994.

[21] Tony Beck and Madan G. Ghosh. Common property resources and the poor: Findings from west bengal. *Economic and Political Weekly*, 35(3):147–153, 2000.

[22] Tony Beck and Cathy Nesmith. Building on poor people's capacities: The case of common property resources in india and west africa. *World*, 29(1):119–133, 2001.

[23] F Berkes, CS Holling, and C Folke. *Linking Social and Ecological Systems.* Cambridge University Press, 1998.

[24] J. C. Cardenas, J. Stranlund, and C. Willis. Local environmental control and institutional crowding-out. *World Development*, 28(10):1719–1733, 2000.

[25] Kanchan Chopra and Purnamita Dasgupta. Common Pool Resources in India : Evidence , Significance and New Management Initiatives. *Mimeo under the UK DFID Project R7973*, 2002.

[26] Kanchan Chopra and Purnamita Dasgupta. Nature of household dependence on common pool resources: An empirical study. *Economic and Political Weekly*, 43(8):58–66, 2008.

[27] Kanchan Chopra, Gopal K Kadekodi, Maddipati Narasimha Murty, et al. *Participatory development: people and common property resources.* Sage, 1990.

[28] Jaquelin Cochran and Isha Ray. Equity reexamined: A study of community-based rainwater harvesting in rajasthan, india. *World Development*, 37(2):435 – 444, 2009.

[29] CWS. Common pool resources in semi-arid india: Dynamics, management and livelihood contributions. Technical report, A.P. Regional Report Ű Centre for World Solidarity, 2001.

[30] Jeff Dayton-Johnson. Determinants of collective action on the local commons: a model with evidence from Mexico. *Journal of Development Economics*, 62(1):181–208, June 2000.

[31] Jean Ensminger and Jack Knight. Changing social norms: Common property, bridewealth, and clan exogamy. *Current Anthropology*, 38(1):1–24, 1997.

[32] S. Iyengar and N. Shukla. Regeneration and Management of Common Property Land Resources (CPLRs) in India: A Review. *Working Paper No. 110*, Gujarat Institute of Development Research: Gota, Ahmedabad., 1999.

[33] N. S. Jodha. Common property resources and rural poor in dry regions of india. *Economic and Political Weekly*, 21(27):1169–1181, 1986.

[34] N. S. Jodha. Rural common property resources-contributions and crisis. *Economic and Political Weekly*, 25(26), Jun 1990.

[35] N. S. Jodha. *Management of Common Property Resources in Selected Dry Areas of India*. Natural Resource Economics: Theory and Application in India. Oxford and IBH Publishing Company Pvt. Ltd, 1997.

[36] N. S. Jodha. *Common Property Resources in Crisis*. Life on the edge: sustaining agriculture and community resources in fragile environments. Oxford University Press, New Delhi, 2001.

[37] N.S. Jodha. Depletion of Common Property Resources in India : Micro-Level Evidence. *Population and Development Review*, 15(Supplement: Rural Development and Population: Institutions and Policy):261–283, 1989.

[38] J. Knight. *Institutions and Social Conflicts*. Cambridge University Press, 1992.

[39] Mathew Kurian and Ton Dietz. Irrigation and collective action: A study in method with reference to the shiwalik hills, haryana. *Natural resources forum*, 28(1):34–39, 2004.

[40] Elinor Laerhoven, Frank Van Ostrom. Traditions and trends in the study of the commons. *International Journal of Commons*, 1(1):3–28, 2007.

[41] Sharachchandra Lele and Seema Purushothaman. Implications of trends in access , benefits and status of commons land in karnataka. IASC 2011 (Sustaining Commons: Sustaining our future), 2011.

[42] Ajit Menon and G Ananda Vadivelu. Common Property Resources in Different Agro-Climatic Landscapes in India. *Conservation and Society*, 4(1):132–154, 2006.

[43] Syed Ajmal Pasha Nadkarni M.V. and L.S. Prabhakar. *The political economy of forests use and management,*. Sage, New Delhi, 1989.

[44] Sirisha C. Naidu. Access to benefits from forest commons in the Western Himalayas. *Ecological Economics*, 71:202–210, November 2011.

[45] NSSO. Report no. 452: Common property resources in india, jan-june 1998, nss 54th round. Technical report, National Sample Survey Organization (Department of Statisitcs and Program Implementation), 1999.

[46] Elinor Ostrom. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press, 1990.

[47] S. A. Pasha. Cprs and rural poor: A micro level analys. *Economic a*, 27(46):2499–2503, 1992.

[48] Amy R Poteete and Elinor Ostrom. Heterogeneity, Group Size and Collective Action: The Role of Institutions in Forest Management. *Development and Change*, 35(3):435–461, 2004.

[49] Haripriya Rangan. Property vs. Control: The State and Forest Management in the Indian Himalaya. *Development and Change*, 28(1):71–94, January 1997.

[50] Jesse C. Ribot and Nancy Lee Peluso. A Theory of Access*. *Rural Sociology*, 68(2):153–181, October 2003.

[51] Elizabeth J. Z. Robinson. IndiaŠs disappearing common lands : Fuzzy boundaries , encroachment , and evolving property rights. *Land Economics*, 83(3):409–422, 2008.

[52] LM Ruttan. Sociocultural heterogeneity and the commons. *Current Anthropology*, 47(5):843–853, 2006.

[53] Lore M. Ruttan. Economic heterogeneity and the commons: Effects on collective action and collective goods provisioning. *World Development*, 36(5):969 – 985, 2008.

[54] Mohd. Sadiq Salman and Abdul Munir. Common land resources: The present status and need for their conservation in north india. In Shabbir A. Shahid, Faisal K. Taha, and Mahmoud A. Abdelfattah, editors, *Developments in Soil Classification, Land Use Planning and Policy Implications*, pages 591–604. Springer Netherlands, 2013.

[55] Elinor Schlager, Edella Ostrom. Property-rights regimes and natural resources: A conceptual analysis. *Land*, 68(3):249–262, 1992.

[56] C M Shackleton, S E Shackleton, E Buiten, and N Bird. The importance of dry woodlands and forests in rural livelihoods and poverty alleviation in South Africa. *Forest Policy and Economics*, 9:558–577, 2007.

[57] Nori Tarui. Inequality and outside options in common-property resource use. *Journal of Development Economics*, 83(1):214–239, 2007.

[58] G. Varughese. *Villagers, bureaucrats, and forests in Nepal: Designing governance for a complex resource*. PhD thesis, Indiana University, Bloomington, 1999.

[59] George Varughese and Elinor Ostrom. The Contested Role of Heterogeneity in Collective Action: Some Evidence from Community Forestry in Nepal. *World Development*, 29(5):747–765, May 2001.

[60] Trond Vedeld. Village politics: Heterogeneity, leadership and collective action. *Journal of Development Studies*, 36(5):105–134, 2000.

[61] Andy White and Alejandra Martin. Who owns the worldŠs forests. *Forest Trends, Washington, DC*, 2002.

[62] Wendy Wolford, Saturnino M Borras, Ruth Hall, Ian Scoones, and Ben White. Governing global land deals: the role of the state in the rush for land. *Development and Change*, 44(2):189–210, 2013.