

Agriculture, Irrigation and Ecology in Adivasi Villages in Jharkhand: Why Control and Ownership over Natural Resources Matter

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Abstract

This article posits that the ecological and food security crisis in present-day rural Jharkhand is caused by privatisation of landholdings, appropriation of village land by the state, and lack of technological and infrastructural investment and support to agriculture by successive governments. In earlier times farming communities created small-scale storage works for the supplemental irrigation of paddy. This development of storage works was later constrained by the rigid private property rights regime initiated in the colonial period, and by state appropriation of village land post-independence. The management of some storage works was affected by the partial land reforms enacted post-independence. Since the 1980s there have been limited efforts by the government and NGOs to develop new small-scale irrigation systems, and even less to support pre-existing systems. To limit further ecological degradation and improve the food security of households, control over natural resources within village boundaries should be returned to village communities.

Introduction

This paper argues that the landholding structure in rural Jharkhand impedes the design and construction of new storage works, and the management of many pre-existing works. Case studies from two villages illustrate how agricultural production is hampered by a lack of accessible water sources, and in particular the staple paddy crop suffers due to a lack of supplemental irrigation. Groundwater is scarce and fairly inaccessible, and there has been limited development of wells for agriculture. Rivers and streams are deep bedded and seasonal. In the past families laid claim to stretches of rivers and created earthen and rock check dams across the breadth of the rivers, to capture and store monsoon flows. The water stored is manually lifted to irrigate vegetables, besides used for other purposes. Due to the depth of river beds, river water cannot be diverted by gravity to irrigate the surrounding farmland. Therefore farming communities created small-scale storage works to capture rainfall runoff from the catchment area, to irrigate their paddy crop during dry spells. The creation of new *bandhs* (reservoirs) and *talabs*

(ponds) would allow farmland outside of pre-existing works' command areas to be irrigated, however the extant landholding structure prevents the design and construction of new works by communities. The management of many pre-existing storage works is sub-optimal due to the effects of post-independence land reforms.

The question of why there has been an under-development of small-scale irrigation systems is not frequently asked. Irrigation research most often discusses systems that have already been constructed; either irrigation systems designed by state or NGO actors, or so-called traditional systems. In the Indian context the effect of colonialism on indigenous water technologies has been explored extensively (Sengupta 1980, 1985; Agrawal and Narain 1997; Hardiman 1998; Mosse 2003; D'Souza 2006, 2008). Sengupta (1980, 1982, 1985, and 1993) highlights the effects of colonial and post-colonial civil and land reforms upon indigenous irrigation systems, in particular systems located in southern Gangetic Bihar. The *Dying Wisdom* thesis (cf. Agrawal and Narain 1997) holds that colonial actions, such as the instituting of private property in land and dismantling of community control over land, led to the decline or substantial degradation of traditional systems. However subsequent work by Hardiman, Mosse, and D'Souza show that such sweeping statements do not hold in all cases. For example, Hardiman (1998) shows how peasant indebtedness and commercialisation not only predated colonial rule, but helped expand indigenous irrigation wells (cf. D'Souza 2006). Gadgil and Guha (1995) consider that the colonial state apparatus oversaw the collapse of traditional irrigation systems in areas considered unprofitable, and that the post-independence state has manoeuvred to transfer control of small-scale systems to the Minor Irrigation Department to gain control of the resource base. The fact that new irrigation systems have hardly been constructed by communities in the post-independence period is rarely discussed. One is left to assume that this paucity relates to the dependency farmers have come to place upon the state since it assumed control of village land and development planning post-independence.

Field research was conducted in 2004-05 in two villages located in Khairpal Gram Panchayat, Potka Block, East Singhbhum District (Figure 1). Three hamlets, populated by Santal, Bhumij and Dharua Gond communities respectively, were selected based on the presence of storage works as well as recently constructed lift irrigation systems. Some 49% of East Singhbhum's rural populace is *adivasi*, with Santal being numerically dominant, followed by the Bhumij (GoI 2001). Field research was both qualitative and quantitative, including observation, group meetings, in-depth interviews, wealth ranking and genealogies, mapping of landholding pattern and use, and collection and analysis of village records for three survey and settlements (1910, 1937 and 1964). This paper begins with an overview of the land-water-societal context in Jharkhand state and East Singhbhum. It then presents an analysis of four storage works, discussing their design, construction and subsequent management, followed by a discussion of how and why landholding structure can be seen to have impeded the further (new) creation of storage works by communities, and to have affected the management of some pre-existing systems. The paper concludes with some recommendations.

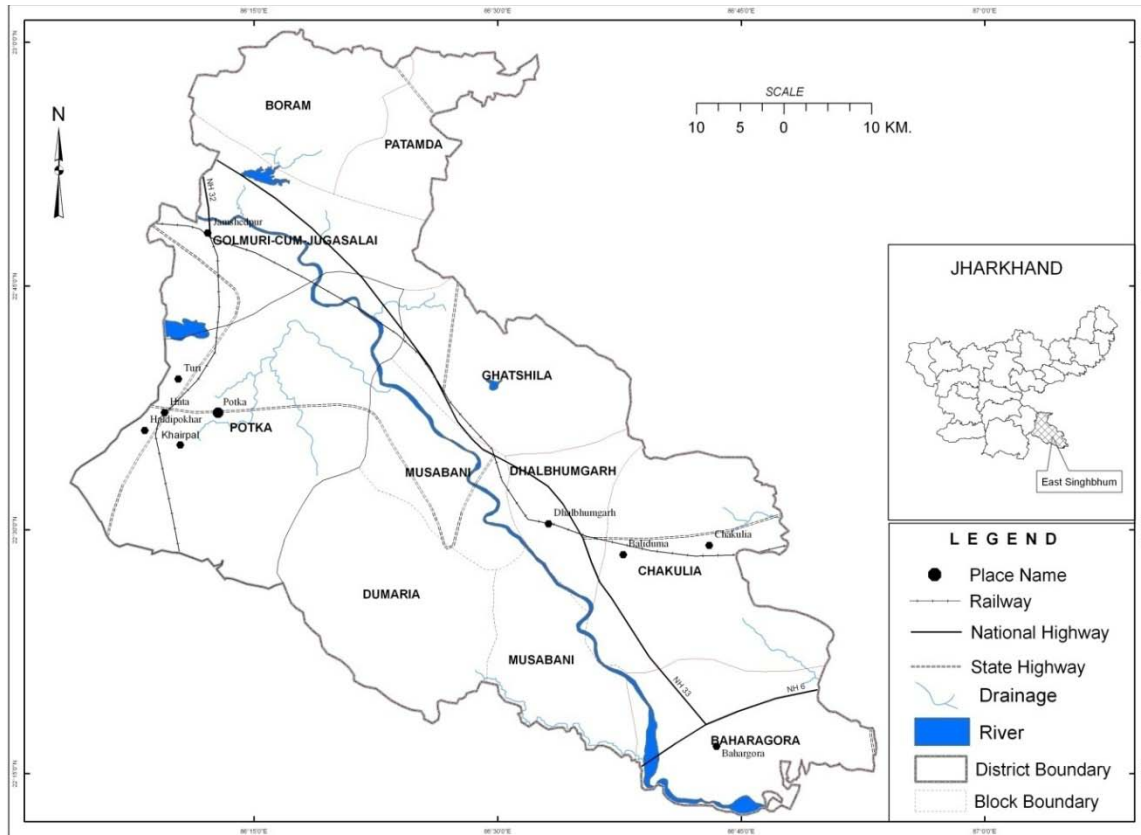


Figure 1. Location of Potka Block (and Khairpal Gram Panchayat) within East Singhbhum District

Land-water-societal context in East Singhbhum District, Jharkhand

Jharkhand became independent as India's 28th state in November 2000. Its people had suffered over five decades of poor governance having been appended to Bihar state on India's independence in 1947. Local-level democratic checks and balances have been absent in the villages of Jharkhand for the past three decades or so, due to the inability of successive governments to hold panchayat elections since 1978 (elections were finally held in early 2011). This helped local contractors, block-level bureaucrats and members of legislative assembly (MLAs) to control and one assumes mispend public funds intended for rural development works. Jharkhand's agro-ecological and socio-economic credentials relate a now familiar tale; one of the richest states in India in terms of its mineral and forest resources, economically Jharkhand is one of the poorest states. In an assessment of rural India, in 2001 Jharkhand was ranked (with Bihar) India's most food insecure state, and (separate from Bihar) as having India's highest percentage of population living below the poverty line (MSSRF/WFP 2001). By 2008, in a revised and more comprehensive assessment, Jharkhand again secured the unfortunate ranking of most food insecure state in India (MSSRF/WFP 2008). Food insecurity relates not only to limited or lack of access to nutritious food, but also to clean water and sanitation. Hence Jharkhand's ranking reflects its history of neglect and under-development, which extends to the agricultural domain where the majority of cultivation remains rainfed.

The area irrigated in Jharkhand state is unclear because of differences in terminology used and lack of referencing of data sources in government reports. For example, Jharkhand's new state government in 2002 produced the document 'Vision 2010' which stated that the net irrigated area was 157,000 hectares, and that it planned to increase the irrigated area of the state from 8% to 25% by 2010 (GoJ 2002). In 2008 NABARD Consultancy Services (NABCONS) was entrusted to prepare the Jharkhand 'State agriculture development plan, 2008-09 to 2011-12'. NABCONS stated its plan to double the area under assured irrigation from 157,000 to 314,000 hectares, half through irrigation potential already created, and half through proposed minor irrigation investments (NABCONS 2008). If correct, the data suggests that little or no progress was made in improving irrigation coverage through 2002 to 2008. Jharkhand was bypassed in the process of agricultural transformation known as the 'Green Revolution', and a National Rain-fed Area Authority to implement a comprehensive programme for the development of rainfed areas was constituted only in 2006 (Sharma et al. 2008).

East Singhbhum District falls within the 'South Eastern Plateau' sub-zone of India's 'Eastern Plateau and Hills Region' agro-climatic zone. At about 100 metres above sea level, the climate in this sub-zone is humid to sub-tropical, and characterised by plentiful but uneven distribution of rainfall. Average annual rainfall is between 1300 and 1350 mm, with roughly 80% falling within the south-west monsoon period June to September, and precipitation during the winter months scanty and highly variable (GoJ nd). The plateau's eroded soils are of poor fertility and have a low water-retaining capacity, and groundwater availability is scarce and its exploitation has been minimal (GoJ nd; NABCONS 2008). Managing extreme rainfall variability in time and space is considered the greatest challenge in such rainfed semi-arid and dry sub-humid tropical regions (Sharma et al. 2008). In Jharkhand the probability of deficient rainfall (25% of the normal) during the south-west monsoon period is once in five years (Sharma et al. 2008). Dry spells, generally of 2-4 weeks of no rainfall, occur in most cropping seasons. Such rainless periods may be termed early season drought, mid-season drought, or terminal drought. Early season drought is often mitigated by replacement with short-duration crop varieties or change in the cropping pattern. However droughts at the latter two stages, particularly at critical growth stages, can potentially cause partial or complete crop failure (Sharma et al. 2008), which is why supplemental irrigation is needed to bridge these gaps.

The 'South Eastern Plateau' region, synonymous with Singhbhum District until its division in 1990-91, is a neglected area having experienced little agricultural development since India's independence. Bhalla and Singh (2001) show that Singhbhum is one of just 17 districts out of India's 281 districts that maintained a low growth (<1.5%) of agricultural output in two consecutive periods, 1962-63 to 1980-83, and 1980-83 to 1990-93. In the same period, from 1961 to 1990-93, the proportion of gross irrigated area to gross cropped area fell from 6.8% to 3.9% (Prasad 1961; Bhalla and Singh 2001). This low proportion of irrigated land ensures that water deficiency at critical crop growth stages is a major constraint of rainfed agriculture. However water itself may not always be the primary limiting factor for food production. Low-input farming means faster depletion of soils, as stagnant yields and rising populations lead farmers to exhaust local soil-water resources and expand to more scanty and vulnerable lands (Lipton 2009; cf. Sharma et al. 2008). Consumption of fertiliser in Singhbhum increased from 0.80

kg/ha of net sown area in 1962-65 to just 10.51 kg/ha by 1990-93 (Bhalla and Singh 2001). These levels are fairly low when compared with Bihar as a whole (2.96 to 85.36 kg/ha through 1962-65 to 1992-95), and very low when compared with Green Revolution targeted areas, e.g. north-west India (4.29 to 163.62 kg/ha through 1962-65 to 1992-95) ((Bhalla and Singh 2001). The incomplete introduction of new seed-fertiliser-irrigation technologies led to unintended outcomes in rainfed areas: for example, increased fertiliser use without assured irrigation has the effect of increasing output in years of good monsoon rains, but decreasing output in years of poor rainfall ((Bhalla and Singh 2001).

Land reform between 1949-50 and 1964-65 was another agricultural policy central to the Green Revolution and its successes (Bhalla and Singh 2001). Yet in Jharkhand there has been no substantial land reform, such as imposition of ceiling and redistribution of excess lands to marginal and landless farmers, or land consolidation. To understand East Singhbhum's landholding structure, which is peculiar due to restrictions placed on the transfer of adivasi land, some contextualisation is required. Prior to the arrival of the British in the late 18th century, the region was colonised by various adivasi and non-adivasi communities.¹ Present-day East Singhbhum District is contiguous with the erstwhile Dhalbhum chieftdom, one of several adivasi Bhumij chieftdoms in the region in the centuries prior to the British invasion and territorial conquest. During this earlier period some social stratification in adivasi society developed, and many non-adivasi settlers arrived and were granted villages/land in return for religious and secular services provided to the Bhumij chiefs (Sinha 1962; Sen 2010). The Sanskritic courtly culture of adivasi chiefs, argue Thapar and Siddiqi (2003 [1979]), would not have impacted the majority of adivasi society because land relations would have preserved adivasi identity: available forest and wasteland, and a relatively sparse population would have allowed the continuing possibility of new *khuntkattis*, i.e. more land being brought under cultivation.² In this period storage works³ likely remained under-developed due to possibilities for farmland expansion.

The British extended the Permanent Settlement to Dhalbhum in 1800; its primary objective being to secure revenue payable by *zamindars* (the erstwhile chiefs or their relatives) (Sengupta 1982). The settlement led to the peasantry's indebtedness to local landlords and moneylenders, further loss of control over land and other resources, and erosion of local authority for adivasis (Upadhyaya 2009). The colonial agrarian world was reordered as some kind of an economic and political hybrid, with zamindars shaped as 'rack renting quasi-feudal landlords', the creation of a series of intermediate tenure-holders (including *pradhani* village headmen), and the realisation of capitalist private property in land (D'Souza 2004). The introduced notion of family/individual property challenged the traditional adivasi system of communal ownership of land, and

¹ Bhumij society was organised into chieftdoms by the 16th century (Areeparampil 2002), possibly as early as the 13th (Sinha 1962).

² *Khuntkatti* was the *adivasi* system of social organisation, through which *khuntkattidars*, the descendents of those who first converted forestland into agricultural lands, received superior collective and individual rights over village land.

³ In 1773 Baber wrote of the Dhalbhum tract, "there is very little land cultivated in this whole extent and very disproportionate part of it capable of cultivation [the soil] is very rocky-the country is mountainous and overspread with thick woods which render it in many places impassable" (in Jha 1967). The number of villages in Dhalbhum increased from 145 villages in 1790, to 1640 villages 120 years later (Reid 1911).

mechanisms for mortgaging and sale of lands encouraged the more avaricious among adivasis to accumulate additional lands (Sen 2004). Jha (1989) describes it thus; the “traditional divisions or distribution of tribal land were now replaced by a rigid landlord-tenant relationship”. Thapar and Siddiqi (2003 [1979]) argue that mid 19th century the British paradoxically sought to protect zamindars and their estates, to maintain political stability, precisely when they should have abandoned such policies to stimulate agriculture. As a result landlords (zamindars and intermediaries) lived off mismanaged estates without paying attention to their tenant cultivators (Thapar and Siddiqi 2003 [1979]), as occurred in Dhalbhum Estate on several occasions late 19th century.

The Chotanagpur Tenancy Act, 1908 (Bengal Act VI of 1908) introduced laws that restricted the sale or transfer of lands from adivasi to non-adivasis, and protected khuntkatti rights on land. However it was enacted too late: few such villages still existed (Devalle 1992). By the time of the first survey and settlement operations in Dhalbhum, conducted between 1906-1911, 3/5ths of village tenures were *pradhani* (a reclaiming tenure) held by *pradhans* (headmen) and just 1/5th were *ghatwali* held by khuntkatti Bhumij headmen (Reid 1911). The colonial government was unconcerned with creating irrigation works in these tracts, because revenue was fixed and the government had nothing to gain from extending irrigation (Sengupta 1991). However significant numbers of storage works had already been created by farming communities, either by families or under the leadership of village headmen (see Reid 1911).⁴ The main source of land rights for farmers in the present-day remains the record of rights (or *khatian*) that were created during the initial survey and settlement operations of 1906-11. A revisional survey was completed by 1937 in Singhbhum. It seems likely that between the first and second surveys little change took place aside from generational land subdivision and some land sale (see Upadhyaya 2009 who finds the same for Ranchi). The land records were published in three parts, the record of rights to individual plots, the record of community rights, and the village note. During research the sample villages’ records were sought and obtained from the District Record Room Chaibasa: the first part was complete and the third part poorly filled in. However the second part, the record of community rights, had either not been created or not been stored.

After Independence the Bihar government took five years to adopt the 1947 Zamindari Abolition Bill (land reform measures). In 1952 reforms took place, but only after much dilution (Sengupta 1982). Zamindari abolition had perhaps a deeper impact on adivasi land rights than had previous colonial reforms (Upadhyaya 2009). The reforms provided for the ‘vesting’ in the state of all lands, estates, and interests other than *raiyati* (farmer) lands, and for the abolishment of all intermediary tenure holders: zamindars, estate managers, and village headmen. Two types of land tenure remained thereafter; Mundari khuntkatti⁵ and *raiyati*, and lands ‘vested’ in the state (Upadhyaya 2009). The second revisional survey conducted in Singhbhum between 1958 and 1965 allowed the state to record their appropriation of community lands (land previously recorded in the name of

⁴ Upadhyaya (2009) discusses in detail the content of the land rights conferred to both *khuntkattis* and ordinary *raiyats* (farmers/cultivators) and notes that though *raiyats* were the majority, it is khuntkattidars and their rights that have formed the basis of adivasi struggles against the state in the post-colonial period.

⁵ The Bhumij are considered Mundari adivasis, as are, for example, Mundas and Santals. In the research villages only some of Kestrapal’s Bhumij households are khuntkattidars; the majority are *raiyats*.

headmen were transferred to the category of government land).⁶ According to the settlement report, about 40% of Singhbhum district's land was assumed by the state during the second revisional survey, half of which was under community control beforehand, and half with the forest department (Prasad 1970, quoted in Upadhyaya 2009). Upadhyaya is wrong, however, to claim that the reforms 'did not materially affect the holdings of *raiyyats* or self-cultivators because the government merely took the place of the landlord to whom rent is paid' (Upadhyaya 2009). In the process of the reforms, control over many storage works shifted from collective ownership by communities to private ownership by former headmen.

The design, construction and management of four storage works

Research was conducted in two neighbouring revenue villages located in Khairpal Gram Panchayat. The villages have differing histories: Gurbhanga was a *pradhani* village whereas Kestrapal was a *ghatwali* village during the colonial period.⁷ Gurbhanga is a young village, having been established when (German Lutheran) Christian Oraon settlers arrived from Ranchi District in 1882 (Chatterji 1910). Aside from a small Bhumij settlement on the roadside, the village was uninhabited and covered by forest. By contrast, in the much older Bhumij village of Kestrapal, the *khuntkatti* rights of several Bhumij families were recognised in the first and second survey and settlement operations; as were several types of Bhumij hereditary political office.⁸ At the time of zamindari abolition, the headmen of *pradhani* villages and *ghatwali* villages were stripped of their hereditary political authority in dealings with the state, however erstwhile *ghatwals* retained their locally recognised social status because of their protected (*khuntkatti*) land rights status.

The two villages each comprise three hamlets, which in the present day function as somewhat independent villages. In-depth study was conducted in three of the six adivasi hamlets in 2005: Champi, in Gurbhanga, populated by 26 Santal households and two Christian Oraon households (descendants of the former headman); Kestrapal hamlet, in Kestrapal revenue village, inhabited by 41 Bhumij households (both *khuntkattidar* and *raiyyats*), and a family of landless Paramaniks; and Manglasai, in Kestrapal, populated by 31 Dharua Gond households.

The four storage works discussed here are of two social types: built by village headmen with the labour of the village community; and built by individual *raiyyats*/farmers by the labour of their family members and hired-in help.⁹ The four storage

⁶ Singhbhum is one of few districts in Jharkhand where a post-independence re-survey was completed (Upadhyaya 2009). This is possibly due to its proven mineral wealth?

⁷ To ensure the safety of the villagers, the village names are fictionalised both here and in my thesis (Hill 2008).

⁸ *Sardar ghatwals* were chiefs of a number of villages, *naik ghatwals* were village headmen, and *paik ghatwals* were 'watchmen' subordinate to *naik ghatwals*. Kestrapal had a *sardar ghatwal* in 1910, whose son was recorded in the 1937 revisional survey and settlement as a *naik ghatwal* alongside two *paik ghatwals*.

⁹ Sen (2008) lists four social types for the neighbouring Kolhan region (now West Singhbhum), which also include *bandhs* created by the *raiyyats* of more than one village, and those built at the initiative and expense of the government.

works include three bandhs (three-sided reservoirs) and one *talab* (a four-sided pond). Bara Bandh in Kestrapal and Toppo's Bandh in Champi were each built under the direction of their respective villages' headmen in the colonial period. Bara Bandh, having a surface area in 2005 of 1.16 ha, was constructed before the first survey and settlement (pre-1910), whereas Toppo's Bandh, of 1.26 ha surface area, was created sometime between the first and second settlements (between 1910 and 1937). Two of Champi's Santal families, around 1920-1930 and 1945-1950 built Mona's Bandh and Surai's Talab respectively. As a result these are smaller works, having surface areas of 0.34 and 0.26 ha respectively. Although all four storage works may seem small, they are capable of providing supplemental irrigation to an area of farmland about five times their surface area and each serve to secure the paddy harvest of up to ten households. For example, Surai's Talab irrigates about 1.3 ha of farmland owned by four households.

Paddy farming remains a central livelihood in the villages because rice is the staple food, used for brewing rice beer, and used in rituals throughout seasonal and life cycles. For adivasis, land is not only a source of livelihood but life itself, both physical and spiritual (Mullick 2005). Aside from food production, land is valued for its ability to provide security, reinforce a sense of personhood, and offers access to credit, labour and other exchange entitlements (Rao 2009). In 2005 over three-quarters of households in the villages pursue agriculture as their primary or secondary livelihood. Households cultivate paddy on their own land, and under contract or share cropping tenurial arrangements. For example, in 2005 Champi's 28 households between them cultivated 34.7 ha of their own land, and half of these households cultivate another 10.1 ha of others' land, a total of 44.8 ha and an average of 1.6 ha per household. Land availability to a great extent determines the livelihood strategies of households. Those having insufficient land also work in the non-agricultural sector, mining rocky outcrops, and working as wage labourers both nearby and as migrants. In Champi 15 households pursued migratory work, and six had service-orientated jobs; whereas these livelihoods were not pursued by the villagers of Manglasai and Kestrapal.

In Champi in 1910, before the creation of its storage works, land was fairly abundant and just 36% of the entire revenue village's geographical area had been converted to agricultural land (Table 1). In contrast, by 1910 61% of the older Kestrapal revenue village's total area was already under paddy cultivation, which likely would have already been restricting the further creation of storage works. The area under cultivation in Gurbhanga quickly rose, to 64% of its area by the second survey and settlement in 1937, while the cultivated area in Kestrapal rose to 73% in the same period. Kestrapal's inhabitants had by this time almost exhausted possibilities to bring further land under the plough. By the time of the 2001 census, three-quarters of each revenue village's land was under cultivation, mostly mono-cropped with paddy. This includes marginal land unsuitable for paddy cultivation.

Year	Kestrapal (Total area: 199 ha)		Gurbhanga (Total area: 181 ha)	
	Cultivated area	Percent of total	Cultivated area	Percent of total
1910	120 ha	61	64 ha	36

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1937	145 ha	73	114 ha	64
1964	152 ha	77	127 ha	70
2001	150 ha	75	132 ha	73

Table 1. Proportion of Kestrapal and Gurbhanga's areas under cultivation
Source: 1910, 1937, 1964 data from village records, 2001 data from 2001 census.

Average landholdings per household fell over the period 1910 to 2005, due to population growth, subdivision of land, and the exhaustion of land of cultivable quality available for conversion. In all three hamlets there is a shift from most households having large (>5 ha) or medium (2.5-5 ha) holdings in 1910, to having small or marginal holdings in 2005 (Table 2). Only two households in Champi, through government service, have managed to increase their landholdings via land purchase (to >5 ha). In Kestrapal the eight households having large and medium landholdings in 2005 are all descendents of the village's various ghatwals. Landlessness has emerged in the revenue village of Kestrapal due to land sales by current raiyats' forefathers (in Manglasai), and conflict and forced dispossession (via marriage and by a descendent of the *ghatwali* headman, in Kestrapal).

Farm size typology	Area owned (ha)	Kestrapal (households)		Manglasai (households)		Champi (households)	
		1910	2005	1910	2005	1910	2005
Large	>5	4	4	2	0	2	2
Medium	2.5-5	9	4	1	3	3	3
Small	1-2.5	2	13	2	8	1	2
Marginal	<1	1	17	0	16	0	21
Landless	0	0	3	0	4	0	0
Total	-	16	41	5	31	6	28

Table 2. Landholding category by hamlet and household over time (1910 and 2005)

By 2005 the distribution of landholdings among owner-cultivators in the three research hamlets (combined) is skewed and unequal. Overall the average owner-cultivator landholding is 1.43 ha, however of 94 sampled owner-cultivators only 27 (29%) have over this landholding size. The six households with the largest holdings own nearly one-third (31%) of land, having an average of 6.95 ha. About 84% of the owner-cultivating households with marginal (>0-1 ha) and small (1-2.5 ha) landholdings own just 46.3% of the land. This pattern is just slightly more equitable than the all-India situation: in 2003 marginal and small landholdings constituted 86% of total operational holdings in India, but covered only 43.5% of area (Reddy and Mishra 2008).

An analysis of paddy production in Champi for the years 1910, 1964 and 2005 reveals that all resident households likely produced surplus paddy in years of normal or good rainfall in 1910, whereas 45% did so in 1964, and only a quarter were able to by 2005

(Table 3).¹⁰ Naturally there is a correlation between marginality in landholding and deficit paddy production, but this has been aggravated by the almost total lack of agricultural development over the decades. The agricultural techniques, production and yields appear to have remained unchanged over the past century. For example, there is little difference between the paddy yield of 1910, 1432 kg/ha (from a calculation made by Reid 1911), and that of 2005, 1444 kg/ha (calculation made using field data). The benefits of the few farm inputs used in the present-day, such as urea fertiliser, are likely offset by soil degradation caused by mono-cropped paddy and widespread ecological degradation, such as the extensive felling of trees and mining of outcrops, all of which affect the local hydrological regime and farm soil condition. The analysis shows that farming has become steadily and increasingly unviable in the villages due to reduction in landholding, partial land reform, and absence of agricultural support from successive governments.

Year	Number of households, according to land typology				Total number of households	Paddy production	
	Large	Medium	Small	Marginal		Surplus	Deficit
1910	2	3	1	0	6	6	0
1964	1	0	8	13	22	10	12
2005	2	3	2	21	28	7	21

Table 3. Paddy production in Champi in 1910, 1964 and 2005 (by household)
Source: 1910, 1964 data derived from village records, 2005 data from field research.

With little irrigation coverage in the hamlets, cultivation of paddy is at the mercy of the monsoon, the amount, timing and duration of rainfall being key to a good harvest. The storage works in the research hamlets were designed and developed with local means at a time when land was fairly abundant, villagers as a community (albeit overseen by a headman) controlled the land within their village boundary, and when a majority of households even without access to supplemental irrigation likely harvested a surplus of paddy in years of good or normal rainfall. The “land factor” partly explains why three significant storage works were created post-1910 in Champi, whereas in the older village Kestrapal, where three storage works already existed by 1910, no further storage works were created. Cooperative forms of organisation with communities is another important factor, for in the absence of state support, the creation and maintenance of storage works necessitates planning, labour and funds.

Toppo’s Bandh

The Christian Oraon headman (pradhan) of Gurbhanga revenue village, and two or three Santal families, created Champi’s first storage work, Toppo’s Bandh (Figure 2),

¹⁰ The methodology, based on data from the Village Record of Rights for 1910 and 1964, a calculation used by Reid (1911) and field data collected in 2005, is given in Hill (2008).

sometime between 1910 and 1937. One presumes that the Santals worked without pay to construct the storage work, though the headman likely fed and provided them rice beer, as is customary. The storage work is listed in the 1937 settlement record of rights under the headman's name, who according to Santal oral history shared the bandh's water with those Santal farmers having land in its command area. At this point Toppo's Bandh was small, as were the number of households in the village/hamlet. One Santal elder fondly recalled the village's pradhan, saying 'he was a very good man. He used to give [irrigation] water'. During the pre-independence period the bandh was likely maintained by community labour.

Following India's independence intermediary (zamindari) tenures were abolished, and erstwhile village headmen lost their hereditary offices becoming on a par with other villagers/raiyats. Up until the mid 1950s when Panchayati Raj was introduced and block development offices created, erstwhile headmen remained important figures locally. Gurbhanga's ex-headman and his son maintained their influence by involving themselves in the newly evolving political and administrative set up. This allowed them, around 1955, to take a loan from the newly created Potka Development Block to enlarge Toppo's Bandh. The loan, according to a Santal elder, was for 1400 rupees, of which about half was spent on the storage work; the Toppo's paid the Santals a wage labour rate of 5-7 rupees per day, so perhaps 100 man-days were spent excavating soil.¹¹ According to Santal discourse, the 1955 loan was taken by Toppo and several Santals. Together they later petitioned the block office to waive the loan repayment, claiming that the storage work provided plenty of irrigation water for the public good. The debt was absolved.

During the 1964 survey and settlement, Toppo's Bandh was recorded under the name of the former headman's son. As he was now a raiyat, it effectively became his private property. He began to deny Santals access to the storage work's water, saying that the bandh was his property. During this period Champi's Santal population, who by the early 1960s numbered about 21 households, elected a Santal *manjhi* (headman) and *naike* (priest). In the early 1980s, one of the grandsons of Gurbhanga's former headman assumed control of Toppo's Bandh. To the dismay of the many Santals having land in the command area, he resolutely decided to utilise the water by and for himself only.

In 2005 Toppo's Bandh has seven co-owners, six Toppo brothers and their mother. Their command area land (about 10 ha) is divided into seven shares. Three of the brothers live in towns, and Santal households sharecrop their land. The mother maintains a couple of large individual plots in her name, which she sublets to Santal farmers. The three brothers living in Gurbhanga farm their own land, in most years irrigating from the bandh during dry spells. However the Santal households having land in the bandh's command area, and those who sharecrop the Toppo's land, are denied irrigation water. In the rabi (winter) season one of the Toppo households uses water from the bandh to grow vegetables, employing some Santal women to help him. He is the only farmer to do so. The Santal grow winter season vegetables along the riverside, manually lifting water to irrigate the crops. Toppo's Bandh is nowadays not maintained, and as a result has a reduced storage capacity, and a lesser productive capacity for fish culture. Most of the Santal community consider Toppo to be selfish and uncooperative. However they have

¹¹ Rupees equivalent is difficult to estimate. In 2005, a daily wage labour rate would be 50-70 rupees privately or about 90 rupees per day working under a government scheme.

internalised the property rights regime imposed upon them, and consider Toppo's Bandh to be the Toppo's private property.

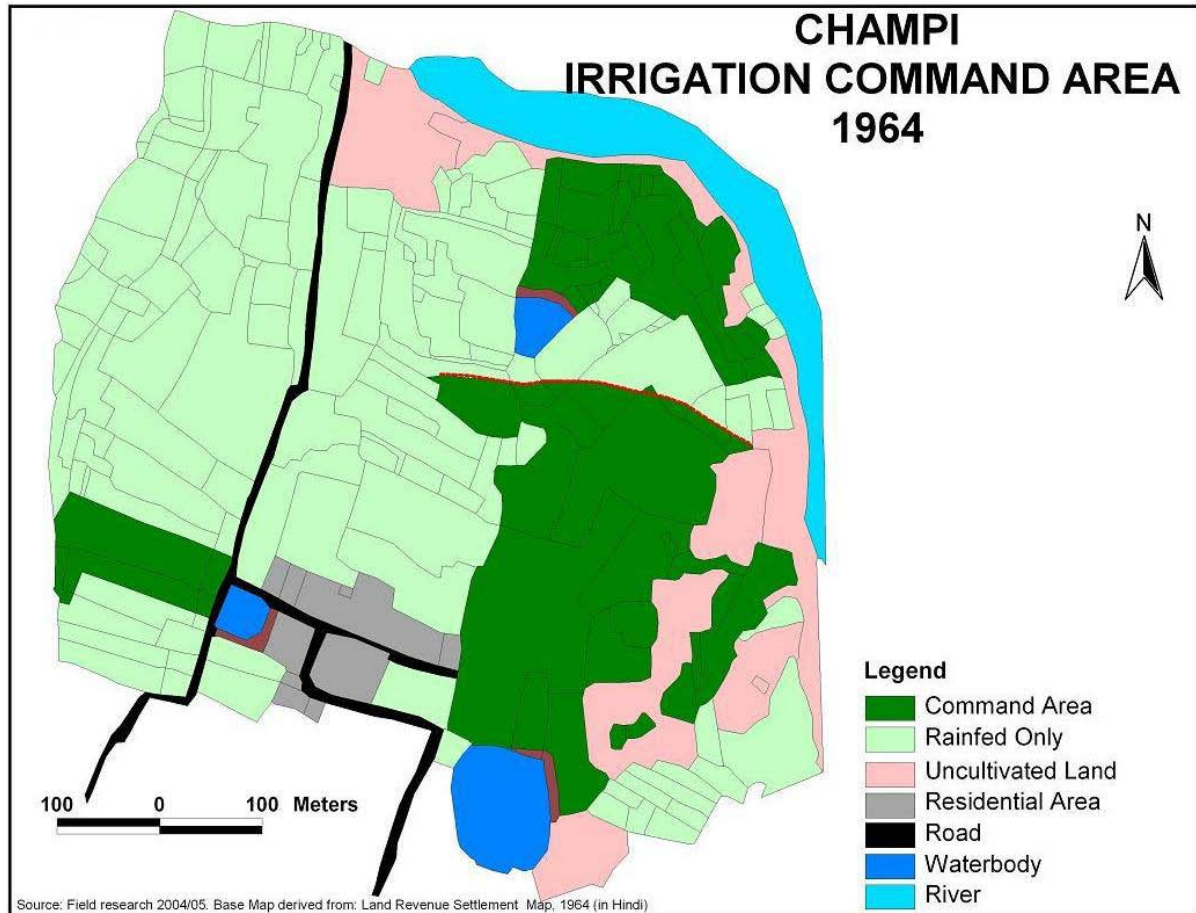


Figure 2. Champi's three storage works and commands areas in 1964. Clockwise from top: Mona's Bandh, Toppo's Bandh, and Surai's Talab

Mona's Bandh

Mona's Bandh was built sometime after Toppo's Bandh. Mona constructed the storage work with the help of his four sons, their wives, and his daughter who returned from her marital village. The storage work has always had a low capacity. Fish culture has rarely been pursued due to its distance from the village. The storage work is listed in the 1937 settlement under Mona's name, and in 1964 as being co-owned by two grandsons from Mona's eldest son, and his other three sons. This family own all the farmland in the command area, which extends to the riverside (Figure 2). The bandh faces management problems which stem from the distribution of farmland and homestead land.

In 2005 ten households descend from Mona, nine of which have land in Mona's Bandh's command area. Santal custom holds that when farmland is divided amongst sons, the eldest son should receive an extra share of land, for it becomes his responsibility to entertain and feed affinal relatives when they visit the village. Over time landholdings have become unequally distributed due to land subdivision. Several households argue that

the practise of distributing a larger portion of land to the eldest son no longer exists, so land should be redistributed within the family. However the largest landholder is not interested in such reform. Confounding the problem is the matter of homestead land. In 2005 seven of the households continue to live on their ancestral homestead plot, one of which is the largest landholder, who has colonised a large part of the plot. The remaining six households are resentful of this. These seemingly trivial land conflicts have led to some disruption in the management of their bandh. The co-owners of Mona's Bandh are unwilling to sit together to discuss the bandh's management including its repair and water distribution.

Surai's Talab

Surai's Talab is a four-sided below-surface pond with a submerged *katchua kuan* (earthen dug-well) in its centre. One Santal elder recalled how he was about 25 years old when his father Surai, having seen Mona excavate his bandh, decided that he would do the same. The talab was designed to provide supplemental irrigation to their mono-cropped paddy and not for pisciculture. Surai had hired Bhumij labour from their nearby mother village, and remunerated the labourers in paddy. Buffalos were used to remove the soil. The well in the centre was created later, after Surai's youngest son's marriage, and used to be deep with steps around its sides. The well fell out of use when the Indian Mark II hand-pump was introduced to the village.

In the present-day Surai's Talab (Figure 2) is effectively managed. Several important attributes abet this. Only four of its six co-owners have land in its small command area, and two of these are relatively wealthy, which aids the planning and implementation of management tasks. Located adjacent to the settlement, theft of fish is near impossible, so besides supplemental irrigation, the talab allows for fish culture and sale. The talab's physical location at the entrance to Champi means that it is seen and used on a daily basis by nearly all the villagers. The majority of Santal women and children use it for bathing and washing their clothes throughout most of the year, and cattle are forbidden from entering it. Because all the Santal households use the talab, they are willing to support the co-owners in maintenance activities. The co-owners refer to themselves as 'Surai's Union'. In the summer of 2005 the co-owners 'cleaned' the talab. First, a diesel engine pump-set was hired and the water drained from the bottom of the talab, into a smaller talab located nearby. Next, the co-owners invited the villagers to come and take away the silt deposited in the talab. At least nine Santal households sent their own household members, servants (typically young and poor adivasis from nearby villages), or hired labour (Santal and Bhumij). The labourers manually dug out the silt, some even using their hands, and piled it on the talab's inner banks. They laboured for two or three weeks in this way. Then, either manually or using a bullock cart, the households transferred the silt to their farm plots, and soon afterwards ploughed it in.

Bara Bandh

Kestrapal's Bara Bandh (big bandh) was created around the 1880s by Bhumij and Dharua Gond hired labourers. It was constructed by Kestrapal's Bhumij headman (ghatwal) for supplemental irrigation, domestic use, and possibly as a show of strength and status. In the 1910 survey and settlement it was listed as khuntkatti land, with no rent

to be imposed, in the name of the ghatwal's son. Between 1910 and 1937 the headman's family split into two parties, most likely due to land pressure. The son remained in Kestrapal hamlet, while his father's second wife and his half-brother relocated to the eastside of the village to found Namotola hamlet. In 1937 the bandh's ownership was recorded in ten parts (*ansh*), five with the Kestrapal party and five with the Namotola party. By this time a grandson of the former ghatwal had inherited the office of headman, and was recorded as Kestrapal revenue village's headman (naik ghatwal). Several elderly Dharua Gond from Manglasai recalled from their childhood, around the time of Indian independence, the Bhumij headman coming to their hamlet to distribute fish from the bandh. They also recall that those Dharua Gond who had land in the command area of the bandh were allowed to take supplemental irrigation.

The exact history of Bara Bandh is difficult to reconstruct partly because there are few Bhumij elders alive today. A Dharua Gond elder of Manglasai claimed that during the 1964 revisional survey several of Kestrapal's dominant Bhumij households, by bribery, managed to get command area land owned by several Gond households settled and recorded in their names. During the same survey, Bara Bandh's ownership was recorded in 24 parts, 12 with the Kestrapal party and 12 with the Namotola party. Within each of these 12 parts are further, unequal subdivisions. Unlike in Gurbhanga where due to its pradhani history the erstwhile headman's family lost its political power, in Kestrapal the ghatwal's great-grandson retained his status as headman up until his death in 1985 (on the strength of his family's khuntkatti heritage). The last headman's death created a political vacuum in the village that remains to the present-day.¹² On his death, his son and nephew (great, great-grandsons of the ghatwal) assumed dominant political roles in village affairs, however under their leadership inter-hamlet relations in the village soured and villagers ceased to celebrate functions together, or to jointly hold meetings. Irrigation is denied to the Gond households having command area land.

Of Bara Bandh's 31 co-owners in 2005, only eight have command area land. Bara Bandh is in a dilapidated condition. In the past few decades, the Kestrapal and Namotola parties are embroiled in a conflict over rights to do fish culture in the bandh. This dispute has involved the police, bribery and two court cases. The judges declared that because the bandh's khatian (record of rights) clearly states that the two parties have joint ownership rights, the two parties should either divide the bandh in half, or take turns using it.

The effects of landholding structure on irrigation, agriculture, and ecology

The analysis of four small-scale storage works has highlighted a diversity of management outcomes that, this paper posits, have been strongly influenced by state-led changes in landholding structure. The secondary drivers of these management outcomes include population growth and the emergence of land scarcity in a context of bureaucratic ineffectiveness, minimal support and investment in agricultural systems, and a political vacuum beyond the indigenous socio-political institutions at the community level.

Land and land-based resources remain central to adivasi communities' lives and livelihoods. Households in Champi whose members work outside of agriculture, either locally or as migrants to cities and industrial areas, invest their remittances in agriculture,

¹² Recall panchayat elections were not held from 1978 to 2011.

such as by purchasing bullock carts, fertilisers, or equipment for processing and milling paddy. However many households work locally in the tough and injurious, poorly paid informal mining sector, which involves the manual breaking of rocks, and over time destruction of the rocky outcrops located in and around the villages. This business expanded due to the lack of opportunities in agriculture, but critically due to the control of village land being taken away from adivasi communities and transferred to private ownership or state 'stewardship'. Farmland expansion meant that rocky outcrops were the last bastions of forest cover, and their destruction disturbs already-pressured local ecological and hydrological systems tremendously. Between 2005 and 2010 the rocky outcrop along one side of Toppo's Bandh has been entirely deforested and mined away. Santal villagers are the workforce, while one of the Toppo brothers and the middlemen involved are the profiteers. The village environments, due to the effects of private landownership, are now greatly degraded.

Taradatt (2001) argues that the non-recognition of communal rights of adivasis in survey and settlement operations supported the separation of individual from community in matters of property relations concerning land. In addition, as argued by Mahapatra (1986), the value systems of the officers and elected representatives of modern state institutions such as the development block and Panchayati Raj are fundamentally at odds with adivasi notions of leadership. While adivasis act as mediators in village relations, seeking to maintain ecological balance in the process, officers and elected representatives are concerned with modern economic development at any cost. Control over land is central to agricultural, irrigation and ecological systems in the villages of rural Jharkhand.

Loss of control over village land and other resources, introduction of alien administrative and value systems, and the related disruption of the socio-political functioning of village communities, affects the management of irrigation systems. These factors disturb the unity that once sustained them.

These factors have also stifled the development of new storage works by farming communities. To create new storage works in a context of maximum land under cultivation, a degree of flexibility and local autonomy to determine landholding patterns and distribution is required. In the past storage works were developed when opportunities for further expansion of land still existed, and when the adivasi notion of collective rights to resources were still operational. Land could, theoretically at least, be redistributed within the lineage or community through consensual agreement. As the landholding structure exists in the present-day, it is difficult to envisage how farming communities could create storage works in optimal locations. Individuals' landholdings, in tiny parcels, are nowadays scattered across villages, the result of survey and settlement operations that reinforced the individualisation of land ownership. This largely explains why farming households and communities have developed few new storage works in the post-independence period. It also explains why large storage works, capable of providing supplemental irrigation to multiple households, have not been created by government or non-government agencies in recent decades. State schemes target individuals, so invariably relatively wealthier households manage to access such funds to build small storage works for fish culture and sometimes to irrigate their own land.

Conclusion

This paper has shown that when societal and property relations were favourable, farming communities created small-scale storage works for the supplemental irrigation of paddy. These systems nowadays face a multitude of management problems. The extant landholding structure has evolved via land revenue settlements and reforms implemented by successive governments without consideration of the indigenous forms of irrigation practised in rainfed agricultural systems. Since the 1980s there have been efforts by the government to develop new storage works, but less so to support pre-existing systems. State-led schemes for creating new storage works have targeted individuals, leading to their placement in locations ill-suited for the provision of supplemental irrigation. Renovation efforts have bypassed many pre-existing works, because they are considered to be privately owned, even though many are co-owned by multiple, often poor households. There is a need to move beyond engineering and management paradigmatic frameworks, under which knowledgeable specialists, civil and social engineers, seek to oversee the design of hydraulic infrastructure, and laws, rules and institutions respectively (Boelens et al. 2005). The creation of water harvesting structures, one every two hectares, in eastern and central India, is recommended (Phansalkar and Verma 2004, 2005). Realising the untapped potential of Indian rainfed agricultural systems through investment in supplemental irrigation is financially attractive and viable, environmentally benign, and equitable and poverty-targeted (Sharma et al. 2008).

To improve irrigation in the region, the government could provide strong inducements to farming communities as a way to indirectly invest in the development of supplemental irrigation (cf. Coward 1986). Japan's government used such a strategy: it left ownership and control in local hands, made subsidies and low-interest loans available to local groups (which generated investments that matched those of the state), and provided technical assistance to local groups (Coward 1986). The strategy was highly dependent upon the existence of strong farming groups who were able to mobilise communal labour and manage water effectively. For this, some degree of localised land reform will be required. It is doubtful that a blanket, state-level land reform would serve the purpose. However progressive land reform is highly unlikely in present-day Jharkhand (see the edited collection by Sundar 2009). In the context of adivasi-inhabited regions, it is important not to change laws that forbid transfer of land from adivasis to non-adivasis. However within adivasi communities the transfer of land should not be ruled out, and would likely be conducive to greater productivity and poverty reduction, besides improvement in socio-political relations within adivasi society. Land could be purchased (not expropriated) from non-resident households, and from households (such as khuntkatti households) who currently have excess land that is unproductively farmed. In the process of localised land reform, landless and marginal farmers could receive land parcels, and land consolidation could take place keeping in mind the optimal location for new storage works. Water reform should take place alongside land reform (Lipton 2009), which would entail all potential command area farmers gaining co-ownership rights over pre-existing storage works. To minimise further ecological destruction (that has already reached extreme proportions) the government could return to village communities control over village land deemed to be 'waste' or 'forest'. The food security challenges of

communities living in rainfed areas are already exacerbated by climate change effects, therefore new ways of understanding and transforming agriculture are urgently required.

References

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Agrawal, A. and S. Narain (eds.). 1997. *Dying wisdom: Rise, fall and potential of India's traditional water harvesting systems*. New Delhi: Centre for Science and Environment.

Areeparampil, M.S.J. 2002. *Struggle for swaraj. A history of adivasi movements in Jharkhand (from the earliest times to the present day)*.: Chaibasa: Tribal Research and Training Centre.

Bhalla, G.S. and G. Singh. 2001. *Indian agriculture. Four decades of development*. New Delhi: Sage Publications.

Boelens, R., M. Zwarteveen and D. Roth. 2005. 'Legal complexity in the analysis of water rights and water resources management', in D. Roth, R. Boelens and M. Zwarteveen (eds.), *Liquid relations: Contested water rights and legal complexity*, New Jersey: Rutgers University Press.

Chatterji, B.M. 1910. *Record of rights. Village 'Gurbhanga', Thana Ghatsila, Pargana Dhalbhum, District Singhbhum*. Created on 12.3.1910 by B.M. Chatterji, Revenue Officer, Government of India. District Record Room, Chaibasa.

Coward, E.W. 1986. 'Direct or indirect alternatives for irrigation investment and the creation of property', in K.W. Easter (ed.). *Irrigation investment, technology and management strategies for development*. Studies in Water Policy and Management, 9: 225-244, Boulder Colorado: Westview Press.

Devalle, S.B.C. 1992. *Discourses of ethnicity: Culture and protest in Jharkhand*. New Delhi: Sage Publications.

D'Souza, R. 2004. 'Rigidity and the affliction of capitalist property: Colonial land revenue and the recasting of nature', *Studies in History*, 20(2): 237-272.

D'Souza, R. 2006. 'Water in British India: The making of a 'colonial hydrology'', *History Compass*, 4(4): 621-628.

D'Souza, R. 2008. 'Framing India's hydraulic crises: The politics of the modern large dam', *Monthly Review Press*, 60(3): 112-124.

Gadgil, M. and R. Guha, 1995. *Ecology and equity: The use and abuse of nature in contemporary India*. New Delhi: Penguin.

GoI (Government of India). 2001. Census of India, 2001.

GoJ (Government of Jharkhand). No date. State of Jharkhand. Department of Forest and Environment, Environment Information System, Government of Jharkhand, Government of India. jharenvis.nic.in/files/State%20Of%20Jharkhand-Overview.pdf (Accessed online 27 February 2011).

GoJ (Government of Jharkhand). 2002. *Vision 2010. Government of Jharkhand, Government of India*.

Hardiman, D. 1998. 'Well irrigation in Gujarat: Systems of use, hierarchies of control', *Economic and Political Weekly*, 33(25): 1533-1544.

Hill, J. 2008. Contexts, ideologies and practices of small-scale irrigation development in East India. PhD thesis. University of East Anglia, Norwich, UK.

Jha, J.C. 1967. *The Bhumij revolt (1832-33)*. Delhi, India: Munshiram Manoharlal.

- Jha, J.C. 1989. 'The changing land system of the tribals of Chota Nagpur, 1771-1831', in T. Banerjee (ed.) *Changing land systems and tribals in eastern India: The modern period (Report of seminar held at Santiniketan, 6-7 March, 1986)*. Calcutta: Subarnarekha.
- Lipton, M. 2009. *Land reform in developing countries: Property rights and property wrongs*. New York: Routledge.
- Mahapatra, S. 1986. *Modernization and ritual. Identity and change in Santal society*. Calcutta: Oxford University Press.
- Mosse, D. 2003. *The rule of water: Statecraft, ecology and collective action in South India*. New Delhi: Oxford University Press.
- MSSRF (M.S. Swaminathan Research Foundation)/WFP (World Food Programme). 2001. *Food insecurity atlas of rural India*, M.S. Swaminathan Research Foundation, Chennai and World Food Programme, India.
- MSSRF (M.S. Swaminathan Research Foundation)/WFP (World Food Programme). 2008. *Report on the state of food insecurity in rural India*. Chennai: Nagaraj and Company Private Limited.
- Mullick, S.B. 2005. 'Hand-back-land model to sustain tribes', *The Telegraph*, Calcutta, 21 February 2005.
- NABCONS (National Bank for Agriculture and Rural Development Consultancy Services). 2008. District agriculture plan. East Singhbhum. 2008-09 to 2011-12.
www.sameti.org/RKVY/SAP/Agri%20plan%20East%20Singhbhum.pdf (accessed 16 February 2011)
- Phansalkar S.J. and S. Verma. 2004. 'Improved water control as strategy for enhancing tribal livelihoods', *Economic and Political Weekly*, 31 July 2004: 3469-3476.
- Phansalkar S.J. and S. Verma. 2005. *Mainstreaming the margins. Water-centric livelihood strategies for revitalising tribal agriculture in central India*. New Delhi: Angus and Grapher.
- Prasad, R. 1961. *District census handbook: Singhbhum*. Patna: Government of Bihar Secretariat Press.
- Prasad, C.B. 1970. *Final report on survey and settlement operations in the district of Singhbhum (1958-1965)*. Patna: Government of Bihar Secretariat Press.
- Rao, N. 2009. 'Conflicts and contradictions: Land laws in the Santhal Parganas', in N. Sundar (ed.) 2009. *Legal grounds: Natural resources, identity, and the law in Jharkhand*. New Delhi: Oxford University Press.
- Reddy, D.N. and S. Mishra. 2008. 'Crisis in agriculture and rural distress in post-reform India', in R. Radhakrishna (ed.), *India development report, 2008*. New Delhi: Oxford University Press.
- Reid, J. 1911. 'Final report on the survey and settlement of Pargana Dhalbhum in the District of Singhbhum 1906 to 1911', in P.R.N. Roy (ed.), *Manual of Chotanagpur Tenancy Laws*, Allahabad: Rajpal and Company.
- Sen, A.K. 2004. 'The process of social stratification in the lineage society of Kolhan in Singhbhum', *South Asia: Journal of South Asian Studies*. 27(1), 27-38.
- Sen, A.K. 2010. 'Water bodies, changing social ecology and Ho adivasis of colonial Singhbhum', *International Journal of Development and Social Research*, 1(2): 59-74.
- Sengupta, N. 1980. 'The indigenous irrigation organisation in South Bihar', *The Indian Economic and Social History Review*, 17(2): 157-187.
- Sengupta, N. 1982. 'Agrarian movements in Bihar', *The Journal of Peasant Studies*. 9: 15-39.
- Sengupta, N. 1985. 'Irrigation: Traditional vs modern', *Economic and Political Weekly*. XX: 1919-1938.
- Sengupta, N. 1991. *Managing common Property: Irrigation in India and Philippines*. New Delhi: Sage Publications.

- Sengupta, N. 1993. *User-friendly irrigation designs*. New Delhi: Sage Publications.
- Sharma, B.R., K.V. Rao, K.P.R. Vittal, U.A. Amarasinghe. 2008. 'Converting rain into grain: Opportunities for realizing the potential of rain-fed agriculture in India', in *Proceedings of the Workshop on Analyses of Hydrological, Social and Ecological Issues of the National River Linking Project (NLRP)*, New Delhi, 239–252.
- Sinha, S. 1962. 'State formation and Rajput myth in tribal central India', *Man in India*. 42: 35-80.
- Sundar, N. (ed.). 2009. *Legal grounds: Natural resources, identity, and the law in Jharkhand*. New Delhi: Oxford University Press.
- Taradatt. 2001. *Tribal development in India: With special reference to Orissa*. New Delhi: Gyan Publishing House.
- Thapar, R. and M.H. Siddiqi. 2003. 'Chota Nagpur: The pre-colonial and colonial situation' [first published in 1979], in R.D. Munda, and S.B. Mullick (eds.), *The Jharkhand movement. Indigenous peoples' struggle for autonomy in India*, Copenhagen: International Work Group for Indigenous Affairs, Transaction Publishers.
- Upadhyaya, C. 2009. 'Law, custom, and adivasi identity: Politics of land rights in Chotanagpur' in N. Sundar (ed.), *Legal grounds: Natural resources, identity, and the law in Jharkhand*,. New Delhi: Oxford University Press.