V. PRODUCTION SYSTEM, LAND USE AND SOCIO-ECONOMIC FEATURES

Limits to the productive capacity of land resources are set not only by the climate, soil and landform conditions. The policies and strategies governing the use and management of these resources are also important factors. A major challenge confronting development policy and planning is sustainable management of natural resources. Negligent and deficient policies and mounting pressure on essential resources, such as land and water, has led to a decline in, both their quantity and quality. We discuss below some of the major features of the production system in Chhattisgarh, covering a range of land and water resource-based activities.

Among the 15 regions demarcated in the country by the Agro-Climatic Regional Planning (ACRP) Unit are regions VII (Eastern Plateau and Hills) and VIII (Central Plateau and Hills). Relatively poor soils, varied topography, steep slopes with high run-off, and medium rainfall characterize these regions. The climate varies from arid in the central parts to semi-humid in the eastern areas. The intensity of both irrigation and cropping is low, with food crops dominating production. Thus, undulating topography, under-developed irrigation potential and a large proportion of rain-fed farming form the agro-climatic context for intervention in these regions. The range of appropriate measures includes integrated watershed development for soil and rainwater conservation, crop diversification to achieve a more balanced and rational cropping system, groundwater development for better utilization; and better inputs and services (Wadia, 1996).

5.1 *Rainfall And Biasi System Of Rice Cultivation*

Chhattisgarh falls in the ACRP regional classification of Plateaus and Hills. Until recently, it was situated in eastern Madhya Pradesh. As discussed in the earlier section, it is divided into three agro-climatic zones — the Northern Hills, the central Chhattisgarh Plains and Bastar Plateau in the south. The climate of the state is sub-humid and it receives about 1200-1600 mm of average annual rainfall. Of this, 90 per cent is received during the southwest monsoon season. The monsoon sets in around 10th June in the southernmost tip of Bastar district and by 25th June it covers all parts of Chhattisgarh. The monsoon withdraws from different areas of the state between 15th and 25th September (IGAU, 1996: 1). In sub-humid climates the seasonal rainfall is too high to grow dry-land crops and insufficient to grow a rice crop without water stress. Particularly in the sub-humid plains of eastern India, where the natural slope is gentle, drainage becomes a problem. The resulting waterlogging narrows down the cropping options to rice in such areas. With limited irrigation facilities and due to conditions of water logging during the growing season, rice is cultivated even under unirrigated conditions.

In Chhattisgarh too, rice has a major share in the total *kharif* area in each district (75-85 per cent), followed by *kodo-kutki*. In fact, rice has the highest coverage in Chhattisgarh Plains, grown in 80 per cent of the net sown area (NSA). The non-rice crops in the remaining 20 per cent of NSA are almost equally distributed between the *kharif* and *rabi* areas. In the other two zones, rice covers between 60 to 70 per cent of NSA. In the remaining 30 to 40 per cent of the area – where soils are shallow, permeable and less water-retentive, non-rice *kharif* crops, mostly small millets, are cultivated. On account of the low water retention of most upland soils, a very negligible portion (1 to 3 per cent) of the NSA is solely under *rabi* cropping. While monocropping is predominant in Chhattisgarh, in heavy soils or on lowlands, lathyrus, linseed or gram is cultivated in *rabi* as a relay (*utera* system of traverse intercropping) crop. The only *rabi* areas are in the Dhamtari-Raipur central plains plains. Rice is even grown as an upland crop on dry, unploughed and unbunded fields, rather than flooded conditions, by broadcast method of sowing, usually in the lateritic areas or by erstwhile forest-dwelling shifting cultivators. Even on fields with embankments and with the use of ploughs, broadcast is the norm as opposed to transplantation.

While the broadcasting method has several constraints arising due to easier spread of weeds, etc., we need to explore more fully the possible merits and demerits of advocating transplantation in the particular soil-moisture-terrain regime obtained in Chhattisgarh (without indulging in environmental determinism). We need to examine the dry, upland rice cultivation practices from the point of view of yield, variety, adaptability to specific local agro-climatic conditions, and ability to withstand drought, The aim should be to build upon these practices where swamps are not possible/desirable, and to shift to transplantation in swamped fields where feasible/desirable, with appropriate attention to the variety, weeding, etc.

Broadcast seedlings can be subjected to severe damage by birds, rats and snails, or be washed away by heavy rain before taking firm root. The rooting depth of rice is very shallow, of about 15 cm. Water stress in upland/dryland conditions can rapidly set in. Weed growth is also difficult to control in unflooded paddy, and grasses and weeds can overrun the land, especially on plots successively cropped under unflooded broadcast paddy. The most critical stage, when water is required in the life cycle of the rice plant is during the latter part of the vegetative period from panicle primordial initiation to about five days after heading. Flooding helps provide an adequate water supply in this period. However, shallow water (up to 15 cms) or absence of puddling is advantageous for certain varieties and soil moisture regimes. Tillar formation seems to be stimulated by the large diurnal variation of soil and water temperature. It also favours decomposition of organic matter, in turn stimulating development of root system. (This increases nutrient intake and higher nutrient intake and greater tillar formation decreases chances of stress as well as protects and even enhances yield.) The hard rock sub-strata forms an impervious layer and perhaps help retain moisture up to the requisite depth on the shallow soils on which rice is grown in Dondi. In some agro-climatic conditions, deep flooding has several deleterious effects, through the decrease of oxygen supply to the roots and slower decomposition of organic matter, both resulting in lower nutrient intake, toxicity and lower tillaring.

As discussed in the section on rainfall, in Chhattisgarh most of the rain occurs in a few discrete and high-intensity bursts or spells. Due to the torrential rains and the limited period for seedbed preparation and sowing, rice is grown under the broadcast *biasi* system. We have already mentioned earlier on that rice seeds are broadcast in the pre-ploughed fields and mixed in the soil, immediately after the onset of the southwest monsoon in mid-June. But, if the monsoon onset is accompanied by a cyclonic storm, generated either in the Bay of Bengal or the Arabian Sea, the bunded rice fields get filled with water and sowing is often delayed by 10-12 days (IGAU, 1996: 6, 23; Baghel and Sastri, 1992: 214).

Unlike in other rice growing areas of the country, in north and south India, in this region the duration of the sowing operation is restricted to 10-15 days. This is so because with very low animal draught power, sowing begins only after the arrival of the monsoon; and the operations are to be completed before a second spell of heavy rainfall. After 30 to 40 days when sufficient water has been impounded—some times up to 30-40 cm--the bunded rice fields are again ploughed, this time with the standing crop. In local parlance this operation is known as *biasi*. In this method of cultivation, the ploughing of fields during the summer season — locally referred to as *acrus* — is necessary (*Ibid.*: 1,6; Baghel & Sastri, 1992: 217; Sastri, 1998: 2).

High yielding, short/medium-duration, dwarf varieties of rice cannot withstand the water accumulation in the bunded fields under the broadcast *biasi* system. Hence, farmers grow the tall varieties, which are of long duration. These varieties, which are mostly photosensitive in nature, flower in mid-October and mature by mid-November. However, the monsoon withdraws by mid- to late September from Chhattisgarh. Hence, the September-October rainfall, which is mostly due to cyclonic activity in the Bay of Bengal, is important for rice production in this state. *Biasi* serves three purposes: it reduces the population of rice plant population, which can be high due to the use of the broadcasting method; it destroys the weed population, which grows and competes with rice; and it creates semi-puddled conditions, which in turn reduces percolation losses (Sastri, 1998: 2).

5.2 *Rainfall And Drought Vulnerability Of Rice*

The main climatological constraint for rice production in Chhattisgarh is the soil moisture regime. With the area under irrigation being very small, the factors governing growth and development of the crop are quantum of rainfall and its distribution and stability during the growing season (Sastri and Chaudhary, 1994: 38). At any stage of growth of rice, water stress can adversely affect the plant and reduce its yield. It is most damaging during the early stages, and is also harmful at the reproductive stage. Water deficits from this stage to heading can lead to a high percentage of sterility. Without irrigation the potential yield of rice is reduced, due to increased spikelet sterility.

In Chhattisgarh the rice growing season varies from 96 days in Jagdalpur to 64 days in Rajnandgaon. The stable rainfall period in Chhattisgarh varies from 59 days in Durg district to 98 days in Jagdalpur district[53]. Further, in places like Durg, this period is not continuous— but in two spells, with a gap of 26 days. So the stable rainfall periods are not sufficient to support the traditional long-duration varieties grown in this region under rain-fed conditions. This makes the rice crop in Chhattisgarh vulnerable to drought (*Ibid.*: 40).

Intermittent dry spells during the growing season are another constraint on rice production in this region. Cultivators usually accumulate 10-15 cm of water in the rice fields. Even with high evapotranspirational losses during a dry spell, the impounded water should last for at least seven days long enough not to affect crop growth. Only dry spells of longer duration are detrimental to the growth and development of rice crop. The frequency of dry spells exceeding even 10 days are very low in July and August, the months of high and stable rainfall. The frequency is slightly higher in September and quite high during the month of October (*Ibid.*: 41-42). Thus, long-duration varieties are bound to suffer from water stress during the reproductive stage, making drought a recurring phenomenon in the state.

[53] See section on rainfall in previous chapter

Thus, we see that even though Chhattisgarh is in a high-rainfall, sub-humid climatic region, factors such as variability in monsoon distribution, often delayed onset and too early withdrawal, punctuated by long dry spells, adversely affect rice production in the state. The productivity is low at 1.25 tonnes per hectare, as is cropping intensity at 1.25 (IGAU, 1996: 1). However, studies have shown that, despite a significant trend of decreasing rainfall in some pockets of each district, still the productivity of rice has increased from the late seventies to the early nineties. Technological factors such as cultivation of high-yielding and multi-resistant varieties, balanced use of fertilizers, and pest and disease management are responsible for the slight increase in productivity, which would otherwise have declined due to the decreasing rainfall

5.3 Utera System Of Double Cropping

The double crop is still largely grown under the *utera* system, which involves sprinkling the seed among the standing rice crop in September-October to take advantage of the moisture in the soil. Hence the significance of the September-October rains. When the rice is harvested the second crop rapidly grow and is cut as an early *rabi* crop. As the long-growing varieties of rice do not allow the *utera* crop to give much of a yield, this practice of double cropping is confined to fields where early and medium rice is grown. The *utera* area tends to fluctuate a great deal with the quantum of the September-October rainfall. The crops grown are mainly *urad, mung* and peas; wheat is never grown as an *utera* crop and comparatively gram is grown infrequently. The *nagri* system, under which the land is ploughed again after the rice is cut and sown with other valuable crops such as wheat, gram, linseed, is less prevalent in Dondi. When this is done gram is the usual crop.

In Chhattisgarh, even the heaviest black soil, *kanhar*, is not the pure black cotton soil found in the wheat areas of the Narmada valley and wheat grown on it needs irrigation to produce a good crop. In the case of the lighter and less moisture retentive *dorsa* soils, irrigation is needed even more. Additionally, here, the gradients of the valleys are often very steep as compared to the pure black soil tracts of the North. As a result the impure heavy soils get drained more quickly after the rains and do not always retain sufficient moisture to carry wheat to maturity. Together, the lack of irrigation and bunding on plots with higher slopes result in low wheat acreage even though heavier soils predominate. *Matasi* or yellow soil is considered the soil *par excellence* for rice and almost every acre of it is under that crop. Large areas of the heavier soils are left for grazing. Wheat, when cultivated without irrigation, is generally sown on deep and black soil.

It is by no means indisputable that there is any considerable advantage or prospects of increasing the *rabi* irrigation and replacing utera by *nagri* cultivation, as in the central parts of the state. Differences in the characteristics of the heavy soils only partly explained the preference for the *utera* system in the hills of Chhattisgarh. The terrain may also have a role to play, as also the fact that the staple crop of the hilly parts is rice so a catch crop of *rabi* follows a main crop of rice. Not only do they stand in greater need of protection; a considerable portion within them had a tradition of wet cultivation.

Most of the second crop is grown under *utera* conditions. In this method of cultivation, lathyrus and linseed are grown as relay crops with rice and occupy the major area in *rabi* season under rain-fed conditions. The seeds of these crops are broadcast in the paddy fields after removing the water, just around 20 days before harvesting the paddy. Seeding and harvesting are the only operations required under this system of cultivation. Crop yields are extremely low, generally less than 0.3 t per/ha. Once the paddy is harvested, the lathyrus and linseed crops thrive on the conserved fertilizer and soil moisture (recharged during the October rains). These relay crops are planted in heavy soils like clay loam and clayey soils, which have high water-holding capacity. Later, during the winter rainy season (December-January), these relay crops produce some grain. Although the quantum of winter rainfall is low (102 mm in Chhattisgarh Plains, 106 mm in Bastar Plateau, and 155 mm in Northern Hills), it is sufficient to provide life-saving moisture to the linseed and lathyrus crops. If the winter rains are negligible, lathyrus is used as a fodder crop. Because of the decreasing trend in rainfall and the growing vulnerability of the rice crop to drought in October, the area planted with linseed and lathyrus as relay crops is declining significantly in Chhattisgarh state (Chaudhary, Sastri, Naidu and Srivastava, 1995: 24-25; IGAU, 2001: 11).

5.4 *Fertilizer Use: Rainfall-Induced Variability*

Consumption of chemical fertilizer (NPK) consumption increased multifold after 1985 in all the three zones of Chhattisgarh. The increase ranged from 540 to 1340 per cent in Chhattisgarh Plains (here the NPK ratio was more balanced); from 430 to 500 per cent in Bastar Plateau; and 230 to 300 per cent in Northern Hills. Of the various agro-technological inputs that contributed to the higher productivity of rice and other crops during these years, irrigation seems to have been the least important. The increase in irrigated to cropped area was just 5.3 per cent in Chhattisgarh plains, 0.9 per cent in Bastar Plateau and 1.3 per cent in Northern Hills (*Ibid*: 94-97).

This anomaly may be explained by the fact that the instability of crop yields in rain-fed agriculture arises from two factors. The first is the effect of water stress on crop growth; and the second is the influence of water scarcity on the farmers' decision to use inputs. There is a significant link between rainfall and rice productivity even in the more developed[54] districts essentially because, despite the availability of irrigation, the irrigation is dependent on rainfall in this region (Baghel and Sastri, 1992: 216-217). The net irrigated area in Chhattisgarh Plains is 266 per cent while in Bastar Plateau and Northern Hill it is only two per cent and four per cent, respectively. But even in Chhattisgarh Plains, rice cultivation can be considered to be rain-fed and risk-prone. This is so because irrigation is from reservoirs filled with rainwater drained from the catchments areas. So, if the rains fail, irrigation is also adversely affected. (Alam and Sastri, 2). Another study also seems to corroborate the rainfall-fertilizer use-rice yield linkage. Pal and Bhuiyan found a small increasing trend in yield with time in individual districts of Chhattisgarh on account of expansion of irrigation. However, large fluctuations were due to sensitivity of the crop to rainfall amount and distribution. This sensitivity appears to have become more pronounced from 1980-81 onwards, when fertilizer availability and use showed a substantial increase. Under favourable rainfall conditions, weed control operations are performed on time and the farmers apply significant doses of fertilizer. In water-deficit seasons, fertilizer use and efficiency decline sharply, as does rice yield. This confirms the sensitivity of rice yields to fluctuations in fertilizer use, which is induced by rainfall variability.

[54] By developed areas we mean blocks with higher values for agricultural infrastructure as well as performance.

5.5 *Multiple Adverse Effects Of Water Deficiency In Rice Production*

A favourable water regime in the field is desirable not just to promote efficient fertilizer use but for a whole range of farming activities. This[55] includes: preparing the land, planting the crop, managing weeds; promoting nutrient uptake and reducing nutrient losses; maintaining soil profile softness for deeper root growth; avoiding soil cracking in rice. Irreversible soil cracks, brought on by a dry spell, may disrupt the water economy for the remaining growing period. Fertilizer use efficiency in rice is undermined if the soil water status cannot be maintained above saturation for about a week from the time of application. The nitrification and denitrification processes under alternate submergence and drying of the soil cultivated with rice lead to high losses of applied nitrogen. In Chhattisgarh, uncontrolled weed growth seriously inhibits crop performance when *biasi* is delayed for want of adequate rain. Next to drought, untimely weed control is the most important constraint on raising the productivity of lowland rice in eastern India. Thus, water insufficiency affects crop productivity in various interactive ways (*Ibid*.).

An adequate water regime and a suitable soil nutrient status are critical not just for the traditional long-duration varieties of rice, but also for modern strains of the crop. While the latter have better chances of withstanding drought, the short-duration varieties do not fit into the *biasi* practice of controlling weeds. If rainfall is not timely (30-40 days after emergence), *biasi* is delayed and the intense competition from weeds severely suppresses the growth of the dwarf varieties. It is this hydrological complexity that limits the suitability of the modern short-duration varieties for the rain-fed rice environment (*Ibid*.). Clearly, what is required is a technology that reduces the uncertainty of water supply to the crop, by management of rainwater.

5.6 *Traditional Water Management: Inadequate Drought Protection*

In traditional upland rice ecosystems, including those in Chhattisgarh, farmers try to harvest rainwater through bunding and leveling practices. While these practices substantially improve water availability to rice, they have limited success in most drought-prone environments. Three major factors reduce the efficiency of water retention in rice fields that are leveled and bunded. Firstly, excessive flooding adversely affects seed germination, early seedling growth and tillering. Hence farmers keep the field outlets open or drain out the excess water during the early stages of crop growth. Secondly, water losses by percolation increase with the depth of flooding; especially due to unpuddled areas underneath the bunds. The percolation losses shoot up, as the perched water table recedes after a break in the rainfall. Thirdly, irreversible soil cracks developed during dry spells aggravate the water loss during subsequent rains. This often disrupts the water economy of rice fields, sometimes seriously.

In lowland rice fields, water inputs are in the form of direct rainfall, overflow from higher fields and subsurface interflow. Thus, more often than not, it is the loss of water rather than insufficiency of rains that threatens rice with drought. The prevalent leveling and bunding practices, no doubt, afford appreciable benefits of reducing field water losses and extending a favourable water regime for rice. However, a partial to total crop failure from prolonged drought can still occur in such fields due to high water loss

[55] See the section on rainfall in previous chapter

Thus, the predominantly rain-fed rice-based cropping system practiced in Chhattisgarh suffers from water stress mainly due to uneven distribution of rainfall, significant gaps between rain events and high field water losses. It is the unreliability and shortage of water supply for rice at various stages of growth that have hindered its productivity and discouraged the adoption of modern technology. This is an anomaly considering that Chhattisgarh is a high rainfall state, endowed with well-conserved soils and a favourable climate that are otherwise conducive to growing not only a good rainy season crop but also a post-monsoon one. Part of the explanation lies in the pattern of the precipitation, the bulk of which is received between June and September, and in high-intensity storms of very short duration. It has been estimated that throughout India, including Chhattisgarh, 50 per cent of the rains during the monsoon occur in just 20 to 30 hours, accounting for a meager 1 per cent of the rainy season cropping period. A substantial amount of water from these storms is lost by run-off, and seepage and percolation (S and P) the loss being much faster than the uptake by crops. While the percolated water recharges the soil profile moisture, water drained out from the field as surface run-off is irrecoverable. Thus, in a context where there is water deficiency even in high rainfall areas, the solution could primarily lie in minimizing losses (run-off and S and P) beyond the levels achieved by traditional land and water management practices (Rathore, Pal, Sahu and Chaudhary, 1996: 253-54).

Under the traditional rainwater management system, including that in Chhattisgarh, run-off from unbunded uplands is directed to low-lying (bunded and leveled) rice fields and distributed as evenly as is feasible over the cropped area. In this method of water harvesting for rain-fed rice cultivation, there is no provision for safe *in-situ* storage of excess water. The new approach to rainwater management envisages the creation of a small *in-situ* storage facility, an on-farm reservoir (OFR), in series across or along the slope for collection, diversion and use of excess rainfall, which is otherwise lost as run-off (IGAU, 2001: 5). The high efficiency of OFRs in alleviating drought and increasing the productivity and stability of rain-fed rice lands has been demonstrated in Philippines, Bangladesh and Indonesia. Water conserved in OFRs helped to establish rice early enough even though the onset of monsoon was delayed; provided supplemental irrigation to the crop during in-season drought, especially at the critical reproductive stage; and made possible a second crop of rice or an upland crop to be cultivated; .It also allowed for fish cultivation (Pal and Bhuiyan).

In this section we will look at the production system, land use and the socio-economic features in relation to each other and in relation to selected ecological features (Table 5.1 and 5.3).

Table 5.1: Selected Indicators Of Socio-Economic Equity

Code	Block	Gini Coefficient	Percentage SC	Percentage ST	Percentage Agricultural Labourers	Percentage Workers Dependent on Agriculture
BASTAR						
101	Jagdalpur	0.50	14.14	61.03	41.00	83.79
102	Lohanandeguda	0.73	6.38	76.11	19.02	96.09
103	Darma	0.34	5.66	83.91	20.31	94.87
104	Tokapal	0.39	10.22	72.95	24.49	91.59
105	Bastanar	0.71	1.98	91.29	7.48	96.49
106	Bastar	0.54	11.17	65.27	22.46	92.92
107	Bakaband	0.44	13.01	61.26	24.32	91.47
108	Kondagaon	0.60	5.07	71.69	12.11	94.75
109	Pharasgaon	0.81	5.53	71.63	10.29	92.47
110	Keshkal	0.34	3.12	70.99	13.14	90.22
111	Bederajpur	0.80	2.92	75.84	13.01	94.26
112	Narayanpur	0.60	4.45	71.18	9.44	86.81
113	Abujmar	0.38	1.28	95.02	2.80	98.05
114	Makri	0.79	2.66	77.14	10.98	94.25
BILASPUR						
201	Bilha	0.89	26.72	12.22	31.75	84.46
202	Masturi	0.81	26.02	14.70	30.04	91.15
203	Takhatpur	0.83	20.74	14.42	32.95	87.77
204	Mungeli	0.80	32.16	4.86	29.90	91.89
205	Patharia	0.83	21.77	11.63	25.48	91.54
206	Lormi	0.81	30.73	19.93	29.07	90.56
207	Kota	0.72	10.13	47.32	31.78	88.31
208	Gaurella	0.40	3.79	64.18	18.77	90.86
209	Pendra	0.50	5.18	63.67	27.58	86.60
210	Marwahi	0.81	7.10	61.43	20.93	91.04
DANTEWARA						
301	Dantewara	0.67	3.86	71.56	8.39	85.86
302	Bijapur	0.67	7.43	78.58	6.37	92.90
303	Kuankonda	0.73	0.72	95.15	12.68	96.87
304	Katekalyan	0.35	4.63	82.33	7.93	93.26
305	Bhairamgarh	0.74	1.82	86.97	5.21	96.63
306	Bhopalpatnam	0.45	7.52	74.63	23.32	90.35
307	Abapalli (Asur)	0.75	4.00	85.49	13.63	93.43
308	Konta	0.74	1.82	90.08	6.99	93.08
309	Sukma	0.40	4.46	77.66	5.00	89.79
310	Chhindgaon	0.79	2.56	82.90	9.92	93.59
311	Gedam	0.76	4.68	66.58	8.39	87.98

Table 5.1: Selected Indicators Of Socio-Economic Equity (Contd.)						
Code	**Block**	**Gini Coefficient**	**Percentage SC**	**Percentage ST**	**Percentage Agricultural Labourers**	**Percentage workers Dependent on Agriculture**
DHAMTARI						
401	Dhamtari	0.81	6.42	21.25	40.37	86.82
402	Kurud	0.84	9.77	9.32	34.63	92.51
403	Magerlod	0.50	5.02	25.07	38.24	93.29
404	Nagri	0.70	4.25	62.05	30.09	89.40
DURG						
501	Durg	0.85	13.29	5.87	35.31	74.36
502	Dhamdha	0.89	19.23	5.22	32.31	84.51
503	Gundardhehi	0.82	5.23	5.07	29.91	90.80
504	Patan	0.81	15.02	9.42	39.03	85.97
505	Balodh	0.80	7.05	31.03	29.35	87.71
506	Dhoundhi	0.76	5.44	65.66	18.09	84.14
507	Gurur	0.79	6.09	20.64	37.06	91.52
508	Dhoundilohara	0.67	6.32	47.27	16.72	91.22
509	Bemethara	0.86	19.18	5.08	35.97	92.24
510	Saja	0.86	10.13	7.10	35.93	91.48
511	Berla	0.85	13.98	3.42	35.95	88.47
512	Navagarh	0.81	26.76	4.48	29.29	92.17
JANJGIR CHAMPA						
601	Akaltara	0.81	23.34	15.03	21.49	86.08
602	Baloda	0.80	21.41	16.78	24.99	82.88
603	Nawagarh	0.89	24.49	3.09	21.08	93.86
604	Pamgarh	0.81	33.05	5.15	17.51	91.89
605	Bamhanideh	0.89	17.28	10.22	30.32	88.27
606	Sakti	0.80	14.21	29.20	30.01	86.74
607	Jaijaipur	0.80	26.05	11.21	21.75	94.17
608	Malkharoda	0.81	28.78	12.42	29.62	91.79
609	Dabhra	0.67	18.52	21.50	36.60	88.76
JASHPUR						
701	Jashpur	0.83	5.89	68.89	9.04	85.64
702	Manora	0.30	3.90	81.91	8.55	90.43
703	Bagecha	0.30	3.87	72.29	10.77	89.86
704	Duldula	0.76	6.98	53.06	15.67	90.29
705	Kunkuri	0.45	9.14	52.86	15.06	83.33
706	Kontabel	0.35	9.21	64.47	12.79	89.88
707	Pathelgaon	0.73	8.10	67.61	19.18	93.12
708	Pharsabahar	0.35	9.19	66.00	25.02	90.86
KANKER						
801	Kanker	0.60	4.97	61.36	24.85	89.40
802	Charama	0.70	5.61	48.71	22.70	84.67
803	Sarona/Narharpur	0.72	3.75	67.83	22.80	92.74
804	Bhanupratapur	0.73	6.05	64.49	15.87	85.92
805	Durgkondal	0.79	5.92	76.58	8.04	93.25
806	Antagarh	0.80	2.67	44.41	9.26	92.72
807	Koelibeda	0.80	4.11	64.86	11.08	94.55

Table 5.1: Selected Indicators Of Socio-Economic Equity (Contd.)						
Code	**Block**	**Gini Coefficient**	**Percentage SC**	**Percentage ST**	**Percentage Agricultural Labourers**	**Percentage Workers Dependent on Agriculture**
KAWARDHA						
901	Panderia	0.79	22.08	24.84	22.51	92.24
902	Kawardha	0.86	15.73	7.62	30.16	92.39
903	Sahaspur lohara	0.84	7.34	14.52	26.34	92.80
904	Borla	0.84	8.87	38.86	21.01	92.95
KORBA						
1001	Korba	0.60	12.72	53.92	27.72	78.22
1002	Katghora	0.81	11.66	29.23	18.60	53.65
1003	Poriuprora	0.79	3.78	73.10	22.01	88.33
1004	Pali	0.80	8.08	54.40	25.85	90.88
1005	Kartala	0.76	10.67	49.93	24.67	90.70
KOREA						
1101	Sonhat	0.80	6.20	57.49	12.80	92.42
1102	Baikunthpur	0.70	7.31	41.94	13.53	81.80
1103	Manendragarh	0.68	6.71	69.03	15.49	86.61
1104	Khargawa	0.33	5.77	72.55	14.26	94.89
1105	Bharatpur	0.71	5.70	66.13	18.81	86.28
MAHASAMUND						
1201	Mahasamund	0.80	14.68	24.84	38.04	89.55
1202	Bagbahra	0.76	10.53	33.51	37.61	92.86
1203	Pithora	0.60	8.98	36.09	34.39	92.90
1204	Sarayapali	0.86	15.56	27.31	35.87	91.87
1205	Basna	0.77	13.17	29.02	33.48	89.75
RAIGARH						
1301	Raigarh	0.75	14.34	33.87	38.11	82.38
1302	Pusoar	0.75	13.59	24.44	37.38	87.56
1303	Kharseia	0.75	11.40	35.41	28.80	86.70
1304	Gharghora	0.78	6.62	64.32	25.04	91.68
1305	Launlunga	0.78	7.19	63.79	31.21	91.20
1306	Lagnar	0.40	10.07	53.55	29.81	90.12
1307	Sarangarh	0.76	29.95	15.99	33.04	92.39
1308	Baramkela	0.85	15.84	22.72	38.92	90.13
1309	Dharamjainagar	0.64	5.94	70.41	20.08	91.80
RAIPUR						
1401	Garsiva/Raipur	0.84	15.78	4.24	28.66	64.03
1402	Arangh	0.88	25.23	3.71	36.62	90.08
1403	Thilda	0.83	17.87	4.25	36.71	84.90
1404	Abhanpur	0.80	18.69	5.77	34.06	86.76
1405	Simga	0.84	21.03	9.40	29.87	91.03
1406	Bhatapara	0.81	16.88	22.57	26.99	89.32
1407	B. Bazar	0.81	22.40	17.93	29.43	88.65

Table 5.1: Selected Indicators Of Socio-Economic Equity (Contd.)						
Code	**Block**	**Gini Coefficient**	**Percentage SC**	**Percentage ST**	**Percentage Agricultural Labourer**	**Percentage Workers Dependent on Agriculture**
	RAIPUR					
1408	Palari	0.85	25.63	7.89	29.32	93.61
1409	Kastol	0.81	12.24	25.42	18.69	91.24
1410	Bilaigarh	0.75	30.91	9.67	15.14	92.86
1411	Fingeshwar	0.80	12.15	12.07	34.50	88.29
1412	Gariabandh	0.70	5.51	62.03	35.06	88.10
1413	Chhura	0.30	6.71	48.71	37.38	91.23
1414	Mainpur	0.34	8.71	52.21	28.10	89.16
1415	Dhevabhog	0.50	14.07	25.87	31.44	89.97
RAJNANDGAON						
1501	Rajnandgaon	0.85	12.01	6.50	22.68	81.59
1502	Dongargaon	0.82	8.63	16.17	23.35	88.14
1503	Chouki	0.80	8.16	43.18	15.49	91.77
1504	Churiya	0.40	12.17	10.02	23.36	91.94
1505	Mohalla	0.44	8.15	20.90	25.02	93.73
1506	Manpur	0.54	8.79	30.32	20.38	90.35
1507	Dongargarh	0.75	6.07	70.96	13.43	92.97
1508	Khairagarh	0.50	11.10	51.61	17.25	92.23
1509	Chuyikhadan	0.63	5.37	74.86	9.40	92.60
SURGUJA						
1601	Rajpur	0.63	4.48	61.38	14.81	92.45
1602	Ambikapur	0.57	4.11	60.17	20.38	91.61
1603	Lakhanpur	0.78	4.66	61.03	17.73	89.71
1604	Udaipur	0.75	5.56	53.75	18.66	86.92
1605	Lundra	0.58	3.75	68.97	22.16	92.54
1606	Sitapur	0.50	5.30	70.95	17.38	88.13
1607	Batoli	0.20	3.06	77.63	13.77	93.31
1608	Mainpat	0.13	3.04	76.29	18.46	92.80
1609	Surajpur	0.70	5.43	35.62	14.05	83.89
1610	Oudgi	0.45	4.22	61.78	16.52	95.10
1611	Bhaiyathan	0.85	7.15	33.75	14.57	85.88
1612	Ramanujnagar	0.50	5.96	45.67	12.45	94.68
1613	Premnagar	0.79	3.79	60.17	12.07	94.58
1614	Pratapur	0.45	3.53	65.52	18.45	93.43
1615	Ramchandrapur/Rajganj	0.80	4.18	56.51	37.34	95.43
1616	Balarampur	0.50	2.88	61.30	30.26	93.73
1617	Wardafnagar	0.57	5.74	60.45	23.19	93.16
1618	Kushmi	0.60	5.83	77.32	14.88	92.67
1619	Shankergarh	0.33	6.20	74.27	13.41	90.17

Source: Census of India & Gini Coefficient calculated from Data from Revenue Department of all the districts

The Gini coefficient of land distribution should be discussed in relation to the production system and socio-economic variables, essentially for two reasons. Firstly, because land is the single most important means of production and subsistence, and in many ways the primary determinant as well as expression of socio-economic status and power. Secondly, because land records data are available class wise for all cultivators, unlike any other asset, including income.

However, land records data are notoriously unreliable, and usually underestimate inequality in land distribution. One reason for this is that the landless agriculturists or rural population have been exluded. Yet the overall trends seem to be as expected. The areas of higher inequality are the blocks in the plains and valleys, such as Dhamdha, Saja, Bemetara, etc. in Durg district, Bamhanideh, Nawagarh, Akaltara, etc. in Janjgir Champa district; and several other blocks of Raipur (Garsiva, Simga, Tilda, etc.) and Rajnandgaon. On the other hand blocks in the extreme north and south have more equal distribution of landholding such as Manora, Bagecha, Kontabel, Pharsabahar (Jashpur); Batoli, Mainpat, Shankargarh, Oudgi (Surguja); and Bakabank, Keshkal, Darma (Bastar).

We see that inequality in land distribution is higher in the plains areas, which have predominantly Scheduled Caste population and here agricultural labourers are more. These are also areas with higher rice yields, more irrigation and cropping intensity, as well as display higher utilization of the irrigation potential. Since each of these factors is a function of public investment in infrastructure, given the fact that public investment is concentrated in areas marked by greater inequality, areas with more cultivators and equity remained backward.

At first sight the positive correlation between equity in land ownership and families below the poverty line appears vexing. However, a moment's reflection dispels any analytical mystery around this. 'Cultivators in poverty' is a feature typical of the uplands of tribal concentration. This demographic distribution of land inequality is confirmed by the significant positive correlation between the Gini coefficient and percentage of scheduled castes in total population, on the one hand, and a negative correlation between the Gini coefficient and percentage of scheduled tribes in total population, on the other.

Table5.2: Correlation Matrix

	Gini	Per SC	Per ST	Per_ Agri_ L	Depen _Agri	Per_ BPL	Land Form	Per Slope	Rice_ Yield	GCA NSA 2001	GCA NSA Avg	GIA GCA 1991	UTIP	RIA GIA	KIA GIA	Fall NSA	Cul waste NSA	For NSA	Well	Tube Well	Tank	Canal	Others
Gini	1.00	0.54	-0.71	0.40	-0.23	-0.32	0.72	-0.53	0.29	0.42	0.51	0.46	0.12	-0.13	0.14	-0.32	-0.18	-0.28	-0.18	0.22	-0.13	0.38	-0.39
Per SC	0.54	1.00	-0.77	0.48	-0.15	-0.22	0.58	-0.50	0.27	0.33	0.40	0.49	0.03	-0.14	0.17	-0.42	-0.24	-0.32	-0.36	0.34	-0.08	0.47	-0.42
Per ST	-0.71	-0.77	1.00	-0.67	0.29	0.43	-0.73	0.66	-0.43	-0.52	-0.65	-0.60	-0.14	0.16	-0.21	0.53	0.41	0.45	0.38	-0.41	0.13	-0.56	0.51
Per_Agri _L	0.40	0.48	-0.67	1.00	-0.21	-0.20	0.43	-0.50	0.37	0.33	0.44	0.43	0.20	-0.17	0.20	-0.50	-0.34	-0.26	-0.48	0.42	-0.09	0.44	-0.30
Depen_ Agri	-0.23	-0.15	0.29	-0.21	1.00	0.33	-0.25	0.22	-0.22	-0.04	-0.11	-0.11	-0.10	-0.07	0.03	-0.07	0.04	0.09	-0.06	-0.06	0.02	-0.05	0.09
Per_BPL	-0.32	-0.22	0.43	-0.20	0.33	1.00	-0.31	0.33	-0.36	-0.36	-0.44	-0.31	0.05	0.05	-0.15	0.01	0.39	0.35	-0.08	0.00	0.13	-0.33	0.35
Land Form	0.72	0.58	-0.73	0.43	-0.25	-0.31	1.00	-0.59	0.37	0.55	0.56	0.51	0.11	-0.17	0.17	-0.37	-0.10	-0.27	-0.30	0.26	-0.03	0.34	-0.31
Per Slope	-0.53	-0.50	0.66	-0.50	0.22	0.33	-0.59	1.00	-0.33	-0.48	-0.45	-0.41	-0.16	0.18	-0.18	0.44	0.24	0.31	0.16	-0.31	0.12	-0.39	0.40
Rice_ Yield	0.29	0.27	-0.43	0.37	-0.22	-0.36	0.37	-0.33	1.00	0.50	0.49	0.55	0.24	-0.08	0.10	-0.35	-0.11	-0.10	-0.32	0.01	-0.13	0.49	-0.31
GCA NSA 2001	0.42	0.33	-0.52	0.33	-0.04	-0.36	0.55	-0.48	0.50	1.00	0.89	0.70	0.65	-0.27	0.27	-0.38	0.00	-0.28	-0.43	-0.03	-0.27	0.53	-0.23
GCA NSA Avg	0.51	0.40	-0.65	0.44	-0.11	-0.44	0.56	-0.45	0.49	0.89	1.00	0.72	0.25	-0.20	0.23	-0.38	-0.33	-0.33	-0.40	0.10	-0.30	0.60	-0.33
GIA GCA 1991	0.46	0.49	-0.60	0.43	-0.11	-0.31	0.51	-0.41	0.55	0.70	0.72	1.00	0.37	-0.17	0.17	-0.43	-0.15	-0.18	-0.37	-0.01	-0.23	0.62	-0.37
UTIP	0.12	0.03	-0.14	0.20	-0.10	0.05	0.11	-0.16	0.24	0.65	0.25	0.37	1.00	-0.31	-0.61	-0.07	0.29	0.38	-0.30	0.05	-0.28	0.19	-0.30
RIA GIA	-0.13	-0.14	0.16	-0.17	-0.07	0.05	-0.17	0.18	-0.08	-0.27	-0.20	-0.17	-0.31	1.00	-0.89	0.07	-0.02	-0.07	0.13	0.16	0.08	-0.15	0.04
KIA GIA	0.14	0.17	-0.21	0.20	0.03	-0.15	0.17	-0.18	0.10	0.27	0.23	0.17	-0.61	-0.89	1.00	-0.09	-0.21	-0.14	-0.09	-0.12	-0.05	0.19	0.00
Fall NSA	-0.32	-0.42	0.53	-0.50	-0.07	0.01	-0.37	0.44	-0.35	-0.38	-0.38	-0.43	-0.07	0.07	-0.09	1.00	0.17	0.15	0.36	-0.33	0.03	-0.33	0.27
Cul waste NSA	-0.18	-0.24	0.41	-0.34	0.04	0.39	-0.10	0.24	-0.11	0.00	-0.33	-0.15	0.29	-0.02	-0.21	0.17	1.00	0.55	0.01	-0.17	0.27	-0.38	0.19
For NSA	-0.28	-0.32	0.45	-0.26	0.09	0.35	-0.27	0.31	-0.10	-0.28	-0.33	-0.18	0.38	-0.07	-0.14	0.15	0.55	1.00	0.08	-0.23	0.15	-0.23	0.14
Well	-0.18	-0.36	0.38	-0.48	-0.06	-0.08	-0.30	0.16	-0.32	-0.43	-0.40	-0.37	-0.30	0.13	-0.09	0.36	0.01	0.08	1.00	-0.19	0.07	-0.46	0.15
Tube Well	0.22	0.34	-0.41	0.42	-0.06	0.00	0.26	-0.31	0.01	-0.03	0.10	-0.01	0.05	0.16	-0.12	-0.33	-0.17	-0.23	-0.19	1.00	0.07	-0.11	-0.22
Tank	-0.13	-0.08	0.13	-0.09	0.02	0.13	-0.03	0.12	-0.13	-0.27	-0.30	-0.23	-0.28	0.08	-0.05	0.03	0.27	0.15	0.07	0.07	1.00	-0.38	-0.02
Canal	0.38	0.47	-0.56	0.44	-0.05	-0.33	0.34	-0.39	0.49	0.53	0.60	0.62	0.19	-0.15	0.19	-0.33	-0.38	-0.23	-0.46	-0.11	-0.38	1.00	-0.61
Others	-0.39	-0.42	0.51	-0.30	0.09	0.35	-0.31	0.40	-0.31	-0.23	-0.33	-0.37	-0.30	0.04	0.00	0.27	0.19	0.14	0.15	-0.22	-0.02	-0.61	1.00

Abbreviations:

Gini: Gini Coefficient of Land Distribution; Per_SC: Percentage of Scheduled Castes in total population; Per_ST: Percentage of Scheduled Tribes in total population; Per_Agri_L: Percentage of agricultural labourers in total workers; Depen_Agri: Percentage workers dependent on agriculture; Per_BPL: Percentage of families below the poverty line; Per_Slope: Average percentage slope; GCA NSA 2001: Proportion of gross cropped area to net sown area, 2001; UTIP: Utilisation of irrigation potential; RIA GIA: *rabi* irrigated area as percentage of gross irrigated area (Average of 1995-99) ; KIA GIA: *kharif* irrigated area as percentage of gross irrigated area (Average of 1995-99); Fall NSA: Fallow as a ratio of Net Sown Area (Average of 1995-99); Cul waste NSA: Culturable waste as a ratio of Net Sown Area (Average of 1995-99); For NSA: Forest as a ratio of Net Sown Area (Average of 1995-99); Well: percentage of area irrigated by wells in GIA; Tubewell: percentage of area irrigated by tubewells in GIA; Tank: percentage of area irrigated by tanks in GIA; Canal: percentage of area irrigated by canals in GIA; Others: percentage of area irrigated by other sources in GIA.

5.7 *Rice Yield*

Blocks with the highest rice yields fall in the districts of Dhamtari, Raipur, Rajnandgaon and Durg (Table 5.3). There are blocks that are exceptions to this trend in Raipur (Kastol and

Devabhog) and Durg (Navagarh and Bemetara), which have very low yields of rice. All four have a high interspell gap between commencement of sowing rain and the next rainfall. Surguja, Korea and Korba record very low yields, the lowest in the state, without any exceptions. This high degree of uniformity in yields across blocks falling in the same district is misleading. Most districts (with the notable exception of a few like Durg, Raipur, Mahasamund, etc.) conduct crop-cutting experiments to collect data at the Circle or Tahsil or even district level, rarely choosing block level disaggregation. In any case, the number of farms or observations in the sample is extremely low and does not allow further disaggregating. This is a major lacuna in the data, which is unfortunate because yield is a very significant agricultural variable.

With this caveat in mind, let us examine the correlation matrix (Table 5.2). We find that the yields tend to be positively correlated with all the variables that are higher in the plains and the valleys—landform, irrigation intensity, cropping intensity, etc. That rice yields are higher in areas with higher irrigation in *kharif* understandably. The relationship between yield and different sources of irrigation is puzzling, given the negative correlation with the extent of area irrigated by wells, tanks and ‘other sources’. We will return to this issue below, but a point to be noted is that irrigation by these sources is the highest in the undulating and rugged tribal hinterland, where yields are lower, and canal irrigation is higher in the plains, where rice yields are also higher.

Table 5.3: Selected Production System Variables

Code	Block	Average Rice Yield Kg\ha	Cropping Intensity (Raipur)	Cropping Intensity (Blocks)
BASTAR				
101	Jagdalpur	975.96		1.02
102	Lohanandeguda	975.99		1.04
103	Darma	976.00		1.03
104	Tokapal	976.00		1.02
105	Bastanar	975.99		1.02
106	Bastar	975.99		1.02
107	Bakaband	976.00		1.02
108	Kondagaon	1047.66		1.03
109	Pharasgaon	1047.99		1.03
110	Keshkal	1047.98		1.05
111	Bederajpur	1047.99		1.05
112	Narayanpur	1047.99		1.05
113	Abujmar	1047.96		1.12
114	Makri	1047.98		1.03
BILASPUR				
201	Bilha	1570.25	1.41	1.41
202	Masturi	1568.25	1.36	1.27
203	Takhatpur	1567.00	1.40	1.36
204	Mungeli	1568.25	1.46	1.42
205	Patharia	1565.75	1.52	1.47
206	Lormi	1567.25	1.66	1.62
207	Kota	1565.75	1.21	1.19
208	Gaurella	1566.25	1.09	1.06
209	Pendra	1566.25	1.07	1.07
210	Marwahi	1565.75	1.06	1.05
DANTEWARA				
301	Dantewara	1050.00		1.02
302	Bijapur	1029.45		1.22
303	Kuankonda	804.00		1.02
304	Katekalyan	1100.00		1.04
305	Bhairamgarh	988.03		0.99
306	Bhopalpatnam	1205.40		1.04
307	Abapalli (Asur)	1000.00		1.00
308	Konta	1197.49		0.99
309	Sukma	1257.49		1.02
310	Chhindgaon	1362.47		1.02
311	Gedam	1315.00		1.01
312	Jagdalpur			1.02

Table 5.3: Selected Production System Variables (Contd.)				
Code	**Block**	**Average Rice Yield Kg\ha**	**Cropping Intensity (Raipur)***	**Cropping Intensity (Blocks)***
DHAMTARI				
401	Dhamtari	4038.31	1.43	1.62
402	Kurud	3260.96	1.33	1.63
403	Magerlod	3493.19	1.60	1.40
404	Nagri	1944.04	1.34	1.28
DURG				
501	Durg	1719.00	1.50	1.49
502	Dhamdha	1700.00	1.28	1.27
503	Gundardhehi	1773.00	1.56	1.51
504	Patan	1620.40	1.46	1.45
505	Balodh	1674.80	1.73	1.62
506	Dhoundhi	1328.40	1.33	1.29
507	Gurur	2067.00	1.80	1.76
508	Dhoundilohara	1534.20	1.55	1.55
509	Bemethara	973.60	1.38	1.38
510	Saja	1307.60	1.32	1.29
511	Berla	1273.00	1.38	1.35
512	Navagarh	935.40	1.50	1.44
JANJGIR CHAMPA				
601	Akaltara	1288.99	1.40	1.44
602	Baloda	1258.45	1.31	1.33
603	Nawagarh	1281.22	1.42	1.58
604	Pamgarh	1296.23	1.40	1.22
605	Bamhanideh	1206.52	1.21	1.24
606	Sakti	1210.86	1.05	1.06
607	Jaijaipur	1226.06	1.11	1.10
608	Malkharoda	1246.80	1.07	1.07
609	Dabhra	1284.46	1.07	1.06
JASHPUR				
701	Jashpur	1217.75	1.02	1.02
702	Manora	1217.75	1.06	1.06
703	Bagecha	1217.75	1.08	1.08
704	Duldula	1217.75	1.02	1.03
705	Kunkuri	1217.75	1.04	1.04
706	Kontabel	1217.75	1.04	1.04
707	Pathelgaon	1217.75	1.10	1.09
708	Pharsabahar	1217.75	1.04	1.05

* From the Irrigation Department, Raipur for 1999-2000
* From the Blocks/Districts for 1995-99 (average)

Table 5.3: Selected Production System Variables (Contd.)				
Code	**Block**	**Average Rice Yield Kg\ha**	**Cropping Intensity (Raipur)**	**Cropping Intensity (Blocks)**
KANKER				
801	Kanker	1088.50	1.20	1.14
802	Charama	1180.61	1.16	1.09
803	Sarona/Narharpur	1057.81	1.21	1.10
804	Bhanupratapur	960.72	1.11	1.04
805	Durgkondal	886.97	1.09	1.02
806	Antagarh	969.99	1.08	1.03
807	Koelibeda	1226.99	1.19	1.04
KAWARDHA				
901	Panderia	1205.00	1.05	1.20
902	Kawardha	1218.40		1.35
903	Sahaspur lohara	1147.00		1.24
904	Borla	1098.80		1.15
KORBA				
1001	Korba	2699.99		1.04
1002	Katghora	1109.98	1.04	1.04
1003	Poriuprora	1146.20	1.09	1.10
1004	Pali	878.82	1.12	1.08
1005	Kartala	890.19	1.15	1.12
KOREA				
1101	Sonhat	810.20	1.10	1.11
1102	Baikunthpur	843.80	1.16	1.16
1103	Manendragarh	755.60	1.11	1.11
1104	Khargawa	767.40	1.10	1.10
1105	Bharatpur	772.60	1.12	1.14
MAHASAMUND				
1201	Mahasamund	1533.20	1.11	1.10
1202	Bagbahra	1180.60	1.07	1.07
1203	Pithora	1343.00	1.05	1.05
1204	Sarayapali	1663.60	1.03	1.05
1205	Basna	1287.00	1.10	1.09
RAIGARH				
1301	Raigarh	1212.20	1.08	1.08
1302	Pusoar	1212.56	1.11	1.12
1303	Kharseia	1060.95	1.04	1.02
1304	Gharghora	1212.20	1.07	1.06
1305	Launlunga	1212.20	1.05	1.05
1306	Lagnar	1212.20	1.03	1.04
1307	Sarangarh	1211.80	1.08	1.08
1308	Baramkela	1211.73	1.08	1.08
1309	Dharamjainagar	1209.44	1.07	1.07

Table 5.3: Selected Production System Variables (Contd.)				
Code	**Block**	**Average Rice Yield Kg\ha**	**Cropping Intensity (Raipur)**	**Cropping Intensity (Blocks)**
RAIPUR				
1401	Garsiva/Raipur	3002.41	1.36	1.36
1402	Arangh	2974.00	1.33	1.46
1403	Thilda	1341.00	1.20	1.21
1404	Abhanpur	2871.03	1.46	1.42
1405	Simga	999.85	1.20	1.22
1406	Bhatapara	1547.93	1.29	1.22
1407	B. Bazar	3040.00	1.84	1.31
1408	Palari	2143.00	1.42	1.37
1409	Kastol	225.99	1.07	1.13
1410	Bilaigarh	3085.89	1.10	1.08
1411	Fingeshwar	2556.82	1.43	1.40
1412	Gariabandh	2400.00	1.07	1.05
1413	Chhura	1389.53	1.06	1.07
1414	Mainpur	1917.65	1.09	1.09
1415	Dhevabhog	506.01	1.09	1.13
RAJNANDGAON				
1501	Rajnandgaon	2900.00	1.38	1.35
1502	Dongargaon	1980.00	1.45	1.42
1503	Chouki	1900.00	1.30	1.27
1504	Churiya	1780.00	1.31	1.27
1505	Mohalla	1290.00	1.17	1.28
1506	Manpur	2080.00	1.06	1.26
1507	Dongargarh	1942.23	1.28	1.17
1508	Khairagarh	1611.20	1.25	1.28
1509	Chuyikhadan	2831.20	1.25	1.06
SURGUJA				
1601	Rajpur	987.00	1.19	1.20
1602	Ambikapur	770.40	1.26	1.26
1603	Lakhanpur	775.40	1.14	1.14
1604	Udaipur	823.00	1.10	1.11
1605	Lundra	742.20	1.21	1.20
1606	Sitapur	801.60	1.08	1.08
1607	Batoli	753.80	1.12	1.12
1608	Mainpat	763.20	1.11	1.11
1609	Surajpur	765.20	1.10	1.09
1610	Oudgi	768.20	1.15	1.16
1611	Bhaiyathan	758.00	1.10	1.11
1612	Ramanujnagar	779.80	1.15	1.14

Table 5.3: Selected Production System Variables (Contd.)				
Code	Block	Average Rice Yield Kg\ha	Cropping Intensity (Raipur)	Cropping Intensity (Blocks)
SURGUJA				
1613	Premnagar	763.40	1.10	1.11
1614	Pratapur	796.20	1.18	1.16
1615	Ramchandrapur/Rajganj	773.00		1.20
1616	Balarampur	799.00	1.16	1.18
1617	Wardafnagar	775.20	1.14	1.14
1618	Kushmi	834.20	1.11	1.11
1619	Shankergarh	806.20	1.16	1.27

Source: Irrigation Department Raipur
: Irrigation Department Districts
Note: Average Rice Yield (Kg\ha) is of 1999-2001

5.8 *Cropping Intensity*

Cropping intensity or the ratio of gross cropped area to net sown area measures the extent of double cropped area. Along with yield and irrigation intensity, cropping intensity is an acceptable indicator of agricultural development. Except for the central plains, the northern and southern parts of the state are characterised by low cropping intensities, with the exception of Ambikapur and Shankargarh in Surguja (Table5.3). Even as one moves eastwards in the central belt towards Mahasamund, southern Raipur (Mainpur, Gariyaband and Chhura) and eastern Janjgir Champa (Shakti, Dabhra and Malkharoda blocks) into the hillier tracts, cropping intensities are found to be amongst the lowest. The story is similar in the higher gradient areas of northern Bilaspur (Gaurella and Marwahi) and Manpur in Southern Rajnandgaon. Blocks falling in Dantewara, Bastar, Kanker in the south represent the single largest block of low cropping intensity. Higher cropping intensities are a feature of the central-west core of the state comprising some blocks of Rajnandgaon, Durg, Raipur, Dhamtari and Janjgir Champa.

Table 5.4: Cropping Intensity (GCA/NSA) Average 1995-99

Class Interval	Code	Frequency
< 1.12	1	81
1.12 – 1.25	2	25
1.25 – 1.38	3	21
1.38 – 1.51	4	13
1.51 – 1.64	5	6
> 1.64	6	1

Maximum: 1.76
Minimum:0. 99
Range: 0.77/6

5.9 *Irrigation*

As per the Census Records for 1991, the entire northern area covering Korea, Surguja, Jashpur, Korba, northern Bilaspur, Raigarh and eastern Janjgir Champa fall in the least irrigated category.

In the south, except for Orcha in Bastar district and Bhopalpatnam in Dantewara on the western border of the state, the picture is one of low average irrigation. In the central belt, the adjoining blocks of southern Rajnandgaon and Durg on the western border (comprising Manpur, Mohla, Amba Chowki, Chhuria in Rajnandgaon and Doundi and Dondi Lohara in Durg) too have low irrigation intensity. The story is the same in Kawardha, the upper reaches of Durg and Bilaspur. Towards the east blocks in southern Raipur (Devbhog, Mainpur and Gariyaband) and Nagri in Dhamtari as well as much of Mahasamund, except Mahasamund block itself, and eastern Janjgir Champa (Dabhra, Malkharoda, Shakti, etc.) conform to the low irrigation norm. The only blocks with well developed irrigation facilities lie in the heart of the central belt running southwest to northeast from Gurur (Durg) and Dhamtari through Kurud (Dhamtari), Abhanpur and Rajim (Raipur) to Masturi (Bilaspur) and Akaltara, Pamgarh and Nawagarh (Janjgir Champa)

Table 5.5: Percentage Area Irrigated (1991)

Class Interval	Code	Frequency
< 14.38	1	107
14.38 – 28.74	2	16
28.74 – 43.10	3	4
43.10 – 57.46	4	7
57.46 – 71.82	5	8
> 71.82	6	5

Maximum: 86.16
Minimum: 0.02
Range: 86.14/6

More recent data (1995-99) indicates that irrigation has spread, although this is largely in the previously less irrigated areas of the central belt in the western parts of Rajnandgaon, Durg and Kawardha. Dhamtari district and small pockets in Korea (Sonhat Block) and Surguja (Ambikapur Block) too moved to higher irrigation. However, it must be kept in mind that the data are from completely different sources and may not be strictly comparable

Table 5.6: Percentage Area Irrigated (GIA/GCA) Average 1995-99

Class Interval	Code	Frequency
< 9.9	1	75
9.9 – 24.46	2	32
24.46 – 39.02	3	15
39.02 – 53.58	4	9
53.58 – 68.14	5	7
> 68.14	6	9

Maximum: 87.34
Minimum: 0.00
Range: 87.34

It is no secret that the terrains that can support single point storages with canal irrigation lie in the valleys and plains and have higher order streams that can hold water for longer periods after the monsoons. *What is not so well known is the fact that many of these* *reservoirs are linked by canals to reservoirs in the uplands and most of the water is used for industrial and urban purposes.* In other words, the runoff from the tribal hinterland is stored and used to supply water to the industrial and urban areas and for irrigation in the plains. The tanks, dug wells and 'other sources' are more dominant in the more undulating and hilly terrain with higher average slopes and do not support intensive agriculture.

5.10 Rabi And Kharif Irrigated Area

Whatever irrigation exists in Chhattisgarh is restricted to traditional rainfed surface sources. These are typically seasonal and confined to providing protective irrigation to the main *kharif* crop. The correlation matrix confirms the low degree of support offered by seasonal pattern of irrigation to cropping intensity or irrigation intensity. The predominantly *rabi* irrigated areas appear to display no clear pattern, whether locational, developmental, socio-economic or ecological. They range from the high gradient Kunkuri, Pharasbahar, Kontabel and Duldula blocks in Jashpur to the low gradient blocks of Dhamtari and Janjgir Champa. They range from Blocks with very high cropping intensity like Dhamtari and Nagri (Dhamtari); and Akaltara and Nawagarh (Janjgir Champa), to areas with very low cropping intensity like Konta, Bhairamgarh and Sukma (Dantewara) and Pharasgaon, Kondagaon and Lohandeguda (Bastar). Essentially what this means is that in most areas irrigation is protective and supports the *kharif* crop.

Table 5.7: Gross Cropped Area Irrigated in Rabi and Kharif and Utilisation of Irrigation Potential

Code	Block	GIA as Percentage of GCA (Census 1991)	GIA as Percentage of GCA (Raipur)	Utilisation of Irrigation Potential	Percentage *rabi* irrigated	Percentage *kharif* irrigated
BASTAR						
101	Jagdalpur	1.18	4.21	13.06	19.44	80.56
102	Lohanandeguda	1.44	5.80	33.10	4.10	95.90
103	Darma	0.43	5.92	6.93	0.00	100.00
104	Tokapal	0.55	12.63	25.49	1.85	98.15
105	Bastanar	0				
106	Bastar	2.4	6.91	6.51	8.75	91.25
107	Bakaband	0.78	5.90	16.78	6.28	93.72
108	Kondagaon	1.09	7.94	15.99	44.15	55.85
109	Pharasgaon	0.6			35.14	64.86
110	Keshkal	3.12	8.44	22.75	11.54	88.46
111	Bederajpur	1.35	5.47	10.42	30.60	69.40
112	Narayanpur	0.78	10.15	17.93	17.48	82.52
113	Abujmar	62.1				
114	Makri	0.03				
BILASPUR						
201	Bilha	25.77	45.51		4.76	95.24
202	Masturi	67.66	81.26		1.05	98.95
203	Takhatpur	19.85	47.59		4.43	95.57
204	Mungeli	28.52	36.07		1.71	98.29

Gross Cropped Area Irrigated in Rabi and Kharif and Utilisation of Irrigation Potential (Contd.)

Code	Block	GIA as Percentage of GCA (Census 1991)	GIA as Percentage of GCA (Raipur)	Utilisation of Irrigation Potential	Percentage *rabi* irrigated	Percentage *kharif* irrigated
205	Patharia	15.44	69.64		2.04	97.96
206	Lormi	60.47	8.21		0.34	99.66
207	Kota	9.87	27.45		5.32	94.68
208	Gaurella	1.25	5.40		12.31	87.69
209	Pendra	1.62	9.79		9.55	90.45
210	Marwahi	2.69	8.61		5.02	94.98
DANTEWARA						
301	Dantewara	0.02	9.65	0.00	55.34	44.66
302	Bijapur	0.23	2.29	19.21	23.81	76.19
303	Kuankonda	0	2.16	2.31	0.00	98.74
304	Katekalyan	0			100.00	0.00
305	Bhairamgarh	0.18	4.07	5.41	27.27	72.73
306	Bhopalpatnam	40.61	25.23	42.13	1.86	98.14
307	Abapalli (Asur)	8.68	1.51	52.67	0.00	0.00
308	Konta	0.29	16.42	0.00	37.58	62.42
309	Sukma	1.22	14.25	10.11	29.04	70.96
310	Chhindgaon	0.72	15.36	8.92	26.12	73.88
311	Gedam	0.02	4.30	3.02	20.52	79.48
312	Jagdalpur	1.18				
DHAMTARI						
401	Dhamtari	63.34	87.34		66.45	33.55
402	Kurud	73.23	70.16		1.35	98.65
403	Magerlod	47.1	109.22		2.58	97.42
404	Nagri	13.21	55.75		36.14	63.86
DURG						
501	Durg	46.31	37.67	21.02	15.88	84.12
502	Dhamdha	13.38	36.04	55.13	13.96	86.04
503	Gundardhehi	43.99	62.85	81.36	11.70	88.30
504	Patan	50.31	37.66	16.70	9.78	90.22
505	Balodh	49.18	62.17	65.37	16.99	83.01
506	Dhoundhi	10.5	0.11	100.00	18.68	81.32
507	Gurur	67.12	50.11	80.40	16.53	83.47
508	Dhoundilohara	8.71	46.67	63.38	15.36	84.64
509	Bemethara	13.57	24.32	52.30	17.01	82.99
510	Saja	16.87	15.28	72.25	19.83	80.17
511	Berla	11.93	23.20	14.40	14.35	85.65
512	Navagarh	11.46	16.49	50.82	17.19	82.81
JANJGIR CHAMPA						
601	Akaltara	65.3	3.77		33.22	66.78
602	Baloda	31.44	6.69		19.74	80.26
603	Nawagarh	85.49	0.13		35.28	64.72

Gross Cropped Area Irrigated in Rabi and Kharif and Utilisation of Irrigation Potential (Contd.)

Code	Block	GIA as Percentage of GCA (Census 1991)	GIA as Percentage of GCA (Raipur)	Utilisation of Irrigation Potential	Percentage *rabi* irrigated	Percentage *kharif* irrigated
604	Pamgarh	74.65	6.15		10.88	89.12
605	Bamhanideh	16.32	1.87		12.02	87.98
606	Sakti	5.98	10.49		24.45	75.55
607	Jaijaipur	3.21	1.72		44.02	55.98
608	Malkharoda	11.02	4.19		34.63	65.37
609	Dabhra	11.63	6.65		34.36	65.64
JASHPUR						
701	Jashpur	0.76	8.02		14.44	85.56
702	Manora	0.6	1.47		16.93	83.07
703	Bagecha	3.28	5.52		49.43	50.57
704	Duldula	2.25	3.35		65.88	34.12
705	Kunkuri	7.46	25.99		77.84	22.16
706	Kontabel	1.21	9.20		37.70	62.30
707	Pathelgaon	1.34	3.67		33.17	66.83
708	Pharsabahar	2.73	…		49.38	50.62
KANKER						
801	Kanker	6.04	0.89	93.36	24.77	75.23
802	Charama	10.65	23.57	53.03	29.07	70.93
803	Sarona/Narharpur	6.25	18.80	41.70	26.45	73.55
804	Bhanupratapur	2.19	3.16	42.41	14.78	85.22
805	Durgkondal	0.04	3.69	0.00	19.74	80.26
806	Antagarh	6.79	4.57	26.04	14.77	85.23
807	Koelibeda	0.03	65.59	20.95	28.57	71.43
KAWARDHA						
901	Panderia	3.7	9.77		32.98	67.02
902	Kawardha	15.08	25.45		24.35	75.65
903	Sahaspur lohara	6.44	12.21		20.20	79.80
904	Borla	7.23	26.91		21.44	78.56
KORBA						
1001	Korba	1.09	9.46		11.04	88.96
1002	Katghora	1.32	5.02		19.93	80.07
1003	Poriuprora	0.32	7.29		39.41	60.59
1004	Pali	2.35	10.47		17.22	82.78
1005	Kartala	3.5	7.47		19.44	80.56
KOREA						
1101	Sonhat	2.87	28.19		3.45	96.55
1102	Baikunthpur	6.76	14.70		46.08	53.92
1103	Manendragarh	2.37	23.91		0.00	100.00
1104	Khargawa	0.61	5.84		7.47	92.53
1105	Bharatpur	1.94	11.79		1.80	98.20
MAHASAMUND						
1201	Mahasamund	31.4	73.40		8.66	91.34

Gross Cropped Area Irrigated in Rabi and Kharif and Utilisation of Irrigation Potential **(Contd.)**

Code	Block	GIA as Percentage of GCA (Census 1991)	GIA as Percentage of GCA (Raipur)	Utilisation of Irrigation Potential	Percentage *rabi* irrigated	Percentage *kharif* irrigated
1202	Bagbahra	14.04	23.11		13.61	86.39
1203	Pithora	8.25	8.68		22.73	77.27
1204	Sarayapali	12.72	8.92		16.02	83.98
1205	Basna	8.3	9.13		32.91	67.09
RAIGARH						
1301	Raigarh	10.79	20.02		25.06	74.94
1302	Pusoar	4.97	4.90		43.38	56.62
1303	Kharseia	6.42	31.37		22.30	77.70
1304	Gharghora	2.93	7.07		32.47	67.53
1305	Launlunga	2.15	10.96		44.20	55.80
1306	Lagnar	1.77	5.47		54.30	45.70
1307	Sarangarh	22.37	20.35		6.03	93.97
1308	Baramkela	18.56	19.41		15.87	84.13
1309	Dharamjainagar	3.11	8.44		35.82	64.18
RAIPUR						
1401	Garsiva/Raipur	53.65	50.73		11.76	88.24
1402	Arangh	61.86	72.53		2.59	97.41
1403	Thilda	29.89	66.88		5.02	94.98
1404	Abhanpur	72.29	72.00		20.46	79.54
1405	Simga	18.06	61.52		17.85	82.15
1406	Bhatapara	13.69	80.65		23.94	76.06
1407	B. Bazar	55.82	41.45		1.49	98.51
1408	Palari	65.7	70.15		1.48	98.52
1409	Kastol	23.44	53.86		2.94	97.06
1410	Bilaigarh	10.15	20.38		6.90	93.10
1411	Fingeshwar	86.16	147.67		8.19	91.81
1412	Gariabandh	7.44	1.67		19.12	80.88
1413	Chhura	20.78	35.37		8.30	91.70
1414	Mainpur	4.51	8.42		5.75	94.25
1415	Dhevabhog	3.82	12.37		6.24	93.76
RAJNANDGAON						
1501	Rajnandgaon	16.07	31.72		12.64	87.36
1502	Dongargaon	13.37	20.61		16.32	83.68
1503	Chouki	6	15.38		3.65	96.35
1504	Churiya	15.48	19.82		5.04	94.96
1505	Mohalla	18.18	8.38		0.95	99.05
1506	Manpur	17.38	8.35		7.03	92.97
1507	Dongargarh	4.04	24.29		6.23	93.77
1508	Khairagarh	5.58	28.94		2.86	97.14
1509	Chuyikhadan	2.41	37.43		1.70	98.30
SURGUJA						
1601	Rajpur	3.8	11.95		6.02	93.98
1602	Ambikapur	4.64	48.05		20.93	79.07

***Gross Cropped Area Irrigated in Rabi and Kharif and* Utilisation *of Irrigation Potential* (*Contd.*)**

Code	**Block**	**GIA as Percentage of GCA (Census 1991)**	**GIA as Percentage of GCA (Raipur)**	**Utilisation of Irrigation Potential**	**Percentage *rabi* irrigated**	**Percentage *kharif* irrigated**
1603	Lakhanpur	3.95	18.22		32.50	67.50
1604	Udaipur	3.56	6.51		25.35	74.65
1605	Lundra	2.95	0.67		4.20	95.80
1606	Sitapur	2.5	17.69		7.18	92.82
1607	Batoli	3.36	4.15		20.74	79.26
1608	Mainpat	2.36	1.35		17.71	82.29
1609	Surajpur	4.95	12.65		12.59	87.41
1610	Oudgi	1.62	3.64		2.69	97.31
1611	Bhaiyathan	3.54	7.52		12.15	87.85
1612	Ramanujnagar	2.6	2.56		19.06	80.94
1613	Premnagar	0.68	0.67		7.20	92.80
1614	Pratapur	3.46	7.27		14.34	85.66
1615	Ramchandrapur/Rajganj	3.97	0.75		1.54	98.46
1616	Balarampur	3.55	0.91		1.80	98.20
1617	Wardafnagar	3.17	2.24		0.00	100.00
1618	Kushmi	2.36	8.50		24.07	75.93
1619	Shankergarh	1.97	4.93		2.48	97.52

Source: Irrigation Department Raipur

The correlation matrix presents no surprising results as far as the ethno-demographic basis of development is concerned. The socio-economic profile of the workforce in areas of high cropping intensity is characterised by greater inequality in land distribution, higher proportion of agricultural labourers in the workforce and a concentration of Scheduled Castes. The proportion of families below the poverty line is lower and the terrain is less sloping, with a dominance of plains and valleys. Irrigation intensity as well as the utilization of irrigation potential is higher in these more developed areas of higher cropping intensity. Besides the significant positive correlation between aggregate irrigation intensity and cropping intensity, areas with higher canal irrigation also have a higher irrigation and cropping intensity. Again, these fall within the plains areas. Extent of tubewell irrigation does not appear to play an important role in cropping intensity, but the correlation of cropping intensity with tanks, wells and 'other sources' covering a whole range of traditional surface irrigation is actually negative. This indicates that areas with high dependence on traditional irrigation structures are characterised by lower cropping intensity, whereas areas with high canal irrigation can support higher cropping intensity.

Table 5.8: Correlation Matrix for Source Wise Irrigation

	GCA NSA Avg	GIA GCA 1991	UTIP	RIA GIA	KIA GIA	Fall NSA	Well	Tube Well	Tank	Canal	Others
GCA NSA Avg	1.00	0.72	0.25	-0.20	0.23	-0.38	-0.40	0.10	-0.30	0.60	-0.33
GIA GCA 1991	0.72	1.00	0.37	-0.17	0.17	-0.43	-0.37	-0.01	-0.23	0.62	-0.37
UTIP	0.25	0.37	1.00	-0.31	-0.61	-0.07	-0.30	0.05	-0.28	0.19	-0.30
RIA GIA	-0.20	-0.17	-0.31	1.00	-0.89	0.07	0.13	0.16	0.08	-0.15	0.04
KIA GIA	0.23	0.17	-0.61	-0.89	1.00	-0.09	-0.09	-0.12	-0.05	0.19	0.00
Fall NSA	-0.38	-0.43	-0.07	0.07	-0.09	1.00	0.36	-0.33	0.03	-0.33	0.27
Well	-0.40	-0.37	-0.30	0.13	-0.09	0.36	1.00	-0.19	0.07	-0.46	0.15
Tube Well	0.10	-0.01	0.05	0.16	-0.12	-0.33	-0.19	1.00	0.07	-0.11	-0.22
Tank	-0.30	-0.23	-0.28	0.08	-0.05	0.03	0.07	0.07	1.00	-0.38	-0.02
Canal	0.60	0.62	0.19	-0.15	0.19	-0.33	-0.46	-0.11	-0.38	1.00	-0.61
Others	-0.33	-0.37	-0.30	0.04	0.00	0.27	0.15	-0.22	-0.02	-0.61	1.00

Abbreviations:

GCA NSA 2001: Proportion of gross cropped area to net sown area, 2001; UTIP: Utilisation of irrigation potential; RIA GIA*:* *rabi* irrigated area as percentage of gross irrigated area (Average of 1995-99); KIA GIA: *kharif* irrigated area as percentage of gross irrigated area (Average of 1995-99); Fall NSA: Fallow as a ratio of Net Sown Area (Average of 1995-99); Well: percentage of area irrigated by wells in GIA; Tubewell: percentage of area irrigated by tubewells in GIA; Tank: percentage of area irrigated by tanks in GIA; Canal: percentage of area irrigated by canals in GIA; Others: percentage of area irrigated by other sources in GIA.

Wells, tanks and other sources show a remarkable consistency and similarity in the way they relate to each other and to all other variables. Area irrigated by these three sources together represents the vast variety of traditional technology, sometimes supported by pump-sets for extraction. These sources are less important in areas of high rice yield, and high cropping and irrigation intensity. In the latter areas, canal irrigation far outstrips every other source, with tubewells being insignificant. Where wells and other sources dominate, the proportion area left fallow is higher. In other words, both the indicators of land use intensity — area cultivated in total cultivable area and double cropping — are higher in canal irrigated situations. So is the utilization of irrigation potential these areas. *rabi* and *kharif* irrigation shows no systematic relationship with other variables except of course a strong negative relationship with each other that is not unexpected given the fact that *rabi* irrigation is low in most parts of the state irrespective of everything else. Chhattisgarh continues to use available irrigation extensively and protectively in *kharif*. The reason for this perhaps lies in the low extraction of groundwater and low feasibility of large and medium irrigation works, either due to terrain or due to absence of perennial water bodies and rivers, or a combination of several of these factors.

The question that arises is why is the utilisation of irrigation potential insignificant and why does it have a negative correlation with all traditional irrigation sources, and a positive correlation with other production system variables that capture the spread of agricultural development like rice yield, irrigation intensity, cropping intensity, percentage area irrigated by tubewells and canals? The answer lies in the concentration of growth and development in a few central blocks in the ‘plains and valleys’ and the neglect of the more intractable ecological, socio-economically backward and ethno-demographically tribal areas by state policy and public investment.

Therefore, in the backward areas characterised by presence of large tribal population and harsh terrain, there is continued dependence on traditional sources. By itself this is not a negative feature an adverse characteristic and handicap because this dependence does not represent of a choice of technology in favour of more appropriate traditional technological options. Instead it is indicative of lack of choice and options and neglect, which in turn foster backwardness and underdevelopment.

Dependence on traditional technology is accompanied by low productivity, low cropping and land use intensity, low irrigation intensity, etc, resulting ultimately in a huge agriculture dependent population living in or on the brink of poverty. While by itself it is bad, it is even more unfortunate when viewed in light of the high drainage density and rainfall in these areas. Small and minor water harvesting structures based upon traditional technology would go a large way in establishing micro-irrigation facilities and reducing soil degradation in such areas. The low utilisation data indicates low investment on upkeep and in new capacity installation as well. The moot point is that traditional technology is far more suited to the local conditions, but in the absence of up-gradation, upkeep and innovative technical interventions, and investment in agricultural and rural infrastructure, it remains a mere fallback in the absence of other options, and does not fulfill its inherent potential.

Areas with high tank irrigation include Kondagaon, Keshkal, Bederajpur (Bastar); Dantewara, Bijapur, Kuakonda, Bhopalpatnam, Konta, Gedam (Dantewara); Dhoundi (Durg); Sakti, Jaijaipur, Malkharoda, Dabhra (Janjgir Champa); Kanker, Charama, Sarona/Narharpur, Bhanupratapur, Antagarh, Koelibeda (Kanker); Katghora, Pali (Korba); Pithora, Sarayapali, Basna (Mahasamund); Pusoar, Kharseia (Raigarh); Thilda, Simga, Bilaigarh, Dhevabhog (Raipur); Chhuriya, Manpur (Rajnandgaon); Ramanujnagar (Surguja) (Table 5.9).

Areas of high canal irrigation are largely in the plains in Bilaspur, Dhamtari, Durg, Janjgir Champa, Kawardha, Mahasamund, Raipur, Rajnandgaon covering blocks such as Bilha, Masturi, Takhatpur, Mungeli, Patharia, Lormi, Kota, Marwahi (Bilaspur); Dhamtari, Kurud, Magerlod, Nagri (Dhamtari); Dhamdha, Gundardhehi, Patan, Balodh, Gurur (Durg); Akaltara, Baloda, Nawagarh, Pamgarh, Bamhanideh (Janjgir Champa); Bagecha, Kunkuri (Jashpur), Kawardha, Borla (Kawardha), Mahasamund, Bagbahara (Mahasamund); Sarangarh (Raigarh); Garsiva/Raipur, Arangh, Abhanpur, B. Bazar, Palari, Fingeshwar, Chura (Raipur); Chouki, Dongargarh, Khairagarh, Chuyikhadan (Rajnandgaon).

Though tubewell irrigation is generally low in the state; areas where it is comparatively higher fall in Jagdalpur, Bastar (Bastar); Bilha, Takhatpur (Bilaspur); Dhamtari block (Dhamtari); Dhamdha, Balodh, Gurur, Dhoundilohara, Bemethara, Saja, Navagarh (Durg); Sakti, Jaijaipur, Malkharoda, Dabhra (Janjgir Champa); Kanker, Charama (Kanker); Panderia, Kawardha, Sahaspur lohara (Kawardha); Pithora, Sarayapali, Basna (Mahasamund); Raigarh, Pusoar, Kharseia, Baramkela (Raigarh); Simga, Bhatapara, Kastol (Raipur); Dongargaon (Rajnandgaon)

In general, all traditional sources taken together (that is wells, tanks, other sources) dominate irrigation in Jagdalpur, Lohanandeguda, Darma, Tokapal, Bastanar, Bastar, Bakaband, Kondagaon, Pharasgaon, Keshkal, Bederajpur, Narayanpur, Abujmar, Makri (Bastar); Dantewara, Bijapur, Kuankonda, Katekalyan, Bhairamgarh, Konta, Gedam (Dantewara); Durg, Dhoundhi (Durg); Jashpur, Manora (Jashpur); Kanker, Sarona/Narharpur, Bhanupratapur, Durgkonda, Antagarh (Kanker); Korba, Karghora, Poriuprora, Pali (Korba); Baikunthpur (Korea), Lagnar, Dharamjainagar(Raigarh); Rajpur Udaipur, Lundra, Sitapur, Surajpur, Oudgi, Bhaiyathan, Ramanujnagar, Premnagar, Pratapur, Balarampur, Wardrafnagar, Shankergarh (Surguja)

The more contemporary means of irrigation (tubewells and canals) are prevalent in Bilaspur (Bilha, Masturi, Takhatpur, Mungeli, Patharia, Lormi, Kota, Pendra, Marwahi); Dhamtari (Dhamtari, Kurud, Magerlod, Nagri); Durg (Dhamdha, Gundardhehi, Patan, Balodh, Gurur, Dhoundilohara, Bemethara, Saja, Berla, Navagarh); Janjgir Champa (Akaltara, Baloda, Nawagarh, Pamgarh, Bamhanideh); Jashpur (Bagecha, Duldula, Kunkuri, Pharsabahar); Kawardha (Panderia, Kawardha, Sahaspur lohara, Borla); Korea (Manendragarh); Mahasamund (Mahasamund, Bagbahara, Pithora, Basna); Raigarh (Raigarh, Pusoar, Sarangarh, Baramkela); Raipur (Garsiva/Raipur, Arangh, Thilda, Abhanpur, Bhatapara, B. Bazar, Palari, Fingeshwar, Chhura, Mainpur); Rajnandgaon (Chouki, Churiya, Dongargarh, Khairagarh, Chuyikhadan); etc..

Table 5.9: Source Wise Irrigation as Percentage of Gross Irrigated Area

Code	Block	Well	Tubewell	Tanks	Canals	Others
BASTAR						
101	Jagdalpur	17.04	20.17	8.49	0.00	54.29
102	Lohanandeguda	8.15	0.30	4.44	0.00	87.11
103	Darma	10.83	11.03	8.12	0.00	70.02
104	Tokapal	12.36	5.40	9.32	0.00	72.93
105	Bastanar	27.10	0.00	2.34	0.00	70.56
106	Bastar	13.28	19.59	7.68	0.00	59.45
107	Bakaband	23.72	11.87	8.70	0.00	55.71
108	Kondagaon	34.55	1.11	21.25	0.00	43.09
109	Pharasgaon	29.19	3.17	2.38	0.00	65.27
110	Keshkal	30.68	2.26	33.02	0.00	34.05
111	Bederajpur	49.52	0.00	22.59	0.00	27.89
112	Narayanpur	11.96	1.03	14.41	0.24	72.37
113	Abujmar	29.55	0.00	0.00	0.00	70.45
114	Makri	33.06	7.21	0.00	0.00	59.73
BILASPUR						
201	Bilha	9.38	12.13	6.36	67.95	4.17
202	Masturi	0.99	0.76	0.88	97.20	0.17
203	Takhatpur	11.43	15.83	5.33	66.69	0.72
204	Mungeli	4.40	8.77	0.19	86.54	0.10
205	Patharia	5.65	11.40	0.54	80.18	2.23
206	Lormi	1.20	2.08	0.02	96.37	0.33
207	Kota	6.58	8.09	17.07	67.19	1.07
208	Gaurella	44.61	0.00	4.45	50.95	0.00
209	Pendra	20.19	0.00	6.72	62.74	10.35
210	Marwahi	14.32	0.00	15.44	70.24	0.00
DANTEWARA						
301	Dantewara	14.51	3.65	38.51	0.00	43.33
302	Bijapur	22.76	0.00	42.11	0.00	35.13
303	Kuankonda	12.77	0.00	68.09	0.00	19.15
304	Katekalyan	7.00	0.00	14.77	0.00	78.23
305	Bhairamgarh	33.61	0.00	12.45	0.00	53.94
306	Bhopalpatnam	6.64	0.00	45.34	37.51	10.50
307	Abapalli (Asur)	0.00	0.00	0.00	0.00	0.00
308	Konta	3.68	5.50	50.17	0.00	40.66
309	Sukma	0.00	0.00	0.00	0.00	0.00
310	Chhindgaon	0.00	0.00	0.00	0.00	0.00
311	Gedam	45.26	0.00	39.87	0.00	14.87

Source Wise Irrigation as Percentage of Gross Irrigated Area (Contd.)

Code	Block	Well	Tubewell	Tanks	Canals	Others
DHAMTARI						
401	Dhamtari	10.09	22.90	0.00	65.00	2.01
402	Kurud	7.47	3.60	0.05	88.75	0.12
403	Magerlod	3.27	1.73	1.36	84.80	8.84
404	Nagri	3.45	1.22	15.34	77.57	2.42
DURG						
501	Durg	4.37	6.03	2.92	11.70	74.98
502	Dhamdha	3.17	13.81	5.77	65.25	12.01
503	Gundardhehi	1.91	9.16	2.00	80.09	6.83
504	Patan	4.65	5.34	2.09	68.20	19.72
505	Balodh	4.37	12.90	3.37	71.53	7.83
506	Dhoundhi	9.65	3.55	43.32	11.68	31.79
507	Gurur	3.23	25.78	0.43	64.44	6.11
508	Dhoundilohara	1.82	12.65	4.79	63.57	17.17
509	Bemethara	6.75	33.55	10.81	39.80	9.09
510	Saja	6.44	18.83	2.08	59.58	13.07
511	Berla	9.90	7.70	12.63	54.15	15.62
512	Navagarh	4.39	25.54	4.41	54.05	11.61
JANJGIR CHAMPA						
601	Akaltara	0.15	0.35	4.32	94.28	0.89
602	Baloda	0.95	0.66	8.89	87.67	1.82
603	Nawagarh	0.29	0.15	0.26	98.72	0.59
604	Pamgarh	0.35	0.06	0.36	98.82	0.42
605	Bamhanideh	16.75	1.54	6.27	71.36	4.08
606	Sakti	10.97	29.03	30.53	22.42	7.06
607	Jaijaipur	29.76	41.36	18.24	0.00	10.63
608	Malkharoda	20.14	47.32	28.44	0.00	4.10
609	Dabhra	6.03	41.42	29.21	4.52	18.82
JASHPUR						
701	Jashpur	76.88	0.00	1.65	18.90	2.57
702	Manora	59.92	0.00	11.60	17.72	10.76
703	Bagecha	14.01	0.00	0.03	65.59	20.37
704	Duldula	37.91	0.00	0.19	60.64	1.26
705	Kunkuri	7.06	0.00	0.13	90.14	2.68
706	Kontabel	49.52	0.00	0.00	48.83	1.66
707	Pathelgaon	37.51	0.00	4.99	30.36	27.14
708	Pharsabahar	34.10	0.00	4.36	61.54	0.00

Source Wise Irrigation as Percentage of Gross Irrigated Area (Contd.)

Code	Block	Well	Tubewell	Tanks	Canals	Others
KANKER						
801	Kanker	32.59	15.74	38.42	0.00	13.25
802	Charama	16.36	16.62	36.66	17.81	12.55
803	Sarona/Narharpur	28.72	4.92	38.40	0.00	27.95
804	Bhanupratapur	59.32	3.99	22.18	0.00	14.51
805	Durgkondal	53.96	0.00	0.88	0.00	45.16
806	Antagarh	47.37	0.00	35.09	0.00	17.54
807	Koelibeda	10.85	0.37	37.34	39.44	12.00
KAWARDHA						
901	Panderia	1.50	67.17	0.00	29.63	1.71
902	Kawardha	0.97	27.84	0.00	67.03	4.17
903	Sahaspur lohara	2.11	38.86	0.00	43.04	15.99
904	Borla	2.47	5.46	0.00	85.45	6.62
KORBA						
1001	Korba	11.32	1.55	2.21	1.22	83.69
1002	Katghora	55.90	0.06	17.30	0.00	26.74
1003	Poriuprora	50.94	2.83	13.21	0.00	33.02
1004	Pali	6.98	0.44	38.36	1.24	52.98
1005	Kartala	8.54	0.43	13.12	45.10	32.82
KOREA						
1101	Sonhat	0.00	0.00	0.00	0.00	0.00
1102	Baikunthpur	50.94	1.68	1.95	24.75	20.69
1103	Manendragarh	15.69	0.00	0.32	64.04	19.95
1104	Khargawa	54.87	0.71	0.49	33.71	10.23
1105	Bharatpur	0.00	0.00	0.00	0.00	0.00
MAHASAMUND						
1201	Mahasamund	2.09	6.29	2.91	83.27	5.43
1202	Bagbahra	5.60	5.98	11.87	72.85	3.70
1203	Pithora	4.36	13.55	19.76	56.50	5.82
1204	Sarayapali	3.51	17.57	36.10	38.00	4.82
1205	Basna	8.61	37.00	20.65	28.56	5.18
RAIGARH						
1301	Raigarh	2.87	54.63	9.38	14.00	19.13
1302	Pusoar	0.36	71.41	17.22	0.00	11.01
1303	Kharseia	1.25	39.43	17.31	18.92	23.09
1304	Gharghora	16.63	5.52	3.91	41.76	32.19
1305	Launlunga	9.14	0.61	10.11	53.69	26.45
1306	Lagnar	11.61	7.23	9.56	0.00	71.60
1307	Sarangarh	1.72	2.72	8.38	76.11	11.07
1308	Baramkela	0.30	34.74	14.20	42.53	8.23
1309	Dharamjainagar	11.90	0.91	2.22	16.59	68.38

Source Wise Irrigation as Percentage of Gross Irrigated Area (Contd.)

Code	Block	Well	Tubewell	Tanks	Canals	Others
RAIPUR						
1401	Garsiva/Raipur	2.66	7.99	0.71	86.56	2.08
1402	Arangh	2.34	0.21	3.09	91.43	2.92
1403	Thilda	5.31	9.43	32.25	49.73	3.28
1404	Abhanpur	2.33	2.74	0.99	81.21	12.72
1405	Simga	4.14	13.82	28.05	40.70	13.30
1406	Bhatapara	5.03	17.84	12.98	61.44	2.71
1407	B. Bazar	2.05	0.77	2.45	92.28	2.45
1408	Palari	0.48	0.03	0.61	98.52	0.36
1409	Kastol	57.90	39.34	0.84	0.69	1.23
1410	Bilaigarh	8.26	5.51	45.57	28.98	11.68
1411	Fingeshwar	2.31	0.92	4.40	89.68	2.69
1412	Gariabandh	15.28	6.37	4.55	25.03	48.77
1413	Chhura	2.59	1.20	1.96	89.04	5.21
1414	Mainpur	6.02	0.51	5.94	59.79	27.73
1415	Dhevabhog	5.52	0.11	38.87	29.76	25.73
RAJNANDGAON						
1501	Rajnandgaon	12.55	11.82	9.35	15.59	50.70
1502	Dongargaon	13.58	23.71	8.42	30.32	23.96
1503	Chouki	6.10	3.12	1.08	89.12	0.59
1504	Churiya	7.38	5.94	18.62	61.78	6.28
1505	Mohalla	5.67	1.50	9.98	44.54	38.32
1506	Manpur	25.99	5.27	29.81	28.59	10.34
1507	Dongargarh	3.60	6.28	1.09	68.94	20.08
1508	Khairagarh	1.92	3.67	1.21	67.34	25.86
1509	Chuyikhadan	2.69	4.09	1.25	77.74	14.24
SURGUJA						
1601	Rajpur	17.63	0.26	9.45	20.93	51.74
1602	Ambikapur	15.91	0.70	3.27	53.23	26.89
1603	Lakhanpur	7.75	0.53	3.27	61.39	27.06
1604	Udaipur	24.89	0.16	4.78	26.68	43.49
1605	Lundra	6.39	0.14	3.99	7.37	82.10
1606	Sitapur	27.14	1.03	1.38	5.67	64.78
1607	Batoli	17.38	0.39	1.80	33.31	47.12
1608	Mainpat	10.08	0.53	10.00	39.47	39.92
1609	Surajpur	26.27	7.39	1.38	4.85	60.12
1610	Oudgi	28.99	0.00	2.59	11.37	57.05
1611	Bhaiyathan	57.17	0.32	1.77	18.02	22.73
1612	Ramanujnagar	28.33	0.49	20.36	12.94	37.88

Source Wise Irrigation as Percentage of Gross Irrigated Area (Contd.)

Code	Block	Well	Tubewell	Tanks	Canals	Others
1613	Premnagar	38.96	0.00	3.17	2.54	55.33
1614	Pratapur	18.32	4.00	4.93	13.92	58.82
1615	Ramchandrapur/Rajganj	11.86	0.00	6.02	31.23	50.89
1616	Balarampur	12.77	0.00	7.85	24.07	55.30
1617	Wardafnagar	21.20	0.00	5.15	15.66	57.98
1618	Kushmi	11.11	0.25	3.95	30.15	54.55
1619	Shankergarh	10.99	0.97	2.75	18.83	66.46

Source: Irrigation Department District Head Quarters

5.11 Land Use

In physiographically broken and difficult areas, land use is one of the most critical determinants of high run-off rates and soil erosion. Land use patterns are important determinants of the ability of agriculture to withstand meteorological vagaries and shortfalls, especially in rainfed upland paddy production. In areas displaying significant land attachment through the preponderance of marginal, small and middle cultivators, lower land use as well as insignificant or stagnant off farm employment (since income from agricultural labour is vital to the landless and smaller landowners) combine to increase drought vulnerability. Low double-cropping, high fallows and wasteland are important determinants of nutritional adequacy. Impediments to increasing even traditional cropping intensity, reducing fallows and reclaiming wastelands with growing population density can translate into heavy agricultural losses and human distress. Land use thus has significant implications for fodder, fuel and livelihood security. Some of the most commonly observed problems in Chhattisgarh are:

1. Rice is grown as an upland crop under dry rather than flooded conditions, often by broadcast method of sowing, under practices that can cope with not more than a 7 to 10 day gap between 50mm rainfall spells. Hence, the distinction between ‘fallows’ and ‘cropped’ area may be determined by a single rainfall incident.

2. The double crop is still largely grown under the *utera* system of traverse intercropping, which involves sprinkling the seed among the standing rice crop. The *nagri* system, under which the land is ploughed again after the rice is cut and sown with more valuable crops such as wheat, gram, linseed, is less prevalent.

3. Midlands are often left fallow, and in many areas the local term for midland and fallow land or barren land is the same.

4. Some of the best soils, with highest humus arising from proximity to forests, are often left uncultivated on account of inconvenient location.

5. As is the case for dry deciduous forests in general, despite forest cover, the thin and almost non-existent undergrowth results in rapid runoff and erosion on steep slopes in the early heavy rains.

6. High proportion of fallows and cultivable wastelands co-exist with fodder shortages in drought years.

Land-use planning, particularly of fallows and wastelands through sturdy fodder plantation, and promotion of water-conserving crops for midlands according to the soil, location/gradient and landform is essential.

As a first step, land use patterns were disaggregated to separate areas into less, medium and more drought vulnerable. Data on land use was obtained from the Revenue Department. The Census Data (1991) was also used (Table 5.16). For this, we prepared a matrix of land use planning interventions. We identified areas with high proportion of barren land, permanent fallows and wasteland, and the predominant types of soils in these areas and their terrain. For the typologies, we arrived at the following conclusions regarding selection and choice of land use variables:

1. The higher the proportion of land under forests, *ceteris paribus,* the lower the drought vulnerability.
2. The higher the proportion of agricultural land left fallow, the greater the drought vulnerability of the area.
3. The higher the share of wastelands in geographical area, the greater the drought vulnerability
4. The higher the ratio of gross cropped area to net sown area, i.e., the higher the cropping intensity, the lesser the drought vulnerability.

Table 5.10: Percentage Wastelands

Class Interval	Code	Frequency
< 7.74	1	31
7.74 – 13.11	2	62
13.11 – 18.34	3	33
18.34 – 23.85	4	13
23.85 – 29.22	5	4
> 29.22	6	2

Maximum: 34.56
Minimum: 2.37
Range: 32.19/6

Areas with high degree of wastelands (Census 1991) occur mainly in the south, followed by the northern districts of Raigarh and Surguja. These are Bastar (Tokapal, Abujmar), Bilaspur (Takhatpur), Dantewara (Konta), Durg (Gunderdehi), Janjgir Champa (Pamgarh), Kanker (Bhanupratapur, Durgkondal), Raigarh (Raigarh, Gharghora), Raipur (Raipur/Dharsiba, Arang, Abhanpur), Surguja (Ambikapur, Mainpat, Pratapur, Ramachandrapur/Rajganj, Balarampur, Wadrafnagar, Shankergarh). Data from the districts for 1995-1999 (average) shows a far higher frequency of high wasteland blocks in the south, covering Bastar, Dantewara and Kanker (Antagarh). Raipur too reports high wasteland blocks (Raipur/Dharsiba, Abhanpur, Bhatapara).

Table 5.11: Percentage Area Not Available For Cultivation

Class Interval	Code	Frequency
< 8.59	1	55
8.59 – 15.58	2	68
15.58 – 22.57	3	15
22.57 – 29.56	4	5
29.56- 36.55	5	3
> 36.55	6	1

Maximum: 43.53
Minimum: 1.60
Range: 41.93/6

Land not available for cultivation (Table 5.11) (Census 1991) is the highest in Bastar, Dantewara and Jashpur. The blocks are Lohanandeguda, Bastanar, Abujmar (Bastar), Dantewara, Kuankonda, Katekalyan (Dantewara), Dhamtari block (Dhamtari), Gunderdehi, Balod (Durg), Bamhanideh (Janjgir Champa), Jashpur, Manora, Begecha, Duldula (Jashpur), Kanker, Sarona/Narharpur (Kanker), Borla (Kawardha), Bharatpur (Korea), Lainlunga (Raigarh), Chaki (Rajnandgaon).

Table 5.12: NSA as a Ratio of Cultivable Area

Class Interval	Code	Frequency
< 0.79	1	2
0.79 – 0.83	2	5
0.83 – 0.87	3	23
0.87 – 0.91	4	43
0.91 – 0.95	5	39
> 0.95	6	35

Maximum: 0.99
Minimum: 0.75
Range: 0.24/6

Table5.13: Cropping Intensity (GCA NSA)

Class Interval	Code	Frequency
< 1.12	1	81
1.12 – 1.25	2	25
1.25 – 1.38	3	21
1.38 – 1.51	4	13
1.51 – 1.64	5	6
> 1.64	6	1

Maximum: 1.76
Minimum:0. 99
Range: 0.77/6

Table 5.14: Fallow/NSA

Class Interval	Code	Frequency
< 0.07	1	61
0.07 – 0.13	2	47
0.13 – 0.19	3	30
0.19 – 0.25	4	7
0.25 – 0.31	5	1
> 0.31	6	1

Maximum: 0.34
Minimum: 0.01
Range: 0.33/6

Not surprisingly, the proportion of fallows is highest in the areas with low cropping intensity, like Narayanpur (Bastar), Dantewara, Kuankonda (Dantewara), Jashpur, Manora Bagecha (Jashpur), Durgkondal (Kanker), Baikunthpur, Manendragarh, Khargawa, Bharatpur (Korea), Gharghora (Raigarh), Simga (Raipur), Moholah (Rajnandgaon), Udaipur, Surajpur, Pratapur, Ramchandrapur/Rajganj, Kushmi, Shankergarh (Surguja).

Table 5.15: Cultivable Wasteland/NSA

Class Interval	Code	Frequency
< 0.14	1	126
0.14 – 0.27	2	10
0.27 – 0.4	3	6
0.4 – 0.53	4	4
0.53 – 0.66	5	
> 0.66	6	1

Maximum: 0.76
Minimum: 0.01
Range:0.75/6

Table 5.16: Percentage area Under Different Landuse Categories for All Blocks of Chhattisgarh

		Census 1991				Land records departments, average of 1995-99					
Code No.	Block Name	Por_ forest	Per_ waste land	Per_ unculti	Per_ irrigated	Cult / NSA	Cult / geog	GCA/ NSA	Forest / geog	Fallow /NSA	Waste / geog
BASTAR											
101	Jagdalpur	30.37	13.18	7.00	1.18	1.11	0.50	1.02	0.25	0.11	0.13
102	Lohanandeguda	17.66	16.46	24.18	1.44	1.06	0.43	1.04	0.16	0.06	0.11
103	Darma	28.55	13.24	9.30	0.43	1.09	0.54	1.03	0.23	0.09	0.11
104	Tokapal	8.33	24.30	10.37	0.55	1.07	0.57	1.02	0.06	0.07	0.21
105	Bastanar	6.19	11.94	17.18	0.00	1.15	0.62	1.02	0.07	0.15	0.08
106	Bastar	44.46	11.04	3.81	2.40	1.07	0.43	1.02	0.39	0.07	0.07
107	Bakaband	26.58	16.24	3.50	0.78	1.09	0.54	1.02	0.25	0.09	0.11
108	Kondagaon	47.06	7.45	10.16	1.09	1.06	0.34	1.03	0.47	0.06	0.03
109	Pharasgaon	56.01	7.88	2.57	0.60	1.04	0.41	1.03	0.48	0.04	0.04
110	Keshkal	48.21	5.82	9.51	3.12	1.05	0.36	1.05	0.48	0.05	0.01
111	Bederajpur	50.09	4.41	1.60	1.35	1.03	0.46	1.05	0.47	0.03	0.01
112	Narayanpur	45.79	12.50	4.79	0.78	1.20	0.54	1.05	0.24	0.20	0.10
113	Abujmar	12.25	32.11	32.73	62.10						
114	Makri	51.99	8.08	2.31	0.03	1.03	0.40	1.03	0.50	0.03	0.04
BILASPUR											
201	Bilha	2.25	16.97	9.46	25.77	1.10	0.72	1.41	0.01	0.10	0.04
202	Masturi	3.46	16.99	8.41	67.66	1.07	0.72	1.27	0.03	0.07	0.03
203	Takhatpur	1.56	19.38	6.73	19.85	1.09	0.73	1.36	0.02	0.09	0.04
204	Mungeli	0.10	9.60	6.29	28.52	1.02	0.84	1.42	0.00	0.02	0.00
205	Patharia	0.27	13.12	6.15	15.44	1.04	0.80	1.47	0.00	0.04	0.00
206	Lormi	2.20	5.51	4.25	60.47	1.03	0.25	1.62	0.01	0.03	0.00
207	Kota	41.31	7.97	8.31	9.87	1.08	0.31	1.19	0.27	0.08	0.01
208	Gaurella	58.86	2.89	4.03	1.25	1.04	0.35	1.06	0.58	0.04	0.00
209	Pendra	42.22	5.92	3.23	1.62	1.07	0.22	1.07	0.18	0.07	0.01
210	Marwahi	37.39	6.05	8.66	2.69	1.10	0.34	1.05	0.27	0.10	0.01
DANTEWARA											
301	Dantewara	10.93	10.63	16.86	0.02	1.18	0.60	1.02	0.09	0.18	0.13
302	Bijapur	53.56	13.33	3.88	0.23	1.11	0.30	1.22	0.55	0.11	0.09
303	Kuankonda	19.44	8.57	19.41	0.00	1.19	0.58	1.02	0.13	0.19	0.10
304	Katekalyan	7.63	5.84	25.85	0.00	1.14	0.55	1.04	0.10	0.14	0.06
305	Bhairamgarh	71.35	5.28	6.27	0.18	1.12	0.20	0.99	0.46	0.12	0.09
306	Bhopalpatnam	66.51	2.37	12.02	40.61	1.14	0.14	1.04	0.77	0.14	0.05
307	Abapalli (Asur)	71.62	10.19	4.31	8.68	1.13	0.15	1.00	0.65	0.13	0.10
308	Konta	48.36	20.18	5.89	0.29	1.07	0.29	0.99	0.14	0.07	0.13
309	Sukma	26.92	17.42	10.51	1.22	1.09	0.44	1.02	0.21	0.09	0.15
310	Chhindgaon	25.19	11.31	6.96	0.72	1.15	0.54	1.02	0.18	0.15	0.10
311	Gedam	32.23	9.34	9.11	0.02	1.16	0.48	1.01	0.09	0.16	0.17
312	Jagdalpur	30.37	13.18	7.00	1.18						

Percentage area under different landuse categories for all blocks of Chhattisgarh (Contd.)

		Census 1991				Land records departments, average of 1995-99					
Code No.	Block Name	Por_ forest	Per_ waste land	Per_ unculti	Per_ irrigated	Cult / NSA	Cult / geog	GCA/ NSA	Forest / geog	Fallow /NSA	Waste / geog
DHAMTARI											
401	Dhamtari	4.90	9.48	26.84	63.34	1.01	0.65	1.62	0.02	0.01	0.01
402	Kurud	0.00	13.13	12.69	73.23	1.01	0.78	1.63	0.00	0.01	0.02
403	Magerlod	13.50	11.96	12.94	47.10	1.03	0.60	1.40	0.13	0.03	0.02
404	Nagri	16.14	4.64	14.49	13.21	1.04	0.75	1.28	0.06	0.04	0.02
DURG											
501	Durg	0.01	12.89	14.17	46.31	1.08	0.69	1.49	0.00	0.08	0.05
502	Dhamdha	0.09	14.69	11.49	13.38	1.08	0.76	1.27	0.00	0.08	0.04
503	Gunderdehi	0.01	34.56	22.27	43.99	1.05	0.80	1.51	0.00	0.05	0.03
504	Patan	0.00	16.55	8.40	50.31	1.09	0.74	1.45	0.00	0.09	0.06
505	Balod	5.86	6.86	17.44	49.18	1.04	0.73	1.62	0.06	0.04	0.02
506	Dondi	22.23	9.00	15.68	10.50	1.15	0.53	1.29	0.21	0.15	0.04
507	Gurur	6.80	10.85	11.98	67.12	1.03	0.71	1.76	0.06	0.03	0.03
508	Dondilohara	11.25	8.33	14.78	8.71	1.11	0.64	1.55	0.11	0.11	0.03
509	Baimetra	0.00	9.44	8.59	13.57	1.02	0.81	1.38	0.00	0.02	0.01
510	Saja	0.00	5.62	8.61	16.87	1.03	0.85	1.29	0.00	0.03	0.01
511	Berla	0.03	13.89	9.17	11.93	1.07	0.77	1.35	0.00	0.07	0.04
512	Navagarh	0.07	9.51	6.28	11.46	1.02	0.84	1.44	0.00	0.02	0.00
JANJGIR CHAMPA											
601	Akaltara	5.01	13.66	10.98	65.30	1.06	0.65	1.44	0.05	0.06	0.05
602	Baloda	6.86	12.78	13.53	31.44	1.03	0.42	1.33	0.04	0.03	0.01
603	Nawagarh	0.15	13.45	9.37	85.49	1.03	0.75	1.58	0.00	0.03	0.03
604	Pamgarh	1.49	18.52	7.56	74.65	1.04	0.79	1.22	0.01	0.04	0.03
605	Bamhanideh	1.57	8.02	19.05	16.32	1.05	0.74	1.24	0.02	0.05	0.03
606	Sakti	8.99	9.17	8.96	5.98	1.04	0.26	1.06	0.03	0.04	0.01
607	Jaijaipur	2.51	8.75	8.70	3.21	1.05	0.79	1.10	0.02	0.05	0.02
608	Bhalkharoda	0.06	9.23	9.79	11.02	1.03	0.80	1.07	0.00	0.03	0.02
609	Dabhra	0.11	8.48	12.67	11.63	1.04	0.79	1.06	0.00	0.04	0.02
JASHPUR											
701	Jashpur	6.56	5.72	29.56	0.76	1.30	0.58	1.02	0.06	0.30	0.03
702	Manora	7.77	4.79	43.53	0.60	1.18	0.43	1.06	0.08	0.18	0.01
703	Bagecha	11.56	11.70	31.71	3.28	1.20	0.37	1.08	0.10	0.20	0.01
704	Duldula	16.70	4.41	31.89	2.25	1.14	0.46	1.03	0.13	0.14	0.01
705	Kunkuri	6.91	9.44	16.03	7.46	1.15	0.68	1.04	0.07	0.15	0.01
706	Kontabel	15.05	8.20	13.35	1.21	1.15	0.63	1.04	0.15	0.15	0.01
707	Pathelgaon	12.31	4.53	8.46	1.34	1.05	0.75	1.09	0.12	0.05	0.00
708	Pharsabahar	20.61	8.57	13.92	2.73	1.15	0.56	1.05	0.20	0.15	0.01

Percentage area under different landuse categories for all blocks of Chhattisgarh (Contd.)

		Census 1991				Land records departments, average of 1995-99					
Code No.	Block Name	Por_ forest	Per_ waste land	Per_ unculti	Per_ irrigated	Cult / NSA	Cult / geog	GCA/ NSA	Forest / geog	Fallow /NSA	Waste / geog
KANKER											
801	Kanker	7.65	11.90	23.56	6.04	1.14	0.65	1.14	0.06	0.14	0.02
802	Charama	9.54	13.30	14.62	10.65	1.12	0.65	1.09	0.09	0.12	0.03
803	Sarona/Narharpur	17.19	15.40	17.96	6.25	1.14	0.59	1.10	0.14	0.14	0.03
804	Bhanupratapur	16.03	19.55	16.04	2.19	1.14	0.55	1.04	0.15	0.14	0.02
805	Durgkondal	21.48	18.65	11.85	0.04	1.24	0.57	1.02	0.14	0.24	0.04
806	Antagarh	39.51	13.88	11.03	6.79	1.10	0.55	1.03	0.26	0.10	0.10
807	Koelibeda	62.27	9.41	4.95	0.03	1.12	0.37	1.04	0.46	0.12	0.06
KAWARDHA											
901	Panderia	8.18	4.95	5.80	3.70	1.07	0.67	1.20	0.14	0.07	0.01
902	Kawardha	0.00	5.16	9.03	15.08	1.01	0.86	1.35	0.00	0.01	0.01
903	Sahaspur Lohara	1.98	6.70	10.36	6.44	1.04	0.81	1.24	0.02	0.04	0.01
906	Borla	18.58	10.02	18.12	7.23	1.08	0.57	1.15	0.15	0.08	0.02
KORBA											
1001	Korba	54.51	8.48	7.03	1.09	1.10	0.20	1.04	0.38	0.10	0.03
1002	Katghora	23.06	13.16	12.86	1.32	1.11	0.29	1.04	0.13	0.11	0.03
1003	Poriuprora	54.17	7.59	11.50	0.32	1.12	0.20	1.10	0.42	0.12	0.01
1004	Pali	43.57	5.44	15.80	2.35	1.10	0.26	1.08	0.31	0.10	0.01
1005	Kartala	25.67	11.84	13.16	3.50	1.11	0.49	1.12	0.25	0.11	0.04
KOREA											
1101	Sonhat	48.34	2.65	10.35	2.87	1.13	0.62	1.11	0.14	0.13	0.02
1102	Baikunthpur	15.78	5.04	10.28	6.76	1.17	0.73	1.16	0.06	0.17	0.05
1103	Manendragarh	37.52	9.15	7.50	2.37	1.19	0.53	1.11	0.18	0.19	0.03
1104	Khargawa	31.56	15.08	5.32	0.61	1.22	0.55	1.10	0.11	0.22	0.01
1105	Bharatpur	64.22	8.14	16.10	1.94	1.20	0.38	1.14	0.38	0.20	0.04
MAHASAMUND											
1201	Mahasamund	11.59	11.97	12.46	31.40	1.06	0.66	1.10	0.09	0.06	0.03
1202	Bagbahra	18.52	12.85	9.50	14.04	1.05	0.64	1.07	0.14	0.05	0.02
1203	Pithora	15.37	5.97	7.69	8.25	1.04	1.06	1.05	0.15	0.04	0.02
1204	Sarayapali	2.55	13.31	9.89	12.72	1.03	0.75	1.05	0.03	0.03	0.01
1205	Basna	1.15	5.94	8.58	8.30	1.01	0.85	1.09	0.01	0.01	0.00
RAIGARH											
1301	Raigarh	7.06	20.19	10.42	10.79	1.14	0.60	1.08	0.07	0.14	0.06
1302	Pusoar	0.49	7.48	12.65	4.97	1.04	0.78	1.12	0.01	0.04	0.00
1303	Kharseia	3.66	16.68	12.04	6.42	1.07	0.67	1.02	0.04	0.07	0.01
1304	Gharghora	9.88	20.46	8.35	2.93	1.20	0.61	1.06	0.09	0.20	0.03
1305	Launlunga	8.04	16.19	16.63	2.15	1.10	0.57	1.05	0.09	0.10	0.01
1306	Lagnar	4.78	10.74	8.80	1.77	1.14	0.71	1.04	0.05	0.14	0.04
1307	Sarangarh	0.25	8.18	15.02	22.37	1.05	0.76	1.08	0.00	0.05	0.01

Percentage area under different landuse categories for all blocks of Chhattisgarh (Contd.)

		Census 1991				Land records departments, average of 1995-99					
Code No.	Block Name	Por_ forest	Per_ waste land	Per_ unculti	Per_ irrigated	Cult / NSA	Cult / geog	GCA/ NSA	Forest / geog	Fallow /NSA	Waste / geog
1308	Baramkela	1.18	12.06	13.05	18.56	1.04	0.74	1.08	0.01	0.04	0.01
1309	Dharamjainagar	32.69	11.24	8.82	3.11	1.14	0.44	1.07	0.33	0.14	0.01
RAIPUR											
1401	Raipur/Dharsiba	0.00	17.82	11.61	53.65	1.11	0.62	1.36	0.00	0.11	0.08
1402	Arang	0.34	19.74	10.53	61.86	1.05	0.72	1.46	0.01	0.05	0.04
1403	Tilda	1.11	17.76	10.69	29.89	1.13	0.68	1.21	0.01	0.13	0.06
1404	Abhanpur	0.42	22.16	9.86	72.29	1.05	0.67	1.42	0.00	0.05	0.07
1405	Simga	0.32	13.63	7.76	18.06	1.20	0.78	1.22	0.00	0.20	0.05
1406	Bhatpara	0.02	13.82	7.77	13.69	1.13	2.13	1.22	0.00	0.13	0.08
1407	Balodabazaar	1.98	10.61	8.10	55.82	1.08	0.76	1.31	0.02	0.08	0.03
1408	Pallari	1.18	11.89	8.56	65.70	1.04	0.79	1.37	0.01	0.04	0.02
1409	Kasdole	22.16	8.84	12.75	23.44	1.05	0.58	1.13	0.19	0.05	0.02
1410	Bilaigarh	16.88	9.33	11.92	10.15	1.07	0.62	1.08	0.16	0.07	0.02
1411	Rajim/Phengeshwar	11.26	14.34	11.11	86.16	1.02	0.66	1.40	0.09	0.02	0.01
1412	Garyaband	55.72	9.47	4.82	7.44	1.06	0.29	1.05	0.55	0.06	0.02
1413	Chhura	40.07	12.97	7.94	20.78	1.05	0.40	1.07	0.41	0.05	0.02
1414	Mainpur	31.02	9.85	10.64	4.51	1.04	0.52	1.09	0.29	0.04	0.01
1415	Devbhog	1.90	5.89	6.96	3.82	1.06	0.85	1.13	0.01	0.06	0.01
RAJNANDGAON											
1501	Rajnandgaon	0.05	9.87	13.41	16.07	1.09	0.73	1.35	0.00	0.09	0.04
1502	Dongargaon	0.93	9.26	11.66	13.37	1.09	0.80	1.42	0.01	0.09	0.03
1503	Churia	8.98	8.18	12.60	6.00	1.12	0.69	1.27	0.09	0.12	0.02
1504	Khairagarh	1.37	7.84	10.15	15.48	1.04	0.80	1.27	0.01	0.04	0.02
1505	Chuikhadan	9.90	13.19	11.75	18.18	1.07	0.63	1.28	0.10	0.07	0.03
1506	Dongargarh	11.67	11.62	9.53	17.38	1.09	0.67	1.26	0.11	0.09	0.04
1507	Moholah	33.63	12.93	8.66	4.04	1.19	0.44	1.17	0.35	0.19	0.02
1508	Chaki	16.73	4.46	16.64	5.58	1.12	0.60	1.28	0.17	0.12	0.02
1509	Manpur	45.49	7.56	10.94	2.41	1.11	0.32	1.06	0.46	0.11	0.02
SURGUJA											
1601	Rajpur	46.63	10.10	5.64	3.80	1.09	0.49	1.20	0.33	0.09	0.03
1602	Ambikapur	41.02	21.14	8.95	4.64	1.13	0.64	1.26	0.14	0.13	0.04
1603	Lakhanpur	43.42	9.74	6.02	3.95	1.08	0.49	1.14	0.32	0.08	0.05
1604	Udaipur	39.44	13.51	6.13	3.56	1.16	0.24	1.11	0.59	0.16	0.02
1605	Lundra	25.11	11.19	7.59	2.95	1.11	0.56	1.20	0.26	0.11	0.01
1606	Sitapur	21.16	2.37	6.03	2.50	1.14	0.72	1.08	0.13	0.14	0.01
1607	Batoli	13.37	9.55	12.52	3.36	1.13	0.67	1.12	0.14	0.13	0.02
1608	Mainpat	29.62	19.89	6.90	2.36	1.10	0.47	1.11	0.27	0.10	0.05
1609	Surajpur	6.24	17.65	8.02	4.95	1.18	0.74	1.09	0.02	0.18	0.03
1610	Oudgi	73.19	8.54	4.04	1.62	1.11	0.25	1.16	0.10	0.11	0.02

Percentage area under different landuse categories for all blocks of Chhattisgarh (Contd.)

		Census 1991				Land records departments, average of 1995-99					
Code No.	Block Name	Por_ forest	Per_ waste land	Per_ unculti	Per_ irrigated	Cult / NSA	Cult / geog	GCA/ NSA	Forest / geog	Fallow /NSA	Waste / geog
SURGUJA											
1611	Bhaiyathan	12.95	12.19	7.81	3.54	1.15	0.71	1.11	0.02	0.15	0.05
1612	Ramanujnagar	14.95	14.24	5.57	2.60	1.11	0.71	1.14	0.04	0.11	0.03
1613	Premnagar	52.26	15.30	4.81	0.68	1.13	0.45	1.11	0.03	0.13	0.02
1614	Pratapur	26.80	24.32	6.57	3.46	1.17	0.59	1.16	0.01	0.17	0.03
1615	Ramchandrapur/Rajganj	35.09	21.97	13.81	3.97	1.16	0.38	1.20	0.27	0.16	0.04
1616	Balarampur	45.99	19.58	10.29	3.55	1.16	0.34	1.18	0.10	0.16	0.02
1617	Wardafnagar	31.77	26.78	11.04	3.17	1.11	0.45	1.14	0.01	0.11	0.01
1618	Kushmi	38.28	15.93	4.69	2.36	1.34	0.34	1.11	0.26	0.34	0.03
1619	Shankergarh	30.73	26.58	5.93	1.97	1.18	0.37	1.27	0.31	0.18	0.01
CHHATTISGARH						**1.09**	**0.53**	**1.21**	**0.17**	**0.09**	**0.03**

Abbreviations:
Por_forest: Percentage of forest cover; Per_waste land: Percentage of waste land; Per_unculti: Percentage of uncultivated land; Per_irrigated: Percentage of irrigated land; Cult: Cultivable area; NSA: Net sown area;
GCA: Gross cropped area; Waste: Cultivable wasteland; geo: Geographical area as per village papers

5.12 Demographic Features And Workforce Profile

This section presents a population and workforce profile of the state at the block level, in order to understand conditions of work, gender, literacy, etc. as reflections of social development and livelihood security.

Population

Population density is high in a few central blocks, the southern district of Dantewara and parts of the Surguja and Korea districts (Table 5.7). The highest density is in the blocks of Durg (3.15 persons per sq. km.), Dharsiwa (3.77 persons per sq. km.) and Katghora (3.83 persons per sq. km.). Some of the low density blocks are Bharatpur, Bheramgarh and Odgi (0.26 persons per sq. km.each). The overall density of the state is low as large parts are either in remote areas or are heavily forested. These are also the areas with gently rolling and undulating plains and valleys. The correlation co-efficient of degree of plainness and form and population density is 0.8.

Table 5.17: Population Density

Class Interval	Code	Frequency
< 0.86	1	23
0.86 – 1.46	2	40
1.46 – 2.06	3	38
2.06 – 2.66	4	32
2.66 – 3.26	5	11
> 3.26	6	3

Maximum: 3.83
Minimum: 0.26
Range: 3.57

Literacy is a good indicator of the extent of social development. The total literacy rate for the state is very low, and less than 50 per cent in most of the blocks (Table 5.18). Literacy rate is highest in the district of Gunderdehi (59.34 per cent), Sanjari Balod (58.82 per cent) and Gurur (58.78 per cent). The lowest rates are in Orcha (4.45 per cent), Kuankonda (4.08 per cent) and Bastar (4.68 per cent). Thus there is a large variation in the literacy rates. Generally literacy rates were low either in the remote areas in the south or north of the state, where the proportion of the tribal population is high and the level of development is low, or in the areas which were inaccessible because of the topographical conditions. Areas with a pre-dominantly Scheduled Caste and/or Scheduled Tribe population have low literacy. These are also backward with respect to other indicators. This points to a spatial dimension to unequal access. In areas with high Scheduled Castes population, overall literacy rates may not be low, whereas in the more tribal areas low literacy rates are the norm. This is a reflection of low public investment in more remote and ecologically hostile areas that are typically inhabited by Scheduled Tribes.

Table 5.18: Percentage Literacy

Class Interval	Code	Frequency
< 13.29	1	8
13.29 – 22.5	2	23
22.5 – 31.71	3	33
31.71 – 40.92	4	36
40.92 – 50.13	5	35
> 50.13	6	12

Maximum: 59.34
Minimum: 4.08
Range: 55.26

The Scheduled Caste population is concentrated in a few districts in the central belt of the state (Table 5.19). In these districts inequality in land ownership is also very high and agricultural lands are concentrated in very few hands. There is a large concentration of Scheduled Caste population in the blocks of Pamgarh (33.14 per cent), Mungeli (32.41 per cent) and Bilaigarh (31.23 per cent). The tribal population has been largely pushed out into the ecologically adverse areas. Landlessness amongst Scheduled Castes is reportedly far higher than amongst Scheduled Tribes. This is borne out by the block level picture too where the proportion of agricultural labourers in the workforce is higher in the areas with more Scheduled Caste population. Land attachment among the tribal workforce is reflected in the high positive correlation coefficient between percentage of tribal population and percentage of cultivators in the workforce.

Table 5.19: Proportion of Scheduled Caste Population

Class Interval	Code	Frequency
< 6.11	1	59
6.11 – 11.5	2	39
11.5 – 16.89	3	23
16.89 – 22.28	4	11
22.28 – 27.67	5	9
> 27.67	6	6

Maximum: 33.05
Minimum: 0.72
Range: 32.33

The state has a high population of Scheduled Tribes, which is mainly concentrated in the districts of Kanker, Bastar and Dantewara, and some isolated pockets of Surguja and Korea districts. There are 48 tribal blocks in the state (Table 5.20). In the blocks of Orchha, Kuakonda, Bastar and Konta the tribal population is more than 90 per cent. There is a negative correlation between proportion Scheduled Caste population and that of the Scheduled Tribe population. In some of the predominantly tribal blocks of Kuankonda, Orchha and Bastar the proportion of Scheduled Castes is as low as 1 to 2 per cent. In Berla, Nawagarh and Dharsiwa the tribal population is as low as 3 to 4 per cent. There is a positive correlation between blocks with high tribal population and rugged topography.

Table 5.20: Proportion Scheduled Tribe Population

Class Interval	Code	Frequency
< 18.43	1	36
18.43 – 33.79	2	21
33.79 – 49.11	3	13
49.11 – 64.45	4	29
64.45 – 79.79	5	38
> 79.79	6	10

Maximum: 95.15
Minimum: 3.09
Range: 92.06

The blocks with very high proportion of families below poverty line (BPL) are concentrated in the southern parts of the state, where the proportion of the tribal population is also high. In the blocks of Orccha, Konta and Asur the percentage of BPL families is as high as 80 per cent (Table 5.21). Whereas it is less than 20 per cent in Thakatpur, Antagarh and Dhamtari. Thus we find a positive correlation between percentage of tribal population and percentage of families below poverty line.

Table 5.21: Percentage Under 'Below Poverty Line'

Class Interval	Code	Frequency
< 23.39	1	7
23.39 – 37.66	2	34
37.66 – 51.93	3	58
51.93 – 66.2	4	35
66.2 – 80.47	5	10
> 80.47	6	3

Maximum: 94.75
Minimum: 9.12
Range: 85.63

5.13 Workforce Characteristics

The percentage of workers is high in the central belt of the region, especially in Rajnandgaon, Durg, Raipur and Bilaspur and in some blocks of Bastar (Table 5.22). In Manora, Baikunthpur, Jashpur and Kunkuri it is less than 30 per cent. While in the blocks of Chhuikhadan, Mohla, Chhuriya and Manpur it is more than 55 per cent. The dependency ratio in majority of the blocks is between 2.5 to 3 persons.

Table 5.22: Percentage of Workers

Class Interval	Code	Frequency
< 37	1	19
37 – 40.81	2	25
40.81 – 44.62	3	32
44.62 – 48.43	4	37
48.43 – 52.24	5	35
> 52.24	6	9

Maximum: 56.06
Minimum: 33.19
Range: 22.87

The percentage of agricultural labourers was fairly high in the central blocks (Table 5.23). These areas were relatively better off in terms of agricultural development. Hence, during the *rabi* as well as the *kharif* harvesting season labourers from the neighbouring districts migrated to this region for work. Moreover, the proportion of labourers is also high because the level of inequality is also greater and the land distribution is very skewed and concentrated in the hands of a few large farmers. The areas with high Scheduled Caste population had a higher proportion of the workforce engaged as agricultural labour. About 28 per cent of the blocks had less than 15.54 per cent of the work force engaged as agricultural labourers. These were the ones with a predominantly tribal population and were characterised by land attachment and a large number of cultivators, who were poor.

Table 5.23: Percentage of Agricultural Labour

Class Interval	Code	Frequency
< 9.17	1	12
9.17 – 15.54	2	30
15.54 – 21.91	3	27
21.91 – 28.28	4	26
28.28 – 34.65	5	30
> 34.65	6	22

Maximum: 41
Minimum: 2.8
Range: 38.20/6

Table 5.24: Agricultural Dependency

Class Interval	Code	Frequency
< 61.05	1	1
61.05 – 68.45	2	1
68.45 – 75.85	3	1
75.85 – 83.25	4	64
83.25 – 90.65	5	80
> 90.65	6	

Maximum: 98.05
Minimum: 53.65
Range: 44.40

The extent of dependence of the workforce on agriculture for livelihood can be gauged by the cultivators and agricultural labourers taken together as a percentage of total population or what we have called agriculture dependence, shown in Table 5.24 As the state economy is predominantly agriculture based the extent of agriculture dependence is also very high. Most tribals particularly are dependent on agriculture. An interesting finding is that there is a negative correlation between percentage agricultural labourers and extent of agriculture dependency on one hand, and a positive correlation between percentage of cultivators and extent of agriculture dependency. This suggests that the tribal areas have a lower percentage of agricultural labourers, but a much higher dependence on agriculture, basically because of a larger percentage of the workforce being involved in direct cultivation. Therefore, the key to the development of these areas lies in offering an agricultural growth strategy that increases land productivity. Since these areas have a more rugged ecology, the solutions will have to be extremely location specific.

Table 5.25: Forest Dependency

Class Interval	Code	Frequency
< 0.68	1	49
0.68 – 1.3	2	51
1.3 – 1.92	3	27
1.92 – 2.54	4	13
2.54 – 3.16	5	4
> 3.16	6	3

Maximum: 3.76
Minimum: 0.06
Range: 3.70

Table 5.26: Percentage of Non-Workers

Class Interval	Code	Frequency
< 45.54	1	14
45.54 – 49.18	2	35
49.18 – 52.82	3	33
52.82 – 56.46	4	39
56.46 – 60.1	5	16
> 60.1	6	10

Maximum: 63.74
Minimum: 41.90
Range: 21.84

Table 5.27: Dependency Ratio

Class Interval	Code	Frequency
< 1.99	1	27
1.99 – 2.2	2	43
2.2 – 2.41	3	32
2.41 – 2.62	4	21
2.62 – 2.83	5	14
> 2.83	6	10

Maximum: 3.01
Minimum: 1.78
Range: 1.23

The workforce data does not throw up any unexpected or counter-intuitive results. It corroborates the 'internal colonization' thesis as far as the tribal population is concerned. We find that in the Chhattisgarh the tribal population is concentrated in the most intractable terrains within the dry land districts, and they remain clustered in the steep and rain-deficit areas. The only ecological variable that is in any way positive is forest area. These tribal blocks report a high proportion of cultivators, indicating high degree of land attachment. The agriculture dependent population, defined as agricultural labourers and cultivators taken together, is also highest in these outlying tribal blocks. Paradoxically, the proportion of families 'below the poverty line' as per official estimates is also the highest here, even though the distribution of land holding is relatively less skewed. In the central plains, where Scheduled Castes dominate, the proportion of agricultural labourers as a proportion of the agriculture dependent and the total workforce is the highest. The distribution of landholding is far more skewed, accompanied paradoxically by lower below poverty line population.

The correlation matrix confirms the overall picture that has emerged from this work about the relationship between ethno-demographic profile, production systems and ecology. Typically, areas with a high proportion of Scheduled Tribe population present the following land use. A high percentage of the geographical area is under forest cover. The proportion of fallow land and cultivable wasteland is also high. Both fallows and cultivable wastelands represent the extensive margin or area potentially available for cultivation. Gross cropped areas as a proportion of net sown area captures the extent of double cropping. There is a significant negative correlation with the percentage tribal population. Net sown area as a proportion of cultivable area too is negatively correlated to percentage tribal population. Overall, the land use data in the tribal areas communicates low land use intensities and a high forest cover. There is also an inverse relationship between percentage of tribal population and percentage of area irrigated. The potential for development of ground water is high in these areas. However, it remains largely untapped. Further, socio-economic development is also low, as indicated by the negative correlation between tribal population and literacy rate. Blocks with tribal dominance are sparsely populated and have a very low population of Scheduled Castes. The areas of tribal domination have a low proportion of workers, but a high proportion of cultivators and BPL families. This suggests a high presence of poverty stricken tribal cultivators. The dependency ratio is relatively higher. In contrast, the Scheduled Caste populations are concentrated in the plains and valleys, which show high land use intensities on all counts (low fallows, high multiple cropping, low cultivable wasteland, low forest cover, etc) and high level of development of irrigation from all sources. The population and literacy rates are higher in these blocks. So is the percentage of agricultural labourers.

As far as ecological parameters are concerned, areas of tribal dominance overlap with those of high gradient and rugged topography, a fact borne out by the strong positive correlation between percentage tribal population and average degree of slope. Consequently the landforms are more intractable and unfriendly from the point of view of stable and productive agriculture, an observation confirmed by the strong negative correlation between agriculture-friendly landforms and pre-ponderance of tribal population. High drainage density is a good indicator of high runoff rates of rainwater, which is a cause of low soil moisture and groundwater recharge, and high soil erosion. It also reflects hard rock strata underlying loose shallow soils. These features imply a soil profile that is less compatible with productive and stable agriculture. This is also confirmed by the high negative correlation between areas of high tribal settlement and all the soil characteristics that cause less susceptibility to drought.

Table 5.28: Workforce Participation Rate

Class Interval	Code	Frequency
< 39.9	1	10
39.9 – 43.54	2	16
43.54 –47.18	3	39
47.18 – 50.82	4	33
50.82 – 54.46	5	35
> 54.46	6	14

Maximum: 58.10
Minimum: 36.26
Range: 21.84