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Articles

Book Reviews

New Perspectives on Land Reforms in India

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Abstract

Public policy making in democracies basically involves balancing pressures of self-interest groups. This is much more so in the case of land reforms. Though the Indian land reforms programme was guided by justifiable social and economic goals, after a lapse of time these policies seem to have created some practical economic problems. Though abolition of land intermediaries like *zamindari, inamdari* and all forms of tenancy did help the actual tillers, putting ceilings on the size of landholdings did not help to increase productivity of Indian agriculture. Operation of land ceilings and the laws of inheritance have rendered landholdings in the country uneconomical. Restrictions on corporate tenancy have prevented the entry of private investment into agro-processing activities. Therefore, it is necessary to relax the existing land ceiling and tenancy laws to enable Indian agriculture to benefit from globalisation.

Introduction

Public policy making is an essential function of all forms of government. But this function acquires added significance in democracy because of the participation of the people in generating ideas, influencing public opinion and involving peoples' representatives in policy making through the medium of political institutions. In democracy voters have the power to confer or deny their support to a political representative/ party on public policy issues. Besides, citizens organise themselves into self-interest promoting groups based on occupation, income, language, region, political ideology, etc. These self-interest groups try to achieve their goals by seeking group identity. They form associations for achieving their goals, which their members cannot achieve individually, by reducing transaction costs, increasing the resources at their disposal including their voting strength. (Olson 1965). As a result, formulation of any public policy becomes a complex process in democracy. Further, change of any existing policy imposes varying amounts of costs and benefits on different sections of a society. Hence, it becomes very difficult for any government to change a well-entrenched policy.

Economists have used theoretical paradigms to analyse and understand the process of public policy making and also to assess their impact on different sections of society. Three analytical approaches have been widely used to analyse

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the process of formulating agricultural development policies and also to assess the impact of various policies on the farmers and other sections of society. (See Swinnen and Zee). These approaches are: (1) neoclassical welfare economics approach (Pigou 1932) (also called market failure approach); (2) Marxian approach, (Larrain 1983), and (3) political economy approach. (Downs 1957; Buchanan and Tullock 1962, and Olson 1965). It should be mentioned at the outset that each of these approaches has multiple models, each trying to explain one or the other specific part of the process of public policy making. For our purpose we will treat them as representing a general analytical framework rather than looking in detail at models under each approach.

The first approach starts with the assumption that free market forces enable the economic agents to allocate a country's resources efficiently. However, free market fails to function properly when there are externalities, public goods and decreasing cost industries, in addition to highly skewed income distribution. Therefore, following Pigou, the market failure approach expects the government to intervene and formulate appropriate public policies to reduce the losses that might be suffered by society. This is considered necessary to maximise the welfare of society as a whole. This has also come to be known as 'social concerns' approach. In the context of farmers, market failure resulting from unforeseen risk (of pest attack in the absence of insurance) and uncertainty (of rainfall, which cannot be insured), forces the affected farmers to suffer loss of income, which will reduce the welfare of society as a whole through the multiplier effect. The government, which is expected to be motivated by the objective of maximising the welfare of all sections of society, is supposed to intervene and compensate the farmers through transfer payments. Such transfer payments may be raised from a general tax or a tax confined to a particular group that benefits from the failure of the market.

However, this approach assumes that the institution of government, particularly in democracy, is benevolent and omniscient and is guided by the noble objective of promoting the welfare of all people. This assumption has come to be questioned on the ground that it fails to predict the behaviour of governments in power with a reasonable degree of certainty. Further, the institution of government, like market, is not only imperfect but also prone to failure as much as the markets. Thus, corresponding to the notion of market failures, we have government failure, which may be the reflection of the failure of the political party in power or the failure of the polity and civil society as well. As a result, competition in political markets generates social waste rather than surplus. More specifically, government policies are more often imperfect and incomplete either in their design or implementation or both. Therefore, this analytical framework has come to be branded as normative, (with low predictive strength), and hence is incapable of explaining the true reality of the process of public policy making and its implementation in democratic societies.

The Marxian approach to public policy making is based on the Marxian dichotomy of the social groups into capitalists and working class and on the assumption that the capitalists manipulate the social groups in democracy in such a way as to have a government that protects and promotes their own interests at the cost of the working class. In order to buy peace, the government is allowed to bribe the working class with minimum wage policy, right to form trade unions, etc., to postpone the political revolution. This analytical framework when applied to agricultural policy formulation explains the division of the agrarian economy into landowning and landless classes. The landowning class manipulates its own group as well as other classes either to form government or support those who are sympathetic to the landowning class to control the reins of power. Once that is done, the landowning class dictates the policies to the government to protect the interests of the landowning class and exploits labourers to siphon off the surplus from land. According to the Marxian approach, any democracy with such class distinction becomes an unstable one and economic policies are formulated to protect the major economic interests of the landowning and other ruling classes and postpone the day of final conflict either through oppression of the working class or by throwing crumbs to them in the form of populist programmes.

While this approach has an element of truth in that it identifies the landowning and the landless classes and the nature of public policy that will emerge from the interaction between these two classes, it fails to provide a satisfactory explanation for all variety of public policies formulated in democracies relating to agriculture such as land reforms, and protection versus free trade in agricultural commodities. What is more, the Marxian approach assumes that there is always an irreconcilable conflict between different classes of society and rules out political alliances to serve their mutual interests. More than anything, the Marxian approach is only an ideological framework and not an analytical framework based on any prevailing economic theory.

The third and most important approach is the political economy approach, also known as public choice approach, which applies the analytical framework of neoclassical economics to political behaviour. It has a number of models within itself. This approach rejects the assumption of an all-knowing benevolent government and questions the assumption of the noble objective of the government namely, promoting social welfare by correcting market failures. The political economy approach tries to seek a scientific understanding of the functioning of democratic governments and their agencies and tries to identify the sources of government failure and the politico-economic mechanism of policy design and implementation. The political economy approach applies economic theory to understand as well as predict political and bureaucratic behaviour. It is based on the assumption that all agents including the voters, citizens, self-interest groups, political leaders, political parties, and a host of occupation groups, are guided by rational behaviour of

maximising their self-interest either individually or by forming groups. The voters want to minimise their tax burden and maximise the benefits from government expenditure; the government in power wants to continue in power; opposition parties want to come to power, by forming alliances, if inevitable; the bureaucracy wants to maximise its power and influence in policy design and implementation, and so on.

There are at least three major models within the political economy approach. The first, expounded by Mayer (1984), assumes that all policies are made by the government by using majority voting without lobbies and other influences. Another model, expounded by Becker (1983 and 1985), highlights the role of pressure groups and lobbying in public policy making, and yet another model, (Olson 1965), tries to explain the role of collective action. All these models ultimately go to explain the real political and bureaucratic behaviour. The majority voting model explains the deterministic way in which voters (legislators) decide on the basis of all-or-nothing specification, in the decision-making process. Proportional voting model explains that voting either by the voter or by the legislator is only a political formality without exerting any influence on specific public policy making. The pressure group model really clinches the issue of how lobby groups can wield influence on public policy making. The collective action model is only a variant of the pressure group model. Ultimately, the political economy approach emphasises the political and bureaucratic processes of policy making and the inputs of pressure groups that determine the specific design and implementation of public policy.

The foregoing brief account of the main theoretical approaches to public policy formulation and implementation in democracies provides a background to the study of the political economy of agriculture development policy formulation and implementation in India. These analytical approaches will help us understand the socio-political forces that operated and influenced formulation of specific agriculture development policies at different points of time. We would like to mention here that all the three approaches are relevant for our study of the impact of agricultural policies on farmers in India as the underlying logic of one or the other approach was used by different self-interest groups for formulating and implementing specific agricultural policies in India. This is also consistent with the integrated approach to understanding public policy formulation, which tries to combine both the normative (social concerns) approach and positive (self-interest) approach. (Baldwin 1989, Mueller 1989). In what follows we have presented a review of major agricultural policies that impacted the farming community during the past fifty years.

Old Policy of Land Reforms

Land is the basic factor of agricultural production. Therefore, who owns land and who cultivates it are as important as how it is cultivated in promoting

agricultural production. Agriculture has been a way of life for the vast majority of the rural masses in India. But its economic importance was recognised by the successive governments only in times of food shortages. This was true under colonial rule as well as after independence. Consequently, the main objective of agricultural development has continued to be to achieve self-sufficiency in foodgrains and to meet the domestic demand for agricultural raw materials. No doubt, there were some attempts to reform the agrarian institutional structure. But these were mainly guided by the objective of demolishing the feudal land relations that had taken deep roots in rural society and incidentally were supposed to improve the efficiency of agriculture.

Land reforms have been considered as important tools of socio-economic change in India. They constituted an important component of the strategy of agrarian reform that was designed to transform and modernise Indian agriculture. Political parties, political leaders, economists and administrators have all played their roles in justifying as well as in evolving appropriate legislation for implementing land reforms in post-independent India. Though land reform measures were vehemently advocated by the Marxists, they received both moral and intellectual support even from those espousing capitalist ideology. This was a curious case of convergence of ideologies. Marxists advocated land reforms to eliminate remnants of feudalism whose roots were traced to absentee land ownership. But the capitalist ideologists justified land reforms on the ground that ownership of land by the cultivator provides an intangible incentive to 'convert land into gold' which would improve productivity of agriculture.

Land reform policy has economic, social and political dimensions. The economic dimension of land reforms involved the ownership of land by a small group that did not actually cultivate but exploited the actual tillers who were the tenants and agricultural labourers. On the other hand, because of inadequacy of returns and absence of surplus with the tenants, they could not undertake improvements on land. The landlords having no personal interest in the lands they owned, also did not take interest in investing on land improvement. As a result, land productivity went on declining. This was the dynamics of underdeveloped agriculture.

As far as the sociological dimension is concerned, traditionally, the upper castes owned land and the lower castes were the tenants/agricultural labourers. Even today we do not find the lower castes owning land in any significant measure and the upper castes working as tenants/agricultural labourers in India. This social dimension perpetuated the social inequalities. It is here that the economic inequality created under the economic dimension got reinforced by the social inequality in agrarian relations.

Coming to the political dimension, it may be noted that, historically, the

owners of land have been supporters of the governments in power. This was much more evident during British rule in India. Because of the numerical minority position of the former *zamindars* and the later landlords and their economic stranglehold over the tenants, they depended on the government for their protection, (thus promoting their own self-interest). At the same time, the government depended upon them for its own survival so long as tenants, though large in number, did not organise themselves against the exploitative political and social systems. This has been the experience of almost all countries that faced agrarian problems.

The British rule in India introduced permanent land revenue system which, over time, became widely known as *zamindari* system. Under this system of land settlement, those who agreed to pay a fixed sum of land revenue regularly to the British government were made the owners of demarcated lands. They, in turn, collected whatever land revenue they wanted from the actual tillers who were their tenants. There was also a practice of sub-letting, which involved middle-level landlords in between the *zamindars* and the tenants. The *zamindari* system created one of the worst exploitative land relations in India and strengthened the feudal socio-economic system. *Zamindars* became staunch supporters of British rule in India. This annoyed the Congress party, which was mobilising the Indian masses against British rule. So the Congress party declared in one of its annual sessions that after independence it would support abolition of the *zamindari* system. In pursuance of this resolution, the Congress Agrarian Reforms Committee was appointed under the chairmanship of J.C. Kumarappa, which recommended a wide range of reforms in 1949. After independence the Congress government, under the leadership of Jawaharlal Nehru, abolished the *zamindari* system. But since the Constitution had guaranteed the right to property under Article 19, the *zamindars* approached the Supreme Court, which ruled that the policy of abolition of the *zamindari* system violated the right to property and was hence *ultra vires* of the Constitution. The Congress government amended the Constitution to limit the scope of the right to property. Thus, a major institutional /structural was achieved by abolishing the *zamindari* system of land relations. This policy helped the farming community in general and tenants of the *zamindars* in particular. Nobody shed tears over the demise of the *zamindari* system in India.

However, the *zamindars'* lobby was still powerful at the state level to frustrate the main objective of this land reform measure. Chandra, *et al.* (1999) have narrated the methods used by the *zamindars* to evade the *zamindari* abolition law. They have made the following observation:

'There were, however, certain important weaknesses in the manner in which some of the clauses relating to zamindari abolition were implemented in various parts of the country. For example, in UP, the zamindars were permitted to retain lands that were declared to be under their "personal cultivation." What

constituted "personal cultivation" was very loosely defined (making) it possible for not only those who tilled the soil, but also those who supervised the land personally or did so through a relative, or provided capital and credit to the land, to call themselves a cultivator. Moreover, in states like UP, Bihar and Madras, to begin with, (i.e., till land ceiling laws were introduced) there was no limit on the size of the lands that could be declared to be under the "personal cultivation" of the zamindar.....

The result, in actual practice, however, was that even zamindars who were absentee landowners could now end up retaining large tracts of land. Further, in many areas, the zamindars, in order to declare under "personal cultivation" as large a proportion of their lands as possible, often resorted to large-scale eviction of tenants, mainly the less secure small tenants.' (pp.376–77).

Therefore, reform of tenancy became inevitable. Accordingly, the next land reform measure contemplated was the abolition of tenancy, which continued to operate under the earlier *zamindar* landlords, and also under *ryotwari* and *inamdari* systems of land relations. To begin with, attempts were made to provide security of tenure and fixing fair rent payable by the tenants to the landowners. These measures dominated the land reform measures during the 1950s and 1960s. These tenancy reform measures were motivated by protecting the interests of a large number of tenants who constituted the vote bank for the Congress party. But during the 1970s, the very institution of tenancy was abolished. Though this policy was effectively implemented in Assam, Gujarat, Kerala, Tamil Nadu and West Bengal, in other states the self-interest lobby of landlords forced the state governments to resort to delay tactics. (Thimmaiah and Aziz 1984). This is evident from the number of tenants who benefited from the policy of abolition of tenancy in different states shown in Table 1. As a result, informal tenancy has continued in many states even to this day. This is because the landlord lobby was powerful in other states to prevent implementation or at least postponement of abolition of tenancy. As a result, in 1990–91, about 1.28 million hectares of land was leased in by the cultivating farm families. Such prevalence of informal tenancy might have benefited the cultivating families in states like Punjab and Haryana. But many landowners who owned some land but who were employed in non-agricultural occupations, started leaving their lands uncultivated for fear of losing their lands to the tenants who may be landless labourers or small and marginal farmers. This has led to substantial area of cultivable land being left idle, particularly in those states where feudal land relations were deep rooted. For instance, according to All India Agricultural Census of 1990–91, about 10 million hectares of land was left uncultivated in the country, of which 1.35 million hectares was in Bihar, 1.82 million hectares was in Madhya Pradesh, 1.1 million hectares was in Maharashtra, and 2.81 million hectares was in Rajasthan. In other words, though the policy of tenancy

abolition helped the tenants and actual cultivators, it has also created a problem of vast tracts of land being left uncultivated. This is a loss to the agricultural sector in the country. Recognizing this negative impact, the Government of India is contemplating supporting the state governments' proposed policy of allowing for leasing in and leasing out of small parcels of land owned by those who cannot cultivate their land to the adjoining actual cultivators.

Table 1: Number of Tenants Conferred Ownership Rights, and Area Accrued to Them

State/Union Territory	No. of Tenants Benefited (Lakhs)	Area Accrued (Lakh Acres)
Andhra Pradesh	1.07	5.95
Assam	29.08	31.75
Bihar		
Gujarat	12.76	25.92
Haryana		
Himachal Pradesh	4.01	NR
Jammu & Kashmir	6.1	26.32
Karnataka	6.05	14.5
Kerala	28.42	
Madhya Pradesh		42.9
Maharashtra	14.92	
Manipur		
Orissa	NR	NR
Punjab	0.18	NR
Rajasthan	0.18	NR
Tamil Nadu	4.98	6.95
Tripura	0.14	0.39
Uttar Pradesh	NR	NR
West Bengal	14.6	NR
D & N Haveli	0.26	0.64

Note: NR = Not reported by the state governments/Union Territories.
Source: Government of India (2000–01).

Following the policy of abolition of tenancy, there was another policy that was inspired by the philosophy of achieving a socialist pattern of society. This policy was enunciated in the Second Five-Year Plan document in the following way:

'Essentially, this means that the basic criterion for determining the lines of advance must not be private profit but social gain, and that the pattern of development and the structure of socio-economic relations should be so planned

that they result not only in appreciable increases in national income and employment but also in greater equality in incomes and wealth. Major decisions regarding production, distribution, consumption and investment — and in fact all significant socio-economic relationships — must be made by agencies informed by social purpose'. (1956, p.22).

Socialist ideology became a powerful force during the 1970s in the formulation of agricultural development policy. The socialist ideology silenced even non-ideological dispassionate economists from advancing more appropriate policies to enable Indian agriculture to achieve higher productivity and gainful employment opportunities for the rural masses. The socialist ideology was behind putting the ceiling on agricultural holdings. The Second Five Year Plan (1956) gave prominence to it and justified the policy in the following arguments:

'....the objectives of land reform are twofold: firstly to remove such impediments upon agricultural production as arise from the character of the agrarian structure; and, secondly, to create conditions for evolving as speedily as may be possible, an agrarian economy with high levels of efficiency and productivity.' (p.178)

The policy of putting a ceiling on the size of landholdings was, no doubt, consistent with the policy of putting a ceiling on private investment in industrial activity under the Industrial Policy Resolution of 1956. During the 1960s and early 1970s, the Planning Commission suggested a national programme of land reforms in which prescribing ceilings on the size of landholdings was an important component. The central government provided grants-in-aid to the states to enable them to prepare proper land records to facilitate implementation of the policy of land ceilings and distribution of surplus land. Though land and agriculture-related policy issues were state subjects under the Constitution, the central government, in consultation with the Planning Commission, suggested that the ceiling for irrigated land with two crops should be 4.05 – 7.28 hectares, for irrigated land with one crop 10.93 hectares; and for dry lands 21.85 hectares per family. Most of the state governments have, by and large, followed these national standard guidelines, as may be observed from Table 2 below.

However, the application of land ceiling legislation has not been uniform in all the states. For instance, in Andhra Pradesh, Bihar, Gujarat, Haryana, Jammu & Kashmir, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Rajasthan and Tamil Nadu, the ceiling laws were made applicable to both ownership and tenanted holdings, (i.e., operational holdings), whereas in Assam, Maharashtra, Orissa, Punjab, Uttar Pradesh and West Bengal they were applicable to only ownership holdings. Further, tenancy has been abolished only in Jammu & Kashmir, Karnataka, Kerala, Maharashtra and West Bengal. Furthermore, in geographically small states like Assam and Kerala, the ceiling limits for irrigated land with two crops were fixed at

higher limits of 7 and 6 hectares per family respectively, whereas in bigger states like Andhra Pradesh, Karnataka and Tamil Nadu the ceiling limits were fixed at lower limits of 4 and 5 hectares per family respectively. (Mearns 1999, pp.46–48).

Table 2: Ceiling Limits Introduced by the State Governments on Landholdings (hectares per family)

State	Irrigated land with two crops	Irrigated land with one crop	Dryland
Andhra Pradesh	4.05–7.28	6.07–10.93	14.16–21.85
Assam	6.74	6.74	6.74
Bihar	6.07–7.28	10.12	12.40–18.21
Gujarat	4.05–7.28	6.07–10.93	8.09–21.85
Haryana	7.25	10.90	21.80
Himachal Pradesh	4.05	6.07	12.14-21.85
Jammu & Kashmir	3.60–5.06	___	5.95–9.20
Karnataka	4.05–8.10	10.12–12.14	21.86
Kerala	4.86–6.07	4.86–6.07	4.86–6.07
Madhya Pradesh	7.28	10.93	21.85
Maharashtra	7.28	10.93–14.57	21.85
Manipur	5.00	5.00	6.00
Orissa	4.05	6.07	12.14–18.21
Punjab	7.00	11.00	20.50
Rajasthan	7.28	10.93	21.85–70.82
Tamil Nadu	4.86	12.14	24.28
Sikkim	5.06	4.00	20.23
Tripura	4.00	4.00	12.00
Uttar Pradesh	7.30	10.95	18.25
West Bengal	5.00	___	7.00
Suggested national guidelines in 1972	4.05–7.28	10.93	21.85

There is no record of the basis on which the ceiling limits were suggested by the central government; different ceiling limits were adopted by different states. All that we know is that Farm Management Survey data were used to show an inverse association between the size of farm, (operational holdings), and productivity. (Rao 1966, Rao 1972, Berry and Cline 1979). These and other findings were widely used by economists to rationalise and by political parties to justify putting ceilings on the size of landholdings. It may be mentioned in this context that though the central government and the Planning Commission gave general guidelines to the state governments on the ceiling limits, the Planning Commission very clearly advised

the state governments to exempt certain categories of landholdings from ceiling laws. The Second Five-Year Plan document (1956) elaborated this advice in the following words:

'While determining the general ceiling on agricultural holdings in a state, it will also be necessary to consider the categories of farms to which the ceiling need not apply. Three main factors could be taken into account in deciding upon exemptions from the purview of the ceiling, namely, (1) integrated nature of operations, especially where industrial and agricultural work are undertaken as a composite enterprise, (2) specialised character of operations, and (3) from the aspect of agricultural production the need to ensure that efficiently managed farms which fulfil certain conditions are not broken up.

If these considerations are kept in view, there would appear to be an advantage in exempting the following categories of farms from the operation of ceilings which may be proposed: (1) tea, coffee and rubber plantations; (2) orchards where they constitute reasonably compact areas; (3) specialised farms engaged in cattle breeding, dairying, wool raising, etc; (4) sugarcane farms operated by sugar factories; and (5) efficiently managed farms which consist of compact blocks, on which heavy investment or permanent structural improvements have been made and whose break-up is likely to lead to a fall in production.

In the nature of things, these are general suggestions which should be adapted to the needs and conditions of each state. For instance, in those parts of the country where culturable wastelands are available and a sufficient number of cultivators are not always easy to obtain, a ceiling may not be necessary at this stage or may be set at a higher level than that envisaged here. Similarly, there may be areas in which the level of the ceiling may be lower because of the high density of population'. (pp.196–97).

These elaborate guidelines of the Planning Commission were not headed by all the state governments. No doubt, plantations were exempted from land ceiling laws. But other types of farms and farm enterprises were not even considered by the state governments for higher ceiling limits let alone for exemption. The obsessive objective of promoting social justice through implementing land ceilings, (which became a mirage after some years), blinded the political leaders and bureaucrats, who failed to evaluate the long-term impact of putting low levels of ceilings on land holdings and abolition of all forms of tenancy. There were also some political developments in the country that facilitated implementation of such a restrictive land ceiling policy. During the 1970s, the caste composition of the state-level political leadership of the Congress party started changing. The new leadership which hailed from non-dominant backward castes realised that seeking continued support from dominant middle-caste landowners was becoming counterproductive, and hence they decided to cut them down to size by putting

ceilings on landholdings. There was some resistance to such a policy from the dominant castes who owned large holdings. But imposition of emergency in 1975 eliminated even that resistance to the implementation of land ceiling laws. (See Thimmaiah and Aziz 1984).

Land reforms, particularly abolition of tenancy, no doubt gave some land to the actual tillers in some states. Even the implementation of ceiling laws is reported to have benefited a large number of farmers as shown in Table 3 below. But they did not result in significant redistribution of surplus land among the landless. This is evident from the high Gini coefficient of ownership holdings computed from the National Sample Survey data on landholdings.

Table 3: Implementation of Land Ceilings in the States (Area in Acres as on September 1988)

State/UT	Declared Surplus	Taken Possession	Distributed to Individual Beneficiaries	Total Number of Beneficiaries	Average Extent of Land Distributed per Beneficiary
Andhra Pradesh	791461	639030	577551	529116	1.09
Assam	612380	575837	505202	445648	1.13
Bihar	415447	387463	305858	377730	0.81
Gujarat	230911	158646	134963	31906	4.23
Haryana	93239	88244	87309	27435	3.18
Himachal Pradesh	316556	304895	4374	6365	0.69
Jammu & Kashmir	455575	450000	450000	450000	1.00
Karnataka	267758	155118	118441	32047	3.70
Kerala	138439	95987	64922	148423	0.44
Madhya Pradesh	294838	262406	186158	72558	2.57
Maharashtra	607194	566228	458974	80160	5.73
Manipur	1830	1685	1685	1258	1.34
Orissa	178016	166814	155401	136686	1.14
Punjab	222594	105181	103557	28303	3.66
Rajasthan	610374	566228	458974	80160	5.73
Tamil Nadu	196966	182762	171066	183369	0.93
Tripura	1995	1994	1599	1424	1.12
Uttar Pradesh	570398	538300	402018	360389	1.12
West Bengal	1354689	1265937	1032201	2476910	0.42
D & N Haveli	9406	9305	6851	3353	2.04
Delhi	1132	394	394	654	0.60
Pondicherry	2326	1177	1023	1359	0.75
Total	**7373524**	**6510874**	**5305229**	**5536565**	**0.96**

Source: Government of India (2000–01).

It was 0.731 in 1960–61, which declined to 0.709 in 1970–71 just before implementation of land ceilings, but increased to 0.712 in 1981–82 and stood at 0.710 in 1991–92. This would imply that the data presented in Table 5 above relating to the surplus lands released from big landowners after implementing ceilings and their distribution among the landless class are not reliable. This is not a hunch. Other scholars like Damle, (1989), have reported that big landholders used all possible means to evade the ceiling laws, which is consistent with the above values of inequality coefficients of ownership landholdings. They prove the hypothesis that landowners, (a powerful lobby in the Indian political scene), succeeded in protecting their own self-interest to a substantial extent. It may, however, be noted in this context that Besley and Burgess, (1998), have found that:

'.... there is robust evidence of a link between poverty reduction and two kinds of land reform legislation — tenancy reform and abolition of intermediaries. Another important finding is that land reform can benefit the landless by raising agricultural wages. Though the effects on poverty are likely to have been greater had large-scale redistribution of land been achieved, our results are nonetheless interesting as they suggest that partial, second-best reforms which mainly affect production relations in agriculture, can play a significant role in reducing rural poverty.' (p.20).

We have already mentioned above that abolition of *zamindari* and other forms of intermediaries did help the former tenants of those areas. That policy also made a beginning in dismantling the feudal socio-political system that had taken deep roots in *zamindari* areas. But the point we are making is that many states abolished all forms of tenancy and put unreasonable limits on the size of landholdings. Such wholesale tenancy abolition, coupled with the operation of the laws of inheritance, reduced the average size of landholding. The area as well as the number of small and marginal farms increased phenomenally during the last three decades. Though efforts were made to consolidate landholdings that were sub-divided and fragmented, operation of the provisions of land reforms and laws of inheritance prevented economically viable holdings from emerging as a normal feature of Indian agriculture. It may be observed from Table 4 that the average size of holding declined from 2.28 in 1970–71, before the ceilings on landholdings were imposed, to 1.69 ha. in 1990–91, after two decades of operation of land ceilings, and the proportion of small and marginal holdings increased from 70 per cent to 78.2 per cent. Correspondingly, the proportion of large holdings declined to as low as 1.5 per cent. This trend is true of both ownership and operational holdings. Along with this decline in the size of holdings, productivity of agriculture has also declined, which is not a coincidence but one of the contributory factors.

Table 4: Number of Operational Holdings and Area Operated in India: 1970–71 and 1990–91

Category & Size	No. of Operational Holdings (million)		Area Operated (million hectares)		Average Size of Holding (hectares)	
	1970–71	1990–91	1970–71	1990–91	1970–71	1990–91
Marginal (below 1ha.)	36.20 (51.0)	63.39 (59.4)	14.56 (9.0)	24.89 (15.0)	0.40	0.39
Small (>1–2 ha.)	13.43 (18.9)	20.09 (18.8)	19.28 (11.9)	28.83 (17.4)	1.44	1.43
Semi-medium (>2–4 ha.)	10.68 (15.0)	13.92 (13.1)	30.0 (18.5)	38.38 (23.2)	2.81	2.77
Medium (>4–10 ha.)	7.93 (11.2)	7.58 (7.1)	48.24 (29.7)	44.75 (27.0)	6.08	5.10
Large (above 10 ha.)	2.77 (3.9)	1.65 (1.5)	50.10 (30.0)	28.66 (17.4)	18.10	17.21
All Categories	70.0 (100.0)	106.64 (100.0)	162.1 (100.0)	165.51 (100.0)	2.28	1.69

Note: Figures in brackets indicate percentages to all categories of holdings.
Source: Government of India (1970–71 and 1990–91).

What is more, as may be observed from Table 5, on an average a marginal farmer would be having three parcels, each measuring less than one-fifth of a hectare. Though the number of parcels is higher even in the case of medium and large farmers, the size of the parcel is moderately higher. Those who own small pieces of land cannot lease them out because of the operation of tenancy law. They cannot cultivate either as some of them are employed in non-agricultural occupations and because these holdings are economically unviable for a main occupation. As a result, large tracts of land have remained uncultivated.

In the wake of structural economic reforms initiated in 1991, the investment limit for the industrial sector under Monopolies and Restrictive Trade Practices (MRTP) Act has been removed. This would mean that the ownership of industrial units involving unlimited amount of capital has come to be promoted disregarding its impact on the resultant inequalities of income and wealth. But economists are reluctant to recommend removal of the ceilings on landholdings with a view to encouraging flow of private investment into agriculture. What is relevant here is that there was consistency in land reform measures and industrial licensing and MRTP policies under the old regime of promoting a socialistic pattern of society. But now industrial licensing has been abandoned; MRTP Act has been quietly

Table 5: Sub-division and Fragmentation by Size of Holdings in India (1976–77)

Particulars	Marginal (<1 ha.)	Small (>1–2 ha.)	Semi-medium (>–4 ha.)	Medium (>4–10 ha.)	Large (>10> ha.)	All Sizes
Average number of parcels	2.68	3.50	4.26	4.80	5.35	3.45
Average area of parcel per holding (ha.)	0.16	0.46	0.64	1.24	2.78	0.60

Source: Government of India, *All India Report on Input Survey, 1976–77, Vol. I*

buried in the wake of Competition Law, but there is no change in the policy of ceilings on landholdings. This is a blatantly discriminatory policy against agriculture. This discriminatory policy has prevented improvement in capital formation in agriculture even after the introduction of economic reforms. This is evident from Table 6 below.

Table 6: Capital Formation in Indian Agriculture Before and After Land Reforms (Per cent)

	Public Sector Gross Capital Formation in Agriculture as % of Aggregate Gross Capital Formation		Private Sector Gross Capital Formation in Agriculture as % of Aggregate Gross Capital Formation	
Year	At Current Prices	At 1980–81 Prices	At Current Prices	At 1980–81 Prices
1960–61	28.13	33.15	71.87	66.85
1965–66	31.25	25.35	68.75	74.65
1970–71	27.10	27.36	72.90	72.64
1975–76	28.46	29.27	71.54	70.73
1980–81	38.87	38.87	61.13	61.13
1985–86	37.07	35.14	62.93	64.86
1990–91	28.23	25.91	71.77	74.09
1991–92	24.72	21.78	75.28	78.22
1992–93	23.05	20.07	76.95	79.93
1993–94	26.30	22.82	73.70	77.18
1994–95	24.56	23.03	75.44	76.97
1995–96	22.35	18.05	77.65	81.95
1996–97	NA	16.17	NA	83.8

Source: Ramesh Chand (2001, p.173).

After the 1960s both private and public capital formation were impressive though public sector capital formation was fluctuating. Though both started declining during the eighties, the decline of public sector capital formation was much sharper. During the decade of economic reforms, declining capital expenditure of both the central and state governments, consequent on the need to reduce fiscal deficit, has obviously not improved public sector capital formation in agriculture. Private sector capital formation also did not improve as the agriculture sector has continued to be unattractive as a result of the restrictive policies of the government of India and the state governments. This is evident from the decelerating rate of growth of private sector capital formation in agriculture presented in Table 7 below. It may be observed that the green revolution improved the growth rate of capital formation in agriculture during the 1960s but decelerated sharply after the impact of the green revolution tapered off.

Table 7: Annual Compound Growth Rates of Capital Formation in Indian Agriculture

Period	Gross Capital Formation in Agriculture	Gross Fixed Capital Formation in Agriculture	GDP From Agriculture	Public Sector Gross Capital Formation in Agriculture	Private Sector Gross Capital Formation in Agriculture
	%	%	%	%	%
1950–1990	3.07	3.10	2.69	2.31	3.65
1950–1960	2.57	2.38	2.99	—	—
1960–1970	4.68	4.69	2.02	2.69	5.62
1970–1980	4.83	5.10	1.53	7.76	3.39
1980–1990	-0.56	-0.52	3.51	-4.20	1.09

Source: Mallick (1993, p.668).

Of all the restrictive policies, tenancy law and ceilings on landholdings are the most important constraints that have kept private sector investment from flowing into agriculture. Economists would argue that land is limited in supply and hence has to be rationed whereas capital is not that scarce and, therefore, may be encouraged to be invested without limit. If this were so, where is the need for laying out the red carpet to attract foreign direct investment? In other words, there is no rationale in the argument for continuing the existing ceiling limits on landholdings in India in the wake of liberalisation and globalisation.

It is now realised that abolition of all forms of tenancy has led to waste of scarce land by the owners who cannot cultivate. The lands inherited by those living in urban areas, employed in the non-agricultural sector, cannot be leased by them. Neither are they in a position to cultivate. Though they own the asset, they

do not derive any income from it. From the point of view of society, so much of land, which is an important asset, is going waste. This is the direct consequence of the combined effect of abolition of tenancy and operation of laws of inheritance. Even before the emergence of these economic consequences, the earlier assumption that the size of holding and productivity were inversely related came to be questioned by Ashok Rudra and Ashok Sen (1980), who observed that:

'The general conclusion to emerge is the diversity of Indian agriculture, regarding the existence of the negative relation between size and productivity: "the negative relation may hold in certain parts of the country at certain times." It also appears that even when the inverse relationship holds, it may hold in certain ranges but not in others, and in many cases it is particularly noticeable "only for small size classes." While counting the different regions, one would find that the inverse relation is more frequently confirmed than rejected, it would be a mistake to take it to be an empirical generalisation for Indian agriculture as a whole' (p.693).

Graham Dyer, (1991), after re-examining the empirical basis of inverse relation between farm size and productivity in some developing countries, including India, has come to the conclusion that:

'In the static context, we have seen that the inverse relation is not the product of superior efficiency on the part of small farms nor is it due to better quality land on the small farms, but arises from the desperate struggle of poor peasants for survival on below-subsistence plots of land in a relatively backward agriculture, and the matrix of exploitative relations within which they operate. Redistribution of land on the basis of the inverse relation argument, therefore, far from alleviating poverty and creating employment opportunities, will only deepen and perpetuate extreme levels of exploitation and poverty. Furthermore, in the dynamic context of the development of the forces of production, in the shape of Green Revolution technology, the inverse relation is likely to disappear. Inverse relationship argument no longer has any rationale in the context of changing production conditions.' (p.87).

Further, after reviewing the entire debate on the issue, Dyer, (1997), has concluded that:

Thus, in the dynamic context of the development of both the relations and forces of production, in the shape of new technology, the inverse relationship breaks down and disappears. Rich peasants are able to capture the gains from the new technology, and with increased accumulation develop into capitalist farmers. These findings would seem to lay to rest the possibility of employing the inverse relationship evidence in favour of redistributive land reform'. (p.128).

While ideologically oriented economists and policy makers may not like Indian agriculture to lose its importance as peasant agriculture, the combined operation of domestic liberalisation and Agreement on Agriculture under World

Trade Organisation regime will no doubt change not only the form but also the content of Indian agriculture in the years to come. For the first time, Indian farmers will be exposed to the new competitive environment made possible by integrating Indian agriculture into global agriculture through WTO. This new trade environment may create rewarding opportunities as well as hidden threats. Therefore, the government of India as well as the state governments will have to formulate appropriate agricultural development policies with a view to strengthening Indian agriculture. Invariably, such a policy package should include necessary changes in the old land reform policy.

New Perspectives on Land Reforms

The main objective of government policy on agricultural development under the liberalisation programme should be to reassert that agricultural growth is important both from the point of view of moving the agricultural sector to a higher growth path and also from the point of view of raising the income levels of those dependent on agriculture. It may appear paradoxical to emphasise the need for promoting agricultural development with such a unidimensional objective of achieving higher growth with a view to raising the income levels of those dependent on it when its relative contribution to GDP is declining very fast. Even in terms of value added, the contribution of agriculture to GDP is much lower mainly because of low prices of agricultural commodities and low productivity. But still there is a socio-economic justification for giving prominence to the growth of agriculture because nearly 60 per cent of India's workforce is still dependent on agriculture and allied activities as the main occupation. Since economic liberalisation and the new industrial policy, including liberalisation of foreign trade, may not create adequate employment opportunities to absorb the growing workforce, it would be appropriate to allow agriculture to develop into a commercial enterprise which will encourage flow of private investment and latest technology, which, in turn, will result in increased employment opportunities and income in rural areas.

In the wake of economic liberalisation, there has been some opposition to encourage and promote commercialisation of Indian agriculture. This opposition is mainly based on the fear that commercialisation of agriculture may result in a radical shift of cropping pattern from cereals production to commercial crops, which may lead to a shortage of food grains. Besides, it is argued that commercialisation of agriculture will entail entry of corporate investment into agriculture, which will result in dispossession of land by traditional agricultural classes, particularly small and marginal farmers. These fears are no doubt well-founded and any attempt to promote commercialisation of Indian agriculture will have to ensure that it does not result in a fall in food grains production and loss of ownership of land by the cultivating classes whether they are small, marginal or even big farmers. At present,

there is no bar on private corporate investment flowing into agro-based processing and exporting activities. But these activities have not attracted much private investment mainly because they do not have guaranteed supply of quality raw materials or primary agricultural products. Some multinational companies have started agro-processing activities in certain regions by encouraging contract farming of the required primary agricultural products. Even so, contract farming is considered risky without appropriate changes in land reform legislation of the states. It would, therefore, be necessary to make some changes in the land reforms legislation to encourage flow of corporate investment into agro-processing and export activities.

Now our perceptions about improving the living conditions of the ordinary masses have changed drastically. It is no longer believed desirable to give small pieces of land to the poor and expect them to rise above the poverty line. It is also realised that it is better to allow people to earn some supplementary income from the small pieces of land they own rather than force them to leave it idle for fear of losing it to the tenants. It would be necessary to amend the relevant provisions of land reforms legislation of the states to legalise hiring in and hiring out of small pieces of land for cultivation. It is also necessary to allow corporate organisations to lease in (but not own) land for getting assured supply of raw materials for undertaking agro-processing activities by having their own horticulture, floriculture and aquaculture farms. All these relaxations fall within the exemption guidelines highlighted by the Planning Commission as far back as 1956. Thus it is necessary to amend tenancy laws to encourage leasing of land for productive use. Land ceiling limits that are presently operating should be enhanced, (if not abolished), to appropriate sizes for cultivating horticulture and floriculture products. Without such changes in tenancy and land ceiling laws, it is not possible for Indian agriculture to exploit the opportunities that will be created under the WTO regime.

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On an Index of Discrimination

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Abstract

This note is concerned with deriving an exceedingly simple index of relative disadvantage, which seeks to measure the extent of group-related inequality in a population, when the latter is classified, after a binary fashion, according to identity characteristic and welfare status. Empirical examples are provided of the discrimination suffered by the Scheduled Castes and Tribes of India in access to various welfare outcomes.

Introduction

The phenomenon of discriminatory barriers to entry is one which is experienced, in a variety of social and economic situations, by those groups of individuals that are relatively 'disadvantaged' or 'underprivileged' in the socio-economic hierarchy of the reference society. Common examples would include discrimination in the job market as between males and females, discrimination in access to rented housing as between members of majority communities and members of minority communities, discrimination in access to occupational categories as between 'forward caste' and 'backward caste' persons, and so on.

The examples can be readily multiplied, but what they have in common is the following. Suppose a given set of individuals to be classified according to two broad attributes, A and B, where A is an *identity characteristic* (such as caste, religion, gender, etc.), and B is a *well-being characteristic* (such as literacy status, income status, housing quality status, etc.). Then, it is frequently the case that one observes a high order of concentration of certain 'identity-types' in certain 'well-being slots.' A quantitative measure of such an asymmetry in access would serve the purpose of a useful summary statistic of group-related discrimination.

The object of this note is to develop, in a preliminary way, one very elementary real-valued index of discrimination, which shall be designated by δ. The index δ, it should be pointed out, works for a two-way binary classification of the population, that is, for a situation in which categorisation of the population according

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to the identity attribute A precipitates two groups and, likewise, categorisation according to the well-being attribute B precipitates two groups. While this makes for a potentially restrictive outcome, it can nevertheless find useful application in a variety of real-life situations.

The Discrimination Index d

Consider some identity attribute A (say, caste) which divides the population into two groups (say 'backward' and 'forward' castes respectively), and some well-being attribute B (say income status) which also divides the population into two groups (say 'low' and 'high' income categories respectively). Let t_{ij} be the proportion of the population belonging to identity category i (=1,2) and well-being category j (=1,2). The share of identity category i (=1,2) in the total population is designated by a_i, and that of well-being category j (=1, 2) by b_j. It is immediate that $t_{11} + t_{12} = a_1$; $t_{21} + t_{22} = a_2$; $t_{11} + t_{21} = b_1$; and $t_{12} + t_{22} = b_2$. Further, $a_1 + a_2 = b_1 + b_2 = 1$.

It seems reasonable to suggest that if membership to any given identity category has no influence on the prospects of membership to any given well-being category, then persons belonging to any given identity category should be distributed between the two well-being categories in the same proportion which the population of the relevant identity category bears to the total population. That is, one could envisage an 'ideal' or 'normative' situation of 'perfect symmetry of access,' wherein the t_{ij} are given by:

(1) $t_{ij}^{\#} = a_i b_j$, $i = 1, 2$; $j = 1, 2$.

Next, consider the quantity δ_{ij}, which is given by:

(2) $\delta_{ij} = \left| t_{ij} / t_{ij}^{\#} - 1 \right|$; $i = 1, 2$; $j = 1, 2$.

δ_{ij} is simply the proportionate deviation (in absolute terms) of t_{ij} from its 'normative' value $t_{ij}^{\#}$. If we were to sign δ_{ij}, then $\delta_{ij} > 0$ would imply that identity category i is 'over-represented' in well-being category j, and $\delta_{ij} < 0$ would imply that identity category i is 'under-represented' in well-being category j. The set of numbers $\{\delta_{11}, \delta_{12}, \delta_{21}, \delta_{22}\}$ thus presents a comprehensive picture of the extent of access which each identity category has to each well-being category.

To obtain a more aggregative picture, define the quantity $D_i = \sum_{j=1}^{2} \delta_{ij}$, $i = 1, 2$. D_i can be viewed as an *index of asymmetry of access for identity category i*, or simply as *i's index of discrimination*[1]. Notice that if $t_{ij} = t_{ij}^{\#}$ for all j, then it would be the case that $\delta_{ij} = 0$ for all j, and $D_i = 0$. Thus, the case of *perfect* symmetry of access for identity category i would correspond to $D_i = 0$ — which is, of course, the minimum value that D_i can assume. (It should be clear now why the δ_{ij} have been presented in absolute terms: if the δ_{ij} were to be signed, then a high positive value for one of the δ_{ij} and an equally high negative value for the other would, upon algebraic summation, yield a value of D_i which is zero; to interpret from this that identity category i enjoys symmetric access is seriously misleading).

We now have two 2-vectors: the vector $\mathbf{D} = (D_1, D_2)$, which is a vector of *actual* indices of discrimination for each identity category i = 1, 2; and the zero-vector $\mathbf{0} = (0,0)$, which is the vector that would correspond to *perfect* symmetry of access ('no discrimination') for each identity category i = 1, 2. To assess how far the actual outcome is from the ideal one, we would need to invoke some notion of *distance*. In this context, the notion of the *Euclidean norm* comes readily to mind. For any two vectors $\mathbf{x} = (x_1, x_2)$ and $\mathbf{y} = (y_1, y_2)$ belonging to two-dimensional Euclidean space, the distance between **x** and **y** is defined in terms of the Euclidean norm:

$$||\mathbf{x} - \mathbf{y}|| = \left[\sum_{k=1}^{2} (x_k - y_k)^2\right]^{1/2}.$$

Given the vectors **D** and **0**, let us define $\mathbf{D}^*$ to be that **D** which maximises $||\mathbf{D} - \mathbf{0}||$. Then, it is readily clear that we can write a simple, normalised, aggregate index of discrimination for the society as a whole as

$$\delta = ||\mathbf{D} - \mathbf{0}||/||\mathbf{D}^* - \mathbf{0}||. \tag{3}$$

In (3), the aggregate index of discrimination δ is expressed as the ratio of the distance of **D** from **0** to the maximum possible distance of **D** from **0**. It remains to be specified how $\mathbf{D}^*$ is to be derived. To this end, consider the following.

First, let us designate $||\mathbf{D} - \mathbf{0}||$ by V. Then, in view of the earlier definitions of **D** and **0**, it is clear that

$$V = \left[\left\{\left| t_{11}/t_{11}^{\#} - 1\right| + \left| t_{12}/t_{12}^{\#} - 1\right|\right\}^2 + \left\{\left| t_{21}/t_{21}^{\#} - 1\right| + \left| t_{22}/t_{22}^{\#} - 1\right|\right\}^2\right]. \tag{4}$$

Making use of the fact that $\sum_{j=1}^{2} t_{ij} = a_i$ (i=1, 2); $\sum_{i=1}^{2} t_{ij} = b_j$ (j=1, 2); $a_1 + a_2 = b_1 + b_2 = 1$; and $t_{ij}^{\#} \equiv a_i b_j$ (i =1, 2; j =1, 2), it is possible, through routine manipulation, to show that (4) can be written equivalently as:

$$V = [|t_{11} - a_1 b_1|]/a_1 a_2 b_1 b_2. \tag{5}$$

Recalling that $\mathbf{D}^*$ is that **D** vector which maximises $||\mathbf{D} - \mathbf{0}|| \equiv V$, in order to obtain $\mathbf{D}^*$ we must, in view of (5), solve the following optimisation problem:

$$\begin{aligned} &\text{Maximise } V = [|t_{11} - a_1 b_1|]/a_1 a_2 b_1 b_2 \\ &\{t_{11}\} \\ &\text{subject to: } 0 \le t_{11} \le \min\{a_1, b_1\}. \end{aligned} \tag{6}$$

[The upper bound constraint on t_{11} in problem (6) is dictated by the requirement that $t_{11} + t_{12} = a_1$ and $t_{11} + t_{21} = b_1$, which implies that t_{11} cannot exceed the smaller of a_1 and b_1.]

From inspection of problem (6), it is immediate that the optimal solution to the problem is furnished by

$$t_{11}^* = 0 \text{ if } \min\{a_1, b_1\} \le 2a_1 b_1; \tag{7}$$

$= \min\{a_1,b_1\}$ if $\min\{a_1,b_1\} > 2a_1b_1$.

Given (6) and (7), it is clear that the largest value V can assume is given by:

(8) $V^* = 1/a_2b_2$ if $\min\{a_1,b_1\} \leq 2a_1b_1$;
$= [\min\{a_1,b_1\}-a_1b_1]/a_1a_2b_1b_2$ if $\min\{a_1, b_1\} > 2a_1b_1$.

Recall from (3) that the aggregate index of discrimination δ which we are after is just the quantity V/V^*, so that, in view of (5) and (8), we have:

(9) $\delta = |t_{11}-a_1b_1|/a_1b_1$ if $\min\{a_1,b_1\} \leq 2a_1b_1$;
$= |t_{11}-a_1b_1|/[\min\{a_1,b_1\}-a_1b_1]$ if $\min\{a_1,b_1\} > 2a_1b_1$.

(9) can be written more elaborately as follows:

(10) $\delta = |t_{11}-a_1b_1|/a_1b_1$ if $\min\{a_1, b_1\} \leq 2a_1b_1$;
$= |t_{11}-a_1b_1|/a_1b_2$ if $\min\{a_1, b_1\} > 2a_1b_1$ and $\min\{a_1,b_1\} = a_1$;
$= |t_{11}-a_1b_1|/a_2b_1$ if $\min\{a_1, b_1\} > 2a_1b_1$ and $\min\{a_1,b_1\} = b_1$.

In (10), we have a simple expression for the overall extent of discrimination in a society; with a little manipulation, it is very easy to see that δ is just a multiplicative function of δ_{11}. In fact, δ is precisely equal to δ_{11} when $\min\{a_1,b_1\} \leq 2a_1b_1$; δ is equal to $(b_1/b_2)\delta_{11}$ when $a_1 \leq b_1 < 1/2$; and δ is equal to $(a_1/a_2)\delta_{11}$ when $b_1 \leq a_1 < 1/2$. (10) indicates that the only data that need to be accessed in order to compute the value of δ are (i) the proportion of each identity category's population in the total population; (ii) the proportion of each well-being category's population in the total population; and (iii) for each identity category, the proportion of its population in each of the well-being categories. The index δ, being a normalised index, has the convenient property of lying in the closed interval [0,1], with a higher value of δ signifying a relatively greater degree of discrimination.

Well-Being and Caste-Discrimination in India: Some Illustrative Examples

We now consider a few examples of caste-related discrimination from Indian data, the object being simply to provide some empirical applications for the measurement problem reviewed above[2]. Specifically, we shall look for evidence on the extent to which the Scheduled Castes and Tribes are relatively disadvantaged in the matter of access to income, knowledge, government jobs, and some basic amenities of housing infrastructure. In each case we shall present the data required to compute the discrimination index δ in the form of the 2x2 $[t_{ij}]$ matrix in which, to recall, t_{ij} is the proportion of the population that belongs to the ith identity category (i = 1, 2) and the jth well-being category (j = 1, 2). In every case, identity category 1 will be taken to be represented by the Scheduled Castes and Scheduled Tribes (SCST) group, and identity category 2 by the rest of the population, designated simply as the 'Others' group. In the case of *income*, well-being category 1 will be

represented by the group of *poor* persons, and well-being category 2 by the group of *nonpoor* persons. In the case of *knowledge*, well-being category 1 will be represented by those who are *illiterate* and well-being category 2 by those who are *literate*. In the case of *Central Government jobs*, well-being category 1 will be constituted by the set of *Class III and Class IV employees*, and well-being category 2 by the set of *Class I employees*. Finally, in the case of *housing amenity*, well-being category 1 will be taken to be represented by the set of households living in houses *without electricity*, and well-being category 2 by the set of households dwelling in houses *with electricity*. A typical $[t_{ij}]$ matrix will look as follows.

A Typical $[t_{ij}]$ Matrix

Well-being category Identity Category	Well-being category 1	Well-being category 2	Row Total
Identity Category 1	t_{11}	t_{12}	a_1
Identity Category 2	t_{21}	t_{22}	a_2
Column Total	b_1	b_2	1

We consider differential access to income first. National Sample Survey (NSS) data for 1983 are available on the distribution of consumption expenditure across expenditure size-classes, separately for the Scheduled Castes, the Scheduled Tribes, and the population as a whole. Jayaraj and Subramanian (1999) have used these data to present groupwise poverty profiles for rural India: they have clubbed the Scheduled Caste and Scheduled Tribe populations into a composite SCST group, and treated the rest of the population as constituting a composite 'Others' group. Employing a rural poverty line of Rs.15 per person per month at 1960–61 prices, and updating this poverty line to current prices by using the Consumer Price Index of Agricultural Labourers (Food), the authors have computed the 1983 rural headcount ratios of poverty separately for the SCST and the 'Others' groups. These estimates for rural India in 1983 suggest that the SCST group accounted for 28.76 per cent of the total population; that 49.58 per cent of the SCST group were in poverty; and that the poor accounted for 36.04 per cent of the total population. With this information, it is possible to generate the relevant $[t_{ij}]$ matrix, as is done in Table 1.

Table 1: The [t_{ij}] Matrix for Caste and Income Status— Rural India, 1983

Identity Category	Well-being Category		
	Poor	Nonpoor	Row Total
SCST	0.1426	0.1450	0.2876
Others	0.2178	0.4946	0.7124
Column Total	0.3604	0.6396	1.0000

Source: Computed from data in National Sample Survey Organisation (1986): *Pattern of Consumer Expenditure of Scheduled Caste and Scheduled Tribe Households*, Report No.332, Government of India.

Next, in the dimension of *knowledge*, Census data for 1991 suggest that the (age 7+) SCST population accounted for 23.66 per cent of the total (7+) population; that 64.65 per cent of the (7+) SCST population was illiterate; and that the (7+) illiteracy rate for the population as a whole was 47.80 per cent. Table 2, based on this information, presents the corresponding [t_{ij}] matrix.

Table 2: The [t_{ij}] Matrix for Caste and (age 7+) Literacy Status— India 1991

Identity Category	Well-being Category		
	Illiterate	Literate	Row Total
SCST	0.1530	0.0836	0.2366
Others	0.3250	0.4384	0.7634
Column Total	0.4780	0.5220	1.0000

Source: Based on data in (i) Census of India, 1991, Series 1, Final Population Tables: *Brief Analysis of Primary Census Abstract (India)*; and (ii) Census of India 1991, Series 1, Paper-1, *Union Primary Census Abstracts for Scheduled Castes and Scheduled Tribes*.

In the matter of *Central Government jobs*, information available for 1980 in the *Report of the Backward Classes Commission* (under the Chairmanship of B.P. Mandal) indicates the following. If we restrict attention to the population constituted by employees in Service Classes I, III, and IV, it turns out that the SCST group accounts for 21.53 per cent of the population; that 86.77 per cent of the SCST group is employed in Classes III and IV; and that Classes III and IV employees together account for 60.36 per cent of all employees. The [t_{ij}] matrix compatible with these data is presented in Table 3.

Table 3: The [t_{ij}] Matrix for Caste and Central Government Jobs — India 1980

Identity Category	Well-being Category		
	Classes III & IV Service	Class I Service	Row Total
SCST	0.1865	0.0285	0.2153
Others	0.4168	0.3679	0.7847
Column Total	0.6036	0.3964	1.0000

Source: Based on data in Statement No.1 of Annexure VIII, Vol.1: *Report of the Backward Classes Commission* (Government of India 1980).

Finally, data on the caste-wise distribution of households living in houses with and without electricity are available in the 1991 Census of India. These data for 1991 suggest that SCST households accounted for 25.88 per cent of all households; that of the SCST households, 73.65 per cent lived in households without electricity; and that 57.56 per cent of all households lived in houses without electricity. Using these data, one can generate the appropriate [t_{ij}] matrix, as in Table 4.

Table 4: The [t_{ij}] Matrix for Caste and Housing Amenity Status — India 1991

Identity Category	Well-being Category		
	HHs in houses w/o electricity	HHs in houses with electricity	Row Total
SCST	0.1906	0.0682	0.2588
Others	0.3850	0.3562	0.7412
Column Total	0.5756	0.4244	1.0000

Source: Based on data in (i) Census of India, Series 1, Paper-1, *Union Primary Census Abstracts for Scheduled Castes and Scheduled Tribes*; and (ii) Census of India, 1991, Paper-2 of 1993, *Housing and Amenities: A Brief Analysis of the Housing Tables of 1991 Census*.

Given the information provided in Tables 1–4, it is a simple matter, employing the expression provided in equation (10) of Section 2, to compute the index of discrimination δ for each of the four cases under review. The relevant estimates are summarised in Table 5.

Table 5: The Index d of Caste Discrimination in Access to Selected Dimensions of Well-Being in India

Welfare Dimension	Index of Caste Discrimination δ
Caste and Income Status (1983)	0.2114
Caste and Literacy Status (1991)	0.3231
Caste and Government Job Status (1980)	0.4346
Caste and Housing Amenity (Electricity) Status (1991)	0.2792

Source: Calculations based on information provided in the $[t_{ij}]$ matrices of Tables 1–4.

Table 5 does not present an attractive picture. Any further comment would amount to gilding the lily — a sentiment that is well warranted even if, given the numbers in Table 5, it would be hard to find a more inappropriate metaphor than this for the context at hand.

Concluding Observations

Disadvantage is frequently a manifestation of the violation of both positive and negative freedoms for the affected agent. Pernicious as these unfreedoms are, they acquire an additional, and particularly raw, edge when they are mediated by discriminatory barriers to entry erected against identifiable sections of the population. This note has been concerned with the modest exercise of deriving an elementary index of group-related discrimination. A few empirical applications of the note's primary concern — that with measurement — have been provided. These applications are intended to serve as mere illustrative examples. Even so, they point to a picture of generalised deprivation on the well-being front, a picture that becomes markedly worse when account is taken of caste-related disabilities: high levels of relative disadvantage against a background of low average achievement are especially distressing and unacceptable. To the extent that quantification has any value, there is a case for a systematic presentation of summary statistics on both deprivation and group discrimination in India. This note is a small methodological contribution to that possible end.

Notes

1. The general approach to reckoning discrimination that has been adopted here is motivationally similar in spirit to the approach adopted in Ramachandran (1990), whose indices of 'access' and 'mobility' (attributed to K. Nagaraj) are of relevance in the present context. In this connection, the reader is also referred to Radhakrishnan (1986).
2. For a review of secondary data revealing the differential status experienced by the Scheduled Castes and Tribes in relation to occupational and demographic characteristics, see Thangaraj (1995).

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Risk and Resource Analysis of Rainfed Tanks in South India

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Abstract

The objectives of this paper are to quantify a measure of risk behaviour of tankfed farmers using the safety-first principle, to study the effects of socio-economic variables on risk aversion and to analyse the influence of risk aversion on input use decisions. There has been a skewed distribution of coefficients towards more risk aversion. Among the socio-economic determinants, size of the family, capital available for agriculture, and ownership status of tanks had a significant influence on risk aversion. The larger the family size, the higher was the risk aversion. Capital available for agriculture negatively influenced risk aversion. The ownership of tanks had a positive influence on risk aversion. The results showed that risk played a significant role in the use of labour and fertilizer inputs. Credit had significantly influenced the use of these resources as well.

Introduction

The advent of the Green Revolution and subsequent developments in agriculture have shown the impact of modern technologies, reflected in the present level of foodgrain production (201 million tonnes in 1998–99). However, it is felt that development has been skewed in favour of well-endowed (irrigated) areas, with no comparable productivity gains in risk-prone low-rainfall areas. It is further confounded by the prediction that 246 million tonnes of foodgrains would be needed in the year 2010 to satisfy the burgeoning population (Kumar 1998). On the one hand, demand for foodgrains has been rising, while on the other hand supply prospects are not very encouraging as there is hardly any scope for augmenting production through area expansion. However, there is scope for enhancing productivity through proper rainfed technology and management. Despite their greater significance, rainfed lands are inherently characterized by high climatic risk arising from the stochastic nature of rainfall.

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The problem of productivity variation (risk) among farms is more pronounced in areas with uncertain water supply (Abel 1975). The presence of risk in agriculture has long been viewed as having a significant influence on farmers' production decisions (Bond and Wonder 1980). While there can be no question that risk is an obvious characteristic of the agricultural decision environment, very little is known about the attitudes of farmers towards risk. Keeping in view the pivotal role of risk in an uncertain water supply regime and inadequate empirical studies on risk behaviour in India, the present study was conducted in select rainfed tank-irrigated regions in South India. The specific objectives were as follows: (i) to quantify a measure of risk behaviour of tankfed farmers; (ii) to study the effects of socio-economic factors on risk aversion; and (iii) to analyse the influence of risk aversion on input use decisions. The following hypotheses were tested in this study:

(a) Risk aversion is the most prevalent attitude among rainfed tank farmers.

(b) There is a possible influence of socio-economic characteristics on the risk behaviour of farmers ; and

(c) There exists an influence of risk on resource use decisions.

Methodology

Sampling

Chengalpattu and Sivagangai districts in Tamil Nadu were purposively selected. Both the districts are considered to be tank-intensive districts. There are 583 tanks in Chengalpattu and 1,180 tanks in Sivagangai, inclusive of both Public Works Department (PWD) and Panchayat Union (PU) tanks (Palanisami 1997). From the list of modernised rainfed tanks, one tank from each of the selected districts was randomly chosen. They are Somangalam, in Chengalpattu, and Kilavanur, in Sivagangai district. In the next stage of sampling, 50 farmers were randomly selected from each tank command . Thus, a total of 100 farmers constituted the sample size for the study. The study was conducted during 1998–99, which was a normal year.

The registered command area of Somangalam (PWD[1]) and Kilavanur (ex-zamin[2]) tanks are 116.39 and 34.36 hectares respectively. Both were modernised recently by Public Works Department (PWD), Tamil Nadu, with the assistance of European Economic Community (EEC). The components of the modernisation programme were improvement of weak bunds, correction of leakage of sluices and weirs and lining of distributary channels. The cropping pattern in these tankfed areas included predominantly paddy (over 96 per cent) and to a very limited extent pulses and vegetables. The average rainfall in Somangalam and Kilavanur regions is 1,459 mm and 663 mm respectively, the maximum being from the Northeast monsoon in both the tanks.

Analytical Framework

Safety First principle is one of the best approaches to the measurement of risk. The principle was elegantly applied by Roy (1952), Shahabuddin, *et al.* (1986) and Parikh and Bernard (1988).

Safety First Principle. The principle assumes that the individual's objective is to minimise the probability of experiencing a shortfall in income below a certain initial level. Two measures were formulated on the basis of this principle. The first was by Roy (1952) and later by Moscardi and de Janvry (1977). Roy's approach was applied by Shahabuddin, *et al.* (1986) and Parikh and Bernard (1988). Here the principle is to minimise the probability of a fall (π) below specified levels of disaster (E*) so that

$$\text{Min } P(\pi < E^*)$$
$$\text{or Min } F(E^*),$$

where P refers to probability, and F is the cumulative distribution function. For empirical simplicity, it can be written as

$$\text{Min } \frac{E^* - E}{s}$$

where E is the expected income, E* is the disaster level of income, and σ is the standard deviation of income.

1. Quantification of Measure of Risk:

This is an application of the model used by Parikh and Bernard (1988) and Timothy (1991).

(i) *Disaster level of income* (E*)

$$E^* = C_{min} + COT - LAS - NAI,$$

where C_{min} = minimum consumption needs

$$= 2212\left[FAM - \frac{CHILR}{2}\right];$$

with 2212 being the minimum number of calories per person in rupees (obtained from the Eighth Plan Document at 1992–93 prices). 'FAM' is the family size, including children, and 'CHILR' represents the number of children.

COT = credit outstanding, which includes both institutional and non-institutional credit;

LAS = liquid assets, which include business and livestock assets

NAI = non-agricultural income of trade and industry.

(ii) *Expected income (E)*

E= VO (1+ DMG)–Sc–Ic–Fc–BLc–Pc–Lc

where VO is the value of output on the farm, which includes outputs from both owned and leased-in land. DMG is the weighted crop damage variable. This was obtained by enquiring how much they perceived to have lost due to the adversity by giving prices of the crops as weightages (K_i). Hence,

$$DMG = \frac{\sum K_i DMG_i}{\sum K_i}$$

From the obtained expected value of output was deducted the cost of seed material (Sc), cost of irrigation (Ic), cost of fertilizers and manures (Fc), cost of bullock labour (BLc), cost of plant protection chemicals (Pc) and cost of labour (Lc).

(iii) Standard deviation (s)

The standard deviation of household income was derived from the approximate income calculated from aggregation of all sources of income during the past three years. This was confined to three years to avoid memory bias.

These three variables were used in obtaining the risk-aversion variable.

$$R_i = \frac{E_i^* - E_i}{s_i}$$

where i=1 to n, and n = number of farms.

2. Determinants of Risk Aversion:

To test the second hypothesis, we identified four socio-economic variables for which data were available,viz., family size, farm size, amount of capital available for agriculture, and the ownership status of the tank. Using regression analysis, the possible influence of these socioeconomic characteristics on the farmers' risk behaviour was assessed. The following risk behavioural model has been examined empirically in a sampling context in our study.

RAC= f(FAM, ARM, CAP, DUM)

where RAC = risk-aversion coefficient,
FAM = family size,
ARM = area of the farm in hectares,
CAP = capital[3] available for agriculture in rupees, and
DUM = 1 for PWD tank, and zero otherwise.

Based on scatter analysis and past studies, the above model was estimated in linear form by using the Ordinary Least Squares (OLS) method.

3. Resource Use Models:

It is hypothesised that farmers' risk aversion attitude presumably affects decisions regarding resource use in crop production. To test the hypothesis, the following two models were framed by integrating risk aversion with choices of labour and fertilizer usage. The influence of risk aversion on input use was studied by fitting linear regression models and was estimated using the Ordinary Least Squares (OLS) method.

VARIABLES	**MODEL I** (Labour use)	**MODEL II** (Fertilizer use)
Dependent (Y)	LAB	FERT
Explanatory (X_i)	RISK, HYVA, CREDIT, FERTM, ACROP, DUM	RISK, WATER, FLAB, CREDIT, HYVA, DUM

where,

LAB = labour used per hectare in man days,
RISK = risk-aversion coefficient,
HYVA = percentage of area under high-yielding varieties,
CREDIT = crop loan received,
FERTM = value of fertilizers and manures,
ACROP = cropped area in hectares,
WATER[4]= quantity of water used per hectare,
FLAB = family labour in man days per hectare, and
DUM = 1 for PWD tank, and zero otherwise.

Results and Discussion

Risk behaviour was quantified in rainfed tank-irrigated regions in South India using the 'safety first' criterion. The distribution of the risk-aversion coefficient is presented in Table 1. It was found that 93 per cent of the farmers were risk averters, the degree ranging from moderate to strong (<10). There existed a higher proportion of strong risk averters in Tank II (ex-zamin), which lies in the low-rainfall region. The distribution of R_i values was skewed towards more aversion.

The results of the linear regression model to study the influence of socio-economic variables on risk behaviour are presented in Table 2. The R^2 of the model was 0.56, indicating that 56 per cent of the variation in the risk coefficient is explained by the variables included in the model. The family size had a one per cent significant influence with a coefficient of -1.79, indicating that an increase in family size by one unit reduced the risk preference, or, in other words, increased risk aversion.

Table 1: Pattern of Risk Behaviour

(in no)

Risk Behaviour	Tank I (PWD)	Tank II (ex-zamin)	Total
< - 10	19 (38)	24 (48)	43 (43)
-10 to 0	16 (32)	21 (42)	37 (37)
0.01 to +10	9 (18)	4 (08)	13 (13)
> +10	6 (12)	1 (02)	7 (07)
	50 (100)	50 (100)	100 (100)

(Figures in parentheses indicate percentage of total)

The policy implications include educating the farmers on smaller family size and risk aversion. The dummy variable has greatly influenced the risk-aversion coefficient at the 1 per cent level. The positive influence implies that PWD-owned tankfeds have greater risk preference. The estimate suggests that capital available for agriculture negatively influences risk aversion. Another variable (area of the farm) has insignificant influence on risk behaviour.

Table 2: Results of Risk Behavioural Model

Variables	Symbol	Coefficient
Constant	C	4.42* (2.62)
Family size	FAM	-1.79* (0.27)
Area of farm in hectares	ARM	-0.15 (0.15)
Capital for agriculture (in Rs.)	CAP	-0.0014* (0.0003)
Dummy for ownership of tanks	DUM	3.86* (1.43)

$R^2 = 0.56$; $\overline{R}^2 = 0.54$; N = 100

(Figures in parentheses are standard errors)

* *Significant at 1 per cent level*

Table 3 shows the results of the Labour and Fertilizer Use Models. The R^2 of the labour use model was 0.74 with a high level of significance. The use of labour was influenced considerably by the RISK variable at the 5 per cent level with a coefficient of 1.31. This means that a one unit increase in risk preference has increased the labour use by 1.31 units. HYV area, value of fertilizer and manures and cropped area had no influence on labour use. Borrowed crop loan had significantly influenced the labour use at the 1 per cent level with a coefficient of 0.04. Tank ownership had a considerable influence on labour use at the 10 per cent level of significance.

The fertilizer use model had a significant R^2 of 0.82. The RISK variable influenced fertilizer use significantly at the 1 per cent level. Credit had an influence at the 10 per cent level of significance with a coefficient of 0.06. The rest of the variables were found to be insignificant on fertilizer use.

Table 3: Results of Labour and Fertilizer Use Models

Variable	Labour Use Model			Fertiliser Use Model		
	Coefficient	t-value	Significance	Coefficient	t-value	Significance
Constant	36.41	1.05	*	700.01	6.27	***
Risk	1.31	1.69	**	11.97	5.40	***
HYVA	0.08	0.39	NS	0.22	0.42	NS
Credit	0.04	3.69	***	0.06	1.59	*
FERTM	0.01	0.74	NS	–	–	–
ACROP	2.87	0.58	NS	–	–	–
WATER	N.A.	–	–	–0.59	–0.92	NS
FLAB	N.A.	–	–	0.46	0.69	NS
DUM	8.13	1.44	*	2.98	0.18	NS

$R^2 = 0.74$; $\bar{R}^2 = 0.68$; $F = 11.21^{***}$ $R^2 = 0.82$; $\bar{R}^2 = 0.77$; $F = 17.69^{***}$

Significance: *** – 1 per cent level; ** – 5 per cent level; * – 10 per cent level

NS – Non-Significant

Summary and Conclusions

The basic thrust of this paper was to obtain an estimate of the risk aversion variable using the safety-first principle. The distribution of coefficients was skewed towards risk aversion, indicating that a large number of farmers were more risk averse. Secondly, the role of socio-economic variables in determining the farmer's level of risk aversion was examined. Among the socio- economic determinants, the influence of family size, capital available for agriculture, and ownership status of tanks were found significant. The larger the family size, the higher was the risk aversion. Capital available for agriculture negatively influenced risk aversion. Tank ownership had a positive influence on risk aversion. The policy implications include educating the farmers on smaller family size and risk aversion through community organisers, creating more non-farm opportunities and suggesting standardisation of rain-fed tanks. Finally, the integration of risk aversion with choices of labour and fertilizer inputs and estimation showed that risk played a significant role in the use of labour and fertilizer inputs. Credit had significantly influenced resource usage. The policy option would be to disburse more credit to improve resource use so as to enable farmers to realise higher productivity.

Notes

1. PWD tanks are standardised tanks with a command area of more than 40 ha.
2. Ex -Zamin tanks are non-standardised, irrespective of their command area.
3. Capital utilised in agriculture for inputs was used here as a proxy for liquid cash available at the farm level.
4. This was analysed on the basis of the depth and frequency of irrigation on the farm.

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Fertility Transition and Threshold Estimation: A District - Level Analysis in India

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Abstract

This article focusses on issues relating to fertility transition and related socio-economic variables. The observed differential in fertility between different states, as determined by the cluster-cum-discriminant analysis, by using district-level data, clearly establishes the link between fertility change and social backwardness of women, especially in respect of female education and age at marriage. The economic variables, on the other hand, are found to be less important for the existing fertility differential between states. The findings suggest that the threshold of female literacy for a faster fertility decline in India is about 43 per cent; once that level is achieved, fertility rate will decline faster towards the stability of the population.

Introduction

The demographic diversity of India poses a challenge to planners and policy makers. Physical accessibility to scarce resources depends on several factors, including population distribution. Geographers always classify regions and sub-regions according to factors like soil, rainfall, mountains, river basins. Economists, on the other hand, have attempted to classify regions on the basis of economic criteria, but because of the data constraint, their work has not been as detailed as that of geographers (Bose 1994). A rigorous and pioneering contribution in this direction in India can be said to have originated with the work of Mitra (1965), who attempted to classify all the districts in India on the basis of a large number of variables for which census data were available. Of late, there have been several studies on economic regionalisation. A diagnostic regional analysis of the shortfalls in development and utilisation of human resources by Pathak (1991) has made a significant contribution towards the spatial variations of districts in India using

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census data. It may be mentioned that broad state-level comparisons and classifications may not be able to capture fully the extent of diversities among various indicators characterising several facets of development. Nevertheless, state-level indicators are of prime importance as the state is a crucial political unit. A wide range of relevant fields, including health and education, are constitutionally defined as 'state subjects', to be handled at the level of the states rather than of the central government. There are also 'concurrent subjects', involving both state and central governments (Sen and Dreze 1998).

Considerable regional diversity in terms of social, economic and demographic characteristics prevails in India. This is true not only among the states but also among the districts of the same state. In general, these striking variations among the states in the livelihood of the common people stem from various factors such as the level of literacy, female education, nutritional standards, infant mortality, morbidity, employment, income distribution, public distribution system, political commitments, etc., and their corresponding interactions. Thus, any country-level study is likely to hide variations at the micro level. 'The Indian subcontinent, with its large size, wide structure and eco-social disparities, is better understood and better interpreted when studied at the regional level. Analysis of data in disaggregated form narrows down the variability and enables better identification of special characteristics' (Datta Roy Choudhury 1995). The question of classification of the states into homogeneous groups acquires special status to initiate action programmes to bridge the gap among states (Guru 1992). Different states are at different stages of demographic transition. States differ greatly in respect of mortality decline too (Navaneetham 1993). The factors responsible for demographic changes have been different for different classes of states. Since demographic parameters reflect the progress and development of society, they can be safely used to classify the states or districts in different classes associated with different stages of transition. The set of variables characterising the class constitutes an important link in formulating action programmes. The relative importance of the variables and the threshold at which they become significant in affecting development varies over time. Again, the time for demographic change, varying from class to class, is determined by the interaction of socio-economic and psychological factors.

This paper proposes to explore the main reasons for the existing imbalances using Bayesian discriminant analysis, which can accommodate the prior information of the variables for classifying a state, using the district as a unit of observation. The specific objectives are: 1) to classify major Indian states into some homogeneous groups based on the level of demographic transition and to derive a set of linear discriminant functions to indicate the group to which a state belongs; 2) to determine a lower bound and a threshold value of a particular variable of a state required for a shift to a specific demographic transition phase; 3) to estimate

the time required for a state to shift from a lower transition phase class to an upper transition class and 4) to study the peculiarities of the districts that are subsequently misclassified and show some potential shift of these districts.

This study would be useful for predicting the levels of different inputs necessary for setting up plans or programmes and to prepare a sketch of the time frame of transition from the policy point of view. With the approach adopted here, it will be easy to locate misclassified districts and prepare their individual case studies. Also, the use of the Bayesian approach instead of the traditional classical approach in discriminant analysis helps one to unravel the change occurring in the class over time.

Methodology

The first sub-section, 'Classification', outlines the methodology for classifying major states into homogeneous groups, while the second sub-section, 'Discrimination', is devoted to the methodology required for Bayesian discrimination of the districts.

Classification

Fertility behaviour is a complex phenomenon that results from the interplay of various social, economic, psychological and cultural patterns related to marriage, childbirth, child rearing and kinship affiliation. It is not feasible to explain all the factors of fertility transition in India together. Therefore, we need to classify states into groups in such a way that they are highly heterogeneous between groups and homogeneous within groups to better understand diversity in their fertility transition.

To avoid subjectivity and classification bias, cluster analysis (CA) has been used to classify sixteen major states. The general aim of CA is to 'allocate a set of individuals to a set of mutually exclusive, exhaustive groups such that individuals within a group are similar to one another while individuals in different groups are dissimilar' (Chatfield and Collins 1980). However, there is no completely satisfactory way of defining a cluster. A number of clustering methods are available, each of which will often produce structures that are substantially different. This is because the choice of a clustering method implicitly imposes a structure on the population and is often tantamount to defining a cluster. If a classification does exist, a further problem is that the data may admit more than one different but meaningful classification depending on the purpose of the investigation. Another point to bear in mind is the possible existence of proper information on the likely number of groups. This will be helpful in finding a partition. However, Anderberg (1973) points out that this prior information could be misleading if the data are sampled from larger population and one (or more) of the groups happen to have been excluded from the sample. If the analyst still tries to find the full number of groups, 'silly'

clusters may be created. Bearing in mind the wide variety of practical situations, it is rather hard to make general recommendations. Therefore, instead of imposition of a number of clusters from *a priori* knowledge, the graphical approaches of clustering have become more popular. The more sophisticated graphical approach, known as 'dendrogram' analysis, has been used considerably. But there are also a number of methods available for sketching a dendrogram. In this study, the 'average linkage' method has been used to classify the states. The distance between two clusters is the average distance between pairs of observations, one in each cluster. Average linkage tends to join clusters with small variance and is slightly biased toward producing clusters with the same variance.

Discrimination

The basic idea of discriminant analysis is to allocate an observation to one of the classes specified earlier on the basis of a discriminant function derived from a whole set of observations from each class.

Suppose we have 'g' groups denoted by π_i, i =1, 2, ……..g.

Let $f_i(x)$ be the density associated with population π_i, i =1, 2, ……..g. Let p_i be the prior probability of population π_i, i =1, 2, ……..g. C(k|i) = the cost of allocating an item to π_k, when in fact it belongs to π_i, for i ($\neq$k) = 1, 2, ……..g.

For k=i, C(i|i) = 0. Let R_k be the set of X's classified as π_k

and prob.(k|i) = prob. (classify item $\pi_k|\pi_i$) $= \int_{R_k} f_i(\mathbf{x})\, d\mathbf{x}$ for k, i = 1, 2, 3, ……., g

with $p(i|i) = 1 - \sum_{k\neq i,\, k=1} \text{prob.}(k|i)$

Thus, expected cost of misclassification

$$(ECM) = \sum_{i=1}^{g} p_i \left\{ \sum_{k\neq i\, k=1}^{g} p(k|i)\, C(k|i), \right. \text{……..(1)}$$

The classification regions that minimize the ECM are defined by allocating $\mathbf{x}$ to that population π_k, k=1, 2,….., g

for which $\sum_{i=1}^{g} \sum_{k\neq i} p_i\, f_i(\mathbf{x})\, C(k|i)$ is smallest.

Assuming (0-1) loss function, it can be proved that [Anderson (1984), Johnson and Wichern (1996)] the minimum ECM classification rule is: Allocate $\mathbf{x}$ to π_k if $\ln p_k f_k(\mathbf{x}) > \ln p_i f_i(\mathbf{x})$ for all i$\neq$k.

We assume that the distributions of variables in all the groups follow multivariate normal distribution with mean μ_i and variance-covariance matrix $\sum_i$, i= 1, 2, ……..,g.

Therefore, allocate $\mathbf{x}$ to π_k if

$\ln p_k f_k(\mathbf{x}) = \ln p_k - (p/2)\ln(2\pi) - (½) \ln|\sum_k| - (½)\,(\mathbf{x} - \mu)' \sum_k^{-1} (\mathbf{x} - \mu) = \max. \ln p_i f_i(\mathbf{x})$, for all i.

The constant $(p/2)\ln(2\pi)$ is ignored as it is the same for all the populations. We

define the discriminant score for the i^{th} population to be $d_i(x) = \ln p_i - (½) \ln |\Sigma_i| - (½) (\mathbf{x} - \mu_i)' \Sigma_i^{-1} (\mathbf{x} - \mu_i)$, i = 1, 2, …, g and the allocation rule is: Allocate $\mathbf{x}$ to π_k if $d_k(\mathbf{x})$ = largest of $(d_1(\mathbf{x}), d_2(\mathbf{x}), d_3(\mathbf{x}), \ldots\ldots\ldots\ldots, d_g(\mathbf{x}))$. We further assume that the population covariance matrices, Σ_i for all i, are equal. When $\Sigma_i = \Sigma$ for all i, then $d_i(x) = -(½) \ln |\Sigma_i| - (½) \mathbf{x}' \Sigma^{-1} \mathbf{x} + \mu_i' \Sigma^{-1} \mathbf{x} - (½) \mu_i' \Sigma^{-1} \mu_i + \ln p_i$. As the first two terms are the same for all groups, we can ignore them for allocatory purpose. Thus, by defining the linear discriminant function as $d_i(x) = \mu_i' \Sigma^{-1} \mathbf{x} - (½) \mu_i' \Sigma^{-1} \mu_i + \ln p_i$, the allocation rule is as follows: Allocate $\mathbf{x}$ to π_k if the linear discriminant score $d_k(\mathbf{x})$ = largest of $(d_1(\mathbf{x}), d_2(\mathbf{x}), d_3(\mathbf{x}), \ldots\ldots, d_g(\mathbf{x}))$.

The steps are as follows: a) Sixteen major states are grouped into some classes from the observed dendrogram of usual cluster analysis based on some variables indicating different phases of fertility transition, b) A set of variables has been selected which can be considered as direct/indirect determinant of fertility behaviour by taking the district as a unit of observation, *i.e.*, characteristics of districts are as if samples of the respective states. Then a set of discriminant functions has been derived on the basis of selected variables; prior probabilities have been taken as the corresponding proportion of district in each group to the total. These priors indirectly put a weightage pattern for the discrimination. c) An upper bound of female literacy required for fertility transition for some selected states has been calculated by using the Bayesian allocation rule of discriminant procedure. d) a time frame required for fertility transition is recommended for some states with the assumption that female literacy in India follows a logistic law over time.

Selection of Variables

The districts in all states have undergone several important changes since independence. Some districts have witnessed rapid transformation, while the changes in others are quite slow. Virtually all socio-economic indicators are moving in the same direction of overall development; the expansion of educational opportunities, and the increase in the levels of literacy, enrolment and educational attainment; the improvement in health services and public sanitation, and the resulting decline in mortality; the transformation of the economy from an almost exclusively agricultural base to a mix of industry and agriculture; the spread of urbanisation; the electrification of many rural areas; the expansion of transport networks; and the rapid increase in the proportion of population reached by the mass media. But such social and economic changes have spread unevenly among regions and different segments of the population. It is often argued that economic liberalisation is not enough for development unless accompanied by social development. The high concentration of power and privileges deriving from the combined effects of inequalities based on class, caste and gender have created an environment extremely hostile to social change (Sen 1997). These have been reflected in the diversity of

the reproductive patterns in the states/districts of India. Six variables are selected on the basis of two criteria: a) proximity of the variables to reflect the fertility behaviour of women and b) availability of district-level data. Six major broad components of variables have been considered here: (1) district income, (2) female education, (3) urbanisation, (4) employment in services sector, (5) per capita income and (6) age at marriage. All these components are measured at the district level.

District Income

Economic inequality between districts depends upon several factors such as agricultural output, industrial activities, employment, educational opportunities, level of urbanisation, geographical location, and transport facilities. But at the district level it is extremely difficult to measure these factors exactly, and all the factors are not equally important. Given the lack of availability of data, the only way out is to develop a composite index of the relative development of the district as a proxy for income indicators. The weighting pattern to develop this index should reflect, by and large, the importance of the different sectors of the economy. The weighting pattern, as devised by the CMIE (Centre for Monitoring Indian Economy), is as follows. The agriculture sector has a total weight of 35 per cent in the index. It includes the per capita value of output of crop (25 per cent) and per capita bank credit to agriculture (10 per cent). The mining and manufacturing sector is assigned a total weight of 25 per cent. Mining, manufacturing non-household and household workers per lakh population is given a weightage of 15 per cent. The per capita bank credit to industry is given 10 per cent weightage. The service sector carries 40 per cent weightage; per capita bank deposit (15 per cent), per capita bank credit to services (15 per cent), literacy (4 per cent) and urbanisation (6 per cent). The weighting pattern of CMIE is rather subjective. Therefore, the relative development index (RDEV) of a district thus developed can be used only as an approximate indicator for understanding the regional imbalances with respect to overall development between districts. The data for district-level RDEV is culled out of the CMIE publication on districts' profiles of India.

Education

Studies of fertility conditions and change have consistently pointed to education as an important factor in accounting for fertility differences within population. The specific connections that have been theorised to exist between education and fertility can be classified in various ways. To adopt the economist's terminology, individual-level effects of education can be divided into those that act on the demand for children, those that affect the supply of children and those that influence the costs, broadly defined, of fertility regulation (Easterlin 1978). Education

reduces the expected long-run desire of wealth flow from children to parents (Caldwell 1983).

The connection between education and desired family size is well-established (United Nations 1987). Education may directly change attitudes, values and beliefs towards a small family norm and towards a style of child-rearing that is relatively costly to the parents in time and money. The potential for education to diffuse non-traditional values does not end in the classroom, since the educated are likely to continue to be exposed to modern ideas. Education also influences economic factors in ways that are thought to discourage high fertility; it reduces the economic utility of children; it creates aspirations for upward mobility and accumulation of wealth; it increases the opportunity cost of women's time and enhances the likelihood of their employment outside the home.

There is a strong positive relationship between education and contraceptive use too. Some of the avenues through which education may affect fertility control are: (a) by facilitating the acquisition of information about family planning; (b) by increasing husband-wife communication; (c) by imparting a sense of control over one's destiny, which may encourage attempts to control childbearing as well; (d) the higher income group of educated couples makes a wide range of contraceptive affordable. Education also affects the supply of living children through paths other than its influence on deliberate fertility control. The two most important of these influences are: (a) education delays entry into marital unions; (b) education is associated with reduced child and adult mortality. The variable chosen from this component is female literacy rate (FLIT) and the corresponding data are taken from the 1991 Census.

Urbanisation

Urbanisation has been used as a proxy for modernisation in studying fertility behaviour as it helps in modifying the natural fertility of married women through increased use of contraception. Also, it affects age at marriage. It helps to enhance the status of women in society by improving literacy and educational levels, increases their involvement in productive employment outside the household sector and enhances the longevity and health conditions because of better facilities and awareness of these, and hence leads to better utilisation of maternal and child health care services. In societies undergoing social and economic transition due to development, urban living and lifestyles promote the desire for smaller families and hence reduction in fertility. In short, urbanisation affects fertility through characteristics such as availability of educational opportunities, health facilities, job opportunities in the modern sector, communication facilities and contraceptive information and supplies; and the cost of fertility regulation and of bearing and rearing children. The data on level of urbanisation (URBAN) are taken from the 1991 Census.

Employment

Increased labour force participation, especially of women, has been proposed repeatedly in both the demographic literature and population policy statements as a means of promoting development and reducing fertility in developing countries. A great deal of empirical work has been carried out to examine the connection between employment and fertility of women in developing countries (WFS, United Nations 1987). The hypothesis that women's employment is negatively related to fertility receives support from most empirical studies. Women's employment has seven specific indirect effects in social life — maternal, conjugal, domestic, occupational, kin, community and individual-cum-psychological, each having an impact on the opportunity costs of children and hence on fertility (Oppong 1983). Additional factors considered important in the determination of the work-fertility interrelationship is the group of norms and beliefs governing family life. Particularly important are attitudes towards women as mothers and as workers. However, as far as fertility behaviour is concerned, employment of women in the service sector would be a more appropriate variable for consideration. The effect of participation of women in the service sector on fertility change would definitely be significant, both quantitatively and qualitatively. In this study, the major focus has been to capture the regional imbalances of women employment in the service sector contributing to the change in the childbearing process. But data on work participation rate of women at the district level are not available. Instead, data on percentage of total employment to the service sector (PWTSS) have been compiled from the 1991 Census and have been used as a rough indicator of district-level employment in the service sector since the imbalances among districts with respect to employment in the service sector of women would also be similar to that of PWTSS. Indirectly, PWTSS is assumed to be enough to capture the inequality of women's employment in the service sector among districts.

Per Capita Income

Of the many choices available for economic indicators affecting fertility, per capita income is one of the most widely accepted indicators. This captures people's capacity for daily consumption necessary for minimum calorie intake. Economic independence affects fertility in several ways. This can also be attributed in meeting the need for reproductive health care and family planning. But district-level per capita income data are nowhere compiled in the Indian Official System. In fact, no such attempt has been made in this direction. National sample surveys also do not have enough coverage for district-level income data. As a proxy for district-level per capita income data, per capita bank deposits (PCBD) have been used. It may be argued that bank deposits, in general, reflect the urban characteristics of the population. Since 1969, when the major banks in India were nationalised, the banking

system has grown tremendously in terms of geographical reach and functional spread. It plays a crucial role in mobilising savings and capital accumulation through institutional savings. Each district of the major states is well connected by a banking network and the majority of the people have access to banking facilities. Per capita bank deposits indirectly capture the potential income capacity that is with the banking system. The disparity in individual income among districts should therefore be reflected in their power to capture savings also. As far as district imbalances are concerned, with respect to per capita income, PCBD may well serve the purpose. These data are taken from the CMIE publication on district profile.

Age at Marriage

The date of entry into first union is an important milestone in a woman's life; it represents not only a major change in the composition of her family but also the beginning of regular exposure to the risk of childbearing. Although marital unions form the essential conditions for childbearing and child rearing throughout the world, the structure, associated norms and customs, as well as the initial timing, prevalence and stability of unions vary widely. A trend towards delay of first marriage has been illustrated in developing countries with widely different economic, social and cultural configurations (Smith 1984; United Nations 1987; NFHS 1992–93). The increase in the age at entry into unions has been credited with a large share of the observed fertility decline. Broadly speaking, social and economic changes such as increased schooling for women and likely to be more urbanised, lead both to delays in marriage and to decline in marital fertility. These characteristics are associated with higher contraceptive use; thus, populations with later ages at marriage may show fairly low levels of fertility, not only because of their lost reproductive years but also because of deliberate limitation of marital fertility. Thus, indirectly, delayed age at marriage may enhance the motivation for family planning after marriage. This complicates the interpretation of relationships between the timing of entry into regular sexual exposure and completed fertility, particularly when such findings are to be adapted for policy application. Nevertheless, age at first birth can be viewed as a proximate determinant of fertility. More specifically, this may be viewed as a sufficient condition for fertility decline but may not be regarded as a necessary condition. There are large inter-state variations in age at marriage. The data on district-level age at marriage (MARGE) for 1991 have been taken from the 1991 census.

Some important points are worth noting. We have excluded those districts that are found to be outliers, *viz*., Greater Mumbai, Calcutta, Chennai, Hyderabad, etc. because of the highly influential characteristics of selected variables. In particular, these districts had 100 per cent urbanisation. Inclusion of these districts may distort the true picture of the states and may affect the results of the discriminant analysis.

The average and the standard deviation of these variables are presented in Statements 1 and 2. The average values of these variables have been computed on the basis of district-level observations and after excluding outlier districts, wherever applicable, and thus should not exactly tally with the values reported for a state. For example, the female literacy of Rajasthan, at 18.76 per cent in 1991 (as used here), is the average female literacy of all districts in Rajasthan, which is different from the data reported at the state level at 20.8 per cent. Due to non-availability of district-wise authentic data, no indicator was used on the provision of health and family welfare. However, the importance of health and family welfare services on population transition need not be overemphasised. In the discriminant analysis, we have assumed common population variance-covariance matrix for all the groups, and the sample pooled variance-covariance matrix is taken as the estimate.

Empirical Analysis

States are classified on the basis of TFR, IMR and NICR [natural rate of increase = (CBR-CDR)]. State-wise values of these indicators are presented in Table 1.

Table 1: State-wise Classification Indicators – 1992

State	TFR	IMR	NICR@
Kerala	1.7	17	11.4
Tamil Nadu	2.2	66	12.3
Andhra Pradesh	2.9	79	17.3
Karnataka	2.9	82	17.8
Maharashtra	2.9	67	17.4
West Bengal	2.9	71	16.4
Himachal Pradesh	3.1	69	19.3
Orissa	3.1	118	16.1
Punjab	3.1	61	18.9
Gujarat	3.2	72	18.9
Assam	3.4	83	20.4
Haryana	3.8	79	23.3
Madhya Pradesh	4.4	109	22.0
Rajasthan	4.5	94	24.4
Bihar	4.6	84	21.4
Uttar Pradesh	5.2	102	23.5

Note: @ NICR = CBR – CDR. *Source*: Sample Registration System 1993

Table 2 summarises the classification status of the states. There are four groups; group I consists of two states, *viz*., Kerala and Tamil Nadu comprising 34

districts; group II consists of 7 states involving 130 districts; group III with 52 districts from 3 states; and group IV having 177 districts from 4 states. It can be seen that cluster analysis of states itself imposes some grouping pattern, which clearly depicts different stages of transition among groups. While group I states have almost completed fertility transition, group IV states are yet to make a significant dent in fertility transition.

Table 2: Classification of States by Average Linkage Clustering Method

Group	States	Range of variables					
		TFR		IMR		NICR	
		Min.	Max.	Min.	Max.	Min.	Max.
I	Kerala, Tamil Nadu	1.7	2.2	17	66	11.4	12.3
II	Gujarat, Andhra Pradesh, Maharashtra, West Bengal, Himachal Pradesh, Karnataka, Punjab	2.9	3.2	61	82	16.4	18.9
III	Orissa, Haryana, Assam	3.1	3.8	79	118	16.1	23.3
IV	Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh	4.4	5.2	84	109	21.4	24.4

The results of the discriminant analysis of 393 districts revealed four distinct classes. It may be mentioned that discriminant analysis may not yield the same number of discriminant functions as the number of groups considered earlier. Here we have found four discriminant functions specifying each group, which are tabulated in Table 3.

Table 3: Group-Wise Coefficients of Discriminant Functions

Variables	Groups			
	I	II	III	IV
CONSTANT	-207.46690	-166.39021	-151.61385	-146.34516
RDEV	-0.05215	-0.05163	-0.03270	-0.07346
URBAN	0.39229	0.37287	0.19823	0.34497
FLIT	0.50469	0.28830	0.20609	0.08897
PWTSS	-0.27016	-0.22231	0.20695	-0.02784
PCBD	-0.00626	-0.00517	-0.00578	-0.00466
MARGE	21.20945	19.44956	18.35063	18.53573
No. of districts	34	130	52	177
Prior Probabilities	0.086514	0.330789	0.132316	0.450382

The group-wise discriminant functions clearly reveal the impact of socio-economic variables to determine the stages of fertility transition for each group. The coefficient of each variable in the discriminant function indicates its relative weight or importance among all variables determining the discriminant function. On the other hand, prior probabilities put corresponding loadings of each group. As Table 3 shows, group IV had the highest prior probability followed by group II, as determined by the corresponding number of districts.

Female literacy is found to be the second most dominant factor to characterise the fertility transition in India after age at marriage. Urbanisation is the third most important variable in the selection and specification process. These three variables have consistently positive loadings on the discriminant functions. All other variables turn out to be not as significant as female literacy and age at marriage for the discrimination purposes. It is interesting to note that fertility behaviour of India is explained more by social characteristics than by corresponding economic counterparts. The coefficients of female literacy and age at marriage of group I states were 0.505 and 21.21 respectively. The most important feature of the results is that the impact of these two variables gets reduced as one moves from group I to group IV, i.e. from strong transition states to weak transition states. In other words, the states in group I have achieved a level of female literacy and age at marriage that could hasten the fertility transition process. The states in other groups, group IV in particular, have to achieve a bare minimum of female literacy and age at marriage to control the unprecedented growth of population. The existing level of these two may not be good enough to slow down the tempo of fertility. One needs to remember that female literacy and age at marriage are two highly positively correlated variables. Indeed, one may generally expect literacy to result in higher age at marriage. Alternatively speaking, literacy is a necessary condition for raising age at marriage and may not be a sufficient condition as the stringent legal framework may lead to a rise in age at marriage without recourse to the literacy path. Therefore, to influence the two crucial social variables, honest necessary efforts are to be made quickly as a part of the national movement.

The districts classified in each group are not likely to have exact similarities. That is, all districts in a particular group may not have the same characteristics to belong to the same group. More clearly, there can be some misclassified districts in each group, which are to be re-substituted and redistributed after adopting the discriminant procedure. For example, some districts in Tamil Nadu may not be of the same quality of Kerala districts. Therefore, such misclassified districts from group I should belong down the order in either group II, III or IV. If the initial group classification becomes satisfactory, it is expected to have less misclassification units, i.e., the greater the homogeneity of the class, the less are the chances of misclassification. A re-substitution summary of the districts is presented in Table 4.

It is observed that about 68 per cent of group I districts are correctly classified and the remaining 32 per cent of the districts should actually belong to group II. Thus, districts that are misclassified in group I are yet to register a significant fertility transition as compared with other group I districts. It is interesting to note that not a single district from group I was classified beyond group II districts. About sixty-five per cent of group II districts (84 districts out of 130) are correctly classified. Only 5 (about 4 per cent) districts in group II got berths in group I, while 41 districts (about 31 per cent) slipped to group III or IV, the majority (32 districts) of which should belong to group IV.

Table 4: Re-substitution Summary of Districts Using Linear Discriminant Function

From Group	Classified to Group				
	I	II	III	IV	Total
I	23	11	0	0	34
	(67.67)	(32.25)	(0.00)	(0.00)	(100.00)
II	5	84	9	32	130
	(3.85)	(64.62)	(6.92)	(24.62)	(100.00)
III	0	10	30	12	52
	(0.00)	(19.23)	(57.69)	(23.08)	(100.00)
IV	0	12	2	163	177
	(0.00)	(6.78)	(1.13)	(92.09)	(100.00)
Total	28	117	41	207	393
	(7.12)	(29.77)	(10.43)	(52.67)	(100.00)
Priors	0.0865	0.3308	0.1323	0.4504	1.000

Note: Figures in brackets indicate percentage share in total.

Among group III districts, about 58 per cent of the districts are correctly classified, while 42 per cent are misclassified either into group II or group IV. Of these, 19 per cent of the districts are of the level of group II districts. Classification summary for group IV districts is more accurate. Out of 177 group IV districts, 163 districts (92 per cent) are correctly classified. Only 14 districts are classified as over group IV, of which 12 belong to group II. The salient feature of group III and group IV districts is that not a single district acquired the status of belonging to group I. It may be mentioned that outliers that had exceptionally high values of selected variables are excluded from the purview of the study.

The following findings emerge from the results of the discriminant analysis: (1) The outcomes of this discriminant procedure are likely to be robust and reliable because of the very small error count in each group. (2) Out of 393 districts in India, only 28 districts (about 7 per cent) have achieved expected fertility transition. In

other words, 93 per cent of Indian districts are still away from these 28 districts as far as fertility transition is concerned. (3) More than half of the Indian districts (52 per cent) belong to a very low category of fertility transition phase. Does it imply that the tempo of fertility in India has been arrested? The tempo has slowed down a bit, but the potential for higher fertility can never be ignored, especially for re-substituted group IV districts which account for over 65 per cent of India's population. The average total fertility rate of these districts is above 4. Therefore, on the average, fertility transition in India has not turned out to be a global phenomenon. If we look at the state-wise distribution matrix (Table 5) of the number of districts according to the level of fertility transition, as revealed by each group, a clear picture emerges.

Table 5: Group/State-wise Distribution Matrix of Districts After Classification

Group/state		Group I	Group II	Group III	Group IV	Total
Group I	Kerala	14	0	0	0	14
	Tamil Nadu	9	11	0	0	20
Group II	Gujarat	2	15	0	2	19
	Andhra Pradesh	0	6	1	15	22
	Maharashtra	1	23	0	5	29
	West Bengal	0	6	4	6	16
	Himachal Pradesh	0	8	3	1	12
	Karnataka	1	16	0	3	20
	Punjab	1	10	1	0	12
Group III	Assam	0	2	17	4	23
	Haryana	0	2	12	2	16
	Orissa	0	6	1	6	13
Group IV	Bihar	0	1	0	41	42
	Madhya Pradesh	0	9	0	36	45
	Rajasthan	0	0	0	27	27
	Uttar Pradesh	0	2	2	59	63

Kerala is the only state where the expected fertility transition has been already achieved. Tamil Nadu has also progressed towards the half-way mark since about half of the districts of Tamil Nadu effectively belong to group II. Next in the line are Punjab, Gujarat, Himachal Pradesh and Karnataka. The majority of the districts of Andhra Pradesh are in group II and are apparently similar to group IV districts. In fact, Andhra Pradesh is solely responsible for the misclassified districts in group II. Thus, the performance of fertility transition in Andhra Pradesh should be on a par with the group IV states. Orissa, in group III, has some peculiar characteristics. This state has registered some mixed mobility in the process of

fertility transition; about half of the districts are above group III while the rest are below group III. The performance of group IV districts is really grim and awful. The condition of Rajasthan was most tragic. Among them, Madhya Pradesh had registered some improvement. All of these states are marked with very low female literacy and low age at marriage, besides being economically backward. Some exploratory analysis of these states with special reference to Rajasthan, Bihar and Uttar Pradesh is introduced below.

District-level re-substitution results of the misclassified districts after discriminant analysis are presented in the Appendix. The relative chance of each misclassified district belonging to each group in terms of their posterior probabilities is also presented in the Appendix. These posterior probabilities may serve as a very important indicator of the existing status of the fertility transition of a particular district. These are also extremely useful to predict the pace and mobility of fertility transition for each state. For example, Tiruvannamalai district, of Tamil Nadu, has a significantly high chance of transiting to group I, although effectively it belongs to group II. Similarly, if we see the misclassified group IV districts of Maharashtra we observe that most of them have a sizeable chance of shifting to at least group II. The same is the case of West Bengal. These indirectly imply that these states are heading rapidly towards fertility transition. In contrast to this, very few group IV districts are misclassified, i.e., there are few districts in group IV that are observed to have upward mobility. One needs to remember that any misclassification in group IV is nothing but an automatic upward shift of that particular district heading for better fertility transition.

A Lower Bound of Female Literacy and Fertility Transition

Increased education is among the aims of development planning in all countries, and policies that call for the increased integration of women into the development process specifically require that more educational opportunities be provided for women. The extent to which education affects not only fertility levels but other factors too that may be targets of development policy, such as maternal and child health, breast-feeding, contraceptive use, familial relationships and labour force participation, can have important implications for the achievement of population policy goals. Again the impact of education on fertility transition need not be overemphasised. Thus, we can safely assume that the fertility behaviour of women in India can also be sufficiently captured through the movement of female literacy. In other words, fertility transition must take place once a minimum level of female literacy is achieved, even if the other factors associated with fertility transition do not change. But improvement in fertility automatically derives from improvement in several socio-economic variables affecting fertility. The expected fertility transition may occur even before reaching the lower bound of female literacy. Therefore, this

lower bound is nothing but the infimum literacy rate, i.e., maximum of the lower bounds of female literacy.

Here, we have tried to determine a lower bound of female literacy level by keeping other variables associated in the discriminant function at the state level. As it were, increase in women education is sufficient for fertility transition even if other factors do not improve. Therefore, as mentioned earlier, the estimated threshold value may signal some degree of overestimation. Fertility transition will thus occur before the threshold value is achieved.

The procedure is simple and straightforward. Let 'x' be the unknown threshold value of the female literacy which is to be estimated. For a state, let the variables used for discrimination be denoted by a vector Z= (RDEV, URBAN, x, PWTSS, PCBD, MARGE) where all variables, except 'x' are known. This vector will be allocated to group I, i.e., the state generating Z will shift to higher and expected fertility transition group if $d_i(Z)$ = largest of $(d_1(Z), d_2(Z), d_3(Z), d_4(Z))$, where $d_i(Z)$ is the discriminant score of the i-th group, i=1, 2, 3 and 4. This has been explained in detail in the methodology section. The average values of all the variables are tabulated in Statement 1. State-wise disparities, as measured by the standard deviation and coefficient of variation of these variables, can be seen in Statement 2.

We have mentioned earlier that fertility transition of three states, viz., Rajasthan, Uttar Pradesh and Bihar belonging to group IV has been marginal and the pace of change is also very slow. These three states received special attention in this study and the computation of the lower bound of female literacy has been confined to these states only. The lower bound of female literacy of these states has been worked out as follows:

State= Rajasthan, Lower bound = y, Group = IV, Target = Group I

$d_1(y) > d_2(y)$, $d_1(y) > d_3(y)$ and $d_1(y) > d_4(y)$ imply that

116.59 + 0.50469y > 132.04 + 0.28830y => 0.21639y > 15.45 => y > 71.3988

116.59 + 0.50469y > 133.86 + 0.20609y => 0.29860y > 17.27 => y > 57.8366

116.59 + 0.50469y > 139.92 + 0.08897y => 0.41572y > 23.33 => y > 56.1195

⇨ y > 71.3988.

⇨ Hence, Rajasthan requires at least 71.39 per cent of female literacy to reach group I.

State= Uttar Pradesh, Lower bound = x, Group = IV, Target = Group I

$d_1(x) > d_2(x)$, $d_1(x) > d_3(x)$ and $d_1(x) > d_4(x)$ imply that

124.15 + 0.50469x > 139.26 + 0.28830x => 0.21639x > 15.11 => x > 69.8276

124.15 + 0.50469x > 140.92 + 0.20609x => 0.29860x > 16.77 => x > 56.1621

124.15 + 0.50469x > 146.92 + 0.08897x => 0.41572x > 22.77 => x > 54.7724

⇨ x > 69.8276.

⇨ Therefore, Uttar Pradesh requires at least 69.83 per cent of female literacy to reach group I.

State= Bihar, Lower bound = z, Group = IV, Target = Group I

$d_1(z) > d_2(z)$, $d_1(z) > d_3(z)$ and $d_1(z) > d_4(z)$ imply that

$128.88 + 0.50469z > 142.47 + 0.28830z \Rightarrow 0.21639z > 13.59 \Rightarrow z > 62.8073$

$128.88 + 0.50469z > 145.35 + 0.20609z \Rightarrow 0.29860z > 16.48 \Rightarrow z > 55.1898$

$128.88 + 0.50469z > 149.82 + 0.08897z \Rightarrow 0.41572z > 20.94 \Rightarrow z > 50.3772$

⇨ $z > 62.8073$.

⇨ Thus, Bihar needs at least 62.81 per cent female literacy to reach group I.

As expected, Rajasthan has a relatively greater requirement in female literacy than Uttar Pradesh and Bihar. The lesser requirement for Bihar should not be looked upon as a different phenomenon. Bihar had comparatively less values of RDEV, PWTSS and PCBD, which had negative loadings (probably insignificant) in the discriminant functions, which resulted in a lower numerator in the calculation and hence relatively lower value of the threshold value. And since the values of RDEV, PWTSS and PCBD are significantly low for Bihar, this will be reflected in the movement of female literacy growth. Therefore, the time requirement for Bihar to reach group I level may not yield something different as compared with Rajasthan and Uttar Pradesh. A time frame for the fertility transition of these states is devised in the next subsections. One point is again worth noting. The time for transition, as derived here, basically dictates the expected transition path if the current level of development prevails.

Time Required for Fertility Transition

Here the fertility transition between groups has been envisaged by modelling the female literacy movements. Suppose that L(t), the percentage of female literacy at time 't' follows a logistic law, i.e., $L(t) = K/[1+\exp.(a+bt)]$, where K = highest value of L(t) = 100.

The parameters 'a' and 'b' are estimated by the usual Pearl's method of estimating the logistic curve. Table 6 presents the relative movement of female literacy of the three selected states along with their desired target level. As pointed out earlier, the relative growth in female literacy of Bihar is comparatively less than that of Uttar Pradesh.

Table 6: Trend in Female Literacy Rate of Selected States

State	1961	1971	1981	1991	Target
Uttar Pradesh	8.43	12.46	16.33	25.31	69.828
Rajasthan	7.00	10.00	11.00	18.76	71.399
Bihar	8.00	10.00	14.00	22.50	62.807

Once the parameters 'a' and 'b' are estimated from the past data of L(t), the required time can be estimated from the following formula: $t_0 = [\log\{K/L(target) - 1\} - a_0]/b_0$, where a_0 and b_0 are the respective estimates of a and b.

Table 7 presents state-wise parameters estimates and the time required for the transition of states belonging to lower groups to higher groups using the above formula.

Table 7: Time Requirement for Fertility Transition of Selected Group IV States to Group I

State	Parameter Estimate		Target	Required time
	a	b		(yrs.)
Rajasthan	2.0907	-0.0625	71.399	48.08
Uttar Pradesh	1.6339	-0.0552	69.828	44.83
Bihar	1.8153	-0.0579	62.807	40.43

We observe that Rajasthan will take 48 years more to achieve the group I status, while Uttar Pradesh and Bihar will take about 45 and 40 years respectively to reach the group I stage of fertility transition. In other words, the expected fertility transition of India's most populated states may occur only after 2030 AD if the present rate of change of female literacy and related efforts prevails. Thus the results indicate that the faster the growth of female education, the quicker is the process of fertility transition.

The results clearly show that economic reforms alone are not sufficient unless accompanied by social commitments. Faster development requires government action to improve elementary education, and health care, and to remove barriers against certain sections of society, particularly women. Kerala has set an example and has shown the way. Its success has very little to do with economic growth because in spite of its social progress it has a sluggish economy and a very high level of unemployment. However, the importance of economic growth should not be understated.

Threshold of Female Literacy and Fertility Transition

Following the same logic as given by the United Nations (1963) for postulating the 'threshold hypothesis' regarding fertility transition and development, we can define 'threshold hypothesis' for fertility transition and female literacy. Fertility transition of a society is possible only when literacy of women surpasses the threshold; once that level is achieved, fertility is likely to decline faster and continue downward until it is stabilised. The proper derivation of the threshold depends on how best one can model the relationship between fertility and women's literacy level.

The Model

Let the total fertility rate (TFR) be denoted by f(x) corresponding to female literacy level 'x'. Graph 1 exhibits the plot of f(x) against log(x) where TFR and literacy level correspond to each major state in India for the year 1991. From the plot it is evident that as log(x) increases (i.e. 'x' increases), f(x) follows a gradual slow and flat exponential decay path which has some similarity to log-normal distribution. Therefore, we assume,

$f(x) = a*\exp\{c*(\log x - b)^2\}$, ...(2)

where a, b, c are constants, with a > 0, b > 0 and c < 0.

But our interest is to find out how far the total fertility rate changes with the change in women's literacy. By differentiating f(x) with respect to 'x', we get,

$g(x) = f'(x) = 2*a*c*\{(\log x - b)/x\}*\exp\{c*(\log x-b)^2\} = 2*c*\{(\log x - b)/x\}*f(x)$

Therefore, the change in TFR for the change in women literacy is given by

$g(x) = 2*c*\{(\log x - b)/x\}*f(x)$……..(3)

Now, the threshold of women literacy is that value of 'x' for which g(x) is maximum. In other words, it is that value of 'x' for which $g'(x) = 0$ and $g''(x) < 0$.

Differentiating (3) with respect to 'x' and equating it to 0, we get

$f(x) [\{2*c*(\log x-b)/x\}^2 + (2*c)/x^2 + 2*c*(\log x-b)*(-1/x^2)] = 0$

After simplification, we have $2*c*(\log x-b)2 - (\log x-b) + 1 = 0$

$\Rightarrow 2*c*z2 - z + 1 = 0$, where $\log x-b = z$ (say)

$\Rightarrow z = \{1 \pm \sqrt{(1-8c)}\}/(4*c) \Rightarrow \log x - b = \{1 \pm \sqrt{(1-8c)}\}/(4*c)$

$\Rightarrow x = \exp [\{1 \pm \sqrt{(1-8c)}\}/(4*c)\} + b] = x_0$ (say)…… .....(4)

Now for the second order condition we need to have $g''(x_0) < 0$.

Estimation of the Parameters a, b and c

As the function f(x) is non-linear in 'x', the linearity assumption of the classical regression analysis is no longer valid. So the normal equations by minimizing the residual sum of squares are of non-linear nature. Here we have estimated the parameters by the method of non-linear least square (NLINLS) iterative procedure, which is also known as Gauss-Newton method (the general algorithm for solving a system of non-linear equations was developed by Gauss and Newton). Therefore, estimation of the parameters by the iterative procedure may not be unbiased and minimum variance estimators (UMVE). Accuracy of the parameters is to be judged by either plotting the original data with the predicted values or by seeing their asymptotic standard errors.

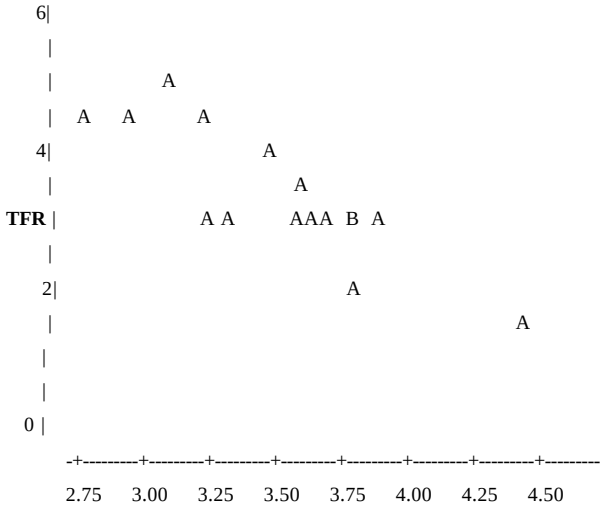
Table 8 reports the non-linear least square estimates of the parameters, while graph 2 shows the plot of observed and predicted values of TFR against female literacy.

Table 8: Non-Linear LS Estimate of the Parameters

Parameter	Estimate	Asymptotic Standard Error	Asymptotic 95% Confidence Interval	
			Lower	Upper
A	5.10503	1.8869	1.0285	9.1815
B	3.02787	1.3271	-0.4884	5.2457
C	-0.25789	0.3016	-0.9096	0.3938

Note: Parameters are estimated by using SAS Software (Version 6.12)

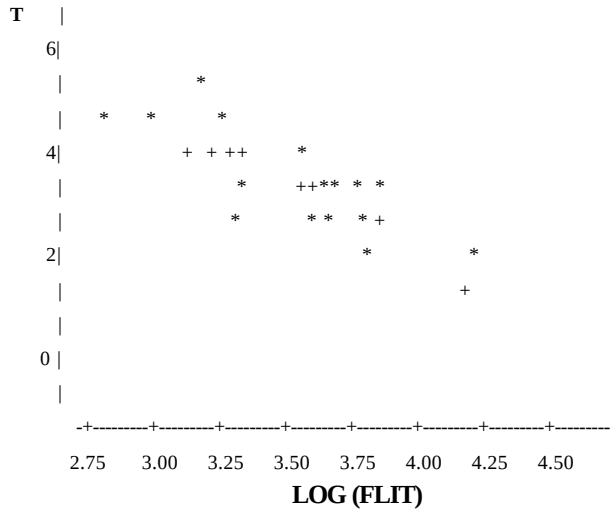
Graph 1: Plot of TFR against States Female Literacy Rates (Literacy is in Logarithmic Term)



Note: Legend: A = 1 observation, B = 2 observations. *Source*: 1991 Census.

It is seen that asymptotic standard error of the parameters is quite low and the model gives a good fit with the observed data. Therefore, the estimates of the parameters a, b and c are very reliable and all have the expected sign. Putting the estimated value of a, b and c in equation (3), we get x = 1.44412 (corresponding z = -2.666037) and x = 42.73819 (corresponding z = 0.727226). Two values of x identify two optimum values of 'x', i.e., g(x) attains a maximum at x = 42.74 and a minimum at x = 1.44. It can be shown that $g''(42.74) < 0$. Therefore, the rate of decline of TFR with respect to female literacy would be the maximum when the female literacy rate of India would reach the level of 42.74 per cent. Once this level is achieved fertility will decline faster towards the stability of the population growth. Hence, the estimated threshold of female literacy with respect to fertility transition in India is found to be 42.7 per cent.

Graph 2: Plot of Observed TFR *vis-a-vis* Plot of Predicted TFR Against States Female Literacy Rates



Notes: 1. 9 observations are hidden because of their very close prediction.

2. For original TFR '*' is used and for predicted TFR '+' symbol is used.

States are arranged according to the level of female literacy and are presented in Table 9. It can be seen from the table that six states have already surpassed the threshold of female literacy and these states have actually registered faster fertility decline in the recent period. Another three states are in the vicinity of the threshold.

Table 9: Distribution of States According to Female Literacy

Range of female literacy (per cent)					
< 20	20-30	30-40	40-43	43-60	60+
Rajasthan	Bihar	Orissa	Assam,	Karnataka,	Kerala
	Uttar Pradesh	Andhra Pradesh	Himachal Pradesh	Gujarat	
	Madhya Pradesh	Haryana	West Bengal	Maharashtra	
				Punjab	
				Tamil Nadu	

Source: Census of India, 1991

But states like Rajasthan, Bihar, Uttar Pradesh, and Madhya Pradesh have to search for a strategic plan to raise the female literacy level to at least 43 per cent to trigger off a faster change in the level of fertility.

Summary and Conclusions

One of the main objectives of this paper was to classify major Indian states into some homogeneous groups characterising different levels of fertility transition. The observed differential in fertility between different groups, as determined by the cluster-cum-discriminant analysis, by taking the district as a unit of observation, indicate the urgent need for social uplift of women, especially in respect of female education and age at marriage. The economic variables, on the other hand, are found to be less important for the existing fertility differential between states. The comparative overview given here may clarify the reasons for the typical relationship between fertility and other socio-economic variables to determine which aspects of a district's population dynamics are to be addressed first. The findings, in general, strongly confirm the need for district-level planning by focusing more on the specific need and urgency of the problems associated with the population change.

It is important to note that the emphasis here has been on the relationships between the levels of female education and fertility transition. Two separate approaches are followed here: (a) The first approach determines the maximum of a lower bound (infimum) of female literacy required for below replacement fertility using Bayesian discriminating procedure, while (b) a threshold of female literacy is derived by modelling the relationship between female literacy and total fertility rate in the second approach. Both the approaches have tried to quantify the magnitude of female literacy required for fertility transition in India. The findings suggest that the threshold of female literacy for a faster decline in fertility in India is about 43 per cent; once that level is achieved the fertility rate will register a faster decline towards the stability of the population.

The evidence presented in this article regarding the association between education, fertility and fertility-related variables are, in general, consistent with the general perceptions. Apart from data limitations at the district level, the results reported in this paper depend heavily on the validity of the models and the variables used in the analysis to capture fertility differential among regions. However, some crucial points are worth mentioning. First, the role of family planning programme in declining fertility has not been incorporated in the district-level analysis. It is well known that the family planning programme in India is by and large successful in reducing the span of demographic transition in many states. There are factors that directly or indirectly influence the adoption of family planning methods. Secondly, during the nineties, the female literacy rate and other socio-economic indicators have markedly improved. The analysis based on 1991 data in determining the time required for fertility transition would be on the higher side. The findings of this study, thus, are limited in that sense. However, further research on the extent to which education of women affects not only fertility levels but other factors that

may be the target of development policy, such as maternal and child health, and contraceptive use, would have important implications for the achievement of population policy goals.

Statement 1: State-wise Distributions of the Average of the Selected Indicators

Group/State	RDEVIN	URBAN	FEMLIT	PWTSS	PCBD	MARGE
Group I						
Kerala	113.57	23.37	85.55	32.14	3885.36	19.11
Tamil Nadu	109.9	28.79	50.45	19.64	1894.65	18.4
Group II						
Andhra Pradesh	86.64	22.75	30.08	16.40	1490.36	15.87
Gujarat	106.12	31.37	47.49	22.05	3507.06	18.32
Himachal Pradesh	73.75	10.82	42.31	20.67	2933.17	17.43
Karnataka	111.85	26.10	43.57	18.06	2388.00	17.04
Maharashtra	78.79	24.99	47.23	16.60	1483.07	16.46
Punjab	200.17	27.91	50.35	29.16	5715.17	18.82
West Bengal	68.31	20.32	41.22	21.71	1277.38	16.33
Group III						
Assam	62.70	10.21	43.53	19.64	1039.04	15.07
Haryana	149.38	23.80	40.75	28.24	2981.31	16.74
Orissa	64.23	12.96	31.30	15.65	1004.85	17.24
Group IV						
Bihar	43.12	12.56	22.50	16.32	1184.38	15.94
Madhya Pradesh	70.57	22.19	28.26	14.55	1365.78	15.49
Rajasthan	63.33	20.70	18.76	17.57	1388.44	15.69
Uttar Pradesh	70.90	18.59	27.14	18.30	1948.87	16.27

Statement 2: State-wise Variations of Selected Indicators

States		RDEVIN	URBAN	FEMLIT	PWTSS	PCBD	MARGE
Kerala	STD	27.18	14.67	5.52	7.54	2500.29	0.74
	CV	23.94	62.78	6.45	23.47	64.35	3.89
Tamil Nadu	STD	31.57	12.46	9.91	4.49	969.44	0.71
	CV	28.72	43.26	19.65	22.85	51.17	3.87
Andhra	STD	17.41	8.67	8.59	4.25	535.76	1.00
Pradesh	CV	20.09	38.10	28.57	25.89	35.95	6.30
Gujarat	STD	46.72	16.82	12.83	8.35	2499.36	0.48
	CV	44.02	53.59	27.02	37.86	71.27	2.63
Himachal	STD	26.70	4.68	12.39	4.78	1594.18	1.44
Pradesh	CV	36.20	43.22	29.28	23.14	54.35	8.25
Karnataka	STD	52.24	14.72	12.55	7.55	2591.86	0.97
	CV	46.70	56.41	28.82	41.81	108.54	5.69
Maharash-	STD	23.09	13.73	10.86	5.87	1114.33	0.74
tra	CV	29.30	54.95	22.99	35.36	75.14	4.49
Punjab	STD	42.99	8.55	9.59	5.40	3654.67	0.25
	CV	21.48	30.62	19.05	18.53	63.95	1.33
West	STD	17.12	14.36	11.91	7.24	757.17	0.66
Bengal	CV	25.06	70.70	28.88	33.35	59.28	4.06
Assam	STD	26.43	6.84	7.70	6.58	959.54	0.49
	CV	42.15	66.95	17.69	33.50	92.35	3.25
Haryana	STD	56.37	8.94	7.77	6.39	1148.77	0.49
	CV	37.74	37.57	19.06	22.61	38.53	2.93
Orissa	STD	12.60	7.11	12.06	5.33	690.25	0.45
	CV	19.62	54.84	38.52	34.09	68.69	2.63
Bihar	STD	16.30	11.31	7.53	9.41	1059.07	0.57
	CV	37.80	90.03	33.47	57.70	89.42	3.61
Madhya	STD	27.04	15.10	10.69	8.50	1490.65	0.87
Pradesh	CV	38.33	68.04	37.84	58.45	109.14	5.63
Rajas-	STD	25.88	9.65	6.40	5.68	732.81	0.87
than	CV	40.86	46.62	34.12	32.32	52.78	5.57
Uttar	STD	28.60	14.91	11.68	9.40	1812.7	0.75
Pradesh	CV	40.34	80.22	43.06	51.36	93.01	4.59

Note: STD = Standard Deviation, CV = Coefficient of Variation

Appendix

Group/State/District-wise Resubstitution Results of the Misclassified Observations Using Linear Discriminant Function

Group/Districts	Original Group	Classified as		Posterior Probabilities I	II	III	IV
Group - I							
Kerala							
Tamil Nadu							
Coimbatore	1	2	*	0.1637	0.8349	0.0002	0.0012
Dharmapuri	1	2	*	0.0120	0.8032	0.0648	0.1200
Dindigulanna	1	2	*	0.0596	0.8702	0.0303	0.0399
Kamarajar	1	2	*	0.3876	0.6096	0.0007	0.0020
North Arcot	1	2	*	0.1790	0.7764	0.0320	0.0125
Pasumpan	1	2	*	0.2695	0.7179	0.0019	0.0107
Periyar	1	2	*	0.0877	0.8919	0.0052	0.0152
Salem	1	2	*	0.0313	0.9350	0.0092	0.0245
South Arcot	1	2	*	0.0579	0.8963	0.0167	0.0291
Tiruchirappalli	1	2	*	0.2769	0.7156	0.0029	0.0047
Tiruvannamalai	1	2	*	0.4093	0.5809	0.0080	0.0018
Group – II							
Gujarat							
Amreli	2	1	*	0.5605	0.4368	0.0014	0.0013
Banaskantha	2	4	*	0.0032	0.4259	0.0330	0.5380
Kachchh	2	4	*	0.0000	0.1918	0.0018	0.8064
Valsad	2	1	*	0.7702	0.2289	0.0007	0.0002
Andhra Pradesh							
Adilabad	2	4	*	0.0000	0.0427	0.0071	0.9502
Anantapur	2	4	*	0.0004	0.4774	0.0294	0.4927
East Godabari	2	3	*	0.0004	0.3581	0.3697	0.2718
Karimnagar	2	4	*	0.0000	0.0476	0.0418	0.9106
Khammam	2	4	*	0.0001	0.3889	0.0405	0.5705
Kurnool	2	4	*	0.0001	0.2931	0.0192	0.6876
Mahbubnagar	2	4	*	0.0000	0.0217	0.0175	0.9608
Medak	2	4	*	0.0000	0.0338	0.0457	0.9205
Nalgonda	2	4	*	0.0000	0.0594	0.1181	0.8225
Nizamabad	2	4	*	0.0000	0.0383	0.0613	0.9004
Prakasam	2	4	*	0.0000	0.2833	0.0471	0.6696
Rangareddy	2	4	*	0.0001	0.3078	0.0291	0.6631
Srikakulam	2	4	*	0.0001	0.1720	0.0522	0.7757

Vishakhapatnam	2	4	*	0.0000	0.1712	0.0170	0.8118
Vizianagaram	2	4	*	0.0002	0.1731	0.0565	0.7702
Warangal	2	4	*	0.0000	0.0618	0.0593	0.8789
Maharashtra							
Amravati	2	1	*	0.7207	0.2785	0.0003	0.0005
Bid	2	4	*	0.0002	0.3662	0.0487	0.5849
Gadchiroli	2	4	*	0.0001	0.3887	0.0752	0.5360
Jalna	2	4	*	0.0002	0.4030	0.0254	0.5714
Nanded	2	4	*	0.0001	0.2469	0.0312	0.7218
Parbhani	2	4	*	0.0001	0.3053	0.0332	0.6614
West Bengal							
Bankura	2	4	*	0.0004	0.3500	0.2894	0.3602
Birbhum	2	3	*	0.0005	0.3056	0.4216	0.2722
Jalpaiguri	2	4	*	0.0006	0.1708	0.2901	0.5386
Koochbihar	2	3	*	0.0001	0.1223	0.6024	0.2752
Maldah	2	4	*	0.0000	0.0722	0.1587	0.7692
Murshidabad	2	4	*	0.0001	0.1450	0.2525	0.6024
Nadia	2	3	*	0.0017	0.3491	0.4334	0.2158
Purulia	2	4	*	0.0000	0.0459	0.0715	0.8826
S24 Parganas	2	3	*	0.0018	0.1989	0.5981	0.2012
West Dinajpur	2	4	*	0.0002	0.2488	0.0742	0.6768
Himachal Pradesh							
Bilaspur	2	3	*	0.0072	0.4635	0.4890	0.0403
Chamba	2	4	*	0.0001	0.1535	0.0827	0.7637
Hamirpur	2	3	*	0.0064	0.4206	0.5277	0.0453
Kangra	2	3	*	0.0155	0.3403	0.6032	0.0411
Karnataka							
Bidar	2	4	*	0.0000	0.1576	0.1223	0.7201
Gulbarga	2	4	*	0.0000	0.1200	0.0241	0.8559
Kodagu	2	1	*	0.6721	0.3231	0.0047	0.0000
Raichur	2	4	*	0.0000	0.1497	0.0437	0.8065
Punjab							
Hosiarpur	2	1	*	0.7428	0.0439	0.2132	0.0001
Rupnagar	2	3	*	0.0022	0.0689	0.9246	0.0043
Group - III							
Assam							
Darrang	3	2	*	0.0040	0.5016	0.4554	0.0391
Dhubri	3	4	*	0.0000	0.0229	0.2144	0.7626
Karbianglong	3	4	*	0.0001	0.2703	0.1520	0.5776
Kokrajhar	3	4	*	0.0000	0.0783	0.2892	0.6324

Marigaon	3	2	*	0.0012	0.4245	0.3695	0.2047
Tinsukia	3	4	*	0.0001	0.2429	0.1171	0.6399
Haryana							
Faridabad	3	2	*	0.0016	0.7186	0.1200	0.1598
Kaithal	3	4	*	0.0001	0.2500	0.3421	0.4078
Sirsa	3	2	*	0.0014	0.5330	0.3954	0.0702
Yamunanagar	3	4	*	0.0010	0.3946	0.0830	0.5214
Orissa							
Balangir	3	4	*	0.0003	0.2982	0.0486	0.6529
Baleshwar	3	2	*	0.0072	0.5250	0.3351	0.1327
Dhenkanal	3	2	*	0.0085	0.6789	0.1350	0.1777
Ganjam	3	4	*	0.0003	0.2776	0.0705	0.6516
Kalahandi	3	4	*	0.0000	0.0680	0.0236	0.9083
Kendujhar	3	2	*	0.0132	0.7261	0.0313	0.2293
Koraput	3	4	*	0.0000	0.0873	0.0105	0.9022
Mayurbhanj	3	4	*	0.0003	0.2865	0.0536	0.6597
Phulbani	3	4	*	0.0003	0.2723	0.0435	0.6839
Puri	3	2	*	0.0089	0.4713	0.4235	0.0963
Sambalpur	3	2	*	0.0044	0.7263	0.0441	0.2252
Sundargarh	3	2	*	0.0189	0.8165	0.0098	0.1548
Group - IV							
Bihar							
Purbisinghbhum	4	2	*	0.0025	0.7694	0.0002	0.2279
Madhya Pradesh							
Balaghat	4	2	*	0.0043	0.8352	0.0333	0.1271
Betul	4	2	*	0.0040	0.7813	0.0057	0.2089
Chhindwara	4	2	*	0.0012	0.6811	0.0181	0.2996
Durg	4	2	*	0.0006	0.7551	0.0065	0.2378
Eastminar	4	2	*	0.0004	0.5567	0.0143	0.4287
Jabalpur	4	2	*	0.0004	0.5844	0.0323	0.3829
Narsimhapur	4	2	*	0.0011	0.6950	0.1807	0.1232
Raigarh	4	2	*	0.0008	0.4941	0.0188	0.4863
Seoni	4	2	*	0.0005	0.4871	0.0342	0.4783
Rajasthan	4						
Uttar Pradesh							
Garhwal	4	3	*	0.0009	0.1525	0.6272	0.2195
Kanpurdehat	4	2	*	0.0069	0.7412	0.1431	0.1088
Nainital	4	2	*	0.0021	0.6652	0.1563	0.1765
Pithoragarh	4	3	*	0.0001	0.1289	0.4969	0.3741

Note: Misclassified districts are indicated by *

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Poverty and Economic Change in Kalahandi, Orissa: The Unfinished Agenda and New Challenges

Sunil Kumar Mishra *

Abstract

Poverty rips the very social fabric of a society. Its victims are apparently divested of some universally accepted human quality of life. This paper analyses the incidence of poverty in the backward district of Kalahandi, Orissa. It focuses on the economic structure and socio-economic conditions of the people to identify the probable reasons for chronic poverty in the district. The paper argues that to reap the benefits of large deposits of raw material and human resources, development of the non-agricultural sector through proper planning is a prerequisite. Collectivity among the members of the co-operative societies and other decentralized institutions would help in harnessing the benefits. The possibilities of such collective actions for rural development are explored.

Introduction

Poverty in Kalahandi[1] is paradoxical in nature. The district is rich in natural resources like forests and minerals, and has a large labour force. The landholding size is larger than the average size of landholdings in Punjab; it receives more rain than Punjab, and the cropped area in the district is the highest in Orissa (Mahapatra *et al.* 2001). Yet, people here are trapped in a vicious circle of poverty. Kalahandi is well known for its backwardness, hunger, starvation deaths and all other social maladies. The district came into prominence in the national and international developmental discourse in the 1980s when the people of the lower strata faced serious economic and social deprivation and were driven to eat inedible roots and grasses. Kalahandi has a high concentration of Scheduled Caste (SC) and Scheduled Tribe (ST) populations. About 93 per cent of its population live in rural areas where the level of poverty is very high. A major challenge for development officials has been that of finding ways to reduce the chronic poverty among the people. To analyse the problem the state economy should be decomposed into a district and village economy.

While discussing the economic structure of Kalahandi, we need to analyse

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its economic changes from 1960 to 1991. The basic elements of an economy are economic structure (aspects of ownership and control of resources), economic activity (pattern of utilisation of resources) and economic performance (measure of what the economy results in). Economic change reflects change in the three aspects of the economy and the interaction among them (Kurien *et al.* 1979). Economic development is not possible without the productive use of the rural population. In Kalahandi district, the agricultural sector is traditional and backward and is a source of livelihood for a large number of people. It is relevant to consider how the excess rural population can be absorbed into other productive occupations. This paper argues that absolute poverty among the rural people may be substantially reduced by encouraging the development of the non-agricultural sector along with that of the agricultural sector through special emphasis on rural industries.

In what follows, this paper outlines the poverty scenario in Kalahandi district. It then discusses socio-economic change and the livelihood pattern of the people in the district. This helps to identify the reasons for its persistent economic backwardness. Next, it analyses the basic causes of underdevelopment of the non-agricultural sector and examines its prospects in the district, and then analyses the role of decentralised institutions in the development of the district. Finally, the paper discusses the anti-poverty programmes and rural development scheme in Kalahandi, and concludes with some policy implications.

Poverty in Kalahandi District

The District Rural Development Agency (DRDA) conducts a survey every five years at the block level with a view to providing benefits to families living Below Poverty Line (BPL), under various anti-poverty programmes implemented either by the state government or the central government.

Table 1 shows that the percentage of rural families below the poverty line in the State in 1992 was 78.70. Not only is the poverty level in the State very high, but also a stark inter-district disparity in poverty levels exists. The table shows the severity of poverty in 13 districts of the state. Districts like Kalahandi (86.65), Koraput (87.20), Mourbhanj (90.77), and Phulbani (89.99) show a very high level of poverty in comparison with other developed districts like Balasore (67.32), Sambalpur (67.37), and Cuttack (70.81). Kalahandi district has as many as 1,94,140 families living below the poverty line out of a total of 2,52,726 families as per the 1999 BPL family census. This constitutes 77 per cent of the total number of rural families (NABARD 2000–01). Table 2 shows rural families below the poverty line in various blocks of the district as they appear in the 1992 and 1997 surveys.

Table 1: Level of Poverty in Orissa in 1992—
A District-Level Comparison

Districts	% of Rural Families BPL
Balasore	67.32
Bolangir	84.54
Cuttack	70.81
Dhankanal	84.25
Ganjam	77.84
Kalahandi	**86.65**
Keonjhar	82.75
Koraput	87.20
Maurbhanj	90.77
Phulbani	89.99
Puri	77.64
Sambalpur	67.37
Sundargarh	80.93
Orissa	**78.70**

Source: Panchayati Raj Department, Government of Orissa, quoted in Samal (1996)

The percentage of BPL families in rural areas of Kalahandi district reduced to 62.71 per cent in 1997 as against 85.77 per cent in 1992. Blocks like Madanpur Rampur (80.23 per cent), Kesinga (70.01 per cent) and the two tribal blocks notified by the Integrated Tribal Development Agency (ITDA), i.e., Thuamul Rampur (88.76 per cent) and Langigarh (75.81 per cent) show a very high percentage of rural families below the poverty line. Of these poor families of the district, 19.59 per cent of the households are small farmers, 41.51 per cent were agricultural labourers, 23.83 per cent were marginal farmers, 1.80 per cent were artisans and the remaining 13.15 per cent were of other categories. The Scheduled Castes and Scheduled Tribes together constituted 57.41 per cent of the rural families below the poverty line in 1997.

Economic Transformation in Kalahandi

Before analyzing the role of the non-agricultural sector, let us examine the economic changes in Kalahandi district. This would help us to identify the causes of both absolute and relative poverty.

Table 2: Rural Families below Poverty Line in Kalahandi District across Blocks and Socio-Economic Groups, 1992 and 1997

Blocks	% of BPL families (rural) in 1992	% of BPL families (rural) in 1997	Out of the BPL families (rural) in 1997 survey, percentage of		Out of the BPL families (rural) in 1997 survey, percentage of			
			SC	ST	Small farmers	Marginal farmers	Rural artisans	Agricultural labourers
Bh. Patna	75.56	55.68	25.41	40.98	15.49	25.39	1.81	39.56
Kisinga	86.08	70.01	24.54	27.78	11.83	28.51	1.73	48.57
Karlamunda	84.85	49.51	23.83	17.90	20.17	31.60	1.87	41.73
M. Rampur	86.55	80.23	20.64	43.37	21.92	27.52	1.57	44.44
Narla	83.88	54.89	14.34	18.76	10.06	19.06	0.83	20.81
Langigarh	87.05	75.81	28.37	46.37	19.53	17.26	0.87	44.15
Th. Rampur	93.81	88.76	29.14	55.35	19.85	21.04	1.47	40.12
Dharamgarh	86.22	64.26	23.84	19.51	24.70	30.95	1.66	36.23
Junagarh	95.40	61.38	22.02	19.36	16.48	14.38	2.95	40.00
Kalampur	87.45	51.77	17.26	27.48	16.03	8.44	2.20	57.13
Jaipatna	85.34	66.59	23.19	38.70	18.30	18.04	1.90	47.00
Koksara	90.97	38.48	22.67	35.00	29.09	22.37	1.86	39.34
Golamunda	88.43	62.77	21.21	32.72	20.83	26.46	2.03	42.33
Total	85.77	62.71	23.39	34.02	19.59	23.95	1.80	41.51

Note: The rural families below the poverty line are calculated by the DRDA on the basis of the total income of the family falling below Rs.11,000 a year. The blocks refer to Kalahandi district as divided in 1993.

Source: District Rural Development Agency, Kalahandi, Orissa.

Land Distribution Pattern in the District

The land distribution pattern in the district is highly skewed. Table 3 shows the changes in the pattern of distribution of operational holdings between 1970–71 and 1990–91. The average land area operated in the district has declined from 3.97 hectares (ha.) in 1970–71 to 1.94 ha. in 1990–91. More then 50 per cent of the households owning less than 3 hectares of land operated 20 per cent of the total land area in 1970–71, whereas the corresponding figures for 1990–91 were 82.09 per cent and 49.78 per cent respectively. The figure for the operational holdings of the highest class (more than 10 ha. of land) shows that 4.69 per cent of all the holders operated 21.92 per cent of the total land area. The corresponding figures for 1990–91 were 1.10 and 8.24 per cent respectively. The concentration ratio[2] shows a smaller variation from 0.452 and 0.444. This reflects a high concentration of land area. The inter-class concentration ratio (ICC)[3] shows concentration of land for all classes of landholding. It is noticed that the ICC of all the size classes has gone up in both the periods. But the absolute increase of the upper size class is higher than that of the lower classes. Here the ICC of the top group, i.e., those owning land above 20 ha., interpreted as the upper size class, had 870 per cent of what they would have been entitled to had the distribution been equal in 1970–71. This figure increased to 1,320 in 1990–91, which indicates that the concentration of land area has increased.

Table 3: Operational Holdings of Land in Kalahandi District, 1971 and 1991

Size class	% of households		% of area operated		avg. area operated		ICC	
(hectare)	'70–71	'90–91	'70–71	'90–91	'70-71	'90–91	'70–71	'90–91
Less than 1	17.40	39.94	2.76	11.70	0.63	0.56	15.90	29.31
1–3	37.48	42.14	17.84	38.08	1.89	1.75	47.59	90.35
3–5	14.97	10.71	14.30	21.42	3.79	3.88	95.51	199.86
5–10	25.42	6.08	43.99	20.53	6.87	6.56	173.02	337.71
10–20	3.66	0.99	12.10	6.73	13.10	13.21	329.81	680.34
Greater than 20	1.03	0.11	8.99	1.51	34.54	25.65	869.35	1320.34
Total	100	100	100	100	3.97	1.94		

Source: Calculated from *District Statistical Abstract for Kalahandi District, Bhubaneswar,* and Directorate of Economics and Statistics 1970–71, 1990–91.

The heavy concentration of land implies that the land reform policy in the district has not been effectively implemented in respect of both the ceiling on landholdings and the consolidation of landholdings. With about 80 per cent of the people in the district being dependent on agriculture, such polarization of

landholding affects the small, marginal and landless people very badly, dragging them into the vicious circle of poverty. This often forces them to opt for informal credit, which is being exploited heavily. In such a scenario, we often find an interlinkage in the land, labour, and money markets, which may be dyadic or triadic. In a dyadic interlinkage individuals interact pair-wise (the terms and conditions of one agent depend on those of others) while in a triadic interlinkage more then two agents are involved in the contract. Such models enhance the understanding of exploitation in the agrarian market (Basu 1990). Again, the poor often resort to 'distress sale' of land and (industrial or agricultural) products. This interlinkage may lead to exploitation of the poor, which Bhaduri terms 'forced commerce.' In his words, 'The fact that the small peasant usually sells when prices are low and buys when prices are high runs quite contrary to the textbook wisdom on price response and strongly indicates a pattern of involuntary involvement in the market under the compulsion of indebtedness through consumption loan. This in essence is the mechanism of "forced commercialization" of a poor peasant economy in the grip of merchant's and usurer's capital' (Bhaduri 1983). Some new institutional economists opine that the interlinkage saves transaction and contract enforcement costs. But '...the isolated rural economic communities and its dense social network often dictate a kind of captive interlinking of transaction among the same small numbers of economic agents with virtually "all or nothing" choices for the weaker partners' (Bardhan 1989). The people are in a 'no man's land', where they cannot afford to wait to profit from a healthy market situation. The distress sale is either due to medical problems in the family, or unemployment or high rates of interest on informal loans.

Land Productivity in Kalahandi

In all the three years, rice production per hectare in Kalahandi was greater than that in Orissa. The average rice production in Kalahandi in 1993–94, 1994–95, 1995–96 was 16.73, 17.17, and 17.71 quintals per hectare respectively as against the State average of 14.52, 14.26 and 13.75 quintals per hectare for the same years. The production per hectare of other crops in the district was very low.

Table 4 shows that rice production per hectare in Kalahandi district is very impressive. Why, then, is the district so poor? A possible explanation is that the pattern of land distribution in the district is very uneven, and hence most of the gain from agriculture is appropriated by a few.

Table 4: Average Yield of Some of the Major Crops in Kalahandi District and Orissa from 1993–94 to 1995–96 (quintal/hectare)

Major Crops	Orissa			Kalahandi		
	1993–94	1994–95	1995–96	1993–94	1994–95	1995–96
Rice	14.52	14.26	13.75	16.73	17.10	17.71
Maize	10.19	7.52	10.53	6.96	4.77	6.67
Ragi	6.42	5.90	6.12	3.97	3.44	4.12
Wheat	12.89	13.49	12.41	7.03	10.01	8.03
Green gram	5.78	5.71	6.68	1.74	2.25	2.31
Groundnut	11.39	11.25	10.13	6.67	8.59	8.30
Til	2.81	2.22	2.27	1.47	1.13	1.23
Mustard	1.88	1.95	1.69	1.46	1.78	1.49
Potato	112.51	111.74	96.95	96.93	86.67	65.34
Sugarcane	582.40	589.87	583.90	436.92	488.49	515.35

Note: Kalahandi district here refers to the one divided in 1993.

Source: Calculated from *Statistical Outline 1997* and *District Statistical Abstract for Kalahandi 1997*, Directorate of Economics & Statistics, Orissa.

Use of Fertilizers

In Kalahandi district, neither the agricultural nor the industrial sector is developed. Even the green revolution did not have much of an impact on the agricultural development of the district presumably because of the absolute poverty that restricts farmers from utilising sophisticated technology such as tractors and high-yielding varieties of seeds and fertilisers. The use of fertilisers by the agriculturists in Kalahandi district and in Orissa is shown in Table 5.

Table 5: Consumption and Use of Fertilizers in Orissa and Kalahandi 1991

Consumption	Orissa		Kalahandi	
	Total Consumption (MT)	Use of Fertiliser per hectare of land (MT)	Total Consumption (MT)	Use of Fertiliser per hectare of land (MT)
Nitrogen	154590	0.029	3289	0.010
Phosphatic	34160	0.006	1290	0.004
Potassic	18950	0.003	551	0.001
Total	207700	0.038	5130	0.016

Note: The average data on fertilizer consumption for some years could have given better insights. However, I did not have access to all the data except for the year 1991.

Source: Calculated from *Statistical Outline 1997* and *District Statistical Abstract for Kalahandi*, Directorate of Economics & Statistics, Orissa.

From the table, it is clear that the use of fertiliser per hectare of land in Kalahandi district is as low as 0.016 million tonnes in comparison with that in Orissa state (0.038 million tonnes).

Classification of Main Workers in Kalahandi District

The slow rate of occupational diversification, coupled with the high dependency of the workforce on agriculture, is one indicator of economic backwardness and stagnation, although we are aware that capitalist agriculture of high productivity often signifies agrarian prosperity. The classification of the main workers in the district, as shown in Table 6, also shows the backwardness of the area.

Table 6: Composition of Main Workers in Kalahandi District and Orissa: Temporal Trends During 1971–91

Sectors	% of total workforce in Kalahandi District			% of total workforce in Orissa State		
	1971	1981	1991	1971	1981	1991
Cultivators	53.57	50.80	42.85	49.16	47.00	44.31
Agricultural Labourers	32.09	35.29	41.04	28.28	27.65	28.68
Household Industry (HI)	2.82	2.65	2.70	3.63	3.47	3.12
Other Services	11.52	11.26	13.36	18.93	21.88	23.67
Total	100	100	100	100	100	100

Source: Calculated from *District Statistical Abstract of Kalahandi 1970–71, 1980–81 and 1993,* Directorate of Economics & Statistics, Orissa.

Kalahandi depends mainly on primary activities, in which about 84 per cent of the total manpower is employed. Participation of the workforce in agriculture is greater in Kalahandi district than in the whole of Orissa. The percentage of people engaged in agriculture (cultivators and agricultural labourers) in Kalahandi decreased very slightly from 85.66 per cent in 1971 to 83.89 per cent in 1991. The proportion of agricultural labour in the district shows an increasing trend, but is more or less constant for Orissa. Again, the percentage change in the number of people engaged in household industries has been more or less the same for both Kalahandi and Orissa in all the three censuses. The proportion of the workforce engaged in other services (which includes transportation, trade and commerce, forest, fishery, etc.) shows an increasing trend in Orissa, but is more or less the same in Kalahandi district. The 1991 census figures show that the proportion of people engaged in trade and commerce is increasing at a higher pace in Orissa than in Kalahandi. The above description indicates that the distribution of the workforce

in various economic activities is highly uneven. Industrial development in Kalahandi district is very low. Only 3.98 per cent of the workers are engaged in the industrial sector as against the state's average of 8.94 per cent. Trade and commerce engages 3.48 per cent of the workers, while the state average is 5.37 per cent. Transportation and communication activities employ only 0.68 per cent of the workforce in the district against 1.74 per cent in the state (*Orissa Statistical Abstract* 1991). The high dependence of the workforce on the primary sector and the absence of urbanisation and alternative job opportunities have forced the workers to migrate.

Urbanization and Migration

Much of the literature on development after the 1980s emphasises the enhancement of non-agricultural employment in the urban fringes or what is called the 'rurban areas'. Urbanization provides employment for the rural worker. The small towns or large cities provide the marketing opportunity and product competition for rural non-agricultural 'exports' and encourage the rural areas to meet non-local demand. Again, better communication and transportation facilities have enabled the workers of adjacent rural villages to shift their activities without changing their residence (Basant *et al.* 1998). The operation of economies of scale lowers the cost, bringing about improvement in efficiency with which rural labour and financial markets are equipped to channelise various remunerative activities. This helps in the viable utilisation of rural resources and rural markets (Haggblade *et al.* 1989). Urbanisation in Kalahandi can be judged from the percentage of urban population to the total population, which was 4.85, 6.04 and 6.51 in the 1971, 1981, and 1991 censuses respectively, as against 8.41, 11.79, and 12.73 per cent in Orissa for the same years. The SC and ST accounted for more than 50 per cent of the entire population, but the rate of urbanisation of these categories is much lower than that in the state and country. In the 1981 census, the rate of urbanisation of SC was 5.97 per cent as against 9.40 per cent in Orissa and 16 per cent in India. In respect of ST, the corresponding figures were 1.35 per cent as against 4.61 per cent and 6.20 per cent respectively (Nayak *et al.* 1991). The total urban population of 1,04,163 is spread over five towns, i.e., Bhawanipatna, Khariar Road, Kesanga, Kharier and Junagarh. Bhawanipatna is a Class II town whereas the remaining are Class IV towns. The data on Kalahandi show that lack of urbanisation forces the workers to migrate to other villages and cities in search of jobs. The following table shows related figures in these five urban towns in the 1991 census.

Table 7: Urban Characteristics of Kalahandi District, 1991 Census

Name of the town	Total population (N/M)	% of people engaged in various sectors					Functional category
		Primary(P)	Industrial (I)	(T & C)	(Trans & Com)	Service (S)	
B. Patna	51,062 (M)	18	13	18	7	44	S
Kesinga	14,127 (N)	43	10	21	7	18	P
Kharier Road	14,027 (N)	28	18	26	7	21	P,T&C,S
Junagarh	12,974 (N)	51	9	19	3	18	P
Kharier	11,738 (N)	36	11	20	5	28	P and S

Note: N—Notified Area Council, M—Municipality, T&C—Trade and Commerce, Trans & Com—Transport and Communication

Source: Compiled from *District Census of Kalahandi, 1991*

Recurring droughts[4] may be the chief cause of migration. People used to migrate to Raipur (MP) in search of jobs in times of drought. Dash and Behura, in their study (in 1998) of two villages of Nawapada (a part of undivided Kalahandi district), found that the non-tribals preferred to migrate to Raipur district in search of factory jobs, whereas the tribals, who were strongly attached to their birthplace, got by on minor forest produce and whatever local employment was available. Migration also has adverse consequences on the education of the worker's children (Dash *et al.* 2000).

Wage and Price Structure

The wage structure in Kalahandi district is very depressing. Even though the government of Orissa fixes the minimum wage rate from time to time, we find a gap between what labour actually gets and what the government fixes.

Table 8 shows that the wage rate of agricultural labour and other labour is extremely low. Even today we find bonded labour (called *goti* in local language). Agriculture is so uneconomical in the district that even a middleman with 10 hectares of land cannot pay a higher wage rate. It is argued that if this system is abolished the poor labourer would lose even the little sustenance that he had (Mohanty 1992).

Table 8: Wages for Different Types of Labour (in Rupees) in Kalahandi District (1977–95)

Sl	Average wage for	1977	1981	1994–95	1995–96
1.	Skilled labour	6.85	9.62	46.36	54.19
2.	Agricultural field labour	2.59	4.39	20.55	22.45
3.	Other agricultural labour	2.56	4.68	21.23	22.69
4.	Other labour	2.34	4.30	20.72	21.30

Note: ***** Wage rate of child labour is excluded. Skilled labour includes carpenters, masons, tractor drivers, etc. The wage rate of skilled labour is found out by average in the respective year.

****** Data for 1994–95 and 1995–-96 refer to Kalahandi as divided in 1993.

Source: Calculated from *District Statistical Handbooks*, Directorate of Economics and Statistics, Govt. of Orissa.

Poverty and Public Distribution System

The success of any planning effort is judged not in terms of the rate of growth of per capita income but by the living standard of the poor. Food security is one of the most effective measures to reduce poverty. The merit of the Public Distribution System (PDS) is that it has effectively contributed to famine prevention and is said to contribute to an increase in physical and economic access to food (Mooij 1999). In Kalahandi, a substantial part of the population lives below the poverty line, which means their income is not sufficient to buy enough food. Their lack of purchasing power often keeps them out of the PDS. When food reaches the poorest and most vulnerable people, it strengthens their bargaining position. A more secure food situation makes the vulnerable people slightly more powerful, or less powerless, in their interactions and negotiation with powerful agents such as landlords and moneylenders. But a backward economy shows that chronic poverty (when they have no money to buy ration commodities and often mortgage their ration cards), and limited opening of shops are the main reasons for the limited success of the PDS (Mooij 1999). In its interim report tabled in the state legislature, the Committee of the House on Drought and Other Natural Calamities (1987) opined that the food habits of the people of a region should be considered while assessing any distress on account of drought. The relief through PDS has only taken into account rice and wheat, which is mainly consumed by the affluent sections of society. The scheme ignored the requirement of the SC and ST population (quoted in Jayal 1999). It is also argued that the subsidised food supplied may be too little to benefit the poor. Often the individual dealer incurs a loss of 3–5 kg per bag, which he makes up by selling at a higher price. A debate was also going on to link employment generation programmes and PDS because the uncertainty and vulnerability with regard to employment give rise to uncertainty in the consumption

level, leading to food insecurity (Coondoo *et al.* 2000). In such a case the PDS and Employment Generation Programmes can overcome the food deficiencies of the poor in Kalahandi.

Development of Non-Agricultural Sector

There are two valid hypotheses for the development of a backward area through the development of the non-agriculture sector. These are:

(a) Development of the non-agricultural sector through agricultural development.
(b) Encouragement of the non-agricultural sector, given the state of agriculture in terms of production, productivity, employment, etc. This can promote the development potential of the district, and boost the agricultural sector.

Development of rural industry requires physical and human infrastructure, which the Kalahandi district lacks.

It was observed in Kalahandi that credit is provided by the Artisan Industrial Multipurpose Co-operative Society (AIMCS) without any collateral security. The AIMCS is a failure in the district because of heavy default. In such a scenario, according to the DIC officials, it is very difficult to provide loans on non-collateral security deposit basis. After 1995, the department did not provide loans to the people owing to non-rotation of the loan amount. But the question is whether or not providing funds is the solution to the problem.

Appropriate technology, which is vital for industrial development, is lacking in Kalahandi. Such technology should develop according to the tastes and preferences of customers belonging to different regions. For instance, the Banarasi saree is made for different regions in India in accordance with the tastes and preferences of the people of that region. The design of Banarasi sarees for Bengalis is quite different from that for Oriyas.

The literacy rate in the district is 36.08 per cent, out of which the ST and SC populations account for 28.20 per cent and 18.54 per cent respectively. The corresponding figures for Orissa are 49.09, 36.78 and 22.31 per cent respectively. The percentage of main workers to the total population in the district is 37.50, out of which male literacy is 59.80 per cent and female literacy is 15.20 per cent respectively. The illiteracy rate in the district was observed to be 67.50 per cent for main workers. Out of this, 60.70 per cent of the total male main workers were illiterate. Illiteracy among female main workers was 94.60 per cent. The comparisons of illiteracy between the male and female main workers show that illiteracy among female workers is extremely high. Hence, one can question the extent to which the ideal of 'women's empowerment' is valid without upgrading their technical skill and imparting education. High illiteracy often forces people to accept low-paying jobs. Another characteristic of the district is that female participation in non-agricultural activities in rural areas is very low as compared with that in urban areas. Again, the percentage of women's participation in the rural workforce (both in agriculture and non-

agriculture sectors) is higher than that of the urban areas. For economic development and enhancement of the livelihood pattern of the people below the poverty line, literacy is a necessary prerequisite. In Orissa, 50.60 per cent of the main workers are illiterate, which is constituted by 42.50 per cent male workers and 87.20 per cent female workers. It would be well to cite the example of Taiwan. In 1930, the Japanese colonial government took the initiative to introduce literacy in Taiwan. As a result, the rural labour force became largely literate, contributing positively towards rural industrialization (Ho 1979, p. 94) and income generating capacity of the worker.

Role of Institutions in Reducing Poverty

The question that arises is, how to harmonise the interests of various agents of a backward economy like Kalahandi through the institutional mechanism? The immediate answer is the effective role of decentralised institutions (local self-government, forming of co-operative societies, NGOs and self-help groups). A fine example of the successful venture of co-operative societies is Gujarat Co-operative Milk Marketing Federation, Anand, where the members of the society are involved solely in milk production and selling through a comprehensive plan. Other examples of successful co-operative societies are the IRULA Snake Catchers' Co-operative Society (Tamil Nadu), Mahila Grihya Udyog, Rajasthan. The success of a co-operative society depends on the appropriate system of management training, skill development, availability of raw materials, finances, and equipment (Durgaprasad 1995). In Kalahandi district, some co-operative societies are working successfully. Sometimes, owing to the negligence and irresponsibility of the bureaucracy and the financial institutions, the societies do not play their role. In an interview with some members of co-operative societies in the district, it was found that the basic problem is transaction cost due to delay in getting the loan. The interval between applying for and receiving the loan was very long, often forcing loan-seekers to borrow from the informal credit markets at an interest rate of 7–10 per cent per month during the peak fair season. They spend a part of the loan on food and raw materials. People are also forced to bribe the officials (bank and administrative) either directly or through middlemen. A fixed commission is charged at two levels, i.e. co-operative secretary and Industrial Promotion Officer. In the co-operative society one member had sanctioned a loan of Rs.12,000 from IRDP, out of which Rs.2,000 was deducted. Out of the Rs.2,000, the co-operative secretary and the Industrial Promotion Officer got a 50:50 share. But when a middleman is involved, the basis of commission is 45:45:10 (10 per cent for the middleman). The Rs.10,000 that the member received was spent on repaying debts and on food. From the above example it is clear that in any market season of handicraft products, hardly anything was invested in the trade. Timely sanction of loans is imperative because artisans generally need money during peak fair seasons like Dasahara Puja and Ratha Yatra. Delays in getting

loans could result in spending the money on food and other articles, which would drive them back to the informal credit market.

Decentralized institutions like local self-government and non-government organizations are found to play a very important role especially in backward rural economic development. Local representatives are more open to public scrutiny than the national or state government, and are more responsible and accountable to the community and individuals whom they are supposed to serve. These institutions should play an effective role, particularly in the various programmes and policies implemented for rural development. Again, an effective role for decentralised institutions should be to enable the 'have nots' (SC, ST and women) to participate in the decentralised model of development on an equal footing with the 'haves'. Much emphasis is placed on the role of local self-government in the 73rd amendment of the Constitution.

On the other hand, NGOs have a major role to play in mobilising the poor and in protecting their rights and providing them with the latest information. Sometimes, NGOs are alleged to be more corrupt than the bureaucracy. The main reason for this is that the NGOs lack continuity and work in isolation, and often at cross-purposes (Samal 1998). Sometimes, the local institutions are dominated by vested interests, which do not allow the poor to be benefited. Hence the necessity of structural change in rural society to enable the poor to be in a position of dominance in local-level institutions (Samal 1998). A constructive and supportive role of local self-government and non-governmental organisations (NGOs) is absolutely necessary. In the words of Raja Chelliah '...the ongoing poverty alleviation programmes would have to be strengthened and made more efficient and cost effective by enlisting the participation of panchayati raj institutions and NGOs.' (Chelliah *et al.* 1999).

Anti-Poverty Programmes and Rural Development in Kalahandi

The state and central governments have launched various anti- poverty programmes aimed at providing wage employment and self-employment for the poor. Various organisations like Khadi and Village Industries Commission (KVIC), Coir Board, and the Handlooms Boards deal with the development of the non-agricultural sector. The central and state governments have implemented various anti-poverty programmes in rural areas. Examples of these are the Integrated Rural Development Programme (IRDP), Training for the Rural Youth for Self-Employment (TRYSEM), Jawahar Rojagar Yojana (JRY), and Employment Assurance Scheme (EAS) Tool Kits Programmes. The IRDP and TRYSEM programmes are aimed at promoting self-employment, and JRY is for creation of supplementary wage employment. Kalahandi district, as a backward area, receives large funds for such programmes. The two tribal blocks in the district, i.e., Th. Rampur and Langigarh,

receive huge assistance for the socio-economic development of the tribal people in development of agriculture, rural industries, basic social and economic infrastructure, etc. The total expenditure on various anti-poverty programmes in the district during 1989–1999 is given below.

Table 9: Physical & Financial Achievement of Various Anti-Poverty Programmes in Kalahandi 1989–2000

Years	Total Fund available (in lakhs)	Expenditure incurred (in lakhs)	% of fund unutilized	Phy. Target (in no.)	Achieve-ment (in no.)	Target mandays (in lakh)	Achieve-ment (in (lakh)
1989–90	1787.360	1352.460	24.34	12486	9717	0.00	0.00
1990–91	1953.030	1207.040	38.2	7357	6245	0.00	0.00
1991–92	1761.970	1524.200	13.5	7004	5420	0.00	0.00
1992–93	1935.300	1380.750	28.66	7671	5306	0.00	0.00
1993–94	3174.200	2557.320	19.44	11461	8041	0.00	0.00
1994–95	3949.245	3012.320	23.73	13330	7690	0.00	60.204
1995–96	3703.235	2925.810	21	10734	11154	52.300	44.330
1996–97	3828.455	2651.210	30.37	10043	10184	44.890	31.860
1997–98	3692.545	2692.490	27.09	8990	14067	29.310	29.540
1998–99	3730.640	2496.080	33.1	10896	9626	30.110	25.890
1999–2000	2402.640	785.140		2745	3589	30.110	8.480

Note: Data after 1992–93 refers to Kalahandi as divided in 1993.

Source: Calculated from the data available in DRDA, Kalahandi, Orissa.

Despite the huge expenditure on anti-poverty programmes in the district, poverty is still rampant. Table 9, which depicts the total expenditure on poverty alleviation programmes from 1989–90 to 1999–2000, shows that a substantial amount of money remained unutilized. In 1996–97, 1997–98, and 1998–99, a balance of 1,177.245, 1,000.055, 1,234.560 lakh rupees respectively remained unutilised in the district. We find that except in 1997–98, there was a large gap between the mandays targeted and the achievement since 1995–96. According to Column 4, which shows the percentage of funds unutilised for various anti-poverty programmes, in 1990–91,1996–97 and 1998–99, non-utilisation of funds was very high. The probable reasons include institutional failure, corruption, low level of economic infrastructure, lack of awareness and/or interest among the people, bureaucratic apathy and lack of proper accountability. No doubt these anti-poverty programmes have a bearing on poverty reduction, especially in the rural areas, but lack of co-ordination hampers their effectiveness. The weak linkage between TRYSEM and IRDP is one such instance. The fourth round of IRDP concurrent evaluation revealed that only 3.88

per cent of IRDP beneficiaries received training under TRYSEM (GOI 1998–99). Further, TRYSEM trainees are not provided with the basic instruments from the tool kits scheme. In such a situation, the lack of co-ordination of various programmes affects rural industrial development. Another major consideration that is overlooked is market viability. The basic reasons for non-implementation of the programmes are:

(a) wrong selection of the target group,
(b) market viability is not considered,
(c) negligence on the part of bureaucratic and bank officials,
(d) misuse of funds by those who take loans from formal institutions,
(e) submission of clearance certificates - If someone defaults on a loan his child cannot avail of a loan from the formal institutions even if he is a skilled or semi-skilled worker.

Conclusions and Policy Implications

Eradication of poverty in Kalahandi is a daunting challenge for policy makers and planners. This is reflected in the fact that 62.53 per cent of the rural families in the district were below the poverty line in 1997. Four major factors account for the severity of poverty. First, more than 85 per cent of the total workforce is engaged in agricultural and allied activities, of which 46 per cent are agricultural labourers. Second, infrastructure (physical, social and economic) is underdeveloped. Third, the traditional cottage and rural industries are neglected, leading to the migration of artisans from the secondary to the primary sector, a case of reverse diversification. Fourth, there is an institutional failure in the district. The institutions include the central, state and local government, NGOs, and co-operative societies.

The slow rate of occupational diversification, coupled with a high workforce dependency on the agricultural sector, is one indicator of economic backwardness and stagnation. The identification of the main workers in the district shows the backwardness of the area. Hence the task is to shift the workforce from the agricultural sector to the non-agricultural sector. A labour-intensive path for the non-agricultural sector should be chosen in the beginning with a dynamicity of the transformation curve, which assures a positive relation between the average income and total employment.

The first step towards overcoming agricultural backwardness is the development and revival of the irrigation system. Often, the coexistence of drought, poverty and agricultural backwardness in the district is observed as a curse of nature. We also find a curious duality in the government's approach. On the one hand, the state government and district administration denied the food crisis and drought; on the other hand, the state government pressed the central government for a larger relief fund. Often, the discourse of hunger is shifted to the discourse of drought, shifting the blame from the state to nature (Jayal 1999). But rainfall in the

district is not low. It receives more rainfall than Punjab. The difficulty is in water management. At independence the district had an extensive traditional irrigation network of ponds, wells, tanks, etc., managed by the local institutions like 'jal sabha'. With the advent of planning, the traditional sources of irrigation were taken over by the government. This was the beginning of mismanagement, which took its toll on agricultural growth. There is a need for planners and policy makers to formulate an effective strategy to revive the traditional source of irrigation so as to provide not only water and therefore increasing agricultural productivity, but also productive employment for the poor of Kalahandi. The revival of the micro watershed will provide irrigation facilities for about 80 per cent of the total cropped areas. It will also create productive employment for about 30,000 poor people at a cost of Rs.50,000 million within ten years. The district gets approximately Rs.100 crore every year for irrigation and watershed development from different national and international agencies (Mahapatra 2001). Agricultural development through technological development, improving irrigation systems, supply of high-yielding variety of seeds, formal credit for cultivators, improving the infrastructural facilities, strengthening marketing societies and an effective implementation of land reforms is absolutely necessary.

The second major public investment needed is rural electrification. Even after fifty years of planning, about 50 per cent of the villages have not been electrified. The question remains about the number of households that have electricity connection in these electrified villages. Development of the power sector is crucial to agricultural and industrial development. Because of the absence of industrialisation in the district, a large percentage of electricity (39.70) is in the domestic sector compared with the state average of electricity consumption for domestic use (21.50), whereas the percentage for industrial use in the district is very low (28.86) compared with the state average (57.37) in 1995 *(Statistical Abstract, Orissa,* 1997). Though many villages have been electrified, continuous power supply is not ensured and energisation is very expensive.

The non-farm sector can play a major role in the development of the district. The district is very famous in traditional industries like handloom (Bhawanipatna), pottery (Jampader), stone carving (Bhawanipatna Koksara, Boden), woodcarving (Dharmagarh), paper flower making (Rampur), horn work (Langigarh), paddy craft (Kesenga), Solapith work (Junagarh, etc.). The revival of the traditional industry will not only sustain the poor but will also check migration in the district. The marketing societies need a boost. The government should provide artisans with proper marketing facilities for their products. Since handicrafts in the local market are costly, the government should provide marketing facilities for their products at the national and international levels. This would help producers to get rid of the middleman. It is vital to revive the marketing societies in the district, which work as a link between the artisans and the market. Kalahandi has 13 AIMCS centres for

promotion of rural artisan activities. Kalahandi GMCS (under handicraft department) and District Supply Marketing Society (under ORMAS) provide marketing support for the artisans. The Tribal Development Co-operative Society provides procurement and marketing facilities for some of the forest and other products like *siali* leaves (used for leaf plate making) and broom grass. Training facilities should be provided for weavers in design development, tie and dye, and upgradation of skills. The Handloom Weavers Co-operative Society, which provides forward and backward linkages to the weavers, has remained defunct. Alternative arrangements should be made for supply of raw materials and provision of market support for the weavers. The credit system for the development of rural industries should be properly targeted, and steps taken against official harassment. This would reduce the high transaction cost incurred by the people.

Food security should be assured in the district. The local staple food (used mostly by the tribals) like jawar and bajra should be taken into account in assessing the performance of PDS. The procurement system needs to be strengthened. It is found that almost fifty per cent of the produce (agricultural, rural, industrial or minor forest produce) is sold before government institutions start procuring. The case of *mahua,* the main forest product in the district, is illustrative. Fair returns on the product enhance the income of the rural poor of the district. Since the Forest Corporation is not properly organised, people sell the product at prices as low as Rs.1–1.50 per kg, whereas the rate fixed by the government is Rs.3 per kg.

The total forest area of Kalahandi district reduced largely after independence. Commercialization of forests has deprived the tribals of the district of the minor forest produce, which is an important source of their livelihood. A comprehensive plan is necessary to enhance the forest area and plant trees that are economically rewarding and environment-friendly. A linkage with the rural industrial sector should be formed. The forest policy should make provision for artisans, especially those directly dependent on forest products, to get raw materials without any problems. According to the social forestry scheme implemented by Swedish International Development Agency (SIDA) in Orissa, land would be allotted to some of the artisans, who would collectively develop the forest, from which they can use raw materials for promotion of their rural industries. This can ensure raw material supply for the artisans and extension and development of the forest. Sustainable development of forests and an increase in the livelihood and income of the artisans go hand in hand.

Profitability of agriculture is also marked by improved productivity, diversification and value addition. There is a critical need to develop storage facilities like rural godowns, cold storage, and indigenous storage structures like onion godowns. This will not only reduce post-harvest losses but also extend the shelf-life. Potato production in the district is 1,512 million tonnes (MT), whereas the

demand is 16,075 MT per annum (NABARD 2000–01). The shortfall is met through imports from other states for which the people pay a higher price. Even though this product fetches a good profit, lack of storage facilities keeps farmers from expanding production. Onion is a major crop grown in the district (9,963 MT per annum) (NABARD 2000–01). It is sold at a very low price during harvest for want of storage facilities. The procurement agents take away these products at a low price and the people in the district purchase them at a higher price during the off-season from the storage agents who store them in other district headquarters.

The service and business sector activities like transport, retail trade/ small business, educational loans, housing, and consumption loans need to be developed. These are mainly demand-based and vital in sustaining development activity in the district. There is a critical need to develop the transport sector to facilitate movement of local products and local people.

Appropriate technology should be developed in accordance with the tastes and preferences of the consumers. Through various poverty-alleviation programmes or through rural industrial development by various boards like KVIC, Coir Board, Handicraft Board, etc. the latest techniques should be imparted to the youth. Programmes like TRYSEM have made good progress, but their limitation is that it is very difficult for the unskilled to be trained in a period of 10–20 days. Besides this, the trade in which they are being trained may not have any market prospects. Apart from training they should also be provided with credit facilities.

Several NGOs are operating in the district, mainly in the areas of education, health, and awareness. In the past, the NABARD-assisted NGO 'Gram Vikash' worked towards providing marketing support for oilseeds by the tribals in Thuamul Rampur block, who are exploited by middlemen. Credit provided by Kalahandi Anchalik Gramya Bank through the NGOs/SHGs is very satisfactory, and their recovery under the programme is 100 per cent. The formation of SHGs is imperative because the poor who have no access to formal credit can secure such access through the group approach. This ensures 100 per cent recovery, assesses the real credit need of the poor, ensures proper utilisation of loans, operational flexibility, and allows the maximum freedom to the groups and their members. For banks too, the SHG approach is a cost-effective credit delivery channel offering a high degree of safety, less risk, and prompt recovery.

Above all, it is important to create awareness in the district, because the government depends on the co-operation of the people. Collectivity among the members of decentralised institutions is necessary. A collective system can function well only if a system of monitoring and sanctions for violating the common law is in place (Nathen *et al.* 1997).

Notes

1. In 1993, the Kalahandi district was bifurcated into Kalahandi and Newapada districts. In this paper, I have used the data on undivided Kalahandi due to the non-availability of data for divided Kalahandi. Hence, data on undivided Kalahandi is for both Kalahandi and Newapada districts. However, this will not disturb the analysis because Newapada is more backward and poverty-ridden than divided Kalahandi.
2. The concentration ratio is calculated using the formula

$$C.R. = \frac{1 - \Sigma (P_k - P_{k-1})(Q_k + Q_{k-1})}{10000}$$

3. Inter-Class Concentration Ratio $= \frac{Qi/Q}{Pi/P} \times 100$

   P_k & P_{k-1} — Cumulative percentage of households of the particular group k and its previous group k-1 respectively.

   Q_k & Q_{k-1} — Cumulative percentage of area owned of the particular group k and its previous group k-1 respectively.

   Qi — Total land area of a particular i^{th} group and Q is the total land area of all the groups taken together.

   Pi — Total number of persons holding the land of the i^{th} group and P is the total number of households, taking all the groups together.
4. Kalahandi district is badly affected by drought, and partial crop failure is a general phenomenon. The drought of 1884, 1885, and 1886 led to a severe food scarcity. The district faced the same situation in 1919, and again in 1922–1923, 1925–1926, 1929–30, 1954–55, 1965–66, 1986–87, 1987–88 and 1988-89 (Dash*et al*. 2000).

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Book Reviews

G.S. Bhalla and Gurmail Singh. *Indian Agriculture: Four Decades of Development.* New Delhi: Sage Publications. 2001. Pp. 300, Rs.450.

The book under review is an outcome of the study 'Recent Developments in Indian Agriculture — A District-Level Study.' It provides an in-depth and detailed account of agricultural growth, land and labour productivity at the all-India, state and district levels since the early 1960s. In a way, the book extends the pioneering work of district-level studies undertaken during the late 1970s and 1980s by Professor Bhalla, first with Y. K. Alagh, and then with D. S. Tyagi. The latter covered the period up to the early 1980s after which Indian agriculture witnessed very interesting changes. These include wider adoption and spread of new agricultural technology, technological gain in crops other than rice and wheat, diversification of crop pattern and broad-based growth. The studies that covered only the initial years of the green revolution have concluded that the new agricultural technology had favoured only a small region with assured irrigation while a large area of the country derived no benefit from this technology. This has also led to the conclusion that the green revolution in India has increased regional disparities. It is thus relevant to see whether, as time went on, new agricultural technology reached new areas or remained largely confined to the irrigated region. This is one of the issues that the volume has addressed adequately. Besides, the book analyses and compares the spatial pattern of changes in Indian agriculture during 1952–56 to 1970–73, 1970–73 to 1980–83 and 1980–83 to 1992–95 using region, state and district as the units.

State-level data for 44 crops and district-level data for 35 crops have been used to study the status and performance of the agriculture sector. The chosen districts cover 98 per cent of all-India area and 97 per cent of the output of 35 selected crops. Thus, the districts included in the study adequately cover the performance of 35 crops selected by the authors. The authors have not reported the proportion of gross cropped area of all the crops and value of output of the whole crop sector or agricultural sector covered by the selected crops. Incidentally, all fruits and vegetables except potatoes are not included in the list of the selected crops. This coverage adequately represents the crop sector in most of the districts, and exclusion of the remaining crops would not alter the results and conclusions of the study for such districts. However, in a few districts the area under selected (35) crops covers less than two-thirds of the gross cropped area (GCA) of these districts.

In terms of output, the list of 35 crops given in the book covers about 80 per cent of the value of the crop sector, at the country level in the early 1990s. When the output of the livestock sector and crops not included in the study are taken together, it adds up to close to 40 per cent of the output of the agriculture sector.

This exclusion can affect the results of the study. If the performance of the fruits and vegetables and livestock sector has a very high positive correlation with that of 35 crops included in the study, there would be no change in the spatial patterns of agricultural performance presented in the study. However, if in some districts the livestock sector or fruit sector have done or are doing better than the 35 crops, then the conclusions based on the 35 crops may not hold. Similarly, if the share of livestock in the total agricultural output differs across districts, it can alter the status of a district in some cases. This can at best be acknowledged as a limitation of the study arising from non-availability of data on livestock output at the district level.

Regional disparities in agricultural development and incomes have remained a serious concern of the policy makers. In the state-level analysis the authors found that the coefficient of variation in yield, measured by dividing the output of selected crops by their area, declined perceptibly during 1980–93 and further during 1992–95. This finding contrasts with certain other studies that found no decline in regional disparities in agricultural output per hectare. The reason for this difference could be in the measurement of output. The measure of yield employed by the authors uses output per hectare of gross cropped area, which discounts the productivity differences due to the variations in crop intensity. As the more productive states also have higher crop intensity compared with the less productive states, productivity estimates based on gross cropped area reduce the variation in productivity. This could explain why labour productivity shows an increase in regional disparities, whereas land productivity shows a decline.

Based on the productivity study of states, the authors conclude that the benefits of the green revolution are no longer confined to the northwestern region, but have spread far and wide to include rain-fed states. The only state that has not witnessed growth in labour productivity since the onset of the green revolution is Bihar.

The book provides a very rich analysis of district-wise agricultural performance. The variations in spatial patterns are beautifully depicted in maps. The authors have taken great pains to provide growth rates, and movements of districts across productivity and growth categories over time for each of the selected districts and by presenting several classifications of districts based on agricultural status and performance. Further, district-wise data on GCA and NSA and area and output of selected crops and input use, farm power and machinery are presented in the Annexure tables, and would be immensely benefit those researchers without easy access to such data.

Further, the book gives an authoritative account of performance, status and changes in India's crop sector during different phases following the onset of the green revolution at country, state and disaggregate district levels. It also

identifies factors underlying the performance of agriculture in different regions, discusses the implications of ongoing change and also proposes policies and strategies for the future development of India's agriculture. Though the study covers the period up to the early 1990s, it fully acknowledges forces like trade liberalisation, GATT and WTO, and discusses their likely implications for Indian agriculture, thereby confronting the reader with a scenario of profound changes to take place in the early twenty-first century. The study emphasises the role of technology as the main driving force since the early 1960s — it needs to be seen whether terms of trade, reforms, and WTO-induced trade liberalisation can sustain, if not improve, the achievements of technology.

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Werner Menski. *South Asians and the Dowry Problem.* New Delhi: Vistar Publications, 1999. Pp 262. Rs. 250 (paper).

The very title of the book stirs up scary violence perpetrated on South Asian women because of dowry, a social evil that continues to afflict South Asian societies. The book is a collection of papers presented by academicians and activists at the three International Dowry Conferences held in Harvard and London between 1995 and 1997. There are twelve chapters in the book with a preface by well-known international activist Himendra Thakur, who has also contributed a chapter for the book.

The preface, by Thakur, analyses the dowry problems in South Asia and justifies the need for an international forum to engage in contemporary discourse on this issue. In the penultimate chapter, Thakur presents a six-point programme for eradicating the practice of dowry and bride burning in India. Though practical, it leaves certain questions unanswered: who should do it and at what level?

The editor, Werner Menski, in the introductory chapter, analyses the concept of dowry and the self-contradictory feminist views surrounding this concept. In chapter three, Menski surveys the literature on dowry, identifies its various forms and highlights central elements of the dowry problem. Interestingly, Menski approaches the problem from a purely humanistic perspective, rather than from a gender or religious framework. The author brings out the need for integrating traditional indological scholarship with modern sociological research to identify the change in the perceptions of dowry transactions over time. In chapter six, the editor dwells on legal strategies to curb the practice. Here he explains how dowry is much more than a straightforward gender issue and why the modern legal system

cannot tackle the problem. He holds modern consumerist greed chiefly responsible for the dowry problem. In the concluding chapter, Menski calls for a new remedy-centred and action-focused research agenda on dowry problems. He advocates different approaches to yield deeper insights into the dowry phenomenon to tackle the issue of violence on women more directly.

In chapter two, Julia Leslie focuses on the scale of the dowry problem, its magnitude across India, the conflicts inherent in the dowry death cases and the limitations of the data, the perpetration of violence on women and the institutionalisation of vulnerability of women for this. In the final part of her analysis, while presenting four agendas for the international society against dowry and bride burning, she makes a strong plea for meting out equal treatment for sons and daughters in all walks of life in order to reduce the girl's dependency on dowry.

In chapter four, Bisraam Rambilass reveals the exceptional case of dowry non-existence among the present generation of Indian South Africans through his empirical study. He critically analyses the reasons for the non-existence of dowry among Indians in South Africa from a historical perspective.

Chapter five, by Bisaka Sen, analyses dowry within the existing economic theoretical framework and uses the human capital approach to explain the phenomenon. The author presents an economic model to explain Indian women's tolerance of even bad marriages. An interesting aspect of this model is the author's deeper perception of the complex social factors that determine the family's decisions to accumulate human capital differently for sons and daughters.

Chapter seven, by Manjaree Chowdhary, assesses the hurdles in the enforcement of legal measures against dowry crimes. The author identifies loopholes in the existing legal provisions, and explains how the attitude, procedural inadequacies and operation of enforcement agencies such as the police and the judiciary have led to poor implementation of anti-dowry provisions in India.

In chapter eight, Rohit Barot discusses the dowry phenomenon among the Gujaratis in Britain, more specifically among the Lohanas and the Patidars, commonly known as Patels. The author, while describing its oppressive features, tries to relate the dowry phenomenon to the hypergamy among these two communities. He reveals that despite the influence of social change on social institution like marriage, rules of endogamy continue to influence a vast number of marriages in South Asian communities.

In chapter nine, Jagbir Jhutti provides insights into the phenomenon of dowry among Sikhs in Britain through individual case portrayals. She reveals how various types of dowry and marriage-related expenses continue to soar among the British Sikhs and the key role played by mothers and daughters in promoting and maintaining the dowry system in the Sikh community. On the positive side, she notes that the phenomenon of dowry accumulation has in fact financially empowered

women, enhanced their individuality and legal awareness among the educated young women. The portrayal of cases, however, looks more like an account of gifts given voluntarily by the parents for their daughters rather than as dowry demanded by the grooms. The author finally concludes that neither migration nor education among the Sikhs has made an impact on the second and third generation of Sikhs in Britain.

In chapter ten, Usha Sood analyses the legal context of dowry in Britain. The author critically analyses the dowry laws in India and Britain, and observes that the English courts and judges are less informed in addressing the cultural void in law in dealing with dowry cases. Sood identifies the gap in the database relating to dowry abuse among the South Asian communities in Britain, and neatly summarises the legal position under English law.

Overall, the book makes interesting reading and is a useful source of literature for both academicians and activists. There are, however, some minor omissions like incomplete list of abbreviations (page 239) and language errors in a couple of articles.

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Sunil Misra (ed.). ***Voluntary Action in Health and Population: The Dynamics of Social Transition.*** **New Delhi: Sage Publications. 1999. Rs.225.**

At Independence, the health and family planning status of the majority of the population was abysmally low and a formal health delivery system scarcely existed. The Government tried to remedy the problem through diverse programmes and initiatives, most of which were conceived, planned and executed at the national level and often superimposed on the existing social structures, institutions and practices. Coercive methods, numerical target achievements, and rigid policy instruments made the programmes, particularly family planning, unsuccessful and unsustainable, what with growing aversion from the participants and stakeholders. The book under review stresses the need for voluntarism in health and family planning practices that are culture compatible and sensitive to the ground realities of the specific localities and through community-accepted change agents.

According to various case studies, the main reason for the low utilisation of health and family welfare measures is the complete reliance on the traditional system coupled with ignorance of and inaccessibility to the formal system. The traditional system, which is often superstitious and unscientific, survived because it is culturally compatible, has social and community sanction, and is based on locally available materials and means. Any attempt to break this by force would

meet with resistance from the people and therefore hinder the achievement of sustainability.

The volume under review outlines the necessity of the voluntary sector in the centrally planned economies where programmes are conceived at the macro level. The micro- level organisation and operation of NGOs is very effective in ascertaining, formulating and implementing policy measures on health and population problems compared with centrally planned formulations. The book argues for synthesising the activities of the government and of the voluntary sector to tackle the health problems of the country.

The introductory chapter discusses the various determinants in ensuring effective communication from the people and the various change agents, and is followed by seven theme areas. There are fourteen case studies on broad classifications like infant mortality; integrated health and development in rural areas; fertility, reproductive health and responsible sexual behaviour in urban slums; family planning and reproductive health in the organised sector, and involvement of indigenous resource persons to promote family planning. A description of the critical areas of action and a brief conclusion then follows.

The basic premise of the studies is the experience of numerous projects implemented by the Population Foundation over the years. It is realised that the projects are unsustainable unless they actually involve the people without changing their social ethos, perceived behaviours and area-specific ground realities. Hence, the project design is based on an understanding of the health status of the target population, ascertaining the felt need, prioritising the objectives, and evolving a methodology that is culturally compatible and locally acceptable. Community Health Volunteers will be the change agent and the involvement of community /social leadership can make the programme sustainable in the future. Women's/youth organisations can act as the catalytic agent in health and family planning measures and in building social infrastructure, and the NGOs the chief agent in implementing these programmes.

The first three projects were taken up in high-prone areas to study infant mortality and fertility with different topographical conditions representing divergent ethni-linguistic-cultural characteristics of the people living there. Community participation is based on direct material benefits, as evidenced by the fact that they welcomed the economic and developmental programmes but resisted preventive and promotional health care. The identification and training of traditional birth attendants to serve as local health functionaries in maternal and child health care was effective and gave them social recognition. The distinct approaches, namely, understanding of the core issues and targeting of the specific areas, integration of traditional knowledge with modern knowledge, and training of the traditional functionaries to interact with community leadership and the health workers proved

effective and hence vital for the success of the programmes.

The book advocates focussed action programmes with fewer components for effective co-ordination and time-bound results. The introduction of innovations in health behaviour would have better chances of success if they were integrated with programmes of social and economic development, which give direct and immediate material benefits to the people. Here the authors call for the participation of NGOs in organising these programmes.

The book has a section on fertility, reproductive health and responsible sexual behaviour in urban slums due to the peculiar conditions prevailing in those areas. The slum characteristics such as rural-urban migration, deteriorating environment, extramarital affairs and migrant labour force compound the problem. Certain innovative techniques such as peer communicators, adult literacy and vocational training, educating women members, and creating interest groups of adolescent girls were tried out with varying degrees of success.

Understanding of family planning and reproductive health behaviour among workers in the organised sector is crucial since most of them are young and are exposed to extramarital sex and sexually transmitted diseases. The experience with three projects showed that the management of the industries played an important role in implementing the programmes. The presence of a popular nodal agency makes the programme popular among the workers. In the case of remote and inaccessible geographical areas the study used practitioners of the Indian system of medicine as change agents to popularise the family planning measures. But lack of coordination and withdrawal of incentives detracted from the success of the programme.

The book also details certain critical factors involved in the formulation and effective implementation of health projects. These include adequate attention at the planning stage, identification of the problem in the context of the social setting, involvement of community-level volunteers, integrated approach and acceptance of family planning, and the need for documentation and data retrieval. The book concludes with a discussion of the role of NGOs in bringing about social change. The advantages of voluntary agencies in creating a favourable environment, a felt need for the programme, qualitative feedback on ground realities, coordination with the health functionaries, research base, training and serving are highlighted.

To facilitate comparison, the case studies are structured on the same lines but this has made some parts repetitive as the objectives, methodology, and role of change agents are almost the same for the projects. The book vehemently argues for a new approach to health and family planning through methods that are culturally compatible, implemented with local resources and persons, and with the sanction of the community, with emphasis on sustainability. The case studies demonstrate this quite convincingly. The book also makes a strong case for voluntarism in

effecting social changes in health and family welfare. But in the light of public outbursts in some parts of the country against certain voluntary agencies, this needs to be reconsidered.

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Biswamoy Pati (ed.). *Issues in Modern Indian History*. For Sumit Sarkar. Mumbai: Popular Prakashan. 2000. Rs.400.

Any expression of academic gratitude is heartening, particularly when expressed in an elegant *festschrift*. Prof. Sumit Sarkar, in whose honour *Issues in Modern Indian History* is brought out, is one of our finest historians. His *Swadeshi Movement in Bengal, Writing Social History or Modern India* are as well known to discerning students of modern Indian history as his strong ideological conviction and social commitment, which he has allowed an occasional intellectual review but not any hypothecation to the vagaries or frownings of the official custodians of history. His critique of the Bengal 'Renaissance', and the Gandhian nationalism, or his association with the *Subaltern Studies* show him as a historian ideologically anchored but insisting on exploratory freedom, while his stand against communalism has enrolled him in a long and as yet unfinished battle.

Issues in Modern Indian History offers an interesting menu of twelve articles, which have been introduced well, and in sober prose, by the editor. David Arnold's 'Disease, Resistance and India's Ecological Frontier, 1770–1947' is an attempt to revisit earlier interpretations of tribal resistance by focusing on forest ecology, taking up a much-ignored factor like malaria in tribal society and rebellion. The hyperendemicity of many forest/tribal areas was initially an insurance against outside intervention and control, but once the ecological frontier was breached there was no way the insurance could be sustained. Indrani Chatterjee and Sumit Guha have ferreted out, from the Maratha sources, the strange world of the slave-queen Virubai to critique the Euro-centric and male-centric notions of slavery, bringing in the crucial role of 'social capital' which could overrule the conventional inputs of power like wealth and heredity. There is an attempt, by Amar Farooqui, to question the imperialist refrain that the events of 1857 were a bolt from the blue and show that they were but a significant moment in a long struggle against the British. This he does by reconstructing the history of the Sindhia state and the policies and postures of Baiza Bai. The insurrectionary mood of and performance of a subaltern class of tribals is brought out in Hari Sen's 'The Bhil Rebellion of 1881,' which is reconstructed, as it often happens, from the narratives of the feudal *durbar* of Mewar and the Colonial British. In 'Sri Ramakrishna and the Middle Class Religion in late Nineteenth Century Bengal: Exploring Some New Paradigms of

Understanding', Amiya Sen takes up a problem which Partha Chatterjee and Sumit Sarkar had grappled with. He interrogates Mahendranath Gupta's *Ramakrishna Kathamritha* afresh to explore the making of the *bhadralok* counter-discourse as a reactive and manipulative strategy evolved in the face of the pervading colonial discourse.

Another interesting exercise in deconstructive analysis in the volume is that of P. K. Datta, who shows how U. N. Mukherji's *Hindus — A Dying Race*, published in 1909, had created an irresistible communal consciousness through the instrumentality of a colonial power-knowledge system like the census and the printed word. The portrayal of the Hindus as a dying race, threatened to be outnumbered and overwhelmed by the unrestrained reproductive powers and strategies of the Muslims, could become, as it has since become, both an alarmist reminder and a call for an aggressive and immediate agenda of self-defence. The dynamics of strikes and communal riots of Calcutta in the 1890s is examined by Subho Basu in the context of a complex and changing milieu of caste, religion, linguistic identities and as a fitful reaction against agencies of capitalism and colonialism. Biswamoy Pati's paper brings out the ironies of politics associated with the anti-feudal upsurge in the 'Dark Zones' of Orissa and the strategies of the Congress in appropriating it. Sanjoy Bhattacharya explores the character of colonial propaganda against the Indian National Congress during the Second World War and the way it boomeranged. Srimanjari's study of the Bengali literature of the same period brings out the pervading anger of the intelligentsia against fascism and the War as well as against the exploitative nexus among the feudal, capitalist and colonial agencies, though the anger was sought to be combated by a manufactured mood of optimism about the new dawn. I. Tirumali's 'Dora and Gadi: Manifestation of Landlord Domination in Telengana' reveals the ways in which landlordism and caste domination had operated with cruel efficiency in the Telenganga region of Andhra, which was soon to be contested by the angry peasants. The last paper in the anthology appropriately deals with the conceptual shifts in the Leftist writings, underlining the fact that they have now become more broad-based, taking up such issues as culture, ethnicity, religion, gender, environment, and so on. Left writings, contrary to what these political antagonists have accused, have not been averse to debates within their ideological parameters nor afraid of extending the frontiers of their interest or concern. Call it heresy or freedom, they have not denied it to themselves.

Issues in Modern Indian History covers many areas and issues of interest to a student of history. Politics — feudal, colonial or nationalist — the world of the peasant, tribal, the worker and the landlord, the *bhadralok* attitude or the communal consciousness, ecological factors or ideological debates provide a rich mosaic of well-researched articles. These areas have, in fact, been surveyed on various

occasions with masterly attention by Prof. Sumit Sarkar himself, and in so doing he has always enriched them. That makes this collection of research papers all the more appropriate in the *festschrift.*

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Datta Ray, B., H. K. Mazhari, P. M. Passah and M. C. Pandey (eds.). *Population, Poverty and Environment in North-East India.* New Delhi: Concept Publishing Company. 2000.

Northeast India conjures up images of lush green forests, mountain peaks, rich and colourful cultural traditions and an overwhelming majority of communities living in perfect harmony with the sylvan ambience. It also brings into focus a region that has never apparently been considered part of mainstream India. This is on account of a variety of factors: politics, lack of understanding of the local needs and faulty perceptions about the dynamics of the diversity of living conditions, cultural traditions, need-based local economy and the like, among the national planners and policy-makers. Enmeshed by a number of countries, the region is a melting pot of different nationalities, cultures and traditions. The resulting brew is exotic, with a distinct charm of its own, as to merit a more significant role in the political landscape of the Indian sub-continent. It is also a sanctuary for increasing subversive and fissiparous activities, which too could be the result of phenomenal neglect and unjust exploitation of the locals by a succession of rulers. Having a special status under the constitutional scheme[1], the region presents an excellent opportunity for research on the life, psyche, economic conditions and overall environment of its people. Such efforts, which are few and far between, explain the reasons for the different attitudes and attributes of these people besides projecting their world view, in first person. It is also hoped that such efforts will yield viable solutions to ensure that the Northeast remains culturally, emotionally, politically and economically an indivisible part of India.

It is with these expectations that one approaches the volume under review, which is a collection of forty-two articles, developed out of a seminar[2] and edited by very distinguished personalities, who have been associated with the administration, social life and academic environment of the region. The sweep and reach of the themes addressed also are amazing. They include poverty, population, pollution, and tribal traditions and their travails. The articles are clustered around three major 'inter-linked' issues of concern in Northeast India, namely, demography, levels of poverty, and the physical and social environment of the region. The editors claim that the issues were considered against the backdrop of the 'degrading social situation' and to 'suggest remedies'.[3] Unfortunately, what looks full of promise

ends up more as a collection of papers full of rambling thoughts. The connection between issues never gets established nor do the intended solutions get articulated anywhere. The book ultimately turns out to be little more than a compilation of statistical information.[4] The information explosion, attempted through a glut of statistical tables, in a large majority of articles, do not get supported by cogent analysis. The observations turn out to be very inane and axiomatic.[5] Some authors even allow the statistics to speak for themselves![6] The titles of over a dozen articles on problems of population growth mislead as they fail to create, through analysis, the nexus between ideas, themes and issues like population and environment[7], internal migration, natural resources and social services.[8]

The articles dealing with environmental issues[9] also leave one exasperated as they fail to connect or engage in a meaningful analysis of the issues.

The group of articles dealing with the problem of population are the most organized, analytical, and well researched.[10] While these too provide a surfeit of statistical information, one can discern that a serious attempt has been made to put them in an analytical frame.

Hence, one would question the basic objectives of the seminar and what was sought to be achieved in bringing out a volume of this kind. If the editors desired to make available a mine of information, as it is, as basic reference material, shorn of any analysis, for a researcher to pick, dig deep and critically evaluate, they have more than achieved their purpose. Verily, an excellent opportunity of transforming the collective wisdom of forty-two scholars into a major definitive research effort in relation to Northeast India is lost. What looked promising at the beginning turns out to be a mere mirage!

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U. Sankar. *Economic Analysis of Environmental Problems in Tanneries and Textile Bleaching and Dyeing Units and Suggestions for Policy Action.* New Delhi: Allied Publishers. 2001. Pp. xxii+300, Rs. 660.

There has been growing evidence of the continuous discharge of untreated effluents on land and water bodies adversely affecting the quality of groundwater, agricultural lands and human health. In spite of stringent environmental regulations by the Central Pollution Control Board (CPCB) as well as the Supreme Court, the 'Red—Highly Polluting' industrial units very often fail to comply with the Environmental Protection Rules 1986. This is widely attributed to: a) the preponderance of small-scale units, which are highly dispersed and resource poor; b) high transaction costs in enforcing the environmental standards and laws; c) the

lack of technical know-how and high costs of establishing and operating effluent treatment plants (ETPs); and d) the concerns of the state governments that strict enforcement of the regulations would hurt individual industries, which help to reduce unemployment. These problems are compounded by the absence of a database adequately supplemented with empirical analysis at the micro level examining the production processes, input usages, outputs produced and effluents generated, resource position, technical capabilities, etc. of the individual industrial units.

Against this backdrop, the volume under review assumes significance as the outcome of a pioneering study of the environmental problems caused by the tanneries and textile bleaching and dyeing units in Tamil Nadu. These account for 50 per cent of the tanneries in India and a significant share of the production of textile garments and apparel. The book is divided into two parts, containing seven chapters each. The first part gives a comprehensive account of the tanneries in the Ranipet and Vaniyambadi regions in North Arcot District, while the second part deals with the textile bleaching and dyeing units in Tirupur and Karur regions in Tamil Nadu. The major aspects covered include: a) the evolution, structure, growth and present status of the Indian leather and cotton textile industries; b) a techno-economic survey of tanneries as well as bleaching and dyeing units; c) environmental impact of effluents on water quality, health and agricultural land; d) the availability and status of Common Effluent Treatment Plants (CETPs) as well as Individual Effluent Treatment Plants (IETPs). Important policy suggestions are also discussed in separate chapters at the end of each part.

The author is pessimistic about India's trade performance in leather and textile products in the post-reform era as it has constraints in organisation and management of production and exports. However, India could continue to have a comparative advantage in the production of leather and cotton textile products with the opening up of the economy as the replacement of the multifibre agreement by the Agreement on Textiles and Clothing (ATC) under the WTO rules envisages integration of the entire textile sector into the multilateral framework. This would give India greater access to global trade and increase its share of the global textile exports. India's share in global exports of leather and leather products is projected to increase from 4 per cent in 1995–98 to about 10 per cent by 2004–05, provided steps are taken to remove infrastructural bottlenecks and high transaction costs involved in production and exports as well as in implementation of stringent environmental regulations. Moreover, Indian exports have to be price competitive and cost effective amid stiff competition from China and South Asian countries.

India's share in the exports of finished leather and leather products has increased from 15 per cent in 1971–72 to 100 per cent in 1991–92. About 93 per cent of the tanneries functioning in India are small-scale units, of which Tamil Nadu

accounts for 52 per cent, West Bengal for 21 per cent and Uttar Pradesh for 14 per cent. Tamil Nadu accounted for 46 per cent of India's exports of leather and leather products, 75 per cent of the export value of footwear components and 72 per cent of the value of finished leather in 1996–97. This clearly brings out the importance of Tamil Nadu in the exports of leather and leather products, thus justifying the scope of the study.

The high concentration of tanneries in the SSI sector makes it difficult to determine the installed capacity of tanneries as there are variations in technical capabilities, processes and levels of tanning. While some tanners process leather up to the 'finished' stage either by vegetable tanning (VT) or chrome tanning (CT) using hides or skins as raw material, others process leather only up to the 'semi-finished' stage.

An analysis of the impact of tannery effluents on water quality, human health and cultivable land, based on a survey of 352 households, revealed that 88 per cent of the respondents reported increasing levels of hardness/ salinity of groundwater as well as bad taste, indicating poor groundwater quality. While loss of working days and income due to illness was widely reported, 44 per cent of the households had spent Rs.500–5,000 for treatment. A bivariate analysis of the relationship between household income as well as education and willingness to pay for drinking water indicated a high response among the lower income groups (below Rs.2,000 per month). Similarly, illiterate and less educated persons were ready to pay more, in total contrast to the well-educated and high-income groups.

The survey also brings out the perceptions of the households on the effect of effluents discharged by the bleaching and dyeing units on water quality, human health and cultivable land. While about 74 per cent of the 595 respondents reported stagnation or run-off of the effluents, 72 per cent reported mosquito menace, and 57 per cent reported well-water contamination and the spread of respiratory diseases. Decline in land productivity, owing to water pollution, and a consequent depression in land values was reported by almost 90 per cent of the land owners.

A detailed discussion on the technical, institutional and economic issues in the setting up of Common Effluent Treatment Plants (CETPs) concludes that the majority of the tanneries cannot establish their own Individual Effluent Treatment Plants (IETPs) owing to constraints such as small scale of operations and lack of land, finance or technical and managerial expertise. Hence, Common Effluent Treatment Plants (CETPs) have been set up as a co-operative venture on the principles of collective action to reduce transaction costs in pollution abatement at the individual unit level. However, with the growing environmental concerns of the public and the pressure of environmental regulations under the WTO directives, it is important to consider how best the individual units will tackle this problem and how far the CETPs would help to achieve the prescribed standards.

A drawback of the existing cost-sharing scheme attached to CETPs is that it provides no incentives to member units to minimise pollution. The author suggests a three-part tariff system with in-built incentive and penalty clauses, viz., i) capacity-based charge considering the maximum volume of effluent a unit discharges in a year; ii) user charge based on the actual volume of pollutants in the effluent; and iii) customer-related charge. These measures are necessary to induce the units to conserve and economise on water use, reducing the volume of effluent generated at the existing level of output. Based on unit-level information on the pollution load, markets may be developed with Tradable Permits Scheme (TPS), to minimise the aggregate costs of reducing pollution.

The book is an important addition to the growing literature on the environmental consequences of industrial development. Researchers concerned with micro-level studies on environmental impact assessment of industrial projects would benefit from its sound methodological framework. The book also offers ample scope for future research on various dimensions of the problem, such as the environmental effects of these units on various classes of the dependent workforce and the environmental safeguards and security measures offered to them. Another dimension is long-term perspective planning for streamlining the development of the industrial segment in the context of the growing process of globalisation with environmental regulations.

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Manikuntala Sen. *In Search of Freedom: An Unfinished Journey*. Calcutta: STREE. 2001. Pp.310, Rs.120.

Manikuntala Sen has that rare talent which has proved wonderfully apt in the realm of modern history. Ms. Sen has done her best to give an account of the facts that have proved very crucial to an understanding of the events in Indian history. This account, as historical document, is to be studied in the hope that the informed mind will be able to persuade them to balance with their vivacity.

It is an engrossing and revealing book by a woman who was conscious of having achieved much (though she never mentioned it in so many words) but who also believed that at a time when she should have been at the top, she had suffered envy, bad faith and calumny. As the book progresses, the control of the narrative from a woman of self-regard becomes increasingly clear. The task of describing a talented and busy life is not stymied by interest in plain truth like her insistence on joining the Communist party. Later, in retrospect, she remarks that she felt a kind of

stupidity which goes beyond political incorrectness when faced with questions whether she ever did anything right in her life especially in the context when her uncle expressed his dismay that if she was joining the Communist party then she remained a non-believer. She said she pondered deeply, not finding an answer to the question.

Exceptionally few historians appeared to have said that a history of struggles, constantly trying to provide a historical explanation of why its own version of events should be accepted as the true one, is bound to turn into a tedious act. Yet, Sen keeps us firmly on familiar grounds, regaling us with many anecdotes and reassuring us with simple chronologies. Her sketches of the ensuing history of struggle are a whirlwind tour in various stages, in which tradition, feeling and reason have succeeded as dominant modes of understanding of the phases of struggle.

Events are the product of complex causation, in which interacting human decisions play an important part. The historian's ambition may not be to produce a stylised or elegant account, but rather one that captures a persuasive verisimilitude, imbricated with the contingent circumstances of a particular time and people who lived through the experiences. Sen asks, 'why should there be a quarrel between God and Communism? Why do I still feel angry at the negative propaganda? Is it not possible to reveal Communism to people through its economics, the superiority of the new society under the leadership of workers, a new state with more equality and justice to the people, equal rights and opportunities, more dignity to every individual, the liberation of female power, all the values that this ideology upholds? Of course it is. What else have I done all through my life as a Communist? And then, later, have we not seen Kalighat pandas or priests who manage the temple and organise the worship being inducted into the Party even as they continued to be associated with the temple?'

If each historical event or circumstance has multiple causes, it is equally true that each then generates multiple consequences. The uniqueness of history lies in this dual condition, sometimes trivially, sometimes substantially. If changes in the status-quoist position are attempted there would be more wild and unpredictable consequences. This happened when 'with the help of the British government, Rammohan Roy and Ishwarchandra Vidyasagar became successful in getting laws passed against *sati* and for widow remarriage. In order to achieve even this degree of limited reform, Rammohan had had to quit the country and there was no end to the humiliation that Vidyasagar had to bear. Those same women for whom they had suffered social ignominy averted their faces from these laws created for their welfare. They were not yet prepared to accept these reforms. Eventually, after ignoring a fresh round of social opposition, Vidyasagar had to prepare for reform by educating women.'

Sen's important line of argument may predispose one in favour of her views which explore the alternative and counterfactuals at various junctures in the history of the struggle for independence. She enables herself to be both erudite and cogent in staking out the ground. She questions the putative viability of British rule, raising the issue of Partition. The fact that her analysis is presented in characteristically robust terms should not obscure the extent to which this work builds on the Party perspective. Though not a historian, still on history she had already queried the adequacy and reality of the two-nation theory, which celebrated the inexorable unfolding of a preordained assertion of independence from the imperialist oppressors. She could not accept the fact that her party too had agreed to Partition as she believed that it was not the right thing to do because it did not work out happily.

There may be another way of saying that the impact of events on a particular individual may be spectacular for the individual concerned, yet simultaneously a manifestation of a regularity of incidence is tediously predictable for the whole population. In retrospect, it seems clear to her that what she refers to as the New Cultural Movement had come with a new light as the Second World War was on and people were hunger-stricken. Prominent masters in art and culture became involved in raising funds for relief measures.

As far as peasant movements are concerned, one may realise from Sen's account of Tebhaga Andolan that there is still plenty of scope for research on these movements which may be captured substantially. Her account of organising women before and after the Partition, making a special mention of Manorama Basu, who ultimately became a Communist, is impressive. But that is not what is emphasised more. How Manorama, known as Mashima, with single-minded determination transformed herself from a child bride to a social worker, teacher, philanthropist and woman activist enhances our concern.

At a later stage one finds that for her, conflict and division of the party were absolutely shocking. Like a self-confessed sceptic, she writes in response to a comrade's comment that the party must break: 'I responded only once. Fine, go ahead and split it up, but count me out. I had come to build a party, not to break it up. I had joined the party because I cherished some ideals; if these were brushed aside, what else could I do? In the name of idea so much hatred was being spewed out; friends were preparing to stab each other in the back; if this was what we were expected to do, there was no place for me in the party.'

This is a lively account, moving easily between psychology and history, exposing people in tireless action. She humbly acknowledges that there must always be more in other facts and events that could not be included than there is in her writing. The painting of the eventful past (Shedin) comes alive and resonates with the present. Her feeling that she was perhaps politically incorrect is misplaced. For her the journey never ended. Manikuntala has walked her way sincerely and

successfully. It would now be continued by the new generation.

One last word about the translators. The absence of their names will greatly intrigue people. So sublime is the work that it does not read like a translation. The anonymity of the translators may be a sign of humility and may generate appreciation, yet to receive the appreciation they may as well surface.

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Henryk Skolimowski. *Dharma, Ecology and Wisdom in the Third Millennium.* New Delhi: Concept Publishing Company. 2000. Pp.127.

Henryk Skolimowski has tried to buttress the foundations of newly formed *Ecophilosophy* by drawing upon two age-old concepts, Dharma and Wisdom. As we understand so we act. The more luminous is our understanding of the subtle intricacies of reality, the higher beings we are. The present condition of humanity is forlorn as we live in polluted physical, mental, and spiritual environments—all as a result of the current structure of our consciousness, which is programmed to manipulation, to mechanistic thinking, to an instrumental treatment of people and nature. According to Skolimowski, the true work of ecology is healing all the three environments, physical, mental and spiritual, simultaneously.

Skolimowski echoes the ideas of ancient Dharma and Wisdom that all is divine; all things are connected and are parts of the same web of life. A wrong attitude contributes to degeneration of the web itself. The traditional concept of Karma—you reap as you sow—at the personal level is extended to the principle of *ecokarma*, making us collectively responsible for the condition of life and redemption of the same. The traditional concept of yoga—pursuit of harmony and balance between body and mind— is extended to *ecoyoga* to include harmony and balance with nature. The practice of *ecoyoga* begins with viewing the world as a sanctuary and practicing of reverence as a right mode of our being in the world. Exercising empathy—to be friends with the cosmos is a precondition for being a true friend of yours. Reverence for all emphasizes the importance of responsibility for one's own life, for the life of all including the future generations. The proper discharge of this responsibility empowers self and inspires others. This empowerment is to establish your inner peace, so that you are empowered to help others and future generations, to heal nature, without which inner peace will be incomplete. When ugly and polluted environments violate our senses, our soul is bruised, and it suffers. Thus we cannot tolerate ugliness around us without suffering some harm. This is how individual salvation is linked with the improvement of the conditions of others and the environment.

Ecological Dharma informs us that ecological reconstruction and working in harmony with nature can be restored only by right livelihood—not just for a select few but for all —which is essential both for the spiritual well-being of the individual and for sustainability of the local, national and global society and the planets.

Ecoyoga is thus a path of beauty and sanctity of our times. *Mahayoga* informs us that overall balance and harmony signifies not only balance between our bodies and minds and between our hearts and souls, but also balance with other beings in the world. Striving for justice to enable others to live and striving for harmony with nature is a necessary part of *Mahayoga. Mahayoga* reminds us that we are always a part of the web of life, and true compassion means the yoga of life, which embraces all. The chapter on yoga of empowerment helps us to understand how to retain balance and remain rooted in values without getting swayed by the idols of the market place — competition and advertisements. Imitation, visualisation, turning adversity into advantage, beholding positive ideas, and participation are suggested as positive strategies of empowerment.

In the chapter on the yoga of wisdom, Wisdom and Dharma are referred to as the state of the entire being rather than of the mind. Discernment, judgement, distance (non-attachment), compassion, holistic sense of the universe, hope, and courage are explicated as dimensions of wisdom. Being stupid, repeating mistakes, learning to defuse the fuses within, which make situations irritating, and preoccupation with trivia are mentioned as hurdles, while healing inner phobias, fears, anxieties, catharsis, forgiveness, and discipline are mentioned as aids to the attainment of the state of wisdom. *Ecophilosophy* outlines ecological cosmology (right beliefs, right thought, right speech) and distinctive ecological ethics (right conduct, right livelihood). A human being is no longer seen as a machinist who manipulates or is manipulated, but as a custodian and guardian of the planets. Everything in the universe is related. Hence, establishing and maintaining a harmonious and balanced relation (right relation) is considered important.

From this conception of the cosmos (and of the human being within it) follows an ethics of reverence, responsibility, frugality and justice. As the ecological crisis has brought about an enormous sea of new suffering, ecological cleansing becomes the vehicle of the cessation of this suffering. Consequently, reverence for life and our universe as a sanctuary emerges as the basic ecological value. From this follows responsibility as reverence in action. The third is frugality, conceived as grace without waste, as doing more with less, as treading gently on the earth, leading to discarding horrendously wasteful lifestyles in favour of elegantly frugal lifestyles, gentle and unharmful to nature and other beings. It is argued that a sustainable world and sustainable development cannot be a reality in the absence of sustainable lifestyles and values. Genuinely sustainable development should be

ecologically responsible, economically frugal, socially equitable and culturally sensitive or culture specific; hence the futility of uniform blueprints that do not recognize the plurality of local contexts.

The chapter on the key to happiness starts with the statement that happiness is not a fixed state of being, but a perpetual state of becoming. Great causes elevate us and make us transcend our egoistic self. Great causes pervade us with reverence and infuse us with dignity, which are necessary components of a worthy life. This enhances life and enlarges our being. Happiness is being at peace with oneself while the self is united with a larger order of things. The key to happiness is to lose your ego and ambition, and to acquire a vision and a mission.

This book is very timely and helps us reconcile our traditional notions of Dharma and Wisdom with contemporary universal problems. It also offers a right perspective by following which a genuinely sustainable world and sustainable development become achievable by embracing sustainable (right) values and sustainable (right) livelihoods.

Mention may be made here of thousands of men, women and children who are part of *Swadhyaya parivar,* inspired by Shri Pandurang Shastri Athavale, and strive to live close to this principle of reverential attitude towards self, others and the universe as God is immanent in all this. He said in his Templeton Prize address (1997), 'It is my experience that awareness of nearness of God and reverence for that power creates reverence for self, reverence for others, reverence for nature and reverence for the entire creation'. This reverential attitude, invoked in large numbers, is responsible for the motivation that brought about sustained collective action, resulting in the creation of impersonal wealth. Beginning in 1958, Athavale established dozens of programmes without any external assistance, solely by inspiring the participants to demonstrate their *bhakti,* or devotion, by engaging themselves in socially useful and environmentally harmonious activities like tree planting (recipients of the first Indira Priyadarshini Vrikshamitra Award for the exemplary work done in establishing the Vrikshamandir near Baroda); numerous water harvesting initiatives in Saurashtra, Gujarat; *Yogeswar Krishi* farms by volunteers from farming communities, and *Matsyagandha*—floating temples by fishermen.

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A. Vaidyanathan and P. R. Gopinathan Nair (eds.). *Elementary Education In Rural India: A Grassroots View*. New Delhi: Sage Publications. 2001. Pp.563. Rs.695 (Cloth).

Much has been written and said about the state of elementary education in India. Although the Constitution guarantees free, universal and compulsory education for all children aged between 5 and 14, all reports and data on education show that even after Independence, we have not achieved this goal. In some states, like Kerala, where the data show a high level of enrolment, it has come at the cost of quality. Disparities in gender, caste, and class persist as does the urban-rural divide. The upper castes and classes in urban areas enjoy the benefits of universalization, while the lower castes, who are also economically backward, have been marginalized. Females from the Scheduled Tribes occupy the lowest rung in this hierarchy. All this has been reconfirmed by a survey conducted during 1993–1997. The findings of the study reinforce the existing stereotypes and show that the vicious circle of poverty is continuing, albeit at a higher level. Though the data point to great improvements in the overall literacy rates at all levels, the disparities still exist.

The book, edited by A. Vaidyanathan and P. R. Gopinath Nair, presents the findings of eleven studies on participation in and performance of elementary education in nine major states of India. The studies are a result of a National Research Project on Social Strategies and Financing for Human Development in India. Studies are based on secondary data from the 1981 and 1991 Census, the National Sample Survey (NSS), and the National Council of Educational Research and Training (NCERT). In order to supplement the data, surveys were conducted in ninety-five villages across nine states using a questionnaire with a common set of questions. This questionnaire was used as a springboard from which qualitative information was gathered through interactions, interviews and group discussions. On the basis of the 1981 data, districts were grouped into high, medium, and low categories, according to the literacy levels in the villages. The 1991 data were used to record the decadal changes in the literacy rates, and districts were classified into low change, medium change and high change groups. Using these classifications as a base, districts in diametrically opposing categories were selected, and factors affecting enrolment and dropout in elementary education in these districts were studied. Only one study of Maharashtra and Madhya Pradesh, by Sarthi Acharya, is based entirely on secondary data from the census and NSS. The study by Manabi Majumdar is based on two of the best performing districts in Tamil Nadu and Rajasthan. All the other studies have selected villages from two different districts within the same state.

The studies look at both the demand and the supply side factors that

affect enrolment (entry) and dropout (exit) rates. The demand side factors are caste, economic status, parents' occupation, parents' educational attainment, dependency burden, rank of the child in the birth order, number of animals, distance from sources of food, fuel, fodder and drinking water, and physical and social access to school. The supply side factors are school infrastructure, curriculum, incentives offered, teachers' qualification and experience, and interactions between the stakeholders (teachers, management, students, parents, community). Multivariate regression analysis was used to study the relative significance of the factors on enrolment and dropout rates. Most of the studies have used the probit/logit models to study the influence of any of the explanatory variables on the dependent variable, keeping all others constant. The findings of the studies have been presented with an interesting blend of tables and qualitative information.

The findings of the study do not reveal anything new about the factors that have a positive and significant influence on the enrolment and dropout rates (caste, economic status, parents' education and occupation, size of landholding). The factors that negatively influence enrolment and dropout rates are physical access to school, number of animals, distance from sources of food, fuel, fodder and drinking water. On the supply side the school infrastructure, teachers' qualification and attitudes, and curriculum seem to have a strong influence on the retention rates. Non-enrolment was also due to social discrimination and high direct costs of education (even though education is supposed to be free), lack of secular institutions (Srivatsava), and impersonal organizational aspects of schools that ignore the special needs of minority groups (Rajyalaksmi and Jabbi, Thomas, Srivastava).

However, the studies offer new insights into the role of the missionaries, communities, (Thomas, Srivastava, Nambisan), and literacy missions (Sailabala Debi) in causing literacy rates to improve. Some states like Maharashtra, Kerala, and Himachal Pradesh have been able to combine quantitative increases with qualitative improvements (Majumdar). Thomas, on the other hand, feels that the expansion in Kerala has been at the cost of quality because the school system in Kerala has been 'churning out semi-literates like an overworked grinding mill' since promotions are 'policy determined rather than performance determined'. While distance from the school seems to be a major factor in most states, in the UP Himalayas (Anuradha Pande) great progress in literacy rates has been made despite settlements being small and isolated with poorly developed roads. This study also gives historical reasons for high literacy rates among both males and females.

Most of the studies place the onus of drop-out rates on teachers and their attitudes, while only the study of rural Rajasthan (Nambisan) lists the 'official obligations' of the teachers that hinder their performance. The New Education Policy of 1986 clearly states that there will be no single-teacher schools (Sailabala

Debi). Yet, this is clearly flouted in most of the districts covered. In some cases enrolment figures and number of teachers are exaggerated because financial aid depends on these figures. Contrary to popular belief that incentives will attract and retain students, Srivastava's study of rural Uttar Pradesh reveals that people also value education for its future benefits. The studies also belie the myth that education in government schools is free. Most of the studies show that uniforms, books, examination fees, and travel costs are higher than tuition fees. Teachers' salaries constitute 90–99 per cent of the school expenditures, leaving very little for teaching-learning materials, and maintenance of infrastructure. Owing to deficiencies in the school systems, people in Rajasthan rely on private tuitions to improve their performance. All this adds to the cost of education.

The authors have made some recommendations to improve the attractive and retentive qualities of education. Some suggest that the curriculum be made more relevant and sensitive to the specific needs of the minorities, that the school calendar and timings be made more convenient, sensitizing the teachers to the needs of the community, and being sensitive to the needs and alleviating the pressures on the teachers. The Bihar study highlights the importance of greater interaction among the teachers, students, parents, and peer groups. Some studies call for strict monitoring and evaluation and for legislative instruments that will make education meet the socialistic aspirations of all sections.

Even though much effort has gone into the publication of this book, the tables have received little attention. The reader is deluged with numerous tables and statistical analysis; Areacode in Kerala has been chosen because it had high literacy and a high rate of change, whereas the table (5.1) shows it as a low literacy-low change area. According to the study in Orissa, all the 62.5 per cent of the students aged 10–14 who had enrolled had dropped out (Table 11.11), and in one study the table shows that there were a few cases where children had been enrolled at the age of one, with no explanation as to how this happened. The study of Maharashtra presumes the readers have a thorough geographic knowledge of the state and all the districts in the different regions like Vidharba, Khandesh, Konkan, and Marathavad. A small note or table giving the districts belonging to these regions would have been welcome. On the whole, the book is an eye-opener for the people involved in making a change in the education scenario of India: the policy makers, the educators (teachers and management), the community (beneficiaries), and the NGOs (grassroots initiatives).

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Remote Sensing and Agricultural Statistics: Rationale, Scope and Aims, Proceedings of National Seminar (April 21-22, 1998), Supplement to *Indian Journal of Agricultural Economics*, Vol. 55, No. 2, April – June 2000, Pages 124.

The volume under review is an excellent collection of selected papers on the application of remote sensing techniques in agriculture. These papers were presented at a seminar jointly organised by Indian Society of Agricultural Economics and National Remote Sensing Agency. Such an effort is highly commendable in the light of the potential for providing unbiased and real-time data on land uses, cropping pattern, irrigation and crop conditions, and the widely shared concern about ensuring reliable and timely agricultural statistics. The principal aim of the seminar, to familiarise agricultural economists and statisticians with the applications of remote sensing to crop statistics and related agricultural activities, has been widely publicised by this supplement.

The foreword, by Dr A Vaidyanathan, highlights the importance of remote sensing techniques in generating agriculture-related data more accurately with less involvement of manpower. This is followed by a succession of analytical and informative papers by eminent economists and experts from ISRO, National Remote Sensing Agency, Directorate of Economics and Statistics, and Central Statistical Organisation.

Prof. Y. K. Alagh's six point programme for using satellite data to supplement traditional sources of agricultural statistics summarises the uses of remote sensing data in a way that makes it clear even to the layman. These data can substitute the traditional crop and season reports with a time lag of three to five years with timely data on land use statistics. The space data can be used for checking estimates of errors of crop area and yield statistics. Geographic mapping systems can be used for public sector projects such as watersheds. Farmers, who are a source of data, can also be recipients of technology and agro-economic data, which would be serviceable in agriculture in a globalising world. Remote sensing images can also be useful in building up new systems of man and machine working together in a restructured agricultural information system.

'Scientific Basis of Remote Sensing and Applications in Agriculture,' by Sridhar and Parihar, discusses the physical and statistical basis of remote sensing application in agriculture, and emphasises the principles underlying various agricultural applications such as crop identification area, yield estimation, and soil moisture. Gautham *et al.*, in their paper on 'Spatial Analysis of Land Use/Land Cover over India Using Satellite-Based Remote Sensing Techniques,' have presented the results of the data using these techniques. They have shown how the remote sensing technique can be used to collect up-to-date and accurate information of

land use and land cover at the district level and to monitor the changes periodically. The detailed methodology and the results of the reconciliation exercise on land use statistics generated by remote sensing and ground-based techniques is well documented by National Remote Sensing Agency.

Some of the broad agricultural areas wherein considerable progress has been made in the last few years in the country are: i) crop production forecasting, ii) land use/cover mapping, iii) mapping of wastelands, iv) soil mapping, v) drought monitoring, vi) monitoring of surface water bodies and vii) groundwater exploration. Improvement in the accuracy of remote sensing estimates is associated with technological development and use of high-resolution data. Manjunath, Panigrahy and Chakraborty elaborate all this in their paper on 'Crop Assessment Using Remote Sensing — Crop Acreage Estimation, Crop Condition and Yield Assessment. The CAPE project has provided training support for various government agencies in remote sensing analysis in agricultural applications. The paper highlights the use of remote sensing to get pre-harvest crop yield estimates and early crop condition assessments.

The paper by Sharma, Chaurasia and Mahey attempts to compare the wheat acreage and production estimate in Punjab using remote sensing technology and a cooperative approach. They opine that remote sensing technology, combined with other data inputs, can provide a reliable, timely, accurate and effective method for pre-harvest acreage and production estimation.

The scope, potential and limitations of using remote sensing applications in the agricultural statistical system are elaborately discussed by Rajiv Mehta. The potential of remote sensing techniques is realised in bridging the gaps in the data in the existing system and removing the impediments to decision-making and policy formulation.

In addition, the supplement contains papers on experience in the use of remote sensing for crop statistics (by Deka and Deb, and Rajiv Sharma *et al.*); application of remote sensing in agricultural statistics (by Narasimham and Chandra); and crop inventory using remotely sensed data (by Navalgund and others).

To sum up, the supplement highlights the advantages and disadvantages of remote sensing technology, which has proved to be highly useful in the estimation of yield of major crops, land use, and surface water availability, groundwater table, etc. The final estimates of area and production emerging from the existing system can be refined through the use of remote sensing techniques. The advance estimates and forecasts are mortals: though they attempt to foretell the future, they die when the final figures are available. However, these forecasts have immense value in decision making and timely action on the policy front. The element of minimum human bias in this technique is very useful when the decisions based on these results influence policies connected with financial transactions such as drought

and calamity relief. The remote sensing technique helps in generating data with minimum errors, reducing the costs and avoiding data fudging.

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Notes

[1]With a particular level of autonomy to the people conferred under the Sixth Schedule of the Constitution.
[2] The seminar was held in 1996 and was organized by North East India Council for Social Science Research, Shillong. *See Introduction*, at p.5.
[3] *Ibid.*, also *see* the blurb.
[4] As many as 107 statistical tables, most of which have been sourced from Government records, find a place in the book!
[5] *See*, for example, the observation, 'If the population growth in these states is controlled then more than half of the problems can be solved,' and 'for sustainable development and in the interest of intergenerational equity, all the states will have to control population growth,' at p.48: also *see*, '… some findings are only preliminary in nature and further research is necessary at this stage'!, at p.79 and *see*, '.....control population to reduce population', at p.101.
[6] *See*, for example, the statement, 'The evidence is loud and clear'!, at p.114.
[7] Article entitled 'Growth of Population and Environmental Problems in the Urban Areas of North East India', pp.92–101.
[8] In the article entitled 'Composition and Pattern of Internal Migration in Aurnachal Pradesh: A District Level Study', the author confesses the difficulty of establishing such a relationship, but still makes an attempt! (p.135).
[9] As many as eight articles deal directly with the subject (article nos. 14, 30 and 37 to 42).
[10] At least fifteen articles revolve around poverty (article nos 18 to 22, 24 to 29 and 32 to 35).

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