
Institutional Specificities and Agrarian Transformation in Arunachal Pradesh: Changing Realities and Emerging Challenges

Deepak K. Mishra*

I

INTRODUCTION

The centrality of institutional mechanisms to facilitating and fostering economic growth is being widely acknowledged today. There is also a greater recognition of the diversity in institutional arrangements that affect the economic processes, particularly in the context of developing countries' agriculture. The failure to take into account the ecological and institutional specificities of the mountainous regions, it has been argued, has resulted in inadequate efficacy of development intervention in many underdeveloped and remote regions. India's north-eastern region, characterised by an extraordinary degree of diversity in terms of its ecology, social structure and economy, continues to remain relatively underdeveloped, and inadequate attention to local specificities has been cited as one of the main reasons behind this.

Without going into the details of the way institutions have constrained or facilitated development in the region, this paper tries to focus on the specificities of institutional arrangements in relation to the development of agriculture in Arunachal Pradesh, a mountainous border state. Agriculture accounted for 27 per cent of the net state domestic product (NSDP) of Arunachal Pradesh in 2003-04 and as per 2001 Census, nearly 63 per cent of total workers in the state were engaged in agricultural activities. Given the predominantly rural character of agriculture as well as the spatial unevenness and diversity in the farming systems within the state, transforming traditional agriculture in a way that enhances productivity and raises the earnings and well being of those dependent on agriculture remains one of the fundamental challenges facing Arunachal Pradesh. The paper, relying upon the available secondary data on agrarian structure and production of various crops as well as few micro-studies, attempts to identify the key institutional specificities, which have impacted upon the growth performance of agriculture in this predominantly tribal state.

*Associate Professor, Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi-110 067.

II

PROPERTY RIGHTS AND AGRARIAN STRUCTURE

Changing Property Rights Structures

The property rights formations in Arunachal Pradesh have undergone substantial changes over the last five decades. The traditional form of land ownership was collective, although animals, tools and implements were privately owned. Most of the villages had some institutional mechanism like village councils to manage and safeguard property rights in land and forest.¹ The traditional shifting cultivation system was based upon elaborate networks of informal contracts, co-operation, resource pooling, risk sharing and mutual insurance mechanisms. However, because of internal dynamics of the system such as non-coverage of covariant risks, absence of fairness in the distribution of agricultural land in terms of quality, lack of sufficient surplus generation and demographic changes as well as the mutually reinforcing interventions by the state and market forces, private property rights over land have emerged in many parts of the state (Mishra, 1987; 2001; Roy and Kuri, 2001, pp.53-59).

Although individualisation of ownership rights over land is the most widely noticed dimension of the transitional phase in Arunachal Pradesh, it is important to note that the collective or communal property rights continue to have diverse context-specific operational meanings.² In practice, there were considerable local variations in the rule governing access to land. The land under shifting cultivation, generally described as under ownerships by the whole village community and over which individuals are supposed to have use rights alone, are owned by specific clans and by individual households³ (Bordoloi, 1998).

The traditional shifting cultivation systems have undergone several changes in response to the emerging opportunities and constraints. Firstly, there has been a perceptible decline in the area under shifting cultivation, although there are conflicting estimates of the area under shifting cultivation in the state⁴. Secondly, the *jhum* cultivation system itself has changed in terms of the time span of the *jhum* cycle, crop mixes and input use.⁵

The emergence of private property rights over land is often preceded by adoption of permanent cultivation, which in turn might have followed a gradual shortening of the *jhum* cycle or abandonment of *jhum* cultivation. Thus, the growing privatisation of property rights over cultivable land could be inferred from the rise in the share of area under settled cultivation in total operated area.⁶ While the area under settled cultivation has increased from 5.73 per cent in 1970-71 to 31.96 per cent in 1995-96 as a proportion of total operated area, its share in net sown area has gone up from 24.31 per cent to 48.84 per cent during the same period (Table 1).

TABLE 1. EXTENT OF JHUM AND SETTLED CULTIVATION IN ARUNACHAL PRADESH: 1970-71 TO 1995-96

Year (1)	Share in total operated area		Share in Net Area Sown	
	Jhum (2)	Permanent (3)	Jhum (4)	Permanent (5)
1970-71	94.27	5.73	75.69	24.31
1976-77	89.88	10.12	64.25	35.75
1980-81	84.51	15.49	56.01	43.99
1985-86	77.70	22.30	48.59	51.41
1990-91	68.90	31.10	44.08	55.92
1995-96	68.04	31.96	51.16	48.84

Source: *Agricultural Census*, Government of Arunachal Pradesh, various years.

Trends in Agrarian Structure

The distribution of land ownership is an important indicator of the access to one of the most important means of production in predominantly agrarian economies. However, because of the non-availability of data on landownership in Arunachal Pradesh, the distribution of operational holdings has been used to understand the changes in agrarian structure in Arunachal Pradesh.

Size-Class wise Distribution of Operational Holdings: 1970-71 to 1995-96

As per *Agricultural Census*, 1995-96, around 19 per cent of operational holdings were marginal holdings, operating on only 3 per cent of the total operated area. On the other hand, only 6 per cent of holdings belonging to the large size category operated on nearly 24 per cent of the area. Between 1970-71 to 1995-96, there has been a significant increase in the share of marginal, small and semi-medium categories of holdings, while that of the medium and large size-classes have declined (Table 2). Thus, the prominent feature of the agrarian structure as captured through the distribution of operational holdings is the increasing marginalisation of holdings.

TABLE 2. SIZE CLASS WISE DISTRIBUTION OF OPERATIONAL HOLDINGS IN ARUNACHAL PRADESH: 1970-71 TO 1995-96

Size class of operational holdings (ha) (1)	Share in total holdings (per cent)											
	1970-71		1976-77		1980-81		1985-86		1990-91		1995-96	
	No. (2)	Area (3)	No. (4)	Area (5)	No. (6)	Area (7)	No. (8)	Area (9)	No. (10)	Area (11)	No. (12)	Area (13)
Marginal	7.67	0.71	9.69	0.99	16.53	2.25	17.18	2.67	17.38	2.87	19.26	3.03
Small	11.96	2.77	18.25	4.36	20.75	6.89	18.87	7.02	18.40	7.51	19.37	7.62
Semi- Medium	25.91	11.63	27.42	12.75	28.13	17.81	31.17	21.80	32.01	24.00	28.97	22.36
Medium	36.40	35.00	27.32	28.34	28.10	38.87	27.01	40.17	27.16	42.13	26.65	43.32
Large	18.06	49.89	17.33	53.57	6.48	34.18	5.77	28.33	5.04	23.50	5.75	23.67
All	100	100	100	100	100	100	100	100	100	100	100	100

Source: *Agricultural Census*, Government of Arunachal Pradesh, various years.

The fragmentation of holdings due to family/clan-partition, partial or complete abandonment of large jhum plots in favour of smaller permanent holdings might have caused the decline in the number of large size holdings. In addition to these the shift of manpower from rural/agricultural occupations to urban/non-agricultural occupations; increasing population pressure on fertile plain land which is scanty and the resultant demographic differentiation; the influx of migrant labourers as tenants has also acted as a catalyst of differentiation. However, given the increasing popularity of horticulture and the drive for land occupation among the neo-rich, under-reporting of area under the large category of holdings is also a distinct possibility (Mishra, 2001; 2002b). The Gini Concentration Ratio, which has shown a fluctuating trend during the period, demonstrates a decline in inequality in the distribution during 1980-81 to 1990-91, but between 1990-91 to 1995-96 there has again been a rise in inequality in the distribution of operational holdings in the state (Table 3). The trends in the inter-class concentration ratio,⁷ also shows that the relative shares of the three smaller categories, after showing an increasing trend during the earlier periods, has declined during 1990-91 to 1995-96.

TABLE 3. INDEX OF INTER-CLASS CONCENTRATION RATIO AND GINI RATIO

Size class of operational holdings (1)	(ha)					
	1970-71 (2)	1976-77 (3)	1980-81 (4)	1985-86 (5)	1990-91 (6)	1995-96 (7)
Marginal	9.26	10.23	13.67	15.54	16.60	15.74
Small	23.16	23.89	33.49	37.20	41.36	39.50
Semi-Medium	44.89	46.50	63.88	69.97	77.57	72.24
Medium	96.15	103.69	139.52	148.72	159.19	162.21
Large	276.25	309.24	518.52	490.99	509.03	411.30
Gini Concentration Ratio	-	0.52444	0.527604	0.491387	0.460899	0.47723

Source: Computed from *Agricultural Census*, Government of Arunachal Pradesh, various years.

The problem of arriving at any generalisations regarding the agrarian structure of the state by examining the state level data is evident from the distribution of operational holdings at the district level. There is considerable inter-district variation in the shares of different classes of holdings in the state (Table 4). The share of marginal holdings in the districts, for example, varies from a high of 70.79 per cent in Tawang to a low of 1.58 per cent in Upper Subansiri district. In a number of districts the semi-medium category of holdings seems to have an overwhelming presence, while in others their share is relatively small. The variations are particularly high in the case of the smallest and the largest of the size classes. The size class wise distribution of holdings, like many other aspects of agriculture in the state, seems to have been influenced by the local topography and other ecological conditions.

TABLE 4. SIZE CLASS WISE DISTRIBUTION OF OPERATIONAL HOLDINGS IN DISTRICTS OF ARUNACHAL PRADESH: 1970-71 TO 1995-96

District	Share of Holdings and Area									
	Marginal		Small		Semi		Medium		Large	
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Tawang	70.79	50.38	26.51	41.72	2.69	7.9	0	0	0	0
West Kameng	25.5	6.56	24.04	17.4	45.28	61.38	4.95	12.64	0.24	2.01
East Kameng	7.57	1.64	21.89	10.01	38.62	33.46	31.63	50.43	0.29	4.46
Papum Pare	17.12	2.47	17.04	5.66	32.53	21.55	27.97	42.41	5.33	27.92
Lower Subansiri	20.01	3.5	23.07	9.74	32.02	26.35	19.80	35.49	5.1	24.91
Upper Subansiri	1.58	0.17	6.25	1.82	37.17	21.19	44.32	50.88	10.68	25.94
West Siang	4.76	0.37	5.52	1.35	22.08	9.39	48.04	46.85	19.6	42.04
East Siang	6.07	0.67	13.62	4.08	26.62	15.25	44.88	54.03	8.81	25.98
Upper Siang	29.28	3.97	17.03	6.28	18.8	12.44	25.12	43.67	9.78	33.64
Dibang Valley	27.27	7.56	24.86	15.86	26.06	28.89	16.40	31.09	5.41	16.6
Lohit	24	5.32	24.09	13.67	34.66	34.31	13.86	30.71	2.74	15.99
Changlang	26.9	6.07	33.77	19.42	25.48	24.90	10.69	21.86	3.16	27.74
Tirap	8.93	1.36	13.57	4.22	31.53	24.75	42.75	59.48	3.22	10.18
Arunachal Pradesh	19.24	3.03	19.33	7.64	28.96	22.37	26.69	43.31	5.75	23.65

Source: Computed from *Agricultural Census*, Government of Arunachal Pradesh, various years.

Another aspect of the agrarian structure that assumes much significance in the state is the relative share of holdings operated by the Scheduled Tribes.⁸ There has been a marginal decline in the share of ST operated holdings, both in number of holdings and area operated, during 1970-71 to 1995-96. However, among various size classes, the relative share of ST operated holdings within the marginal category of holdings has seen the sharpest decline. As the operational holdings belonging to the Scheduled Tribes accounts for around 93 per cent of the holdings in the state the size class wise distribution of ST operated holdings, by and large, follows the same pattern as that of the total holdings.

The average size of holding has steadily declined from 6.19 ha in 1970-71 to 3.31 ha in 1995-96, partly showing increasing population pressure on the agricultural land. Within the different size classes, the decline has, however, not been uniform. In the large size class, for example, the average size increased, during 1970-71 to 1980-81, thereafter it has declined steadily. Another noticeable feature is the decline in the average size of holdings across all the size classes during 1990-91 to 1995-96.

Tenancy: Extent and Types

In Arunachal Pradesh, the agrarian structure continues to be dominated by owner-cultivators, although the areas under tenancy as well as the percentage share of both partly leased-in and entirely leased-in holdings are increasing (Table 5). Although a few micro studies have reported that a land-lease market has already developed in

parts of the state, with labourers from neighbouring states and countries migrating to the rural areas as tenants, the agricultural census does not reflect such a trend till 1995-96 (Mishra, 2002a; Roy and Kuri, 1999; 2001). So far as the size class wise distribution of leased-in operational holdings is concerned, it is found that most of the leased-in holdings belong to the marginal and small categories of holdings (Table 6). In terms of the types of tenancy, it is found that in 1995-96, fixed money tenancy accounts for the largest proportion of leased-in area, followed by 'other terms', while share cropping accounts for around one-fourth of the area leased-in. There is possibility that the extent of leasing-in is being underreported in the Agricultural Census data.

TABLE 5. EXTENT OF TENANCY ACROSS SIZE CLASSES OF OPERATIONAL HOLDINGS
(ARUNACHAL PRADESH): 1970-71 TO 1995-96

(as per cent to total operational holdings)

Year (1)	Type (2)	Marginal (3)	Small (4)	Semi- medium (5)	Medium (6)	Large (7)	All size classes (8)
1970-71	Self Operated	99.67	99.47	99.71	99.76	100	99.75
	Partly Leased in	0.33	0.53	0.29	0.24	0	0.25
	Wholly Leased in	0.17	0.63	0	0	0	0.1
1976-77	Self Operated	90.41	98.18	99.52	99.29	99.11	98.26
	Partly Leased in	6.69	1.57	0.38	0.66	0.89	1.38
	Wholly Leased in	1.47	0.25	0.1	0.05	0	0.23
1980-81	Self Operated	97	98.39	97.19	98.43	99.27	97.89
	Partly Leased in	1.26	1.39	2.57	1.54	0.73	1.7
	Wholly Leased in	1.74	0.21	0.24	0.02	0	0.41
1985-86	Self Operated	99.26	98.12	97.85	99.54	99.66	98.7
	Partly Leased in	0.6	1.85	1.95	0.46	0.34	1.21
	Wholly Leased in	0.14	0.03	0.2	0	0	0.09
1990-91	Self Operated	99.41	98.85	98.28	99.38	99.68	98.95
	Partly Leased in	0.47	1.15	1.56	0.6	0.32	0.97
	Wholly Leased in	0.12	0	0.17	0.02	0	0.08
1995-96	Self Operated	97.94	97.7	99.24	99.31	98.41	98.66
	Partly Leased in	1.35	0.94	0.03	0	0	0.46
	Wholly Leased in	0.71	1.35	0.73	0.68	1.59	0.88

Source: *Agricultural Census*, Government of Arunachal Pradesh, various years.

III

GROWTH PERFORMANCE OF AGRICULTURE

Between 1970-71 to 2001-02, agriculture in Arunachal Pradesh registered a growth rate of 6.53 per cent per annum, as against a growth rate of 7.34 per cent of the state's NSDP. While agriculture grew at a rate of 6.4 per cent during 1970-71 to 1979-80 and at a rate of 9.18 per cent during the 1980s, during 1990-91 to 2001-02, its growth rate came down to 2.68 per cent. This decline in the growth of the agriculture sector in the nineties, along with the deceleration of growth in the forestry and logging sector, following the restrictions imposed on timber trade, had a serious impact on the state's economy. In this section, the growth performances of various important crops and changes in the cropping pattern have been discussed with a view to bring out the nature of agrarian transformation that the state has undergone.

TABLE 6. EXTENT OF TENANCY IN ARUNACHAL PRADESH: 1970-71 TO 1995-96

Size class of operational holdings (in ha)	Percentage of leased-in holdings to total holdings											
	1970-71		1976-77		1980-81		1985-86		1990-91		1995-96	
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Marginal	0.50	0.12	8.17	3.64	3.00	1.81	0.74	0.32	0.59	0.29	2.07	2.39
	[10.71]	[2.02]	[49.30]	[19.06]	[23.55]	[6.01]	[9.04]	[3.81]	[9.71]	[2.84]	[23.09]	[30.90]
Small	1.16	0.14	1.82	0.65	1.61	0.80	1.88	0.57	1.15	0.42	2.30	1.57
	[39.29]	[9.41]	[20.71]	[14.95]	[15.82]	[8.09]	[27.58]	[18.00]	[20.12]	[10.78]	[38.36]	[33.05]
Semi-Medium	0.29	0.08	0.48	0.15	2.81	1.58	2.15	0.57	1.72	0.58	0.77	0.23
	[21.43]	[22.37]	[8.25]	[10.12]	[37.50]	[41.53]	[52.17]	[56.37]	[52.58]	[47.45]	[17.27]	[16.13]
Medium	0.24	0.03	0.71	0.17	1.57	0.71	0.46	0.09	0.62	0.24	0.68	0.09
	[25.00]	[27.73]	[12.09]	[25.63]	[20.89]	[40.47]	[9.67]	[15.77]	[16.08]	[35.39]	[13.36]	[13.62]
Large	0.00	0.00	0.89	0.11	0.73	0.08	0.34	0.05	0.32	0.04	1.59	0.11
	[0.00]	[0.00]	[9.65]	[30.24]	[2.23]	[4.00]	[1.54]	[6.04]	[1.52]	[3.53]	[7.96]	[6.31]
All	0.35	0.04	1.60	0.19	2.11	0.68	1.30	0.22	1.05	0.29	1.34	0.30
	[100]	[100]	[100]	[100]	[100]	[100]	[100]	[100]	[100]	[100]	[100]	[100]

Source: *Agricultural Census*, Government of Arunachal Pradesh, various years.

Note: Figures within square brackets refer to percentage to column totals.

Cropping Pattern and Diversification

The changing cropping pattern of agriculture in Arunachal Pradesh can be judged from the steady decline in the percentage of area under foodgrains, and an increase in the area under non-foodgrains, particularly since 1980 (Table 7). Considering nine major crops being produced in Arunachal Pradesh, it was found that the share of foodgrains came down from nearly 87 per cent in the early 1980s to nearly 77 per cent during 2000-03. The cereal together accounted for 86 per cent of total area in 1980-83, but their share has come down by more than 11 percentage points by 2000-03. Among the cereals maize is the only crop that has increased its share in area during the last two decades, while all others, most notably rice, have lost their share in total cropped area. Pulses have also increased their share in total area. Among other major gainers are oilseeds and vegetables. The value of the Herfindahl index

TABLE 7. CHANGING CROPPING PATTERN IN ARUNACHAL PRADESH: 1980-81 TO 2002-03

Crops (1)	TE 1982-83 (2)	TE 1992-93 (3)	TE 2002-03 (4)	Change during TE
				1982-83 to TE 2002-03 (5)
Rice	57.49	51.82	48.68	-8.81
Maize	14.98	15.95	15.78	0.80
Millet	11.37	8.94	8.19	-3.18
Wheat	2.13	1.68	1.65	-0.48
Total Cereals	85.97	78.39	74.29	-11.67
Total Pulses	0.90	2.41	2.72	1.82
Total Foodgrains	86.87	80.80	77.02	-9.85
Vegetables	6.34	7.67	8.91	2.57
Oilseeds	5.55	9.99	11.05	5.50
Spices	0.94	1.39	2.66	1.73
Sugarcane	0.30	0.15	0.36	0.06
Total	100.00	100.00	100.00	0.00
Herfindahl Index	0.373567	0.318886	0.290418	

Source: Computed from *Statistical Abstract of Arunachal Pradesh*, various years.

has declined from 0.38 in triennium ending 1982-83 to 0.29 during triennium ending 2002-03, suggesting a greater diversification of the cropping pattern.⁹

Growth of Area, Production and Yield of Major Crops: 1970-71 to 2000-02

The performance of agriculture in Arunachal Pradesh can be judged from the growth rates of area, production and yield of different crops and crop groups presented in Table 8. During 1980-81 to 2004-05, the foodgrain output in the state has grown at a compound rate of 1.76 per cent. While area under foodgrains has grown at the rate of 1.18 per cent, the growth rate of yield has been far from satisfactory. Within foodgrains the highest growth in production has been recorded for pulses, followed by maize. Although the growth of area contributed significantly to the expansion of production of these two crops, their growth rates of yields were better than that for many other foodgrains as well. The production of rice, the major cereal crop of the state, increased at a rate of 1.28 per cent only, with an insignificant growth in yield. Among non-foodgrains, the most promising crops include spices, oilseeds and vegetables.¹⁰ Their high growth rates in production, however, have to be viewed in relation to the abysmally low levels from which production of these crops have shot up. Secondly, expansion of area has contributed substantially to the growth of these crops, although in the case of spices, there seem to be considerable yield improvement as well.

TABLE 8. GROWTH RATE OF AREA, PRODUCTION AND YIELD RATE OF CROPS
(ARUNACHAL PRADESH): 1980-81 TO 2004-05

Crop/ Crop groups (1)	1980-81 to 2004-05			1980-81 to 1989-90			1990-91 to 1999-2000			2000-01 to 2004-05		
	A (2)	P (3)	Y (4)	A (5)	P (6)	Y (7)	A (8)	P (9)	Y (10)	A (11)	P (12)	Y (13)
Rice	0.97	1.28	0.30	4.27	5.39	1.08	-0.12	-1.04	-0.93	0.49	1.73	1.25
Maize	1.99	3.13	1.12	5.41	6.53	1.07	-0.79	0.62	1.42	-0.32	1.39	1.71
Millet	0.05	0.83	0.78	3.04	1.73	-1.26	-1.38	-2.30	-0.94	3.39	6.15	2.68
Wheat	0.64	0.89	0.25	4.02	6.24	2.14	-0.04	-4.30	-4.25	0.32	8.61	8.27
Total cereals	1.04	1.61	0.57	4.35	5.30	0.90	-0.39	-0.89	-0.49	0.64	2.28	1.62
Total pulses	7.73	10.86	2.90	18.33	23.86	4.68	2.78	5.72	2.86	2.80	2.77	-0.03
Total Foodgrains	1.18	1.76	0.58	4.55	5.46	0.86	-0.29	-0.72	-0.43	0.71	2.30	1.56
Vegetables	3.51	2.83	-0.66	5.11	9.35	4.04	0.00	-1.07	-1.07	0.53	1.99	1.45
Oilseeds	5.32	6.69	1.31	12.02	14.17	1.92	2.13	1.47	-0.65	0.79	-1.00	-1.79
Spices	7.83	15.65	7.25	8.34	14.65	5.82	9.40	20.71	10.33	0.29	-1.28	-1.57
Sugarcane	3.97	4.69	0.69	-7.55	-2.38	5.59	11.75	8.32	-3.07	-6.01	-2.50	3.74

Source: Computed from figures provided in *Statistical Abstract of Arunachal Pradesh*, various years.

Note: All growth rates are compound growth rates. A= Area, P= Production and Y= Yield.

The overall growth pattern, however, conceals a great deal of temporal variations in different sub-periods. The eighties as a decade was substantially better than the nineties in terms of the growth performance of all major cereals and foodgrains. The growth rate of production of rice, maize and wheat, along with that of cereals as a

group, was higher than 5 per cent during 1980-81 to 1989-90. The remarkably disappointing growth performance of all major crops during the 1990s is manifested in the negative growth rates of production and yield rates of all the foodgrains, except maize and pulses. In the case of the latter two crops as well, there was a decline in the growth rates of production. Among non-foodgrains, spices and sugarcane could achieve higher growth rates than the eighties, while the growth performance of vegetables and oilseeds worsened during the nineties.¹¹ There seems to be some recovery in terms of growth performance of crops during the last period under study. The performance of oilseeds, spices, vegetables and sugarcane, however has worsened off during the last five-year period. Thus, after a remarkably poor growth performance of the crop production sector during the nineties, there seems to be some recovery during the last five years.

Agricultural Production at the District Level

The compound growth rates of the main cereal crops at the district level have been presented in Table 9. Due to non-availability of data, the analysis is confined to only four major cereal crops and to the 11 undivided districts of the state. However, since these crops account for around 75 per cent of the total operated area in the state, the growth performance of these crops at the district level is likely to provide important insights into the state of the agrarian economy at a disaggregated level.

TABLE 9. GROWTH RATE OF AREA, PRODUCTION AND YIELD RATE OF CEREALS IN THE DISTRICTS OF ARUNACHAL PRADESH: 1980-81 TO 2003-04

District (1)	Rice			Maize			Millet			Wheat			Cereals		
	A (2)	P (3)	Y (4)	A (5)	P (6)	Y (7)	A (8)	P (9)	Y (10)	A (11)	P (12)	Y (13)	A (14)	P (15)	Y (16)
Tawang	-0.86	-0.46	0.40	2.38	4.91	2.47	1.41	2.28	0.85	0.16	-0.13	-0.29	0.40	0.78	0.38
West Kameng	-1.34	-2.13	-0.80	1.21	3.39	2.14	-0.96	1.56	2.53	1.28	1.48	0.20	0.17	1.98	1.81
East Kameng	1.85	1.78	-0.07	2.55	5.61	2.97	-2.68	-1.55	1.17	-5.93	-6.58	-0.70	1.54	2.18	0.63
Lower Subansiri	-0.79	-0.34	0.45	-0.38	-0.50	-0.12	2.04	2.33	0.28	9.55	5.10	-4.07	-0.52	-0.18	0.34
Upper Subansiri	2.70	-0.11	-2.72	2.93	6.87	3.82	10.33	8.45	-1.71	9.92	10.14	0.22	3.45	2.31	-1.10
West Siang	1.30	1.13	-0.17	1.71	3.10	1.35	0.60	1.89	1.29	7.18	6.22	-0.89	1.28	1.44	0.16
East Siang	1.36	2.78	1.40	-0.17	3.19	3.37	-2.20	0.09	2.34	3.41	4.37	0.93	0.47	2.54	2.06
Dibang Valley	1.77	2.90	1.12	2.42	4.52	2.06	0.76	1.47	0.71	12.08	11.61	-0.42	1.95	3.43	1.45
Lohit	1.49	1.69	0.21	6.72	5.35	-1.28	3.50	0.21	-3.18	-0.48	-0.82	-0.34	2.89	2.50	-0.38
Changlang	1.99	2.93	0.92	8.26	10.18	1.77	-0.98	-1.38	-0.41	-0.67	-1.61	-0.95	1.75	2.78	1.03
Tirap	1.24	-1.06	-2.28	2.05	2.53	0.46	0.04	-0.40	-0.44	-8.52	-7.66	0.95	0.78	-0.04	-0.82

Source: Computed from figures provided in *Arunachal Agriculture in Brief*, 1980-93 and *Statistical Abstract of Arunachal Pradesh*, various years.

Note: All growth rates are compound growth rates. A= Area, P= production and Y= yield.

During 1980-81 to 2003-04, two districts, namely Lower Subansiri and Tirap, have witnessed negative growth in overall cereal production. Relatively higher growth in total cereals is observed in Dibang Valley, Changlang, East Siang and Lohit districts. The growth rate of yield was the highest in East Siang district, while in many of the better performing districts the growth rate of area under cereals was relatively high. In terms of crop-specific performance, as many as five out of the eleven districts under study had negative growth rates in rice production. The decline was particularly sharp in the case of West Kameng district. East Siang, Dibang Valley and Changlang have achieved relatively high growth rates in the production of rice. Again, apart from East Siang, in all other districts the growth in production of rice was largely a result of expansion of area rather than improvements in yield rates.

The growth rates of production of maize in almost all the districts have been much impressive than that of rice. The only district showing a negative growth in maize production is Lower Subansiri. An important aspect of the better growth performance of maize in the districts is the relatively high growth rate of yield rate. In seven districts the yield rate of maize has increased at a rate of more than 2 per cent per annum. In the case of millet there seems to be a wide dispersion of growth rates at the district level. While, Upper Subansiri has recorded a growth rate of around 8.5 per cent in the production of millet, Changlang, Tirap and East Kameng have shown negative growth rates. Some other districts like East Siang and Lohit have experienced very low growth rates in millet production. Although the growth rate of production of wheat has been very high in some of the districts, it is largely because of expansion of area under wheat. In as many as five districts, the growth rate of production of wheat was negative during 1980-81 to 2004-05. Thus there is a great deal of variation in the growth performance of different crops among different districts of the state. However, while analysing such aggregate growth performance over a time period, it is important to note the diversity in cropping pattern of the districts as well as the differences in the initial levels of agricultural development. For example, in the triennium ending 2003-04, rice accounted for more than 70 per cent of area under cereals in a number of districts such as East Kameng, Lower Subansiri, West Siang, East Siang and Changlang, while in some others such as Tawang and West Kameng it accounted for less than 20 per cent of area under cereals.

Trends in Input-Use

The low yield rates and poor growth performance of agriculture has often been linked to various constraints faced by the farmers in the state as well as to the general underdevelopment of the state's economy. The pattern of input-use provides important insights into the growth process, or the lack of it, in agriculture.¹² Notwithstanding the policy pronouncements and efforts by different government agencies to modernise agriculture in Arunachal Pradesh, the spread of irrigation and use of modern inputs such as high-yielding variety (HYV) seeds, chemical fertilisers

and pesticides remain limited and confined to few pockets. However, the state has made steady progress in terms of utilisation of these inputs. But the growth in the various sub-periods is found to be highly fluctuating. During the 1980s the areas under these modern inputs as well as the amount of fertiliser use increased at more than 10 per cent per annum, while the growth in use of these inputs were relatively modest in the 1990s. During 2000-01 to 2004-05, the growth of NPK fertiliser use has become negative. Even the growth of area under HYV seeds and plant protection chemicals has come down sharply.

Apart from the limited suitability of the modern inputs to production conditions in hill agriculture, another important cause of their slow adoption is the infrastructural and communication bottlenecks faced by the farmers in Arunachal Pradesh. The NSS 59th round data, clearly bring out the locational disadvantages and seasonal variations in the availability of farm inputs in Arunachal Pradesh. In *kharif* season, for example, more than 68 per cent of the farmers have to travel more than 10 kms to obtain fertiliser. Around 75 per cent and 30 per cent of the farmers have to travel that distance to get improved seeds and pesticides respectively.

TABLE 10. USE OF MODERN INPUTS IN ARUNACHAL PRADESH

Category of holding (1)	<i>(as per cent to GCA)</i>					
	Area irrigated		Area under HYV seeds		Area treated with chemical fertiliser	
	1981-82 (2)	1991-92 (3)	1981-82 (4)	1991-92 (5)	1981-82 (6)	1991-92 (7)
Marginal	22.52	6.52	18.95	15.9	14.69	13.47
Small	15.29	19.20	10.61	26.84	4.88	16.33
Semi-medium	10.99	19.54	10.81	33.82	2.47	17.08
Medium	8.66	19.69	9.13	25.48	1.79	16.4
Large	6.55	22.45	12.59	22.93	1.08	13.42
All	9.02	19.21	10.79	26.76	2.1	15.83

Source: Report on Input Survey, 1981-82 and 1991-92, State Agricultural Census Commissioner, Government of Arunachal Pradesh.

Given the low level of utilisation of modern inputs and predominance of subsistence cultivation, it is hardly surprising that there has been little inflow of formal credit to agriculture in the state. As per the NSS 59th Round data, only 5.9 per cent of farmer households were found to be indebted in the state. The percentage of farmers who have depended upon informal sources of credit was as high as 86 per cent in the state. Looking into the purpose of loans, 39 per cent have taken it for consumption expenditure, 18 per cent for medical expenditure, 6 per cent for education, 3 per cent for non-farm business, 10 per cent for current expenditure in farm business and only 4 per cent have taken a loan for capital expenditure in farm business. Thus, the character of the credit market itself underlines the underdeveloped nature of the state's agrarian economy. A related problem for enhancement of access to formal credit in the state, particularly in the rural areas, is that the ill-defined nature

of property rights and legal safeguards against transfer of land prevents the use of cultivated land as collaterals against credit. Unless adequate measures are created for providing credit to the farmers, their dependence on informal credit is likely to continue, which in turn would act as a barrier to improvements in productivity. The on-going effort to expand credit support to farmers and other sections of the rural population has rightly emphasised group-lending schemes as an alternative.

There is a voluminous literature suggesting the positive impact of literacy and education of the farmers on adoption of improved technology. There has been a great deal of improvements in the literacy rate of Arunachal Pradesh, but low educational standards of the farmers continue to act as a barrier not only for use and adoption of new technology, but also for availing the benefits of different government programmes.¹³

TABLE 11. GROWTH RATES OF USE OF MODERN INPUTS IN ARUNACHAL PRADESH:
1980-81 TO 2004-05

Inputs (1)	1980-81 to 2004-05 (2)	1980-81 to 1989-90 (3)	1990-91 to 1999-2000 (4)	2000-01 to 2004-05 (5)
Area under HYV crops	11.14	18.78	5.46	1.98
Area under fertilisers	13.84	13.86	9.98	3.01
Area under plant protection chemicals	5.94	10.75	2.79	-0.25
Amount of fertilisers (NPK) used	9.52	13.96	5.77	-0.21

Source: Computed from figures provided in *Arunachal Agriculture in Brief*, 1980-93 and *Statistical Abstract of Arunachal Pradesh*, various years.

Note: All growth rates are compound growth rates.

IV

CONCLUDING OBSERVATIONS

To sum up, the institutional specificities of agriculture in Arunachal Pradesh lie in the informal, but rapidly changing property rights regime, the preponderance of small-holder agriculture as well as the legal restrictions on land market transactions and also on labour mobility. Notwithstanding the institutional and ecological constraints faced by Arunachal Pradesh, agriculture and allied sectors in the state have grown rapidly over the past few decades. The worrying aspects of this growth in agriculture are the extremely low levels of productivity as well as regional variations in growth performance. Lack of availability and/or adoption of advanced technology, which is suitable for high altitude and hill agriculture has emerged as a main constraint for technological transformation. The inadequate success of the standard package of 'modernising' traditional agriculture has also to be seen, in the context of the mismatch between the underlying institutional assumptions of the strategy and the institutional reality of the state. While programmes, including extension services,

training of farmers, subsidies, incentives, target the individual farmers, actually the existing property rights regimes do not support such an assumptions. Also, institutional arrangements, particularly those governing access to labour, credit and land, are interlocked in the sense that absence or presence of private or collective rights in one affects the nature of access in others. There is a clear need to take into account these institutional realities, in designing locally relevant and inclusive strategies for agrarian transformation in Arunachal Pradesh, as well as in other north-eastern states.

NOTES

1. While in some areas the institution of chieftainship was well developed and the individuals derived their rights of ownership from village chief, in many areas the village-council, consisting of all adult male members was the basic institution of decision-making, conflict resolution and collective action (Mishra, 1979; Das, 1995). The village chiefs had special privileges such as shares from produce, free labour-services of the villagers etc. Surplus generated through this mechanism were generally redistributed through rituals, feasts and festivals Mishra (1979).

2. For many years, the Jhum Land Regulations, 1947-48, which did recognise, to some extent, the rights of the tribes practicing shifting cultivation remained the only legal framework governing access to cultivable land (Das, 1989). Recently, the Arunachal Pradesh (Land Settlement and Records) Act 2000 has been passed with a view to complete the cadastral survey of land in the state.

3. On the basis of a micro-study, Mishra (2002a, 2002b) has reported that in case of privately owned land the rights of use, occupancy and inheritance are generally enjoyed by the owners, but the right to transfer is often conditional. In some cases '*limited transfer rights*' (viz., temporary transfer rights under mortgage, use rights without inheritance rights etc.) and '*preferential transfer rights*' (viz., transfer within family, clan or tribe) were found, along with unconditional rights to alienate. The specificity of the emerging private property regime lies not only in its institutional basis but also in the changing dimensions of collective ownership.

4. The Forest Survey of India data suggest that during 1987-97, 0.23 million ha of area in Arunachal Pradesh have been affected by shifting cultivation. According to the State of India's Forests reports during the 1990s, shifting cultivation has been the major cause of forest degradation in Arunachal Pradesh.

5. The *jhum* farmers in Arunachal Pradesh raise between 8 to 35 crops on a small plot of 2 to 2.5 ha with simultaneous sowing and sequential harvesting. It is thus considered as 'a highly intensive system of farming in harmony with the environment'. With the shortening of the *jhum* cycle to 3-10 years, the crop-mixture and cropping pattern has changed. As a result of high population pressure, particularly in urban vicinities, burning of slash is dispensed with, which has led to rotational/ sedentary system of cultivation. A shift towards certain crop-species, which are more appropriate under reduced fertility status of the soil, signifies the response of the forest farmers to ecological stress (Ramakrishnan, 1992).

6. The steady decline in the proportion of area under *jhum* cultivation during 1970-71 to 1990-91 seems to have slowed down during 1990-91 to 1995-96. While the reasons behind such a shift needs more careful investigation, a study on changing livelihood diversification in rural Arunachal Pradesh had reported that in response to the short fall in earnings, following the timber ban in 1993, at least some household returned back to *jhum* cultivation, which they had left a few years ago (Mishra, 2003b).

7. The Index of Inter-Class Concentration Ratio for the *i*-th size class is defined as:

$$I_i = [(q_i / \sum q_i) / (p_i / \sum p_i)] * 100$$

where q_i and p_i are the area owned and number of households for the *i*-th class respectively.

8. Land in Arunachal Pradesh is legally not transferable to persons other than those belonging to the Arunachal Pradesh Scheduled Tribes. The non-ST holders are mainly tenants from outside the state. The entry of outside labour to the state is also restricted through inner-line permit system.

9. The Herfindahl Index (H) is an index of concentration. For increasing diversification H is decreasing and vice versa. It is bounded by 0 (complete diversification) and 1 (complete specialisation).

10. In recent years, there has been a significant growth of horticulture in the state. Since the varied agro-climatic conditions in the state offer scope for growing a wide variety of tropical and sub-tropical horticultural crops, horticultural plantations, which could be taken on slopes also, are being promoted as part of a strategy for agricultural diversification and higher value addition within agriculture. By 2001-02 total production of horticultural crops has reached nearly 95,583 metric tonnes per annum. Among the major horticultural crops in the state are citrus, pineapple, banana and apple. These crops have not been included in the analysis because of non-availability of data.

11. Among the oilseeds, the share of mustard in total oilseeds production was as high as 90 per cent in 1980-81, which has come down to nearly 79 per cent in 2000-01. The other important oilseeds were soyabean, sesamum and groundnut, respectively. All these oilseeds have grown at a very high rate during 1980-81 to 2000-01, but mainly because of expansion of area under cultivation rather than improvements in yield rates. Again, as in the case of other foodgrains, their growth performance was better in the 1980s than in the 1990s.

12. One of the significant features of *traditional* agriculture is the relatively unchanging input-combinations, which keeps the sector tied to the low-level equilibrium trap (Schultz, 1964). However, while analysing the nature of input use in Arunachal agriculture, through conventional indicators, it is important to note that given the considerable diversity in ecological conditions, some of these inputs may have limited applicability in certain regions. The use of irrigation intensity, for example, would be of limited explanatory significance in the context of high altitude agriculture.

13. Recent data from NSS suggests that around 50 per cent farmers in the state are illiterates and around 62 per cent of farmers were either illiterates or have studied up to below primary school level.

REFERENCES

- Bordoloi, B.N. (1998), "Tribal Land Tenure System and Land Alienation in Arunachal Pradesh: An Analysis" in S.N.Mishra (ed) *Antiquity to Modernity in Tribal India*, Vol.II, Inter-India, New Delhi.
- Das, G. (1995), *Tribes of Arunachal Pradesh in Transition*, Vikas Publishing Co., New Delhi.
- Das, J.N. (1989), *Land Systems in Arunachal Pradesh*, Law Research Institute, Guwahati.
- Mishra, B.P. (1979), "Kirata Karyokinesis: Mode of production in Tribal Communities of North East India" in A.N.Das and V.Nilakanth (ed) *Agrarian Relations in India*, Manohar Publishers and Distributors, Delhi.
- Mishra, Deepak K. (2001), "Political Economy of Agrarian Change in Arunachal", *Man and Development*, Vol.23, No.3.
- Mishra, Deepak K. (2002a), "Agrarian Structure and Labour-Use Patterns in Rural Arunachal Pradesh: A Case Study", *Arunachal University Research Journal*, Vol.5, No.2, pp.31-56.
- Mishra, Deepak K. (2002b), "Institutional Arrangements and Agrarian Structure during periods of Transition: Evidences from Rural Arunachal Pradesh", in S.S. Acharya *et al.* (eds) *Sustainable Agriculture, Poverty and Food Security: Agenda for Asian Economies*, Vol.2, Asian Society of Agricultural Economists, Seoul and Rawat Publications, Jaipur.
- Mishra, Deepak K. (2003), "Environmental Degradation and Changing Livelihood Strategies in Rural Arunachal Pradesh" paper presented at the 45th Annual Conference of the Indian Society of Labour Economics, Jadavpur University, Kolkata.
- Mishra, S.N. (1987), "Private Property Rights Formation among the High Land Tribal Communities of North East India", *Social Science Probings*, Vol.4, No.4.
- Ramakrishnan, P.S. (1992), *Shifting Agriculture and Sustainable Development of North-Eastern India*, UNESCO series, Paris, Parthenon Publications, Carnforth (Indian Reprint, Oxford University Press, Delhi, 1993).
- Roy, N.C. and P.K. Kuri (2001), *Land Reforms in Arunachal Pradesh*, Classical Publishing House, Delhi.
- Schultz, Theodore W. (1964), *Transforming Traditional Agriculture*, Yale University Press, New Haven.