

Trends in Agrarian Structure in the Hills 132
structure and labour force composition in the state with the help of
figures derived from 1971, 1981 and 1991 census reports

Table 1

PROPORTION OF WORKING POPULATION ENGAGED IN FARM
AND NON-FARM ACTIVITIES (1971-1991)

CHAPTER 15

Changing Facets of Agriculture in Arunachal Pradesh

□ B. PANDA

The economy of Arunachal Pradesh continues to be agriculture dominated. Out of a total geographical area of 84,000 sq.km. (approx), about 70 percent constitutes broad valleys and narrow valleys, 10 percent foothills and plains and 20 percent forms the snow clad peaks. Agricultural operations are undertaken in only five percent of the total geographical area. Even then it provides direct employment to about 67 percent of total main workers of the state as per 1991 census. However agriculture in the state has undergone significant qualitative and quantitative changes over the past two decades. This paper highlights some such important changes in the state of agriculture and makes an endeavour to quantify such changes wherever possible so that further intensive and extensive research can be carried out on those aspects by subsequent researchers. However, non-availability of data in many cases, non-availability of comparable data in some cases and limitations of space and time, etc. have denied the author to explore the possibility of undertaking certain fruitful quantification exercises. With these limitations, the following percipient changes have occurred in the agricultural sector of the state over the last two decades.

Decline in the Proportion of Working Population Engaged in Agriculture

A noticeable change has taken place in the pattern of total main working population engaged in agriculture over the past two decades. Table 1 below depicts such changes in the occupational

structure and labour force composition in the state with the help of figures derived from 1971, 1981 and 1991 census reports.

Table 1

PROPORTION OF WORKING POPULATION ENGAGED IN FARM AND NON-FARM ACTIVITIES IN ARUNACHAL PRADESH (1971-1991)

Year	Total Working Population	Percentage of Main Workers to Total Population	Labour Force in	
			Farm Sector	Non-farm Sector
1	2	3	4	5
1971	269542	57.65	216452 (80.30)	53090 (19.70)
1981	313445	49.61	231164 (73.75)	82281 (26.25)
1991	399782	45.20	256041 (64.05)	143741 (35.95)

Source: Various census reports.

Note: Figures in brackets indicate percentage of workers.

Table 1 states that there has been a gradual fall in the proportion of main workers to total population from the level of 57.65 percent in 1971 to 45.20 percent in 1991. In 1971, 80.30 percent of the total main workers were engaged in farm sector, it declined to 73.75 percent in 1981 and finally to 64.05 percent in 1991. On the other hand non-farm employment as a percentage of total main workforce has increased from a level of 19.70 percent in 1971 to 35.95 percent in 1991 census. In view of more or less constant contribution of agriculture to Net State domestic product (NSDP) (it has remained more or less constant at about 33-34 percent) in the early nineties and the quantum rise in non-farm employment the noticeable fall in the percentage of workforce in farm sector indicates the huge under-employment and disguised unemployment prevailing in agriculture in the yester decades.

So far as the reasons for this fall are concerned one plausible reason is the presence of under employment. Another important reason is the increase in stress on land reflected by the gradual fall in the average size of operational holdings. (See Table 2).

Table 2 shows that the average size of operational holdings has declined from 6.19 hectares in 1970-71 to 4.27 in 1980-81 and

Table 2

AVERAGE SIZE OF OPERATIONAL HOLDINGS

Year	Size of Operational Holdings (Ha)
1	2
1970-71	6.19
1976-77	5.95
1980-81	4.27
1985-86	4.00
1990-91	3.62

Source: Arunachal Agriculture in Brief, Govt. of Arunachal Pradesh.

to 3.62 hectares in 1990-91. With the decline in the average size of operational holdings the land-man ratio has worsened bringing stress on the existing land. This along with general developmental activities (which have opened up alternative employment facilities) has been instrumental in pushing up increased percentage of main workers to find employment in non-farm activities. Further, this decline in the percentage of farm employment and the rise in the percentage of non-farm employment over the past two decades can also be partly ascribed to the increased profitability of alternative non-agricultural occupations, preference for white-collar jobs among the educated youths and rise in intensive and permanent cultivation, etc.

Rise in the Percentage of Agricultural Labour

Another development discerned is the sharp rise in the percentage of agricultural labourers in the total workforce engaged in agriculture which is explained in Table 3.

Agricultural labour as a percentage of total main workforce employed in agriculture has increased from 2.44 percent in 1971 to 3.37 percent in 1981 and to 7.83 percent in 1991, and as a percentage of total main working force has increased from 1.96 percent in 1971 to 2.49 percent in 1981 and 5.02 percent in 1991. Simulta-

neously a decline is noticed in the percentage composition of cultivators in total main workforce (it has declined from 78.34 percent in 1971 to 71.26 percent in 1981 and to 59.03 percent in 1991) and in the total main agricultural workforce (it has declined from 97.56

Table 3

COMPOSITION (IN PERCENTAGE) OF AGRICULTURAL LABOUR IN THE TOTAL WORKFORCE AND AGRICULTURAL WORKFORCE IN THE STATE (1971, 1981, 1991)

<i>Year</i>	<i>Agricultural Labour as a Percent of Total Main Workforce.</i>	<i>Agricultural Labour as a Percent of Total Agricultural Main Workforce</i>	<i>Cultivators as a Percentage of Total Agricultural Main Workforce</i>	<i>Cultivators as a Percentage of Total Main Workforce</i>
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
1971	1.96	2.44	97.56	78.34
1981	2.34	3.37	96.63	71.26
1991	5.02	7.83	92.17	59.03

Source: Computed from different census.

percent in 1971 to 96.63 in 1981 and to 92.17 percent in 1991). The rise in agricultural labour is more pronounced if we look at the decadal percentage growth during the last three censuses in agriculture labour, cultivators and non-agricultural workforce as given in Table 4 below :

Table 4

DECADAL PERCENTAGE RISE IN AGRICULTURAL LABOURERS, CULTIVATORS AND NON-AGRICULTURAL WORK-FORCE

<i>Decade</i>	<i>Percentage Growth</i>		
	<i>Cultivator</i>	<i>AgriL. Labourers</i>	<i>Non-Agricultural Workforce</i>
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
1971-81	5.78	47.32	91.00
1981-91	5.65	157.23	41.75

Source: Computed from different census.

From Table 4, it is noticed that during 1981-91 decade the growth of cultivators has declined to 5.65 percent from 5.78 percent during the decade 1971-81, whereas, the decadal growth of agricultural labourers has increased from 47.32 percent in 1971-81 to 157.23 percent in 1981-91.

The stress factor, migration of labourers from outside the state in view of reluctance of educated youths to undertake to agricultural labour and their shift to non-agricultural occupations (esp. white collar jobs) etc. are some of the underlying reasons for this development. Owing to want of space and time, it is not possible here to go into the details of the causes.

Increase in Net Area Sown Under Permanent Cultivation

Another positive development marked is the continuous rise both in absolute terms and percentage terms in the net area sown under permanent cultivation *vis-a-vis* shifting cultivation. Shifting cultivation which has been the way of life of tribal people is gradually being discouraged. Table 5 below explains this trend.

Table 5

NET AREA SOWN UNDER SHIFTING AND PERMANENT CULTIVATION

(Area in Ha.)

Year	Net Areas Sown		Total Area Sown
	Permanent Cultivation	Jhum. Cultivation	
1	2	3	4
1970-71	28006 (24.31)	87220 (75.69)	115226 (100)
1976-77	40013 (35.75)	71901 (64.25)	111914 (100)
1980-81	52012 (43.99)	66220 (56.01)	118232 (100)
1985-86	76759 (51.41)	72555 (48.59)	149314 (100)

Source: Computed from Annual plan, Govt. of Arunachal Pradesh, 1995-96.

From Table 5, it is seen that net area sown under permanent cultivation as a percentage of total net area sown has increased from 24.31 percent in 1970-71 to 51.41 percent in 1985-86, whereas, the percentage share of net area sown under shifting cultivation has

decreased from 75.69 percent in 1970-71 to 48.59 percent in 1985-86. What is remarkable about this development is that such percentage decrease is net area sown under shifting cultivation and percentage and absolute increase in net area sown under permanent cultivation has been a continuous trend over last 15 years (1970-71 to 1985-86) for which period data are made available. This is no doubt a welcome sign for agricultural growth in the state. This healthy trend has been the result of spread of agricultural extension services even to the remote areas of the state-mechanisation of agriculture, stress factor, increased availability of infrastructural facilities including marketing and communication, irrigation use of HYV seeds and fertilisers and above are general socio-economic development of the state.

However, what worries the planners is that although in percentage terms there has been a precipitous fall in the share of net area sown under shifting cultivation, but in absolute terms there has not been any appreciable decrease in the total area sown under this form of cultivation as soon from this table.

Table 6
FOOD GRAINS PRODUCTION IN ARUNACHAL (1970-71, 1990-91)

<i>Year</i>	<i>Foodgrains Production (MT)</i>	<i>Average Annual Percentage Growth</i>
<i>1</i>	<i>2</i>	<i>3</i>
1970-71	75915	—
1976-77	106339	5.78
1980-81	131026	5.36
1985-86	185000	7.14
1990-91	214308	2.98
1991-92	219780	2.55
1992-93	226050	2.85

Source: Computed from Arunachal, Agriculture is brief using the formula
 $r = (P_n/p)^{1/n} - 1$.

Increase in Food Grains Production

Since the beginning of the fourth plan, considerable importance has been attached to increase crop production especially food grains

production. Table 6 reveals the volume of increase in foodgrains production.

It is noticed that foodgrains production has increased over the past two decades from a level of 75915 in 1970-71 to 214308 in 1990-91. The decadal growth rate has been 72.60 percent and 63.56 percent respectively for the decades of 1970-71 to 1980-81 and 1980-81 to 1990-91. However, the annual percentage growth rate has slowed down in the first three years of early nineties. This is to some extent because of the diversification of agricultural activities.

The increase in foodgrains production has been possible mainly due to increase in extension services, increase in area coverage, transfer of technology (increase in irrigation infrastructure, HYV seed utilisation, fertiliser utilisation etc.) This author wanted to have estimations of the correlation of some such variables with food production non-availability of data/comparable data with regard to extension services and irrigation facilities necessitated the need to exclude these two important determinants of foodgrains production from the model of partial correlation. Even then a partial correlation analysis is undertaken involving the following variables:

Y (depended variable) = Foodgrains production.

X₁ (Independent variable) = Fertiliser used.

X₂ (Independent variable) = HYV seeds used.

In this model,

r_{yx1} = Simple correlation coefficient between Y variable and X₁ variable.

r_{yx2} = Simple correlation co-efficient between Y variable and X₂ variable.

r_{x1x2} = Simple correlation co-efficient between X₁ and X₂ variables.

r_{yx1x2} = Partial correlation co-efficient between Y variable and X₁ variable eliminating the impact of X₂ variable.

r_{yx2x1} = Partial correlation co-efficient between Y variable and X₂ variable eliminating the impact of X₁ variable.

$r^2_{yx1.x2}$ = Coefficient of partial determination between y variable and x_1 variable eliminating the impact of x_2 variable.

$r^2_{yx2.x1}$ = Co-efficient of partial determination between Y variable and X_2 variable eliminating the impact of X_1 variable.

Data for these sets of variables pertain to the period 1988-89 to 1992-93. The results are summarised below :

RESULTS OF PARTIAL CORRELATION ANALYSIS

Simple Correlation Coefficient	Value of the Coefficient	Partial Correlation Coefficient	Value of Partial Correlation Coefficient	Coefficient of Partial Determination	Value
r_{yx1}	0.55	$r_{yx1.x2}$	0.65	$r^2_{yx1.x2}$	0.42
r_{yx2}	0.65	$r_{yx2.x1}$	0.72	$r^2_{yx2.x1}$	0.52
r_{x1x2}	0.10	—	—	—	—

Both the co-efficients of partial determination are significant. The implication of a high $r^2_{yx2.x1}$ is that in days to come more emphasis should be given on HYV seed use.

Besides this exercise an attempt is made to study the correlation between food production and land under irrigation with data pertaining to a different period *i.e.* from 1970-71 to 1985-86 and the zero order co-efficient of determination (r^2) is found to be 0.83 which suggests that food production and irrigation are highly correlated. Hence, increase in irrigation facilities should continue to be on the top of measures to be adopted in coming years for increasing food production. (Irrigation should not be put into the partial correlation model since data for it could not be made available for the same period of time.)

Conclusion

Over the last two decades and some odd years agriculture in Arunachal has undergone a metamorphosis in various fields. In the present paper, changes with regard to the pattern and composition

of main workforce employment in agriculture, net area sown under shifting and settled cultivation and foodgrains production were taken up for a detailed study. It is found that farm employment as a percentage of total main workforce has gone down and non-farm employment has increased significantly during this period. Net area sown under settled cultivation in absolute and percentage terms has increased continuously. Net area sown under shifting cultivation as a percentage of total net area sown has declined but in absolute terms there has been no marked fall in the net area sown under this head. Food production has increased at a high rate during the seventies and eighties, whereas, during the early nineties it shows a marginal growth. Food production although show a significant positive correlation with the growth of irrigation facilities, HYV seeds utilisation and fertiliser use, its correlation is highest with irrigation, higher with HYV seeds use and comparatively low with fertiliser consumption. Hence, the planners should attach highest importance to irrigation and HYV seeds use for further acceleration in food production in addition to other measures. Due to various limitations a number of other aspects of transformation, in the state of agriculture in Arunachal could not be dealt with. It will be in the best interest of the state, if researchers come forward and undertake further studies on these untreated aspects of agriculture in this State.

References

1. Annual Plan 1995-96, Planning and Development Department, Govt. of Arunachal Pradesh.
2. Arunachal Agriculture in Brief (Series-3) 1980-83, Directorate of Agriculture, Govt. of Arunachal Pradesh.
3. Economic Review of Arunachal Pradesh, 1994. Directorate of Economics and Statistics, Govt. of Arunachal Pradesh.
4. Visaria, Pravin and Rakesh Basant (Eds) 1994. "Non-Agriculture employment in India, Trends and Prospects", Sage Publications India Pvt. Ltd., New Delhi.