Applied Economics on North-East India

Kanchan Datta
Chandan Kumar Mukhopadhyay

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Dr. Kanchan Datta
Dr. Chandan Kumar Mukhopadhyay

ABHIJEET PUBLICATIONS
DELHI 110094

ABHIJEET PUBLICATIONS
2/46 Tukhmeerpur Extension
Delhi-110 094
Phone: 011-22960492, 65698474
E-mail: abhijeetpublication@gmail.com

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Preface

North-east India consists of eight states: Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and finally Sikkim, these are popularly known as seven sisters and one brother. There has been a plethora of research studies regarding the economy, socio-cultural structure, political boundary, ethnicity, terrorism of North-East India. There has been a huge promise regarding the development of these states, both from central and state governments' corner. But inspite of this promise with respect to development perspective it is still far below to South India, West India and North India. It is not that north east states are resource less. Inspite of having plenty of potential resources why these states are not flourishing is a matter of research. This book basically seeks to investigate the relationship between two macro economic variables, contribution of forestry and fishing, overall development indicators and present status compared to national average, tourism potentialities, forecasting on domestic tourists arrival etc. We shall be very happy if this book benefits

any researchers, government officials or political leaders. We shall gladly accept any comments or suggestions for the improvement of this book.

Finally, we express our sincere gratitude to Professor A. Basumajumdar, Hon'ble Vice Chancellor, North Bengal University, since he is our main source of inspiration of accelerating the pace of research activities. We are also grateful to Abhijeet Publications for taking the initiative of publication of this book.

Dr. Kanchan Datta

&

Dr. Chandan Kumar Mukhopadhyay

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Relationship between Agriculture and Economic Growth in Arunachal Pradesh—A Reflection of Tribal Commitment

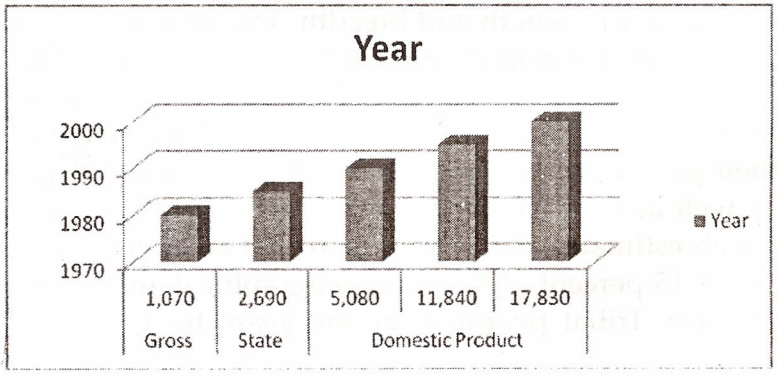
1.1 Introduction

India has the largest concentration of tribal people anywhere in the world except perhaps in Africa. The tribal are children of nature and their lifestyle is conditioned by the Eco-system. India, with a variety of ecosystems, presents a varied tribal population throughout its length and breadth. The areas inhabited by the tribal constitute a significant part of the under developed areas of the country. The tribal live mostly in isolated villages or hamlets. A smaller portion of their population has now settled in permanent villages as well as in towns and cities. On the whole, as per rough estimates, the prominent tribal areas constitute about 15 percent of the total geographical area of the country. Tribal people over the years have become

the most disadvantaged, exploited and the neglected lot in our society. The tribal basically stand averse to the modern life styles and hardly willing to change until and unless they encounter a very strong social mobilization.

There are 533 tribes (with many overlapping types in more than one State) as per notified Schedule under Article 342 of the Constitution of India in different States and Union Territories of the country with the largest number of 62 being in the State of Orissa.

Arunachal Pradesh is a thinly populated hilly tract lying on the north-east extremity of India comprising roughly 83,573 square kilometers. The Pradesh is known to be rich in flora, fauna, power and mineral potential. Previously this region was known as the North East Frontier Agency (NEFA) and constituted a part of the state of Assam. Arunachal Pradesh became an independent state on 20th February 1987. It is bounded by independent countries on the three sides and by Assam and Nagaland in the south. The long international border comprises of Bhutan on its west (160 km), the Tibet region of China on its northern and north east border (1080 km) and Myanmar (formerly Burma (440km) on the eastern border.



Arunachal Pradesh's gross state domestic product for 2004 was estimated at $706 million in current prices. Agriculture primarily drives the economy. Jhum, the local word for a shifting cultivation widely practiced among the tribal groups, is now less practiced. Arunachal Pradesh has close to 61,000 square kilometers of forests, and forest products are the next most significant sector of the economy. Among the crops grown here are rice, maize, millet, wheat, pulses, sugarcane, ginger, and oilseeds. Arunachal is also ideal for horticulture and fruit orchards. Its major industries are rice mills, fruit preservation units, and handloom handicrafts. Saw-mills and plywood trades are prohibited under law.

1.2 Some of the major Tribes of North Eastern India

Arunachal Pradesh: Nyishi, Adi, Tagin, Apatani, Wangcho, Dafla, Khampti, Singpho etc

Assam: Boro, Kachari, Mikir (Karbi), Lalung, Rabha, Dimasa, Hmar, Hajong etc

Meghalaya: Garo, Khasi, Jayantia, etc.

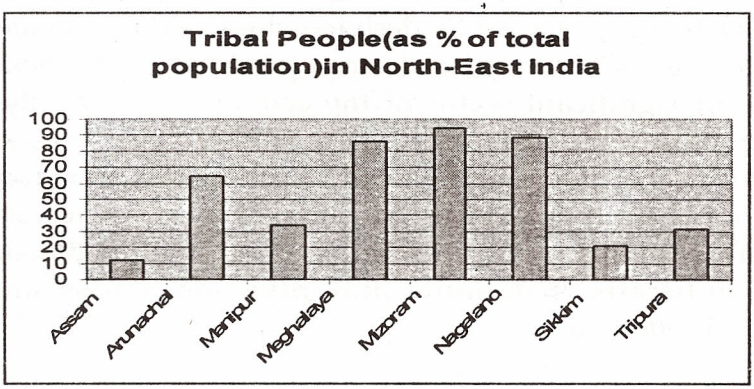
Tripura: Chakma, Garo, Khasi, Kuki, Lusai, Liang, Santhal etc

Mizoram: Lusai, Kuki, Garo, Khasi, Jayantia, Mikir etc.

According to 2001 Census, in Arunachal Pradesh the tribal population constitutes 64.22% of the total population in which the highest percentage is in Kurung Kurney district with (97.89%) while in Lohit district schedule tribes account for only a third of the population (32.42). Figure-1.1 shows the diagrammatic representation of the tribal peoples in

North-Eastern states in India. Which shows that Mizoram, Meghalaya and Nagaland contain more than 80% of schedule tribe people.

Figure 1.1



In 1990, an attempt was taken by UNDP in its Human Development Reports to construct an index to analysis the comparative status of socio-economic development of different nations, which is termed as 'Human Development Index' (HDI). The HDI attempts to rank all countries on a scale of 0 to 1. It consists of three indices, income index, health index and education index. With respect to HDI Arunachal Pradesh is the least developed states among eight north-eastern states in India.

Other than HDI, there are other indices to measure level of development from various angles these are GDI (Gender Development Index), GEM (Gender Empowerment Index), HPI (Human Poverty Index) etc, according to GDI nation's development can not be possible without the development of female. The main components of these index is

(1) with respect to per-capita income how much females are getting compared to male

(2) with respect to education how girl students are progressing compared to boys

(3) the male-female ratio with respect to enrollment in school and

(4) average life expectancy of female compared to male etc.

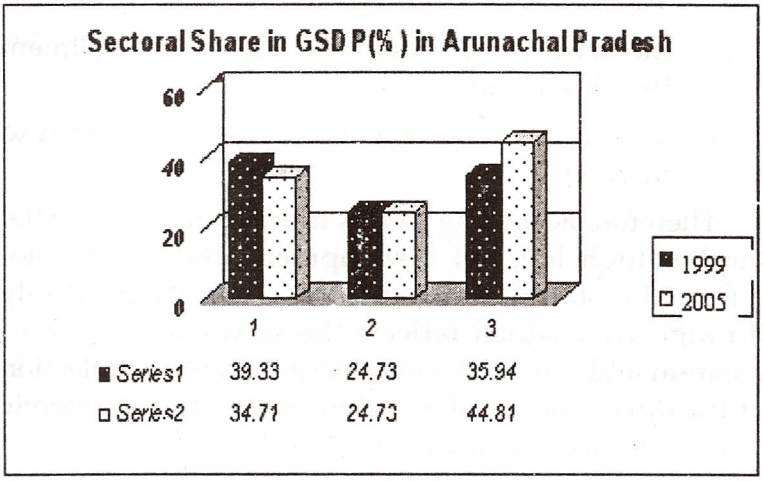
Therefore according to this index though high HDI implies high level of development, but it does not reflect the status of women of a nation. It is only through GDI which reflects the status of women of a nation and whose development is the true reflection of the development of a nation. Some socio-economic indicators are given in the table below.

Table 1.1

States	*Population Growth (1991-2001)*	*Area (Sq.Km)*	*Literacy rate (2001)*		*HDI*		
			Male	*Female*	*1981*	*1991*	*2001*
India	22.7		75.8	54.2	0.263	0.381	0.56
Arunachal	27	83743 (B)	63.8 (L)	43.5 (L)	0.228 (L)	0.328 (L)	0.49 (L)

Table 1.1 shows with respect to decadal population growth Arunachal is higher than national average, where as with respect to literacy rate, it is lagging behind the national average both with respect to male and female. The Human Development Index shows its rank is lowest among the eight north-east states in India.Figure-1.2 shows the sectoral share of Gross State Domestic Product (GSDP), which clearly shows the share of agriculture has declined slightly between 1999 to 2005, where as the share of service sector has increased while intermediate sector remains unchanged.

Figure 1.2



1.3 Objective and Importance of the Study

Since a huge percentage of tribal people in Arunachal Pradesh depended on agriculture and its related activities and the remaining are in unregistered manufacturing hence the objective of this study is to investigate the contribution of agriculture and its related activities that is finishing, forestry and logging, village industries (Unregistered manufacturing) to the growth of state's income (NSDP). This may be a true reflection of the tribal people's commitment to the growth of state's income.

1.4 Data and Methodology

In this study the data are time series yearly data taken from RBI bulletin and the time periods are from 1999 to 2007. As far as methodology is concerned Vector Auto Regression (VAR) models are used.

1.5 Models

The study is based on the following equations. Where g means growth rate.

$$gNSDP_t = \alpha_1 + \alpha_2\ gNSDPt\text{-}1 + \alpha_3\ gNSDP_{t-2} + \alpha_4\ gFISHING_{t-1} + \alpha_5\ gFISHING_{t-2} + \varepsilon_1 \quad (1.1)$$

$$gFISHING_t = \beta_1 + \beta_2\ gNSDP_{t-1} + \beta_3\ gNSDP_{t-2} + \beta_4\ gFISHING_{t-1} + \beta_5\ gFISHING_{t-2} + \varepsilon_2 \quad (1.2)$$

$$gNSDP_t = \gamma_1 + \gamma_2\ gNSDP_{t-1} + \gamma_3\ gNSDP_{t-2} + \gamma_4\ gMANUFAC_{t-1} + \gamma_5\ gMANUFAC_{t-2} + \varepsilon_3 \quad (1.3)$$

$$gMANUFAC_t = \delta_1 + \delta_2\ gNSDP_{t-1} + \delta_3\ gNSDP_{t-2} + \delta_4\ gMANUFAC_{t-1} + \delta_5\ gMANUFAC_{t-2} + \varepsilon_4 \quad (1.4)$$

$$gNSDP_t = \theta_1 + \theta_2\ gNSDP_{t-1} + \theta_3\ gNSDP_{t-2} + \theta_4\ gFORESTRY_{t-1} + \theta_5\ gFORESTRY_{t-2} + \varepsilon_5 \quad (1.5)$$

$$gFORESTRY_t = \pi_1 + \pi_2\ gNSDP_{t-1} + \pi_3\ gNSDP_{t-2} + \pi_4\ gFORESTRY_{t-1} + \pi_5\ gFORESTRY_{t-2} + \varepsilon_6 \quad (1.6)$$

$$gNSDP_t = \mu_1 + \mu_2\ gNSDP_{t-1} + \mu_3\ gNSDP_{t-2} + \mu_4\ gAGRI_{t-1} + \mu_5\ gAGRI_{t-2} + \varepsilon_7 \quad (1.7)$$

$$gAGRI_t = \upsilon_1 + \upsilon_2\ gNSDP_{t-1} + \upsilon_3\ gNSDP_{t-2} + \upsilon_4\ gAGRI_{t-1} + \upsilon_5\ gAGRI_{t-2} + \varepsilon_8 \quad (1.8)$$

where ε_i i=1...8 are white noise error terms

1.6 Diagrammatic Presentation of the Primary and Unregistered Manufacturing Industries

Figure 1.3 shows the diagrammatic representation of the growth of agriculture and its related activities and the growth of unregistered manufacturing.

Figure 1.3

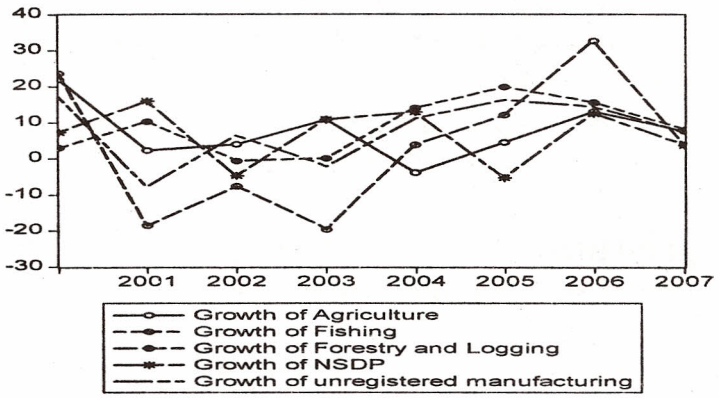


Figure 1.3 shows the diagrammatic representation of the Agricultural growth and its related activities and the growth of unregistered manufacturing, since in Arunachal Pradesh there is not a single registered manufacturing sector, so unregistered manufacturing may be treated as village and small industries. The common thing among the entire growth rate is that volatility, that is growth, is fluctuating in nature. The growth of agriculture has a declining trend, where as growth of fishing, forestry and logging have an upward tendency. But after 2006 all the rates have sharply declined.

1.7 Findings

The estimations of the VAR model is given in the table below. For equations (1.1) and (1.2) that is

$$gNSDP_t = \alpha_1 + \alpha_2\, gNSDP_{t-1} + \alpha_3\, gNSDP_{t-2} + \alpha_4\, gFISHING_{t-1} + \alpha_5\, gFISHING_{t-2} + \varepsilon_1 \quad (1.1)$$

$$gFISHING_t = \beta_1 + \beta_2 gNSDP_{t-1} + \beta_3 gNSDP_{t-2} + \beta_4 gFISHING_{t-1} + \beta_5\, gFISHING_{t-2} + \varepsilon_2 \quad (1.2)$$

Table 1.2: Results of Regression of Equations (1.1) and (1.2)

Constant / Parameters	*Estimated value*	*Standard error*	*t-value*	*Level of Significance*
α_1	22.12701	2.06508	10.7148	***
α_2	-1.254897	0.13250	-9.47069	***
α_3	-0.867919	0.12173	-7.12975	***
α_4	-0.059800	0.10901	-0.54860	
α_5	-0.310992	-3.85247	-2.33296	**
β_1	19.58160	0.69644	1.49250	
β_2	-0.895403	-5.53169	-1.06364	
β_3	-0.810697	0.77340	-1.04823	
β_4	1.017424	0.69254	1.46912	
β_5	-1.140936	0.84691	-1.34717	

*** implies 1% level, ** implies 5% level of significance

Now for equations (1.3) and (1.4) that is

$$gNSDP_t = \gamma_1+\gamma_2\ \gamma NSDP_{t-1}+ \gamma_3\ gNSDP_{t-2}+\gamma_4\ gMANUFAC_{t-1} +\gamma_5\ gMANUFAC_{t-2} +\varepsilon_3 \quad (1.3)$$

$$gMANUFAC_t = \delta_1+\delta_2\ gNSDP_{t-1}+ \delta_3\ gNSDP_{t-2} + \delta_4\ gMANUFAC_{t-1} + \delta_5\ gMANUFAC_{t-2} +\varepsilon_4 \quad (1.4)$$

Table 1.3: Results of Regression of Equations (1.3) and (1.4)

Constant / Parameters	*Estimated value*	*Standard error*	*t-value*	*Level of Significance*
γ_1	20.71048	3.27120	6.33115	***
γ_2	-1.193590	0.19780	-6.03437	***
γ_3	-0.832517	0.19743	-4.21681	***
γ_4	-0.244023	0.15594	-1.56483	
γ_5	-0.101848	0.15561	-0.65449	

δ_1	2.089404	13.8013	0.15139
δ_2	0.396526	0.83452	0.47516
δ_3	0.138423	0.83295	0.16618
δ_4	0.378914	0.65792	0.57593
δ_5	0.102966	0.65653	0.15683

*** implies 1% level, ** implies 5% level of significance

Now for equations (1.5) and (1.6) that is

$$gNSDP_t = \theta_1+\theta_2\ gNSDP_{t-1}+\theta_3\ gNSDP_{t-2}+ \theta_4\ gFORESTRY_{t-1} + \theta_5\ gFORESTRY_{t-2}+\varepsilon_5 \quad (1.5)$$

$$gFORESTRY_t = \pi_1+ \pi_2\ gNSDP_{t-1}+ \pi_3\ gNSDP_{t-2}+ \pi_4\ gFORESTRY_{t-1}+ \pi_5\ gFORESTRY_{t-2} +\varepsilon_6 \quad (1.6)$$

Table 1.4: Results of Regression of Equations (1.5) and (1.6)

Constant / Parameters	*Estimated value*	*Standard error*	*t-value*	*Level of Significance*
θ_1	18.30712	1.04608	17.5007	***
θ_2	-1.147456	0.07678	-14.9443	***
θ_3	-0.853194	0.07889	-10.8154	***
θ_4	-0.126980	0.02856	-4.44547	***
θ_5	-0.028704	0.03428	-0.83728	
π_1	6.184676	30.8081	0.20075	
π_2	-0.281858	2.26132	-0.12464	
π_3	-0.016277	2.32331	-0.00701	
π_4	0.358167	0.84124	0.42576	
π_5	0.080458	1.00964	0.07969	

*** implies 1% level, ** implies 5% level of significance

Finally for equations (1.7) and (1.8) that is

$$gNSDP_t = \mu_1+ \mu_2\ gNSDP_{t-1}+ \mu_3\ gNSDP_{t-2}+ \mu_4\ gAGRI_{t-1} + \mu_5\ gAGRI_{t-2} +\varepsilon_7 \quad (1.7)$$

$$gAGRI_t = \upsilon_1 + \upsilon_2\ gNSDP_{t-1} + \upsilon_3\ gNSDP_{t-2} + \upsilon_4\ gAGRI_{t-1} + \upsilon_5\ gAGRI_{t-2} + \varepsilon_8 \quad (1.8)$$

Table 1.5: Results of Regression of Equations (1.7) and (1.8)

Constant / Parameters	*Estimated value*	*Standard error*	*t-value*	*Level of Significance*
μ_1	59.36616	10.7938	5.50005	***
μ_2	-3.852477	0.69644	-5.53169	***
μ_3	-3.806143	0.77413	-4.91664	***
μ_4	-2.635494	0.68232	-3.86253	***
μ_5	1.451465	0.37053	3.91726	***
υ_1	-55.92007	26.2779	-2.12803	**
υ_2	3.614995	1.69551	2.13210	**
υ_3	4.700092	1.88467	2.49386	**
υ_4	3.986752	1.66115	2.40000	**
υ_5	-1.943655	0.90207	-2.15465	**

*** implies 1% level, ** implies 5% level of significance

From the above results it can be said,

(1) Regarding equation (1.1) and (1.2) α_2 and α_3 are highly significant; it implies current period growth of income inversely depends on previous two period's income. It is the reflection of volatility of income.

(2) α_5 is also significant, which implies two previous periods growth of fishing is also significant for maintaining the volatility of income growth.

(3) β_i's are insignificant, it implies growth of income is not significant for the growth of fishing, it is totally traditional year after year.

(4) γ_4, γ_5 and δi's are insignificant, which implies neither income growth affecting manufacturing nor the unregistered manufacturing growth affecting growth of income. Therefore manufacturing is at the subsistence level.

(5) θi's are significant . It shows that a large section of tribal people are dependent on forest resources. Growth of forestry and logging is significantly affecting the growth of income.

(6) Finally the growth of income positively affecting the growth of agriculture.

1.7 Conclusion

In the eighties and latter half of nineties agriculture's contribution was more prominent than the growth of any other states. Nowadays almost 32% Arunachal's economic growth comes from Agriculture. Forestry and logging, and Fisheries take an important part in the economy of Arunachal Pradesh. The primary sector as a whole recently is responsible for 40% of the economic growth of the state. But the average contribution of manufacturing is being 4.04% of NSDP. If this situation continues it will be very difficult for the government of Arunachal to raise the level of development indices.

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Chandan Kumar Mukhopadhyay is the Professor of Economics at the University of North Bengal. He received his doctorate in economics in 1986 from the University of Illinois, Chicago, USA. The University of Illinois honored him with the 'WINIFRED B. GELDARD AWARD' in 1987 for his outstanding research contributions.

Professor Mukhopadhyay also tought at the Department of Information and Decision Sciences, University of Illinois, and he received the 'SILVER CIRCLE AWARDS FOR EXCELLENCE IN TEACHING' from that University in 1987 for his outstanding teaching services. Professor Mukhopadhyay did his Post-doctoral Research works on 'Exhaustible Resources and Backstop Technologies'. He also took the leading active role in the introduction of 'Environmental Economics' in Undergraduate and Post Graduate courses of study at several Universities in India.

He is currently leading the Departmental research activities under the UGC (SAP) DRS-II programme in economics as the co-ordinator and he has formal editorial responsibilities for the 'Journal of Regional Economic Studies' and the ' Journal of South Asian Economy'. He has published many research articles in National and International Journals and many books on SAARC Countries with the applications of Time series econometrics.

Dr. Mukhopadhyay's area of interest covers Time series Econometrics, International Finance, Macro economics and Environmental Economics. His current research focuses on the development and application of time series models in Economics and International Finance.

Dr. Kanchan Datta did his M.A. (Economics) in 1997 in the University of North Bengal and Ph.D (Economics) in 2010 under the supervision of Professor Chandan Kr. Mukhopadhyay. He joined St. Joseph's College, Darjeeling as a lecturer in Economics in year 2000. After serving nine years in this college Dr. Datta has joined as a Reader in the Department of Economics in the University of North Bengal.

ABHIJEET PUBLICATIONS
2/46 Tukhmeerpur Extension, Delhi 110 094
Tel: 011-65698474, 22960492
e-mail: abhijeetpublication@gmail.com
abhijeet_singh1@indiatimes.com

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