

# ENVIRONMENTAL DEGRADATION AND GENDER RELATIONS IN NORTH EAST INDIA: A CASE STUDY OF ARUNACHAL PRADESH

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*Present paper attempts to look at the multilevel linkages between economic development, environmental degradation and gender relations in Arunachal Pradesh. The sheer enormity of these far reaching changes and the speed in which they have been introduced has unsettled many of the age-old institutions, beliefs and practices. The transitions in gender relations, both in individual and collective levels in the state have been looked at selectively to find out the implications of the development process on some selected aspects of women's well-being and survival. Based on field observations and focused group discussions, the paper attempts to look at some of the implications of the changes in property rights over natural resources and the emerging inequalities in resource use on gender relations at the micro-level.*

**Key words:** Environment, Economic Development

## INTRODUCTION

Environmental degradation, in most of the developing countries is becoming a major constraint on future growth and development. The real costs of environmental degradation are increasingly felt in terms of health costs, declining productivities of natural resources like land, water, forests, grasslands etc. The rapid degradation of natural resource-base as a result of urbanization and industrialization in the last century has made the relationship between economic growth and environmental degradation a crucial aspect of current development debates. There exists a considerable diversity in the extent, pattern and impacts of environmental degradation across the world. The debate over appropriate technological, institutional and economic structures to guarantee sustainability and reproducibility in resource consumption over a longer time-horizon has much significance for choosing among alternative growth-paths in case of less developed economies. The shift from nature based natural economy to a market-based economy entails significant changes in the pattern of resource-utilization (Gadgil and Guha, 1996). The implications of different property rights regimes upon the use of natural resource have been widely discussed in the context of developing economies, particularly because the relationship between poverty and environmental degradation seems to be fairly complex. It has also been observed that women as a group tend to be more vulnerable under conditions of environmental degradation and resource depletion (Agarwal; 1986, Shiva, 1989; Sharma, 1994).

## ECONOMIC DEVELOPMENT AND ENVIRONMENT

Most people have viewed economic development as the most important tool to reduce poverty and raise the living standards. This has led nations to pursue economic growth, which has resulted in impressive economic gains worldwide. There is a close and complex interlinkage between economic development and environment. Economic development must be achieved in an environmentally sustainable manner, giving top priority to reducing pollution and environmental degradation as well as protecting biodiversity. According to Kuznet the relationship between the rate of environmental degradation and the level of economic development is that of an inverted U-shape (Kuznet, 1965). At low levels of development both the quantity and the intensity of environmental degradation are limited to the impacts of subsistence economic

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activity on the resource base and to limited quantities of biodegradable wastes. As economic development accelerates with the intensification of agriculture and other resource extraction, the rates of resource depletion begin to exceed the rates of resource regeneration. At higher levels of development, structural change towards information-intensive industries and services, coupled with better technology, increased environmental awareness result in a leveling-off and gradual decline of environmental degradation.

## ECONOMIC DEVELOPMENT AND GENDER RELATIONS

In her pioneering work on the economic role of women during the process of economic development, Ester Boserup has shown that as a result of increasing population density and consequently, intensification of agriculture, shifting cultivation systems with collective ownership over land are usually transformed into a system of peasant production with private ownership of land with use of animals for cultivation and transport. These changes are usually accompanied by significant changes in women's position (Boserup, 1970). Generally, privatisation leads to transfer of lands to males and marginalisation of women in production activities, which in turn leads to their marginalisation in society and in the household as well.

The relationship between economic development and female work participation rate has been a widely-debated issue. Often it is conceptualised in terms of a U-shaped curve. At initial stages of development a good portion of non-agricultural productive activity takes place in households where females find it easy to combine their traditional domestic responsibilities with part-time productive endeavour. With movement to higher levels of development as the production structure gets more formalised, the scope of such informal work shrinks. A second set of argument emphasizes the role of shrinkage in span of working age, resulting from greater consciousness of the need for learning rather than earnings in early years of life on the one hand and lowering of average exit age with the growth of organised sector on the other, in contributing to the decline of work of both males and females (Durand, 1975). At an advanced stage of development, spread of education among women, skill-acquisition as well as rising levels of living enhances the employability of women in the economy, particularly in the service sector, leading to rising work participation rates among females.

**Table: 1 : Comparison of Growth Rate of Arunachal's Income (NSDP) and National Income (NNP)**

Period	Growth Rate of		Growth Rate of Per Capita	
	NNP	NSDP	NNP	NSDP
1971-80	3.36	7.07	1.10	4.03
1981-90	4.99	7.81	2.85	4.69
1991-00	5.93	4.81	3.95	2.31
1994-03	5.85	2.35	3.98	-0.04
1999-03	5.00	1.99	3.23	-0.40
1971-03	4.78	7.16	2.68	4.35

Note: NNP data are from Economic Survey 2003-04, Government of India and NSDP data are from State Domestic Product of Arunachal Pradesh for different years published by the Directorate of Economics and Statistics, Government of Arunachal Pradesh.

There are different views on the effect of economic development on women. According to the integration thesis as economic development takes place, women's opportunity to get education, to acquire skill and enter the job market expands and they become more and more involved in the social and economic life. Further the marginalisation thesis argues that inspite of being an integral part of the household production in

the pre-capitalist societies, development has over all increased women's social and economic marginality. Finally the exploitation thesis argues that women provide cheap labour because sex-segregated labour market, discriminatory hiring practices and inadequate mental preparation weakens their position within the labour market and their involvement in a capitalist system becomes more harmful than beneficial (Tiano, 1987). The proportion of population engaged in economically productive work is considered to be an important indicator of effective utilization of human resources (Jose, 1989). They also reflect upon the fact, as to how much, women are integrated into the economy.

## FEATURES OF ECONOMIC DEVELOPMENT IN ARUNACHAL PRADESH

Given the historical legacy of relative isolation and underdevelopment, the progress made by Arunachal Pradesh on the economic front, in a comparatively short span of few decades is quite impressive. During the entire period of 1971 to 2007, for which data is available, the Net State Domestic Product (NSDP) has registered an average annual growth rate of 7.34 per cent per annum. Although the growth rate was much higher in the seventies (7.07 per cent) and in the eighties (7.81 per cent) than in the nineties (4.54 per cent) and in post two thousand (5.24 per cent), given the low levels of initial development, difficult ecological pre-conditions and geo-political constraints of being a border state, the development of the economy, in overall terms, may seem satisfactory (Table: 1 and Table: 2).

The economy of the state is mainly agrarian and *jhuming* i.e. shifting cultivation is still prevalent among all the tribes of the state. Due to various developmental activities on government initiative, a certain section of the population has taken to settled cultivation in addition to *jhuming*. According to tradition, land belongs to the whole village among certain tribes. Each family in the village is allotted a plot of cultivable land, which is treated as private holding as long as the plot is under cultivation. The forest and fallow lands are commonly held and are used by the whole community. There are certain amounts of variations from tribe to tribe in land holding pattern and most of the newly reclaimed 'wet rice cultivation' plots have become private holdings. Thus we see that community ownerships of land are slowly being replaced by private ownership (Roy and Kuri, 2001; Mishra, 2004; Harris-White, Mishra and Upadhyay, 2009).

**Table: 2 : Growth of SDP in States of Northeast India (At Constant 1999-2000 price)**

States	Growth Rates			
	NSDP		PCNSDP	
	1981-1992	1993-2007	1981-1992	1993-2007
Arunachal Pradesh	8.31	5.24	5.25	3.19
Assam	3.59	2.84	1.19	1.23
Manipur	5.01	4.63	2.19	2.48
Meghalaya	7.13	6.15	2.46	4.44
Nagaland	7.23	6.45	2.98	2.14
Sikkim	10.63	6.99	8.76	5.55
Tripura	7.14	7.97	4.01	6.99
NER	4.25	4.80	-----	-----
India	5.08	616	2.82	4.04

Note: NSDP=Net State Domestic Product; PCNSDP=Per Capita Net State Domestic Product

Source: Roy and Debnath, 2010

The structural transformation of the Arunachal economy gets manifested through increasing diversification of the workforce, emergence of a modern non-farm economy, rapid urbanisation and gradual integration with the regional and national economy. However, it is important to note that in the last three and a half decades, the contribution of manufacturing has never exceeded seven per cent of the state's income. It increased from less than 1 per cent in 1971 to more than 6 per cent in the 1980s but in the 1990s it declined and reached 2.27 per cent in 2004-05. The share of the secondary sector has gone up from around 20 per cent in 1970-71 to only 25 per cent in 2004-05. The bulk of the secondary sector activity mainly revolves around construction. While that of the tertiary sector has increased substantially during the same period – from 20.48 per cent in 1970-71 to 43 per cent of the NSDP in 2004-05. The share of the primary sector registered a sharp decline from around 59 per cent to 31 per cent during the same period. The decline was largely attributed to the fall in the relative contribution of forestry and logging. In the same period, the contribution of agriculture declined from 38 per cent to 24 per cent, while that of fishing increased from 0.04 per cent to 1.1 per cent (Table: 3 and Table: 4). The key aspect of the changing sectoral composition of the state is that the expansion of service sector has been almost entirely driven by government-sector activities. Even within the service sector, it is public administration, yielding 15 per cent of income in the State that has come to occupy a position of relative importance (Upadhyaya and Mishra, 2009).

**Table: 3 : Sectoral Composition of NSDP of Arunachal Pradesh**

Industry	1970-71	1980-81	1990-91	2000-01	2004-05	Changes 1970-71 to 2004-05
Agriculture	38.33	36.91	35.09	31.16	24.37	-13.96
Forestry & Logging	20.72	10.23	9.58	3.64	4.30	-16.42
Fishing	0.04	0.08	0.72	1.06	1.07	1.03
Mining & Quarrying	0.11	0.06	0.79	1.04	1.34	1.23
<b>Primary Sector</b>	<b>59.19</b>	<b>47.28</b>	<b>46.19</b>	<b>36.89</b>	<b>31.09</b>	<b>-28.10</b>
Manufacturing	0.85	6.51	6.04	4.43	2.27	1.42
Construction	19.58	18.69	17.98	15.58	22.51	2.93
Electricity, Etc	-0.10	-2.99	-2.47	2.14	0.64	0.74
<b>Secondary Sector</b>	<b>20.33</b>	<b>22.21</b>	<b>21.56</b>	<b>22.16</b>	<b>25.42</b>	<b>5.09</b>
Transport, Storage, Etc	1.55	0.36	0.65	5.89	8.19	6.64
Trade, Hotel, Etc	1.96	4.42	4.95	4.79	3.86	1.90
Banking & Insurance	0.11	0.60	1.49	1.78	2.61	2.50
Real Estate, Etc	0.79	7.79	5.29	2.46	2.09	1.30
Public Administration	9.98	10.36	8.17	13.80	14.99	5.01
Other Services	6.09	6.98	11.72	12.23	11.77	5.68
<b>Tertiary Sectors</b>	<b>20.48</b>	<b>30.51</b>	<b>32.25</b>	<b>40.96</b>	<b>43.50</b>	<b>23.02</b>
Total	100.00	100.00	100.00	100.00	100.00	100.00

Note: Changes in percentage points are over the period 1970-71 to 2004-05.

Source: Estimates of Domestic Product, Arunachal Pradesh, Directorate of Economics and Statistics, Itanagar 2002.

The decade of the nineties and the 2000 seems to have reinforced the structural imbalances of the state's economy. Apart from the relatively slow growth of NSDP during this decade, the dependence of the state on service sector in general and public administration in particular increased substantially. As such industrialisation never really had a firm footing in the state's economy, but the restrictions on timber trade imposed by the Supreme Court of India, led to closure of many of the timber-based industries. Although agriculture has been growing over the years, it is primarily expansion of area under cultivation, rather than improvements in yield rates, which have contributed to its growth (Roy, 1996; Mishra, 2001; Mishra and Upadhyay, 2009).

**Table: 4 : Sectoral Growth of Arunachal Economy: 1971-2005**

<b>Name of the Industries</b>	<b>1970-71 to 1979-80</b>	<b>1980-81 to 1989-90</b>	<b>1993-94 to 2004-05</b>	<b>1970- 71 to 2004-05</b>
Agriculture	6.4	9.18	1.22	5.95
Forestry & logging	0.32	4.05	-7.92	2.48
Fishing	16.1	34.3	4.8	18.55
Mining & quarrying	14.4	37.3	9.99	16.04
<b>Primary Sector</b>	<b>4.61</b>	<b>8.48</b>	<b>-0.26</b>	<b>5.40</b>
Manufacturing	14.2	7.85	-0.61	9.44
Construction	7.70	6.26	3.89	7.11
Elect. , gas, etc .	0	0	0	0
<b>Secondary Sector</b>	<b>8.03</b>	<b>6.43</b>	<b>3.69</b>	<b>7.49</b>
Transport, Storage & Comm.	9.77	13.3	12.49	12.63
Trade, Hotel, etc.	17.6	9.69	-0.89	8.39
Banking Insurance	27.96	20.77	11.39	16.45
Real Estates.	3.57	4.54	4.03	10.50
Public Adm.	10.81	5.29	8.68	8.05
Other services	9.58	9.5	7.61	9.44
<b>Tertiary Sector</b>	<b>11.39</b>	<b>7.62</b>	<b>7.53</b>	<b>9.17</b>
NSDP	7.07	7.81	3.55	7.05
POPULATION	3.04	3.12	1.14	2.75
NSDP per capita	4.03	4.69	1.61	4.32

Source: Calculated from *Estimates of Domestic Product*, Directorate of Economics and Statistics, Government of Arunachal Pradesh, Itanagar, 2006.

Like many other states of North-East India, Arunachal Pradesh continues to remain heavily dependent upon central government's assistance. In 2005-06, only 2.31 per cent of the revenue receipts of the state could be generated from its own tax revenue. The fiscal deficit for the State was as high as 9.54 per cent in 2005-06. Among the north east states only the state of Mizoram had a higher fiscal deficit of 12.40 per cent (Ministry of Development of North Eastern Region and NEC, 2008). The predominant role of the state

as the prime economic actor and the dependence of the state government on central government aid and loans have crucially conditioned the pattern of development of Arunachal Pradesh over the past decades (Sachdeva, 2000; Harris-White, Mishra and Upadhyay, 2009).

**Table: 5: Human Development Indicators: Arunachal Pradesh and Other Northeastern States**

States	Per Capita NSDP 1998-99	Per capita Consumption Expenditure (2004-05)	HDI (1991)	HPI (1991)	Gender Disparity Index (1991)
<b>Arunachal Pradesh</b>	12335 (4)	798.76 (3)	0.328 (8)	47.40 (2)	0.776
<b>Assam</b>	8826 (8)	613.67 (8)	0.348 (7)	46.29 (3)	0.576
<b>Manipur</b>	10504 (6)	663.50(7)	0.536 (2)	39.82 (6)	0.815
<b>Meghalaya</b>	11090 (5)	795.57 (4)	0.365 (6)	49.41 (1)	0.807
<b>Mizoram</b>	13479 (1)	862.78 (2)	0.548 (1)	26.47 (8)	0.770
<b>Nagaland</b>	12408 (3)	1259.59 (1)	0.486 (3)	41.30 (5)	0.729
<b>Sikkim</b>	12645 (2)	787.20 (5)	0.425 (4)	38.59 (7)	0.647
<b>Tripura</b>	9613 (7)	734.79 (6)	0.389 (5)	42.71 (4)	0.531
<b>All India</b>	14395	700. 3	0.381	37.42	0.676

Note: NSDP = Net State Domestic Product; HDI = Human Development Index; HPI = Human Poverty Index.

Source: Planning Commission, 2002; 2011

Although Arunachal Pradesh until recently has been relatively free from secessionist violence and insurgency, its development performance, particularly in terms of the human development indicators, has not been satisfactory. Among the eight northeastern states, Arunachal Pradesh occupies fourth position in terms of per capita NSDP and third position in terms of consumption expenditure, but according to the National Human Development Report, it was at the bottom in terms of Human Development Index (Table: 5 and Table: 6). In terms of the Human Poverty index, barring Mizoram, its position is the worst in the region. In 2011, Arunachal Pradesh with a literacy rate of 66.95 had the lowest literacy rate among all the northeastern states, as well as the highest urban-rural gap and the highest gender gap in literacy. In terms of enrolment, drop-out rates and school availability the states' performance, in a comparative perspective, has hardly been satisfactory (Mishra and Upadhyay, 2004; Upadhyay and Mishra, 2009).

**Table: 6 : Human Development Index and its Components in North East India**

States	Health Index 2000	Health Index 2008	Income Index 2000	Income Index 2008	Education Index 2000	Education Index 2008	HDI 2000	HDI 2008
Assam	0.339	0.407	0.152	0.288	0.516	0.636	0.336	0.444
North East (Excluding Assam)	0.567	0.663	0.316	0.386	0.535	0.670	0.473	0.573
All India	0.497	0.563	0.223	0.271	0.442	0.568	0.387	0.467

Source: Institute of Applied Manpower Research and Planning Commission, 2011

## DEFORESTATION IN ARUNACHAL PRADESH: EXTENT AND INTER-DISTRICT VARIATIONS

The growing global concern for conservation of the world's natural resources implies actions in many fields. Among these is included the conservation of forests which in turn would help maintain ecological balances, bio-diversity and the quality of the environment by checking soil erosion, increasing water retention and regulating the water cycle. Forest conservation also acts as carbon sink, which removes carbon dioxide and oxygen from the atmosphere and thus mitigates the 'greenhouse gas' effect. Population pressure, rampant poverty and a weak institutional framework have often been identified as underlying causes of forest depletion and degradation in developing countries. It is often argued that it is population growth and livestock pressure as well as development activities which generate pressure on forest resources like fuel wood, fodder, timber etc which trigger a process of deforestation. The growing pressure results into over-exploitation of the forest, beyond its incremental capacity for regeneration and leads to an escalation of forest depletion and degradation. Excessive deforestation has both local and global ramifications and ultimately effects sustainable socio-economic development.

The overall forest cover of India has declined drastically from nearly 40 per cent of its geographical area a century ago (Ramachandran, 1983) to 22 per cent in 1951 and to 19 per cent in 1997 and again increased marginally to 20.55 percent in 2001 (MoEF, 1997; 2001). Since independence forest has declined from 72 million hectares in 1951 to around 63 million hectares in 1997 and then has increased marginally to 68 million hectare in 2001 (Table: 7). India possesses around 16 per cent of world's population and 15 percent of world's livestock, but only 2.4 per cent of the worlds land area and 1.7 per cent of the world's forest stock. Encroachments have led to conversion of forest into non-forest between 1950 and 1980 in the order of 4.5 million hectares. Since then the forest cover has been reduced only marginally, the average annual rate of decline being 0.016 million hectares (Planning Commission, GOI, 1998-99). Declining forest cover coupled with population growth has resulted in a downward trend in per capita availability of forest since the 1950s.

**Table: 7 : Forest Cover Area and Composition in North East India: 2001 (In Square kilometers)**

States	Geographical Area	Recorded Forest AREA	Forest Cover Area			Percent of FOREST Area	Percentage of FOREST COVER
			Dense Forest Cover*	Open Forest Cover	TOTAL		
Assam	78,438	27018	15830	11884	27714	34.45	35.33
Manipur	22,327	17418	5710	11216	16926	78.01	75.81
Meghalaya	22,429	9496	5681	9903	15584	42.34	69.48
Mizoram	21,081	15935	8936	8558	17494	75.59	82.98
Nagaland	16,579	8629	5393	7952	13345	52.05	80.49
Sikkim	7,096	5765	2391	802	3193	81.24	45.00
Tripura	10,486	6293	3463	3602	7065	60.01	67.38
Arunachal Pradesh	83,743	51540	53932	14113	68045	61.55	81.25
<b>India</b>	<b>3,287,263</b>	<b>768436</b>	<b>416809</b>	<b>258729</b>	<b>675538</b>	<b>23.38</b>	<b>20.55</b>

Note: \*Included 4482 sq.km of mangroves (0.14% of country's geographical area)

Source: State of Forest Report, 2001, FSI, MoEF, GoI



Further it has been observed that wide disparities exist between the north eastern states of India in per capita availability of forest cover in 1997 (Table: 8). The availability varies from 7.93 hectares per person in Arunachal Pradesh to 0.11 hectares per person in Assam and 0.20 in Tripura. Arunachal Pradesh contains 11 per cent of India's total forest cover, second only to Madhya Pradesh which has the highest at 21 per cent. The percentage of area covered by the forest in the north eastern states is quite high. Mizoram has the highest at 89 per cent, followed by Nagaland at 86 per cent and Arunachal Pradesh at 82 per cent. It has also been found that the estimated forest cover area of the North East on the whole has shown a declining trend from 1989 onwards except for the state of Tripura (Table: 9).

**Table No: 8 : Forest Cover Area and Composition in North East India: 1997 (Square kilometers)**

States	Geographical Area	Recorded Forest Cover	Forest Cover Area	Dense Forest Cover	Open Forest Cover	Mangroves	Percent of area covered by Forest	Forest area per capita (Hectares)
Assam	78,438	30,708	23,824	15,548	8,276	0	30	0.11
Manipur	22,327	15,154	17,418	4,937	12,481	0	78	0.95
Meghalaya	22,429	9,496	15,657	4,044	11,613	0	70	0.88
Mizoram	21,081	15,935	18,775	4,348	14,427	0	89	2.72
Nagaland	16,579	8,629	14,221	3,487	10,734	0	86	1.18
Sikkim	7,096	2,650	3,129	2,423	706	0	44	0.77
Tripura	10,486	6,292	5,546	1,819	3,727	0	53	0.20
Arunachal Pradesh	83,743	51,540	68,602	54,155	14,447	0	82	7.93
<b>India</b>	<b>3,287,263</b>	<b>765,209</b>	<b>633,397</b>	<b>367,260</b>	<b>261,310</b>	<b>4,827</b>	<b>19</b>	<b>0.07</b>

Source: Forest Statistics of India, 1995, 1997, 1999

**Forest covered Area:** All lands statutorily notified as forest though they may not necessarily bear tree cover

**Forest cover:** All lands with a tree canopy density of more than 10%, though they may not be statutorily notified as forests

Livelihoods in Arunachal Pradesh, like in many other states of the North-Eastern region are critically dependent upon 'environmental entitlements'. Environmental entitlements, refer to 'alternative sets of utilities derived from environmental goods and services over which social actors have legitimate effective demand and which are instrumental in achieving well-being' (Gasper, 1993). 'The alternative set of utilities that comprise environmental entitlements may include any or all of the following: direct uses in the form of commodities, such as food, water or fuel; and the utilities derived from environmental services, such as pollution sinks or properties of the hydrological cycles' (Leach, Means and Scones, 1999: 233). These environmental entitlements play a crucial role in different aspects of livelihood security at the household level, viz, economic security, food security, health security, and empowerment, particularly in fragile ecological contexts (Jodha, 2001; Mishra, 2007).



**Table: 9 : Estimated Forest Covered Area in North East India: 1951 to 2001****(In Square kilometers)**

States	Geographical Area	Estimated Forest Covered Area in						
		1951	1969	1989	1991	1995	1997	2001
Assam	78,438	26,155	29,535	26,058	24,751	24,061	23,824	27,714
Manipur	22,327	5,663	6,022	17,885	17,685	17,558	17,418	16,926
Meghalaya	22,429	7,479	8,445	15,690	15,875	15,714	15,657	15,584
Mizoram	21,081	7,029	7,938	18,178	18,853	18,576	18,775	17,494
Nagaland	16,579	5,434	2,897	14,356	14,321	14,291	14,221	13,345
Sikkim	7,096	3,036	3,124	3,124	3,033	3,127	3,129	3,193
Tripura	10,486	8,703	6,300	5,325	5,535	5,538	5,546	7,065
Arunachal Pradesh	83,743	26,660	51,540	68,763	68,757	68,621	68,602	68,045
<b>India</b>	<b>3,287,263</b>	<b>718,025</b>	<b>755,324</b>	<b>640,134</b>	<b>639,182</b>	<b>639,600</b>	<b>633,397</b>	<b>67,5538</b>

Source: Forest Statistics of India, various years

Arunachal Pradesh in particular and North-Eastern region in general has witnessed a phenomenal degree of environmental degradation over the last few decades (Husain, 1996). Although the recorded forest area in the state is 51540 sq.km i.e. 61.55 per cent of the total geographical area, as per the estimates Forest Survey of India, 1999, 81.9 per cent of the total area in the state is under forest cover, out of which 79.39 per cent consists of closed forest (density 10-40 per cent) (GoA, 1995). The commercial extraction of timber and other forest resources played an important role in transforming the local economy, particularly in fastening the process of monetization of the exchange process and commercialization of production relations, even in the relatively inaccessible areas of the state (Mishra, 2001; Harris-White, Mishra and Upadhyay, 2009). The restrictions imposed by the Supreme Court on commercial extraction of timber has resulted in closure of timber-based industries as well as loss of employment and income for those dependent on timber trade, but there has been an increase in area under forest cover as well. As far as the percentage of degraded forest in the districts of Arunachal Pradesh is concerned, it is highest in Tawang at 40.10 per cent followed by Tirap and West Kameng at 31.72 and 28.32 per cent respectively. Deforestation is high in the cold districts of Tawang and West Kameng, as wood is the only and primary source for heating purposes. It is also used on a large scale as fuel wood in the villages. The district of Tirap has the second highest density of population at 47 persons per sq. km which is much higher than that of Arunachal Pradesh as a whole at 17 in 2011. Further it is situated closer to the industrial towns of upper Assam which have many timber based industries. These two factors to a great extent have been responsible for such large scale of deforestation in the district (Table: 10).

The significance of the forest resources lies in the centrality of forest-based resources as an additional and dependable source of livelihood, particularly for smoothening consumption. Mishra in a finding of a study based on the primary data collected from 160 households in four villages of West Kameng district highlights the following. In all the villages, as in most parts of the state, forests were found to be under the collective ownership of the community, although the emergence of private property over forests was also noticed during the survey. The value of forest resources collected per household annually was found to be highest in relatively interior villages, than the well-communicated developed villages. However, the intensity of dependence of households on forest products was highest in the interior villages. In the better-

communicated villages, forest dependency was less. There is a gender dimension to this process as well, when male workers in small and marginal holder families move out to non-farm activities like government services or petty business, female workers tend to spend a comparatively higher percentage of working days on farm and forest related activities. It is important to note that the dependency of agricultural labourers and non-farm wage earners on forest products is much higher than other occupational groups (Mishra, 2003).

**Table: 10 : Percentage of Degraded Forest in the Districts of Arunachal Pradesh**

(Area in hectare)

Districts	Evergreen Forest	Degraded Forest	Total Forest Cover	Percentage of Degraded Forest to Total Forest Cover
Tawang	87028	58252	145280	40.10
West Kameng	357175	141101	498276	28.32
East Kameng	506703	94974	601677	15.78
Papum Pare	278830	24273	303103	8.01
Lower Subansiri + Kurung Kumey	723205	60114	783319	7.67
Upper Subansiri	576680	31939	608619	5.24
West Siang	554440	95340	649780	14.67
East Siang	314007	25335	339342	7.46
Upper Siang	491486	96372	587858	16.39
Dibang Valley + Lower Dibang Valley	926909	86222	1013131	8.51
Lohit +Anjaw	763006	106482	869488	12.25
Changlang	364746	70437	435183	16.19
Tirap	157889	73347	231236	31.72
<b>Arunachal Pradesh</b>	<b>6102104</b>	<b>964188</b>	<b>7066292</b>	<b>13.64</b>

Source: A Resource Atlas of Arunachal Pradesh, Government of Arunachal Pradesh

## KEY DIMENSIONS OF CHANGING GENDER RELATIONS

### Sex Ratio

Sex ratio (defined as females per 1000 males) is taken to be an indicator of women's health, nutrition and survival status. A lower sex ratio typically represents a lower social status of women, which creates conditions for discriminations at various levels. Dreze and Sen (1995) feel that it also captures the extent of intra-household gender inequalities. Although the sharp decline in sex ratio in India has been a cause of concern, at a disaggregated level there are significant regional variations. Regions having higher percentages of scheduled tribe populations are typically found to have a higher sex ratio, reflecting a lesser degree of gender discrimination (Rustagi 2000).

Sex ratio in the state of Arunachal Pradesh after declining from 862 in 1981 to 859 in 1991 increased to 893 in 2001 and further increased to 920 in 2011 (Table: 11). Among the districts, Tawang has the lowest and Kurung Kumey followed by East Kameng have the highest sex ratio (Table: 12). The sex ratio in the state, however, cannot be taken to be a reliable measure of women's well-being because of the discrepancies

arising out of in-migration. In order to isolate the effects of migration, if we consider the sex ratio among the Scheduled Tribe population, which largely consists of the indigenous population, a steady decline in the ratio is noticed during 1961 to 1991, although it has registered an increase in 2001.

**Table: 11 : Sex Ratio in Arunachal Pradesh: 1961-2011**

Year	All Population			S.T. Population		
	Total	Rural	Urban	Total	Rural	Urban
1961	894	894	-	1013	1013	-
1971	861	881	457	1007	1009	765
1981	862	881	629	1005	1010	803
1991	859	880	728	998	1004	921
2001	893	914	819	1003	1000	1020
2011	920	NA	NA	NA	NA	NA

Note: Sex Ratio for ST and Rural/Urban Population figures for 2011 are not yet available.

Source: Census of India: Various Years.

**Table: 12 : Sex Ratio in Districts of Arunachal Pradesh: 1961-2011**

Districts	1961	1971	1981	1991	2001	2011
Tawang	884	853	905	844	782	701
West Kameng	586	661	834	822	754	755
East Kameng	1017	930	943	962	985	1012
Papum Pare	832	909	754	831	901	950
Lower Subansiri	967	949	965	957	983	975
Kurung Kumey						1029
Upper Subansiri	982	953	972	867	960	982
West Siang	870	850	913	873	912	916
East Siang	963	863	833	877	931	962
Upper Siang	879	872	907	822	848	891
Dibang Valley	999	806	661	788	836	808
Lower Dibang Valley						919
Lohit	854	762	781	797	856	901
Anjaw						805
Changlang	918	855	833	863	906	914
Tirap	961	903	899	862	910	931
<b>Arunachal Pradesh</b>	<b>894</b>	<b>861</b>	<b>862</b>	<b>859</b>	<b>893</b>	<b>920</b>

Source: Census of India Various Years

## Child Sex Ratio

The child sex ratio (CSR), which is less likely to be affected by migration, has registered a sharp decline in the state from 982 in 1991 to 964 in 2001. This decline has been sharper in the rural areas than in the urban areas (Table: 13). The CSR in the state declined by 18 points, same as that of all India level during 1991-2001. Among the northeastern states, Sikkim, Tripura and Mizoram have registered an increase in CSR during the same period, while the decline in other states of the region has been less severe than that of Arunachal Pradesh. It is important to note that in 1991, CSR among the ST population was 976, which was lower than that for all social groups. At a disaggregated level, ten out of the thirteen districts, have experienced a decline in CSR, during the last decade. The census data shows the overall sex ratio of the tribal population declining in Arunachal Pradesh during 1961–1991. This decline can be explained in terms of the gender-gaps in education and income: women are less literate and have less command over resources than men, probably because of gender inequalities in access to emerging opportunities, sex ratio among the ST population declined during a period of rapid economic growth and transformation. However, the low child sex ratio in the tribal population cannot be explained in terms of differential literacy or income. The only plausible explanation is then in terms of discrimination against female children. Many studies, however, point out that discrimination against the female children is relatively less severe in predominantly tribal societies. The low and falling CSR in Arunachal Pradesh, thus needs further investigation.

**Table: 13 : Child Sex Ratio in Districts of Arunachal Pradesh: 1991-2001**

Districts	1991			2001		
	T	R	U	T	R	U
Tawang	965	965	NA	948	948	948
West Kameng	970	973	932	955	956	952
East Kameng	1036	1036	NA	1035	1027	1058
Papum Pare	934	942	924	978	967	990
Lower Subansiri	970	978	947	1005	1013	945
Upper Subansiri	1005	1005	NA	985	985	985
West Siang	997	1008	921	950	949	953
East Siang	1008	1007	1009	958	945	1003
Upper Siang	967	967	NA	1010	1010	NA
Dibang Valley	994	1008	906	946	947	939
Lohit	968	980	912	933	927	966
Changlang	987	987	NA	954	958	912
Tirap	946	940	1054	941	933	1000
Arunachal Pradesh	982	986	946	964	960	980

*Note:* NA implies that there was no urban population in the district.

*Source:* 1991- District Census Handbooks, Census of India, 1991; 2001

## Female Literacy Rates

Female literacy rate for Arunachal Pradesh, according to census 2011, is 59.57 per cent, lower than the national average of 65.46 per cent. However the state has made rapid progress in raising the female literacy – from only 14.02 per cent in 1981 to 44.24 per cent in 2001 and further to 59.57 per cent in 2011. In rural areas female literacy rate is as low as 36.9 per cent, and the rural-urban gap in female literacy continues to be very high. Among the ST population female literacy has gone up from 7.31 per cent in 1981 to 24.94 per cent in 1991. Adult literacy rate for females went up from 20.18 per cent in 1981 to 26.43 per cent in 1991, but in rural Arunachal Pradesh female literacy was only 19.13 per cent, which was much below than other northeastern states.

Although the state made significant progress in the past, its performance in comparative terms has not been very impressive. Considerable inter-district variations exist in female literacy rates from 76.65 per cent in Papum Pare to 41.83 per cent in Tirap and 44.31 per cent in Kurung Kumey. Among the rest, districts having relatively high female literacy levels include, Lower Subansiri and East Siang. (Table: 14) Substantial gap exists between urban and rural female literacy levels in many of the districts as well. The gap is the highest in Tirap followed by Tawang, Lower Subansiri, Changlang and Dibang Valley respectively. The rural-urban gap in female literacy is lowest in East Siang district. Given the inaccessibility and inadequacy in provision of social infrastructure, there is a huge gap in the opportunities before the rural women and their urban counterparts (Table: 15).

**Table: 14 : Literacy Rate in Arunachal Pradesh: 2011**

Districts	Literacy Rate (2011)			Gender Gap in Literacy Rate (2011)
	Total	Male	Female	
Tawang	60.61	68.54	48.75	19.79
West Kameng	69.40	75.66	60.80	14.86
East Kameng	62.48	70.95	54.18	16.77
Papum Pare	82.14	87.33	76.65	10.68
Lower Subansiri	76.33	82.40	70.10	12.30
Kurung Kumey	50.67	57.28	44.31	12.97
Upper Subansiri	63.96	67.36	60.51	7.85
West Siang	67.62	73.89	60.76	13.13
East Siang	73.54	78.94	67.90	11.01
Upper Siang	59.94	64.09	55.22	8.87
Dibang Valley	64.80	69.39	59.10	10.29
Lower Dibang Valley	70.38	76.62	63.56	13.06
Lohit	69.88	77.25	61.62	15.63
Anjaw	59.40	69.54	46.39	23.15
Changlang	61.90	70.80	52.08	18.72
Tirap	52.23	61.87	41.83	20.04
Arunachal Pradesh	66.95	73.69	59.57	14.12
India	74.04	82.14	65.46	16.68

Source: Census of India, 2011

**Table: 15 : Female Literacy Rate: Arunachal Pradesh 2001 and 2011**

District	Female Literacy Rate (2001)			Urban-Rural Gap (2001)	Female Literacy (2011)
	Total	Rural	Urban		
Tawang	30.0	25.0	66.6	41.6	48.75
West Kameng	47.5	44.8	71.3	26.5	60.80
East Kameng	28.6	20.8	52.7	31.9	54.18
Papum Pare	60.4	49.0	71.3	22.3	76.65
Lower Subansiri	36.0	31.3	69.8	38.5	70.10
Kurung Kumey					44.31
Upper Subansiri	40.7	32.5	63.0	30.5	60.51
West Siang	51.6	46.7	73.0	26.3	60.76
East Siang	52.4	47.5	67.2	19.7	67.90
Upper Siang	38.8	38.8	-	-	55.22
Dibang Valley	48.7	42.5	78.1	35.6	59.10
Lower Dibang Valley					63.56
Lohit	44.5	38.8	69.3	30.5	61.62
Anjaw					46.39
Changlang	39.2	35.0	75.4	40.5	52.08
Tirap	28.8	21.2	73.1	51.9	41.83
Arunachal Pradesh	43.5	36.9	69.5	32.6	59.57

Note: Upper Siang district does not have any urban area.

Source: Census of India 2001; 2011

## Gender Gap in Literacy

Gender differences in educational attainment are one of the important indicators of relative well-being of females. The gender gap in literacy in the state as per 2001 census is lower than the national average. The gap between male and female literacy rates declined very slowly during 1981 to 2001. In rural areas, gender gap in literacy is sharper than that in urban areas. Although the gender gap in literacy has been narrowing down in the urban areas, it has remained at around 20 per cent during the past two decades in rural areas - a fact that needs to be addressed in all future initiatives. But in 2011, the gender gap in literacy in Arunachal Pradesh has come down to 14 per cent.

In comparative terms, gender gap in literacy in Arunachal Pradesh is highest among all the states in northeast India — both for total as well as for rural population (Table: 16). At a disaggregated level, gender gap in literacy was highest in Anjaw district and lowest in Upper Subansiri. The districts having higher gender gap in literacy than the state average include the western districts of Tawang, West Kameng and East Kameng on the one end, and the eastern districts of Tirap, Changlang, Anjaw and Lohit on the other. Such patterned concentration of districts having high gender gap in literacy rates may imply the importance of shared social attitudes in determining gender difference in access to education - an issue that needs further scrutiny. In 2011 it was observed that the gender gap in literacy in all the districts of the State has declined (Table: 17).

**Table: 16 : Gender Gap in Literacy: Arunachal Pradesh and North Eastern States 1981-2011**

States	1981			1991			2001			2011
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Arunachal Pradesh	21.1	20.23	18.48	18.73	21.69	15.76	20.30	20.80	15.70	14.1
Assam	-	-	-	18.84	19.47	11.17	15.19	16.77	8.85	11.5
Manipur	29.48	29.33	29.07	24.03	24.38	23.44	18.17	18.62	17.31	13.3
Meghalaya	9.48	8.59	10.81	8.27	7.71	8.40	5.73	5.88	5.60	3.4
Mizoram	10.75	11.97	6.4	7.01	10.33	3.54	4.56	8.21	1.28	4.3
Nagaland	18.20	18.20	9.7	12.87	13.06	6.84	9.85	9.86	6.92	6.6
Sikkim	25.62	26.49	15.37	19.05	19.51	10.25	15.27	16.06	8.42	10.9
Tripura	23.48	24.74	14.32	20.93	22.74	12.07	16.06	17.84	8.15	9.1
All India	26.62	27.89	-	24.84	27.25	-	21.61	24.60	13.43	16.68

Note: (i) Census not held in Assam in 1981.

(ii) Literacy Rate is defined as the proportion of literates to the population in the age group 7+.

(iii) Gender Gap in literacy is defined as male literacy rate minus female literacy rate.

Source: Census of India, 1981; 1991; 2001; and 2011.

**Table: 17 : Gender Gap in Literacy in Districts of Arunachal Pradesh: 1991-2011**

Districts	Gender Gap in Literacy Rate		
	1991	2001	2011
Tawang	35.82	30.28	19.79
West Kameng	19.81	22.83	14.86
East Kameng	23.67	23.77	16.77
Papum Pare	22.47	16.92	10.68
Lower Subansiri	17.55	17.36	12.30
Kurung Kumey			12.97
Upper Subansiri	20.34	18.85	7.85
West Siang	18.01	15.07	13.13
East Siang	16.74	16.00	11.01
Upper Siang	21.97	19.92	8.87
Dibang Valley	22.64	18.55	10.29
Lower Dibang Valley			13.06
Lohit	22.81	21.20	15.63
Anjaw			23.15
Changlang	24.80	22.90	18.72
Tirap	24.92	24.52	20.04
Arunachal Pradesh	21.76	20.30	14.12
India	24.84	21.61	16.68

Source: Census of India various years



Gender gap in literacy among the ST population in the state, although lower than that among the total population is quite high. Despite the rise in female literacy rate among the ST population, the gender gap increased substantially from 13.48 percentage points in 1981 to 19.06 percentage points in 1991. This implies that the expansion of educational opportunities has not been gender neutral - females within the ST population are lagging behind their male counterparts.

In Arunachal Pradesh, the educational infrastructure continues to be inadequate, but its expansion over the past three decades or so has been impressive. Girls, as a result, have better access to schooling today in comparison with the past. Enrolment ratio among the girls in the age group 6-11 has gone up from 24.1 to 33.4 per cent, while in 11-14 age group it improved from 28.5 to 53.7 per cent during 1981 to 1991 (NHDR, 2001).

### **Sectoral Distribution of Female Workforce**

The occupational diversification of the workforce, particularly the shift of workers from low productive to high productive occupations, signifies better earnings and hence, better access to resources. In Arunachal Pradesh a substantial proportion of the female workers are engaged in agriculture. In 2001, 76.60 per cent of female workers were working as cultivators and 4.49 per cent as agricultural labourers. Thus, only 18.91 per cent were engaged in non-agricultural activities. The inter-district variation in percentage of female workers engaged in non-agricultural activities is quite high — ranging from 55.37 per cent in Papum Pare to only 7.98 per cent in Tirap. The percentage of female agricultural labourers to total female workers is highest in Dibang Valley, closely followed by neighbouring Lohit and it is lowest in Tirap.

The pattern of occupational diversification of workers in the state shows that female workers are moving out of agriculture, at a much slower pace than their male counterparts. For example, in 1971 among the total male main workers 68.78 per cent were engaged in the primary sector, only 0.66 per cent were working in the secondary sector and the rest 30.56 per cent were in the services. By 2001, the share of male workers in the primary sector had come down to 51.54 per cent and their shares in secondary and tertiary sectors had gone up to 14.54 and 33.93 per cent respectively. In contrast, the distribution of female workers in different sectors in 1971 was 97.11 per cent in primary, 0.14 per cent in secondary and 2.75 per cent in tertiary. In 2001, 81.70 per cent of female main workers were still engaged in primary sector, 5.74 per cent in secondary and 12.55 per cent in the tertiary sector. (Table: 18)

The empowerment of women crucially depends upon their participation at various spheres and levels of decision-making. The expansion of freedoms cannot be made possible without guaranteeing the fundamental right to choose between alternatives. The capability to shape one's own future through legitimate and participatory processes of decision-making is of intrinsic value in any democratic society. But beyond that, guaranteeing the freedom of participation to everyone including the marginalised and oppressed is absolutely essential for deepening democracy.

### **DEVELOPMENT, ENVIRONMENTAL DEGRADATION AND WOMEN**

Environmental degradation is critically linked with sustainable development especially in agrarian economies. There is a complex and close interrelationship between development, environmental degradation and women. Any change in the economic, political and environmental situation has affected both the sexes not only as stakeholders in resource-use and allocation but also in environmental management. Probably the first victims of any environmental degradation are the women among the poor. A fuel wood crisis as a result of deforestation forces women to travel for miles in search of wood (Agarwal, 1986). Often low household incomes are associated with low land productivities. There is ample literature which links increasing poverty and declining land quality called as the vicious circle of poverty and land degradation

Table: 18 : Sectoral Distribution by Industries in Arunachal Pradesh: 1971-2001

Areas	Sex	Primary				Secondary				Tertiary			
		1971	1981	1991	2001	1971	1981	1991	2001	1971	1981	1991	2001
Total	Male	68.78	63.21	54.60	51.54	0.65	13.13	12.34	14.54	30.56	23.66	33.06	33.93
	Female	97.12	95.11	89.93	81.70	0.14	2.00	2.21	5.74	2.74	2.89	7.87	12.55
	Total	80.44	75.28	67.44	62.27	0.44	8.92	8.66	11.41	19.12	15.80	23.90	26.32
Rural	Male	72.30	68.00	62.34	64.59	0.55	11.85	11.09	12.18	27.15	20.15	26.57	23.23
	Female	97.38	96.10	92.61	89.04	0.11	1.74	1.87	4.47	2.50	2.16	5.52	6.49
	Total	82.92	79.08	74.13	74.14	0.36	7.87	7.50	9.17	16.72	13.06	18.37	16.69
Urban	Male	5.39	6.75	6.72	6.07	2.58	28.25	20.10	22.63	92.03	65.00	73.18	70.67
	Female	45.99	30.60	22.46	15.40	5.75	18.93	10.69	17.22	48.26	50.47	66.85	67.39
	Total	8.01	9.25	8.86	8.40	2.78	27.27	18.82	21.57	89.21	63.47	72.32	70.03

Source: Census of India, various years.

(UNSO). This is attributed mainly to the population, agriculture and environment nexus. In this regard Boserup's theory of positive relation between population pressure and technological innovation is unfound in many parts of the developing world. It was felt that increased population density without technological progress has led to shortened fallow periods, deforestation and soil degradation (Vosti, 1993 as cited in UNSO, 1994). On the contrary, appropriate institutional arrangements could halt or reduce degradation even under the condition of increasing population pressure (Tiffen et al 1994). The participation, roles, rights and obligation of women change drastically along with the emergence of institutions like private property over land and other resources. The dependence upon common property resources is more crucial for the survival of the poor than the rich (Jodha, 1986; 1998). It has been often argued that poor and the marginalized people extract more natural resources and degrade the environment more due to a greater reliance on the natural resource base and also due to high discount rates of future returns. Survey studies, on the other hand have also pointed out that since the marginalized people depend more heavily on the limited natural resource base, they attach greater value to its conservation (Reddy, 1999; Reddy and et al, 2001; Chopra and Gulati, 1998). Environmental degradation substantially increases the survival risks of the women and the poor. In fact vulnerability to environmental degradation induces women to become agents of eco-restoration in organized efforts (Nadkarni, 1989). Further the nature of property rights regimes and the distribution of access to natural resources not only affects the survival of the poor and the marginalised in the long run, it also affects the quantity and quality of the environmental resource-base (Dasgupta and Maler, 1991). Efficient institutional arrangement for sustainable resource-use and conservation has been widely discussed in recent literature. It has been argued that in case of open-access and unregulated common property, individuals do not get proper incentive to act in a socially efficient way and hence the 'tragedy of commons' occur (Hardin, 1968). It has been argued that distributional implications of privatization may not be socially desirable (Weitzman, 1974). On the other hand, evidences from various parts of the world suggest that state-managed natural resources degrade faster, were used inefficiently and the outcome were not necessarily beneficial to the poor and the women folk. As an alternative to both market and state-controlled institutional arrangements, local level decentralized management of CPRs have been emphasized (Baland and Platteau, 1996; Ostrom, 1990; Prakash and Gupta, 1997). The studies on common property and community based natural resource management are marked by silence over distributive concerns, social stratification and conflicts. They tend to over emphasize cooperation and sustainable ecological ethics of traditional societies (Menon, 1999; Leach et al, 1999). There is a need to further investigate the actual functioning and implications of institutional arrangements, because the rights over resources are often contested with the help of distinct classes; different communities; distinct ethnic groups; and the local, national and international users (Nadkarni, 1998; Shiva, 1991).

### Changing Property Rights

The process of economic development initiated by the state and strengthened by the gradual monetisation and marketisation of the local economy has led to substantial changes in the property rights structure of the state. Several studies show that the emergence of private property rights over land has been the most important feature of the development process in the state (Das, 1995; Roy and Kuri, 1995; 2001; Mishra, 2001; Harris-White, Mishra and Upadhyay, 2009). It is important to note that the traditional system of ownership varied from tribe to tribe and often collective and private ownership coexisted across different types of resources. However, the process of development has undoubtedly strengthened the move towards privatization of property rights over land, forests and other resources. The process of transition from collective to private property rights, studies by Boserup and others show, that it has got tremendous implications for the gender relations in any society. In the traditional *jhum*-based agrarian economy, women members played a very significant role. The collective and communal mobilization of labour at the community level did provide the scope for participation of women in and off-farm activities. Since women

contributed significantly to the production process their position was perhaps better than in many settled societies. It is important to note that there were sex-based segregation of many activities and also that many of these communities were patriarchal. Whatever limited documentation of traditional inheritance laws are available, the evidence shows that women did not enjoy substantial rights over resources in many of the communities (Pandey et al, 1999). But, when there is a transition to private property rights, the ownership tends to be in favour of the male heads of the households. It has got two sets of implications for women. Firstly, as members of the community they become *disinherited peasants*. Secondly, as the traditional farming practices are replaced by permanent cultivation, the participation of women members in farm activities tends to decline. In many parts of the state, wet rice cultivation is increasingly becoming popular and a land-lease market has already emerged in the state. Now a section of peasant households are being transformed into rent-earning households. Field survey experiences show that the landlord's family is still involved in decision-making and in some cases they also participate in farm operations during the peak season to supplement the labour supplied by the tenant's family. But these are perhaps signs of the transitional phase and gradually the participation of women members of the landlord's family is going to decline. Thus, over a period of time women's contribution to perceived productive labour is likely to decline. This will have a negative impact on women's status as well as their well-being. Available evidence point out that gender differences in nutritional standards in Arunachal Pradesh is not very significant. One possible cause of this might be the easy access of women to leafy vegetables and other food items from *jhum* fields and forests. The on going changes in property rights formations and farming systems, in all probability, will worsen the situation, particularly for the rural poor (Mishra, 2004).

### Changing Employment Opportunities

As it has already been pointed out, the changing workforce structure of the state has a clear implication for the emerging gender relations. Women are moving out of agriculture, but at a much slower pace than their male counterparts. The literacy levels among women have been improving. But the gender gap in rural areas is unacceptably large. This needs to be seen in the backdrop of comparatively impressive improvements in female literacy in many of the predominantly tribal states of northeast India. All these indicators show the widening disparities among males and females in the context of rapid economic transformation. However, the significant gains made in expanding the opportunities for women should not be overlooked. A large number of women have joined the service sector, particularly in government and semi-government organizations, but their share is larger in the lower-ranking jobs. Exceptions apart, the top echelons of bureaucracy are beyond the reach of women in general and the tribal women in particular. Those who are left behind, in the rural farm sector, for them the decline in forest covers, traditional institutional support and also the changing value system has got important implications. Other things remaining constant, marketisation and commercialisation of the rural economy makes them increasingly vulnerable to shocks of market. With many women participating in production of horticultural crops, and spices, the inefficient and exploitative market networks makes them more insecure and vulnerable. This is not to say that commercial farming has not increased productivity and income levels of some of the better-endowed households, but women as producers and sellers face additional constraints because of their lack of skills and exposure. In parts of rural Arunachal Pradesh, women have started taking part in various non-farm activities. In urban and semi-urban areas they have started taking part in micro-enterprises of various kinds. Their participation in petty trading in vegetables, fruits and textile items is an important aspect of the changing livelihood strategies of women (Upadhyay and Mishra, 2004; Upadhyay, 2005). However, some evidences also shows that when male members tend to diversify their activities and join the urban or non-agricultural occupations, the burden of maintaining agricultural production and maintaining social obligations fall on women (Mishra, 2002).

### **Time required for firewood and water collection**

It has been observed that much of women's labour is performed in the non-cash economy. Women's dependence on forests for gathering wood, fodder, and food has always been much greater than their male counterparts (Agarwal and Narain, 1985). One of the most striking implications of decline in forest cover for women is the longer time spent on firewood and water collection. Several survey-based studies have revealed that rural women in several parts of India may spend 4-5 hours in searching for fuel wood. Thus, the scarcity of fuel wood, due to depletion and degradation of forests certainly lengthens the already long hours of the average rural women's household work (10-12 hours) in most parts of rural India (Agarwal, 1997). Although we do not have any conclusive evidence to show that time taken for collection of water has increased in all the villages of the state, it takes longer time to collect firewood and other forest based items for many households. It is important to note in this context that according to official statistics more than 90 per cent of villages in the state are provided with tap water. The water supply may be erratic, particularly during the rainy season and it is basically untreated water, but still the time taken to collect water is not a reliable measure of the extent of deforestation in many villages. But the distance of the forests from the habitations has increased in many parts of the state. And since women in many areas do the task of collection of forest-based products, hence it has got various implications for their time use and overall work burden.

### **Commercialization and the Gender Ideology**

The market economy has brought the cultural transformation at various levels. One of the outcomes is the rapid expansion of consumerist culture in the state. The political economy of the state's development has created a culture of easy money. Corruption has become a part and parcel of governance in the state. There is nothing unique about this in the state, but the lack of accountability in spending public money, emergence of rent-seekers, easy money flow from the timber trade etc has resulted in rapid growth of materialist and consumerist desires at least among the neo-rich and middle classes. It has its demonstration effect in the rural areas as well as among the lower middle classes. All such developments have led to gradual erosion of the traditional egalitarian outlook of the communities. Such changes are difficult to measure and there are obvious differences regarding the extent to which traditional values have been eroded, but by and large careful observers of the societal changes in the state have pointed out at the rapidly deteriorating value system in the state. Deforestation and timber trade together with corruption in the bureaucracy have been instrumental in spreading this culture. Not all sections of women are necessarily adversely affected by these developments, some of them have enjoyed better consumption standards because of such developments, but such changes, to put it mildly, are detrimental to the long run safety and security of women as a group (Upadhyay and Mishra, 2005).

### **CONCLUSION**

The transformation of a need-based society to a profit-oriented one is essentially a complex one. With changes in the economy, the modes of resource use have also undergone a change. In a society like Arunachal Pradesh, the transition is all the more complex because it has happened in a rapid speed. Secondly, the state and the market have acted as the twin agents of modernization. In any backward society, commercialization changes the property rights structure in favour of just a few. The traditional values and institutions give way to new ones. Status is replaced by contact. This process profoundly affects women as a group. However, the state has undergone a significant and multi-layered transition in past decades and gender roles within and outside the household are being redefined throughout this on-going transition. Across the state there is a great deal of diversity in the pace, direction and nature of changes in gender roles. While improvements in the levels of education, greater facilities for learning and skill formation along with improvements in

infrastructure have opened up new employment opportunities for a section of women in the state, the gender gap in access to new opportunities continues to remain a cause of concern. As a relatively neglected section of the society they face new constraints and new challenges. As the study reveals, even when they march into new territories the gender inequality increases and this puts them under additional burden. This is what has happened in Arunachal Pradesh. The new institutions and new opportunities are not equally accessible to both men and women (Harris-white, Mishra and Upadhyay, 2009). Environmental degradation, on the other hand, has increased the vulnerability and work burden of those who could not shift to the modern economy. A substantial section of them, again, are women. Since women are so closely linked with the health and the environment, they represent a constructive and protective force for the environment as a whole. They can play a crucial role in turning vicious circles into virtuous ones.

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