Chapter 28
Nature of Land Use and Agricultural Change in Peripheral Regions: A Case Study of Arunachal Pradesh, India

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Abstract Peripheral regions have typical developmental challenges. The issue becomes problematic in view of general apathy toward them revealed through their 'negligence' in development discourse. The studies on Northeast India, especially Arunachal Pradesh, which lies in the extreme northeastern part of India, are predominantly anthropological (and ethnographical). Such a treatment could be justified on various grounds; at the same time, it provides the academic rationale to attempt an analysis of land use shaped by a number of inhabiting ethnic communities while interacting with their natural surroundings in respective habitats and the intraregional pattern of agricultural change that has been mainly introduced by the governmental agencies. This state is by and large mountainous with an aggregate of 61.57 % of the geographic area being forested. The region experiences (hot-humid) subtropical conditions in the southern foothills to an alpine-type climate in the northern high-altitude mountains. Analyses presented in this study are based on secondary sources, mainly the Statistical Abstract of Arunachal Pradesh for different years. The unit of analysis considered in this exercise is district. The discussions are further supported by the author's personal field experience and observations during his fairly long stay in the region.

Keywords Agriculture • Change • Development • Land Use • Modernization • Arunachal Pradesh (India)

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28.1 Introduction

Arunachal Pradesh (ArP), literally ‘the land of (rising) sun,’ lies in the extreme northeastern (26°28′N–29°31′N and 91°31′E–97°30′E) part of India. Before attaining full statehood in 1987, it had been one of the Union Territories of the Indian Union since 1972. This state was known in the past as the North East Frontier Tract before 1954 and the North East Frontier Agency (NEFA) during 1954–1972. Although significant in terms of geostrategic location, the state has shown a slow pace of ‘development.’ Before moving further, it would be appropriate to provide a geographic introduction to the study area.

28.1.1 Arunachal Pradesh (ArP): A Brief Geographic Orientation

Despite early professional interest in this part of India dating back to the nineteenth century, the absence of a complete geologic survey obscures a clear geologic picture. However, evidences of the Upper Tertiary and Lower Gondwana formations are found with traces of the (Adi) volcanoes, which are difficult to explain. ArP, being part of the Himalayan mountain system, naturally contains the major features of this mountain chain. There is apparent predominance of the west–east length over the north–south one. More than 70 % of the geographic area is above 1,350 m above mean sea level (MSL). Gradual decline in altitude from west to east is prominent. Moving from the west one finds longitudinal (erosional) valleys, ridge-like formations. Step-like variation in the relief and formation of deep gorges in the upper parts are found to the east. Moving further eastward, the antecedent drainage of Siang is found, and it forms a depositional plain (northwest–southeast). The southeastern part, being affiliated topographically to the Naga Hills, is distinctly different from the rest of ArP. Having an average annual rainfall exceeding 200 cm, Arunachal is entirely covered by a network of different order streams, and its topography is naturally sculptured by the rivers’ active role similar to any other humid region. In fact, rivers have prominently defined the sub-regions and probably this is the reason almost all major administrative divisions are named after them (Singh 2005). The life cycle of an average Arunachali is closely and neatly woven around the rhythm of seasons in which rain (fall) has a distinct role. One can identify five precipitation zones forming a concentric circle pattern (Singh 2005, pp. 7–8): very high (above 400 cm), high (300–400 cm), moderately high (200–300 cm), low (100–200 cm), and very low (below 100 cm).

Three natural resources are of greatest importance across the state: forests, land, and water, which form common property resources in Arunachali village society. Life of an average Arunachali cannot be imagined in the absence of forests whose accessibility varies with altitude. Soil is the next important natural resource in this region. At the aggregate level, one finds differences in terms of soils in mountains and hills and that of the narrow river valleys. Wide intraregional variations are quite prominent. In general, soils lack well-developed soil profiles, leaching is ubiquitous, and despite a huge supply and addition of vegetal remains, the effective humus layer is too thin subsequent to washing away by widespread surface runoff. The National Soil Survey and Land Use Planning (NBSSLUP), Nagpur, has identified nine soil types in ArP that occur independently. Soil erosion and consequent loss of soil fertility are two impediments in the path of sustainable (agricultural) development. As mentioned earlier, average annual rainfall is quite high in Arunachal, but availability of water in the upper hills and mountains is very low. The situation worsens during the drier spells. Apart from domestic use, water is used for three specific development purposes: hydel power generation, irrigation, and pisciculture.

The state is currently organized into 16 districts (Fig. 28.1). As per Census 2011, the total population of ArP is provisionally estimated at 1,382,611 persons distributed over a geographic area of 83,743 km^2 (about 17 persons/km^2). There was growth of about 26 % during 2001–2011. This population could be disaggregated as scheduled tribal (64.22 %) and non-tribal (35.78 %), with 79.59 % as rural and 20.41 % as urban. ArP, similar to the whole northeast region, presents a cultural mosaic with 31 communities identified as permanent inhabitants whose sociocultural practices vary considerably. Diversity in ethnic composition could be better captured with reference to linguistic variations: 42 languages and 61 dialects are spoken and six scripts, viz., Devanagari, Assamese, Hingna, Mon, Roman, and Tibetan, are followed (Singh RS 1999). However, greater similarity is noticed in the occupational pattern, dominated by agriculture, which is complemented by collection from the forest, hunting, and fishing.

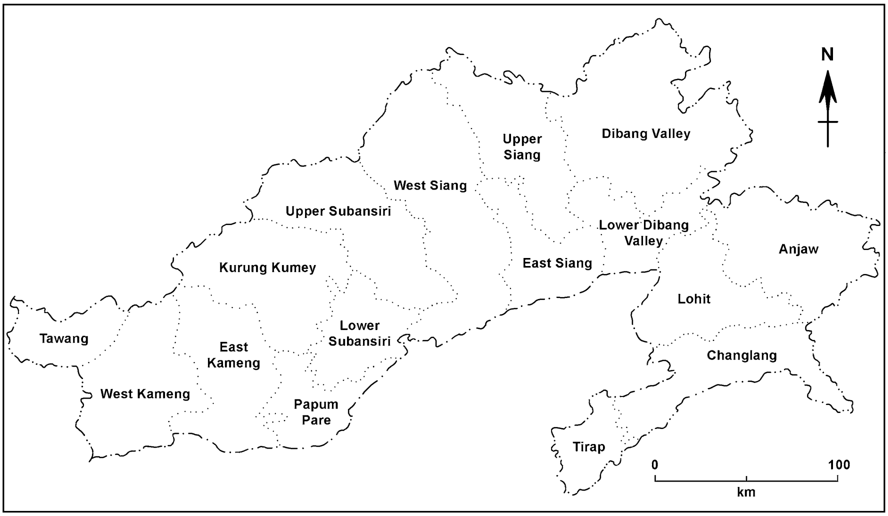

Fig. 28.1 Arunachal Pradesh: location of districts, 2010–2011 (Note: Map is notional and does not depict correct boundaries. From Statistical Abstract of Arunachal Pradesh, 2011)

The level of human development is too low (0.515) in the state. The geographic pattern presents a mixed scenario. Of the three components, income index appears better than education and health. The gap between 'performing' and 'not-performing' districts is too small. Two districts, one each in west (East Kameng) and east (Tirap), are found at the bottom where education, health, and income are in a poor state (Arunachal Pradesh Human Development Report 2005).

28.1.2 *Implications of Peripherality and the Rationale of Present Study*

If ArP has not been able to catch up with the pace of development of mainstream India, what could be the possible reasons? Is it locational disadvantage? At this point, the conceptual position could be briefly considered. Although periphery, and hence, 'peripheral' and 'peripherality,' are understood quite clearly in regional studies as concrete geographic terms, there is an emerging thought about the 'fuzziness' of the concepts (see Markusen 1999). Perhaps it is the result of the post-modern practice of deconstructing an ascribed and established meaning. Despite the questions raised regarding non-clarity of the meaning, a plethora of studies in both regional and development studies (Wallerstein 1974; Alonso 1964; Myrdal 1957; also see, Lomnitz 1977) indicate that 'peripherality' can be understood as 'an inherently relational condition' (Crone 2012). In a critical modern development geography perspective, which aims at understanding developmental patterns in the context of power relationships, the relational condition expressed by peripherality necessarily is an expression of 'power inequality' and 'subordinate status of the peripherality in relation to the core' (Anderson 2000). Crone (2012) points out two more important facets: multi-scalarity and typology of peripherality. Referring to Fig. 28.2, peripherality along with similar other conditions vis-à-vis the core or center could be appreciated better. No matter whether we look at the peripheral regions from a centripetal perspective or otherwise, they are generally at the receiving end but for

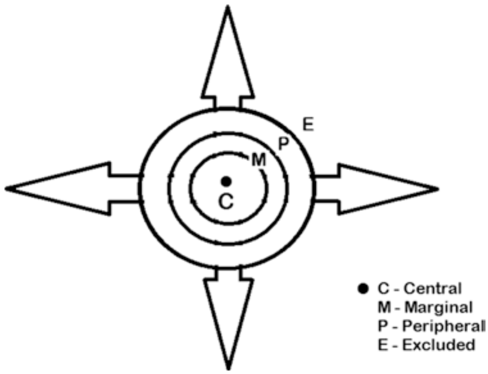

Fig. 28.2 Geographic positions in a system

their military and defense significance. Marginality in the general sense is an issue of 'perspective,' and being a geographic fact necessarily involves 'scale' and therefore spatial resolution (Leimgruber 2004, 2010).

Leimgruber (1994, p. 8) believes that the border regions can be regarded as a manifestation of 'geometrical marginality.' There have been allegations by the peripheral states, particularly of the northeast region, in India that they are not perceived but rather seen as 'Indians.' Even in a recently published scholarly work on globalization and Indian agriculture (Bhalla and Singh 2012), I fail to locate the northeastern states (except Assam) in discussions therein. Why do they miss out? Is it the result of their peripherality, the lack of secondary data, or some other reason? When we look at the studies on ArP specifically, they are predominantly anthropological with a few from the historical perspective. Barring a few recent attempts, developmental studies have been on a backburner. One can justify such a treatment on various grounds. To me, this 'neglect' has provided the academic rationale to attempt analyses of development issues (see Singh 2000, 2001, 2005, 2006, 2008, 2010), including the present one. It seeks to understand patterns of man–nature interaction as revealed by the land use shaped (internally) by a number of inhabiting ethnic communities. These communities have been interacting with their natural surroundings in local habitats, and the intraregional pattern of agricultural change has been by and large 'forced' and 'imposed' (externally) by governmental agencies.

28.1.3 Objective, Research Questions, Materials, and Methods

In the backdrop of the preceding section, my objective of conducting this study is to determine the nature of land use and agriculture that has evolved in ArP in recent periods. To pursue this objective, answers to the following research questions are sought in the subsequent sections: (1) What is the nature of change across land use categories at aggregate level? (2) What is the spatial pattern of land use? (3) What are the major agricultural changes and developments taking place there? and (4) How is agricultural development distributed at the disaggregated level?

The present study being empirical, the backbone of analysis is naturally formed by secondary data sources, and the conventional geographic method of mapping also has been employed. The discussions are further substantiated by my personal field observation during 4 years of residence in the region. The unit of analysis considered in this exercise is district, and the major data source is the Statistical Abstract of Arunachal Pradesh (SAAP) of different years. Land use analysis has made use of data pertaining to the last four agricultural censuses: 1985–1986, 1990–1991, 1995–1996, and 2000–2001. The latest SAAP (2011) contains 2000–2001 agricultural census data only.

Ideally, agricultural development is measured utilizing such variables as productivity and yield, infrastructure development, and also the amount of inputs used. As a matter of fact, for different reasons discussed later in the agriculture section, one does not find sufficient progress with regard to the latter two categories of variables. Their inclusion in measuring agricultural development in ArP is likely to distort the patterns in which we are interested. For this reason, the present study employs measurement of agricultural development based on crop productivity (Bhatia 1967). Two time points are considered here, 1993–1994 and 2010–2011, to contrast and compare the development canvas. In general, the methodology of the study is descriptive, supported by some simple statistical applications.

28.1.4 Choices and Data Limitations

Except microlevel studies where compulsion of generating primary data becomes boon in disguise, dependence on secondary data is by compulsion rather than choice. In such cases, the statistical analysis part of a research has to compromise with data available instead of using what is 'appropriate.' Often would-be research is 'designed' on the basis of available data, which severely affects the 'appropriateness' of research (questions). My personal engagement and experience with research on ArP has not been satisfactory enough as the choice of data is too limited. Data generation is too sketchy. In fact, this state still waits for several crucial surveys such as geologic and cadastral in a complete fashion. In some recent surveys such as the District Level Household and Facility Survey (DLHS). coverage is satisfactory. The state government nevertheless has to do much more in this direction. Poor data generation forbids any deeper analysis. I have even consulted some older statistical sources dating back to the1950s and find that erratic data compilation is another inherent problem that worsens further with incoherency in structure and organization of data. Similarly, changing district boundaries forbid district-wise analysis of temporal changes. This problem of internal reorganization of administrative units is a limitation found in almost every state of India, and ArP is no exception. Because of such inconsistencies, assessment of the trend of performance of districts is totally forbidden. There are techniques to resolve these issues, when data are reduced to a base year level, but that again intervenes with realistic interpretation and future projection. Time points in a study focusing on spatiotemporal variations should be the same. However, it has not been possible here to adhere to a technically rigorous method for the lack of published data.

Analysis and discussion to follow in this chapter are organized into two broad heads, land use and agriculture. The following section is an analysis of land use pattern and recent changes. Here, the changes across the categories are explored first, followed by an analysis of district-level intraregional changes between different land use censuses (1985–1986 to 2000–2001). The third section, on agriculture, discusses the general nature of agricultural practice. Subsequently, the changes, from *jhooming* (also *jhuming*) to settled cultivation, availability and distribution of agricultural land, cropping pattern, and modernization (with special reference to irrigation, high yield variety seeds, and chemical fertilizers) are discussed. The fourth section pertains to the theme of progress shaping development contours since the early 1990s, a watershed in Indian development policy. The fifth section concludes.

28.2 Land Use: Change and Emerging Scenario

Land resource is crucial because it is the platform on which ultimately every development strategy rests, whether it is 'vegetative-agricultural,' residential, commercial, or industrial. Similarly, in the light of given scientific advancement, it will not be out of place to remind ourselves that food still remains basic among human needs and its supplies predominantly come from fields rather than laboratories.

Land use reflects the nature of interaction between the physical environment and human factor, characterized by the prevalent sociocultural and economic environment, and, naturally varies across the geographic environments and cultural groups. In a way it is an index of human use of land resources. Hence, the study of land use is not merely the descriptive analysis of different categories of land utilization; rather it is also an (qualitative) assessment of patterns of man–nature interaction and the extent to which human agencies are able to use the geographic area meaningfully (Singh 2005, p. 19). An understanding of land use therefore requires knowledge of the peculiarity of environmental conditions and the nature of human constraints in the region concerned. In mountainous regions such as the Himalayas, to which the larger part of ArP belongs, terrain (limitation) has tremendous role in determining the extent and efficiency of resource use, including land.

Available literature has well established that the existing land use system is the result of many 'causative factors' both natural and cultural in their wider connotation. The nature and level of land utilization consequently is determined by mainly three sets of determinants: (existing) socio-techno-economic, infrastructural facilities, and the people's living standard in the region. Of course, these three interact with each other in multiple ways, creating facilitating or impeding circumstances.

28.2.1 A Broader View

To begin with, one finds apparent positive changes with regard to categories such as operational area and cropped area. If interpreted together, they convincingly indicate agricultural development. Simultaneous considerations of the categories that have gained, and those areas not available for cultivation and cultivable waste that have declined, reflect a broad level positive correlation. Growth of total cropped area, for example, could be attributed to bringing areas not available for cultivation, cultivable waste, and (current) fallows under crops (Table 28.1).

The larger part of ArP is found to be covered by forests. Until the early 1990s a very large geographic area (more than 60 %) was covered by forests, which may be attributed to their tremendous regenerative capacity caused by the hot and humid climate complemented by difficult terrain conditions that make the forests less accessible for exploitation. During the land use census of 1985–1986 and 1990–1991, a positive change was noticeable, that is, an average annual increase of 400 ha. But, that did not continue. Excessive and unchecked commercial exploitation, on which the *kunda* business excelled to the benefit of all who were somewhere in the

Table 28.1 Land use, 1985–1986 to 2000–2001

Land use category	Area (ha)						
	1985–1986	1990–1991	Change (1985–1986 to 1990–1991)	1995–1996	Change (1990–1991 to 1995–1996)	2000–2001	Change (1995–1996 to 2000–2001)
Forests[a]	5,154,000	5,156,000	2,000	5,098,000	(−)58,000	4,759,949	(−)338,051
Operational area	344,232	349,878	5,646	405,878	56,000	393,638	(−)12,240
Total cropped area	167,469	193,193	25,724	248,064	54,871	215,064	(−)33,000
i. Net area sown	149,314	164,819	15,505	203,630	38,811	200,210	(−)3,420
ii. Area sown more than once	18,155	28,374	10,219	44,434	16,060	14,854	(−)29,580
Area not available for cultivation	48,129	42,780	(−)5,349	33,142	(−)9,638	32,386	(−)756
Miscellaneous use	28,655	44,555	15,900	14,362	(−)30,193	NA	–
Cultivable waste	44,426	33,094	(−)11,332	43,008	9,914	27,821	(−)15,187
Total fallow land	73,708	64,630	(−)9,078	88,030	23,400	87,000	(−)1,030
i. Current fallow	24,700	28,376	3,676	28,109	(−)267	22,961	(−)5,148
ii. Other than the current fallow	49,008	36,254	(−)12,754	59,921	23,667	64,039	4,118

Source: Based on Statistical Abstract of Arunachal Pradesh (SAAP) for different years
[a]Forests figures are not part of land use census

'power network,' in connivance with outsider merchants, led to a sudden decline of the 'real' forested area. The indiscriminate forest felling, legal and illegal both, came to a halt only after the December 1996 order of the Honorable Supreme Court of India, which in case of Arunachal Pradesh 'ordered saw mills to close down not only where a complete ban was directed but even within a 100-km radius of Arunachal Pradesh's state boundary' (Rosencranz and Lélé 2008). Around the same time, I had begun my lectureship in Arunachal when there were protests against this ban. I wanted to know about the whole issue and asked a local person. I remember his comments: "When this ban was not there the trucks plied all through the night making it difficult to take a proper sleep. All those who were connected to powerful people benefitted like anything. Money flowed down in the market, not only in Arunachal but also the markets down in neighboring Assam. Of course, for the common man, life was always the same—full of hardships—may there be ban (on commercial felling of forests) or not."

28.2.2 Intraregional Patterns

As mentioned earlier, changing district boundaries mean it is not possible to make a district-wise temporal comparison as that will not provide any meaningful understanding into the nature of change. However, it cannot forbid a spatial comparison and analysis of the emerging patterns (Tables 28.2 and 28.3).

28.2.2.1 Forests

Despite the Supreme Court of India ban on commercial felling of trees, forests are still central to the life of average Arunachalis who get their sustenance and livelihood from them. It is hence logical to begin with the changing intraregional distribution of forests in ArP. To present a precise picture, one can try to see with reference to the state average. In 1985–1986, all western districts had a lesser percentage of forested area than the east, except Tirap (and Changlang together). In the 1990s, the existing gap between districts reporting larger forest area (West Siang, 83.75 %) and the one with the smallest area (Changlang, 45.88 %) is considerable. In 2000–2001, as per the government statistics, not much change has taken place, at least at the state level. However, western districts appear to have increased their forested areas. The uneven distribution of forests could be explained as the outcome of degree of inaccessibility for commercial exploitation, particularly for the timber business, which devastated Arunachali forests mainly in the foothills. Location of timber mills and plywood industries in the vicinity, especially along the Arunachal–Assam border, acted as catalyst to this process; that is why districts with difficult terrain and inaccessible areas could maintain larger forest cover compared to those that were victims of rash and ruthless deforestation such as Changlang, Tirap, and Lower Subansiri.

Table 28.2 Pattern of land use by districts, 1985–1986 (ha)

State/district	Geographic area (ha)	Operational area[a]	Forest[a]	Cropped area			Fallow land			Cultivable waste[b]	Area not available for cultivation[b]
				Total[b]	Net area sown[b]	Sown more than once[b]	Total[b]	Current fallow[c]	Other than current fallow[c]		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Arunachal Pradesh	8,374,300	4.11	61.55	48.65	43.38	5.27	21.41	33.52	66.48	12.90	13.98
Tawang	217,200	1.79		90.23	66.67	26.10	10.72	46.64	53.36	3.87	7.96
West Kameng	742,200	2.48	51.55[d]	63.22	50.55	20.03	23.22	8.86	91.14	11.89	1.70
East Kameng	413,400	5.69	51.50	34.33	33.07	3.67	41.78	30.42	69.58	17.57	3.85
Lower Subansiri	1,013,500	4.38	51.48	46.88	46.88	Nil	16.22	56.43	43.57	4.33	22.95
Upper Subansiri	703,200	3.56	26.48	26.57	25.41	4.34	32.92	38.83	61.17	10.93	19.48
West Siang	832,500	5.50	DE	48.78	46.18	5.32	20.97	26.5	73.50	8.89	11.13
East Siang	1,019,300	5.75	50.66	54.60	45.86	16.02	11.14	54.43	45.57	6.93	31.19
Dibang Valley	1,302,900	1.00	62.63	80.10	60.69	24.24	14.99	38.62	61.38	6.33	3.47
Lohit	1,140,200	2.27	62.66	75.02	57.33	23.58	22.61	42.10	58.90	4.95	6.96
Changlang	466,200	4.63		67.99	63.93	5.97	13.73	25.98	74.02	5.52	5.60
Tirap	236,200	21.80	46.34[e]	23.29	23.26	0.16	28.78	51.82	48.18	41.42	3.50

Source: Adapted from SAAP
DE data error unverifiable
[a]Percent (%) of geographic area of the district
[b]Percent (%) of operational area
[c]Percent (%) of total fallow
[d]Includes Tawang
[e]Includes Changlang

Table 28.3 Pattern of land use by districts, 2000–2001 (ha)

State/district	Geographic area (ha)	Operational area[a]	Forest[a]	Cropped area			Fallow land			Cultivable waste[b]	Area not available for cultivation[b]
				Total[b]	Net area sown[b]	Sown more than once[b]	Total[b]	Current fallow[c]	Other than current fallow[c]		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Arunachal Pradesh	8,374,300	4.70	61.55	54.63	50.86	3.77	22.10	26.4	73.60	7.07	8.23
Tawang	217,200	2.97	49.99	85.50	69.80	18.36	7.76	78.60	21.40	1.06	18.12
West Kameng	742,200	1.07	54.60	60.44	58.39	3.39	15.84	42.65	57.35	3.14	12.69
East Kameng	413,400	4.62	75.80	58.78	55.83	5.03	32.13	8.65	91.35	4.67	1.51
Lower Subansiri	131,700	15.99	DE	85.17	78.54	7.78	12.37	48.20	51.80	1.49	5.85
Kurung Kumey	8,818	2.79	67.64	87.26	77.32	11.39	13.22	65.39	34.61	17.51	4.35
Papum Pare	287,500	6.42	87.52	74.51	70.68	4.99	12.02	64.62	35.38	2.52	8.69
Upper Subansiri	703,200	4.16	50.94	28.88	28.71	0.57	26.24	20.88	79.12	9.94	20.28
West Siang	764,300	5.41	44.53	47.43	46.79	1.35	18.28	37.91	62.09	4.04	13.20
Upper Siang	618,800	1.29	18.89	42.13	41.10	2.44	20.77	15.16	84.84	8.38	15.35
East Siang	468,700	9.75	38.80	64.90	58.09	10.50	17.97	86.82	13.18	5.55	8.70
Dibang Valley	912,900	0.07	72.90	92.64	92.16	0.52	0.18	50.00	50.00	4.80	0.16
Lower Dibang Valley	390,000	4.56	42.55	87.00	78.89	9.33	9.89	63.80	36.20	1.63	3.37
Lohit	521,200	3.06	DE	56.03	54.99	1.85	17.64	42.23	57.77	6.45	8.92
Anjaw*	619,000		27.50								
Changlang	466,200	9.85	88.65	59.85	59.07	1.29	21.93	12.09	87.91	5.54	4.40
Tirap	236,200	30.72	63.97	21.00	18.39	12.45	38.52	16.41	83.59	17.25	5.01

Source: Adapted from SAAP
DE data error unverifiable
[a]Percent (%) of geographic area of the district
[b]Percent (%) of operational area
[c]Percent (%) of total fallow
*New district carved out of (old) Lohit on 16th February 2004

28.2.2.2 Operational Area

It is true that there is an appreciable increase in the operational area. Still, a very small proportion of the geographic area is reported to be operational (Tables 28.2 and 28.3). It is a candid indication of the natural environment's dominance over the local ethnic communities in different parts of the state. Further, it also points out that there is no population pressure on the land.[1] There is a huge spatial variation but no noticeable pattern emerges as such. In 1985–1986, the operational area at state level was merely 4.11 %. Tirap had the highest at 21.80 % and Dibang Valley the lowest at 1.0 %. In the 1990s also there existed the same gap, almost 20 times, between the East Kameng highest operational area (21.83 %) district and Dibang Valley with merely 1.11 %. Similarly, during 2000–2001, despite an improvement shown by all districts, of course a marginal one, gaps remained considerably high. Here too such huge inter-district difference is basically the result of terrain complexity coupled with the lower technology possessed by local inhabitants, which together make the task of bringing a larger land area under (human) operation difficult.

28.2.2.3 Cropped Area

From the (agricultural) development aspect, the area sown is very important for all land use categories. In general, it reflects the extent to which areas have been brought under the plough and cultivation of crops. There are two subcategories under which cropped area is reported in the Indian agricultural census system, net area sown (NAS) and area sown more than once (ASMO). The former expresses extension of cropped area and the latter reveals cropping intensity.

One of the most common strategies of increasing agricultural production has been bringing more and more area under the plough. However, usability of land surface and level of demand (for such expansions) are crucial factors in this process. And, on the other hand, such extensions are at the cost of other land use/land cover; the most prominent among them has been forests that were cleared to create the first agricultural fields, and the process continues to date. In ArP one finds that neither of the aforementioned factors favors increase of cropped areas. On top of that, prevalence of community ownership of land (Roy and Kuri 2002), along with other common property resources (CPRs), probably hinders enough enthusiasm, encouragement, and incentives to extend and develop the area for cultivation (Singh 2005, p. 23). At the same time, forests are valued relatively high as the source of supplementing low productive subsistence farming and hence a common Arunachali person would not

[1] The general population density of Arunachal in 2011 was 17 persons/km^2, less than one third of the next lowest, 52, in Mizoram whereas the highest was of Bihar (1,102) among the states.

favor their destruction. This interpretation nevertheless needs further field testing as to what is the people's perception in the changed times.[2]

Tawang, Changlang, and Dibang Valley were the first three districts in terms of highest NAS in 1985–1986, which was above 60 % of the operational area (Fig. 28.3). Beside them, Lohit and West Siang too joined this group in 1990–1991. After a decade, when there was considerable reorganization of the districts, the scenario changed completely. Dibang Valley (92.16 %), Lower Dibang Valley (78.89 %), and Lower Subansiri (78.54 %) surpassed the previous figures and emerged as the top three districts in this respect in 2000–2001 while the state average remained at merely 50.8 %. The intraregional distribution hence reveals the eastern and southeastern districts doing better compared to their western counterparts, barring a few exceptions like Tawang and Lower Subansiri.

The ASMO does not provide a bright picture. In 1985–1986, a little more than 10 % of the gross cropped area was sown more than once. It improved in the next 5 years and reached around 15 %. But, again in 2000–2001, it dropped to half of the 1990–1991 mark. Tawang is the only district that has been consistently top ranking in this respect; performance of other districts in quite inconsistent (Fig. 28.4).

28.2.2.4 Fallow Land

Maintaining fallows in Arunachal, as in other parts of this region, is apparently linked with *jhooming*—the practice of shifting or slash-and-burn method of cultivation, which is why no steady trend is witnessed in this land use category. In 1985–1986, a little more than one fifth of the operational area was fallow. However, any regional pattern was difficult to discern as the top three districts were East Kameng (41.78 %), Upper Subansiri (32.92 %), and Tirap (28.78 %). In the following census of 1990–1991, clear regional trends were not deciphered. Western Arunachal, with the exception of Tawang, had larger fallows in comparison to the eastern part. The same was found again in 2000–2001. A pertinent point to be noted here is that there is a very high proportion of other fallow subcategories in the majority of the districts across the last four agricultural censuses, which confirms the wide prevalence of shifting cultivation.

28.2.2.5 Cultivable Waste

Generally, unscientific farming and poor management practices lead to unsuitability of land for continued cultivation. In the entire northeast region including ArP, deforestation, *jhooming*, and unscientific slope cultivation are together responsible for soil erosion that renders land unsuitable for cultivation. However, concerted efforts from different state government departments have yielded positive results. In

[2] There is unsubstantiated information about unauthorized private use of land that is otherwise a CPR in ArP.

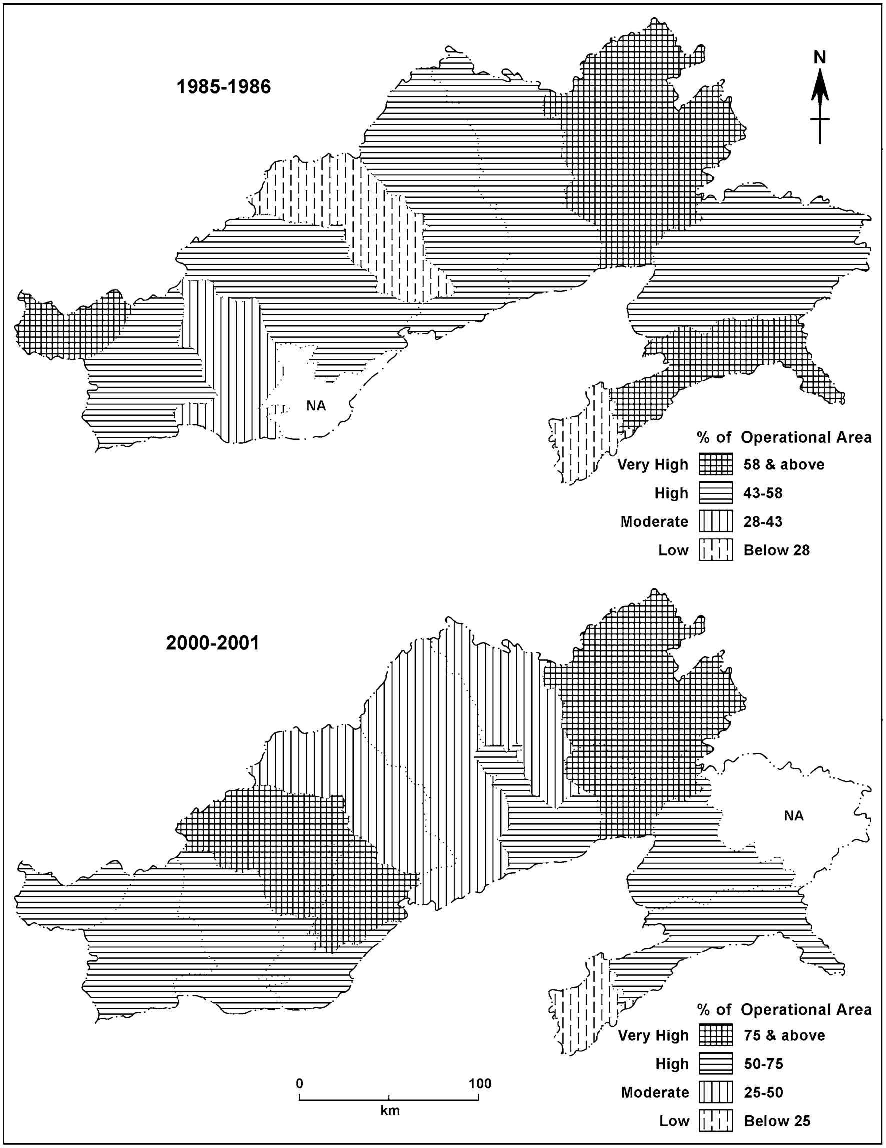

Fig. 28.3 Changes in net area sown (Note: Map does not depict correct boundaries)

1985–1986 the cultivable waste accounted for around 13 % of the operational area, which declined to 9 % in the next census of 1990–1991, and after a decade it dropped to just 7 % (2000–2001). Some older districts such as Tirap and newly carved ones such as Kurung Kumey, however, have reportedly a higher amount of wastage of cultivable land. On the other hand, Tawang shows better performance by maintaining its lowest proportion of cultivable waste across the censuses.

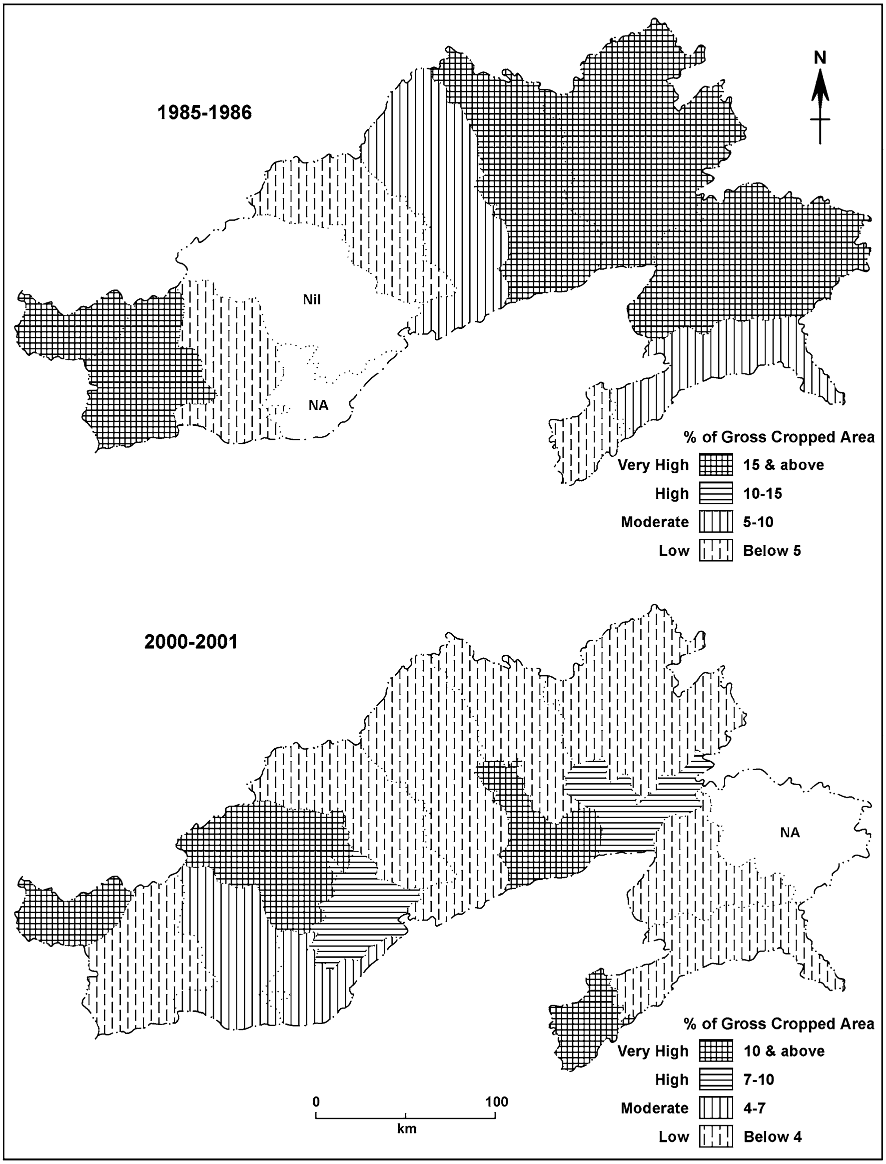

Fig. 28.4 Changes in area sown more than once (Note: Map does not depict correct boundaries)

28.2.2.6 Land Not Available for Cultivation

This category of land includes land put to nonagricultural uses such as settlements and roads and barren and uncultivable land. In the case of hilly and mountainous regions, to a considerable extent it does include highly rugged and eroded areas unfit for any kind of human utilization. As cultivable waste, in this category also signs of improvement are visible. Around 14 % of the operational area was reported under this category in 1985–1986, which declined to around 8 % in 2000–2001. It was quite high in East Siang (31.19 %), Lower Subansiri (22.95 %), and Upper Subansiri (19.48 %) in 1985–1986, whereas in 2000–2001 the top three districts were Upper Subansiri (20.28 %), Tawang (18.12 %), and Upper Siang (15.35 %).

28.3 Agriculture Practices

A majority of the population in ArP depends upon the agriculture sector for livelihood, mainly as cultivators and quite a small proportion as agricultural labor too. The people here, as do their other counterparts in northeast India, mainly practice *jhooming*. *Pani-kheti*, wet (settled or permanent) cultivation, is practiced by a small number of people in river valleys and plateaus where soil and water supply conditions are conducive to this. Initially, agriculture was largely restricted to the production of rice, the staple food of the people, supplemented by many minor crop products. This low-subsistence agriculture, of very meager productivity, was complemented by a number of activities, important among them being hunting, fishing, and a variety of collections from the forest. Consequently, a marketable surplus was almost unknown, preventing the emergence of monetized transactions as well as capital formation.

As noted earlier, agricultural land was held communally except for a few pockets. However, the individual cultivator enjoyed usufructuary rights during his operation of the land (Roy and Kuri 2002; Talukdar 1997). Agricultural land was not cadastral surveyed; even today a cadastral survey has not been conducted on agricultural land. After the recent enactment of a Bill on Land Settlement and Revenue in 2001, preparations are being made for a cadastral survey (Arunachal Pradesh Human Development Report 2005).

28.3.1 General Nature of Practiced Agriculture: Interplay of Nature and Culture

Agriculture is an excellent example to analyze the interplay between nature and culture, in which man, despite all his capabilities, finally depends on nature for success. Of course, the technological man has endeavored to surpass the limits posed by nature; however, the known information is yet to confirm his success conclusively. This observation becomes crucial in the context of ArP where people with limited technological access could not surmount nature's limit. They have tried to live in harmony with nature and probably because of it only they have tried to self-impose limits on their material requirements. Hence, the primary objective of agriculture practiced by the inhabitants in this mountainous and hilly state is to subsist on growing traditional crops using local practices.

Looking scientifically into the basic nature of agriculture, it is important to look into the land capability pattern. The state government's Soil and Land Use Survey Organization has conducted a survey of land resources and identified four land capability classes that are applicable in the case of Arunachal: II, III, IV, and VIII. Of these, class IV is found in the largest area across the state, whereas II is concentrated in parts of Lohit and Dibang basins, III in a narrow strip running along the Arunachal–Assam border and Siang, Subansiri, and Kameng basins, and class VIII is found along the Indo-Chinese borderline. Among them, class II is most suitable for agricultural cultivation conditionally. The rest of the capability classes suffer from severe limitations having negative impacts on cultivation. For example, class IV, which is prominent being widely distributed, suffers from profound limiting factors such as moderate to severe erosion by water, steep slopes, and soils with poor rooting zones and low water-holding capacity (Singh S 1999, pp. 77–78). Thus, the nature of agriculture in ArP needs little explanation. A cultivator here has actually limited choice rather than going in for traditional *jhooming* with the least use of modern inputs such as fertilizers, either because of their lesser utility in slope terraced farms, or too small agricultural landholdings (SAAP 2011), or their highly scattered nature, which forbids proper application of modern inputs (Tiwari and Joshi 2000, p. 83). Moreover, in such farming practice commercialization is yet to materialize, and that is why one does not find the free availability of such inputs in the local market.

28.3.2 Changes from Jhooming to (Wet) Settled Cultivation

Although *jhooming* has been found as a practice that is not environment friendly in many ways, it continues to be the dominant agricultural practice across northeast India. It needs to be recognized that in the given agro-ecological conditions, the only way is to rely on inherent soil fertility, which is not capable of permanent cultivation. And that is why keeping fallows—an ages-old practice—becomes the only option to maintain the fertility of the soil. This practice was possible, and perhaps 'sustainable,' when the land-to-man ratio was low. But now, the situations are changing. Although in comparison to other states, the northeast as a whole and ArP in particular have low population density, one cannot deny the fact that over the years this will increase. Such an anticipated increase will create pressure on *jhoom* fields in the form of gradual shortening of the *jhoom* cycle. Naturally, this will have a deteriorating impact on land quality with reference to cultivation even though the best traditional ecological knowledge of the local people is utilized to manage soil fertility (Ramakrishna 1992, 2002).

For this reason, there has been a consistent effort from the government's side to encourage people to shift to settled cultivation. There has been some success (Fig. 28.5), but such attempts have not yielded as much as desired. The academic argument put to explain it is that 'this is because the people perceive sedentary agriculture is demanding very high inputs in terms of fertilizers and pesticides'

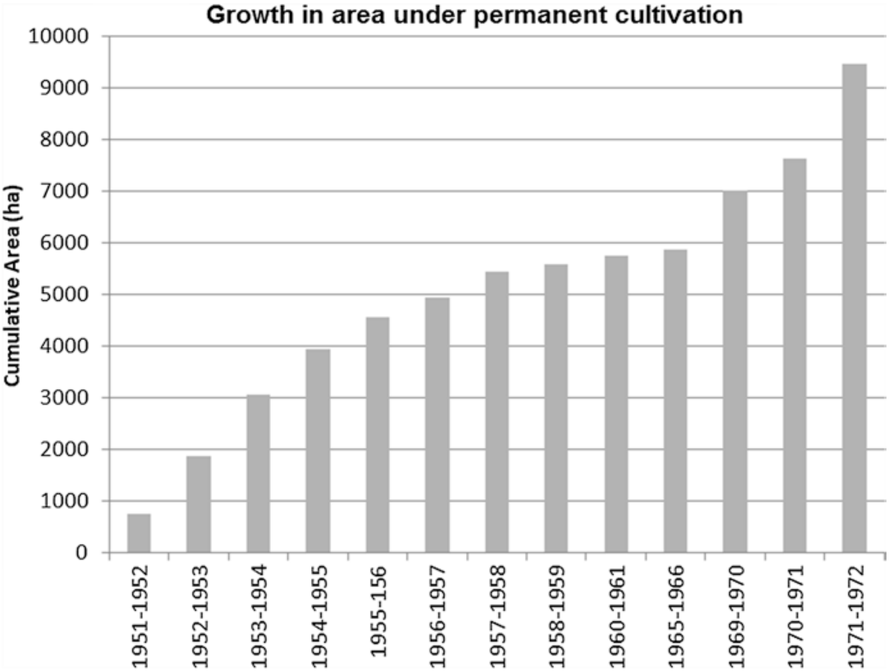

Fig. 28.5 Area under permanent cultivation during 1951–1952 to 1971–1972 reflecting slower pace of change (Based on different statistical reports)

(Arunachal Pradesh Human Development Report 2005, p. 173). Here, we tend to err. We need to remind ourselves that mere (modern) inputs cannot facilitate such a switch-over. Settled agriculture is possible only in a situation where land capability is good enough to support it, at least with the adoption of best land management practices. So, the people well understand through their indigenous traditional knowledge system that it would be disastrous to switch over to settled cultivation where nature does not permit it. Such a situation calls for considering other ways to tackle low productivity, discussed later in this chapter.

28.3.3 Agricultural Land: Availability and Distribution

Agricultural land, which is defined variably, here means 'land normally used for agricultural production.' Thus, it includes cultivated and fallow lands as well. In the context of ArP, it is needless to mention that both the area under *jhoom* and settled cultivation are considered. Singh (2008) attempted to analyze the distribution of agricultural land. Here, the main findings of that study are noted in a summarized form.

Table 28.4 Concentration of agricultural land

District	Location quotient		
	Net sown area	Gross cropped area	Total
Tawang	0.76	1.05	0.63
West Kameng	0.37	0.36	0.30
East Kameng	1.17	1,06	1.40
Papum Pare	3.17	3.25	2.52
Lower Subanasiri	0.32	0.32	0.51
Upper Subanasiri	0.72	0.71	0.57[a]
West Siang	1.42	1.26	1.49
East Siang	2.28	1.88	2.10
Upper Siang	0.55	0.48	0.49
Dibang Valley	0.92	1.00	0.67
Lohit	0.83	0.79	0.64
Changlang	1.26	1.21	1.88
Tirap	3.19	3.25	3.76

Source: Singh (2008)
[a]Land under miscellaneous tree crops or groves not included as data are not available

Table 28.4 reveals that agricultural land is highly concentrated in Tirap, Papum Pare, and East Siang. The gross cropped area (GCA) is expected to provide a better picture as ecological, techno-economic, and socio-institutional factors have direct bearing on it. The same pattern is repeated in case of the NAS and the GCA.

In view of the significance of agricultural land as the single major source of food and non-food supplies, its 'scarcity' or 'sufficiency' has economic, social, and political implications. Hence, its analyses need to take into account the people dependent on it through (agricultural) land–population ratios. With this purpose in mind, per capita availability of agricultural land with respect to total, rural, and agricultural workers population has been determined (Table 28.5).

In case of NAS, Dibang Valley has the highest per capita area, that may be with reference to the total or rural or agricultural worker population. The next highest figures are almost half of this. Lowest availability is found in Lower Subansiri, West Kameng, and Changlang (Table 28.5). It can be observed that Lower Subansiri and West Kameng had the lowest concentration of NAS (see Table 28.5). The GCA too by and large confirms the pattern noted by NAS. A degree of regionalization can be observed in the comprehensive land uses in the state. The western districts show lesser per capita availability compared to the eastern part, and hence it may be inferred that the population pressure on land is relatively high there. On comparing and contrasting district-wise values, that the inter-district gaps are not very large, which means the entire state reels under the same depressed condition, that is, lesser availability of agricultural land.

Table 28.5 Per capita distribution of agricultural land

District/state	Per capita[a] agricultural land[b] (ha)		
	Total population	Rural population	Agricultural workers
Tawang	0.144	0.166	0.503
West Kameng	0.109	0.120	0.602
East Kameng	0.368	0.498	1.099
Papum Pare	0.217	0.440	2.152
Lower Subanasiri	0.194	0.222	0.557
Upper Subanasiri	0.268[c]	0.373[c]	0.935[c]
West Siang	0.400	0.500	1.482
East Siang	0.410	0.547	1.839
Upper Siang	0.337	0.337	0.967
Dibang Valley	0.550	0.667	2.029
Lohit	0.184	0.226	0.682
Changlang	0.256	0.284	0.708
Tirap	0.322	0.380	0.867
Arunachal Pradesh	0.280	0.351	1.015

Source: Singh (2008)
[a]Population data used here are from Census of India 2001
[b]Land use data based on the latest available agricultural census
[c]Land under miscellaneous tree crops and groves not included because date are not available

28.3.4 Cropping Pattern

There has been tremendous increase in the area under major crops. During the periods 1980–1981 to 1993–1994, an increase of 59.9 thousand hectares (ha) is noticed (Singh S 1999). Similarly, during 1993–1994 to 2010–2011, another 47.6 thousand ha were added in the gross cropped area. Of all the crops, both in *jhooming* and settled cultivation, paddy emerges as the dominant crop, claiming the highest area of the GCA. Other major food grain crops have been mainly maize and millet, followed by wheat, which has been quite successful in the western districts of Tawang and West Kameng as well as East Siang in the central part. However, over the years the percentage of paddy has declined considerably, from 70 % (1993–1994) to 56 % (2010–2011) of the GCA at the state level.

There is simultaneous gain by other crops during this period. For example, oilseeds, pulses, potato, ginger, and crops such as chilies have gained significantly. Interestingly, sugarcane also is being cultivated in most of the districts, as revealed by the SAAP of different years.

It is worth mentioning here that apart from the aforementioned crops, experiments with horticultural crops, particularly fruits such as apples, orange, pineapple, banana, pears, and the recently introduced kiwi, together with spices such as big cardamom and black pepper, have picked up significantly. This trend suggests growing crop diversification and commercialization of agriculture, although many of these items are mainly meant for export outside the state. The only major hindrance in successful growth is the marketing bottleneck, arising from poor transport connectivity, as there are still many areas not connected with roads (Singh 2006; Mishra et al. 2004). In terms of total value as well as yield, these crops are at the lower end; still, they can increase poor agricultural return and provide better livelihood security to the people.

28.3.5 'Modernization' of Agriculture

The miracle called the 'Green Revolution' in agriculture that took place in India after attaining Independence during the 1960s–1970s was possible only because of the introduction and adoption of the Borlaug (high yield variety, HYV) seed, chemical, and fertilizer technology, essentially a novel paradigm in Indian agriculture. It created an upbeat mood among policy makers and planners and carved a new benchmark of agricultural growth and development. However, the gains of this miracle did not spread out evenly across the states and regions (Bhalla and Singh 2012, pp. 6–11) for a variety of reasons; important among these was its 'crop bias,' which had its natural regional fallouts. The peripheral regions such as ArP had to bear the brunt rather severely.

Looking at the nature of change from the grass roots perspective, it is not difficult to recognize that changes are not internal; rather, they are the outcome of *sarkari* ('official') interventions, which have always been external. So far, the state agencies seem to have failed in involving people.[3] For that reason, policies and programs remained more 'official' and less 'real.' Also, the union territory (UT) got statehood quite late in 1987 and for long it was administered remotely from Shillong. And it was in 1974 when the capital shifted to Itanagar, the present state capital. This administrative arrangement naturally had its implications for proper and meaningful integration of the state with the mainstream and of the implementation of development plans and programs including those related to agriculture.[4]

[3] There are many reasons responsible for this; the main issue has been, for a long period of time, the government officials at all the levels came from outside and did not have proper communication and interaction with local people. For this reason, perhaps, they developed apathy and lacked interest and did not take the initiative in developing the state.

[4] Fortunately, I have the Statistical Outline of North-East Frontier Agency, 1959, published from Shillong, the headquarters. The information generated is too scanty and gives an idea as to how this part of the country was treated at that time. For example, the directorate of agriculture has reported data on area brought under permanent cultivation; animals treated, castrated, and vaccinated; and farms and demonstration and upgrading centers.

Table 28.6 Growth of irrigation

Year	(Net) irrigated area (ha)
1969–1970	NA
1970–1971	NA
1971–1972	NA
1993–1994	3,138
2004–2005	664
2007–2008	44,478
2010–2011	44,478

Source: Adapted from SAAP for different years

28.3.6 Irrigation

As the traditional practice of *jhooming* was rain fed, irrigation was not required for it. In the areas where settled cultivation was practiced in a limited way, water was supplied through an indigenous method of channel irrigation in which water from rivulets and rapids is channelized to the agricultural plots. In the wake of gradual switching over to settled cultivation and governmental efforts to modernize and intensify agricultural production, the need to develop irrigation is also increasingly realized as it is one of the most important technological factors found to have direct impact on agricultural productivity. Humble beginnings in this direction were made in 1966–1967 when minor irrigation projects were started with 1,032 ha of command area (Singh S 1999). Up to the mid-1990s, limited success was noticeable (Table 28.6), but in subsequent years, appreciable progress is seen (Table 28.7). During 1993–1994, only 2 % irrigated net sown area increased more than ten times, making it a little over 20 % in 2010–2011. Earlier, Tawang had the only impressive irrigated area. The scenario has however changed after the first decade of the twenty-first century when many more districts such as Upper Siang (47.67 %), East Siang (44.83 %), Lower Subansiri (39.06 %), Papum Pare (36.64 %), Lower Dibang Valley (25.18 %), and West Siang (23.02 %) registered higher percentages of irrigated net sown area contrasted against the state average (Fig. 28.6).

28.3.7 High-Yielding Varieties (HYVs)

The application of high-yielding varieties (HYVs) has been found to increase the crop yield level and reduce the yield gaps (Singh S 1999, p. 83). Adoption of HYV seeds of wheat and paddy from the mid-1960s to 1980–1983 in northwestern India had resulted in significant increase in yield and output. During the period of 1980–1983 to 1990–1993, the 'Green Revolution' matured, which meant acceleration of growth rates at all levels including the eastern states (Bhalla and Singh 2012, pp. 214–218). However, the same did not happen in the case of most of the states of the northeastern region. For example, in ArP, a very small proportion of

Table 28.7 Concentration of irrigated area

Districts	1993–1994	2010–2011
Tawang	5.69	0.37
West Kameng	0.49	0.10
East Kameng	1.72	0.66
Upper Subansiri	0.93	0.58
Lower Subansiri	2.01	1.76
West Siang	1.18	1.04
East Siang	0.83	2.02
Upper Siang	–	2.15
Lohit	0.97	0.29
Dibang Valley	2.22	NIL
Lower Dibang Valley	–	1.13
Tirap	0.28	0.08
Changlang	0.97	0.58
Kurung Kamey	–	0.88
Papum Pare	–	1.65
Anjaw	–	–
Arunachal Pradesh	2.10	22.21

Source: Adapted from SAAP for different years

cultivated area was reported to be under the HYVs until the early 1970s (Table 28.8). It is just one illustration that the 'revolution' diffused with quite varying pace into peripheral regions, and the states had to wait longer to experiment with and experience the outcomes.

Rice being the staple food grain of the state, paddy naturally was the first crop to benefit from the HYV technology. Still, by the early 1990s, not even a quarter of the area under paddy had HYVs. In contrast, half of the area under maize and more than 90 % of wheat was under HYVs. Recently, the adoption rate of HYVs has improved only marginally, as indicated by the case of paddy, of which 36 % area was reported under HYV in 2010–2011 (SAAP 2011, p. 32). As per the latest data, of the total area under HYVs of all crops, 42 % was shared by the first three districts West Siang, Lohit, and Lower Dibang Valley only. And, among them, 15 % of the share was of West Siang alone.

28.3.8 Chemical Fertilizers

Chemical fertilizers have been considered another important component of the Green Revolution. They too have contributed in the efforts to increase agricultural productivity as well as yield by playing a complementary role in compensating for the nitrogenous-phosphoric-potashic (NPK) deficiency in soil. Research has confirmed that fertilizers have a significant role in advancing agricultural production in

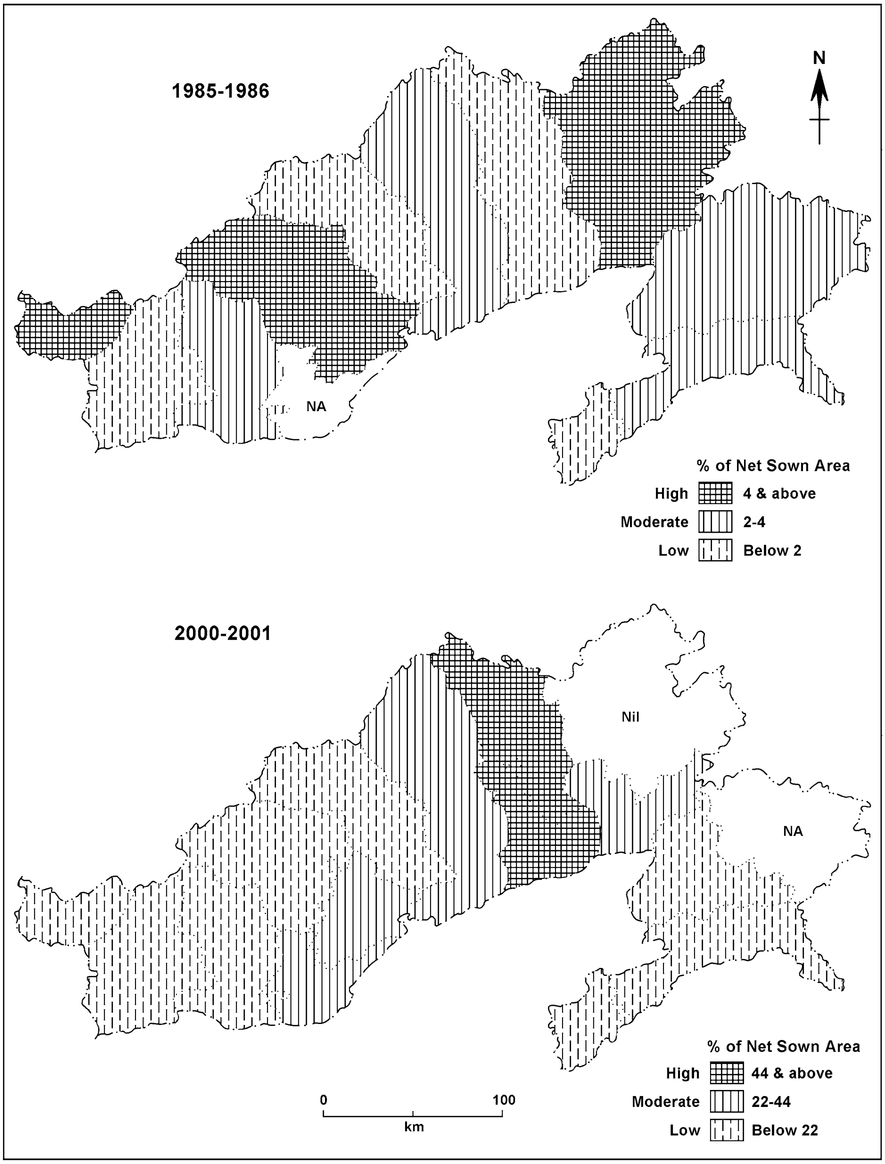

Fig. 28.6 Distribution of net irrigated area (Note: Map does not depict correct boundaries)

the lagging agricultural regions of India (Bhalla and Singh 2012, p. 86). Unfortunately, in ArP, the NPK consumption is too small and the rate of progress in this regard is very slow. In the entire state, only 750 metric tons were consumed as per the 2010–2011 statistics, which is highest so far (Table 28.9). The two

Table 28.8 Use of high-yield varieties (HYVs)

Year	Area under HYVs (ha)
1969–1970	446.72[a]
1970–1971	487.24[a]
1971–1972	450.87[a]
1993–1994	49,700
2004–2005	65,300
2007–2008	32,200
2010–2011	74,000

Source: Adapted from SAAP for different years

[a]Figures for these years are available as 'area under HYVs of seeds'

Table 28.9 Trend of fertilizer consumption

Year	Unit	Consumption
1969–1970	ha	184.91
1970–1971	ha	139.61
1971–1972	ha	54.55
1993–1994	tons	575
2004–2005	tons	695
2007–2008	tons	735
2010–2011	tons	750

Source: Adapted from SAAP for different years

westernmost districts, Tawang and West Kameng, were the leading consumers, sharing 22.13 % each of the state total. In the rest of the districts, consumption barely passes the 10 % mark.

28.4 Levels of Agricultural Development

Development both as a process and a goal has been ever desirable. With the passage of time, the need to develop agriculture has been felt in ArP too despite a comfortable land–human ratio compared to other states in India. In addition, agriculture has been the major source of people's livelihood and the state's economy depends on it substantially. There are three objectives: to meet the local demand of agricultural produce, to provide and strengthen livelihood security, and to raise the local people's income level.

It may be noted that agricultural development determinants fall broadly into two sets: physical and cultural. Often the physical challenges that are tackled by

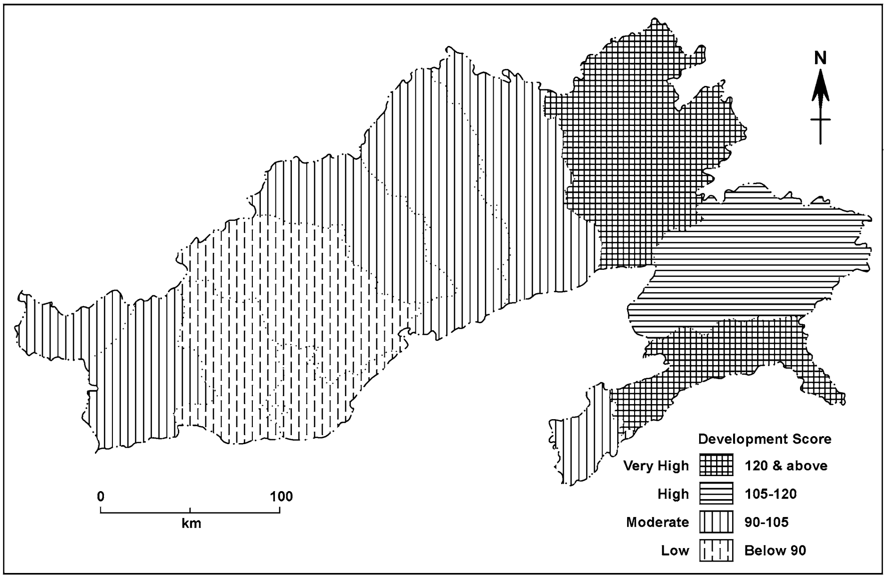

Fig. 28.7 Levels of agricultural development, 1994 (Note: Map does not depict correct boundaries)

cultural interventions are related to climate or soil. Biotechnology added a new dimension to this wherein crop plants (and therefore their seeds) were modified to make them more ‘suitable’ to the changing circumstances. In the context of the present discussion, farming techniques and farm technology are also considered important. They are either improvised internally in response to the societal needs of a time or acquired through the process of cultural exchange and adopted in due time. In recent times, the political economy and political ecology have emerged as crucial, especially in the context of peripheral regions. Several studies confirm the apparent development of agriculture in India after Independence (Singh 2005, p. 25; Bhalla and Singh 2012), and they have also provided alternative ways to measure the development and its (regional) distribution. From the foregoing discussions, it is easy to infer that agricultural development has taken place even in ArP; of course, not as much as in other states, especially outside the northeast region.

Now, it is time to see what kind of geographic pattern emerges with reference to development attainments. Is there uniformity in the spatial distribution of underdevelopment or not? In 1994 the average development score was 104.5. As is apparent from Fig. 28.7, most of the districts performed more poorly if the average is considered the benchmark. If an imaginary north–south line is drawn between Subansiri and Siang basins dividing ArP into east and west, the eastern part will appear to be performing better. The basic reason appears to be the difference in terms of land capability, which is apparently better in the east, and also the presence of a sizeable area under settled cultivation. As far as individual district-wise performance is

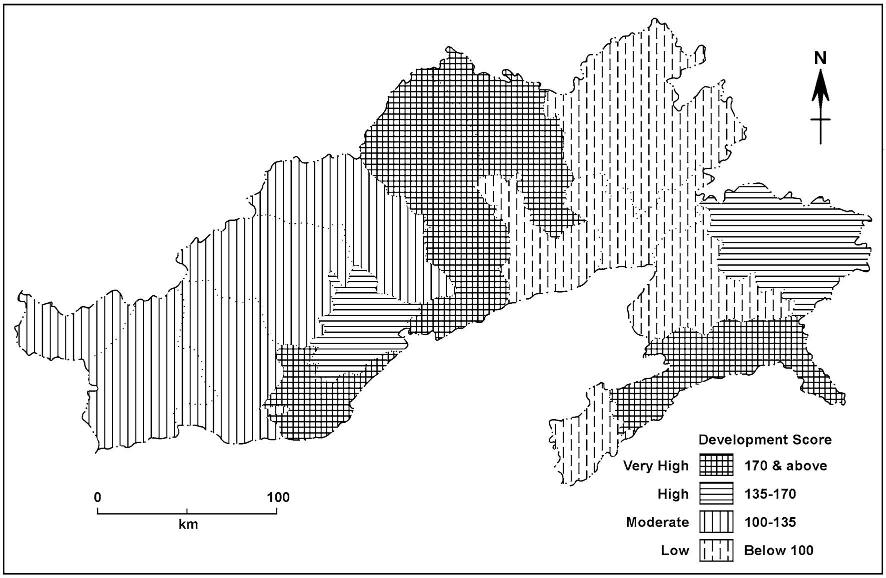

Fig. 28.8 Levels of agricultural development, 2011 (Note: Map does not depict correct boundaries)

concerned, East Kameng with a score value of 55.67 emerged as the poorest performing district and Changlang with 221.42 as the highest performing district.

The agricultural development scenario definitely improved in 2010–2011 relative to the 1990s level. The first point to note here is the average development score, which increased to 135.84. A clear 30-point improvement was attained, which attests to a positive change, but again this is too slow if evaluated with reference to time. The districts were reorganized many times during this period, and the development scores are available for 16 districts. The number of better performing districts doubled to become six and the eastern districts dominate among them. District-wise performance reflects an interesting picture that contrasts visibly compared to the previous pattern observed. Most of the eastern districts were found in the lowest category whereas the western districts perform relatively better (Fig. 28.8). Two neighboring districts, Changlang and Tirap, showed relative contrasts as compared to each other with scores of 230.92 and 75.25 as the best and worst performing districts, respectively.

28.5 Conclusions

ArP, as the other hilly states of the northeastern region, has not been able to benefit from various development initiatives because of its peripheral location and limitations imposed by the limits of the geographic environment. In spite of the odds, development as a process has marched, albeit slowly, which is why one finds encouraging changes with respect to land use and agricultural development particularly. It is said that under the neo-liberal development paradigm, state intervention has diminished over the years and the free market has assumed its role in that space. Such a change nevertheless is against regions such as ArP where the economy yet not fully monetized nor has the market penetrated the whole territory. Moreover, such underdeveloped spaces never attract the market. So, the state role remains crucial for pushing the development cart ahead in favor of this agriculture-dependent society and economy. Successful agriculture no doubt requires good external conditions such as climate, soil, topography, accessibility, and knowledge, which are not found ubiquitously. Five constraints have been identified affecting agriculture development in ArP: climatic constraints, infrastructure constraints, biophysical constraints, constraints of management, and socioeconomic constraints (Mishra et al. 2004).

Therefore, despite the slow rate of success, interventions are needed from state agencies, otherwise the development of Arunachali people will prove to be difficult. The lesson to be learnt from the past experience is to ensure people's involvement and genuine participation. No development initiative could be successful and give desirable optimum results in the absence of the stakeholders' involved contribution to it. It is rightly pointed out by a group of scholars that "Arunachal needs to plan its development in a considered and phased manner, ensuring that the development is people-centric yet decentralized; community-based but, with the Government as a facilitator; using its resources in a measured and sustainable manner, and in keeping with the aspirations of the people. The challenge is to evolve a development model that is truly sustainable and worthy of emulation." (Arunachal Pradesh Human Development Report 2005, p. 15).

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