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CONTENTS

AN INTEGRADED APPROACH TO REHABILITATION OF JUMIAS IN ARUNACHAL PRADESH

Shri Khirod Kr. Phukan , & Dr. B.D. Nayak

INTRODUCTION:

One of the primitive types of cultivation called Jhum cultivation has been prevailing since time immemorial in North-Eastern Region. It is also alternatively called as the slash and burn method of cultivation as shifting cultivation. It is the oldest farming system believed to be originated in the Neolithic period around 7000 B.C. The ancient people regard this process of food production as the first step in transition period from food gathering and hunting of food production

Arunachal Pradesh is the largest North-Eastern State of India with a geographical area of 83,743 sq. km. The state has a population of 10,91,117 (i.e 2001) with a density of 13 person per sq. km. The density is the lowest compared to the rest of the states of the country. The economy of the state is mainly agrarian in nature. As per 1991 census 80 percent of total population of Arunachal Pradesh were engaged in primary sector i.e agriculture, agri-allied and forest based activities of the state. Agriculture guides and determines their socio-economic relation and their cultural life.

Objective of study:

In the present paper an attempt has been made to picturerised the status of jhum cultivation, causes, effects in the North-Eastern states in general and in Arunachal Pradesh in particular. Though jhum cultivation is linked with the social life of people of the North-Eastern states, it has been deteriorating the condition and standard of living of the people of the region continuously. It has severe effect on environment, resulting ecological imbalances. There is therefore an urgent need to develop sustainable agricultural strategy for the development of agriculture and other allied activities in order to bring the significant rural development and improvement of standard of living of rural masses in North-Eastern region in general and in Arunachal Pradesh in specific. Thus the importance has to be given to rehabilitate the jhumias through an integrated process that is a collective ways for raising their socio-economic status in the society. If alternative avenues can be introduced before jhumias then it is convenient to prevent jhumias from their traditional mode of occupation, which is not substantial for the survival of jhum cultivators.

Extent of Jhum Cultivation:

The North-Eastern India comprising the states of Arunachal Pradesh, Assam, Manipur, Mizoram, Meghalaya, Nagaland and Tripura. The region is characterized by hilly terrain and extreme climates ranging from sub-tropical to alpine zone. The intensity of shifting cultivation varies with the changing conditions of rainfall, topography, density of population and accessibility.

In the recent times the total area available for jhum cultivation in the entire NER is 2.69 million hectares out of which total area shown at one time 4.55 lakh hectares. Again as Table-1 shows the annual area under jhum cultivation is 92 thousand hectares in Arunachal Pradesh. If we compare the extent of jhum areas in eighties with nineties the area engaged under such cultivation we could see that there is a marginal increase in the area at one time in the entire NE India from 4.16 lakh hectares to 4.55 lakh hectares. The estimated total area under jhum cultivation has declined marginally from 2.8 million hectares to 2.69 million hectares.

Factors responsible for the continuation of Jhum in the state:

Jhum cultivation has been emerged as one of the deteriorative occupation. Arunachal Pradesh is the state having almost hilly terrain and their main occupation is agriculture. Moreover out of total population 54000 families are practing jhum cultivation though it has negative impact on development of the state economy and ecology. There are many factors, which are responsible for continuation of Jhum cultivation in the area. So far as Arunachal Pradesh is concerned some of the factors are:

a) Lack of viable employment and income earning alternatives may be considered as one of the major factors for the continuation of jhum cultivation. The topographic condition, conducive environment, security problems are some of the major reasons for non-availability of earning sources.

b) Non-availability of agricultural infrastructure may be considered as a significant cause for the continuation of jhum cultivation. Infrastructures for the development of a region are very necessary. But most of the villages in A.P. are far from their primary needs like road, communication, irrigation, electrification, etc. without having these types of facilities, it is extremely difficult to wean away tribal cultivators from the age-old traditional farming process, which they have been practicing since long ago.

c) Lack of suitable plain land for permanent cultivation and lack of awareness of the indigenous people regarding the harmful effects of jhum cultivation are also found to be major causes for the continuation of jhum cultivation.

d) It is quite sure that to start terrace or settle cultivation in the concerned area higher initial investment both in terms

f study:

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of money for purchasing of landform the chief, hiring labour and other inputs are required. In general what we see that most of the jhum cultivators are in the grip of poverty. They have no capacity to collect their minimum requirement to start settle cultivation.

e) **Non availability of Institutional Finance:** It may be mention that poor saving habit every of the tribal in general and among shifting cultivators in particulars does not help in creating capital formation in rural areas. Without having a good amount of savings one cannot think of taking loan from outside agencies all the times for small investment and for better living standard. Jhumias use to earn only for meeting there day to day requirements, not for future. Thus they normally go for jhum cultivation only for their sustenance.

f) **The method of shifting cultivation has got its own significance:** It renders a dense vegetable cover suitable for growing crops after felling and burning of the jungle. The ashes out of burning add to fertility to soil. It is now well established that the highly acidic soil in the heavy rainfall area like Arunachal Pradesh is partly neutralized by the alike contents of the ashes. The burning of the felled jungles helps in destroying insects, pests and fungi that continue to be menaces to many for settle cultivation.

Adverse effects of Jhum cultivation:

Jhum cultivation has been creating a serious impact on geographical and environmental conditions in the Northeastern region. Moreover, such type of cultivation is a primitive in nature; labour intensive, unremunerative and wasteful, some adverse effects are detailed below.

a) There has been large-scale deforestation resulting in denudation of hilltops and slops. This leads to undesirable ecological changes. Further since the hilltops are the sources of water, deforestation hilltops leads to elimination of the sources of water, which leads to drought situation on the surface. Jhum cultivation causes deforestation on a large scale and is highly destructive to productive and protective values of forest.

b) There is large-scale soil erosion due to deforestation and cultivation of hill slops without effective soil conservation practices. This in turn, leads to several adverse effects in silting of reservoirs and streams leading to Northeastern states. Removal of topsoil leads to loss of fertility, which is not easily built up. This leads to low productivity and subsequent pressure on land. The annual soil loss due to shifting cultivation in different states of NE India was computed by taking in to account soil loss of 55.ot/h/yr of cultivation and the annual area under cultivation (Table-3).

c) Continuation of primitive form of agriculture offers very little scope for introduction of modern technology. This along with loss of fertility has led to such a low level of productivity that the farmers live in near famine condition.

d) Shifting cultivation is labour intensive one. The traditional farm tools/equipments are normally used in this farming process. This results in low productivity. Further there is no scope for development of any source of subsidiary income for the farmers. Since jhum cultivation used to shift settlement very often after every two-three years because of their shifting cultivation. They are also deprived of several socio-economic and welfare schemes of the state government. The public Health, Education, communication, etc are the basic facilities, which are difficult to be developed when there is no permanent settlement.

e) Jhum cultivation has serious effects on ecology and natural heritage. Jhum cultivation leads to environmental degradation and also disturbs the fragile eco-system. Arunachal Pradesh has been considered as a great bio-diversity one. It is found that number of species of various plants yet to be introduced. Due to the jhum cultivation, thousands of valuable timber, medicinal and aromatic plants are lost every year. The environmental imbalance has resulted uneven spread of monsoon rainfall leading to the problem of drought and excessive rainfall resulting floods in the low lying areas of the region.

From the above analysis the practice of jhum cultivation cannot be endorsed. The practice of jhum cultivation leads to indiscriminate cutting cannot be endorsed. The practice of jhum cultivation leads to indiscriminate cutting of jungles and consequent ecological imbalances of concerned area. The devastating floods in the plain and low-laying areas are decidedly attributed to the practice of jhum cultivation. It has got many inbuilt economic deficiencies apart.

Strategy to change the status of Jhum:

During the fifth plan period a major trust was given on the control of jhum cultivation in the NE states. Under the North Eastern Council programme 8 pilot project of soil conservation and jhum control were undertaken in seven constituent units for the settlement of jhumias. During the six plan the North Eastern Council has introduced the concept of watershed management on pilot basis for optimum use of land water resources with a phi geographic or hydrological unit governed by natural condition.

The total geographical area of Arunachal Pradesh has been classified into four agro climatic zones and accordingly the government of A.P. has adopted different approaches. The components of Jhum control scheme in Arunachal Pradesh are:

a) Reclamation of land, b) Development of land in to terrace and wet rice cultivation, c) Soil conservation by physical, agronomic and chemical measures d) Extensive irrigation supported and supplemented scientific agricultural inputs like wonder seeds, organic manures, chemical fertilizer, pesticides and improved tools and implements apart from heavy and light machinery like tractors, power tiller, dusters etc.

Moreover, to control and change the status of jhum from the existing areas the state administration of government of A.P. has undertaken quite a few project/programme in this regards, Out of several programme, terrace cultivation, horticulture, livestock rearing a forestation programme are some of the major schemes which have been undertaken for rural development. Similarly watershed management programme was also undertaken in Arunachal Pradesh with the financial and technical support extended by the NEC, Shillong.

Some of the research organization and the government agencies initiated several economic and agro-based activities as substitutes to jhum cultivation for increasing rural income. But, due to maladjustment of execution such schemes and some loopholes these could not bring much impact in the rural economy. Therefore, some integrated approaches should be urgently introduced not only to rehabilitate the jhumias that also to enhance their income and standard of living as well.

* The hill and forest areas are very rice in bio-diversity and minerals. Therefore, many forest-based and mineral based industries of small and medium scales can be established in the state. Further through cooperative efforts good number of forest-based activities such as basket making, rope making, cane furniture making, processing of minor forest produces, honey collection could be made commercially viable by providing professional education and training programme to the tribal youths. This will create employment opportunity to the youths of jhum depended villages.
* The areas put under jhum cropping considered being ideally suited for different horticultural crops. Fruit crops like citrus, banana, pineapple, guava, are suitable crops for lower elevation situation, while temperate fruits like peach, plum, pear, and apples are being tried successfully at higher altitude situation. In addition different vegetables crops, tuber crops like areca nut, black paper, coffee are also successfully cultivated in different agro-climatic zones of Arunachal Pradesh. So far growing of horticultural crops are concerned, these plant can be planted on slops by making half moon terraces which check erosion of soil. By encouraging the jhum cultivators for use of modern inputs, horticultural crops and by providing good market facilities, jhumias can be induced to taking this type of occupation, which is more economically reliable and suitable.
* The people of hills region who practice jhum cultivation do not go for animal husbandry to improve their economy. Moreover, agricultural technique of jhumias is not high enough to produce surplus food. To get some extra income and to lift upto the economy of jhumias, to supplement their economy. Depending on the land classification for various uses and also on the availability of land for unit of cattle, goat, pig, poultry, or even mixed unit. Livestock rearing may be considered as a primary occupation of jhumias. Extension or orientation of animal husbandry through cooperative efforts may helps the jhumias to great extent in terms of their domestic income.
* The selected groups of jhumias should be given requisite training in permanent cultivation. Agricultural development programme should be conducted extensively in jhuming area. If jhum families adopt permanent cultivation then it will be easier and feasible to lunch welfare and economic development programme in their villages. This will further helps the jhumias to earn more live hoods.
* Govt has many schemes for the tribal development. However the govt. has to pump in sufficient resources through various development schemes such as reclamation and development of wasteland through agro-gorestry and silvi-pasture practices. This will give alternative earnining sources to the jhumias .
* By forming village Forest Committees for the protection and development of degraded forest, jhumias can keep environment balance ecology and better. These committees by providing suitable incentives to the tribal particularly after harvest can divert some of the tribal away from the jhum cultivation. Generating some other engagement opportunity specifically forestry operation during the lean season will also prevent tribal from shifting to other areas. Moreover, tribal can plant some low cost cash crop like banana, papaya, and guava on commercial basis during the fallow period of the jhum land. It will also give protection to the environment and also can be regenerated the degraded jhum lands.
* During the jhum cycle large number of edible vegetation are cut and burnt which cause great hardship to semi domestic and wild animals. The type of vegetation destroyed depends on the length of the jhum cycle. A dense forest of long cycle has more tree species than grasses, whereas a forest of short cycle ahs more number of grasses. In the process of jhum cycle number of species of medicinal value and aromatic plants get lost and disappeared forever. Therefore, the training and orientation programme can be conducted to search and identify these types of valuable things from the dense forest, which can be projected

a) Reclamation of land, b) Development of land in to terrace and wet rice cultivation, c) Soil conservation by physical, agronomic and chemical measures d) Extensive irrigation supported and supplemented scientific agricultural inputs like wonder seeds, organic manures, chemical fertilizer, pesticides and improved tools and implements apart from heavy and light machinery like tractors, power tiller, dusters etc.

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for their commercial use. Jhumias can earn considerably nurturing these valuable plants instead of burning up them.

* Water resources has great potentiality in the North- Easter region. The region, primarily because of the high rainfall, has also abundant ground water resources. A.P. has very good scope for exploitation of water resources and for the development irrigation and mini-hydro projects. By introducing Terrance/settle cultivation among the jhum cultivator's water resources can be exploited for the better agricultural productivity. For utilization of water resources in terrace preparation and mini-hydro cultivator's water resources can be exploited for the better agricultural productivity. For utilization of water resources in Terrance preparation and mini-hydro projects, large number of jhumias can be engaged and huge wage employment could be created in rural areas.
* Fish production system has very high potential and adopted as subsidiary source of income for the jhumias. However, its applicability is limited in some cases only depending on the location opportunities. Involving the local manpower can create most of the water harvesting structures. Embankment type of ponds can be created in perennial water bodies for fish production. At individual and community level, this programme has tremendous potential for boosting the rural economy of the jhumias and it will help immensely as alternative way of living instead of their traditional life style.
* Jhum cultivators produce food grains only for their self-sustenance. There is no surplus production at all. Therefore, selection of crops should be based on the priority of crops that can produce sufficient amount. Besides, they are to be encouraged to produce crops, which have market potential such as spices, potato, pea, buckwheat etc. which will give jhumias a good amount of return. Thereby, jhumias will have surplus production and marketing habit of their products can be established.
* Most of the jhum cultivators live in dense forests and in hill slopes/tops. They are normally far from the modern society. They have no knowledge about modern way of living. It is every important to spread education to the remote areas of hills and thereby giving them adequate knowledge about the situation.
* Rural financial network is very poor as far state of A.P. is concerned. Disbursement of loan is very limited in case of agricultural sector. Without agricultural finance or institutional finance one cannot thing of alternative economic activity for the development. Therefore, Govt should give the financial assistance to the rough jhumias to undertake any self-employment schemes such as small shop, artisan activity animal husbandry like – poultry, Piggery, fishery etc.
* Jhum cultivation is a non-surplus generating system. In physical since no surplus was produce. If any surplus is being produced in any year it is normally distributed among the co-villagers in the form of organizing feasts and festivals. Thus there is no accumulation of capital and no capital formation in rural sector. Moreover, growing population also pressure on land. Therefore, jhumias has to find out alternative avenues for their survival. Keeping this view some construction works through wage labour can be providing alternative way for the jhumias. Jhumias can be engaged as wage labour on road construction, building construction, other govt./public works and forest department. It will give supplementary sources of livelihood to the poor farmers.

Conclusion:

An integrated approach as said above could be the basis of solution to ecological imbalance occurring in the state. Besides, this jhunias can divert from their traditional mode of occupation to newly established permanent cultivation. For the successful implementation of these integrated approaches Govt., other agencies and village chiefs/decision makers are to be involved frequently. In every implementation o programme new problems are likely to arise. It is believed that if the schemes are implemented with unexhausted patience by involving the local tribals leaders, the success will be surely achieved.

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RURAL DEVELOPMENT - ACHIVEMENTS AND PROBLEMS IN ARUNACHAL PRADESH.

Dr. S.B. Biswas

INTRODUCTION:

Arunachal Pradesh is situated in the North Eastern corner of India with an area of 83743 Sq. Kms. It is the largest state in the North East Region having a long international border with China, Myanmar and Bhutan covering 1030 Kms., 440 kms. and 160 Kms., respectively. The state is bounded on the North, North – East and North – West by China (Tibet), on the south by Assam and Nagaland, on the South – East by Myanmar and on the west by Bhutan. Till 1972, the area was known as the north East Frontier Agency. It gained the status of Union territory on 20th January 1972 and was renamed as Arunachal Pradesh. On 20th February 1987, Arunachal Pradesh became a full-fledged state.

Administratively, Arunachal Pradesh is dived into fifteen districts. The total population of the state is 10,96,702 as per 2001 census and the total workers constituted 43.97 per cent of the total population. The economic life of people of the state depends to a large extent on land and forests. Agriculture is the backbone of the people as 58.44% of the total workers are found to be cultivators.

Rural Development involves a process of developing the rural economy by various Programmes designed to raise the standard of living of those rural people who are poor and require upliftment.

Poverty alleviation and raising the average standard of living have been the central aims of economic planning in India. But the approach has been changing from time-to-time considering the circumstances and past experience. Initially the main emphasis was on growth. But since the Fifth Plan, poverty alleviation has been adopted as an explicit objective of economic planning. As the strategies could not be made effective in isolation, so emphasis has now been shifted to 'growth' and 'poverty alleviation' as two complementary factors.

Rural Development programme in the form of National Extension Service (NES) was launched in Arunachal Pradesh by the Government of India on 2nd October 1952 by selecting Pasighat NES project of the then NEFA out of he total 55 NES projects for the country. During the third Five-year plan, NES projects were converted to Community Developments Blocks. Rural development assumed greater importance in Arunachal Pradesh since the beginning of the Sixth Plan, when poverty alleviation Programmes were launched throughout the state.

Over the years, a number of poverty alleviation Programmes have been implemented in the rural areas of Arunachal Pradesh. The Policy mechanism of these Programmes can be described as fellows:

* Proper identification of the families living below he poverty line (BPL) on the basis of assets/income/consumption expenditure and categorization of BPL families. During the Ninth Plan, poverty line was estimated at Rs. 19650 per annum as family income.
* Selection of beneficiaries.
* Considering the economic problems and skill, formulated Programmes to raise their income and employment.
* Providing credit for undertaking the scheme at lower than the market rate of interest.
* Providing infrastructural facilities and special extension services to the beneficiaries to run the scheme successfully.
* Evaluation of the Programmes from time-to-time and effective monitoring.

Rural Development Programmes are mainly of two kinds:

* Firstly, to promote self-employment, the poor households are provided with productive assets financed through bank credit and subsidies.
* The second one seeks to provide wage employment to the members of the BPL families during lean season and in the process creates community assets.

Government has made District rural Development Agency as the nodal agency to implement all the Rural Development Programmes at district level. One of its main tasks is to coordinate with the various development Departments, Panchayat Raj bodies, banks and other agencies.

The achievements under some of the major restructured Rural Development Programmes in Arunachal Pradesh are as fellows:

1. RESTRUCTURED SELF-EMPLOYMENT PROGRAMME:

a) Swarnjayanti Gram Swarozgar Yojana (SGSY):

Restructuring of Self-employment programme, the Government of India has launched Swarnjayanti Gram Swarozgar Yojana w.e.f. April 1999 as a single programme by merger of erstwhile IRDP, DWCRA, TRYSEM, SITRA, MWS, GKY in it.

This is a credit-cum-subsidy scheme, which aims to establish a large number of micro enterprises in rural areas. Assisted families, known as Swarozgaris, may be individual or Self-Help Group (SHG). Preference is, however, given to SHG. Financing of SGSY is shared between the Centre and the State in the ratio of 75:25. The objective of the scheme is to bring every assisted family above the poverty line in three years. The achievement under SGSY in Arunachal Pradesh during last three years is indicated in Table – 1 below:

TABLE – 1

ACHIEVEMENT UNDER SGSY IN ARUNACHAL PRADESH

Year	Expenditure incured (Rs. In crores)	Physical	
		Unit	Achievement
1	2	3	4
1999-2000	3.77	a. SHG formed b. Individual Swarozgaris	54 3233
2000-2001	1.88	a. SHG formed b. Individual Swarozgaris assisted (No)	56 802
2001-2002	1.86	a. SHG formed b. Individual Swarozgaris assisted (No)	41 1251

b) Jawahar Gram Samridhi Yojana (JGSY):

The Jawahar Rozgar Yojana has been replaced by Jawahar Gram Samridhi Yojana in 1999. The primary objective of this scheme is to create rural infrastructure including durable assets at the village level. The secondary objective is to create wage employment for the unemployed rural poor in the process of execution of schemes. Cost sharing ratio between the Centre and the State is 75:25.

The physical and financial achievement under JRY/JGSY during the Ninth Five Year Plan are given below in Table – 2:

TABLE – 2

Physical and Financial Achievement under JRY/JGSY in Arunachal Pradesh During the Ninth Plan

Programme	Period	Expenditure incurred (Rs. In Crores)	Mandays of Employment Generated (In Lakhs)
1	2	3	4
JRY	1997-1998 1999-1999	2.42 3.26	2.97 3.96
JGSY	1999-2000 2000-2001 2001-2002	5.37 5.08 7.37	5.92 6.59 8.57

c) Employment Assurance Scheme (EAS):

The Primary objective of EAS is to provide assured wage employment of unskilled manual work during lean season to the rural poor. The secondary objective is to create durable community, social and economic assets for sustained employment and development. Financing of the programme is in the ratio 75:25 between Centre and the State.

The financial and physical achievement under EAS in Arunachal Pradesh are shown in Table – 3:

TABLE – 3

Financial and Physical Achievement under EAS During the Ninth Plan Period.

Year	Expenditure incurred (Rs. In Lakh)	Mandays Generated (No. In Lakh)
1	2	3
1997-1998	2586.93	43.66
1998-1999	2327.96	38.29
1999-2000	1360.57	26.25
2000-2001	1064.19	20.10
2001-2002	614.51	9.82

2. Integrated Wastelands developments Programme (IWDP):

To develop non-forest wastelands on micro-watershed approach schemes on soil conservation, aforestation, horti-culture and agro forestry, fuel wood plantation etc., are being taken up under integrated wastelands Development Programme.

3. RURAL HOUSING SCHEME:

a) Indira Awas Yojana (JGSY):

Under IAY assistance is given for construction of houses by the SC/ST and free bounded laborer families living below the poverty line in rural areas. The scheme was launched in the year 1985-86 as component of RLEGP/JRY. But during 1996-97, IAY was declared as an independent scheme.

The financial and physical achievement under IAY in Arunachal Pradesh during the Ninth Five Year Plan are shown in Table – 4:

TABLE – 4

Financial and Physical achievements under IAY During the Ninth Plan.

Year	Expenditure incurred (Rs. In Crores)	No. of Houses Completed	No. of Houses under Construction
1997-98	210.49	932	238
1998-99	127.82	470	418
1999-2000			
New construction	666.04	2485	885
Upgradation	71.98	725	-
2000-2001			
New construction	724.16	3078	872
Upgradation	151.13	1437	360
2001-2002			
New construction	202.35	3188	157
Upgradation	153.42	1424	137

b) Under Rural Housing Sector, the Government of India Introduced the under mentioned new schemes during the year 1999-2000.

(i) Samagra Awas Yojana to ensure integrated provision of shelter, sanitation and drinking water to the poor rural households.

(ii) Innovative stream of Rural Housing and Habitat Development to promote cost effective and environment friendly housing construction technologies.

(iii) Credit-cum-subsidy scheme for Upgradation of unserviceable kutcha houses into semi-pucca or pucca houses in respect of BPL families.

(iv) To set-up Rural Building Centers.

Moreover under Pradhan Mantri Gramodaya Yojana (Gramin Awas), 3404 houses wee constructed in Arunachal Pradesh during last two years (April 2000 to March 2002).

For rural connectivity good numbers of road projects are being executed in Arunachal Pradesh under Pradhan Mantri Gram Awas Yojana (PMGSY).

To raise the standard of living rural masses Rural Sanctioned Programme and Rural Water Supply schemes are being implemented in Arunachal Pradesh. Similarly for uplifting the condition of the rural people, there re other programmes and schemes of many development departments like Agriculture, Animal Husbandry, Fisheries, Public Health, Irrigation etc.

To improve the performance of officials and non-officials involved in the Rural Development activities and also for Upgradation of their knowledge and skill, the Central Government has sponsored three-tire training institutions like NIRD at National level, SIRD at State level and ETC at District level. In Arunachal Pradesh, the State Institute of Rural Development was setup during 1993-94 for providing such training at the State level and GTC Pasighat has been organized Extension training for village/block level functionaries.

Problems in implementing the Rural Development Programmes:

* The main problem lies in identifying the families living below the poverty line and selection of beneficiaries. In the BPL census for the Ninth Five Year Plan, expenditure approach involving exclusion criteria was adopted. For identification of families below the poverty line for the Tenth Five Year plan (2002-2007), it has been proposed to adopt a normative approach by introducing a 'Score Based Ranking' of each household indicating their quality of life, based on both economic and social indicators.
* Part financing or under financing of any scheme leads to failure of the scheme. Credit disbursement of financing of the scheme should be done with an intention to really help the rural masses to cross the poverty line.
* Panchayat Raj institutions have a vital role to play in implementing rural development Programmes at the grass root level. Therefore the degree of transparency and vigilance will certainly go down due to non-functioning of local bodies and if these bodies are not involved in he development process.
* Problems is also faced to mobilize bank credit in Arunachal Pradesh due to following reasons:-

(i) Unwillingness on the parts of some of the beneficiaries to enter into he bondage of loan.
(ii) Absence of banking facilities in some of the blocks.
(iii) The service area approach adopted by the RBI.
(iv) Absence of required infrastructure like road connectivity and marketing facilities in some blocks.

* Bank and financial institutions face problems for recovery of loans from the beneficiaries for which cooperation of the elected representative, local bodies and administration is very essential.

SUGGESTIONS

* Special care needs to be taken by DRDA to maintain financial discipline.
* Poverty alleviation Programmes can only be short-term strategy. The best poverty alleviation strategy for the long run is that of fostering high rates of economic growth. Areas having employment potential should be targeted for higher economic growth through long-term investment.
* Panchayati Raj institutions should ensure proper utilisation of resources at the ground level.
* Poverty alleviation Programmes lose their effectiveness due to the fact that Programmes meant for really poor is not reaching them; instead it is being transferred to those who do not deserve it. As such proper care should be taken during BPL Census – 2002 so that affluent households are also identified as BPL families.
* For proper implementation of rural development Programmes in Arunachal Pradesh, block should be opened with adequate infrastructure.
* It is believed that rural scenery would have been different had the fund placed so far into rural sector being properly utilized. As there is leakage in the system, so constant monitoring and evolution of the ongoing schemes and Programmes are very essential.
* As rural development is a collective task so to achieve the goal, the state should pool all its available resources. Local bodies, DRDA, development departments, banks and NGOs should have proper coordination.
* Development departments have to provide technical guidance and support taking into account local suitability and long-term viability of a scheme. As such they must be able to apply the day-to-day technological innovation in the field so as to make the rural development Programmes cost-effective

DECENTRAL PLANNING AND GOVERNANCE ARUNACHAL PERSPECTIVES

Proff. N. Upadhaya & Dr. R.M. Pant

INTRODUCTION:

A critical review of the various State Panchayat Acts reveal that the state legislature has incorporated all the mandatory provisions like three tire provisions, reservation, delimitation, term, constitution of finance commissions and state election commissioners but still remain gaps for making the villages independent in the light Art 243 (G) of the constitution.

The word "Development" has undergone radical change with the emergence of industrial age 300 years ago. The new mode of development open he path of improving quality of life followed by creation of two classes owner and worker. The owner started exploiting the workers resulting social movement started in defense of the working class. The gift was social security. Working conditions, working hours, employment of women and children received first attention. This led the foundation of democratic governance in the industry in England where the workers had say in resolving issues.

73rd Amendment Act, which came into force in April 1993 provides power to legislate to the state to make Panchayat laws to make their institutions of self Government (ISG) envisaged in Art 234 G of the constitution. The Act has both mandatory & enabling clauses. Panchayat should have the following: -

(i) Guarantee for women participation by making 1/3 reservation.
(ii) Clearly defined functions.
(iii) Adequate fund to perform the functions.
(iv) Minimum manpower for execution of the programme.
(v) Minimum infrastructure i.e furniture & small equipments & computer.

The Gram Sabha is supposed to be the head and heart of the entire schemes of decentralized governance, planning & development. But the Article 243 (A) is silent on the function and powers and delegated the states to make rules for implementation. To bring parity, Panchayat (extension to the scheduled areas) Act 1996 came up.

Gramsabha:

The following areas do come under the Gram Sabha: -

* Ownership of minor forest produce [Now Non Timber Forest Produce (NTFP)]
* Development plans approval.
* Selection of beneficiaries under various Programmes.
* Constitution of land acquisition.
* Management of minor water bodies.
* Control over minor mineral leases
* Regulation/prohibition of sales of intoxicants.
* Prevention of alienation of land and restore unlawfully alienated land of STs.
* Management of village markets, control of money lending to STs.
* Control institutions and functionaries in all social sectors.
* Safe guard and preserve the tradition and customs of the people, their cultural identity, community resources and customary mode of conflict resolution.

Development Philosophy:

Panchsheel[1] for NEFA as spelt out by late Prime Minister Jawaharlal Nehru happens to be the future guidelines for development paradigm. These are:-

1. People should develop along the line of their own genious and we should avoid imposing any thing on them. We should try to encourage in every way their own traditional art and culture.
2. Tribal rights on land and forest should be respected.
3. We should try to train and build up a team of their own people to do the work of administration and development. Some technical personnel from outside would no doubt be needed especially in the beginning. But we should avoid introducing too many outsiders into tribal territory.
4. We should not over administer these areas or overwhelm them with a multiplicity of schemes. We should rather work through, and not in rivalry to their own social and cultural intuitions.

5. We should judge results, not by statistics or the amount of money spent by the quality of human character that is evolved.

LOOKING BACK:

Philosophy of Community Development emerged in India after independence, as a result Panchayati Raj Institutions (PRI) was conceived from the idea of gram Swaraj of Gandhiji. Being agro-based country, the need for democratization was essential to ensure grass root level democracy and participation in the governance of rural planning, administration and development. The dream came to reality in the early sixties with high hopes and expectations, by short time the result started showing negative trend. This led the Govt. of India to appoint Asoka Mehta Committee to find the reasons, and recommended measures to revitalize the P.R.I.

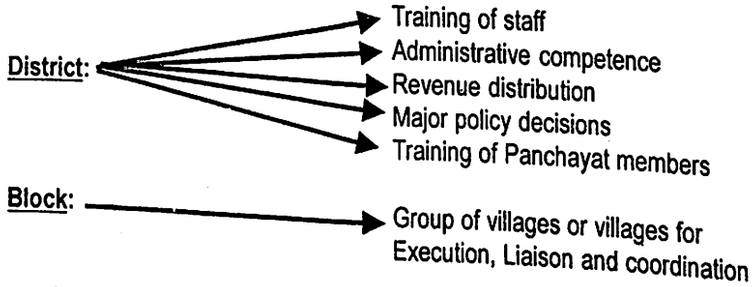
Principle : People's programme with people's participation
Terms of reference : was mainly relied upon the priorities
Motto : Decentralise planning

1. Priorities of the committee were components of Rural Development such as:-
   * To increase Agriculture production
   * Eradicate poverty
   * Create employment
   * Rural Infrastructure for Development.
2. The committee has discussions with all the state Governments and invited suggestions.
3. The committee dealt the History of Panchayat Raj in three phases.
   * 1959-64 – Striking roots
   * 1964-69 – Phase of erosion
   * 1968-77 – State of non-performance
4. The reasons attributed for the failure to achieve desired results were:-
   * Haphazard program
   * Lack of monitoring by State/Central Govt.
   * Lack of political will
   * Non performance
   * Vested interest
   * Village politics

Ashok Mehta report has traced the evolution. And radical changes that have taken place in the rural India since independence. The committee thoroughly examined the existing situation in rural area and has also attempted to chart to future plan of action. The recommendations include new approach of governance: -

* Administration through PRI
* It should be of 2-tire District & mandal Panchayat
* Autonomy both administrative and financial
* Based on secular governance
* Liberal
* Open-end

Levels of Operation



Outlays for social employment and poverty alleviation programme.

Year	Outlay(crore)	GDP
91-92	10,929	1.77%
98-99	35,936	2.23%

Central Govt. outlay 9,844 on 98-99
(Source EPW – 1998)

Performance in last 50 years:

* Poverty reduction unsatisfactory
* BPL 312.8 (87) to 320.3 (93)
* Population increased more than double
* Marginal reduction of poverty

Approaches:

* Understanding basic problems
* Strengthening Institutions
* Increasing financing for sustained rural development
* Making comprehensive Rural Development policy
* Building managerial capabilities

Action:

* State should have definite programme for rural development
* Defect of the composition of Panchayats has to be removed
* Political parties & their role should be directed to growth
* No super session of Panchayat on the partisan ground
* Village judge (Punch)
* Special programme for weaker section
* Social justice to every section
* Staffing/office
* Development of institutions through traing
* Full time executive officer

Recommendation of Dantwal Working Group

Planning in Block level: The working group suggested that the following activities are to be undertaken at block level

* Ag Allied activities
* Soil conservation of water supply
* Fisheries, forestry
* Original input supply, credit markedly
* Local infrastructure
* Drinking Water
* Education
* Housing
* Welfare programme
* Minor irrigation
* Animal husbandry & Poultry
* Processing of Agriculture produces
* Cottage/SSI
* Social service
* Health & nutrition
* Sanitation
* Local Transport
* Training of local youth

Participation:

It is important to first evolve strategy for involving people of planning process at Gram Sabha Level. Planning from down to up and not the reverse. A few of them are discussed herein.

Approach:

The following approaches are essential to bring forth the successful planning:

(i) **Rapport building**: The following activities are to be undertaken for rapport building.

* Frequent village meetings
* Participatory Rural Appraisal exercise
* Participation in Social function by local staff
* Informal discussion whenever opportunity comes
* Local level workshop
* Visit of Demonstrations farms.

(ii) **Awareness building**: This is to be done through village meetings, workshops and training Programmes. Issued to be deliberated are:

* Role of people in the development process.
* Participatory planning as per 73rd constitution Amendment Act.
* Women's participation and role
* Equity issues

(iii) **Strengthening community based organization (CBO):** Motto is to encourage people to participate in development and Empowerment them to come forward with their problems, needs and suggestions to tackle them. This can be achieved by activating the following groups:

* Self Help groups
* Youth clubs.
* User's groups
* Co-operatives

Entry Point Activities

Confidence Building: For confidence building following village development activities are essential:

* Construction of community center
* Drainage
* Help maintaining common religious places.
* Link roads/villages entry streets
* Sponsoring village sports

Developing Human Resources Base At Local Levels

This needs strengthening capacity of systems with the help of resource groups at Panchayat level. Representative from PRI and CBO and experts from local/nearby areas, women and weaker section also to be included for achieving self-sustaining system. The areas of focus are:

* Agriculture
* Fisheries
* Energy
* Health, Family Welfare
* National Resource management
* Forest
* Education
* Women-Child Development.
* Irrigation
* Rural Connectivity
* Industry
* Social Welfare, Poverty Alleviation, PDS
* Animal Husbandry
* Housing
* Drinking Water

Function of resource groups:

* Problem identification
* Prioritization of needs and problems
* Monitoring & Evaluation
* Sectoral Analysis
* Implementation of Plan

Strengthening PRI

As per 73rd Constitution Amendment Act, PR Institutions are bestowed with enormous responsibility for planning and implementation of Programmes with involvement of people at grass root level. For this we need to strengthen the PR Institutions:

Infrastructural support	Office, meeting hall in all the three tires.
Functioning of Gram Sabha	Active Participation Awareness building Regular meetings Motivate women for participation
Methodology of Planning	Preparation action plan Forming resource groups Situation analysis Inter sectoral analysis

ADMINISTRATIVE ARRANGEMENTS

Delegation of powers and responsibilities

* Devolution of functions & funds.
* Defining roles and responsibilities of G.P. Block, DRDA PRIs, CBOs

. Transparency

* Free and fair discussion
* Informing actions and result
* Reporting on the policy issues regularly
* Accountability

Organization Structure (P-225-228, 249)

* Integration of Delivery System at all levels are essential. The levels are:-

Government of India Level:

* Panchayati Raj dept. of Ministry,
* Chief Development commissioner of Planning Commission.
* Other coordinating Departments

At State Level

* Development Commissioner under the Directorate or Chief Development Commissioner. And also the development should take place at District level, Block level: Sectoral level cluster of villages) and at last but not the least at Gram Panchayat level.

TABLE – 1

Extent of indebtedness among Rural Labour Households.

Sl.No.	State	All classes of households 1987-88	
		Average debt. per Households Rs.	Average debt. per indebted Households Rs.
01.	Andhra Pradesh	1145	2140
02.	Assam	148	1113
03.	Bihar	539	1609
04.	Gujarat	450	1442
05.	Harayana	1523	2810
06.	Himachal Pradesh	861	2650
07.	Karnataka	569	1856
08.	Kerala	1026	2219
09.	Madhya Pradesh	635	1811
10.	Maharastra	503	1419
11.	Orissa	503	1419
12.	Punjab	1255	2271

Source : Book DN Gupta

Conclusion:

The Act has given all that are required for the proper execution. Some of states have come out with the successful experiments such as Karnataka, West Bengal and Maharastra and others are on the way to progress. Even then we hear he tragedies and maladies in the execution, which needs correction. Act largely mandatory and the scope of discretion is absent. In view of the homogeneous monolithic culture and past traditions of working together in participatory manner, the decentralized democracy in the form of Gram Sabha is appropriate for the hilly part of the state, particularly in the tribal dominated areas. As the village governance deals purely local issues, women participation must be encouraged. To avoid domination the state legislation may incorporate equal representation by the women. Economic use of nature resources can be effectively addressed only with the women's Participation.

References:

1. DK Duarah Hand Book of Arunachal Pradesh, p-15
2. Yojana Vol. 45, May 2001, pp 24-35
3. Yojana Vol. 45 August 2001 pp 45-48

Chart – Present status of RD System – (P-184-185)
Chart – Suggestions from work for efficient Rural Development System (P-193)
Evolving sound strategy for RD – (P- 194)
System approach of RD (Ref book DN Gupta)
Strategy for strengthening participatory planning (197)
How to achieve participation (198)
73rd const,. Amendment Act has provided necessary statutory guidelines for involvement of people at GP level (p-215).

STRATEGY FOR RURAL DEVELOPMENT IN ARUNACHAL PRADESH

Dr. Shipra S. Nayak and Dr. B.D. Nayak

INTRODIUCTION:

Arunachal Pradesh popularly known as the land of the rising sun is one of the beautiful piece of land in the North-eastern Region of India, rich in scenic beauty and splendor with flora and fauna all around. Agriculture is the main occupation of the people of the State. In Arunachal Pradesh a huge size of population lives in the rural areas. Therefore, development of the rural areas is a must. But it is known to every boby that agriculture being the chief source of livelihood of the rural people, every effort should be diverted towards the development of agriculture and its infrastructure. Co-operatives in this regard can play an important role. Therefore, an attempt is, made in this paper to discuss the role of co-operatives in rural development of Arunachal Pradesh through easy disbursement of credit along with other activities.

METHODOLOGY:

This study is based on primary data, collected through questionnaires from the elected households of the villages in the three districts of Arunachal Pradesh namely, Lower Subansiri, Lohit and Papum Pare on the basis of simple random sampling method and secondary information are gathered from the records of the office of the Registrar of Co-operative Societies (RCS), Govt. of Arunachal Pradesh, Naharlagun. The period of study extends from 1987-88 to 1999-2000. Simple statistical tool have been used for analyzing the data.

Rural development refers to he development or the dynamic process of social change of rural economy. It further refers to all he round development of rural masses. This means elevation of the levels of living and quality of life particularly in rural sector. It means development of a specific group of the people that is rural poor. It includes extending the benefits to the poorest. James Copp and Uma Lele [1] define rural development in trems of rasing standard of living of the rural people. The World Bank [2], which have given attention to rural development in terms of improvement of life of specific group of people i.e., the rural poors including small and marginal farmers, tenants and the landless households.

It is well-established fact that co-operative organization can play a dynamic role in bringing out an alround development of the rural poor. Cooperation exited in the very way of living of the people of ancient Arunachal Pradesh. The existence of self-governing institutions among the tribes is nothing but cooperatives. Cooperation refers to an institutional framework to instill self-help among those who participate in it. In general such an organization consists of person of small means. If hey organize themselves into cooperatives, they can pull their resources and thereby enlarge them beyond what they would be if used separately (Agarwal, A.K. 1987) [3]. The cooperatives, in addition to financing agriculture and rural household industries, finance retail trade and extend credit facilities to the poor households. Agriculture being a gamble in monsoon is steeped in poverty. The need of the hour commands over credit to gain access to irrigation sources and improved farm technology to develop agriculture. Cooperative agencies can be expected to extend credit for financing the investment. By giving due stress on the rural poor, the cooperatives nonetheless may extend credit facilities to large and middle class cultivators to generate the required thrust in rural development and retain the viability of the credit organizations. Further, the cooperatives can help in generating domestic income of the poor classes such as landless rural labourers and by including them to take up activities allied to agriculture, such as dairy, poultry, pisciculture, sericulture, goatery, bee keeping, etc.

Agriculture and allied activities like, animal husbandry and household industries offer considerable scope for labour absorption and income generation for the poverty stricken rural masses with relatively low but quick result producing investment. Increased production in rural areas will lead to higher purchasing power in the hands of rural people, which in turn will crest more effective demand both for agriculture and industrial commodities. Thus a cyclical process will get into motion for for achieving self-sustaining economic growth in turn opening up several new avenues of employment and income for rural masses.

With the diversification of rural activities much importance can be laid on the marketing and credit institutions. The modern approach to the use of co-operative institutions as an instrument of development comprises with mobilizing savings of the richer sections of the community and channelizing a significant part of it for the generation of income I the poor socio-economic classes and in the religion inhabited by poor so as to neutralize individual and geographical divergency. In mobilizing surplus for rural development, the strategic role of co-operative lies in reorienting its loan operation to meet production, consumption, commercial and social needs of the poor rural households so as to unlock the markets, close down major avenues of exploitation and increase agriculture productivity. Co-operative organization mainly through their cheap and adequate credit facilities, supply of agriculture inputs, and well-organized marketing network along with the distribution of consumer goods deserve special attention in the analysis of rural transformation. These are the institutions of technological innovation per se research and extension service need greater fillip to cater its services to the end of rural development.

Besides, creating, maintaining and effective use of agriculture extension services to the end of rural development. Besides, creating, maintaining and effective use of agriculture extension services are some of the ingredients of very success of rural development through co-operative movement.

During the British rule no efforts were made by the Britishers to develop Arunachal Pradesh economically and administratively. Thus, socio-economic system of Arunachal Pradesh society continued to remain in disturbed condition for several decades. It was only after Independence that the socio-economic status of the state underwent a considerable change and the introduction of modern administration necessitated the building up of basic infrastructure in Arunachal Pradesh. Construction of roads, landing strips, helipads and residential quarters were given utmost priority. To maintain a regular supply of daily necessities to the government staff at all the administrative head quarters, CPO (Central Purchase Organization) was established. However, even in the initial stage it was realized that CPO could not provide a permanent system and therefore its replacement by the co-operative consumers stores was contemplated. Thus, it leads to the establishment of the Department of cooperation in the year 1957. Since then a number of co-operatives got established in the State. But the beginning of co-operative credit was made during 1977-78 where large Area Multi-Purpose Societies (LAMPS) were set up in Arunachal Pradesh as primary outlets and the State Co-operatives Banks at the apex level. This two-tire co-operative credit system has been introduced here unlike other states of the country.

The Arunachal Pradesh Co-operative Marketing and Supply Federation Ltd. earlier named as the NEFA General Co-operative Stores and Union Ltd. was originally registered in the year 1959, with the headquarters at Pasighat. Subsequently in the year 1976, the society was renamed as the Arunachal Pradesh Co-operative marketing and Supply Federation Ltd. with headquarters at Naharlagun of the Byelaws. The Federation is having branches at Itanagar, Ziro and Deomali. It has also a supply base at Dibrugarh. Air transport supply is made to the co-operative in the remote areas of the state such as Machuka, Tuting, Anini and Bijoynagar from Dibrugarh base of the Federation. The location of these places are very close to International borders with China and Myanmar. The Government provides free air lifting facilities for keeping up the supplies to such far-flung areas.

The number of members in the STATEFED is 66 in the year 1999. Number of branches is 3 and the number of Fair Price shops run by the society is 17. There has been increased of 9.5% in the total share capital of the STATEFED during the year 1991 to 1999. Government loan to the STATEFED and subsidy has increased since 1991. The reserve funds, working capital and annual turnover have also raised significantly through its profit has decreased.

However, there is a positive progress in almost all the activities of Arunachal Pradesh State Co-operative Apex Bank during the year 1986-87 to 1995-96 through in between these years some ups and downs in the figures are noticed in some of the activities of the Bank such as STD with Commercial Banks, gross profit, salary overhead, interest on deposits, profit before provision and net profit after provision.

The primary Agriculture Credit Service Societies have grown in number and membership since 1992-93 to 1996-97. The share capital increased by 101.4% where as the owned capital and the working capital increased by 46.3% and 87.77% respectively. Borrowing and outstanding loans have also risen. Loans advances during the year have gone up by about 10%. But loan recovery has been reduced. Loan outstanding at the end of the year since 1992-93 to 1996-97 has increased but it is lesser than that of 1995-96. Overdue as percentage of outstanding loan and number of profit showing societies have increased from the year 1992-93 to 1996-97.

The progress of public distribution work done by co-operative organizations in Arunachal Pradesh in the last 10 years i.e. from 1990-91 to 1998-99 has been studied and seen that the total allocation of rice, wheat and sugar in the state has increased in the 90 decade. The retail sale of these items through cooperatives has increased to 99.933 thousand MT, 5.969 thousand MT and 4.06 thousand MT respectively. The total number of Fair Price Shops (FPS) run by co-operative organization in the state is 267 in 1998-99.

The Arunachal Pradesh Co-operative Union Ltd. with Head Quarters at Naharlagun was organized in the year 1960 with a view of giving guidance and direction to the co-operative movement by extending co-operatives education among people and imparting training to the co-operatives employees for proper and smooth management of co-operative institutions. The union established a training center in the year 1978 for implementing basic training to the personnel of the co-operative societies and junior officers of the co-operative department. In addition, the co-operative union has been conducting member Education Programme at various locations from time to time. The position up to 31-3-98 is that about 82 numbers of training camp held under membership Education Programme and 4,536 numbers of trainees have so far attended, 40 other training Programmes are organized and attended by 775 members. 457 numbers of Departmental and other officials of all grades have been trained so far and 3 workshops and 8 seminars are held.

On being inspired by the achievements made by the various types of non-credit societies, the need for a credit structure was greatly felt and accordingly a humble beginning was made in the year 1978. With the reorganization of the

Arunachal Pradesh State Co-operative Apex Bank Ltd. with headquarter at Naharlagun it is looking after the credit requirement of the poor farmers and artisans of the state. Simultaneously, large size multipurpose co-operatives societies wee also organized at the grass root level in the form of a two-tire credit structure for maintaining smooth flow of credit to the weaker section of the society. The Bank has since then expanded its activities and by now opened 31 branches in important and strategic places in most of the districts of the state. It has also mobilized sufficient deposits while meeting the agriculture credit requirements of the farmers though the LAMPS and assisting societies for marketing of surplus agriculture produces like paddy, mustard seeds, potato, ginger etc.

There are present 32 LAMPS functioning as co-operative credit societies at the primary level. The LAMPS have been advancing cent percent of agriculture loans. Lower collection and higher overdue position in both apex and the primary levels of the credit structure have assumed a disturbing proportion. The management of the banks and the LAMPS has been reviewing this sensitive aspect of the credit business for corrective step.

The statement of the Government loans disbursed to various co-operative societies in Arunachal Pradesh shows that the balance outstanding at the end of March 1997 is Rs. 317.88 lakh. The year wise loan disbursement during this period has not increased insignificantly. However the total amount of Govt. loan disbursed to the co-operative societies has increased. At the end of the financial year of 1996-97 it was Rs. 334.96 lakh. The recovery of loan during this period has increased from Rs. 6.60 lakh to Rs. 27.08 lakh in 1996-97 and balance outstanding with the co-operatives societies has been increased over the years.

As far as the primary survey is concerned it has been studied that in all the three districts of Arunachal Pradesh (Papum Pare, Lower Subansiri and Lohit), the co-operative societies have been the main source of loan and the purpose of loan is mainly for agriculture and agri-allied activities even through some loans have been taken for business. The average annual incomes of the surveyed families in the above mentioned districts are Rs. 50.33 thousand, Rs. 43.3 thousand and Rs. 57.3 thousand respectively. While the same of the borrowing families are Rs. 61.77 thousand, Rs. 53.01 thousand and Rs. 70.25 thousand and of non-borrowing families of the districts are Rs. 41.14 thousand, Rs. 37.12 thousand and Rs. 48.38 thousand respectively.

CONCLUSION & RECOMMENDATION:

The above analysis throws light on the fact that cooperatives are playing an important role in improving the socio-economic development of the state. But the development I very less and slow. This is due to the various obstacles in the form of geographical isolation of the state and ignorance of the people that prevent faster and proper functioning and development of the cooperatives. Hence attempt should be diverted towards the removal of the obstacles and smoothening of the way for the healthier and speedier growth of the cooperatives in Arunachal Pradesh.

Every attempt should me made to include the rural deprived people in the co-operatives. The rules and the regulation and all the formalities while forming the co-operative should be framed in such a way that scrutiny of papers and properties and other possessions can be done without making any injustice to the poor and real needy people. The formalities to enroll the rural poor as a member of the co-operatives should be as minimum as possible and should be over within few hours so that the villagers do not have to go again and again to the co-operative society for the same work leaving their field work.

Due to the peculiar geographical features of the region and absence of proper transport facility it becomes very difficult for the villagers to go to the co-operative societies to get loans. Hence effort should be made to establish more of its branches within the village or at a close distance. Road transport and communication facilities in the hilly and plain areas of the North Eastern Region should be developed.

Loans should be made available to the villagers, in time without bribe, otherwise timely full recovery of loans will not be possible. There should be a direct link in between the villagers and the financing agencies. Intermediaries if caught fooling the villagers should be severely punished. There should be no other way in this regard. If failed then we are doomed to die.

Education of the villagers is a must, relating to the formalities and benefits of co-operative through audio-visual, documentary films and posters etc. Education here does not mean adult education or teaching in classroom or making a person literate as normally one thinks. Here only we mean some sorts of symbols indicating the amount of loans and the terms and conditions relating to it while accepting and returning the loan amount, which they can easily recognize.

All the co-operative societies should come forward with he promise to serve the people by showing a coordinated relation. There can be vertical and horizontal co-operation among co-operatives. The vertical relationship among the various co-operatives organizations signify the relation in between the primary co-operative societies and the district level co-operatives and the apex co-operative organizations and relation between the state level apex organizations and the national level federations. Similarly horizontal inter-co-operative societies relation in between the co-operatives of one sector with other should also be developed. For instance, the relation among the consumer's co-operative societies and LAMPSs or the same

of the marketing and processing co-operatives and credit co-operative societies should be enhanced and their functioning should be integrated to cater better services of co-operative organization in rural sectors.

The rural credit co-operative societies should arrange to provide finance in more extensive ways for the development of agriculture-allied activities and household industries in supervisory and demonstrative services. It will be worth mentioned over here that instead of emphasizing on the typical agriculture crop which are planted all over the country, it will be better if attempts are made to show that type of crops which will be suitable to climate and soil of this region. For instance tea and coffee plantation can be done in an extensive scale in Arunachal Pradesh.

Diversification of activities is necessary to make them economically more viable units. The functions like credit supply, marketing of agriculture produces, distribution of essential consumer goods, supply of improved agriculture inputs and other welfare activities should be undertaken by them in an integrated way which would result in reduction of operational cost. The provision of these services will also enable the societies to increase their memberships and capital, which in turn will result in the improvement of the economic strength of the societies.

A definite programme of the bank, district wise and scheme wise should be prepared and priorities should be laid down for the schemes in the light of the agriculture situational prevailing in the district. A definite outlay within the scheme must be prepared for marginal and sub-marginal cultivators so that with comparatively less investment, they may be made more productive.

Apart from agriculture credit, the co-operatives agencies should provide package of quality services at the right time, at right place with high quantity, thereby accelerating the process of agriculture modernization. They must provide adequate scientific farm guidance for proper application of inputs and marketing.

The government should help to speed up the process of recovery of co-operative loans by ensuring prompt against willful defaulters. Importance of training facilities for the personnel of co-operatives credit institutions has hardly been emphasized. The present weakness of co-operatives credit and the steps required to be taken for removing them underline the significance of qualified and trained personnel. This point is of urgent need and significance through evaluation of existing institutions and the formulation of a programme for training course to all staff to improve their efficiencies. Other Departments and agencies should be persuaded to reorient their approach towards co-operative so as to reflect the accepted policy of Government that the co-operative institutions are the instruments of rural socio-economic development.

Marketing is one of the most important aspects of GPSSs and LAMPs. Each GPSS and each LAMP should be developed integrated approach for the development of the tribal farmers by providing necessary inputs including fertilizers for the production and undertaking marketing of produces. If we can provide whatever a farmer need for his farming, it will surely lead a betterment in the field of agriculture production and consequently leading to the improvement in the quality of life of the tribal people. Co-operative leadership should be developed among the tribals and they should come out spontaneously to increase the speed of the co-operative movement. Apart from that women as homemakers, play an important role in maintaining the health and happiness of the family. The same principle can be applied through co-operatives to a particular area/ village/region and to the Nation itself, by utilizing these skills for the women folk. As far as income-generating activities are concerned, it has been studied that individually they can do animals husbandry, kitchen garden, poultry, cattle rearing, embroidering, toy making, agriculture work and other. Whereas in groups they can be taken up for food preparation such as fruit drink and squashes, jams and jellies, bread and other bakery items, and running dhabas (small hotels with homely lunch and dinner). Food processing, sowing of seeds, cutting crops and in fact many other field works they can cover if they get proper scope from the concerned authorities. Hence adequate measures should be provided to the women masses to participate in the co-operative movement.

The practice of preparing false reports on the services render and functions in the organization should be stopped and only the genuine and real works are to be recorded for it further growth.

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MANAGEMENT OF COMMON PROPERTY RESOURCES
AN AGENDA FOR SUSTAINABLE RURAL DEVELOPMENT IN ARUNACHAL PRADESH

Robin Jyoti Khataniar,

INTRODUCTION:

In recent years, one of the important issues that has achieved substantial interests from Researchers is the Local Common Property Resources. CPRs broadly speaking are the resources accessible to the whole community of a village and to which no individual has exclusive property rights like village pastures, Community forest, waste lands, common threshing ground, watershed drainages, village ponds, tanks, river, rivulets and river-bed etc. Though these CPRs have significant contributions to the economy of rural poor yet these recourses have seldom been received enough attention of planners. In Arunachal Pradesh no systematic effort has yet been made to quantify the extent of dependency of rural poor in CPRs and its implication to rural development. Arunachal Pradesh with a population of 10.91 lakhs. (as per 2001 census) it has 22 majors tribes and around 110 sub tribes each having their own customary institutions of resource management, exchange and distribution. In the communitarian economy all available natural resources used to manage by the various tribal communities of the state. The establishment of individual property right in natural resources particularly of land forest is a recent phenomenon in Arunachal Pradesh (Roy and Kuri, 1997). Its history in many areas of the state is sa recent as the post independence period. However the institutional shift from the community to the individuals has not yet been completed. Still many tribal communities are mainly in the rural areas heavily dependent upon CPRs. In village commons tribal enjoys freedom to use forest and hunt animals. It's the main source of fule and folder, edible fruits of all kind, leaves, roots, animals, birdes, insects, fish from the rivers and streams constitute the items of food for the tribal people. (Haimendofr, 1885, Elwin, Kuri 2001). Common Forest provides raw materials for erecting their houses. Their cattle graze in the forest. Herbs cure their diseases. After all their life is intimately linked with CPRs. Since these resources are being used by commonly, a situation of no caretaker will arise which result in over-exploitation of resources. The Government polices that had been under taken to control the over-exploitation of CPRs and environmental degradation had failed to fulfill its objectives to regulate the commons. In this background, analyzing the extent of dependency of rural peoples on CPRs this paper deals with alternative institutional arrangement of CPRs for sustainable rural development.

OBJECTIVES:

The main objectives of the study are:-

1. To explore the natures and extent of CPRs in Arunachal Pradesh.
2. To estimate the extent of dependency of poor on the CPRs.
3. To explain the employment potential and gender dimension of CPRs based activities and
4. To asses the current management of CPRs in he length of sustainable rural development in Arunachal Pradesh.

METHODS AND MATERIAL:

The study is based on a primary survey, which was contacted in October.2002, covering 50 households from two villages of Kimin block namely Jhumi and Kakoi under Papum Pare district of Arunachal Pradesh. The technique of simple random sampling was followed to select households from the village. We have classified the sample households in two categories, viz. poor and non-poor. Land holding pattern has been taken as the basis to distinguish poor and non-poor. Those have less then 04 acres of land are considered as poor and those having more than 04 acres of land are non-poor.

RESULT AND DISCUSION:

Both the surveyed villages are rural. The first village "Jhumi" is 16 km away from the head quarters of Kimin Block. The link road between Jhumi village and Kimin Headquarter is not good at all. Agriculture is the predominant economic activity of the villages. But due to lack of marketing facilities and underdeveloped communication system, their production activities organized to meet the domestic consumption requirement only. Rarely they sale their agriculture products and the collected goods from CPRs in he market. Marketing network of the village is very underdeveloped. The nearest market is at Johing of Assam, which is about 10 km away from the village. Our second study village "Kakoi" which is about 25 km away from Kimin Headquarter. There is a link road between Kakoi and North Lakhimpur via Lilabari Air-Field. People of the village are agri-dependent. There is a market namely Chinatali of Assam which is about 8 km away from the village. The women of he village are arranged to sale their surplus products in the market. Education and other characteristic of the surveyed villages are given in table No – 1

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TABLE NO.1

Literacy Rate in the Surveyed Villages

Name of the villages	No. Of Household	No. Of Person	7 + Population	7 + Literate Population	Literacy Rate	Average Years of Schooling	Average family Size
Jhumi	19	100	74	34	45.94	3.44	5.26
Kakori	31	199	153	78	50.98	3.36	6.42
Total	50	299	227	112	49.34	3.40	5.98

Source: Field Survey, 2002

Our total sample size is 50. out of which a sample of 19 households selected from Jhumi and 31 from Kakoi. The average number of members in a household, i.e, the family size in the surveyed villages is 5.98. Jhumi has a family size of 6.26 while Kakoi 6.42. The literacy rate of the surveyed population aged 7 years and above is 49.34 percent. Comparatively literacy percentage is higher in Kakoi being 50.98 percent while it is 45.94 in Jhumi. The average years of schooling as shown in the table No. 1, is not very high being only 3.40 years.

TABLE NO. 2

Employment Status of the Surveyed Population

Villages	Percentage Distributors of Working Population in				Total Working Population
	Agriculture	Business	Service	Wage labour	
Jhumi	86.00	4.00	6.00	4.00	50(100)
Kakori	88.69	6.09	0.86	4.37	115(100)
Total	87.88	4.45	2.42	4.24	165(100)

Note: Figure in the parentheses are percentage of the total.
Source: Field Survey, 2002

EMPLOYMENT STATUS OF THE SURVEYED POPULATION:

The occupational structure of the surveyed villages can be categorized into four groups: Agriculture employment, Business, Service and Wage labour. Agriculture is the most predominant occupation among the surveyed population. Around 88 percent of the total working population are engaged in this sector, followed by Business, which has absorbed 5.45 percent, Wage labour 4.24 percent and service 2.42 percent.

DISTRIBUTION OF LAND AND RESOURCES:

The Table No. 3 presents the size class distribution of total operated land as the summation of permanently cultivated land, shifting land, Horticulture land and land under pond.

TABLE NO. 3

Size-class Distribution of Total Operated land (area in acre)

Villages	0-02		02-03		03-04		04-05		05-06		06 and above		Total	
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
Jhumi	8	10.61	7	15.06	1	3.66	0	0	0	0	3	22.65	19	51.98
Kakoi	6	7.1	7	15.66	5	17.15	3	12.00	0	0	10	71.46	31	123.37
Total	14	17.71	14	30.72	6	20.81	3	12.00	0	0	13	94.11	50	175.35

Source : Field Survey, 2002

Table – 3 shows that out of the total operated land area of 175.35 acres, 94.11 acres being 54.29 percent are cultivated among the large farmer households which constitutes 26 percent of the total households of the surveyed villages, while 68 percent of the households operated only around of the total operated land. This clearly indicates that there is significant inequality in the distribution of land holdings in the surveyed villages.

This ownership pattern of private property resources in the surveyed villages is shown in the Table – 4

TABLE NO. 4

Ownership of Private property Resources (Land and Livestock)1

Items		Category of Household	Name of Villages		Total Surveyed Area
			Jhumi	Kakoi	
1. Landholding size per Household		P-	1.83	2.22	2.04
		N-	7.55	6.42	6.63
		T-	2.73	3.98	3.51
Size of ruminant Livestock per Household	a) Cow	P-	2.87	6.05	4.56
		N-	13.66	4.12	12.01
		T-	4.75	8.55	7.04
	b) Bullock	P-	1.66	1.77	1.23
		N-	4	6.07	5.69
		T-	1.15	3.58	2.66
	c) Goat	P-	5.25	7.55	6.47
		N-	14.33	14.76	14.69
		T-	6.68	10.58	9.22
	d) Pig	P-	2.75	4.44	3.64
		N-	7	8.38	8.12
		T-	3.42	6.09	4.2
	e) Mithun	P-	0	0	0
		N-	0	0.375	0.375
		T-	0	0.19	0.12

Note: P denoted poor household, N denoted non-poor household and T denotes total household.
Source: Field Survey, 2002

It is evident from table – 4 that the average size of land holding of poor household is much lower than that of non-poor households. The same is true with regards to the ownership of live stock resources. The differences in the terms of land and livestock resources clearly indicate the degree of inequality between poor and non-poor households at the surveyed village.

RURAL POOR'S DEPENDENCY ON CPRs:

In the surveyed villages majority of the households heavily dependent upon CPRs for their dally live hoods. These people collect Timber, Bamboo, Firewood, Edible fruits, leafy vegetables, Tokaw leaves, Bamboo-soots, Phuljharu, Honey, Mushroom, etc from the CPRs. They also catch fish from the river and hunt animals in the jungle. These CPRs provide general benefits to he surveyed households through supply of the fodder and grazing land, which help them in saving their private land for crops production. Wild food and leafy vegetables are collected as food items.

In Arunachal Pradesh the contribution of CPRs to the rural economy is much higher. Their life is intimately related to the forest. In our surveyed area it is found that the households income from Business, Service and Wages is very low. There are two types of Agriculture Practices prevalent in the surveyed villages: Shifting cultivation and permanent cultivation. Permanent cultivation is limited. For the poor households the area under permanently cultivated land is insignificant. Jhuming is their major agriculture activity. However it is not possible to operate huge plot of land at a time due to the constrains of family labour and private property resources etc. As a result the poors are bound to dependent upon CPRs. The nature and extent of CPR collection in the surveyed villages is given in appendix table – 1.

EMPLOYMENT GENERATION AND GENDER DIMENTION IN CPRs ACTIVITIES:

It is observed that the average land holding size of the poor people is very low. So in the poor families there are always surpluses of labour. But due to underdeveloped factor market these surplus labour could not find suitable place to be absolved. Consequently they are forced to dependent upon CPRs activities to a greater extent. Generally the male engage in the collection of timber, bamboo (for the collection of their houses) hunting, collection of honey etc. The work like the collection of fuel wood, fodder, edible fruits, vegetables etc are done by the female and child only.

TABLE NO. 5

Gender wise Participation in CPR Activities in the Surveyed Villages.

Villages	Category of Household	Male	Female	Child	Total
Jhumi	P	10 (20%)	16 (32%)	14 (28%)	40 (80%)
	N	3 (30%)	3 (30%)	4 (40%)	10 (20%)
	T	13 (26%)	19 (38%)	18 (36%)	50 (100%)
Kakoi	P	12 (20.33%)	20 (30.89%)	27 (45.75%)	59 (56.73%)
	N	10 (22.22%)	15 (33.33%)	20 (44.44%)	45 (43.27%)
	T	22 (21.15%)	35 (33.36%)	47 (45.19%)	104 (100%)
Total	P	22 (21.15%)	36 (36.36%)	41 (41.41%)	99 (64.28%)
	N	13 (23.64%)	18 (32.73%)	24 (43.64%)	55 (35.71%)
	T	35 (22.73%)	54 (35.06%)	65 (42.21%)	154 (100%)

Note: P = poor Household.
N= Non-Poor Household.
T = Total Household.
The figures within the brackets are percentage to the total.
Source Field Survey, 2002.

In the table – 6 attempts has made to show the gender-wise participation in CPRs activities in the study villages. We have found that total 154 persons were participated to CPRs activities, out of which 64.28 percent are poor and 35.71 percent are non-poor. Again out of the total CPRs based employment 22.73 percent are poor and 35.71 percent are non-poor. Again out of the total CPRs based employment 22.73 percent are male, 35.06 percent are female, 42.21 percent are child. It is thus obvious that mainly female and child are engaged in CPR based activities.

SOURCES OF INCOME AND THE DEPENDENCY ON CPRs:

For the purpose of highlighting the dependency o f rural poor on CPRs an attempt has been made to estimate the total income of the household taking into account the various sources of income including th component of CPRs. It is to be noted that the estimation of the income we have excluded income from permanent assets. So there is possibility of under estimation of actual income

TABLE NO. 6

Sources of Income (in Rs.) of the Surveyed Villages (in last one year).

Villages	Category of Household	Agriculture	Business	Services	Wage Labour	CPRs	Total
Jhumi	P-	171200 142.80%	0	56000 14.01%	7000 1.75%	165770 41.44%	399970
	N-	170500 61.11%	60000 21.50%	0	0	48500 17.38%	279000
	T-	341700 50.33%	60000 8.84%	56000 8.25%	7000 1.03%	214270 31.56%	678970
Kakoi	P-	207000 34.13%	114000 18.79%	30000 4.59%	20000 3.29%	235550 38.83%	606500
	N-	321500 42.15%	205000 26.88%	0	0	236190 30.97%	762690
	T-	528500 38.60%	319000 33.30%	30000 2.19%	20000 1.46%	471740 34.45%	1369240

Villages	Category of Household	Agriculture	Business	Services	Wage Labour	CPRs	Total
Total	P-	378200 37.57%	114000 11.33%	86000 8.54%	27000 2.68%	401320 39.87%	1006520
	N-	492000 47.30%	265000 25.44%	0	0	284690 27.33%	1041690
	T-	870200 42.48%	379000 18.50%	86000 4.20%	27000 1.32%	686010 1.49%	2048210

NOTE: P = Poor Households
N = Non-poor Households
T = Total Households

Source: Field Survey, 2002

Table 5 indicates the contribution of various sectors (Agriculture, business, Service, Wage Labour and CPRs) to the total income of the households. In our study villages both poor as well as non-poor are heavily dependent upon CPRs. Around 39.87 percent and 27.33 percent of total income of the poor and non-poor households respectively come from CPRs. These includes mainly Timber, Bamboo, Fuel wood and fodder etc. It is ingesting to note that if we exclude CPRs income from total income most of the households will drop below poverty line. So there is a negative relationship between CPRs extraction and the extent of poverty.

Though the CPRs play a crucial role in the economy of the rural poor, it is the non-poor who get greater benefits from CPRs in absolute terms. Table – 5 explains that the average income from CPRs in the study villages is Rs. 13720.20 (686010/ 50). The poor non-poor classification of CPRs income reveals that the non-poor earns greater income from CPRs (Rs. 17793.12 on the average) than the poor household (Rs. 11803.53). This clearly signifies that with the growing commercialization of CPRs the poor are systematically being excluded from the access to CPRs in the study villages. It is to be noted in this context that the CPRs base activities and ownership of private property resources have greater access to CPRs.

EXISTING MANAGEMENT SYSTEM:

It is evident that forest product constitutes the major component of CPRs. The forest area of the surveyed villages can be classified into: State forest, un-classed State forest and community forest. The villagers claimed that un-classed State forest is also the community forest. In our surveyed area government tried to protect and develop the degraded CPRs by extending the State Forest Programme. But it is found that illegal extraction of the CPRs (Timber, Fuel wood, Cane, Bamboo etc.) is a common phenomenon in he study villages. Therefore evidence shows that the conservation of common property into State property had failed to fulfill its objectives to regulate the commons. The successful cases of locally devise system indicate that it is not necessary for regulation of commons to be imposed from the outside. In our study Villages State poverty recourses have became defacto private or open access resources due to state failure to enforce property right.

We have found that state intervention, as a strategy to reduce the degradation of CPRs became a defacto private or open access resources. In our study villages, the rural livelihood strategy is co-related with the nature (CPRs), where the people earn 33.49 percent of total income from CPRs. Any management system of CPRs will not be a sustainable one that discourage of local participation. So the CPRs management should be in such a way that it involves all the rural families at he village level in the use and management of the available CPRs. Thus more than protecting the CPRs it seems essential to have community based use and management of the resources with the active participation of all the households.

CONCLUSION:

CPRs play a very important role in the rural economy of Arunachal Pradesh through the income from CPRs is higher for the rich in absolute terms yet in relative terms the poor's income from CPRs is very important and crucial in their household economies. Hence there is an urgent need for the sustainable management of CPRs in order to avoid the 'tragedy of com-mon'. But there is no universally accepted institutional arrangement for the management of CPRs that is sustainable for all situations and all times. In Arunachal Pradesh sustainable management of CPRs is possible only with the active involvement of the local people.

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APPENDIX – 1

The Nature and Extent of CPRs Collection in the Surveyed Villages (in the last one year)

Items	Category of Households	Villages					
		Jhumi		Kakoi		Total	
		Quantity	Value	Quantity,	Value	Quantity	Value
Timber Grade Tree (No)	P	89	17.80	120	24.00	209	41.80
	N	45	9.00	140	28.00	185	37.00
	T	134	26.80	260	52.00	395	78.60
Fire Wood (Bundle)	P	6760	67.60	8528	85.28	15288	152.88
	N	2080	20.80	7124	71.24	9204	92.04
	T	8840	88.40	15652	156.52	24492	244.92
Bamboo (No.)	P	3550	17.75	4420	22.10	7970	39.85
	N	900	4.50	2040	10.20	2940	14.70
	T	4450	22.25	7260	32.30	11710	54.55
Cane (Bundle)	P	41.50	4.15	188	8.80	229.5	12.95
	N	10	1.00	557	55.70	567	56.70
	T	51.5	5.15	605	64.50	656.5	69.65
Edible fruits (Kg.)	P	569	2.84	602	3.01	1171	5.85
	N	90	.45	437	2.18	527	2.63
	T	659	3.29	1039	5.19	1698	8.49
Vegetables (Kg.)	P	778	7.78	795	7.95	1573	15.73
	N	110	1.10	595	2.97	705	4.07
	T	888	8.88	1390	10.92	2278	19.80
Toko Leaves	P	4040	12.12	6470	19.41	10510	31.53
	N	700	2.10	3630	10.89	4330	12.99
	T	4740	14.22	10100	30.30	14840	44.52
Bamboo Shoots (Kg)	P	418	12.54	876	26.28	1294	38.82
	N	75	1.50	577	11.54	652	13.04
	T	493	14.04	1453	37.82	1946	51.86

Items	Category of Households	Villages					
		Jhumi		Kakoi		Total	
		Quantity	Value	Quantity	Value	Quantity	Value
Phull Jharu (Kg)	P	190	0.95	1920	9.60	2110	10.55
	N	0	0	2650	13.25	2650	13.25
	T	190	0.95	4570	22.85	4760	23.80
Honey (Kg)	P	3.5	0.35	17	1.70	20.5	2.05
	N	4	0.40	13.5	1.35	17.5	1.75
	T	7.5	0.75	30.5	3.05	38	3.80
Mushroom (Kg)	P	11.5	0.34	15	.45	26.5	.79
	N	0	0	6	.18	6	.18
	T	11.5	0.34	21	.63	32.5	.97
Fish (Kg)	P	445	13.35	621	18.63	1066	31.98
	N	66	1.98	425	12.75	491	14.73
	T	511	15.33	1046	31.38	1557	46.71
Birds (Kg)	P	35	2.1	87.5	5.25	122.5	7.35
	N	9.5	0.57	89.5	5.37	99	5.95
	T	44.5	2.67	177	10.62	221.5	13.29
Animal (Kg)	P	101.5	6.09	51.5	3.09	67.5	9.18
	N	85.	5.10	176	10.56	180	15.66
	T	186.5	11.19	227.5	132.65	247.5	24.84

Source : Field Survey, 2002. **Note : P =Poor, N=Non-Poor, T= total.**

Impact of Horticulture in Rural Development of Arunachal Pradesh

Dr. B.Singh, S.Kalita, Dr. P.Rethy and M. Gogoi

INTRODUCTION:

Arunachal Pradesh lies between the latitudes 26° N and 29° N and longitude of 91° E and 97° E. It has geographical area of 83,743 sq km with a population of 10,91,113 (2001 census). The state is endowed with varied agro climatic conditions, ranging from tropical to temperate. This trait is attributed to variation in altitudes from 150 m to 7300 m (Orchem in Kameng). The temperature may be as low as below freezing point to 37° C depending on the altitude. The state shows tremendous variation in vegetations due to heavy rainfall spread over several months of the year. The mean monthly rainfall varies from 8.54 mm to 512.68mm. The total rainfall varies from 1000 to 5000 mm per annum. These factors offer immense scope for horticultural development relative to other crops. Despite these favorable factors, the state has not been able to take advantage of it because of several constraints. Therefore, there is an urgent need for the state to explore the horticultural potential in a scientific and systemic way to initiate sustained of growth to raise income and enhance employment opportunities so that it can not only be self reliant in the production of horticultural crops but also becomes a supplier of fruits to the neighboring states.

Prospect and problem of Horticulture in Arunachal Pradesh:

There is enough scope of horticulture in the state. Soil conditions and climates favour growth of wide range of horticultural species at all the altitudes. Arunachal Pradesh is a hilly region with various agro-climatic conditions having tropical, subtropical and temperate climates (table 1)

Table-1
Agro climatic Zones of Arunachal Pradesh

Agro Climatic Zone	Area under the zone
Alpine Zone	Gourichen, Upper Tawang, Tulungia, Bamla, Shela pass areas of West Kameng, Jidu and adjoining area of the Northern Siang.
Temperate and Sub-alpine zone	Tawang, Dirang, Bomdila, Shergaon areas of West Kameng dist. of Dibang Valley, Northern parts of East Siang, Upper Subansiri, parts of Siang around Anini and North Eastern part of Lohit district.
Sub-tropical hill zone	Changyak, Naga and Khonsa areas of Tirap district, Basar area of Siang district.
Mid-tropical hill zone	Southern part of Lower Subansiri
Mid-tropical plain zone	Pasighat area, Singphow area of Tirap district and Lower part of Lohit district.

Source: Barthakur D. N (1992)

It has a wide forest cover with undulating terrain, where plain area available for agriculture is very limited. Area under agriculture in Arunachal Pradesh is 1868.1 sq.km accounting only for 2.23% of the total geographical area and area of 1.16% (964.64 Sq Km) is recorded as wasteland. This wasteland can be brought under horticultural production. Crops suitable for different horticultural zones in the state is presented in table 2. Area and production of important fruit and spices in the state has been given in Table No.3. The total fruit and spices production in the state is 1,23,101 MT from an area of 53,338 ha whereas scope of area under horticultural corps is 4,31,300 ha. The total gross income from fruit and spices is more than 120 crores (Singh et al.2001). But full potential of the benefit is not realized by the farmers due to lack of poor communication. If infrastructure is developed properly, farmers can gain more income from horticultural crops. There are at least five reasons for the state to give priority on for from horticultural development.

1. The soil and agro climatic conditions are suitable for the production of various horticultural plants.
2. Marginal lands are unsuitable for production of field crops.
3. Horticulture can improve rural economy by providing more opportunity for self-employment.
4. It can substantially contribute to the improvement of the diet of rural poor which is nutritionally deficient in proteins, minerals and vitamins, and
5. It can not only beautify the local landscape but also protect the environment by checking soil erosion and landslides, which are common in some districts.

More or less the same reasons are given by Azard et al (1988) for horticultural development in hilly areas of Himachal Pradesh.

Table 2.

Crops suitable for different horticultural zones in Arunachal Pradesh

Sl.No.	Horticulture Zone	Suggestive crops suitable for cultivation	Potential area in hectare
1	Foot hills and Valleys (170-915 m altitude)	Citrus, Guava, Banana, Mango, Litchi, Pineapple, Sepota, Jackfruit, Papaya, Plum, Pear etc.	1,45,000
2.	Mid hills (915-1800m)	Peach, plum, Apricot, Pear, Almond, Low shilling, Apple, Pomegranate, Olive, Grapes etc. Seasonal vegetables for seed and truck gardening.	1,40,000
3.	High hill (Above 1830m)	Apples, Cherry, Walnut, chestnut, Peanut, Pomegranates etc off season vegetable and production of temperate vegetable seeds.	1,15,000
4.	Rain shadow area below 40" annual rainfall (with wide range of shilling requirement and temperature)	Apple, Pear, Plum, Peach, Walnut, Pomegranate etc off season vegetables.	31,300

Source: Annual Report, State Horticultural Department. Horticulture Development in Arunachal Pradesh at a glance (2000-2001).

In view of potentialities of horticultural crops, some selected value added fruit crops have been identified which are based on the microclimate with specific location in the state. Tawang, West Kameng, Lower Subansiri, Mechuka Sub-Division, Anini and Walong having temperate climate, have been identified for Apple, Walnut, Kiwi and Plum while mid foot hill areas of al the district having subtropical climate have been identified for Citrus, Pineapple, Guava etc (Annual report, Horticulture Department Arunachal Pradesh, 2000-2001) Among the fruit crops, two main fruits that have gained popularity in Arunachal Pradesh are Apple and Citrus. Apple was introduced in Arunachal Pradesh in 1956. Apple plantations are established in Kameng, Siang, Lohit and Tirap districts. The awards on apple varieties bagged All India Apple shows bear testimony to the excellent quality of fruits grown in the region. Although production of apple is good, there are several constraints like heavy pest and disease problems and absence of grading, packaging and marketing agencies. Absences of storage, post harvest and transport facilities also deter the development of fruit industries within the state. State Department of Horticulture has taken up distribution of the fruits to distant places from the place of production. But the department is yet to d develop proper storage, packing and processing facilities. Once these infrastructure facilities are developed in Arunachal Pradesh, horticultural industry can hope to contribute to the improvement of rural economy not only though greater production but also through greater employment opportunities. As their abundant raw materials in Arunachal Pradesh there is vast scope to develop horticulture based small industries such as pickle, sauce, juice industries etc. which will improve the rural economy of the state.

Spices:

The important spices in the state are chili, Black pepper, Cinnamon, large cardamom, ginger etc large cardamom is cultivated in some parts of the state and it has been found to be a promising crop. It is to be mentioned here that a number of wild varieties of large cardamom are available in the region. Some of the them have rough surface of fruit with large seeds while others are small with smooth surface and small seeds like commercial cardamom.

Table 3.

Area and production of fruits and spices during 2000-2001

Fruits	Area (Ha)	Production (mt)	District
Temperate Fruits			
1. Apple	6733	8513	West Kameng Tawang & Ziro Plateau
2. Walnut	2,285	51	
3. Plum	804	2,800	
4. Pear	870	3010	
5. Peach	239	1216	
6. Grape	12	7	
7. Strawberry	1	1	
8. Chestnut	11	2	
9. Kiwi	36	5	
10.Persimmon	1	1	

Tropical and sub-Tropical fruits	Area (Ha)	Production (mt)	District
1. Circuits	19,147	24,000	Seppa, Papumpare, Daporijo, Tirap, Yingkiong, Pasighat
2. Guava	976	3,000	
3. Pomegranate	146	214	
4. Pineapple	7,329	31,980	
5. Banana	3,538	13,200	
6. Papaya	585	3,100	
7. Litchi	692	250	
8. Jackfruits	406	1500	Changlang, Lohit, Dibang Valley, Along
9. Mango	142	130	
10. Areca nut	61	67	
11. Corrumbula	5	7	
12. Coconut	109	30	
Species			
1. Large Cardamom	2,142	507	Lohit, Changlang, Tirap, Dibang Valley
2. Black Pepper	635	117	
3. Ginger	6414	29,059	
4. Turmeric	44	289	
5. Cinnamon	10	23	
6. Bay leaf	10	22	
Total	**53,388**	**1,23,101**	

Source: Annual Report, State Horticultural Development. Horticulture Development in Arunachal Pradesh at a glance (2000-2001)

Olericulture:

A large array of vegetables, including tuber and rhizomatous crops like potato, sweet potato, yam, tapioca and colocasia are cultivated in the entire state. However, there is no reliable data on the total area under vegetable crops. In Arunachal Pradesh both the tropical and temperate vegetables are grown. Brinjal, bitter gound, sponge gournd, ridge, gound, bottle gound, pumpkin, cucumber, ladies finger, various kind of beans etc are grown as tropical vegetables and many types of leafy vegetables such as palak, meithi, amaranthus, dhekia, Solamum Nigraum, Brassica spp. Basella rubra (puroi sag) etc also eaten as vegetable. The important vegetables grown in the area are given in the Table 4

Table 4
Vegetables commonly grown in Arunachal Pradesh

a) Tropical vegetable

Types of vegetable	Example
Legumes	Hyacinth Bean (Dolichos lablab, Cow pea (Vigna sinensis) French bean (Phaseolus vulgaris).
Cucurbits	Bitter ground (Momordica Charantia), Sponge gound (Luffa cylindrical) Ridge gourd (Luffa actangula) Bottle gourd (Naria vulgaris), Pumpkin (Cucurbita pepo), Cucumber (Cucumis sativus).
Others	Brinjal (Solanum melongena) Okra (Abelmoschus esculentus)
Temperate Vegetable	Cabbage (Brassica oleracear Var. capitala) cauliflower. (Brassica oleracear Var botrytis) Tomato (Lycopersicon esculenturm) Pea (Pisum Sativum), Raddish (Raphamus sativus), Carrot (Daucus carota), Knol Khol (Brassica oleracea).
Leafy vegetable	Toria (Brassica nigra), white mustard (Brassia juncea), Palak (Spinacea oleracea) Pani Kolmong (Ipomoea reptans), Khutura (Amaranthus Spp)
Tuber, Corm and rhizome	Potato (Solamum tuberosum), Tapioca (Manihot utilissima), Turnip (Brassica campestris var. rapa) Yam (Dioscorea esculanta) Colocasia (colocasia esculenta)Alocasis spp) Sweet potato (Ipomoea batatas)

Production of vegetables like potato is very high in the state, but due to lack of cold storage can not stored it for longer time and there is no other way of farmers except selling these at very low price. Therefore, development of cold storage is very essential for such perishable products, which helps, in rural economy.

Tropical and sub-Tropical fruits	Area (Ha)	Production (mt)	District
1. Circuits	19,147	24,000	Seppa, Papumpare, Daporijo, Tirap, Yingkiong, Pasighat
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Area (Ha)	Production (mt)
),147	24,000
76	3,000
46	214
329	31,980
538	13,200
35	3,100
92	250
06	1500
42	130
51	67
5	7
09	30
,142	507

Floriculture:

The State is very rich in floral diversity. It is well known for its orchids, and out of 1100 species of orchids in India, about 650 species are found in the northeastern state (Hedge, 1984). the agro climatic condition of the state is very well suited for the growth of species of Cymbidium and Paphiopedilum. Orchid cultivation has been promoted as a cottage industry in the state by the State Forest Department (Hegde, 1979, 1987, 1991, 1996). Intensive cultivation and establishment of orchids in nurseries have been suggested as a step towards self-employment and income generation (Kumar and Singh, 2000 and Sinha, 2000). Growing of other important garden plants like Allamanda, Rose, Jasmine, Dahlia, Chrysanthemum, Begonia, Bougainvillea, Holmskioldia Sanguina, Musaenda, Clorodendron thomsonii etc can be an important entrepreneurial venture. Some of the common ornamental plants that can be grown commercially in Arunachal Pradesh are shown in the Table 5

Table 5
Ornamental plants grown in Arunachal Pradesh

Ornamentals	Example
Orchids	Arundina graminifolia, Bulbophyllum odoratissimum, Calanthe biloba, Cleisocentrom trichomum, Cymbidium elegans, Cymbidium ensifolium, Cypripedium tibaticum, Paphiopedilum insigne, Paphiopedilum villosum, Phaius flavus, Rhynchoslylis retusa, Spathogtollis plicata, Vanda coerulea.
Bulbus plants	Belladonna lily, Gadiolus, Iris, Spinder lily, tiger lily, Tube rose.
Perennial	Bottle brush, Bougainvillea, Gardenias, Jasmine, Poinsettia.
Flowers plants	Roses
Hedges and Shrubs Landscape	Acalypha, Clerodendrum Duranta, Hydrangea, Lawsonia, Murraya, Pedilanthus. Cassia fistuta (Amaltas), Araucaria, Bottle brush, Butea monosperms (Flame of forest), Mesua ferrea (Nahar), Gravellia robusta (Silverroak), Telecoma, Bauhinia, Largerstroemia.
Annual Flowers	Antirrhinum, Calendula, Californian poppy, Carnatioin, Chrysanthemum, Daisy, Gazania, Hollyhock, Pansy, Phlox, Salvia, Sunflower, Verbena, Balsum, Celosia, Cosmos, Tagetus(Marigold), Portulaca, Tithonia, Zinnia, Gaillardia.
Creepers	Asparagus, Bignonia venusta, Jasminum, Merremia umbrellate, Passiflora edulis, Quisqualis indica, Rosa spp. Solanum Jasminoides, Thubergia coccinia.

Medicinal and Aromatic plants:

Arunachal Pradesh is a treasure house of medicinal plants (Sarmah et al, 2000). There is a shift in the attitude of the people of shift from allopathy to traditional systems of medicine, which uses the plants for making drugs. These plants have potential for commercial production, which in turn will change the health and economy of the state. Some medicinal plants viz. Aconitum, Berberis, Coptis teeta, Podophyllum, Rheum, Swertia etc are available at high altitude of the state. Indigenous knowledge of the people of the state regarding the utilization of the plants is quite high, but not documented properly. Village people cultivate some of the medical plants like Aconitum, Balsam, Coptis teeta, Clerodendron, Piper, Spilanthus etc for their own use. The common medicinal plants used by the local people are given in the Table 6. Some villagers collect and sell these plants to middle men who dispatch these collections to other places. The state government has recently constituted as Medicinal Plant Broad, which will monitor the possibilities of sustainable production, collection and dispatch of these medicinal plants.

Table 6
Medical plants available in Arunachal Pradesh and their uses.

Botanical name	Family	Uses
Aconitum ferox	Rananculaceae	Astringent in diarrhea and cough
Adhatoda zeylanica	Acanthaceae	Leaves are source of drug used in expectorants.
Andrographis paniculata	Acanthaceae	Leaves steams and inflorescence used in fevers, worms and dysentery.
Aquilaria agallocha	Thymeliaceae	Agar oil extracted from the infected wood used as medicine as stimulant, carminative and astringent.
Clerodendrum colebrookaiamum	Verbeniceae	Used for reducing hypertension.
Copotis teeta	Ranunculaceae	Contain berberine in leaves.
Gaultheria fragrantissima	Ericaceae	Oil used as stimulant, carminative and in treatment of reheu matism.

Botanical name	Family	Uses
Illicium griffithii	Illiciaceae	Expectorant, stometic carminative
Oroxylum indicum	Bignoniaceae	Root and bark used in diarrhea, seeds purgative.
Parnax pseudoginseng	Araliaceae	Reduce high blood pressure or raise low blood pressure.
Piper mullesua	Piperaceae	Fruits used in fever, cough and pain.
Podophylum hexadrum	Rodophylaceae	Rhizomes are source of drugs used as stimulant and purgative.
Rauvolfia serpentiana	Apocynaceae	Used as anti-hypertensives and sedatives.
Rheum emodi	Polygonaceae	Roots and rhizomes are source of drugs used as laxative tonic and purgative, powder roots are used for curing ulcers.
Taxus baccata	Taxaceae	Tincture prepared from young shoots used for headache, giddiness and diarrhea, leaves are source of flaxol.
Terminalia bellerica	Combretaceae	Fruit pulp used in dropsy, diarrhea and leprosy.
Terminalia chebula	Combretaceae	Fruits used as laxatives, stomachic and purgative.

Indigenous medicinal and aromatic plants appear to have good scope for commercial cultivation than can fetch high prices in the market (Sarmah et al, 2000) Plantation crops such as tea, coffee, and betel vine can also be raised in the state, the demand for which is well known in the market.

The state Arunachal Pradesh has already taken some steps to produce horticultural crops through commercial cultivation. Some of the horticultural farms and nurseries established in the Arunachal Pradesh are given in Table 7

Table 7

Horticulture farm and Nurseries in Arunachal Pradesh

District	Name of Nursery/Farm	Location & Area	Fruit crops
Tawang	a. Hort. Demonstration garden	Namtesering (2.5 Ha)	Guava, Orange, Pear, Peach
West Kameng	a. Regional Apple Nursery Govt. Hort. Farm. b. State Hort. Farm c. Govt. citrus Nursery	Dirang (30 Ha) Salary (5.5 Ha) Shergaon (120 Ha) Nafra at Khazalang (10 Ha)	Temperate fruits Grape, Kinnow All temperate fruits Orange & Multi-purpose
East Kameng	a. Horti. Nursery b. Govt Hort Demonstration garden c. Transit Nursery	Pampoli (0.4 Ha) Bameng (2 acre) Khenua	Orange Orange
Papumpare	a. Hort Sub-Tropical Nursery b. Hort Nursery c. Hort Nursery d. Black Pepper	Yupia (10 ha) Doimukh (1 acre) Sagalee (1 acre) Naharlagun (1 acre)	Sub-Tropical fruits
Lower Subansiri	a. Govt Hort Grarden b. Govt Hort Garden c. Hort Nursery d. Hort Nursery e. Hort Nursery	Hapoli (2.5 acre) Ziro (2.5 acre) Tali (1 acre) Koloriang (1 acre) Palin (1 acre	Temperate Fruit & Orange
Upper Subansiri	a. Hort Nursery b. Hort Nursery c. Hort Nursery	Baririjo (5 acre) Nacho (5 acre) Ningtemuri	Orange Orange Orange
West Siang	a. Trial Cum demonstration	Mechuka (2 acre) Jumlo (10 acre)	Temperate, Species and Orange
East Siang	a. Model demonstration b. Hort Transit Nursery c. Govt. Hort Nursery d. Govt Hort Nursery	Jenging (2.5 acre) Boleng Pangin Pangin	
Upper Siang	a. Hort cum Vegetable b. Hort Nursery cum Model garden demonstration garden	Tuting (6 acre) Yingkiong (2 acre) Mariyang (2 acre)	

District	Name of Nursery/Farm	Location & Area	Fruit crops
Upper Dibang Valley	a. Hort cum vegetable demonstartion b. Hort cum vegetable demonstration garden	Anini (1 acre) Anini (1 acre)	
Lower Dibang	a. Govt Citrus Nursery	Roing at Baleck (10 ha)	Orange
Lohit	a. Hort Nursery b. Govt Apple Orchard c. Special Nursery	Tezu (1 acre) Walang (2 acre) Orange	Orange
Changlang	a. Sub-tropical fruit cum vegetable garden b. Transit cum production Nursery c. Hort cum vegetable	Nampong Miao Changlang	

Source: Horticultural Development in A.P. at a glance published by Department of Horticulture, 2000-2001.

Suggestions:

Following further steps may be taken to improve the horticultural production in the state of future.

i) Implementation of scientific management of horticultural orchard.
ii) Expansion of area under horticultural production.
iii) Strengthening of extension support by providing training to farmers, distributing leaflets, charts etc to educate farmers and to make them aware of the present day scientific practices of horticulture.
iv) Production and supply of large quantity and good quality of the planting material to the farmers.
v) Setting up of sufficient numbers of post harvest units for proper utilization of fruits, vegetables, ornamentals, medicinal and aromatic plant produce.
vi) Increasing marketing avenue/facilities.
vii) Improving the infrastructure facilities like road, transport and communication between areas of production and consumption.
viii) Establishment of horticulture colleges/universities where training and research activities can be initiated with teaching to develop appropriate agricultural technique for the region and to produce trained manpower to support horticultural activities and to improve the existing crops varieties through breeding and genetic engineering.

It may be concluded that the land and the climate of the state are very conducive for the production of temperate and sub-tropical horticultural crops. If proper methods and management practices are adopted, the state can boost its rural economy through horticultural production.

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INTENSIVE MECHANIZATION OF ARUNACHAL PRADESH FOR SUSTAINABLE DEVELOPMENT OF RURAL AREAS IN ARUNACHAL PRADESH - a review.

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INTRODUCTION:

The mechanization deals with introduction of improved machineries and their efficient utilization to bring an improvement over existing farming. The present scenario of mechanization in India is quite different from that, which was a decade ago. There has been continuous progress in this area after independence. During previous decades growth rate of country has been around 3.5%. Now there is a need to increase it to tune of 7.0% for enhancing food production needed by present population. The solution of this holy mission is to adopt intensive mechanization in all types of land for their rigorous utilization. In fact, need of hour is to utilize all available land resources most judiciously, so that sufficient profit could be achieved by farmers. Otherwise, little negligence towards land and farming power resources may cause severe deterioration.

The agro climate of state is characterized by high rainfall and humidity and wide variations in attitude. All these make state unique affecting agriculture in various ways. The natural resources available there for agriculture include abundance of water, fertile soil, etc. However, there are peculiar problems of agriculture in form of shifting cultivation, chronic devastation by floods, large scale of degradation of environment, dearth of transport and communication facility. The soil of state could be classified in to loamy soil, laterite soil, brown soil, old and new alluvial soil. The food crops such as cereals, pulses and oil seeds are growth in state, although rice in main crop. Rice, maize, wheat, finger millets etc are among cereals grown. The pulses grown in the state include black gram, green gram pea, pigeon pea (arhar), etc. Among oil seeds are mustard, sesame, soyabean and groundnut. However high yield varieties of crops are not sown by all farmers. Waste land, fallow land and flood prone areas are available in plenty. There is ample scope of bridging gap with intensive mechanization. The opportunities for value addition and post harvest management are immense. Arunachal farming basically consists of small and scattered holdings, inspite of speedy growth in mechanization in recent years. A scheme of farm mechanization has been introduced some times back. Under this scheme a package of power tiller, rotavator unit, thresher, maize Sheller, etc were distributed among farmers through State Agriculture Dept. There is a seed multiplication farm located at Sonajuli, which conducts trials and produces seeds of HYV for distributing among farmers. However, draught animals available as progenies of mulch animals continue to be major source of farm power for field operations on small and marginal farms. In sloppy hill areas and on marginal, small and semi-medium farms up to 4 ha area under cultivation, draught animals will remain main source of farm power for a long time besides human, mechanical and electrical power resources. On the basis of requirement of mechanization inputs available land could be divided in four categories: hill, foothill, riverbank and flood areas. The farming is the main source of income of people of Arunachal Pradesh as industries based on locally available raw materials are yet to be explored and in absence of that intensive mechanization is only solution for rapid development of rural areas. The mechanization infrastructure of each category is discussed below:

MECHANIZATION OF HILLS:

In shifting cultivation, hilly land is cleared by cutting bushes, etc up to stump height during Dec-Jan. The cut material are left for drying there itself and finally burnt to make land ready for seeding before on set of rain. The cultivator is confined to a village boundary and only for 2 or 3 years. After that area is abandoned and a new site is selected to repeat same process. The hutments of village may remain at one place. Earlier, a few decades ago whole village used to shift to a new site. But now there is change in this practice. The mode of land allotment to individual families varies from tribe to tribe and it is decided by village council, village elders or village chief. The size of plot is decided on the basis of family size. The upland paddy is main crop grown in mixture with maize, finger millet, foxtail millet, etc. The cultivation involves only human power due to undulating topography. The agriculture operations are carried out manually with a primitive hand tools. The farm practices carried are clearing bushes, direct seeding or seeding after little cultivation, maintenance of crops, harvesting and threshing, which are power intensive as well as control intensive. The male and female workers are the main source of power. It was found during study that on an average 3.11 farm workers (1.61 male + 1.50 female) per family were engaged in this type of farming which shows nearly equal share of female. The ambient temperatures are more during July-August inspite of rain. The weather in state is humid in all seasons. The soil is sandy loam with high sand content. The farm practices under this shifting cultivation is quite tedius involving tremendous amount of labour. The presowing operation such as jungle cutting, burning and clearing consumes high degree of energy. All family members remain engaged in this cultivation throughout the year. The cultivation on sloppy land i.e. hill need a package of hand tools required for clearing bushes, seeding, harvesting, etc. These tools should be designed and developed keeping in human power available in state. This will attract farmers to remain engaged in farming and that too in settled from at one place. The farmers can grow 2-3 crops a year covering entire Soil surface by vegetation. This will also check soil erosion and provide sustainability to farming. Three tire farming system recommended by Indian Council Agriculture Research for hills may be adopted.

MECHANIZATION OF FOOT HILLS AND RIVER BANK:

The paddy is main crop grown once or twice a year on foothills and river bank, through other crops such as maize, pea, mustered etc are also grown. The bullocks, power tillers and tractors are major sources of farm power available there for cultivation through farm power availability is below 0.5 kwh/ha. The trials with existing implements have shown that there is good scope of increasing sizes of implements by 30-50% to match draught power available from animals. Here is scope of land leveling on foothills for creating small plots for paddy cultivation. It was find during study that land leveling with manpower was quite tedious. However, this operation could be performed by a pair of bullocks or he-buffaloes with scoop. These draught animals were also found under utilized in absence of matching implements, comfortable harnesses, etc. They remain unattended and kept on grasses available on bunds and wasteland. There is scope of green manuring of these newly created plots on foot hills. Guatemala is an appropriate green manure crop being used on tea gardens and same may be adopted for increasing productivity of these plots. Mithun is a power full animal available for cultivation in foot hill areas. The characteristics of mithuns are most similar to that of drought breeds of bullocks and he-buffalos. They could be put in two classes, small mithun and big mithun, on the basis of their body weight as other Indian draughts breeds are classified in view of their body weight. A few pair of young male babies of mithun (3 years old) may be selected and imparted training with light implements having all major components of bamboo. In beginning they should be allowed to walk behind a pair of bullocks or he-buffaloes while working in field. During this period they should be lorded. They should be guided to walk behind senior draught animals in straight line. This training may continue for one year atleast and after that they may be fully lorded. Mithun is a power full source as draught animals, locally available is plenty in state. There is need to harness farm power from them. Some of the implements available for area are discussed below.

Animal drawn puddle developed by Indian Council of Agriculture Research may be utilized for puddling for transplanting paddy seedlings. It is a rectangular blade type puddler for wet land under operation. The implement has 3 rows of blades. In each row there are five blades. The average depth of operation is 100mm. The field capacity and field efficiency are 0.09 ha/h and 65% respectively. The draft required is 600N. It saves66 to 88% labour and operating time 60-80% on cost of operation as compared to conventional method of using bullocks with primitive implements. It costs Rs. 1500/- and cost of operation is Rs. 260/ha. This operation is quite power intensive as it is carried out in standing water. He buffaloes and mithun, both are suitable draught animals for puddling.

After seed bed preparation, paddy seedlings are transplanted in field. The manually operated six row rice transplanter is suitable for this. It can be used for mat type rice seedlings in puddle soil. It saves 65% labour and operating time and 45% on cost of operation. It also results in 5 to 10% increase in yield as compared to conventional method of hand transplanting. It costs Rs. 2500/- and cost of operation is Rs. 450/-ha as compared to Rs. 250/-ha with manual method. The planting mechanism of transplanter consisting of fixed opening type finge bar actuated by hand operated lever. The row-to-row spacing is 200mm. The depth of planting varies between 20 and 30 mm. The average field capacity is 0.02 ha/h and field efficiency 55%. Two to five seedlings are transplanted in each hill.

The farming state requires Japanese approach of mechanization, which provides small farm machineries for all power intensives operation. The self-propelled vertical conveyor reaper can be used for harvesting paddy. It is an engine operated, walking type machine sustainable for harvesting and windrowing cereals and oilseed crops. This will enable farmers to clear land from matured crops as early as possible and prepare same for next crop. The engine power is transmitted to cutter bar and conveyor-belts through V-belts pulleys. The cutter bar length is 110 m and pitch 75 mm. A 5 hp diesel engine is used as prime mover. The machine has been found suitable for harvesting rice, wheat and soybean. The average field capacity of machine is 0.20-ha/h and field efficiency 65%. It saves 52% labour, 90% operating time and 52% cost operation, which is Rs. 665/ha as compared to Rs. 700-1200/ha by conventional method.

MECHANIZATION OF FLOOD PRONE AREAS:

It was find during study that he-buffaloes were under utilized and under loaded and therefore, their draught ability may be investigated for intensive utilization as they have reserve power. The flood prone areas need special attention for reclamation. There are streams and rivers originated from top of the mountains, flowing through hilly terrain, join Brahmaputra as its tributaries. The flood prone areas are located close to river ad their tributaries. The area gets flooded for few days. The flood water carries silt, which improves productivity of soil. It also brings debris, course sand etc, some times, which spoils land. Sometimes, it becomes essential to reclaim that land after flood is over. The suitable implements for locally available he-buffalos are mould board plough (150-200mm) disc harrow (6-8 disc), blade harrow (450-500) mm), three and 5 type cultivator, three and 5 row seed cum fertilizer drill/ planter, puddler (450-500mm), groundnut digger (450-500mm).

Such areas need rehabilitation after flood is over. All debris should be removed with the help of scraper, scoop, etc. The weeds, grasses etc be utilized as cattle feed for he-buffaloes and other draught animals. It was found during studies that water hyacinth, an aquatic weed is utilized as green fodder for he-buffalos in North East India. The flood prone areas need

special attention during rain and when flood water has passed. It is not possible to engage till age implements, as soil remains wet. All soil preparation should be completed within reasonable time for timely seed sowing. The farm machineries play an important role in completion of farm operation required by crop. The waterlog resisting varieties of crop should be grown in such areas.

SOIL CONSERVATION MEASURES:

The state is under high rainfall area and hence, there is need to adopt appropriate soil conservation measures as an integral part of mechanization. The length of plots on foot hills should be across the slope. All farm operation should be carried out across the slope. There must be minimum disturbance to soil during any season. The leveling of land and other reclamation activities should be performed during off-season i.e, Oct-March. The sand content of soil of state is high and due to that its erodibility is high there is need to cover all soil surface with mulch or grasses. This will check soil erosion. The conservation tillage, mulching, etc should also be adopted as counter part of intensive mechanization for sustainable development. The bunds of plot should be strong and compact to impound water required for growing paddy. The planting of seedlings of paddy also should be done across slope as it will check velocity of water and thereby erosion of soil. All outlets of water, etc should be grassed to checked soil erosion.

FARM MACHINERY HIRING CENTRE:

The scope of establishment, hiring center/ agro service center for provide tractor, power tiller, improved farm machineries, draught animals, etc. on rented basis to small and marginal farmers was found in the state. This type of center can be set up by entrepreneurs having knowledge of operations and maintenance of these equipments. In the beginning, a medium size tractors suitable for wet land operation, a power tiller, all their maching implements including land levelers, scraper, trailor, etc. should be owned. All fast wearing spare parts including all those required for minor repair and servicing should be kept. A pair each of bullocks, he-buffaloes and mithun also should be owned. All the animals drawn matching implements and their comfortable harnesses available in country should be purchased. Some of such items are available at Central Institute of Agriculture Engineering, Nabi Bag, Berasia Road, Bhopal (M.P.). The entrepreneur can undergo training at central Farm machinery and Tractor Training and Testing Institute (GOI), Bundi, Dist. Sehore (M.P). The selection of site for establishing the center is important and therefore, it should be in rural area, where sufficient work pertaining to land leveling, and reclamation, farm operations, etc are available. The main objectives of the establishing the center is to provide services to farmers for intensive agriculture mechanization for providing sustainability to development.

CONCLUSION:

The intensive mechanization will enable farmers to utilize all land and farm power resources judiciously and thereby agriculture production will go up which will provide employment opportunities to farmers and youth in handing farm product in post harvest operations. The intensive mechanization shall attract young generation to remain engaged in farming and thus it will provide sustainability to rural development.

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FORESTRY DEVELOPMENT IN THE NORTH EASTERN HILL STATES OF INDIA

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INTRODUCTION:

Forest, the soul of north east India is playing an important role in shaping the socio-economic conditions of the Tribal population that have steeled in the hilly states Viz. Arunachal Pradesh (AP), Manipur (MN), Meghalaya (ML), Mizoram (MZ), and Nagaland (NL). Beside extracting, timber fuel wood and fodder, the communities also collect tubers, fruits and seeds from the forest. They also collect certain organic substances that have medicinal properties from the forests; even beaten barks of the trees are used as clothing materials. Besides meeting the basic needs, forest has a very deep rot in the folklore of the hill population (Agarwal, 1986). Many songs, dances and festivals have grown on forest base (Banerjee et al., 1986).

Traditionally the communities inhabiting these hills states adopted some sort of forest management methods such as optimum exploitation of forest, punishment for over-exploitation of forest and conservation of rare and endemic species by means of sacred groves. They also practice many land and water management systems keeping forest as its base for co-existence between man and the nature (Singh, 1998). In spite of such planned and systematic ideologies, the status of the forest cover in these hill states is deteriorating at an alarming rate. Population pressure, decrease in productivity and critical economic conditions of the hill population have forced the people to follow the so-called modern methods of forestry which is different from the old traditional practices (Arunachalam et al., 2002). For example, jhum cultivation (slash-and-burn agriculture), the most commonly practiced technique by the hill population for meeting their food requirements earlier had a cycle of 20-30 years (Borthakur, 1978), which now days is generally 3-6 years thereby, causing hazards to forest at a very fast rate (Ramakrishnan, 1992). Unfortunately many other human activities is also contributing in deteriorating the forest prevailing in these regions. The factors are directly and indirectly creating an imbalance in demand and supply of the forest produce. Viewing the interactions that exist between man and forest in these hilly states, it can be inferred that forest is an inseparable and integral part of the hill residents and therefore development of forest in the degraded land requires the people's participation. In this paper, we have consummated the over all state of affairs of forestry development in the northeastern hill states.

FOREST COVER:

Forests in the five states of North Eastern Hill Region of India (AP, MN, MI, MZ, NL) covers an area of 9041 thousand hectares, which forms 54.45% of the total geographical area of the region. Nevertheless, the forest cover is 5.55% below the level recommended in the National Forest Policy (1988).

Data given in table 1 shows that forest cover of this region is gradually decreasing. However the forest cover of Manipur and Arunachal Pradesh is above and in Nagaland it is below the suggested level. Table 2 shows that the reserve forests, which are directly under the State Government management, are meager in Meghalaya, Manipur and Nagaland. Unclassified forests are more in Manipur and Arunachal Pradesh, while forests under District Council and individuals are predominant in Meghalaya and Nagaland (Ganguly, 1986).

TABLE – 1

Forest Area of the Hill States of North East India for the past Three Decades.

States	Total Forest area			Percent of Forest area to geographical 1 area
	1972-1975 (KM^2)	1980-1982 (KM^2)	1999 (000 ha)	
Arunachal Pradesh	51438	52104	51540	61.7
Manipur	19796	15090	1515.4	67.8
Meghalaya	14390	12458	948	36.6
Mizoram	13860	11971	1223.2	33.8
Nagaland	8154	8095	287.6	17.4

Sources: Basic Statistics of North Eastern region, 2000 – NEC, Shillong.

TABLE – 2

Classification of forests in north Eastern Hill States. (in 000 ha).

States	Reserved Forest (%)	Protected Forest (%)	Forest under Distict Council Individual (%)	Unclassified (%)	Total (100)
Arunachal Pradesh	1113 (21.61)	1	147 (0.29)	4026 (78.11)	5154
Manipur	137 (9.04)	417 (27.52)	-	961 (63.44)	1515
Meghalaya	70 (8.28)	10 (1.21)	772 (90.51)	-	852
Mizoram	712 (58.26)	-	-	520 (41.74)	1233
Nagaland	28 (9.95)	52 (18.01)	207	-	287

Percent values are given inside the parentheses.
Sources: Basic Statistics of North Eastern Region, 2000 – NEC, Shillong.

SHIFTING CULTIVATION AND FOREST FIRE:

Data presented in table 3 shows that 1976.61 thousand hectares of area per year is under jhum cultivation in the hills of north east India which is about 21.86 percent of the total forest area of these hills states (Awasthi, 1975). Number of Tribal families involved in shifting cultivation was about 4.25 lakhs during 1976-77 (NEC, 1982). The NEC has projected that the number of families that will be involved in jhum cultivation will be 4.79 lakhs in 1979-1980, 5.47 lakhs in 1984, 6.76 lakhs in 1994 and 7.66 lakhs by year 2000. Apart form this NEC estimated that about 9.80 lakhs hectare would be developed in in all for regular cultivation to settle all the jhummais by the year 2020, which will be 1.28 hectare of average land holding per tribal family out of the total 27.6 lakh hectare presently available for shifting cultivation and utilization of the balanced area for forestry programs. According to this plan 13.5-lakh hectare will be available for forestry development in the hill states of northeast India. Mitra (1986) also reported that jhum cultivators along with the society as a whole is very much concerned about the hazards of jhum cultivation. They all agree to control and regulate jhum cultivation as they are paying heavy price for deforestation in these states in the form of soil erosion, drought and floods (Arunachal and Maithani, 1994).

TABLE – 3

Forest Area under Shifting Cultivation in North Eastern Hill Region.

States	Area available for Shifting Cultivation (000 ha)	Area sown at one point of time (000 ha)	Tribal Families involved (000 nos)	Area cultivated per tribal family (ha)
Arunachal Pradesh	248.58	92.00	81	1.13
Manipur	100.00	60.00	50	1.20
Meghalaya	416.00	76.00	68	1.12
Mizoram	604.03	61.61	45	1.37
Nagaland	608	73.54	80	0.92

Source: Basic Statistics of North Eastern Region, 2000 – NEC, Shillong.

Another agent responsible for the destruction of forest in these hill areas is fire. After shifting cultivation the cleared forest land is generally abandoned, at this stage the area is susceptible to fire. Forest fire results in water imbalance of plants, which gradually slows down growth of the forest species. Fire leads to premature mortality of plants by damaging their tissues. The consequences of fire ultimately lead to degradation of the wildlife habitat and even become a threat for the species inhabiting a particular habitat (Arunachalam and Maithani, 1994). Degraded forests with growth of grasses are also very much prone to forest fire. Sometimes such forests are artificially set to fire by local population for luxurious growth of green grasses for their cattle (Lalthanzama, 1986).

TRADITIONAL FOREST CONSEVATION SYSTEM:

Sensing the threats from human activities leading to over-exploitation of forest, the tribal communities practice many traditional systems for sustainable production. Some examples of the sustainable traditional methods are, (i) Land and

water management system of Apatani plateau in Arunachal Pradesh, (ii) Bamboo drip irrigation system of the Khasis in Meghalaya, (iii) Ao land use system and agriculture with alder trees (Alnus nepalensis) in abandoned jhum lands in Nagaland, and (iv) terraced rice cultivation in the high hills (Singh, 1998).

AFFORESTATION PROGRAM:

Data presented in table – 4 represents number of seedlings planted by respective State Governments for the last few years. Many afforestation programs are taken up by respective State Governments in the hills of this region. In such programs efforts are made by the respective State Governments to involve the local population. This step is taken in consideration with the strategies laid down for forestry development in these hill states. The concept of social forestry where people's participation in the integral part of its success was established in 1975 and it gained momentum in this part of the country in early 80's. Under this programme-degraded lands, roadside barren lands, bank of rivers, etc. were planted in multipurpose trees (Arunachalam and Palanichamy, 1933). According to National Forest Policy (1980) one of the prime objectives of forest management laid down was conservation of forest through people's participation, particularly in the hilly states of the north-eastern regions. In order to monitor the over all development of forest plantation, the Ministry of Environment and Forests, Government of India instituted a National Board of Afforestation and Ecodevelopment Board in 1983 and the regional headquarters in the North-Eastern Hill University, Shillong.

TABLE – 4

Seedlings Planted by Forest Governments During 1981-2000 in the Hill States North East India.

States	Seedlings planted in lakhs			Targets
	1981-85	1986-90	1991-95	1996-2000
Arunachal Pradesh	58.00	18	53.87	150
Manipur	63.29	69	86.42	100
Mizoram	204	257	300	350
Nagaland	66.12	95	91.80	120

FORESTRY DEVELOPMENT:

The major step in forestry development in this region is the establishment of ICAR Research Complex for North Eastern Hill Region at Shillong (Meghalaya) in 1975 with its prime objectives is to study the shifting cultivation in detail and to suggest various alternatives to replace the age old practice (ICAR, 1983). Much research like hew watershed Based Farming System conducted in the ICAR Research has also revealed the possibilities of managing the land resources at the local level where alternate land uses can be made to behave hydrologically similar to forest land use (Singh, 1998). Setting up of State Forest Research Institute (SFRI), the first of its kind in this region at Itanagar (Arunachal Pradesh) is another step towards forestry development. The SFRI is actively engaged in research projects for forestry development with special reference to conservation of biodiversity.

Another Governmental Agency that is actively engaged in forestry development of North Eastern Hills is the North Eastern Council (NEC). The NEC formulated many development schemes, which are oriented for conservation natural forests, fauna and the promotion of promotion of social forestry programs. NEC has also supplemented and supported many existing governmental developmental schemes like the Tree Improvement Schemes to improve genetically the quality and quantity of the trees. This council has also sponsored many schemes for afforestation of catchments areas of the reservoirs of the hill states where hydro-electricity is generated. NEC also formulated a plan for aerial seeding for afforestation in remote areas. NEC has suggested many techniques for controlling forest fires especially in the hills of this region. It has also planned to start a plant resource center and protect the natural forests and plant resources in the North Eastern Hill region by establishing a tropical botanical garden. NEC also formulated schemes for preservation and multiplication of the orchid resources in the northeastern hill region. NEC initiated many watershed-management projects to encounter jhumming (Lalthanzama, 1986). The significant movement towards development of forestry in the region was during the Sixth Plan period that envisaged ecological security; fuel, fodder and other domestic needs of the population; and the needs of village, small scale and large scale industries' (Burman, 1986). Forestry education was imparted after the establishment of the North Eastern regional Institute of Science & Technology (NERIST) in 1986 to develop manpower to meet the regional requirements. In 1996, the North Eastern biodiversity Research Centre was launched under the aegis of the North Eastern Council at Shillong (Meghalaya. Also, the Supreme Court's ban on logging is another significant progress towards forest protection/conservation. Recently, institute of Bioresearches and Sustainable Development has been established at Imphal to Cater to the research and development requirements with special reference to biological diversity and sustainable development in the region. At the outset, all these institutions working for one mandate (i.e. forest based sustainable development) in the region have to be got networked to accomplish the objectives of the regional planning and conservation with special emphasis on forests and forestry.

CONCLUSION:

The Sixth Schedule Areas of the Indian Constitution recognized corporate rights of the tribal communities over their lands and forest. However, due to differences in view between the Autonomous Districts Councils and the State organization the process of planned development of land uses in the hills of this region is going at very slow pace. The non-existence of record rights has hindered large-scale forestry programs based on massive investment (Burman, 1986). Programs initiated to provide alternatives to shifting cultivation in the hills of the northeastern region is also continuing at a slower rate because of lack of viable alternatives (Arunachalam et al., 2002). It is thus important that the states constitute pragmatic land use policies and implement the same strategically for better land management and also support the growing livelihood requirements of the residents in the region. Further, farmer-led approach may also help in conservation of the biological diversity as well as enrich crop production. This, if done, would balance the region planning for sustainable development with the biological conservation per se.

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