Trends and Patterns of Land utilization with Special Reference to '*De-Facto* Common Property Land Resources' in India: A Regional Analysis

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CHAPTER 1

Introduction

1.1 Introduction

Over many years, significant effort has been made on providing answers as to why some regions produce more than others. To answer such differentiation as why whole region may be more productive than an aggregation and evaluation of their material resource can explain, different perspective have been adopted such as social capital and mutually beneficial collective action(MBCA) perspective at community level, resource base and population dynamics at village and regional level and so on . It is crucial to look at the region broadly through Agro-ecological as well as eco-political lens to gauge the dynamism between resource endowment and its beneficiaries.

Almost every present day nation, developed or developing, had their beginning through interaction with the environment. Though the resource endowed differently but human made it sure to carry on the development of his own through harnessing it. Land apparently become the matter of sustenance as the development took place , activities diversified and abundant land gradually fall short of sustaining livelihood, for some if not for all. Possession of land for economic purposes gained so much value that a trade off in between the land management gained utmost attention. Those who were exposed to these diversified opportunities are keen to get more of it. Who left behind was those to whom the benefit never reached. Conversely, the source of livelihood and possession on environment came in risk. Inequality grew in between the stakeholder and as by the rule, power prevailed over weaker. The land is falling prey to such diversification abundant land became scarce and population multiplied to only to compete for what was left aloof. This gave rise to a negative externality and challenge to sustain the balance between ever increasing demand and supply from the common land . Sea of literature produces enough evidences to confer the fact that poor significantly rely on local resource to substitute their livelihood and income. Over exploitation of local or common property land resources (CPLRs henceforth); community as a whole depends on the Common property resources but its utility is highest amongst the poorest due to the fact that they have lesser means of access to livelihood. Any increase in

the size of the poor class would equally enhance pressure on already scant resource base and hence, leads to deterioration of the resources. Therefore, any reduction in poverty would implicitly diminish dependence on CPRs.

The rationale behind such relationship is that infrastructural arrangements that paves way to income generation and causes mobility among the rural household to non-agricultural sector thereby reducing the pressure on resources. A growing body of recent empirical literature has proved that infrastructural facilities (such as 18 targets of Millennium Development Goals) have positively contributed in reducing poverty. But this is noteworthy to observe as what is happening to the local resource while poverty reduces at snail's pace. More precisely to say whether or not the balance between the resource user and the resource base is maintained? Awfully, this is what seems to have been happening in rural India where resource degradation is much faster leaving a generation gap.

It is well established fact that almost entire community, more or less, depends on natural resources. It is worth considering the fact that, the relevance and utility of common properties are maximum for the poorest and the least income group. Poor people harvest natural resources for their survival or in order to meet their basic needs such as firewood, agricultural productions (such as maize), and water and wild plants for their medicine. All people despite of being poor or rich depend on natural resources; the concern with poor people is that they are utilizing the resources directly. The rich people do depend on these resources but not, in fact, intense users.

Lack of sufficient income causes people to start to use and overuse every resource available to them when their livelihood is at stake. As desperate hunger leads to desperate strategies for survival, resources are used indiscriminately. Still firewood forms one of the most important source of income by selling them, and besides that art & craft products are also used for income generation. The roots of the trees are dug out for medicinal purpose. This leaves the soil exposed as the grasses are also grazed by animals and also collected for roofing the houses. When it rains the entire top and good soil are eroded which makes it difficult for that soil to produce further.

Poor people often lack sufficient income and education to afford higher quality life where they can use electricity and also buy electric appliances to ease their domestic life. Electric and gas stoves are still far from reach to the rural kitchens and smoky firewood dominates it.

Electricity can also slow down the firewood business as most people will no longer be relying on firewood as it takes time to prepare the fire using wood than just switching on the electricity. The Labor Day and time spent in search for fetching firewood could have been put to some better productive activity. The health condition of women is deteriorating and good proportion of income of the household is spent in treatment of respiratory diseases. The lack of education also prohibits them from practicing environmentally sustainable agriculture; protect natural resources against degradation or rehabilitate degraded resources like rivers.

In the poorest regions it is anticipated that one in five children will not survive till the age of five due to environment-related diseases Statistics[1] show that almost four million children are dying each year because of acute respiratory infection linked to indoor and out-door air pollution. Other environment-related diseases killing the children are diarrhoea caused by lack of clean water and sanitation and also cholera, Malaria and Asthma.

In order to foster development and providing platform for the promotion of economic activities, infrastructural development is of utmost significance for any development initiative is forward looking measure with a possibility of fetching benefits. Hardly any doubt exist that such infrastructural development would not auger fertile ground for the development of farm as well as nonfarm activities. But it is imperative to inquire whether or not the benefits are reaching to the bottom liners in the pyramid of income group. As (R. Chand et.al , 2011) states ,it is afraid that the upper strata or the greater income group has powerful influence on accumulating the benefits of such development .The impact could be positive or negative among the small and marginal farmers who constitute the majority(83%) of total farmers.

It is apparent that development is not a radical process rather it is gradual process that culminates over successive stages based on several factor and the socio- economic as well as resource structure of the region. Resource utilization and economic development is a two way linkage that responds as per the status of each other. Whatsoever, more or less, development is bound to take place.

[1] See under the “highlights” in report on millennium development goal ,1999

1.2 Review of literature

1.2.1 Contribution of CPRs to Rural Poor

The wealth of literature available already establishes that common property resources (CPRs) are of great use for the entire community as a whole and mostly for the poor in particular. About the contribution of CPRs in rural economy NS Jodha (1978, 1985a, 1985b, 1986, 1987a,1987c,1988a) , Elliott, H. (1997), Beck, T., Ghosh and G. Madan (2000), Beck, T. and C. Nesmith (2001), P Dasgupta, Maler.K.G, (1994). Bucknall,Krausand, Pillai (2001) , William Cavendish (2000)etc. More importantly, the highlights reflected in the NSSO report no. 452 (54th Round, 1998) broadly categorizes the CPRs and the level of utilization among different rural house hold categories. Among all categories the rural labor and farmers possessing land less than 1.00 hectare draws more than 50% of the fuel wood 20-26 % of fodder from CPRs (TableT11, page 31) [2].But sadly the poors is either getting excluded or is subjected to scant supply due many reasons. “Poor people are being systematically excluded from customary access to CPRs, a key element in their livelihoods, at an alarming rate. The main causes of this exclusion are agricultural intensification, commoditization of CPRs, environmental degradation and population growth. New forms of `community' management of environmental resources, which have been promoted by governments and aid donors over the last 10 years, may add to the exclusion of the poor”. (Beck, T., Ghosh and G. Madan ,2000). More over legal and illegal encroachments of common lands for establishments of schools hospitals, dams, irrigation projects, privatization , military activities etc. are reducing the extent of the CPRs and increasing the pressure, thereby lesser availability of materials per capita . Population growth and structural changes are further adding to the problem of ever diminishing supply of natural resources.

Since CPRs are of greater use for the rural poor, mostly belonging to agrarian background necessitates reforms in the agricultural sector, for it is an important step toward increasing growth rates in the Indian economy and thus reducing poverty sustainably. But many households are not in a position to share in economic growth because of their low asset base

[2] Households having large land tend to spare a part of their land for fodder . Moreover crop residues supplies to the requirement for fuel.(see NS.Jodha, “Common Property Resources and Rural Poor in Dry Regions of India” , Economic and political weekly , 1986 ,p- 1172)

(for example, poor nutrition, low education, and few physical assets). Studies reveal that there is typically little mobility out of extreme poverty, and many households remain poor for generations. Indeed, low human capital status and an inability to build up a minimum physical asset base play a key role in the intergenerational transmission of poverty. (Braun V.J et.al, 2004). Moreover NSS Report No. 496: Some Aspects of Farming, 2003 reveals the fact the 40 % of the small and marginal farmers (who constitutes 83 percent of the total farmer) wishes to quit agriculture because of the nominal profit and high risk inherent in the process of cultivating ,storing and disposing off the produce to the market.

1.2.2 Poverty and Environment Relationship

According to the discussion on poverty and environmental nexus, Poverty is considered as a great influence of environmental degradation. “There is much controversy surrounding the poverty-environmental degradation nexus. The predominant school of thought argues that poverty is a major cause of environmental degradation and if policy makers want to address the environmental issues, then they must first address the poverty problem.”(Duraiappah, 1996). Poverty and environmental degradation are closely linked, often in a self perpetuating negative spiral in which poverty accelerates environmental degradation and degradation results in or exacerbates poverty. They also recognize the poverty as most serious threat in low income developing countries and suggest eradicating poverty via accelerating the agricultural intensification (Anderson and pandava-lorch, 1995) in many regions of the world, regional overgrazing has resulted in destruction of grazing lands, forest and soil. Air and water have been degraded. The carrying capacity of the natural environment has been reduced. As the people become poorer, they destroy the resources faster. (Mennonite, 1990.) Almost majority of the scholars agree to the fact that judicious access to the natural resource base and enhancing the productivity of poor people natural resource asset is important to make the natural resource amicable to sustain the prolonged supply of essential support to livelihood (Sara J. Scherr, 2000,) if this is not checked poor will continue to overuse the natural resources to substitute their food as well as income, they start to depend more on natural resources. In this course of sustaining livelihood giving thought about conservancy falls back. “When people living in poverty are asked to identify their priorities, care for the environment or the needs for sustainable development are rarely at the top of their lists.

Housing, feeding and clothing the family, education for their children and care in their old age are much more significant concerns. Both production (or employment) and consumption patterns are determined more by these basic needs than by any consideration of their longer term impact."(Klien and Khan, 2001)

A wealth of recent literature, however, indicates that these relationships are far more complex, and often mediated through such macro- and micro-level factors as policy measures, markets and prices, local institutional arrangements, gender relations, land distribution and tenure, and entitlements to natural resources (Leach and Mearns 1991; Roe 1998; Ekbom and Bojo 1999). Moreover the specific ways in which poor people depend on natural resources and are affected by environmental changes is not universal, but country- and region-specific. Any simple conclusion or easy synthesis of these relationships is further confounded by the quantity of evidence and counter-evidence favoring or undercutting different hypotheses. (Bucknall ,et.al. ,2001) therefore instead of seeing the likely impact of poverty on environment and vice versa, in either black or white , it's rather wise to look at the regional differentiation based on the available socio –economic consideration. .

1.2.3 Agricultural Growth and Its Effect on Common Property Land Resources

During the 1960s and 1970s there was an intense debate on the observed inverse relationship between farm size and per hectare agricultural productivity in India. It is found that over the years area irrigated and the inputs used are higher in small and marginal farm holdings. Despite a strong advantage in land productivity and much

Better production performance, smallholders earn an awfully low amount of income from agriculture on a per capita basis primarily due to very adverse land-man ratio (Table 9) R. (Chand et al, 2011) [3].Over years wage rates are being raised but employment opportunity still lag to keep the pace with population increase. To reduce such adverse man land ratio there is a pressing need to mobilize the people out of agriculture. Apart from Institutional arrangements, any support to physical infrastructure can prosper the prospects for further productivity enhancement. For eg. In the NSS Report No.496 (2003) It's only the organic manure that is available within the village and for most of the inputs (such as fertilizers,

[33] R.Chand et.al , "Farm Size and Productivity: Understanding the Strengths of Smallholders and Improving Their Livelihoods", EPW, July 2011, See page no- 9

pesticides veterinary services, HYV seeds etc) they have to travel up to 10-20 km on an average [4] – for an enclosed village with poor infrastructure the impact is even deeper which can be traced in minute measures of improving the productivity such as how often farmers replaces seed varieties. The low percentage of such input users can also be increased using with the help of proper approach road and connecting roads. This will not only enhance the greater input usage with higher percentage of farmer but could also assist in market developments.

Chopra and Dasgupta (2002) elaborate a close linkage between different aspects of infrastructural development, common pool resources and poverty. They establishes the close complementarily and substitutionality of common resources. The outputs from common resources intrinsically contribute as input for the survival strategy of the rural poor and agricultural development. With the help primary data they have represented the relationship between poverty instances and size and availability of common property resource across different states in various Agro Climatic zones.

Right from the beginning of the planning periods, impetus has been directed towards improvement of the agricultural sector. Different phases of development took place to make the country self sufficient in food grain production to an exporter. But still majority of the population engaged in agriculture and are mostly poor because of small and marginal farm size as discussed previously. In subsequent planning process Emphasis has been on increasing the per hectare productivity of important agri-horti crops in a partnership mode by addressing the issue of non-availability of seed (crops, animal and fishes) and planting materials, amelioration of problematic and degraded soils, cultivating at least 30% of low altitude area under double cropping, increasing irrigation potential, in situ farm input generation, agri-mechanization etc. For achieving the desired growth rate in agriculture, development of infrastructure is absolutely essential like processing units, storage godowns, quality control and value addition units, rural connectivity, information centers and market linkages as well as facilitating the production of high-value low-volume crops including

[4] See figure no.7 page 17 of the *NSS Report No.496: Some Aspects of Farming, 2003*

round the year production of ornamental fish and flowers for eradication of poverty and providing improved livelihood options for farmers.(Panjab Singh,2007) [5]

Though the overall growth in agriculture sector had been encouraging, the signs of Productivity deceleration had started emerging since 90s onwards. It is important to note that the growth during recent past as well as during the last three decades has been attributed to the high cost of farm inputs driven by new agro-technologies. Thereafter, the impact of technology appears to have been less effective. The markets have also not supported creation of a proper incentive environment for the growth in agriculture[6] rise in private expenditure and decline public investment in capital formation envisage spread of modern technology to wider areas increasing cropping intensity, crop diversification, increased use of technology enhancing input use driven by market forces and policy support. Input based crop production and protection system did not yield expected proportionate increase in production (now a well known yield stagnation phenomenon)[7]. The higher input cost keep the most needy aloof to share the benefit[8]. This may have an implication over poverty which in turn could increase the dependency on common property resources. On the other hand, monoculture consequent to specialization and technology, mechanization, the improved crop varieties and the development agrochemicals to fertilize crops and control weeds and pests. Sectored Infrastructural development (such as research extension, storage and warehousing, transport, markets) also boosting for the industrialization of agriculture). Since there is a greater application of such inputs in small farms, there is also an apprehension that the yield stagnation point is not so far. Few scholars have already noticed the diminishing trend in the yield of some principal crops. If this happens then the marginal farmers would get the hardest hit as there is no other way to increase the productivity[9].This trend can have further push the affected to depend on the CPRs. Therefore. A vicious circle is formed where in the landless rural laborers', at first and consequently small and marginal farmers are trapped.

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[5] Chairman for the working group on "Agro-climatic Zonal Planning including Agricultural Development in North Eastern India" was constituted vide the Planning Commission letter No. 11016/4/2005-PC dated 24/01/2006 in the context of formulating Eleventh Five Year Plan (2007-2012), volume 1, Main Report. PP-5-7

[6] See For the current status of agricultural development ,pp11

[7] For agro climatic region specific decline see page 13 .

[8] For the widening gap between the demand and supply of food grains see table 1

[9] Though bio technology boom has made it possible to further intensify the agricultural production , by equipping the crop with 'insecticidal genes' which could cut the amount of pesticides to be used . But the major constraint is environmental inappropriation and relatively costlier input application benefitting mostly in commercial agriculture and cash crops which not most of the farmer's business.

1.2.4 Infrastructural Growth Poverty

In order to assess the inter-regional disparity several works have been done which gives almost similar trend of anomalies in differential development. In a study Anil Rai et al. (2008) a livelihood index has been developed for different agro-climatic zones of India based on the secondary data for TE 2003. Six different sub-indices obtained are indicators of Infrastructure Status, Agricultural Status, Nutritional Status, Economic Status, Health and Sanitation Status and Food Availability Status in respective zones. A total of 57 variables have been considered for this study. Finally, a composite integrated livelihood index has been developed which indicates the livelihood status of different agro-climatic zones in the country. Also, 103 districts of low agricultural productivity have been identified within low livelihood regions. The results of this study have been compared with those of backward districts identified under Wage Employment Program by the Task Force of Planning Commission of India. It is found that about 60 per cent districts identified in this study are the same as identified by the Task Force. Further, the spatial distributions of the identified districts under the study have been mapped using GIS maps and it has been observed that almost same region of the country has been found to be most backward in both the studies. The study has revealed regional disparity in the development process. Though the same indicators have been taken up for the infrastructure as well as agricultural development, but the level of livelihood is differentiated.

Since different region have differential resource endowments with varying degree of potential to harness growth and income generation, there is a need for understanding the developmental programs on area specific lines. D.N.Basu and G.S. Guha (1996) have extensively recognized the importance of Agro-climatic regional planning in India according to whom the Agro climatic regional planning (ACRP) project is an explicit recognition of concern for social and intergenerational equity in resource use. Through quoting the Bhalla (1989) “The ACRP brought to light, for the first time, the interface between technology based growth and natural resource endowments by examining the growth performance from a perspective of agro-climatic regions delineated by planning commission in 1988” . This regionalization originally targeted to orient the programme of agriculture and rural development on area specific lines. This program not only attempts to bring optimality in

resource utilization but also tends to address many issues such as to reconcile Top down and bottom up approach, brings in the dimensions of technology and sustainability as integral to resource based planning. Altogether ACRP can be seen as a holistic approach combining area based planning against sectoral or schematic approach. CRP brings in the dimension of sustainability and technology as integral to resource base planning. Technology is a means of utilization of natural resource endowments within the constraints of finance, institutions and social imperatives. In another sense, technology lends an element of dynamism in the changing and more efficient use of land and water resources. Sustainability may be seen as subset of this approach. The logical corollary of this would imply that in the ultimate analysis ACRP approach seeks to achieve the best tradeoff between maximization of productive efficiency of given resource endowments through use of appropriate technology and institutions and long term sustainability of such resource use both in sense of maintaining intergenerational and social equity in the access to resources (page 30, Agro climatic regional planning in India Vol. 1). D.N.Basu and G.S. Guha (1996)

Braun et.al(2005)[10] while highlighting strategic issues and reform options for sustainable solutions for ending hunger and poverty, prominently focuses onto Promote pro-poor rural and agricultural development by increasing investments in rural infrastructure and agricultural research and Development (R&D).

As per the discussion on Income /Growth and environment, literature presents multifaceted aspects. A vigorous public debate has arisen between individuals who maintain that environmental degradation is a necessary outcome of economic growth and those who believe that economic growth and environmental quality go hand in hand. This debate was highlighted at the 1992 United Nations Conference on Environment and Development in Rio de Janeiro J.M. Antle and G.Heidebrink (1995) highlights the divergent views that growth and development are inherently damaging to the environment whereas the pro-growth view proposes, that economic growth and a concomitant increase in per capita incomes are the key factors in protecting the environment. Income was first developed as a way of measuring welfare and well being by Pigou (Human Development Report 1990: p 104) income is collectively seen as primary means to attain all other choices for well being.

[10] "Indian Agriculture and Rural Development Strategic Issues and Reform Option" A Strategy Paper Prepared by IFPRI's Senior Management Team for Consideration by the Policymakers of the Government of India

But in the same report it is also reflected that relatively higher per capita income does not necessarily determine the other aspect of well being such as literacy, life expectancy, infant mortality etc. besides this by and large income is deemed to be crucial parameter to exhibit basic objective of development that promises to create an enabling environment for people to enjoy long, healthy and creative lives. Income generation is the function of production function itself where resourcefulness and the efficiency are determinant factors. Resourcefulness of a region is viable only if appropriate mechanism is developed to harness the potential benefits. Infrastructure is a key which not only channelize the resources towards income generation but also ensures sustainability of the resource utilization.

Kuznets (1965, 1966) showed that during the various economic development stages, income disparities first rise and then begins to fall. The environmental Kuznets curve (hereafter EKC) hypothesis proposes that there is an inverted U-shape relation between environmental degradation and per-capita income. Environmental damage seems to be lower in the most developed countries compared to many middle-income countries and higher in many middle-income countries compared to less developed countries. It is worth mentioning that an alternative form of the EKC hypothesis suggests that environmental degradation as a function of income is not a stable relationship but may depend on the level of income. This is because in this alternative form, there may exist one relationship for poor and another for rich countries. On the aggregate this would give an inverted U-like curve. George E. Halkos() concluded that “even if Kuznets curve do exist, their parameters are so extremely heterogeneous across countries that an aggregate summarization is not very useful at all. V. Ruttan (1971) hypothesized that "in relatively high-income economies the income elasticity of demand for commodities and services related to sustenance is low and declines as income continues to rise, while the income elasticity of demand for more effective disposal of residuals and for environmental amenities is high and continues to rise. This is in sharp contrast to the situation in poor countries where the income elasticity of demand is high for sustenance and low for environmental amenities[11].

The environmental transition hypothesis states that economic growth is likely to be accompanied by environmental degradation at low income levels. However, as income grows, the accompanying increase in the demand for environmental protection is

[11] V. W. Ruttan, "Technology and the Environment," American Journal of Agricultural Economics 53 (1971):7 07-17,

hypothesized to bring about a development path characterized by both economic growth and environmental quality improvement (Environment and Development: Theory and International Evidence, (J.M. Antle and G.Heidebrink).

Theodore Panayotou (2001) seeks to answer the question as "What is the relationship between a steady increase in incomes and environmental quality? Are there trade-offs between the goals of achieving high and sustainable rates of economic growth and attaining high standards of environmental quality? For some social and physical scientists such as Georgescu Roegen and Meadows et al., growing economic activity (production and consumption) requires larger inputs of energy and material, and generates larger quantities of waste by-products. Increased extraction of natural resources, accumulation of waste and concentration of pollutants will therefore overwhelm the carrying capacity of the biosphere and result in the degradation of environmental quality and a decline in human welfare, despite rising incomes (H daly 1971). W Beckerman ,B Barlet etc – more or less holds the Anti growth perspective . Whereas many also argue neutrally as growth may or may not bring the resource degradation due to variation in demands consequent to infrastructural development. In predominately agricultural region, as agriculture and resource extraction intensifies and industrialization takes off, both resource depletion and waste generation accelerates . Which at later stage due to structural change and efficient usage of infrastructure levels off and a steady decline of environmental degradation. (T. Panayotou ,1993) with the help of a cross table reflecting the empirical evidence of EKC by different scholars Such as Shafik and Bandyopadhayay (1992) Hettige, Lucas and Wheeler(1993) ,Panayotou (1993) Grossman and Krueger(1993) , Shafik 1994) Selden and Song (1994) shows the relationship between per capita income with various indicators of environmental elements such as clean water , forest area , sanitation, carbon emission etc. [12]

Fan, Hazell and Thorat(2000) based on the state level data for 1970-93 ,examined different type of government spending on infrastructure and its outcome on poverty reduction .the result shows that in order to reduce rural poverty , some specific infrastructure has to be prioritized ,particularly rural roads and research and development . The represented that the investments on infrastructure has inverse relation with the incidence of poverty 13

[12] Pp-65

[13] See table 1 and table 4 "Government Spending , Growth and Poverty in Rural India"American Journal of Agricultural Economics, vol82,no.4,2000,pp- 1039& 1049

Zhang and Fan (2004) confirmed the causality test of the positive effect of infrastructural development on the total Factor Productivity. The causal effect of Roads and Irrigation contribute to the TFP growth and the demand effect of total factor productivity is less noticeable than on irrigation.

The institutional framework has long been felt in order to bring about the efficiency in resource utilization. This framework essentially reflects in the policy prescription for effectiveness in management and execution of target programs. Community participation and collective action principle have positive effect over resource utilization and management but still far from being realized for its own inherent complexities and proper mechanism. The gap between Population increase and human capital formation is widening. Efforts being channelized towards better mechanism to safe guard the resources, rural infrastructural development have always been an over arching principle for the development. Growth initiatives must, therefore, be incorporated keeping the environmental aspect and poverty in the priority list.

1.2.5 Development of irrigational facilities and its effect of CPRs (dependence Levels on CPLRs)

K. Kiran Kumar, Lele.S and Shivashankar.P (2002) hypothesized that in villages with large amount of cultivated area under canal irrigation, an increase in the number of crops and the area cultivated would substantially increase the availability of crop residues that could be used as fodder and fuelwood by the villagers. Consequently, the dependence on common lands for these products would be expected to reduce substantially. They concluded based on the field survey in villages in Karnataka that in the case of grazing, the decline in dependence on common lands is clearly the outcome of irrigation, which has dramatically increased fodder and grazing material availability from agricultural lands. Definitely, benefits derived from the higher Productivity and crop diversificationare reaching to the farmers owing large holdings. Small and marginal farmers only tend to be in loss due to this decline. However, evidence from micro studies shows that the richer cultivator households sometimes get higher benefits from common pool resources due to complementarity between agricultural private property assets and the capability to use common pool resources. Other researchers also point out that privatisation of common pool resources tends to redistribute land in favour of the richer households (Chopra and Dasgupta, 2002).

Though the decline of common land can be attributed to many factors such as mentioned by Jodha (1986)[14].

1.2.6 Other ways of Pressure on CPRs

In most of the villages, cultivation tends to encroach the common land for there is lack of supervision of common property lands away from villages. “Encroachment, the illegal occupation and cultivation of common land, occurs throughout many less-developed countries. Much of this encroachment has been at the boundaries of common and private land: Farmers with private land adjacent to the common land encroach by gradually moving the boundary marker, incorporating the common land into their own holdings, and farming it as their own to the exclusion of others” Robinson E.J.Z (2004) . In a Gujarat based case study by rural areas, Iyenger.S (1989) highlights different forms of encroachment to cultivation and other purposes. He found that there are in certain type of villages 15where encroachment takes place. In some villages it is as high as 40% of the total De-Jure CPLR.

About the change in the forest cover different scholar hold different views, some has linked Economic growth with the forest growth. Foster.D.A and Rosenzweig(2003)[16] try to hypothesize “that increases in the demand for forest products associated with income and population growth lead to forest growth” using the 29 year period of rural India at village level. They found a clear significant positive relationship between changes in income and changes in forest area. Apart from this Government forest policies are committed towards increasing the Area under forest. In hilly and tribal region, existence of JFM may also contribute towards increase in the forest cover. Decline might take place due to legal occupation of land.

1.3 Statement of the problem

Nearly 80% of total farmers belong to small and marginal category and are eventually poor. If poverty is the sole cause for the overexploitation and degradation of resources then reduction in poverty supposedly improve the resource base. But reverse is the ground reality

[14] Jodha N.S, 1986,“Common Property Resources and Rural Poor in Dry Regions of India” Economic and Political Weekly, Vol. 21, No. 27 Page 1178 , under the heading “ Decline of CPRs 1986

[15] Marked as second type of villages in the article , where the prospect for agriculture are apparently good, but the present status is not very promising. Irrigation facilities are limited and have improved only marginally. The area available under CPR land is reasonably high and ranges between 9.6 to 72.9 per cent of the total geographical area.

[16] Foster.D.A and Rosenzweig, “Economic Growth and the Rise of Forests” The Quarterly Journal of Economics, Vol. 118, No. 2 (2003), pp. 601-637.

where in incidence of marginalization of cultivators and landlessness is in increasing trend and means to their livelihood is reducing in multidimensional ways. Over the last five decades productivity augmenting strategy, have greatly relied on technology which has also been responsible for the degradation of resources. Over the recent past years, it has been observed that public investment in Gross capital formation has declined drastically and private investment, on the other hand, is on the rising trend. This implies that individual farmers are investing on their own. Well off farmers can manage with the cash crop and profitable crop enterprises which also demands good deal of investment but the marginal and small farmers get the hardest hit for such a recession in the investment.

Over enthusiasm for promoting agricultural productivity has led to exhaustion of resources and diversification of agriculture, which is more oriented towards monoculture or industrialization in a narrow sense. If such program is supposed to bring the desired results then there may be a reduction in poverty which should have a positive impact on level of utilization of resource base but advanced technological adoption could or could not show a positive outcome. Even though the infrastructural development graph tend to rise up, the flow of benefit seldom reaches to the bottom liners in the pyramid of income group (mostly the small and marginal farmers which forms the majority of farmers group)

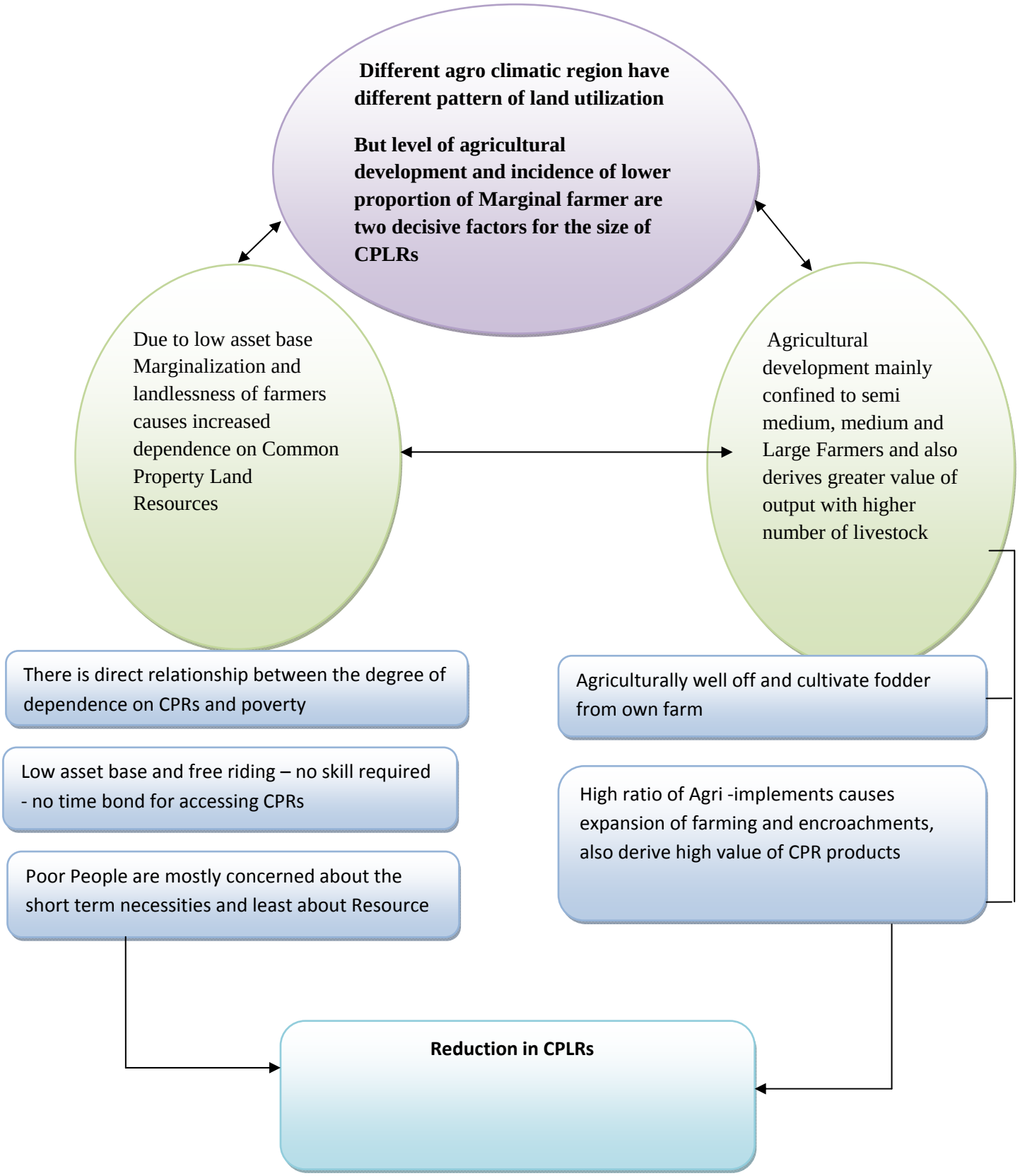
There is a sea change in the dietary patterns of the newly emerged middle income group. In this “farm to fork” affair Larger farmers having advantage of ripening the benefit of such changed diet pattern whereas small and marginal farmers still have to struggle with subsistence nature of farming to sustain their livelihood. Government policies and the incentives so designed to revitalize agricultural sector hardly reaches the real beneficiaries and is confined to upper reaches of rural producers mostly engaged in agriculture[17]. A “farm to fork” development strategy still far to be incorporated in it the objective of realizing the maximum benefit to small-holding farmers and rural communities from agriculture sector.

[17] Heath and Binswinger(1999) study of Colombia suggests that rather than poverty or population growth , it is government policies that have had adverse effect of promoting natural resource degradation . They argue that despite the recent introduction of a more participatory land reform in the country ,agricultural policy (including credit policy and subsidies for specific crops and fertilizer) still supports large farmer rather than labor intensive family farms . J.C Braun, Gulati , Hazell (IFPRI, 2005) argues about the inefficient creation of assets . In their words “high costs associated with managing the creation of assets through public works programs absorb scarce resources, and the resulting projects are often of low quality or never benefit the poor. The economic inefficiencies associated with financing these safety net and public works programs can also be substantial, as is the case with food grain support prices that distort production incentives. These different safety net programs are often poorly integrated, with some households receiving benefits from a number of sources and other poor households being completely excluded”

Agriculture to industry linkage in the country is still in its infancy “It is an irony of the sustainable development process that energy efficiency programs or collective, self help initiatives, such as food co-operatives (box schemes) and credit unions, which were initially developed in response to the needs of poorer communities are increasingly being adopted by the more advantaged to enhance their own lifestyle” (Killen and Khan, 2001).

Since different regions have varying degree of resource endowment and priorities do differ, a similar treatment of sectoral or schematic approach towards infrastructural developments could foster varying outcomes. The externalities of such strategy and planning can be analyzed through comparing the developments in infrastructure and levels of exploitation of resources. A cross regional assessment could serve a vital ground to scrutinize the basic infrastructural developments and it’s linkages with the actual level of utilization of resources. If such development realizes the target to mobilize rural people to activities other than the agriculture and allied activities. Since intergenerational equity and sustainability tops the list of priority of recent development initiatives, it is very much required to observe the trend of outcomes so that a holistic approach combining area based planning,as against sectoral or schematic approach, could be devised so that marginal and small farmers could be protected from being pushed out of right to life with dignity.

1.4 Conceptual framework



1.5 Research question

Whether or not Agricultural infrastructure reduces area under common Property Land Resources.

1.6 Objective

- To trace the changes occurring in Land utilization patterns across the states and Agro Climatic Zones.
- To highlight the inter-regional disparity in agricultural and rural infrastructural development.
- To categorize regions based on pressure on CPRs and to reflect anomalies in development differentials.

1.7 Hypothesis

- Marginalization of farmers and landlessness adversely affect the recourse base and causes shrinkage in the area under Common property Resources (viz. permanent Pasture &Grazing Land)
- Infrastructural development augers avenues for further development and asset creation enable extension in Agricultural area.

1.8 Data Source

Land Utilization data has been taken from compiled from

Indian Agricultural Statistics, Vol -I, 53 for 1971-72, Vol-I, Issue 56th. (For 1981-82)

www.dacnet.nic.in/eands (for 1991-92 and 2001-02),

Directorate of Economics & Statistics, Ministry of Agriculture, Govt. of India

www.agricoop.nic.in

www.indianagrisata.com

Data for Agricultural Implements, Fertilizer, Annual Rainfall, and Operational Holding and Livestock – ICRISAT Website (compiled from Different sources)

Website – www.icrisat.org/vls-mip/vls_

1.9 Methodology

In order to show the Trends and Patterns of land utilization, time series data following formula and methods has been used

1. Simple growth Rate

= (Ending year/Previous Year)*100

2. Compound Annual Growth Rate

= (((Ending Year –Starting Year) ^ (1-9))*100 (for a gap of 10 years)

3. Decadal Growth

= (starting Year- Previous Year) /previous year*10

4. 'Percentages' to show the particular land class of Total Reporting Area.

5. Correlation and Scatter Plot Diagram.

Ordinary Least Square Model of Regression:

In the same chapter to establish the relationship between Common Property Land Resources and Other factors related with the agricultural infrastructure Ordinary Least Square Model of regression has been used. In this model cross-sectional data has been used, in which all the variables (dependent variable and independent variable) for three points of time (1971-72, 1981-82 and 1991-92)

With the Help of Correlation Matrix correlation between the selected variable were checked. After observing the correlation the significant variables were selected for the cause and effect test.

In the first model CPLR has been taken as dependent Variable and Livestock, Tractor, Electric Pumpset, Diesel Pumpset, and power Tiller were tested. In the 2nd Model, Livestock, Tractor, Electric Pump set, Diesel Pump set, and power Tiller, annual rainfall and Number of Marginal Labour are taken as explanatory variables.

In the second set of Regression Dependent Variable remains as CPLR where as independent variables taken are Cropping Intensity, Irrigation Intensity and Fertilizer intensity

Where, DIESEL_PS stands for Diesel Pump sets

ELECTRIC_PS- Electric Pump set

POWER_T Stands for Power Tiller

TRACTOR Stands for Tractors

LIVESTOCK_T Stands for Livestock

ANNUALRF Stands for Annual Rainfall

MAR_TO TOAL Stands for Marginal Farmers

For Processing the Data SPSS version 17 have been used.

Cartographic Methods**:** Cartographical methods like Bar-diagrams and Choropleth are used. For making the map tool used is Arc Gis 10.

1.10 Organization of the study

First chapter acquaints with the objective, methodology and data source along with the explored literature to derive the objectives.

Second chapter gives a broader picture about the change taken place during the last 40 years (between 1968-69 to 1998-99) the change has been interpreted at National Level and the National Aggregates has be taken as the threshold for the comparative analysis at state level. State Level Analysis has been done through cross tabulation and has been plotted on Maps and Graphs to get the quick visual effect. Descriptive Analysis has been given along with the respective table and Graphs. Third Chapter is the extension of the second chapter that shows land utilization trends and patterns at District Level which is then aggregated to Agro-Climatic Region to generalize the pattern of change.

Fourth chapter seeks to identify the determinants of change in the CPLR. For this purpose data of equal time interval is used ranging from 1971-72 to 1991-92. Fifth also the last chapter brings the conclusion and summary of all the chapters .

Chapter 2

Trends and Patterns of Land utilization and likely changes in de-facto CPLR

2.1 Introduction

The role of CPRs as substitute to livelihood of rural people is no more in question. Increasing demand for more livelihood option due to Increase in population (at higher rate in rural area) necessitates innovating and device better method to cope with such increasing need. Such innovation and improved methods have largely opened avenues for enhanced production horizon my overcoming the physical as well as institutional impediments. The growth trajectory, however, leads to the goal but with some negative externalities inherent in the process. Since CPRs and all other sources of natural resources have always been a way to substitute the livelihood of bottom liners in the income group, negative impact of any reduction in the stock of resources could alone be managed if the proportion of poor, who depends largely on these resources, is equally reduced. But unfortunately, contrary to it some micro level findings by some scholars like Jodha and others reveal that CPRs are decreasing. Similarly NSSO findings summarizes that out of total 4939 cases of use of CPR and forest land recorded in the survey , 33 inconsistent cases found in the data where area diminished was recorded but code for 'whether diminished' was not appropriate. All 33 entries were edited as 'CPR land was larger 5 years ago'[18].

Irrespective of the micro level changes in the CPRs (that ultimately fall under different land use categories) can be inferred with land use changes. It is imperative to look at the holistic scenario over considerable period of time at national as well as sub national level. The utilization of land in a region or a particular area depends largely on its physical, cultural and economic environments. In other words, it is governed by such factors as configuration of land, amount and other distribution of rainfall, fertility of soil, density of population and dietary habits of the people, number and types of draught and domestic animals, agricultural practices followed, stage of industrial development, transport facilities and the demand for its produce. Since most of these factors are dynamic, there is a corresponding change in land

[18] See Annexure III, Report No. 452: Common Property Resources in India, Jan - June 1998, NSS 54th Round, A- 267

utilization. Land use decisions are based on opportunities and constraints affected by both biophysical and socio-economic drivers. Predicting future land use change requires methodologies that integrate understanding of the processes affected by these drivers. A close look into the trends of land use accompanies certain assumptions, such as

- Since the geographical area is finite any increase or decrease in certain category of land use will be compensated by the other category.
- Due to continuous increase in human and livestock Population the requirement for material resource has increased manifold that necessitates judicious and sustainable adjustment
- Advancement of technology and improvement in the agricultural practices and institutional mechanism tends to widen the horizon for production which opens avenues to incorporate more land. Recognizing patterns of change can provide insight for future outcomes.

2.2 De facto and De jure Approach of CPLRs

The issue of identification and estimation of resources, to be called as Common property, has been taken up as the matter of further research. N.S. Jodha (1986) defines common property resources (CPRs) as the "community's natural resources where every member has access and usage facility with specified obligations, without anybody having exclusive property rights over them." This notion has widely gained popularity and acceptance, however, inconsistency exists between the structural and functional aspects. Structurally, CPRs are mostly defined to be owned by community having no exclusive property rights or individual ownership vested to it. Different scholars have defined commons differently. The term "common property resources" is defined in the literature as "private property for a group". However, functionally resources are used by the community beyond the ambit of so called CPRs. The community shares resources which are not seen as 'belonging' to any specific entity or body. It subsumes the existence of property regimes or organizational systems circumscribing the nature of rights and responsibilities existing within the group with respect to the resources. The organizational rules could be supported either by legal or conventional authority. However, in common parlance common property resources are often viewed as a category on which ambiguous rights exist. This misspecification of open access

as common property is mainly due to the varying degree of access that now exists on common property as a consequence of the breakdown of the organizational systems associated with them. In such a situation it is appropriate to distinguish between "common pool resources" which are subject to different degrees of access and "common property resources" which have well specified property regimes. Before Estimating the extent of CPR's, it is necessary to identify as which area to be included under CPRs.

This is not to suggest that only two dichotomous (public and private) systems exist but that social groups have defined their relationship with the natural word in numerous ways, many of which do not rest on the notion of private property. In few micro level studies, the actual area based, on the information collected from individual approach, comes out to be greater than that of secondary sources. For e.g. Pasha (1992) estimated the area under CPLRs to be 36% on an average for diverse agro climatic zone across Karnataka which has been reported under NSSO at 2.90%. Similarly Singh et.al (1996) estimated it as 34% for a given specific region. This dichotomy originated out of usufructuary rights which forged ground for distinctive approaches to evaluate common property resources, as a matter of fact, de jure and de facto approaches is begin used for further research.

Keeping the variety of conceptual approaches and their implications in mind, two distinctive approaches were adopted for collection of data on CPRs during the survey conducted by NSSO accomplished in 54th round (report number 452) First, called de jure approach, was used for collection of data on the size of CPRs. In this approach, only those resources were treated as CPRs which were within the boundary of the village and were formally (i.e. by legal sanction or official assignment) held by the village panchayat or a community of the village. The second approach, called de facto approach, was adopted for collecting information on use of CPRs. In this approach, the coverage of CPRs was extended to include resources like revenue land not assigned to panchayat or a community of the village, forest land, or even private land in use of the community by convention. The common use of private property may be confined to particular seasons as in the cases where cultivated land are used for grazing between crops, fields submerged during monsoon are used for fishing etc. All such land which are in practice used as common resources were treated as CPRs due to benefits accruing to villagers from the CPRs even if they were located outside the boundary of the village. (Report No. 452: Common Property Resources in India, Jan - June

1998, NSS 54th Round,, Page 8, concepts and definitions) The data on area of common property land resources were collected following de jure and de facto approaches and were recorded separately in the village schedule. The estimates of common property land resources presented in the report are based on the data of area collected using the de jure approach (page 16, summary and findings) and compiled in Table T1 which gives the estimates on availability of common property land resources obtained using de jure approach from the survey. Common property land resources, as per this approach, include the categories of land like community pasture and grazing grounds, village forests and woodlots and village sites, on which the villagers have legal usufructuary rights. In an overall estimation of CPLRs NSSO estimated the contribution of Community pasture land at 23%, village forest and woodlots at 16% and other categories at 61%. These also include all other land formerly held by the community or the Panchayats even when it is given or leased to some organization. The restrictive definition of CPRs in the de jure approach excludes all Government forests and revenue land which in practice may actually be used as common property. Government forests, i.e. land under the jurisdiction of the Forest Department, and land put to nonagricultural uses (except the land under water bodies) were excluded from the coverage of common village land in de jure approach.

The propose of this paper is to seek to scrutinize the proportion of CPLRs to total Geographical area and trend and patterns of changes taking place over the period of 40 years (1968-69to 2008-09) and the present status of the same. This is done through incorporating the Nine fold classification[19]and regrouping them based on the approaches adopted by NSSO and suggested by few scholars such as Jodha (1985) Singh(1994) etc. Thus De facto CPR land has been derived by summing up the appropriate classes out of the nine fold classification and relating it with the change in other classes.

2.3 Categories of CPLRs: integrated with land use classification system

According to Jodha (1985) in dry areas of Rajasthan, the village-level common property resources include:

- Community grazing lands, including permanent pastures, uncultivable and cultivable wastelands, and fallow lands contributing to the grazing area of the village.

[19]This nine fold classification has been recommended by the Technical Committee on Co-ordination of Agricultural Statistics, set up in 1948 by the Ministry of Food & Agriculture.

- Village forests and woodlands, including Orans (forests protected on religious grounds) Private croplands available for public grazing after harvest of crops.
- Community threshing and waste-dumping grounds
- Community ponds and animal watering points
- Migration routes and facilities
- Community facilities for stock breeding.

In more specific terms, similar classification has been done by NSSO for its household level survey in Rural India. Common land has been categorized based on the Information collected on area of CPR land (both de jure and de facto lands) of four different types and summed up to derive CPLRs[20].

(i) grazing/pasture land
(ii) Village forest and woodlot (not under Forest/Revenue Dept.) and van panchayat forest
(iii) Village site and threshing floors
(iv) Other barren or waste land not owned by any individual

Chopra et al. (1990), Attempt to measure the extent of the commons .They used a nine-fold land use classification data to estimate the total area of CPRs. They suggested that 'other than current fallow', 'cultivable waste', 'pastures', and 'protected and unclassed forests' can be broadly categorized as CPRs. Based on this classification, they concluded that 21.55 per cent of all land in India (1980–81 figures) were CPRs with the rider that this estimate might be slightly high given the fact that not all protected forests are CPRs. In fact, however, if definitions of CPRs are bind to de jure and de facto distinctions, the extent of CPRs might be much higher.

In the Indian context, it is important to note that public land such as the degraded revenue land owned by the State Revenue Departments and degraded forest land owned by the State Forest Departments are also de facto CPRS in the sense that they are accessible to and used in common by the villagers in whose (village) jurisdiction they lie (Singh 1994).

[20] See Annexure III, *Report No. 452: Common Property Resources in India, Jan - June 1998, NSS 54th Round,pp-A228*

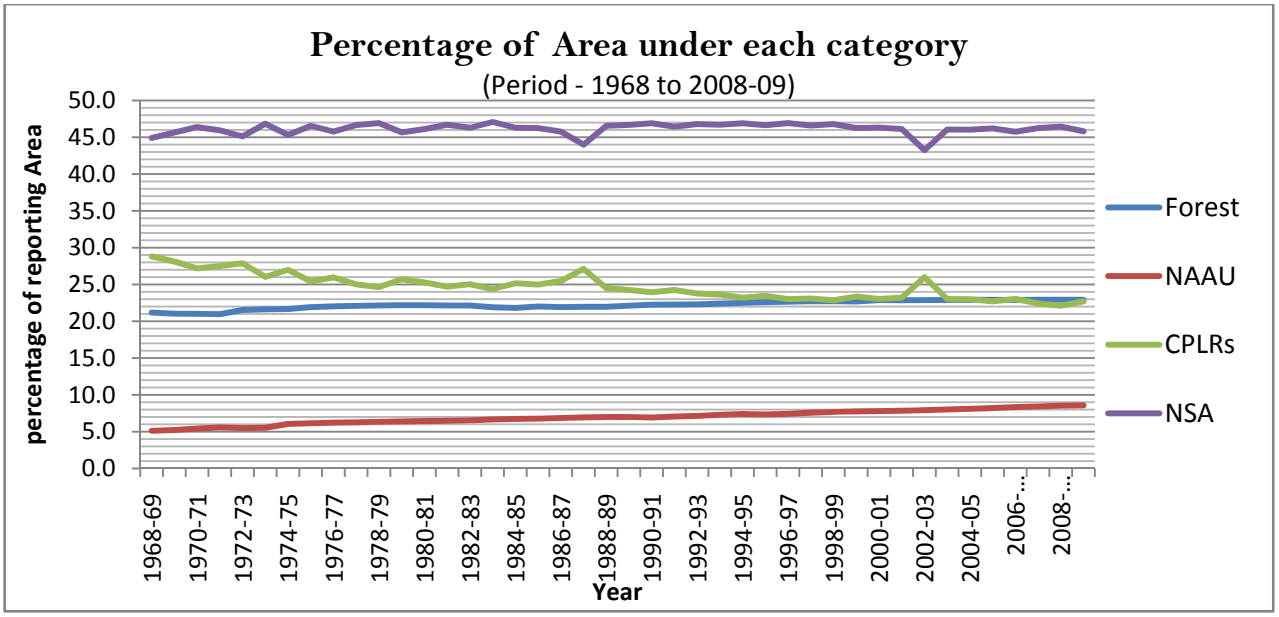
In almost all parts of India today, villagers have extensive legal right of access only on some specific categories of land like `pasture and grazing lands' and 'village forests', which are directly under the jurisdiction of the village or village panchayat. Strictly speaking all other categories of land not under private ownership such as barren or uncultivable land, waste land, land put to non-agricultural uses and forests, belong to the state revenue department or the state forest department. In practice however, the rural population, especially the poor, does depend to a large extent on the goods and services available from these categories of land also. Apart from these, there are systems of customary rights, which support traditional practices, and thereby represent common rights on private property in certain situations such as when private land is lying fallow in between crop rotation cycles (Kanchan C and Dasgupta P, 2002). They further differentiate the de jure and de facto approaches to reconcile the study on common land. Similar explanation exists in the NSS report on common Property Resources (1998, section 2.7.3, PP-7)

2.4 Land use Trends and Patterns: At National Level (From 1968-69 to 2008-09)

Based on the data released by Indian Agricultural Statistics, Ministry of agriculture on "Total Area and Classification of Area", it can be inferred that de facto common property land resource (CPLRs henceforth) are on declining trend whereas area under forest and Area not available for Agriculture (NAAU henceforth) expanding gradually. Since economically feasible area already taken under the plough, there is negligible rise in area net sown (NSA). Only annual fluctuation could be observed in NSA pertaining to the fallowing of land on account of deficient rain[21].

[21] Sharp decline in NSA is associated with increase in the fallow .This can be compared with the corresponding years of deficient rainfall. Such as the year 2002-03. See Annexure IV .

Fig. 2.1 Percentage of Area under broad categories



See Annex. I for details and break up of each category.

Area under forest has been expanding continuously (even if it is not actually covered by forest growth but is specified under forest) due government's commitment to reach the goal of 33 % of the total geographical area under forest22. Forest policies from time to time reviews the existing impediments and concerted effort has been directed towards conversion of barren and uncultivated land, cultivable waste land etc. under the forest cover. Therefore a slightly increasing trend can be seen in the Fig.1 that reflects the rise in the area under forest cover. Percentage of forest cover in 1968-69 was 21.2% which has only reached up to 22.9 % in 2008-09 with an average annual growth rate of 0.19% .This rate of growth seems to have no effect on the CPLR however, judgment requires to meet the threshold of 33% area under forest.

[22] As per the forest policy guidelines 1952

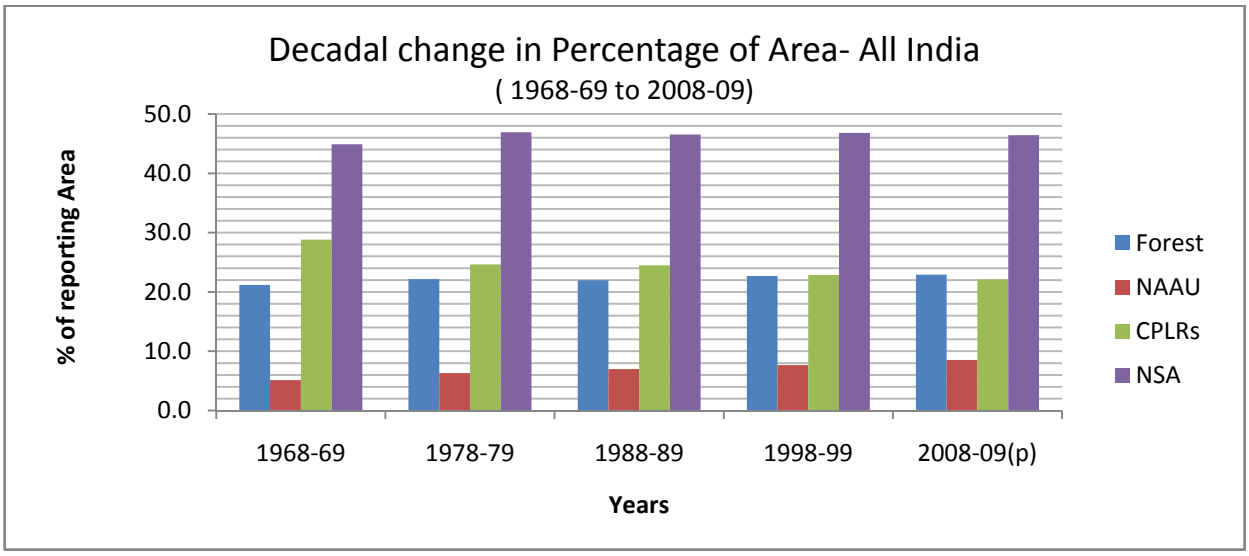
Table 2.1

Decadial Growth and change in Percentage of Area - All India

Year	GA	Area(in He	Forest			NAAU			CPLRs			NSA		
			Area(in He	% of Area	Decadal Gr	Area(in He	% of Area 2	Decadal Gr	Area(in He	% Area	Decadal Gr	Area(in He	%Area	Decadal Gr
1968-69		305885	64790	21.18116		15648	5.115648		88134	28.81279		137313	44.8904	
1978-79		304681	67465	22.14283	4.128724	19201	6.302001	22.70578	75034	24.62707	-14.8637	142981	46.9281	4.127796
1988-89		304826	66944	21.96138	-0.77225	21299	6.987265	10.92651	74692	24.50316	-0.45579	141891	46.54819	-0.762339
1998-99		305006	69215	22.693	3.392388	23348	7.654931	9.62017	69691	22.84906	-6.6955	142753	46.80334	0.607509
2008-09(p)		305586	70034	22.91793	1.18327	26064	8.529187	11.63269	67560	22.10834	-3.05778	141929	46.44486	-0.577221

Source: computed from data released from Indian Agricultural Statistics, Various Issues (for period 1960-61 to 1996-97) and www.dacnet.nic.in/eands (data from 1997-98 to 2008-09)

Fig 2.2. Decadal Change in Percent of Area



There has been an increase in the area put to non-agricultural uses(NAAU), as expected, because as a result of increase in the development activities, more & more land is being used for industrial sites such as mining ,dumping grounds etc, housing, transport systems, recreational purposes, irrigation systems, and most recently for MNC manufacturing units.

However the rate of increase was higher between (1968-69 and 1978-79, 22%) but the increasing trend remains static at an average annual growth rate of 1.3% leading to increase in area from 5.11% in (1968-96) to 8.5% in 2008-09

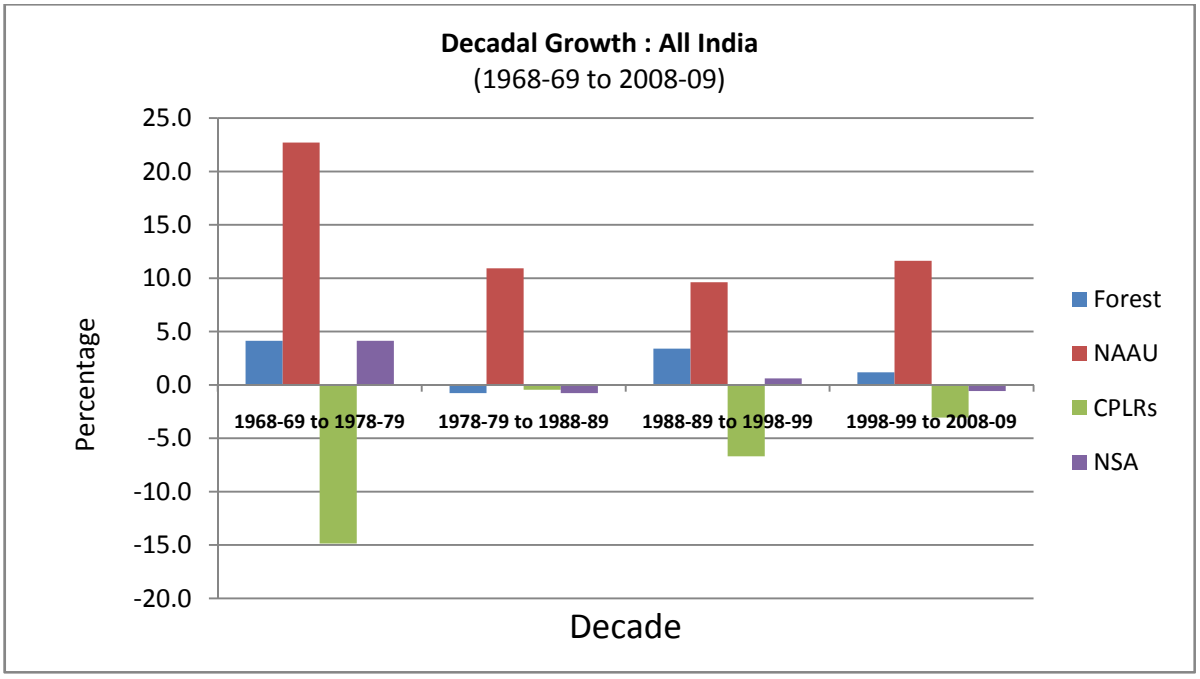
As far as CPLR is concerned it accounts for an average of 22.10 % of the total area and incorporates the following sub -categories with given share of CPLR as in:

Sub Categories	**% of CPLR**
• Barren and uncultivated land (BUL)	27.0
• Permanent pasture and Grazing land	15.4
• Land under Miscellaneous Tree Grooves (not under NSA)	4.9
• Cultivable waste land	20.2
• Fallow (more than Five years /Other than current fallow)	13.2
• Current fallow (fallow for less than a year)	19.3

Increase in fallow land (average annual growth rate of 0.4 in Fallow and 1.4 in current fallow) is nullified by the decrease in the land under permanent Pasture and barren & uncultivated land (at an annual average of -0.6% and -1.5%) . These two sub categories of CPLR forms crucial and determinably big share in CPLR. Cultivable waste land reducing at a rate of -0.5 % per annum on average. This Pattern apparently establishes that the foregone land are being occupied by other categories such as Net sown area, forest and Not available for agricultural use. The inverse relationship between Fallow and NSA is apparent from the fact that India still a country depending largely on Rain fed agriculture. Fluctuation in amount of rainfall has a direct impact and consequent shrinkage in NSA caused by fallowing the land due to lack of the irrigation facilities. This is obvious among the Small and marginal farmers who constitute about 83 percent of the total Farmers. For instance the rainfall received in the Year 2003- 04 was less by 18.6 and the annual decline recorded in NSA was -6.1 percent whereas fallow land increased by 32.6 percent over the previous year. The overall figure evokes that the fallowing has declined in general due to overall increase in the facilities that reduces the sense of insecurity among farmers about their farming business.

This has been explained by Sauer.J et.al (2012) on the basis of different variables determining the endogenisity for leaving the land idle[23]. Fallow land being one of the components of CPLRs (in this study) its increase or decrease has prominent bearing on the overall pattern of CPLR. As the technological innovation and demand for more land takes the pace, further decline is anticipated. Though the decadal growth rate figure shows an ease in the decline.

Fig.2.3 Decadal growth of Area under Each Category



2.5 State wise analysis of Land Utilization (Between 1968-69 to 2008-09)

Different size and vocational settings of states combined with the level of economic development tend to size and resize the land by the nature of their use. Though the general trend observed at national level is, more or less, concomitant with the trends at state level but with some exceptions. These anomalies are more apparent in economically developed states than the laggard states. Since the dissemination of technology has taken place at different pace which is reflected in the land use pattern in each state.

[23] Sauer.J et.al "Determinants of Smallholders' Decisions to Leave Land Fallow: The Case of Kosovo", Journal of Agricultural Economics, Vol. 63, No. 1, 2012, 119–141 doi: 10.1111/j.1477-9552.2011.00321.x

Table 2.2 Average Change in percentage of Area under specified categories of Land Use (Period 1960-61to2008-09)

YEARS/ STATES	Forest	NAAU	CPLRs	NSA
Andhra Pradesh	22.5	8.5	29.6	39.3
Assam	25.3	12.2	28.6	33.9
Bihar	16.7	11.7	27	44.6
Gujarat	9.8	5.7	34.1	50.4
Haryana	2.6	8	8.4	81.1
Himachal Pradesh	27	6.6	50.7	16
Jammu & Kashmir	59.1	7.2	17.1	17
Karnataka	15.8	6.1	23.9	54.2
Kerala	27.7	8.2	7.5	56.6
Madhya Pradesh	32.7	5.3	18.8	43.3
Maharashtra	17.1	3.7	21	58.2
Odissa	37.5	5.2	18.5	38.7
Punjab	4.7	8.3	4.1	83
Rajasthan	6.4	4.6	43.5	45.5
Tamil Nadu	16	14	26.6	43.4
Uttar Pradesh	17.1	8.1	16.6	58.1
West Bengal	13.2	13.4	11	62.4

Fig 2.4 Average Percentage of Area under Each Category

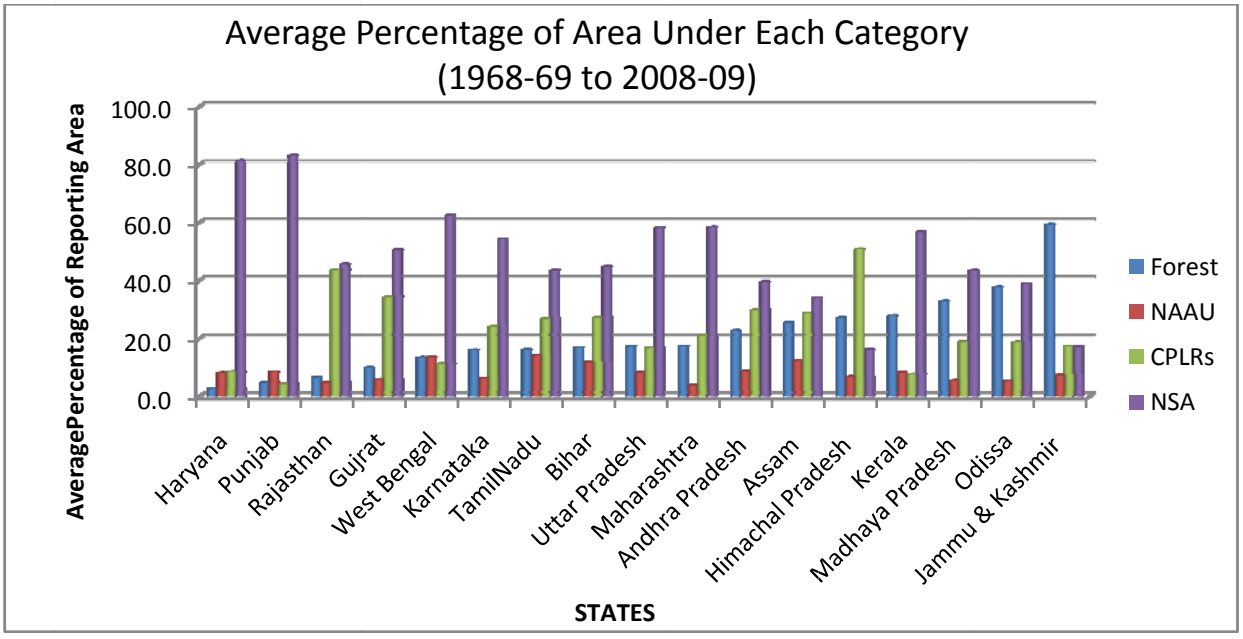
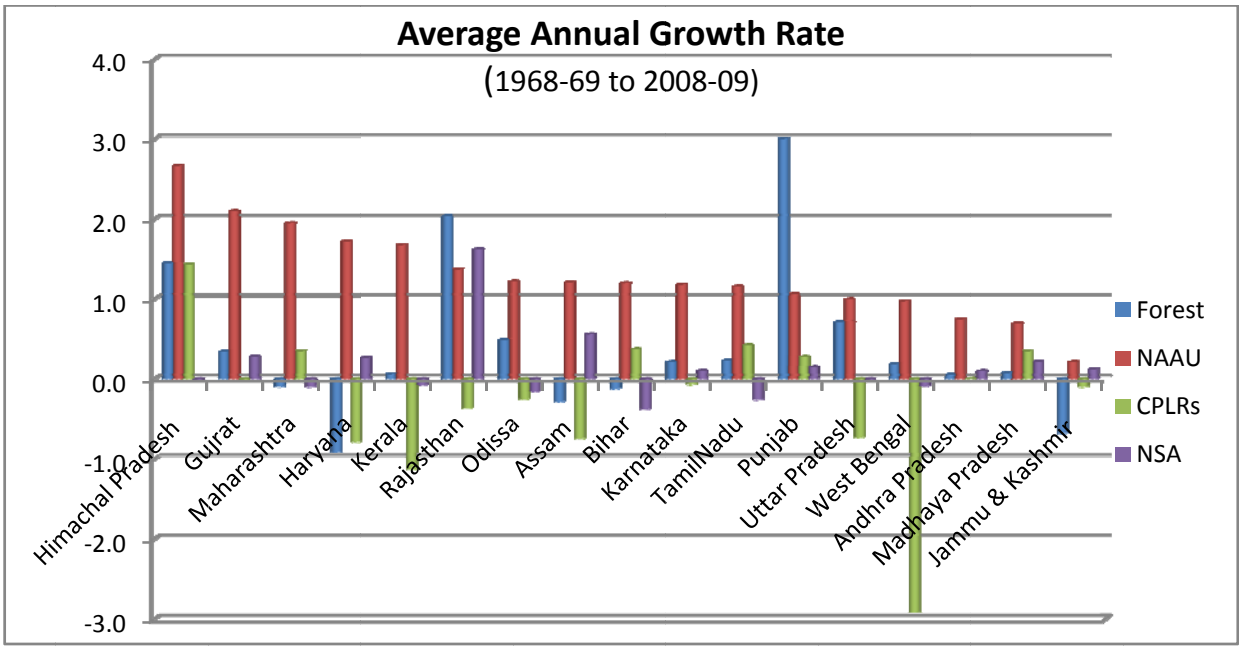


Table 2.3 Average Annual Growth Rate of Area under Each Category (Period 1960-61to2008-09)

YEARS/ STATES	Forest	NAAU	CPLRs	NSA
Andhra Pradesh	0.1	0.7	0	0.1
Assam	-0.3	1.2	-0.7	0.6
Bihar	-0.1	1.2	0.4	-0.4
Gujarat	0.3	2.1	0	0.3
Haryana	-0.9	1.7	-0.8	0.3
Himachal Pradesh	1.4	2.7	1.4	0
Jammu & Kashmir	-0.7	0.2	-0.1	0.1
Karnataka	0.2	1.2	-0.1	0.1
Kerala	0.1	1.7	-1.1	-0.1
Madhya Pradesh	0.1	0.7	0.3	0.2
Maharashtra	-0.1	2	0.3	-0.1
Odissa	0.5	1.2	-0.2	-0.2
Punjab	3	1.1	0.3	0.1
Rajasthan	2	1.4	-0.4	1.6
Tamil Nadu	0.2	1.2	0.4	-0.3
Uttar Pradesh	0.7	1	-0.7	0
West Bengal	0.2	1	-2.9	-0.1

Fig. 2.5 Average Annual Growth Rate of Area under Each Category



2.5.1 FOREST

States having average area of forest above the National Average (21%) are Jammu and Kashmir (59.1%), Odissa (37.5%) Madhya Pradesh (32.7%), Kerala (27%), Himachal Pradesh (27 %), Assam (25.3%) and Andhra Pradesh (22.5%) these states have physiographic advantage of hills and plateaus. States close to national average are Maharashtra and Uttar Pradesh (17.1%). Flat surface owing to agricultural feasibility gives way to cultivation at the cost of forest cover. Punjab Haryana and Rajasthan have less than 6.5 % of Average area under forest. Though Punjab has appreciably moved forward to bring more areas in forest with average annual growth of 3% (table 2.2) is the highest rate and has achieved 5.9% area in 2009 against 2% in 1968-69. Other states having gained areas under forest between 1968-69 and 2008-09 are Odissa (from 31.8 % to 37.3%) with the average rate of 0.5%, Rajasthan (3.6% to 8%) at the rate of 2% and Karnataka (14.9 to 16.1%) at the rate of 0.2 %

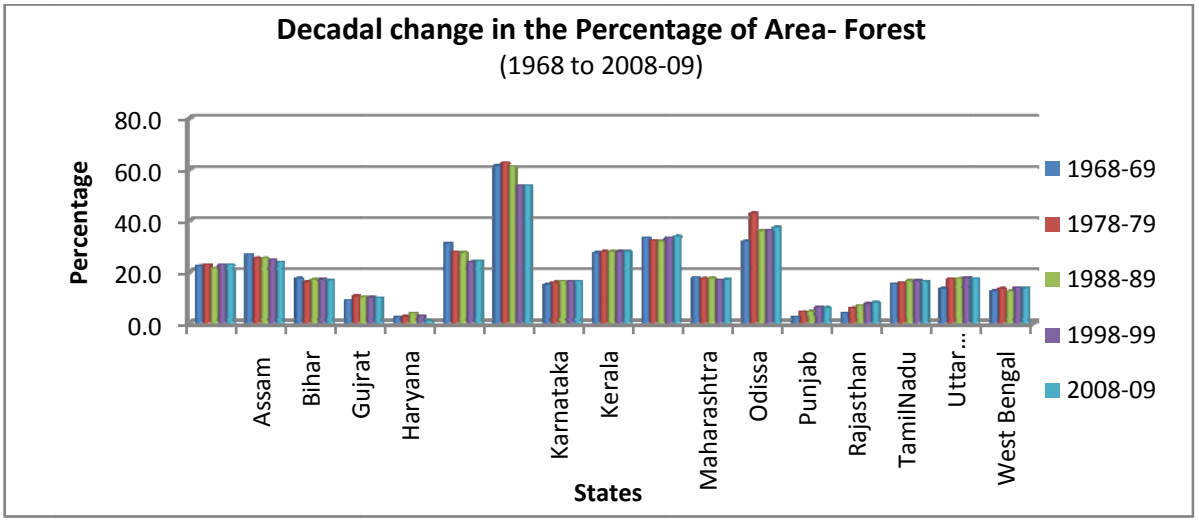
Table 2.4 Average Percentage of area under Forest

YEARS/ STATES	1968-69	1978-79	1988-89	1998-99	2008-09	Difference
Andhra Pradesh	22.3	22.7	21.3	22.6	22.6	**0.3**
Assam	26.6	25.3	25.3	24.6	23.6	**-3**
Bihar	17.4	15.9	16.9	17	16.5	**-0.9**
Gujarat	8.8	10.5	10	9.9	9.7	**0.9**
Haryana	2.1	2.5	3.8	2.6	0.9	**-1.2**
Himachal Pradesh	31	27.7	27.4	23.8	24.2	**-6.7**
Jammu & Kashmir	61.3	62.4	61	53.5	53.5	**-7.8**
Karnataka	14.9	15.8	16.1	16.1	16.1	**1.2**
Kerala	27.4	27.8	27.8	27.9	27.8	**0.5**
Madhya Pradesh	33	32.1	31.8	33.2	33.8	**0.7**
Maharashtra	17.6	17.3	17.4	16.7	16.9	**-0.7**
Odissa	31.8	42.8	35.9	36	37.3	**5.5**
Punjab	2.3	4.3	4.4	6.1	5.9	**3.6**
Rajasthan	3.6	5.8	6.7	7.5	8	**4.3**
Tamil Nadu	15.1	15.6	16.5	16.5	16.2	**1.1**
Uttar Pradesh	13.5	17.1	17.3	17.5	17.2	**3.8**
West Bengal	12.4	13.4	12.3	13.7	13.5	**1.1**

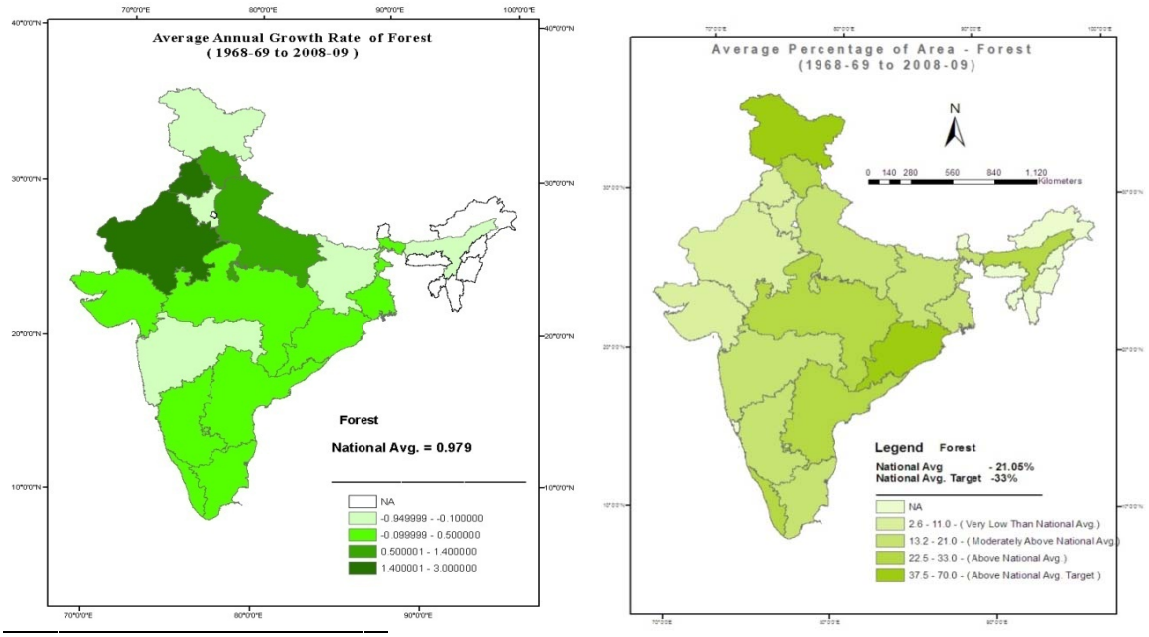
Though Himachal Pradesh shows rapid rate of growth but the actual area has diminished. This is owing to the discrepancy between the data released by state forest department and

revenue department. Decline in forest are observed in the states of Jammu and Kashmir, Bihar, Haryana (as low as 1% forest area) these are also the states having growth rate negative. Other includes states with gradual rise but below the national average (See Table 2.1, 2.2 and 2.3 as well as Fig 2.1 and 2.2 simultaneously); most of the states have less than the specified threshold to be under the forest area.[24]

Fig 2.6 Decadal change in the Percentage of Area- Forest



Map 2.1 Average Annual Growth Rate & percentage of forest area



[24] It has been observed that considerable portions of Indian forests are such only in name & are subject to various forms of maltreatment. As a result, a hectare of forest land in India yields less utilizable timber than a hectare of forest in Europe. Having regard to these considerations, specially the lower productive capacity of the natural tropical forests in India, the National Forest Policy Resolution of 1952 proposed that the area under forests be raised steadily to 33% of the total area, the proportion to be aimed at being 60% in the hill regions & 20% in the plains

2.5.2 Area under Not Available for Agricultural Use

Almost all the state is experiencing infrastructural development. It is very much expected that the area under this category increases. States qualifying to be above the national average in terms of Average area are Tamil Nadu (14.0%), West Bengal[25] (13.4%), and Bihar (11.7%) Andhra Pradesh, Punjab (8.3%), Kerala (8.3%), Uttar Pradesh, Haryana, Jammu and Kashmir being other states above national Average of 6%.

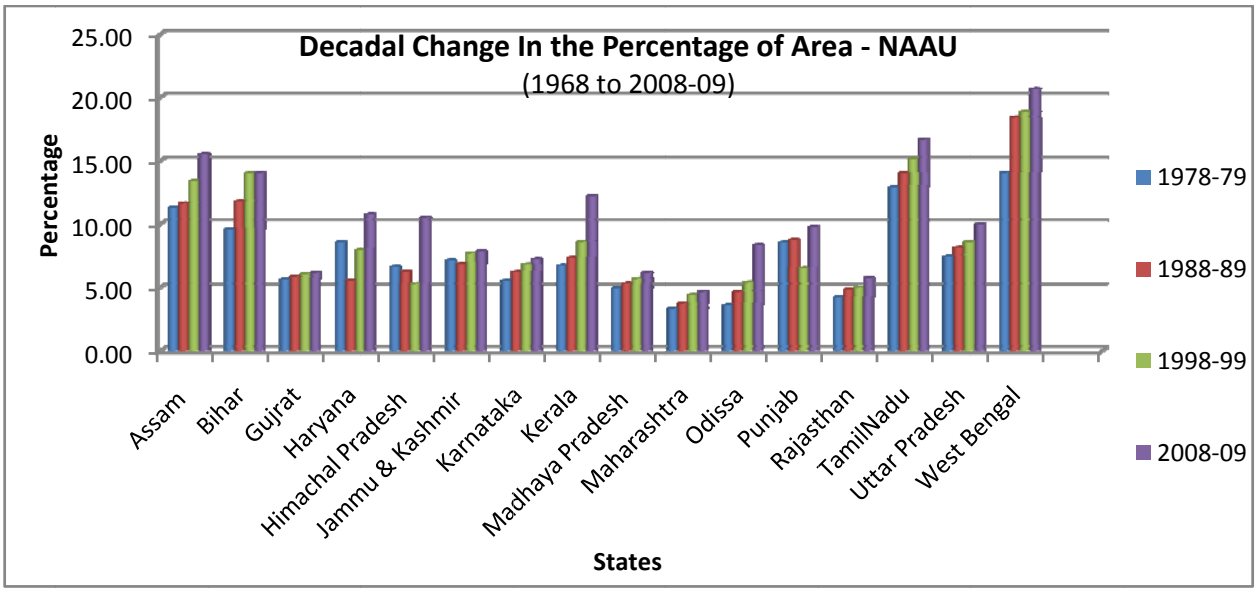
States with higher average annual growth rate such as Himachal Pradesh (2.7) Gujarat (2.1) Maharashtra (2.0) are above the national average (2%). Whereas Haryana (1.7) Kerala (1.7) are close to the figure. Rajasthan (1.4), Odissa (1.2) etc. exhibits low pace of growth in acquisition of area under this category but none of the state shows negative decline. (See table 2.2and 2.3)

Table 2.5 Average Percentage of Area under Not Available for Agricultural Use (NAAU)

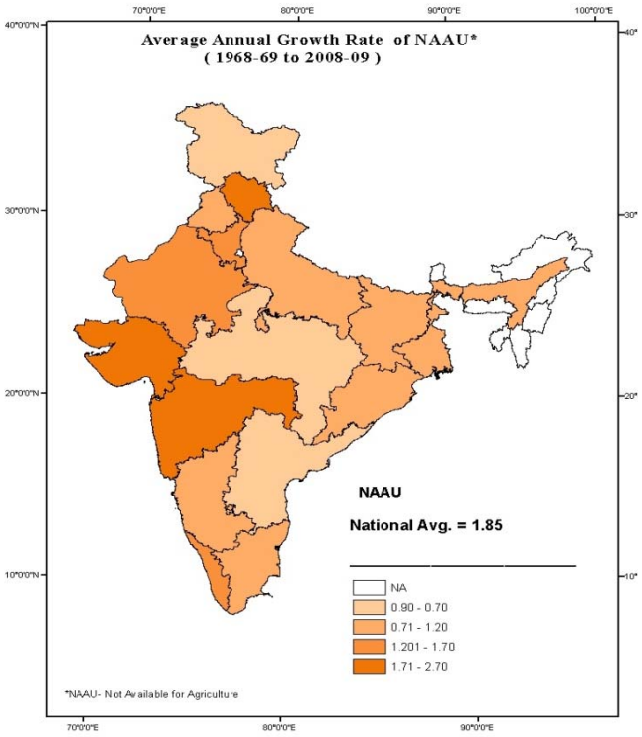
YEARS/ STATES	1968-69	1978-79	1988-89	1998-99	2008-09	Difference
Andhra Pradesh	7.7	7.78	8.3	9.45	9.97	**2.3**
Assam	9.83	11.3	11.64	13.39	15.52	**5.7**
Bihar	8.75	9.57	11.77	14.01	14.05	**5.3**
Gujarat	2.89	5.63	5.87	6.07	6.16	**3.3**
Haryana	6.27	8.57	5.54	7.95	10.76	**4.5**
Himachal Pradesh	7.34	6.62	6.24	5.27	10.52	**3.2**
Jammu & Kashmir	6.35	7.13	6.83	7.7	7.86	**1.5**
Karnataka	4.55	5.52	6.2	6.8	7.22	**2.7**
Kerala	6.5	6.7	7.32	8.6	12.22	**5.7**
Madhya Pradesh	4.72	4.94	5.29	5.68	6.16	**1.4**
Maharashtra	2.25	3.34	3.75	4.4	4.66	**2.4**
Odissa	6.44	3.58	4.65	5.38	8.34	**1.9**
Punjab	7.05	8.53	8.75	6.5	9.78	**2.7**
Rajasthan	3.44	4.23	4.84	4.98	5.75	**2.3**
Tamil Nadu	10.8	12.9	14.03	15.14	16.68	**5.9**
Uttar Pradesh	6.79	7.43	8.12	8.58	9.98	**3.2**
West Bengal	0	14.05	18.41	18.86	20.64	**20.6**

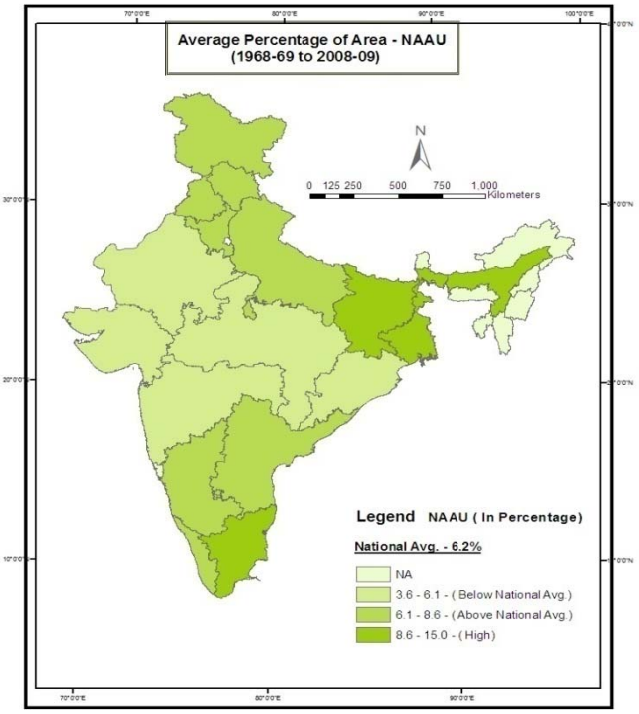
[25] There is an ambiguity about high figures in west Bengal due to inappropriate data where for almost a decade the data provided by the agency includes barren and uncultivated land as well . Similar is true with Assam .

Fig. 2.7 Decadal Change of percentage of Area under Not Available for Agriculture



Map 2.2 Average Annual Growth Rate & Percentage area of NAAU





2.5.3 *DE FACTO* COMMON PROPERTY LAND RESOURCES

Since this category constitute six sub categories which are also targeted for any sort of expansion in other category of land. The major Category in includes Barren and Uncultivated land which is devoid of agriculture or are abandoned due to costlier cultivation. Most of these area fall under the state revenue department and are subjected for leasing out to other enterprises. Thus, any increase in Areas not available for agriculture expands at the cost of this category of land. The other types of areas, which are covered under barren and uncultivable lands, are generally unsuitable for agricultural use either because of the bad soil and topography or because of their inaccessibility. Instances are the desert areas in Rajasthan, the saline lands in parts of the Rann of Kutch in Gujarat, the weed-infested and ravine lands in Madhya Pradesh and USAR or alkaline lands in Uttar Pradesh. The proportions of barren lands to the reporting areas are higher in the states of Rajasthan, West Bengal, Assam, and Gujarat. Due to improvement in land reclamation techniques such areas are reducing recently. Even if they are included in CPLRs this category is of least importance due to poor productivity and degraded quality aspect. Forestry policies also target such areas to convert them into wetland. Nonetheless, this category is useful for drought resistant cattle and bovines. Culturable waste land is the second most priority for expanding the cultivation hence likely to reduce. Such reduction is also subjected to land reform policies such as in Bengal where CPLRs declined sharply.

Area under Miscellaneous tree grooves support the livestock rearing and often used for two tier cultivation and collection of firewood and local resource derivatives. Fallow land and permanent Pasture and Graging land are most crucial segments of CPLRs. Fallow lands have increased recently. Land lying fallow for more than one agricultural year but less than five agricultural years has increased during the recent years and fallows for each year including current fallows has remain more or less constant at national level. This increase is probably due to the fact that there is an increase in the percentage of small and marginal farmers and fragmentation of land is causing the farming business more costly. According the NSS report - NSS Report No. 496: Some Aspects of Farming, 2003 Highlights that 40% o f the farmer wishes to opt for an alternative career due to lack of profitability and risk inherent in the farming. In 2003 the 79% of households possessed land of size 1 hectare or less. About 32% possessed less than 0.002 hectare of land. Such a small size of land is

further subjected to fragmentation Moreover Marginal devoted only 14% of farmland to cultivation and reported 69% of farmed land as used for dairying. Still about 79% of gross irrigated area during the kharif and 83% during the Rabi season were irrigated without the use of any device. And diesel pumps and electric pumps accounted for 5% and 4%. Due to all these factors there is a trend of reverse tenancy (small farmers secede their land to richer farmers possessing big farmed land) observed in few northern states. Contrary to it Permanent pasture and grazing land are falling prey to riches encroachment. Failure of institutional mechanism and free riding issues pays no heed towards conservation and maintenance of such category. Hence decline is the outcome.

Table 2.6 **Average Percentage of Area under CPLRs**

YEARS/ STATES	1968-69	1978-79	1988-89	1998-99	2008-09	Difference
Andhra Pradesh	30.3	28.2	30.3	28.0	27.9	**-2.4**
Assam	35.2	29.6	28.6	27.6	25.8	**-9.4**
Bihar	25.9	25.3	27.1	26.1	28.7	**2.9**
Gujarat	36.9	33.0	34.7	32.6	32.2	**-4.7**
Haryana	17.2	6.1	9.6	6.8	6.5	**-10.7**
Himachal Pradesh	51.6	47.4	48.7	58.8	53.5	**1.9**
Jammu & Kashmir	16.7	14.9	16.6	19.4	19.1	**2.4**
Karnataka	27.0	24.6	22.5	22.0	23.3	**-3.7**
Kerala	10.3	8.7	7.9	5.5	6.2	**-4.1**
Madhya Pradesh	21.5	20.3	19.2	16.4	15.9	**-5.5**
Maharashtra	20.4	20.0	20.3	20.9	21.7	**1.3**
Odissa	22.7	14.4	19.0	19.8	18.3	**-4.4**
Punjab	12.3	4.2	3.1	2.8	1.5	**-10.8**
Rajasthan	53.8	45.4	41.3	40.7	35.1	**-18.8**
Tamil Nadu	28.0	23.4	26.8	25.0	28.4	**0.4**
Uttar Pradesh	20.9	16.9	16.8	14.9	15.2	**-5.6**
West Bengal	25.0	9.5	9.0	4.8	4.9	**-20.1**

Sharp decline have been observed either in the states where agricultural mechanism is sound or the areas in dry region. States with Average area under CPLRs above national average (27%) are Himachal Pradesh (50%) Rajasthan (43.5%) Gujarat (34.1%) Andhra Pradesh (29.6%) Assam (28.6%) and Bihar (27%). Lowest instance of area under CPLRs are found in Punjab (4.1%), Kerala (7.5%) Haryana (8.4%).

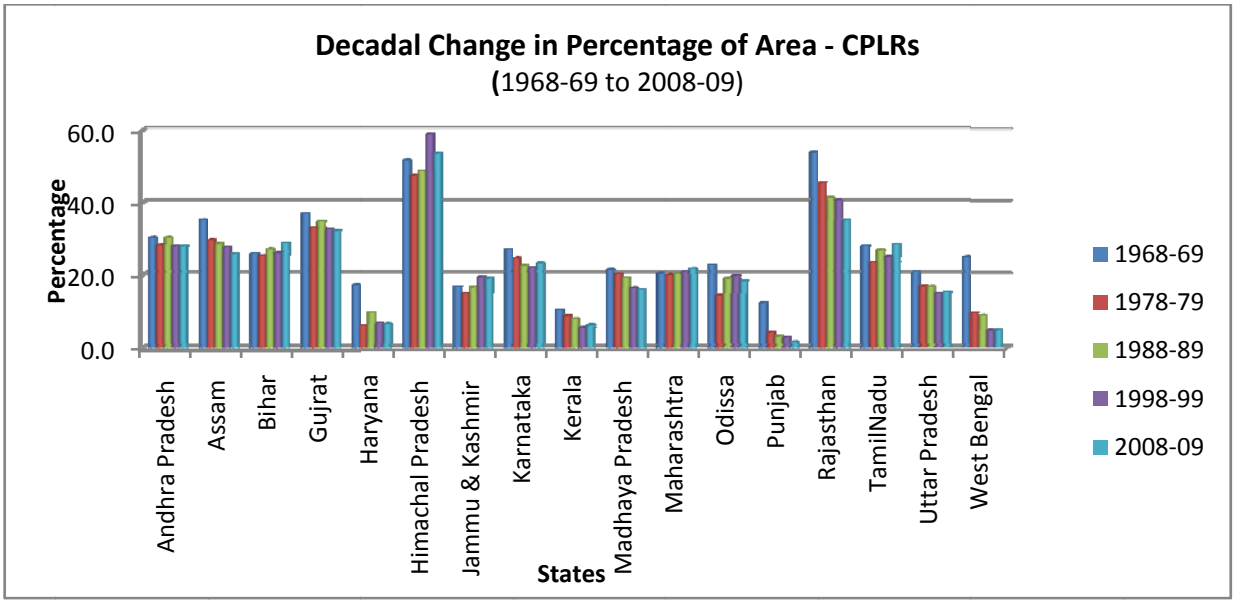
Positive Average annual growth rate has considerably been low in all the states with maximum of 1.4 in Himachal Pradesh (1.4) rest accounts between 1 and 0 or negative growth. Most loses in this category are reported from West Bengal at the average annual rate of -2.9% (table 2.1) from 25% in 1968-69 to 4.9% 2008-09. Other states Rajasthan 53% (1968-69) to 35.1% (2008-09) similar figure is observed in Punjab 12.3 % to 1.5%, Haryana 17.2% to 6.5%. Besides change in different categories Maharashtra has almost sustained decline with a slight increase by 2008-09 to cover 22% of total Area.

States with positive growth (percentage wise) have been observed in Bihar and Jammu& Kashmir. The reason being responsible for this is the more and more cultivators are abandoning agriculture. This is evident by the instance of fallowing being more intense in States where number of cultivators is higher. All India figure for The decreasing trend of Percentage of Cultivators to Total (Main + Marginal) Workers (39.69% in 1991 that decreased to 31.65%) and increase in Percentage of Agricultural Laborers to Total (Main +Marginal workers (20.96% in 1991 to 26.55% in 2001) evokes that more and more cultivators are becoming agricultural laborers by abandoning cultivation . That also intrinsically indicates that more lands are getting added to Fallow. Bihar and Orissa and West Bengal fall in this category.

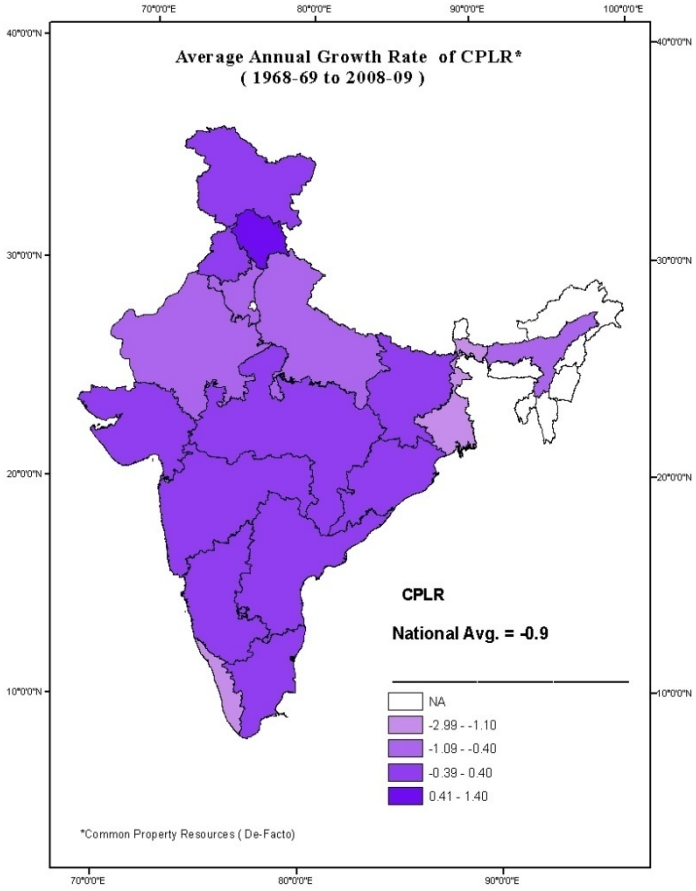
These are also the states wherein the livestock population is on increasing trend. The pressure exerted by this multiplying human and livestock population has further led to qualitative deterioration of CPRs. Comparative works of one of the early study of N.S Jodha (1986) and recently Chopra and Dasgupta (2002) confirms the fact that CPRs are declining and the decline is more pronounced in Dry region. States with large arid and semi-arid zones have more than 25 to 30% of their geographical area under common pool resources whereas states dominated by river valleys with intensive agriculture have a larger area under privately owned land holdings. In the survey conducted by NSSO It was found that the

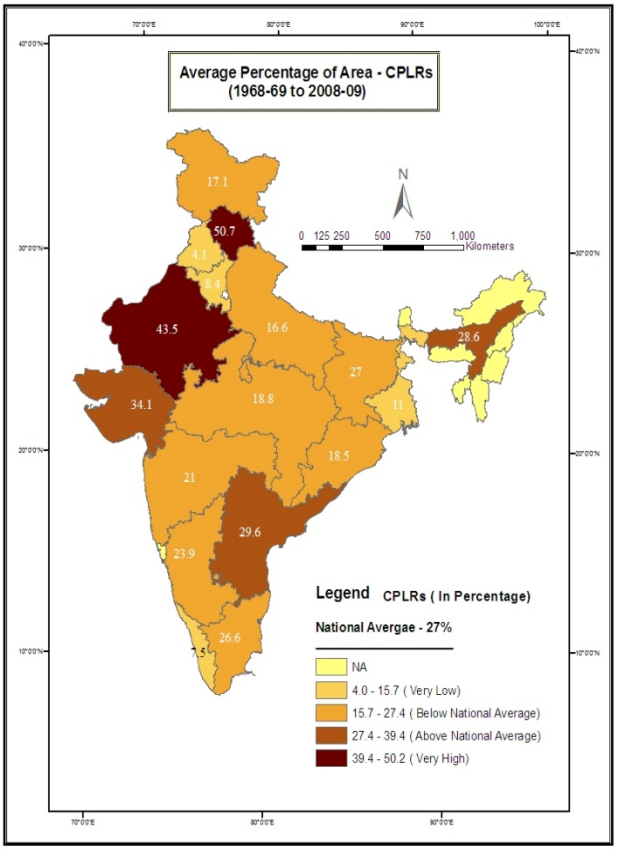
percentage of geographical area considered as common pool resource land varied over a wide range from 1% in the lower Gangetic Plains (LG) to 38% in the Western dry region (TD). The results obtained confirm the findings of micro studies in the different agro-climatic zones.

Fig. 2.8 Decadal Change in Percentage of Area under CPLRs



Map 2.3 Average Annual Growth Rate & Percentage area of CPLR





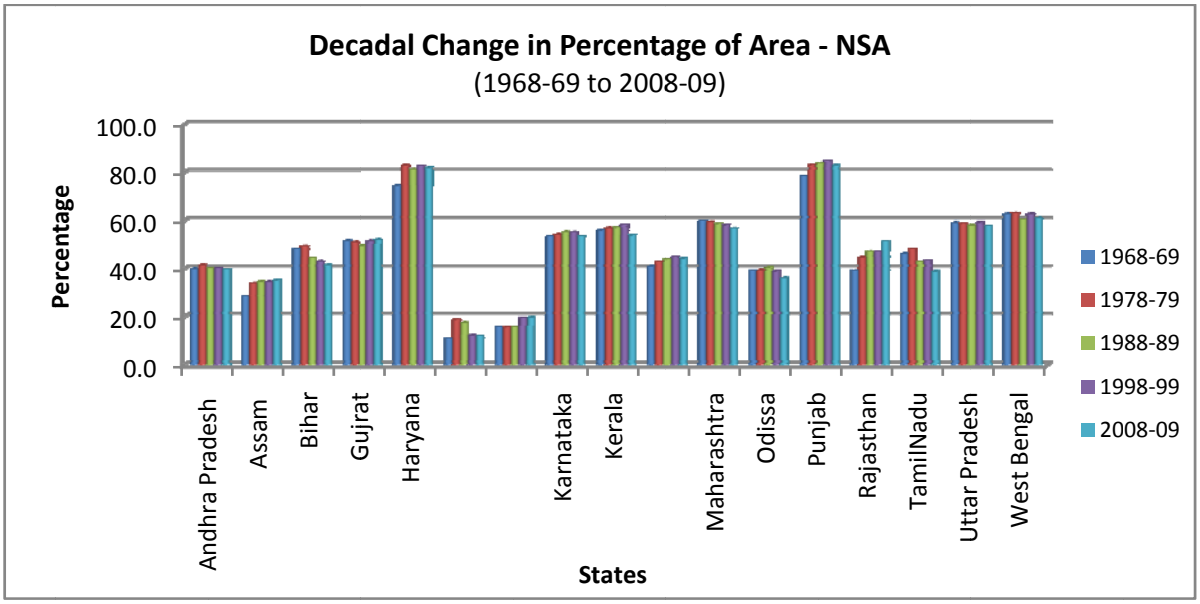
2.5.4 NET SOWN AREA

Almost maximum possible land has already been acquired for the purpose of cultivation leaving no scope for further expansion in arable land . Fig 1.1 shows that the trend line is almost constant for NSA ,however, rises slightly during the end of the decade of 2008-09. States with progressive farming demonstrate the expansion of area whereas a few have experienced shrinkage. Bihar has maximum tendency of shrinkage because of the incapability of farmers to carry out cultivation. Consequently fallowing takes place, thus , negative growth rate prevails(-4%). Whereas in Rajasthan large tracts allows farmers to induce with some extensive farming due to availability of cultivable waste land with an average growth rate of 1.6 % . States showing declining trend includes Tamil Nadu(-0.3%) , West Bengal(-0.1%), and Odissa(-0.2%) . States with negligible but rising trends includes Assam (0.6%) ,Gujarat(0.3%) Haryana (0.3%),Madhya Pradesh (0.2%) etc. (See table 2.2)

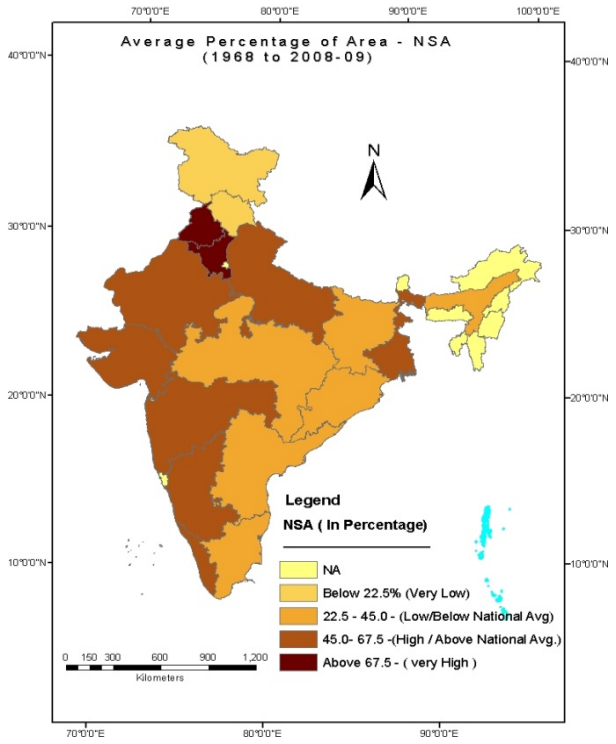
Table 2.7 – **Average Percentage of Area under Net sown Area**

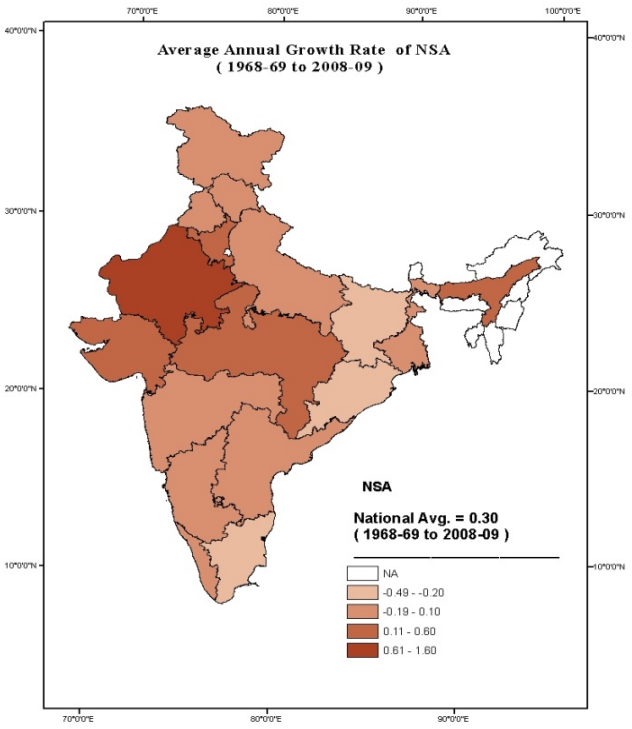
YEARS/ STATES 1968-69		1978-79	1988-89	1998-99	2008-09	Difference
Andhra Pradesh	39.7	41.4	40.1	40.0	39.5	**-0.2**
Assam	28.3	33.8	34.5	34.4	35.1	**6.8**
Bihar	48.0	49.2	44.3	42.9	41.4	**-6.7**
Gujarat	51.4	50.9	49.4	51.4	51.9	**0.5**
Haryana	74.4	82.9	81.2	82.6	81.8	**7.4**
Himachal Pradesh	10.8	18.7	17.4	12.1	11.9	**1.0**
Jammu & Kashmir	15.6	15.5	15.6	19.4	19.6	**3.9**
Karnataka	53.3	54.1	55.1	55.1	53.4	**0.1**
Kerala	55.8	56.7	57.0	58.1	53.7	**-2.1**
Madhya Pradesh	40.8	42.6	43.7	44.7	44.1	**3.3**
Maharashtra	59.7	59.3	58.5	58.0	56.7	**-3.0**
Odissa	39.0	39.2	40.4	38.8	36.0	**-3.0**
Punjab	78.4	83.0	83.8	84.7	82.8	**4.5**
Rajasthan	39.1	44.6	47.1	46.9	51.2	**12.1**
Tamil Nadu	46.1	48.1	42.7	43.3	38.7	**-7.4**
Uttar Pradesh	58.9	58.6	57.8	59.0	57.5	**-1.3**
West Bengal	62.6	63.0	60.3	62.6	61.0	**-1.6**

Fig.2.9 Percentage of Area under Net Sown Area (NSA)



Map 2.4 Average Annual Growth Rate & Percentage area of NSA





2.6 Relationship in between Grazing Land and Operational Land Holding Classes

Host of literature have already established the fact that poor (landless and Marginal) predominantly depend on CPL to substitute their income. This can be checked through the correlation coefficient between CPL and each class of land Holding. Following is the correlation matrix (See Annexure IV for the complete matrix)

Correlations	
	CPL
CPL	**1**
Marginal	**-.111**
Small	**.308****
Semi-medium	**.534****
Medium	**.796****
Large	**.927****

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The negative coefficient in between Marginal and the size of CPL[26] confirms to the fact that an increase in the number of poor will lead to increase in Culturable waste land. As Pasha.A (1992) found in their study that "poor at present seem to have access for their biomass requirements mainly from the available degraded CPRs. Earlier apart from the abundant availability of biomass from CPRs they used to get free fodder and fuel-wood from the rich households as perks for their labour. But now the rich themselves face the problem of fodder and fuel wood. Further, whatever CPRs tile poor have possessed so far as private access, either by way of encroachments or by way of governmental programme, may not be either available to them or meet their biomass requirements. Since the poor lack other complementary resources like capital, bullocks and other agricultural implements they can hardly cultivate the land properly and regularly. In many cases due to poor cultivation and excessive grazing by the livestock, these lands have become barren area". Though the areal extent might increase under de-facto CPLR but as a matter of fact quality of de-jure CPLR goes for a toss the marginal cultivators becoming landless further exerts pressure to degrade the already under pressure resources. This has been termed as "Exogenous" factor for resource degradation by Duraiappah[27](1988).

Relationship between CPL and cultivators of different size class demonstrate that all categories of cultivators depend upon CPL but the coefficient increases from the number of marginal cultivators to medium cultivators. Nandkarni et al (1990) [28]found in their study in the Western Ghats of Karnataka that income from CPRs was much more in the case of rich households than among the poor families though in relative terms the poor obtained a greater proportion of their income from them (Nadkarni et al, 1989, pp 147-48 and 152). Similar findings have been revealed by Paha A.S (1992) which "explains that in our study villages per household gross income from CPRs is nearly double (being Rs 1,393) among the rich households -- compared with that for poor households (being Rs 794). But the difference is higher still in the developed village, which shows that even in the developed

[26] For a more clear understanding and results *de-facto* CPLR has been narrowed down, by disassociating the integrated land categories used as *de-facto* CPLRs in earlier section , to area under permanent pasture and grazing land and culturable waste land resembling *de-jure* common property land.

[27] Duraiappah, A.K**, "**Poverty and Environmental Degradation: A Review and Analysis of the Nexus" World Development Vol. 26, No. 12, pp. 2169-2179, 1998

[28] Nandkarani M.V(1990), 'Use and management of common Lands –Towards and Environmentally Sound Strategy' in Cecil J SaIdanha (ed), Karnataka State of Environment Report IV Centre for Taxonomic Studies, St Joseph's College, Bangalore.

village the pressure on CPRs by the non-poor is high, in spite of their economies being more diversified …this is because it is the non-poor who have an absolute control over the use and management of such resources. Even while taking up the degraded CPRs for development it appears that all the households were never consulted or involved" Paha A.S (1992)[29] however, the coefficient is comparatively low at 0.46 in relation to the category of cultivators possessing large lands (above 10 Hect). Larger possession allows the cultivators to spare a portion of land for fodder cultivation. Good maintenance of Grazing and Pasture land can help in adjusting factor proportion in farming "by providing alternative space for grazing, CPRs allow farmers to devote all their land to the production of cash crop or food crops" (Bucknall et.al, 2000) [30] Another interesting fact in the found result is a strong correlation of livestock with the CPLRs. Greater the number of Livestock higher the dependence on CPLR. The possession of livestock (in numbers) is proportional to the size of land

2.7 Interstate comparison of status of CPLR and Poor*[31]

after having seen that marginal cultivators do possess extra threat to already burdened CPLRS in this section the prime motive is to demarcate the potential region having lower incidence of area under CPR in one hand and high number of landless and marginal farmers on the other. The growing number of marginal holding and diminishing proportion of Grazing land is a serious issue on the livelihood of rural marginal poor. "The distribution of land holdings is characterized by predominance of marginal holdings. Table 4 (pp 11) reveals that, during the period 1960-61 to 2002- 03, the proportion of households in the combined group of "nil" and marginal categories of household operational holdings have risen from 58% to 79%. During the 1970s and 1980s, the proportion of marginal holdings rose from 33% to 48%. In the last ten years prior to 2002-03, however, it is the proportion of "nil" (mainly, non-operating) households which has grown most sharply, from 22% in 1991-92 to 32% as per the survey findings in 2003" (NSS Report No.493 Chapter Livestock

[29] Paha A.S (1992), **"**CPRs and Rural Poor: A Micro Level Analysis". Economic and Political Weekly, Vol. 27, No. 46 (Nov. 14, 1992), pp. 2499-2503

[30] Bucknall et.al, "Poverty and the Environment", the world bank,2000

[31] *'poor' here implies the land less and marginal farmers having land possession below 1 hectare. The term has vehemently used by Jodha and Pasha .

Table 2.8 percentage of the total number of holdings among different land holding classes

STATES	landless	marginal	small	semi-medium	medium	large	Column3
JAMMU & KASHMIR	1.10%	88.60%	8.30%	1.60%	0.40%	0.00%	100.00%
HIMACHAL PRADESH	0.30%	91.40%	5.60%	2.40%	0.30%	0.00%	100.00%
PUNJAB	1.60%	32.80%	24.00%	22.70%	16.00%	2.80%	100.00%
CHANDIGARH	0.00%	41.60%	13.70%	44.70%	0.00%	0.00%	100.00%
UTTARANCHAL	0.10%	89.40%	7.40%	2.30%	0.80%	0.00%	100.00%
HARYANA	2.50%	26.50%	28.20%	25.40%	14.30%	3.20%	100.00%
DELHI	75.60%	23.10%	1.30%	0.00%	0.00%	0.00%	100.00%
RAJASTHAN	1.90%	40.60%	21.70%	20.30%	12.20%	3.40%	100.00%
UTTAR PRADESH	2.20%	71.30%	16.10%	8.10%	2.10%	0.20%	100.00%
BIHAR	6.30%	72.30%	13.90%	5.90%	1.60%	0.10%	100.00%
SIKKIM	2.60%	88.50%	6.30%	2.60%	0.00%	0.00%	100.00%
ARUNACHAL PRADESH	0.70%	47.30%	28.00%	15.80%	6.80%	1.40%	100.00%
NAGALAND	9.50%	65.60%	20.70%	3.20%	1.00%	0.00%	100.00%
MANIPUR	1.10%	78.00%	16.40%	3.50%	0.90%	0.00%	100.00%
MIZORAM	0.60%	83.80%	13.80%	1.00%	0.80%	0.00%	100.00%
TRIPURA	1.20%	96.10%	1.30%	1.30%	0.00%	0.00%	100.00%
MEGHALAYA	1.00%	82.40%	11.70%	3.60%	1.30%	0.00%	100.00%
ASSAM	0.70%	58.00%	27.20%	13.20%	1.00%	0.00%	100.00%
WEST BENGAL	15.60%	78.10%	5.00%	0.90%	0.40%	0.00%	100.00%
JHARKHAND	3.60%	82.60%	7.30%	5.20%	1.20%	0.10%	100.00%
ORISSA	6.50%	63.60%	22.10%	6.80%	0.90%	0.10%	100.00%
CHATTISGARH	1.10%	54.80%	27.60%	11.80%	3.80%	0.80%	100.00%
MADHYA PRADESH	5.20%	40.70%	19.70%	22.30%	10.70%	1.30%	100.00%
GUJARAT	3.10%	55.00%	17.30%	14.00%	9.30%	1.40%	100.00%
DAMAN & DIU	45.10%	54.90%	0.00%	0.00%	0.00%	0.00%	100.00%
D & N HAVELI	0.00%	34.30%	61.90%	3.80%	0.00%	0.00%	100.00%
MAHARASTRA	8.90%	40.20%	21.40%	21.00%	7.00%	1.60%	100.00%
ANDHRA PRADESH	3.60%	54.90%	20.60%	14.80%	5.70%	0.50%	100.00%
KARNATAKA	21.00%	38.00%	18.30%	15.80%	5.50%	1.40%	100.00%
GOA	34.30%	53.90%	6.30%	2.30%	3.10%	0.00%	100.00%
LAKSHADWEEP	1.50%	98.50%	0.00%	0.00%	0.00%	0.00%	100.00%
KERALA	7.20%	88.00%	3.80%	0.80%	0.10%	0.00%	100.00%
TAMIL NADU	19.40%	58.70%	14.70%	5.30%	1.80%	0.10%	100.00%
PONDICHERRY	78.00%	14.50%	2.00%	4.10%	1.30%	0.00%	100.00%
A & N ISLANDS	2.10%	78.60%	12.10%	6.60%	0.60%	0.00%	100.00%

Ownership, 2003)[32] the data revealed from 66th round of NSS gives the classification by ownership by size class of land holding. Following Table gives the percentage of the total number of holdings among different land holding classes.

2.8 Conclusion

Based on the observation of data over 40 years, it is found that area under non agriculture use is expanding with positive growth rates in almost all the states .This entails that the area generally falling under the de facto CPLRs are being engulfed via addition in area under other categories. The instance of fallowing has the highest impact on the positive growth of CPLRs. Somewhat progressive States, irrespective of the percentage of area, in land under Non Agricultural uses shows keen inclination with abrupt growth rates. Area with large expanse of degraded land also shows positive growth rate in NSA as well as increase in the CPLR percentage area. More or Less forest would continue to grow in areas where agricultural viable area lacks. Contrary is true in flat fertile surface such as Haryana and Uttar Pradesh with Punjab as the only exception.

There is an inverse relationship between the number of marginal farmers and the area under CPRLs .Richer farmer get dual benefit of fodder cultivation as well as collection from the CPLRs owing to possession of comparatively higher number of livestock. Though the collection is higher by the rich but relative utility is much higher for the poor. The land distribution system was targeted to cope with the increasing number of landless farmers and marginal farmer conversion into landlessness, but distribution of low productivity land to already resource scant mass would definitely reduce the number in government records but in reality they would continue to strive for livelihood from CPRs after having abandoned the land owing to lesser profitability. These abandoned land become waste land but in reality they are continued to be used as CPRs. Thus, the time frame has to scrutinize so that right institutional intervention in a correct framework is the urge of time for the stakeholders.

The preliminary statistical analysis in this paper indicates, that even given the present state of development in India, which is in fact quite differentiated across the component states, there is a need to focus on common pool resources beyond the evidence found through de jure estimation of Common Property Resources. Viewing the decline in aggregate CPLRs

[32] See section 3.4.2, NSS Report No.493 Chapter 3,Livestock Ownership, 2003. pp 11. Also refer to the Table 4 in order to observe the increasing trend of Marginal farmer over consecutive years from 1960-61 to 2002-03)

there’s a need for qualitative improvement in De Jure CPLRs so that judicious and sustainable development of the land resource could be ensured.

While reckoning the forest area there are instances of differences in area under the forest According to the land-utilization statistics and area according to the returns of forest statistics furnished by the state forests departments .The two sets of figures is due mainly to the variations in the definitions of the term 'area under forests', in geographical coverage and in the reference period. This problem has been faced particularly in Himachal Pradesh and the hilly regions such as Jammu and Kashmir. Reconciliation of the two sets of figures ought to be minimized. A uniform definition has now been adopted for reporting the data by both the sources and it is hoped that the gap between the two sets of figures would be narrowed down considerably, if not altogether eliminated.

CHAPTER 3

Trends and Patterns of Land Use in Agro Climatic Zone of India

2.1 Introduction

The Availability of CPLRs varies widely from Region to Region in India, depending mainly on the ecological and agricultural systems or prevalent agro climatic condition and partly in the present or past settlement and land tenure systems. Further change in the land use pattern is a gradual process that inculcates over long period of time. These changes may be attributed mainly to four factors. Firstly, change in government policies such as Land reform programs and polity structures. Second, Economic progress as in expansion of technological frontier and commercialization such as establishments of Special Economic Zones (SEZ) and other infrastructural developments. Third, constraints and side effects of overly rate of growth of population and fourth, land degradation and climatic changes.

"Opportunistic land encroachment, resulting from costly and incomplete enforcement of common land boundaries, is a problem in many less-developed countries. A multi-period model of such encroachment is presented in this paper. The model accounts explicitly for the cumulative effects of non-compliance of regulations designed to protect a finite, non-renewable resource. In this case common land. From private expropriation. Gradual evolution of property rights from common to private. The consequence of encroachment. Is demonstrated to be equilibrium. To prevent the complete loss of common land, full enforcement must be the rule rather than the exception." Robinson.E.J.Z(2004)

In most of the villages, cultivation tends to encroach the common land for there is lack of supervision of common property lands away from villages. "Encroachment, the illegal occupation and cultivation of common land, occurs throughout many less-developed countries. Much of this encroachment has been at the boundaries of common and private land: Farmers with private land adjacent to the common land encroach by gradually moving the boundary marker, incorporating the common land into their own holdings, and farming it as their own to the exclusion of others" Robinson E.J.Z (2004) . In a Gujarat based case

study by rural areas, Iyenger.S (1989) highlights different forms of encroachment to cultivation and other purposes. He found that there are in certain type of villages 33where encroachment takes place. In some villages it is as high as 40% of the total De-Jure CPLR.

About the change in the forest cover different scholar hold different views, some has linked Economic growth with the forest growth. Foster.D.A and Rosenzweig(2003)34 try to hypothesize "that increases in the demand for forest products associated with income and population growth lead to forest growth" using the 29 year period of rural India at village level. They found a clear significant positive relationship between changes in income and changes in forest area. Apart from this Government forest policies are committed towards increasing the Area under forest. In hilly and tribal region, existence of JFM may also contribute towards increase in the forest cover. Decline might take place due to legal occupation of land and construction. This can be traced where forest cover decline in one hand and the increase in the area under NAAU. Consequent to rapid population growth in developing countries exert pressure on land, leading to over-exploitation and degradation of the natural resource base of agriculture. "The problem is greater in the low-productivity, high-risk environments such as dry tropical regions. In these regions not only is nature's bio-mass productivity low, but recovery speed of once-damaged land and vegetative resources is slow" (Jodha, 1989). Demographic factors influence CPRs directly by raising demand for land and indirectly by leading to privatization of CPRs. Rapid population change in association with such external factors as public interventions and commercialization induces structural changes in the village communities-changes in occupational patterns, group dynamics, and distribution of economic and political power at the local level (Mandelbaum, 1972)[35]

It is crucial to analyze the trend and patterns of the land utilization in order to auger avenues for an optimal utilization of the resource and intergenerational equity. For this very purpose Agro Climatic Regional Planning division was formed under the umbrella of Planning

[33] Marked as second type of villages in the article , where the prospect for agriculture are apparently good, but the present status is not very promising. Irrigation facilities are limited and have improved only marginally. The area available under CPR land is reasonably high and ranges between 9.6 to 72.9 per cent of the total geographical area.

[34] . Foster.D.A and Rosenzweig, "*Economic Growth and the Rise of Forests*" The Quarterly Journal of Economics, Vol. 118, No. 2 (2003), pp. 601-637

[35]For detail refer to " Depletion of Common Property Resources in India: Micro-Level Evidence",, Population and Development Review, Vol. 15,pp263

Commission in 1988. D.N.Basu and G.S. Guha (1996) have extensively recognized the importance of Agro-climatic regional planning in India according to whom the Agro climatic regional planning (ACRP) project is an explicit recognition of concern for social and intergenerational equity in resource use. Through quoting the Bhalla (1989) "The ACRP brought to light, for the first time, the interface between technology based growth and natural resource endowments by examining the growth performance from a perspective of agro-climatic regions delineated by planning commission in 1988" . It includes the strategy towards inventorying resource endowments and the levels of utilization of natural resources such as proportion of Land available and non available for cultivation. The Rate of increase or decrease and its impact on the proportion of other categories of land utilization. Long term observation of land use pattern is significant aspect for consideration of trade-off between Long term sustainability and short term maximization of production.
Different region evolve different pattern of Land use. Semi Arid and Arid regions, hill regions, and forested tribal regions are the three distinct region which exhibits markedly different pattern of endowment .In the Arid And Semi Arid regions ,CPRs are less in extent than in wet mountainous areas but are fully integrated in agricultural systems "Marathi(2010)

Drawbacks while processing the information

It is deemed necessary to highlight the grey areas coherent in analysis in this Chapter. While processing the data the cases of inconsistencies were recorded in most of the districts wherein, the sum of areas figures fall sort to the total reporting area in consequent years as well as the total reporting area falling short to the Total Geographical area. The cases have been cross checked with PCA data in village directory. In most of these cases, inconsistency with the census figure remained unresolved. In fact, it was found that there were a number of inconsistent cases within the Census data as well. For making the comparative analysis relevant, only Total Reporting Area has been taken into consideration with adjustments after summing the area under different categories.

Also the boundary adjustments fails to derive the actual area reported in the Base Year (1981-82). Except for the clean division, districts having created by deriving the share from two or more adjacent districts are tedious and complicated to demarcate the districts. "136 of

the 356 Indian districts in 1971 (38%) were unaffected by boundary changes over the subsequent three decades, 79 districts (22%) were cleanly partitioned into multiple districts over the same period, and the remaining 141 districts experienced more complex changes"36 The Adjustments are, however, done as per the percentage and share published in the three primary sources from national volumes of the General Population Tables for all census years from 1971 to 2001. First, Appendix-1 to Table A-1 provides a detailed statement of territorial units at the time of the current census and the changes in territorial boundaries during the preceding decade. For each affected territorial unit, it lists the regions added and subtracted, along with their areas in square kilometers.37 In order to overcome such discrepancies, the districts are merged in to broad Agro climatic Zones to derive the holistic picture, if not consistent at district level. In Terms of Agro climatic region trends observed are consistent with the facts available except for west Bengal and Assam. Lower Gangetic Plain (LG) occupies most of the area in West Bengal. Though data efficiency is speaks least for itself for the state, besides this fact an analysis have been attempted based on the available figure. Analysis about Northern Himalayas and Brahmaputra valley (EHm) has been avoided because on virtue of Assam any generalization could be an exaggeration.

[36]Kumar.H and Somnathan.R, "Mapping Indian Districts Across Census Years,1971-2001",Working Paper no. 176, Center for Development Economics, DSE, March 2009

[37] See the Annexture 2-A For Districts Modifications and merger schemes .

1.Land Use Trends and Patterns in Different Agro Climatic Regions.

Table 2.1 - Percentage of Total Reporting Area - FOREST

SL No.	Agro_Climatic Zones	1981-82	1991-92	2001-02	Average
1	WHm	26.0	27.4	27.5	27.0
3	LG	13.8		13.5	13.6
4	MG	6.0	7.0	7.0	6.7
5	TG	6.2	6.2	5.9	6.1
6	UG	3.8	3.9	3.6	3.7
7	EHg	18.8	18.3	19.0	18.7
8	CHg	18.8	18.3	19.0	18.7
9	WHg	14.0	14.6	14.0	14.2
10	DP	17.9	18.5	18.5	18.3
11	EG	23.8	23.6	23.6	23.7
12	WC	26.2	26.1	26.1	26.1
13	GC	10.4	9.7	9.1	9.7
14	TD	6.6	6.8	6.9	6.6

Table 2.2 - Percentage of Total Reporting Area - NAAU

Column1	Agro Climatic Zones	1981-82	1991-92	2001-02	Average
1	WHm	8.38	8.45	8.52	8.45
3	LG	7.13	NA	8.23	7.68
4	MG	12.65	13.24	13.98	13.29
5	TG	8.13	9.34	10.57	9.35
6	UG	7.28	7.89	8.77	7.98
7	EHg	5.96	6.78	7.46	6.73
8	CHg	5.96	6.78	7.46	6.73
9	WHg	4.85	5.89	6.21	5.65
10	DP	8.55	8.73	10.04	9.11
11	EG	9.32	10.56	11.84	10.57
12	WC	8.23	9.53	11.80	9.85
13	GC	6.67	7.97	8.23	7.62
14	TD	4.57	4.84	5.21	4.87

Table .2.3 -Percentage of Total Reporting Area – CPLR

Sl.No.	Agro_Climatic Zones	1981-82	1991-92	2001-02	Average
1	WHm	33.8	33.9	34.2	33.9
3	LG	16.8		16.1	16.5
4	MG	17.7	17.4	16.5	17.2
5	TG	17.4	16.1	14.1	15.9
6	UG	7.1	5.7	4.5	5.8
7	EHg	24.1	22.6	21.3	22.7
8	CHg	24.1	22.6	21.3	22.7
9	WHg	21.6	20.8	21.0	21.1
10	DP	28.8	27.6	26.9	27.7
11	EG	25.0	22.8	21.9	23.2
12	WC	23.4	21.1	19.1	21.2
13	GC	32.0	33.9	34.8	33.6
14	TD	38.5	37.2	36.2	38.1

Source: compiled from Indian Agricultural Statistics, Vole-I, Issue 56th. (For 1981-82)
www.dacnet.nic.in/eands (for 1991-92 and 2001-02), Directorate of Economics & Statistics, Ministry of Agriculture, Govt. of India

Figure 2.1. Forest Area as percentage of the Total Reporting Area

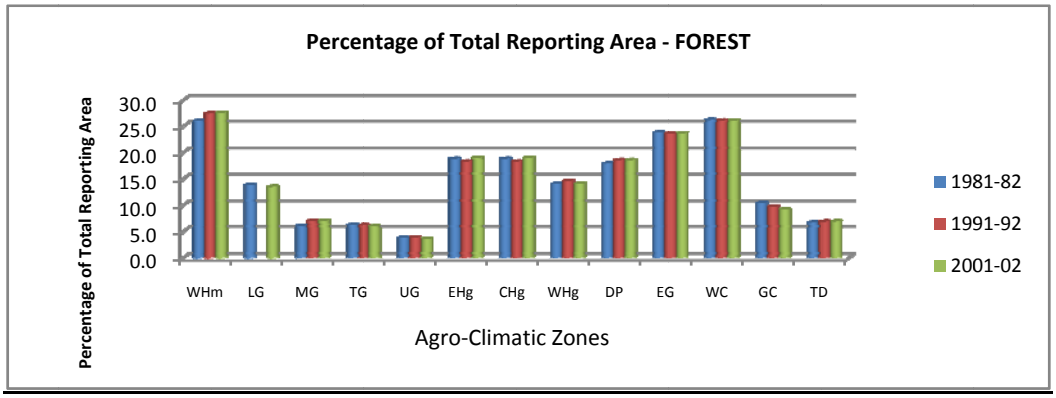


Figure. 2.2 Area not Available for Agricultural Use as Percentage of total reporting Area

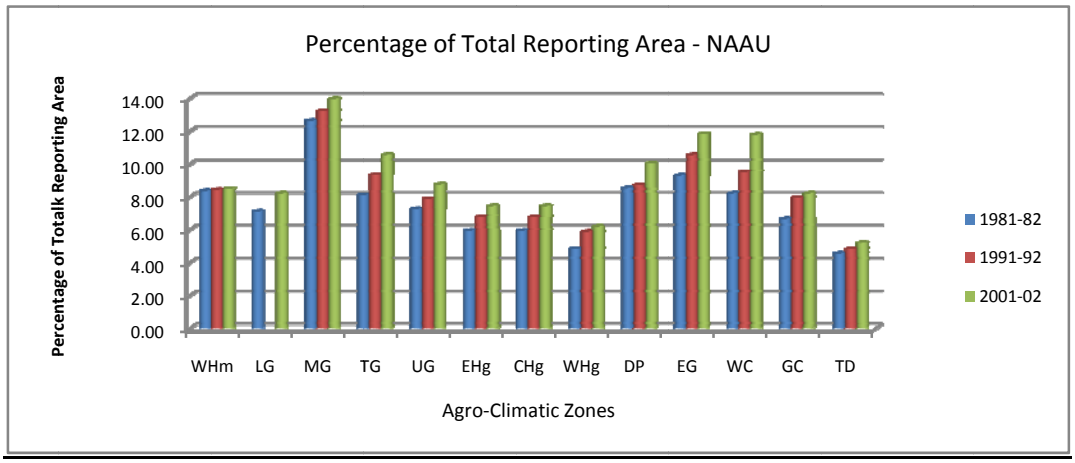


Figure 2.3. Area under *De-facto Common Property Resources as Percentage of Total Reporting*

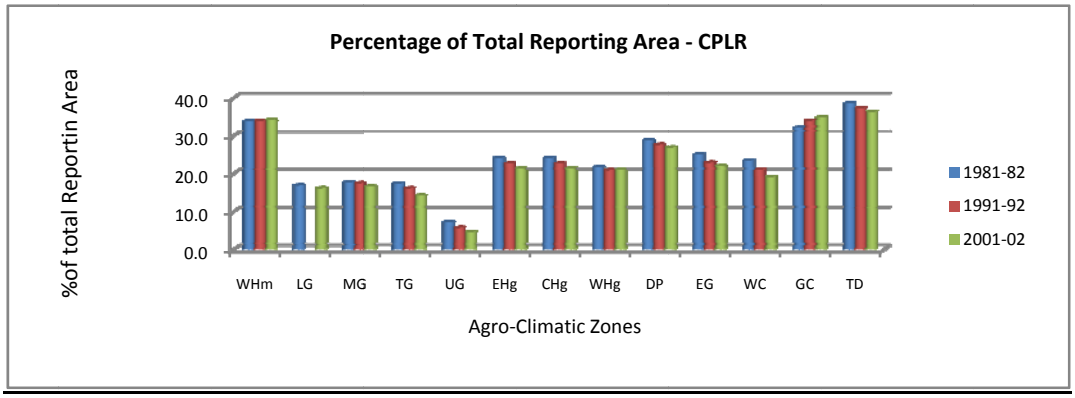


Figure. 2.4 Area under forest as percentage of Total reporting Area

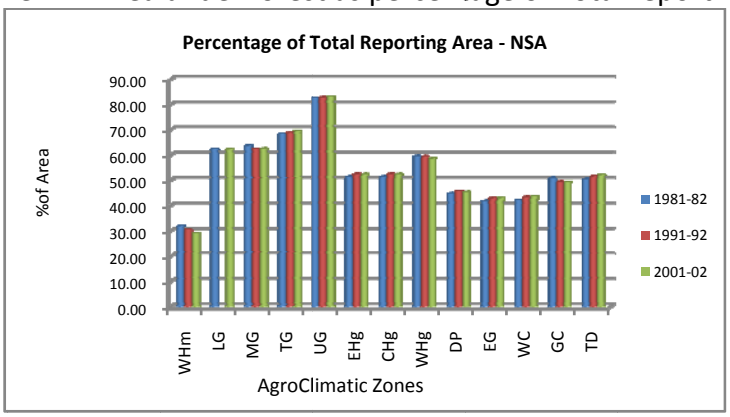


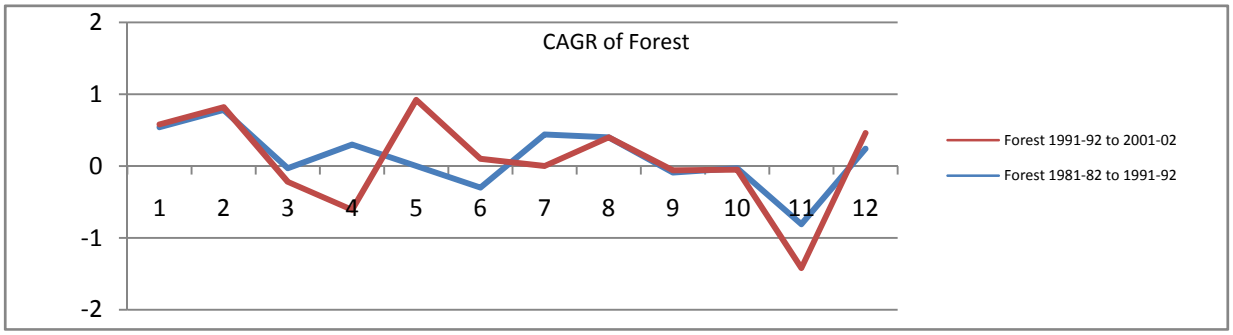
Table 2.5 – Decadal Growth of Different Categories of Land by Use in Various Agro-Climatic Zones

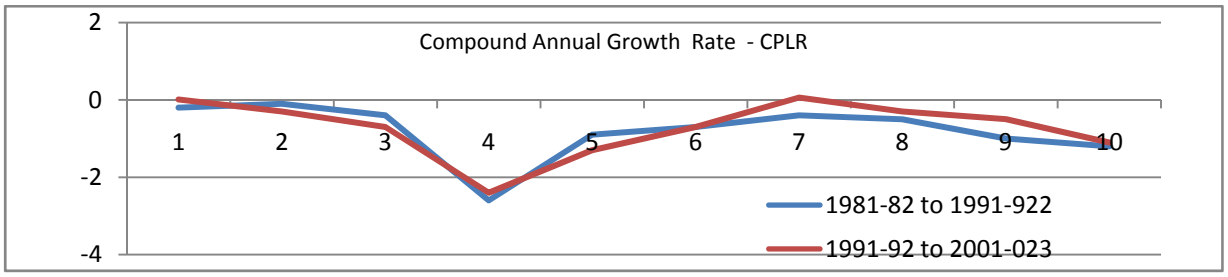
Sl.No.	Agro-Climatic Zones	FOREST		CPLRS		NAAU		NSA	
		1981-82 to 1991-92	1991-92 to 2001-02	1981-82 to 1991-922	1991-92 to 2001-023	1981-82 to 1991-924	1991-92 to 2001-025	1981-82 to 1991-926	1991-92 to 2001-027
1	WHm	0.6	0.05	0.23	0.01	0.03	0.09	-0.48	-0.79
3	LG	NA	NA	NA	NA	NAAU	NA	NA	NA
4	MG	1.47	0.07	-0.14	-0.54	0.46	0.54	-0.2	0.01
5	TG	-0.05	-0.36	-0.77	-1.29	1.39	1.24	0.06	0.1
6	UG	0.27	-0.82	-2.34	-2.2	0.56	1.86	0.03	0.03
7	EHg	0	0.82	-0.82	-1.19	1.55	0.86	0.12	0.01
8	CHg	-0.27	0.36	-0.64	-0.58	1.29	0.95	0.21	-0.02
9	WHg	0.4	-0.4	-0.37	0.05	1.94	0.53	-0.01	-0.14
10	DP	0.36	0	-0.43	-0.26	0.21	1.4	0.2	-0.09
11	EG	-0.08	0.03	-0.9	-0.41	1.25	1.14	0.28	0
12	WC	-0.03	-0.02	-1.05	-1.02	1.47	2.14	0.28	0.06
13	GC	-0.73	-0.55	0.57	0.25	1.78	0.32	-0.3	-0.06
14	TD	-0.73	-0.55	0.57	0.25	1.78	0.32	-0.3	-0.06

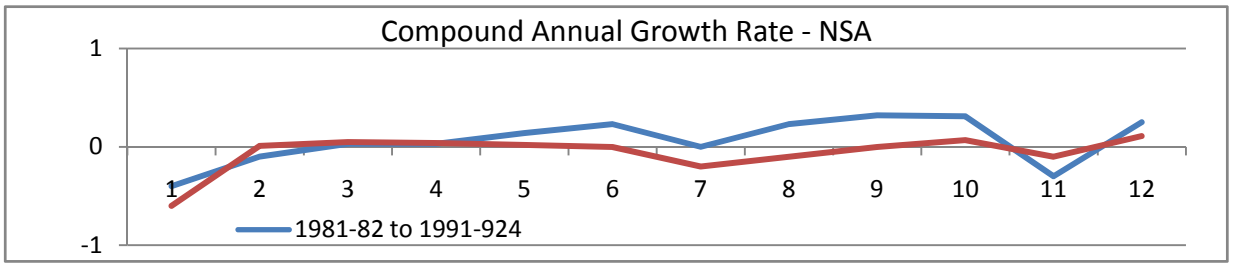
Table 2.6 Compound Annual Growth Rate Of all The categories of Land by Use in Various Climatic Zone (180-81, 1990-91 and 2000-01)

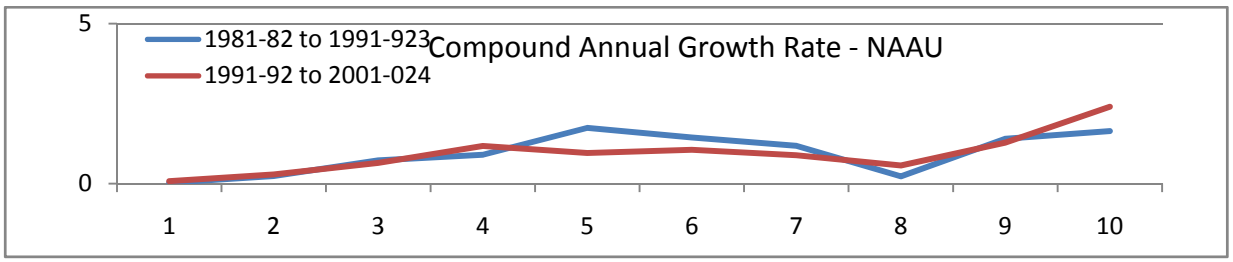
Sl.No	Agro-Climatic Zones	Forest		CPLR		NAAU		NSA	
		1981-82 to 1991-92	1991-92 to 2001-02	1981-82 to 1991-922	1991-92 to 2001-023	1981-82 to 1991-923	1991-92 to 2001-024	1981-82 to 1991-924	1991-92 to 2001-025
1	WHm	0.54	0.04	-0.2	0.01	0.03	0.08	-0.4	-0.6
2	MG	0.78	0.04	-0.1	-0.3	0.24	0.29	-0.1	0.01
3	TG	-0	-0.2	-0.4	-0.7	0.73	0.65	0.03	0.05
4	UG	0.3	-0.9	-2.6	-2.4	0.9	1.18	0.03	0.04
5	EHg	0	0.92	-0.9	-1.3	1.74	0.96	0.14	0.02
6	CHg	-0.3	0.4	-0.7	-0.7	1.44	1.06	0.23	-0
7	WHg	0.44	-0.4	-0.4	0.06	2.18	0.59	-0	-0.2
8	DP	0.4	0	-0.5	-0.3	0.23	1.57	0.23	-0.1
9	EG	-0.1	0.03	-1	-0.5	1.4	1.28	0.32	0
10	WC	-0	-0	-1.2	-1.1	1.64	2.4	0.31	0.07
11	GC	-0.8	-0.6	0.64	0.28	2	0.36	-0.3	-0.1
12	TD	0.24	0.22	-0.4	-0.3	0.64	0.82	0.25	0.11

Figure 2.6 Compound Annual Growth Rates









1.1 Western Himalayas (WHM)

Due to its mountainous topography with brown soils & silty loam, steep slopes.most the Agriculture is limited to definite tracts. According to a recent study by Anil Rai et.al (2008) the Agricultural Status Index[38] of the region is low. NSA is comparatively lesser due topographical adversity and lack of Irrigational means. Owing to lesser NSA most of the area eventually

[38] "development of livelihood Index for different Agro Climatic Zonesof India",Agricultural Economics Research Review,Vol.21, 2008, Table 1, pp177 . In his work he has derived index for different aspects and parameters for measuring livelihood for each climatic Zone .

falls under the CPLR. Greater extent of CPLR and lesser NSA necessitates keeping a good number of Livestock so as to ease out the natural stress and shocks. Area Under forest has increased because of natural favorability and partly due to existence of Joint Forest Management (JFM) organizations. . Increase in the forest Area could be attributed to the extension of forestry plans on Barren and uncultivable land as there has active JFM organization across the region.

Over 30 years percentage of area under forest has increased from 25, 97 % in 1981-82 to 27.52% in 2001-02 at an average annual growth rate of 0.54% between 1981-82 and 1991-92 (0.60% decadal growth) and 0.04% between 1991-92 to 2001-02.Area under NSA has undergone a decline over the two decade at the annual rate of -0.44 % in the first and -0.57% in the second decade. Area under CPLR increased in the subsequent decades. Though the area is place in low category in terms of infrastructure status by Rai (2008) but the increase in NAAU in the first and Second decade evokes expansion in build up area. NSA has suffered the Loss in this region due to Expansion in Area in other categories.

1.2 Trans Gangetic Plain:

This is one of the most fertile as well as densely populated regions in the world. This fact is prominently reflected in the land use pattern in this region. The proportion of the forest to the total geographical area is considerably low. Geographical favorability of land fertility and homogenous topography for agriculture resulted in Private ownership of land.

Over the period of thirty years, it observable that forest area has remained in between 5 to 6% with an average of 6.09 percentage of total reporting Area. Area under not available for agriculture has also been more or less remained between 8-10.57 % with gradual rise. Proportionate rise can be seen in the in NSA with declining trend in the CPLRs. This can be deduced that the area declining under forest and CPLRs is being occupied by NAAU in greater proportion and by NSA in lesser.

The rate of annual growth in forest remained negative with -0.05% in between 1981-82 to 1991-92 and further declined to -0.36 % between 91-92 and 2001-02..Whereas area under NAAU shows the Positive average annual growth rate at 0.73% in between 1981-82 and

1991-92 which declined to 0.65 % in the following Decade but still high rate of expansion of build up area. This is because of high population growth rate in the region

Decadal Growth in forest has been negative by -0.05 % and rose up to by -0.35% in the following year. whereas CPLR declined at the annual rate of -0.41% and -0.68% in between 1981-82 to 1991-92 and 1991-92 to 2001 -02.decadal change being at -0.77 and -1.29%. This decline in the aforementioned categories has been occupied by NAAU in first decade with 0.73 % of annual growth and by NSA 0.03% in the second.

Between 1993 and 1999 the reduction in CPRs was estimated to be 71 hectares per 1000 hectare.39

Since the region is heavily relying on Agriculture, almost 60% of population in farming business in 68 % of NSA to total reporting Area underlines the significance of CPLR as a means of livelihood and income substitution . This may be seen if improvement or reduction in the waste land via irrigation and land treatment bears positively on the dependence level on CPRs . According to a case study based in Karnataka ,Kiran Kumar40 found that the overall dependence on common lands for fuel wood and grazing was found to be lower in the irrigated village as compared to the unirrigated village. This would be elaborately checked in the Following chapter.

1.3 3 Upper Gangetic Plain

With Punjab and Haryana being agriculturally leading States, backed up by sufficient infrastructure and has very high proportion of Net Sown Area . Consequently , area under other categories is manifestly low . Punjab has improved greatly in improving the forest cover in recent past (as found in the first chapter that over 50 years average was 4.7% for Punjab and 2.6 for Haryana, Table 2.1) the combined figure over the thirty years has been 3.7% with slight annual increase of 0.30% in between 1981-82 and 1991-92 and then falling at -0.91 % afterwards . The decadal change thus arrived is 0.27 %in the first decade and -0.82 % in the second.

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[39] Table T6 , *Report No. 452: Common Property Resources in India, Jan - June 1998, NSS 54th Round, page 24*

[40] Kumar.AK, "Impact of irrigation-led agricultural development on use of common lands in dry regions of Karnataka, India." 'part of the "Joint Forest Planning and Management in the Eastern Plains Region of Karnataka: A Rapid Assessment"

In the first decade CPLR considerably decreased from 7.14% in the first decade to 5.65 %. With annual negative growth 0f -2.34 % in first decade and -2.41 % in the second. Contrary is true for NAAU where the increase in the first decade is low but positive and rapidly increased to8.7% in 2001-02 from 7.89% this is because of new opportunities coming after liberalization. NSA has remained unchanged over the period growth rate of 0.03 % in subsequent decades . Besides Punjab's concentrated effort to improve upon the ecological milieu, the FDI figure evokes that huge investments are being flowed in Haryana and establishments of SEZ is occupying the Defacto CPLR thus raising area under NAAU41 and declining area under CPLR. The rise in NAAU is prominent in Post liberalized years. These expansion in FDI is obliviously anticipates further reduction in CPLRs.

1.4 .Lower Gangetic Plains (data for the year1991-92 not available)

The region only contains the districts of W.Bengal and the area is prone to flooding and is densely populated . The average Forest area in the region is 13.6% which has declined at the annual growth rate of -0.12 % the only category having scored positive growth rate is the NAAU. This is evident through the remote sensing data about the expansion around major cities of Hoogly and Kolkata over the 30 years. More or less the NSA has remained unchanged[42]

1.5 5 Middle Gangetic Plain

This region includes almost entire Bihar and districts of eastern Uttar Pradesh.

The region receives high rainfall and intensively cropped. Population is dense with high proportion of cultivators. The region has low infrastructure Status and medium Agricultural status. No significant change has taken place in this region

There is a gradual increase in the forest at a positive growth rate of0.78% between 1981-81 and 1991-92 and 0.04% between 1991-92 and 2001-02. The similar rising trend goes for

[41] Refer to "FDI in India and its Growth Linkages" *National Council of Applied Economic Research* **(** a project by department of industrial policy and promotion)August 2009, Map1 ,pp 122 . Refer to the Annexture for comparing FDI establishments, Area under NAAU and CPLR

[42] "Land Use Change in Developing Countries :Comparing India and China" ,Sumeeta Srnivasan,, Peter Roggers,DES/HUCE,Harvard University

NAAU with 0.24% in the first decade and 0.29 % in the second. This implies that the region is experiencing loss in NSA and CPLR . The reason for expansion in NAAU might be built up area increasing at the cost of NSA and CPLR.

1.6 6Western Plateau and Hills (WHg)

This region includes the Plateau area of Karnataka, Madhya Pradesh and Maharashtra . The region is marked as medium status in terms of agricultural and Economic status performance. Figures in the in the above table hold consistent with the findings of aforementioned Status Index. Therefore not much economic investment as FDI is taking place. Consequently NAAU is in increasing trend .Forest area almost stagnant with slight fall in 1991-92 (due to non availability of data in few districts) Dewas and Mornea in Madhya Pradesh. Though the Area under CPLR diminished and rose but not to the earlier level. This indicates that some of the Area from CPLR has been seceded to NAAU. Annual growth rate has been positive and has accentuated in the second decade.

1.7 7 Southern Plateau and Hills (DP)

This region too fall in plateau area and has medium Agricultural status but High Economic Status.

The region has experienced Growth in forest having Positive growth in the subsequent period with 0.21% of annual growth in the first decade followed by 0.9% to reach at 18.32% of forest area and is little less than the National Average of 21% . This Increase in the forest is accompanied by NAAU at 0.273 % and 1.57% of annual growth rate in the first and the second decade. NSA has experienced slight fluctuation due to fluctuation in rainfall causing corresponding change in the fallow land . But the impact of fallowing is negligibly reflected in the CPLR because forest area might have taken a good chuck of it and some of the portion has been enumerated in NAAU. Therefore the share of CPLR has decreased particularly in between the 1981-82 and 1991-92. Nevertheless, there is a slight increase in the CPLR in the second decade but could not gain the earlier status.

1.8 .Central Plateau And Hills (CHg)

This region Mostly includes the Central highlands of Madhya Pradesh and Rajasthan a few districts of Uttar Pradesh.

The average Forest area at 18.68 % due to geographical favorability and shows a declining trend with annual negative growth Rate of 0.30% in the first decade and positive at 0.39% in the second . Similarly NAAU has increasing figures with Growth rate of 1.44 % and 1.06 %. With An average area of 52% of NSA the range varies between 51.40% and 52.44 % and has increased with positive growth rate. The growth in all these categories have substituted by the loss in CPLR. Since in Rai's 'Economic Status Index' the region is categorized as higher order , the lack of CPRs could be afforded. But still the permanent pasture and grazing land has to be maintained as the area supports good live stock. Due to high infrastructure the area under CPLR may further open avenues for capturing the land under CPLRs.

1.9 Eastern Plateau and Hills (EHJ)

The area is known for its mineral deposit and is exploring site for coal and other minerals . Mostly covers the districts of entire Jharkhand, Chattisgarh Orissa and a few districts of eastern Maharastra. The Economic , infrastructural as well as Agricultural status in the region is low. Due to high concentration of Tribal population , the significance of CPLR is indispensable . NSS estimation of households collecting CPR product is as high as 73 % which is highest amongst all the regions[43] . But the figures for land utilization shows an adverse trend. Though the Net Sown Area and forest is in increasing trend opposite is true in case of NAAU and CPLR.

Forest has increased at the rate of 0.92% over the second decade to reach 18.76 % of area in 1991-92 from 17.28% in 1981-82 .This increase in the forest area could possibly be linked with Joint Forest initiatives by local and government organization. Area under NSA has increased too with 0.13% of annual growth rate for the first decade and 0.24 % in the second decade. The rise in these two categories are compensated with declining area in NAAU which diminished 7.88% in 1981-82 to 7.01% in 2001-02 . This decline may be

[43] Table T 9, p. 28, National Sample Survey Organisationa (NSSO),1999.

attributed to increasing mining activities . Area under CPLR has declined from 22.10 % in1981-82 to 18.07 in 2001-02 with and declining rate of -0.91% in the first decade and -1.32% in second decade. This decline in CPLR is not of much impact as long as NSA and Forest area increases. Due to lack of irrigational means and heavy reliance on rainfall keeps the potential stress which could be eased out only if sufficient forest and CPLR is managed and accessed

1.10 10 East Coast Plains and Hills (EG)

This region includes the coastal belt comprising the districts of Andhra Pradesh, Orissa and Tamil Nadu. The average households collecting CPR products is around 51%.

The Average Forest area in this region is 23.66% ranging from 23.76% in 1981-82 to 23.64% in 2001-02 . there is a slight decrease in the forest area and CPLR ,however the second decade shows rise in it at 0.03 % of annual growth rate in forest area . In this region, the increasing trend in area under NAAU bring to mind that more or less some portion of CPLR is used for construction canals and other non agricultural work as the Infrastructure status index and Agricultural Status Index is high in the region.44 NSA has increased slightly in first decade and has maintained the proportion at 42.99%

1.11 11.West Coast Plains & Hills (WC)

Area under forest has remained unchanged and remained around 26% which is above the National average of 21%.This is due the fact that area receives high rainfall and has good ecological supporting system. NAAU has increased considerably with annual growth rate of 1.64% to 2.40% in the second decade. Area gained in the NAAU is from the loss of area in CPLR as the Agricultural and Infrastructural Index of this region is high. Average no of household collecting CPR product is also low from the rest of the regions so decline in CPLR is affordable as long as Agriculture strengthens further .

[44] Rai et. al.,Table 1

1.12 12 Gujarat Coastal Plain (GC)

Rai(2008) has placed this region in high Economic and Agricultural Status.

Percentage of Forest area has decreased from 10.39% in 1981-82 to % in 1991-92 and to 9.14% in 2001-02 at the rate of -0.81 % in the first decade followed by -0.61% in the second. Area Under CPLR is marginally increasing at 0.64% in the first decade and the rate of growth has declined in the post liberalized decade to 0.28% . NSA which declined in the First decade At the rate of -0.34 has further declined slightly at -0.06 in the second decade. The high growth rate in NAAU is pertaining to the construction of manufacturing units around Ahmadabad ,Anand and Sundergarh.

1.13 Western Dry Regions (TD)

Many Studies have confirmed the Fact that CPR's are declining in the Dry Region of Rajasthan . Due to climatic adversity most of the land is devoid of farming in the dry season . This is also the region where in high livestock is kept to overcome the shocks and stresses originated out of climatic adversities. Consequent to Government's effort to increase the forest cover in the state , percentage of the forest area slightly increased at the rate of 0.34% in the first decade followed by 0.22%. one reason for such a slow growth is linked with greater number of livestock which damages the planted trees. The Agricultural and Infrastructure status is low besides this fact NAAU has registered continuous growth at the rate of 0.64% in the first decade and 0.82% in the second. NSA accounts an average area of 50.30% and is in rising trend .

Discussion

The above trend and pattern inherently suggests a close link of Land use pattern with the Agricultural and Infrastructural status in respective regions. For example Anil Rai's (2008) work on livelihood index on the basis of different parameters for the entire Agro climatic region is comparable with the Land use pattern . Regions such as Trans Gangetic Plain, Southern Plateau and hills(DP),East coast Plain & Hills , West Coast Plain & Hills have high Infrastructural Index and the Land Use category under NAAU has an increasing trend. These are also the region having declining CPLRs. Whereas Western Himalayan Region(WHm) ,Eastern Plateau and Hills(EHg) and western Dry Region (TD) has low

status index which is concomitant with the declining NAAU. Wherever the Agricultural status is high there is a decline in CPLR such as Upper Gangetic Plain (UG), Trans Gangetic Plain (TG) East Coast Plains and Hills(EC) and Gujarat Plains and hills(GC) have declining CPLRS and slightly increasing area under NSA. Regions with both Infrastructural and Agricultural status high such as Trans Gangetic Plain and East Coast Plains & Hills have Increasing area under NSA and NAAU and except for forest decline in CPLR is observed. This can further be checked with establishments under SEZ. Upper Gangetic Plain , East Coast and Lower Gangetic Plain Have Sizeable number of FDI establishments (in the Working paper published by NCAER-"FDI in India and its Growth Linkages") Present trend shows, particularly, in the post liberalized period - public invest has considerably decreased whereas private investment is increasing at increasing rate. Therefore there isn't much improvement in the proportion of the fallow land . whatever investment is made is solely on individual farm lands . Out of the total investments it is richer or big farmers mostly investing. Marginal farmers still find it costlier to manage the farming and secede the land to bigger landlords what is recently observed as 'reverse tenancy'. In such scenario CPLR carries weight for them. In many districts of the middle Gangetic plain there are instances of increase in the NSA. This might be the result of encroachment over CPLRS. The old tradition of land distribution among the poor might have helped coping such issues but "Even if the land is distributed among the Marginal or poor farmers it is of less significance because the land available for distribution are mostly waste lands of the categories of 'user lands', unmanaged derelict lands, disputed lands and similar large varieties having characteristics causing unproductively were brought under cultivation or allotted to the beneficiaries a major part of such lands were abandoned or unwillingly left of cultivation due to extreme conditions of marginal productivity"(Roy.B.K.Dr., "Are Waste Lands the Last Hope of the Poor, GeoJoumal 17.1 117-124, 1988, Kluwer Academic publisher). Wastelands should be strengthened and managed such way that even if the quantity decline could be compensated with the quality enrichment. As s some of the micro level finding suggests that irrigation improves the quality of land and self reliance decreases the dependence on CPRs.

Conclusion

During the recent years, there has been an increase in the area put to non-agricultural uses, as expected, because as a result of increase in the development activities, more & more land is being used for industrial sites, housing, transport systems, recreational purposes, irrigation systems, etc. Zones where the proportion of lands under non-agricultural uses is higher than the all-India average are East coast Plain, Trans Gangetic Plain East Coast Plains and Hills , Southern Plateau and hills,West coast plains and Ghat.These are also the region where CPLR has decline at high rate of change.This establishes the fact that Economic growth and expansion of the area mainly encroach over the de- Facto CPLR. Many instances were recorded where in the Grazing land and pasture land also diminishes. As long as barren and uncultivated land is put in use for the development construction, there is no setback to the rural but lobbied political decision and high profit motives could undermine the harmony between different categories of land. With Urbanization further strengthening and World Bank anticipates by 2015 more than half of Indians are projected to be urban dwellers. And additional rise in the population can further deteriorate the condition of bottom liners in the income pyramid and possibly poverty led degradation of land could make the situation worse.

Chapter 4

Determinants of the Size and Extent of CPLR: A Reference to Common Pasture Land and Waste Land

4.1 Introduction

Observation through the second chapter its convincingly observable that the status of de-facto CPLR was seen across the Agro climatic zone and was compared with the infrastructure and agricultural Index of the . It was found that a region with high status of infrastructure leads to expansion of NAAU and shrinkage of de-facto CPLR. This chapter intends to look at the whether or not the agricultural infrastructure leads to shrinkage of common land. For a more clear understanding and results de-facto CPLR has been narrowed down to de-jure CPLR viz. 'permanent pasture and grazing land and cultivable waste Land' by disassociating the integrated land categories in de-facto.

Agricultural infrastructure though could be any technology or construction that leads to promote agricultural growth, in this chapter focus has been concentrated on a few prime factors that have been introduced in agriculture right at the beginning of Green Revolution. In order to examine the causality between the Agricultural infrastructure and the *de-jure* CPLR (henceforth CPLR would refer to as *de-jure* CPLRs) three time period has been chosen at an interval of 10 years (1971-72, 1981-82 and 1991-92) with the similar variables in consecutive years so that the effect of particular element of infrastructure could be observed on CPLR. The analysis is based on the district level data of States – Gujarat, Andhra Pradesh, Karnataka, Maharashtra, Uttar Pradesh, Madhya Pradesh, Rajasthan, Tamil Nadu and Orissa constituting 231 districts(districts formed after 1971-72 are merged back to their parent districts)

4.2 Selection of Variables

Available literature and the various rounds of NSSO report on 'employment and unemployment' and 'income and consumption' levels highlights the gap of Ownership of assets across operational land holding classes in India (specially 54^{th} and 59^{th} round). Apparently rich farmers possess assets that could be applied for income generation and

enhancement. In the first chapter (section 6) 'Relationship between grazing land and Operational land holding Classes' shows that rich people commands greater number of livestock. Therefore livestock has been taken as one of the determining aspect for the size of CPLR.

Net Area Irrigated :

Iyengar (1989), based on the survey conducted at Gujarat, "the extent of CPR land is a function of productivity potential and the scope for improvement of land for agriculture. In Arid and Semi-Arid regions and in areas where the productivity potential of land is low, percentage of CPR land to the total geographical area should be high"[45]. This alternatively implies an increase in the means of productivity enhancement such as irrigation and fertilizer would reduce the extent of CPLR. Since the productivity and land cultivation becomes easier the tendency for encroachment is high. "In most of the villages, cultivation tends to encroach the common land as there is lack of supervision of common property lands away from villages. "Encroachment, the illegal occupation and cultivation of common land, occurs throughout many less-developed countries. Much of this encroachment has been at the boundaries of common and private land: Farmers with private land adjacent to the common land encroach by gradually moving the boundary marker, incorporating the common land into their own holdings, and framing it as their own to the exclusion of others" Robinson E.J.Z (2004).

The variation across the size category has declined. During 2000-01, which is the latest published information from the agriculture census, more than half of the area under cultivation in marginal holdings was irrigated. Irrigation coverage on smallholdings was 39percent. As landholding increased, the percentage of area under irrigation decreased. Large-sized farms with holding size more than four has been applied,irrigation on 31percent net sown area.[46]

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[45] Iyengar, S. 1988. *Common Property Land Resources in Gujarat: Some findings about their size, status and use. Working Paper* no.18. Gujarat Institute of Area Planning: Gota, Ahmedabad.

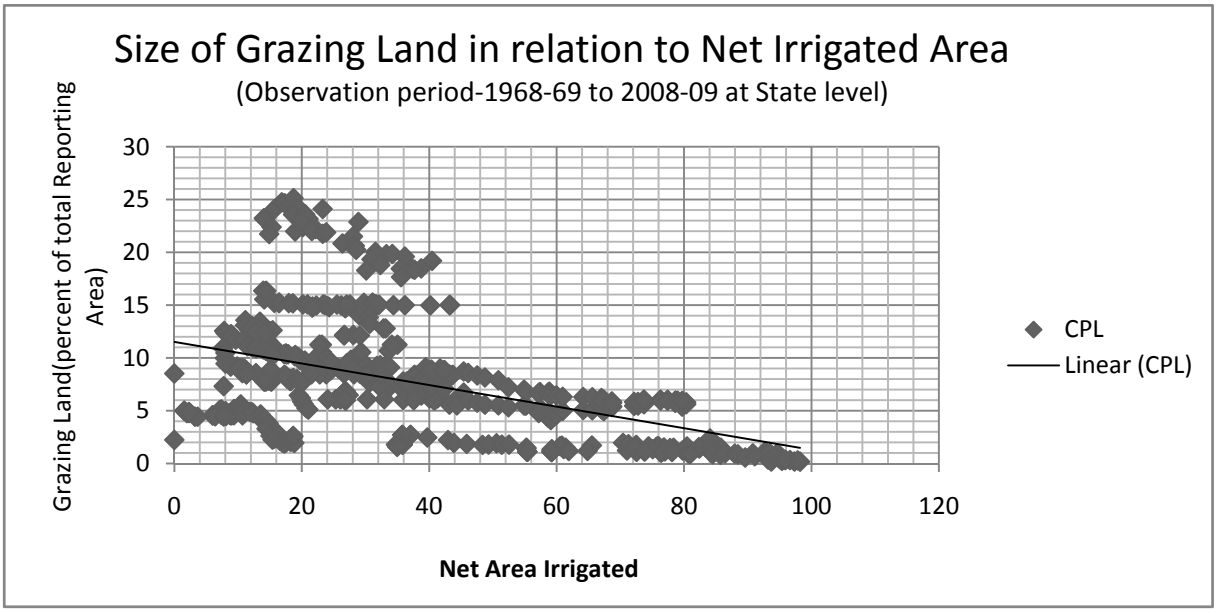
[46] Refer to table no 4, pp-7 in R.Chand et.al , "*Farm Size and Productivity: Understanding the Strengths of Smallholders and Improving Their Livelihoods*", Economic & Political Weekly Supplement EPW June 25, 2011 vol xlvi nos. 26 & 27,2011.

Before, looking at the cause and effect relationship a test is done based on the time series data for 40 years (1968-69 to 2008-09) at the state level to check the interrelationship between irrigation and CPLR. Correlation result explicitly shows an inverse relationship between the level of irrigation and the size of grazing land (see Appendix- table A.1) the correlation is found highly significant at 0.01 level. Increase in irrigation is the need of the hour. Though irrigation has a negative relationship with the CPLR but there is no denial to the fact that irrigation positively relates to income as well. In addition to increasing crop production and farm and family incomes, improved irrigation access significantly contributes to rural poverty reduction through improved employment and livelihoods within a region (Chambers 1988; Barker et al., 2000)[47]. Kiran Kumar (2003) found in a micro level study in Karnataka that there is overall dependence on common lands for fuel wood and grazing was found to be lower in the irrigated village as compared to the unirrigated village. In the case of fuel wood use, the decline in dependence on common lands seems to be more an indirect outcome of the introduction of canal irrigation, which coincided with and has clearly supported the spread of Prosopis juliflora, an invasive woody shrub"[48]. R.Chand et.al.(2011) points out that small farms still manage to produce more than the big farms in the same Agro climatic Zone but the increasing man-land ratio, due to growing no of marginal farmers , tend to generate awfully low amount of income.

[47] Chambers, R.1988. Managing canal irrigation: Practical analysis from South Asia. New Delhi: Oxford & IBH Publishing Co. Pvt. Ltd.

[48] "Impact of irrigation-led agricultural development on use of common lands in dry regions of Karnataka, India"

Figure 4.1 Relationhip between Net Area Irrigated and Percentage of CPLR to the Total Geographical Area.



Annual Rainfall:

Since majority of the small and marginal farmer community depend on the rained agriculture due to lack of proper means of irrigation. Regions with less rainfall would have high CPLRs as in Rajasthan there is greater expanse of the same in rainfed regions. In the previous chapter it is observed that in the Eastern Plateau and Hills region CPLRs have grown a little over the period of time (refer to Sub-section 9) and has highest incidence of CPR usage. This might be because of the predominance of tribal in the region, but such a wide area under CPLR with, highest potential to deliver CPR products, would not have been possible.

Agricultural Implements, Rural Connectivity and Markets:

These Includes tractors, Diesel and electrical pump sets, power tillers etc. they are means to increase productivity. Fan, Hazell and Thorat (2000) based on the state level data for 1970-93 have examined different type of government spending on infrastructure and its outcome on poverty reduction. The result of the study shows that in order to reduce rural poverty,

some specific infrastructure has to be prioritized, particularly rural roads and research and development. This has represented that the investments on infrastructure has inverse relation with the incidence of poverty[49] .Zhang and Fan (2004) confirmed the causality test of the positive effect of infrastructural development on the total factor productivity. The causal effect of roads and irrigations contribute to the TFP growth and the demand effect of total factor productivity is less noticeable than on irrigation.

The general conception about the shrinkage of CPLR is attributed to the expansion in agricultural land. This has been validated in most of the region in the previous two chapters. Factors positively contributing to the agricultural expansion, logically, should have a negative correlation with the CPLRS. Khan.R.E.A and Md. Quazi.A.H (2010)[50] examines the long-run determinants of agricultural land expansion by JJ co-integration technique. The results of co- integration indicates that there exists a long-run relationship between agriculture land expansion and the factors like agricultural prices, agricultural income, live stock population, human population, agricultural technology, fertilizer use, irrigation and rainfall. The normalized co- integrating vector shows that the agricultural prices, fertilizer use, irrigation and technology positively affect agricultural land expansion, whereas, human population, agricultural income and rainfall found to negatively influence agricultural land expansion. It is also found that livestock population has insignificant impact on the agricultural land expansion. The study proposed to increase the use of technology and irrigational infrastructure along with adjusted agricultural prices to expand the agricultural land for agricultural growth. Livestock has been a crucial means for protection against period of shocks. Since still majority of farmers depend on rain-fed agriculture, erratic monsoon pattern and frequent drought condition provides them with the extra income. “The lamb fattening sheep unit represents a very reasonable livelihood option for agricultural labourers as it requires less resources and not demand very specialized skills. The breeding unit, which requires the part time involvement of the farmer, or his family member, provides

[49] See table 1 and table 4 “Government Spending , Growth and Poverty in Rural India”American Journal of Agricultural Economics, vol82,no.4,2000,pp- 1039& 1049

[50] Khan.R.E.A and Md. Quazi.A.H, “Agricultural Land Expansion In Pakistan: An Empirical Analysis” Indian J. Agric. Res.., 44 (4) : 235 - 241, 2010

a very stable and attractive additional income source for small and marginal farmers without affecting their main occupation" Mishra.A.K(2006)[51].

Table 4.1 Correlation between CPLR and components of Agricultural Assets and Infrastructure

Correlations	
	CIL
CIL	1
ANNUAL RF	-.110**
DIESEL_PS	-.113**
ELECTRIC_PS	-0.062
POWER_T	-0.02
TRACTOR	-.082*
NPK_TC	-.128**
PPMRKT	-0.052
PSMRKT	-0.02
LROAD	0.002
CRP_ITSTY	-.161**
NIA	-.133**
LVSTK_T	.134**
MARG_O	-0.087

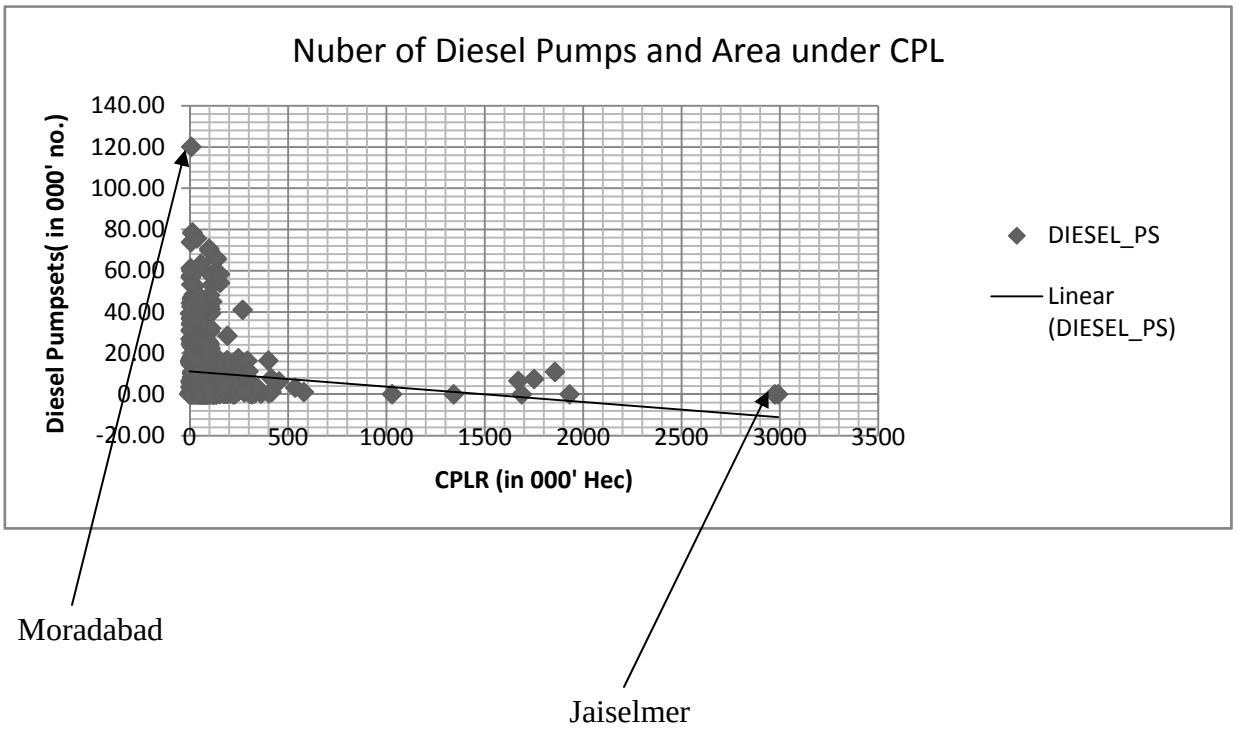
** Correlation is significant at the 0.01 level & *Correlation is significant at the 0.01 level (2-tailed)

The Correlation matrix given in the following reflects more or less the reality. The Negative correlation with annual Rainfall is significant at 0.01 levels. That means there would be an increase in the CPLR with scant rainfall. The dry region have large expanse under grazing land. Conversion of low productivity land to waste land is but obvious due to prolonged dryness hence negatively correlated. Diesel Pump sets and Electric pump sets both show negative relation but Diesel pumps being prominently negative at 0.01 level of significance. The reason is that most of the rural farms still lack electricity supply; except for Punjab and Haryana most of the states have high number of diesel pumps. As we found that irrigation is inversely related with CPL at 0.01 level of significance. NIA has been replaced with Pumps in correlation observation. Tractor is one of the prominent proxies for

[51] Mishra.A.K *et.al* , "Improving the livelihood of landless and marginal farmers through sheep rearing in rainfed agro-ecosystem of India"

Modernization and commercialization of farming hence greater number of Tractor would lead to expand in Arable area. Fertilizer is one of the most determining factors to make land productive. Abandoned land as well as waste land can be reduced due to extended fertilizer application. Close markets provides necessary inputs availability at lower travel cost therefore promising prospects for extension of agriculture.

Figure 4.2 Relationhip between Number of Diseal pumps and Area under CPL



Primary market has higher degree of negativity as they are the one more often visited. Roads have positive correlation with CPLRs because they help mobilization of the rural mass. The daily wage earners and migrants from the rural area help in reducing the overburden on the CPLR resources. As population and resource depletion are inversely proportional, reductions in population eases out pressure on land cropping intensity holistically. Therefore cropping intensity also shows the suitability of agricultural production in an area. The intensity is more likely that the waste land is to be brought under the plough. Livestock and CPLR are positively related at high significance level. This is but obvious that greater number of livestock would require pasture and grazing. Hence local people themselves bother to care for the land. It may also be due to the fact that Dry regions have less prospects for agriculture therefore high incidence of Livestock found in dry region where the CPLR is

widely spread (there's a negative significant correlation between annual Rain and livestock, refer to Appendix.

4.3 Cause -Effect Examination

Having seen the correlation between CPL and some of associates of agriculture, a cause and effect test could be done. For a simple cause and effect examination Simple OLS regression technique has been employed. Discovered result partially confirms the correlation findings. Altogether the result accounts for about 54 percent (R square) of the causality at 0.0001percent significance. 'F' value is about 29.001 which Fairley grades the model. Following Table give an account for the probability.

The Beta value of diesel Pumps signifies that reduction in 957 pumps could lead to 1 thousand hectare of increase in the extent of CPLRs. whereas for tractor it is -3.5. It might be deduced that Tractors are mostly possessed by well off farmers. There is a dual impact on CPLR due to possession and rise in the number of tractors as per the NSS survey report "**t**he rapid rise in number of tractors was accompanied by a fall in the working bovine stock per 100 hectares of operated area from 65 in 1971-72 to 59 in 1991-92.'[52] Lesser number of livestock is then by the rule suggests decline in the CPLRs as well. Livestock and CPLR have positive correlation in the causality shown in the result exhibits that there will be an increase in a unit of Area of CPLR with 0.98 Unit increase in livestock. Relationship increase in the number of marginal farmer would lead to decline in the CPLRs. As the number of poor higher the dependence and pressure on CPLR. Ultimately grazing land becomes barren land with no heed for regeneration of pasture. In the short run these marginalized are less aware with the far reaching consequence of environmental degradation and are much concerned about their livelihood if rather than the issue of sustainability.

In another set of regression between the components showing highest degree of correlation and CPLR explains about 9 percent of change, the test being highly significant at 0.0001 levels perfectly shows the causality. The coefficient of Irrigation intensity is inversely related with the CPLR at -.966 followed by cropping intensity at -.614. (See Appendix -4-B.3).

[52] Report Number 408 , under the title "Highlights" in the introductory pages.

4.4 Discussion

Poor become poorer in the vicious circle of poverty. Landless have no other option rather than to work as agricultural laborer on daily wages or in some other unorganized sector. Well connected village provide linkages and options for a range of work, therefore could reduce the pressure on local resources. But the marginal farmer, with the only option to till a small piece of land, puts entire energy and labour to get maximum possible returns. This is why the production is higher than the big farms. But excessive tillage and no fallowing leads to misappropriation of soil nutrients ultimately abandon the land as barren. Sometime in an effort to produce more even small farmer irrigate excessively which gradually become saline. "In the case of soil salinization and desertification, both commercial farmers and smallholders were present within each group and were driven by the same factors. Government policies encouraging the use of water-dependent Green Revolution techniques were considered by many studies to be a primary cause for salinization (Oodit and Somonis, 1992)53. It's very dilemmatic to reconcile the marginalization of small farmer to marginal and marginal to landless laborer within the ambit high ambitions for agricultural development. The initiatives by the government have failed to show fetch any satisfactory outcome towards adding options for the rural livelihood. Redistribution policy of surplus land shows no positive signs. Incentives and subsidies are absorbed by already advantageous class. Opaque governmental intervention often found occluded. Again the relevancy of Green revolution is questioned. The trajectory which it intended to achieve has been a tough road ahead now. The limited success of Green revolution has indeed been a mixed bag in that it has given rise to new set of problems: overuse of water and fertilizers. Excessive use of water results in water logging and salinisation and adds up to devouring the sustainability for the poor.

[53] Oodit, D. and Somonis, U.E. (1992) "Poverty and sustainable development". In Sustainahihty and Environmental Policy. ed. F. Ditetz. U.E. Somonis and J. van der Straaten. Sigma, Berlin.

4.5 Conclusion

As followed from the second chapter where incidence of decline in de-facto CPLR accompanied with high infrastructure and agricultural status, have been more precisely examined at de-jure level. The hypothesis hold true for reduction in area under the CPLR. Though exact channel of depletion is difficult to recognize but some of the micro level finding almost attest to the fact that modernisation of agriculture coupled with marginalization of farmer is causing negative growth in CPLR. Effects of cropping intensity is highest on the depletion of resources that entail that more area is for the extension in the area is intensively cropped more urge. The observation of panel data over three point of time, covering most of the districts in mainland India, confirms to the fact. Increased adoption of mostly diesel pump sets has enhanced irrigation potential and has brought waste lands under the plough. Electrification as the major thrust for rural development is likely to widen the horizon. Those who can afford irrigation are catering to the new food habit of the changing world and the rest are falling prey to the externalities of development.

Chapter 5

Conclusion

There seems a clean reciprocity between the environmental resources and the economy. Environment responds to its milieu and develops region specific traits. So is the economy that responds to the resource base and develops certain kind of identity. But in reality there is a complex set of relationship existing between multivariate economy in one hand and widely variable resources on the other. Equilibrium to which is also a subject of change. In such a complex situation it is equally crucial to consider as in how many ways the human and the economy depends on nature? In such a dynamic system organizing and sharing the resource would have forward linkages. In this report as well an attempt has made to look through the historicity, assess the present and organizing the future. Land resource has always been crucial base for any development. Before taking any course to of action an attempt should be made to trace the signs as how does the environment have responded to the economy in general and society in particular. Once the puzzling interrelationship is understood it automatically tends to guide the future action. An attempt has been made in this paper to adopt this very logic to understand as how does the land have been used so far and what is its economic and social implication. The hypothesis, thus, build is based on the very basic logic of tracing the linkages of economic progress on the society and the resource. Wealth of literature has immensely contributed providing the building blocks for the hypothesis.

This begins with a very simple question as how the land does have been used so far? Common property Land resource being the sub section of the land as a whole draws paramount significance In India. Common property resources gained attention as an object of study in the 1980s. Several studies attempted to quantitatively measure the degree of dependence on common resources and gauge regional differences .very soon its importance was realized as the source of livelihood to the neediest section of the society. Therefore a pro -poor approach was gaining root. There are broadly two approaches to study CPLR, first, de-facto CPRs that means the area which is actually accessed by the common people for deriving CPR products. This may be beyond the boundary specified for resource use.

And de-jure the category of land specifically opens for the access of all. And have a clear demarcation of area from the rest.

First chapter deals with the literature which particularly deals with the significance of the CPRs to common man in general and to the poor in particular. It brings the idea that due to free riding issue and non excludability from using the resource, poor tend to utilize resources recklessly. On examining the literature various scholar put their view about the stakeholders and the mainly two points come in the forefront. Firstly CPLR forms crucial means to substitute the livelihood, secondly, increasing number of marginal farmer tend to nullify the effect of environmental upgradation. Though government intervention is solicited and blame is put to non e but the customary right for the misappropriation of colors and uncontrolled utilization of resources. Mainly the richer take more advantage out of CPRs. the value of product collected by them is way higher than what marginalized use. In parallel with the literature a quick look at various NSS reports and reference serves to establish vital linkages between different factors.

The trend observed over 40 years of time series data reveals awfully a declining trend in the CPLRS. This was mainly due to increase in the forest areas in some states and increase in area not available for cultivation. Annual growth rates and decadal growth rate over 4 decades further helps in predicting the direction of further change.

The decline in CPLR is matter of serious concern for the poor. Decline was measured with the size class of operational holding across the states. The result reveals that an inverse relationship exists between the Marginal farmers and CPLRs i.e. an increase in the marginal's would lead to decline in CPLR whereas the bigger the size of the farm greater the correlation. The significance level of the correlation is found high.

The second chapter begins with the similar scheme where in Land use patterns have been shown across the Agro- Climatic Zones. Rational for doing this chapter depends on the logic of homogeneity in area. Just to neutralize the effect of weather and to reckon the influence of economic force.

The trends were then compared with an index devised by Anil Rai2010 on the level of infrastructure, Agriculture, economy and so on. It has been observed that the Are

experiences decline in the regions having High Infrastructure and agricultural Index. This gave an idea to test the hypothesis whether or not the agricultural infrastructure leads to decline in area under CPLR.

Third chapter deals with the very idea that infrastructure leads to the depletion of common property land resources. It orders to make the result more clear, de-jure approach has been applied i.e. land under permanent pasture and grazing land and cultural waste land has been considered. The variable e selected were as similar to the Anil Rai's (2011) criterion of selection which is particularly agricultural production enhancing techniques and methods. The correlation found significant at 0.001 % therefore urging to check the cause and effect relationship between Color and the selected variable. Result shows the inverse relationship between irrigation, cropping intensity, diesel pumps and tractors. In another set of regression number of marginal farmers was tested with the CPLR. Results explain that the marginalized groups are significantly more dependent on the commons to sustain themselves as they do not posses property of their own. Another important fact of this research has been the alarming rate at which the commons have been declining over the years which has to do with both environmental damage and private accumulation of resources. This implies that the rural disadvantaged get further marginalized. Livestock possession and the tractor possession across the operational holding shows that the bigger farm owners have greater number of assets .These Farmers exercise greater control over Common Property resources.

If the poverty is increasing at multiples particularly, in the rural economy then what would happen to the common land? If the other category of land is stiffly competing for acquiring more area to be added in them then what is the likely status of the size of CPRs and what is the future. Since in a progressive economy somewhat partial decision is take n up with a hope that 'trickle down' effect would carry the benefit to them. Over 50 years of planning have been witnessed and two decades of so called "liberal" policy adaption but the rate of growth in poverty seems to nullify the growth in rural India. This necessitates asking another question as can community save this source of livelihood from the encroachment of liberal policy initiatives. There is an urgent need for an impartial supervisory institution. Recently concept of social capital also forging ground for the unionism and uniformity of action. Thus promoting Social capital can be of great significance at this level. Since most of

the social capital institution is based on the customary rights, a self evolution process would strengthen the bond between the co actors. Further the in top to down approach there is a need for devising the method bottom to top. As in the earlier approach the policy at times tend to go obsolete while reaching the found reality, also the shrinking Public capital can be re oriented to the Marginalized or in the maintenance of CPRS.

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Appendix 1

Metadata for National Agricultural Statistics in India
Chapter 2. Major Domains and Selected Indicators of Agricultural Statistics 16

Land Use

Concepts, Definitions and Classification

Geographical area - the latest figures of geographical area of the State/Union Territories are those provided by the Office of the Surveyor General of India.

Reporting area for land utilization statistics - reporting area stands for the area for which data on land use classification of area are available. In areas where land utilization figures are based on land records, reporting area is the area according to village papers, i.e. the papers prepared by the village accountants. In some cases, the village papers may not be maintained in respect of the entire area of the State. For example, village papers are not prepared for the forest areas but the magnitude of such area is known. Also, there are tracts in many States for which no village paper exists. In such cases, ad-hoc estimates of classification of area are derived to complete the coverage.

Forest area - includes land classified either as forest under any legal enactment, or administered as forest, whether State-owned or private, and whether wooded or maintained as potential forest land. The area of crops grown in the forest and grazing lands or areas open for grazing within the forests remain included under the "forest area".

Area Not Available for Cultivation :

- **Area under non-agricultural uses -** includes land occupied by buildings, roads and railways or under water, e.g. rivers and canals, and other lands put to uses other than agriculture.
    - **Barren and unculturable land -** includes land covered by mountains, deserts, etc. Land which cannot be brought under cultivation except at an exorbitant cost is

classified as unculturable whether such land is in isolated blocks or within cultivated holdings.

Other Uncultivated Land Excluding Fallow Land

- **Permanent pasture and other grazing land -** includes grazing land whether it is permanent pasture and meadows or not. It also includes the village common grazing land.
- **Land under miscellaneous tree crops, etc. -** includes cultivable land which is not included in 'Net area sown' but is put to some agricultural uses. Land under casurin trees, thatching grasses, bamboo bushes and other groves for fuel, etc. which are not included under 'Orchards' are classified under this category.
- **Culturable waste land -** includes land available for cultivation, whether taken up or not taken up for cultivation once, but not cultivated during the last five years or more in succession including the current year for some reason or the other. Such land may be either fallow or covered with shrubs and jungles which are not put to any use. They may be accessible or unaccessible and may lie in isolated blocks or within cultivated holdings.

Fallow Land

- **Fallow land other than current fallow -** includes land which was taken up for cultivation but is temporarily out of cultivation for a period of not less than one year and not more than five years.
- **Current fallow -** represents cropped area which is kept fallow during the current year.

Net area sown - refers to the total area sown with crops and orchards. Area sown more than once in the same year is counted only once.

Appendix 1.a

LAND USE CLASSIFICATION - ALL INDIA

Years	Total Geographical Area	Reportin Area	Forest			Area Under Non Agricultural Uses (NAAU)			Barren & Uncultivated Land	Permanent Pastures & Other Grazing Land	Land Under Misc, tree Grooves (not Included in NSA)	Culturable Waste Land	Fallow Lands Other Than Current Fallows	Current Fallows	**CPLRs (Total) = (sum of BUL, PPGL, LMTG,CWL,FL_oc,&CL)**			Net Sown Area (NSA)		
AVN-->	GA	RA	AREA	% of RA	Growth	AREA	% of RA	Growth	BUL	PPGL	LMTG	CWL	FL_oc	CL	AREA	% of RA	Growth	AREA	% of RA	Growth
1950-51	328726	284315	40482	14.2		9357	3.3		38160	6675	19828	22943	17445	10679	115730	40.7		118746	41.8	
1951-52		287827	48889	17.0	20.8	12690	4.4	35.6	37484	8592	7881	23929	15154	13808	106848	37.1	-7.7	119400	41.5	0.6
1952-53		290787	51154	17.6	4.6	12321	4.2	-2.9	37420	8634	7757	23680	13480	12899	103870	35.7	-2.8	123442	42.5	3.4
1953-54		291901	51079	17.5	-0.1	13283	4.6	7.8	36379	10881	5800	22898	12750	12025	100733	34.5	-3.0	126806	43.4	2.7
1954-55		291378	50431	17.3	-1.3	13784	4.7	3.8	34517	11218	5770	22805	13045	11963	99318	34.1	-1.4	127845	43.9	0.8
1955-56		291917	51343	17.6	1.8	13921	4.8	1.0	34475	11473	5885	21537	12544	11583	97497	33.4	-1.8	129156	44.2	1.0
1956-57		292179	51391	17.6	0.1	13981	4.8	0.4	33387	12186	5784	21276	11968	11358	95959	32.8	-1.6	130848	44.8	1.3
1957-58		293435	52178	17.8	1.5	14105	4.8	0.9	33232	12831	6087	20602	12620	12700	98072	33.4	2.2	129080	44.0	-1.4
1958-59		293661	51406	17.5	-1.5	14300	4.9	1.4	33155	13090	6000	20175	12255	11452	96127	32.7	-2.0	131828	44.9	2.1
1959-60		297254	54021	18.2	5.1	14899	5.0	4.2	33434	13679	5818	19463	11076	11925	95395	32.1	-0.8	132939	44.7	0.8
1960-61		298458	54052	18.1	0.1	14840	5.0	-0.4	35911	13966	4459	19212	11180	11639	96367	32.3	1.0	133199	44.6	0.2
1961-62		299151	54189	18.1	0.3	14795	4.9	-0.3	35921	14082	4500	18632	10478	11155	94768	31.7	-1.7	135399	45.3	1.7
1962-63		304977	60538	19.9	11.7	15111	5.0	2.1	35164	14104	4558	17908	10195	11058	92987	30.5	-1.9	136341	44.7	0.7
1963-64		305169	60692	19.9	0.3	15270	5.0	1.1	34811	14594	4378	17653	10059	11229	92724	30.4	-0.3	136483	44.7	0.1
1964-65		305252	60351	19.8	-0.6	15442	5.1	1.1	34795	14743	4113	17366	9166	11156	91339	29.9	-1.5	138120	45.2	1.2
1965-66		305535	61543	20.1	2.0	15170	5.0	-1.8	34327	14810	4076	16965	9262	13184	92624	30.3	1.4	136198	44.6	-1.4
1966-67		305487	63458	20.8	3.1	15357	5.0	1.2	32159	14017	4018	16671	9046	13529	89440	29.3	-3.4	137232	44.9	0.8
1967-68		306120	64217	21.0	1.2	15474	5.1	0.8	31830	13795	3969	16235	8800	11924	86553	28.3	-3.2	139876	45.7	1.9
1968-69		305885	64790	21.2	0.9	15648	5.1	1.1	31591	13316	3878	16064	9189	14096	88134	28.8	1.8	137313	44.9	-1.8
1969-70		303893	63895	21.0	-1.4	15868	5.2	1.4	30290	12992	4448	15788	9594	12323	85435	28.1	-3.1	138695	45.6	1.0
1970-71		303753	63830	21.0	-0.1	16478	5.4	3.8	28128	13261	4367	17500	8728	10598	82582	27.2	-3.3	140863	46.4	1.6
1971-72		304141	63771	21.0	-0.1	16972	5.6	3.0	27996	12960	4284	17456	8312	12669	83677	27.5	1.3	139721	45.9	-0.8
1972-73		303992	65430	21.5	2.6	16658	5.5	-1.9	25821	12707	4531	17332	9193	15176	84760	27.9	1.3	137144	45.1	-1.8
1973-74		304093	65729	21.6	0.5	16799	5.5	0.8	25217	12781	4138	17066	8655	11292	79149	26.0	-6.6	142416	46.8	3.8
1974-75		304141	65878	21.7	0.2	18377	6.0	9.4	23160	12856	3771	17032	8969	16307	82095	27.0	3.7	137791	45.3	-3.2
1975-76		304329	66699	21.9	1.2	18660	6.1	1.5	21578	12592	3630	17743	9229	12546	77318	25.4	-5.8	141652	46.5	2.8
1976-77		304680	67159	22.0	0.7	18934	6.2	1.5	21522	12532	3628	17474	9385	14570	79111	26.0	2.3	139476	45.8	-1.5
1977-78		304179	67138	22.1	0.0	19047	6.3	0.6	20219	12353	3691	17183	9567	13028	76041	25.0	-3.9	141953	46.7	1.8
1978-79		304681	67465	22.1	0.5	19201	6.3	0.8	20143	12136	3627	17292	9366	12470	75034	24.6	-1.3	142981	46.9	0.7
1979-80		304130	67501	22.2	0.1	19543	6.4	1.8	20156	12118	3527	16658	10026	15698	78183	25.7	4.2	138903	45.7	-2.9
1980-81		304159	67460	22.2	-0.1	19596	6.4	0.3	19958	11989	3578	16744	9720	14826	76815	25.3	-1.7	140288	46.1	1.0
1981-82		304282	67365	22.1	-0.1	19630	6.5	0.2	20092	12025	3603	16424	9658	13365	75167	24.7	-2.1	142120	46.7	1.3
1982-83		304093	67330	22.1	-0.1	19865	6.5	1.2	20104	11930	3545	16332	9357	14817	76085	25.0	1.2	140813	46.3	-0.9
1983-84		304190	66599	21.9	-1.1	20237	6.7	1.9	20337	12034	3628	15565	9271	13308	74143	24.4	-2.6	143211	47.1	1.7
1984-85		304310	66391	21.8	-0.3	20458	6.7	1.1	20239	12000	3569	15882	9512	15358	76560	25.2	3.3	140901	46.3	-1.6
1985-86		304698	67067	22.0	1.0	20631	6.8	0.8	20090	11783	3563	15718	10051	14894	76099	25.0	-0.6	140901	46.2	0.0
1986-87		305009	66875	21.9	-0.3	20879	6.8	1.2	20164	11838	3632	15548	10255	16240	77677	25.5	2.1	139578	45.8	-0.9
1987-88		304837	66936	22.0	0.1	21168	6.9	1.4	20112	11723	3509	15530	10862	20912	82648	27.1	6.4	134085	44.0	-3.9
1988-89		304826	66944	22.0	0.0	21299	7.0	0.6	19916	11525	3514	15167	10247	14323	74692	24.5	-9.6	141891	46.5	5.8
1989-90		304878	67406	22.1	0.7	21258	7.0	-0.2	19699	11304	3803	15102	10273	13694	73875	24.2	-1.1	142339	46.7	0.3
1990-91		304862	67805	22.2	0.6	21087	6.9	-0.8	19389	11404	3818	14995	9662	13703	72971	23.9	-1.2	142999	46.9	0.5
1991-92		304900	67866	22.3	0.1	21465	7.0	1.8	19270	11299	3761	14994	9941	14672	73937	24.2	1.3	141632	46.5	-1.0
1992-93		304855	67981	22.3	0.2	21771	7.1	1.4	19122	11096	3781	14589	9672	14188	72448	23.8	-2.0	142645	46.8	0.7
1993-94		304881	68277	22.4	0.4	22210	7.3	2.0	18694	10966	3696	14409	9834	14376	71975	23.6	-0.7	142419	46.7	-0.2
1994-95		304829	68603	22.5	0.5	22556	7.4	1.6	18463	11034	3732	14262	9969	13250	70710	23.2	-1.8	142960	46.9	0.4
1995-96		304875	68817	22.6	0.3	22362	7.3	-0.9	19009	11064	3481	14098	10016	13831	71499	23.5	1.1	142197	46.6	-0.5
1996-97		304621	69103	22.7	0.4	22554	7.4	0.9	17964	10880	3655	14021	10192	13323	70035	23.0	-2.0	142931	46.9	0.5
1997-98		304661	69245	22.7	0.2	23138	7.6	2.6	17461	10845	3730	13943	10078	14275	70332	23.1	0.4	141945	46.6	-0.7
1998-99		305006	69215	22.7	0.0	23348	7.7	0.9	17524	10896	3679	13899	10106	13587	69691	22.8	-0.9	142753	46.8	0.6
1999-00		305016	69164	22.7	-0.1	23598	7.7	1.1	17536	10845	3725	13742	10289	15053	71190	23.3	2.2	141063	46.2	-1.2
2000-01		305195	69843	22.9	1.0	23752	7.8	0.7	17483	10662	3445	13631	10267	14777	70265	23.0	-1.3	141336	46.3	0.2
2001-02		305127	69720	22.8	-0.2	23912	7.8	0.7	17417	10528	3453	13520	10534	15344	70796	23.2	0.8	140700	46.1	-0.4
2002-03		305357	69821	22.9	0.1	24118	7.9	0.9	17520	10450	3443	13651	11967	22337	79368	26.0	12.1	132051	43.2	-6.1
2003-04		305566	69968	22.9	0.2	24513	8.0	1.6	17469	10484	3383	13241	11313	14487	70377	23.0	-11.3	140708	46.0	6.6
2004-05		305587	69960	22.9	0.0	24757	8.1	1.0	17471	10452	3364	13272	10878	14790	70227	23.0	-0.2	140642	46.0	0.0
2005-06(p)		305445	69994	22.9	0.0	24989	8.2	0.9	17334	10444	3391	13225	10696	14211	69301	22.7	-1.3	141162	46.2	0.4
2006-07(p)		305650	70002	22.9	0.0	25436	8.3	1.8	17290	10414	3364	13271	10516	15509	70364	23.0	1.5	139848	45.8	-0.9
2007-08(p)		305610	70020	22.9	0.0	25711	8.4	1.1	16990	10198	3413	13059	10329	14512	68501	22.4	-2.6	141377	46.3	1.1
2008-09(p)		305586	70034	22.9	0.0	26064	8.5	1.4	16798	10177	3356	12752	10286	14191	67560	22.1	-1.4	141929	46.4	0.4
2009-10(p)		305611	70042	22.9	0.0	26171	8.6	0.4	16783	10149	3351	12857	10484	15753	69377	22.7	2.7	140022	45.8	-1.3

(p): Provisional # : In 2002-03 there is significant decline in Total Cropped Area and Net Area Sown due to decline in net area sown in the States of Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh Maharashtra, Orissa, Rajasthan, Tamil Nadu, West Bengal and Haryana. This was mainly due to deficient rainfall.

@ : In 2009-10 there is significant decline in Total Cropped Area and Net Area Sown due to decline in net area sown in the States of Andhra Pradesh, Bihar, Jharkhand, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. This was mainly due to deficient rainfall.

Computed from the Source : Directorate of Economics and Statistics , Agricultural Statistics , Various Volumes & Issues .

Appendix 1.b

Annual Changes in the Broad Categories of Landuse
(% of Area to Reporting Area & Annual Growth) - ALL INDIA

	Forest		Area Under Non Agricultural Uses		CPLRs (Total)**		Net Sown Area	
Years	% of Area	Annual Growth	% of Area 2	Annual Growth 3	% of Area 3	Annual Growth 5	% of Area 4	Annual Growth 7
1968-69	21.2		5.1		28.8		44.9	
1969-70	21.0	-1.4	5.2	1.4	28.1	-3.1	45.6	1.0
1970-71	21.0	-0.1	5.4	3.8	27.2	-3.3	46.4	1.6
1971-72	21.0	-0.1	5.6	3.0	27.5	1.3	45.9	-0.8
1972-73	21.5	2.6	5.5	-1.9	27.9	1.3	45.1	-1.8
1973-74	21.6	0.5	5.5	0.8	26.0	-6.6	46.8	3.8
1974-75	21.7	0.2	6.0	9.4	27.0	3.7	45.3	-3.2
1975-76	21.9	1.2	6.1	1.5	25.4	-5.8	46.5	2.8
1976-77	22.0	0.7	6.2	1.5	26.0	2.3	45.8	-1.5
1977-78	22.1	0.0	6.3	0.6	25.0	-3.9	46.7	1.8
1978-79	22.1	0.5	6.3	0.8	24.6	-1.3	46.9	0.7
1979-80	22.2	0.1	6.4	1.8	25.7	4.2	45.7	-2.9
1980-81	22.2	-0.1	6.4	0.3	25.3	-1.7	46.1	1.0
1981-82	22.1	-0.1	6.5	0.2	24.7	-2.1	46.7	1.3
1982-83	22.1	-0.1	6.5	1.2	25.0	1.2	46.3	-0.9
1983-84	21.9	-1.1	6.7	1.9	24.4	-2.6	47.1	1.7
1984-85	21.8	-0.3	6.7	1.1	25.2	3.3	46.3	-1.6
1985-86	22.0	1.0	6.8	0.8	25.0	-0.6	46.2	0.0
1986-87	21.9	-0.3	6.8	1.2	25.5	2.1	45.8	-0.9
1987-88	22.0	0.1	6.9	1.4	27.1	6.4	44.0	-3.9
1988-89	22.0	0.0	7.0	0.6	24.5	-9.6	46.5	5.8
1989-90	22.1	0.7	7.0	-0.2	24.2	-1.1	46.7	0.3
1990-91	22.2	0.6	6.9	-0.8	23.9	-1.2	46.9	0.5
1991-92	22.3	0.1	7.0	1.8	24.2	1.3	46.5	-1.0
1992-93	22.3	0.2	7.1	1.4	23.8	-2.0	46.8	0.7
1993-94	22.4	0.4	7.3	2.0	23.6	-0.7	46.7	-0.2
1994-95	22.5	0.5	7.4	1.6	23.2	-1.8	46.9	0.4
1995-96	22.6	0.3	7.3	-0.9	23.5	1.1	46.6	-0.5
1996-97	22.7	0.4	7.4	0.9	23.0	-2.0	46.9	0.5
1997-98	22.7	0.2	7.6	2.6	23.1	0.4	46.6	-0.7
1998-99	22.7	0.0	7.7	0.9	22.8	-0.9	46.8	0.6
1999-00	22.7	-0.1	7.7	1.1	23.3	2.2	46.2	-1.2
2000-01	22.9	1.0	7.8	0.7	23.0	-1.3	46.3	0.2
2001-02	22.8	-0.2	7.8	0.7	23.2	0.8	46.1	-0.4
2002-03	22.9	0.1	7.9	0.9	26.0	12.1	43.2	-6.1
2003-04	22.9	0.2	8.0	1.6	23.0	-11.3	46.0	6.6
2004-05	22.9	0.0	8.1	1.0	23.0	-0.2	46.0	0.0
2005-06(p)	22.9	0.0	8.2	0.9	22.7	-1.3	46.2	0.4
2006-07(p)	22.9	0.0	8.3	1.8	23.0	1.5	45.8	-0.9
2007-08(p)	22.9	0.0	8.4	1.1	22.4	-2.6	46.3	1.1
2008-09(p)	22.9	0.0	8.5	1.4	22.1	-1.4	46.4	0.4
2009-10(p)	22.9	0.0	8.6	0.4	22.7	2.7	45.8	-1.3
AVERAGE	22	0	7	1	25	-1	46	0

(p): Provisional # : In 2002-03 there is significant decline in Total Cropped Area and Net Area Sown due to decline in rainfall net area sown in the States of Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh Maharashtra, Orissa,Rajasthan, Tamil Nadu, West Bengal and Haryana. This was mainly due to deficient rainfall. **@** : In 2009-10 there is significant decline in Total Cropped Area and Net Area Sown due to decline in net area sown in the States of Andhra Pradesh, Bihar, Jharkhand, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. This was mainly due to deficient rainfall.

** Includes Barren & uncultivated land, Land Under Misc, tree Grooves (not Included in NSA),Culturable Waste Land, and Fallows

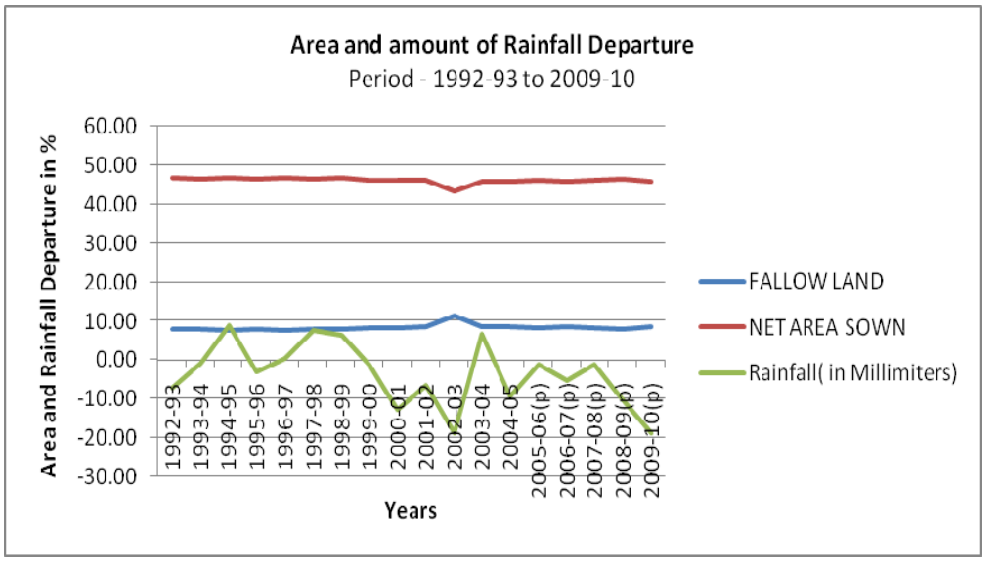
Computed from Source : Directorate of Economics and Statistics , Agricultural Statistics , Various Volumes & Issues .

Appendix 1.c

Comparative data on Rainfall, Fallow Land and Net Area Sown.(1992-93 to 2009-2010)

	Geog. Area	Reporting Ar	FALLOW LAND			NET AREA SOWN			Rainfall(in Millimiters)		
YEAR	(Th Hec.)	(Th Hec.)	Area(Th.Hec.)	Annual Growth	Area in %	Area(Th.Hec.	Annual Growth	Area in %	Actual	Normal	%Departure
1992-93	328726	304855	23860	-3.06	7.83	142645	0.7	46.8	1091.6	1175.6	-7.1452875
1993-94	328726	304881	24210	1.47	7.94	142419	-0.2	46.7	1184.3	1192.6	-0.6959584
1994-95	328726	304829	23219	-4.09	7.62	142960	0.4	46.9	1297.27	1190.7	8.9501974
1995-96	328726	304875	23847	2.70	7.82	142197	-0.5	46.6	1154.6	1189.3	-2.9176827
1996-97	328726	304621	23515	-1.39	7.72	142931	0.5	46.9	1195.47	1190.3	0.4343443
1997-98	328726	304661	24354	3.57	7.99	141945	-0.7	46.6	1291.5	1198.27	7.7803834
1998-99	328726	305006	23693	-2.71	7.77	142753	0.6	46.8	1275.5	1198.8	6.3980647
1999-00	328726	305016	25342	6.96	8.31	141063	-1.2	46.2	1183.5	1197	-1.1278195
2000-01	328726	305195	25044	-1.18	8.21	141336	0.2	46.3	1043.7	1195.5	-12.697616
2001-02	328726	305127	25878	3.33	8.48	140700	-0.4	46.1	1120.2	1196	-6.3377926
2002-03	328726	305357	34304	32.56	11.23	132051	-6.1	43.2	981.4	1205.4	-18.583043
2003-04	328726	305566	25800	-24.79	8.44	140708	6.6	46.0	1278	1196.5	6.8115336
2004-05	328726	305587	25668	-0.51	8.40	140642	0.0	46.0	1085.9	1197.3	-9.3042679
2005-06(p)	328726	305445	24907	-2.96	8.15	141162	0.4	46.2	1185.4	1196.8	-0.9525401
2006-07(p)	328726	305650	26025	4.49	8.51	139848	-0.9	45.8	1133	1195.5	-5.2279381
2007-08(p)	328726	305610	24842	-4.55	8.13	141377	1.1	46.3	1180.2	1194.8	-1.2219618
2008-09(p)	328726	305586	24478	-1.47	8.01	141929	0.4	46.4	1075	1196.4	-10.147108
2009-10(p)	328726	305611	26236	7.18	8.58	140022	-1.3	45.8	972.8	1195.6	-18.634995

Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation.



Apendix1.d

Correlation coefficient in between Common Property L and and Operational Land Holding Classes.

Correlations

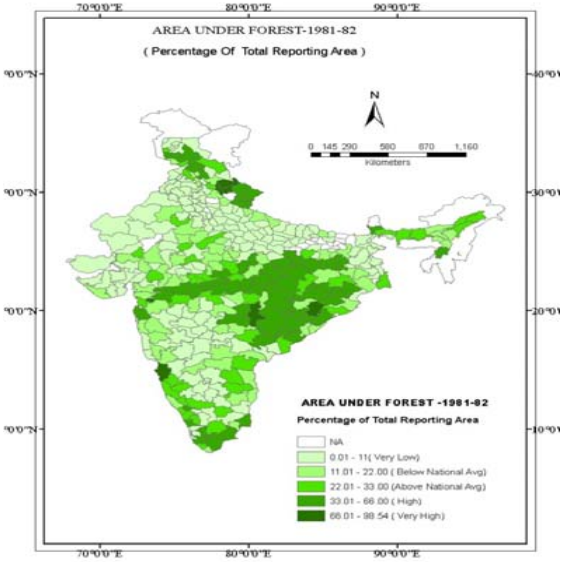
		CPL	Marginal	Small	Semi-medium	Medium	Large
CPL	Pearson Correlation	1	-.111	.308**	.534**	.796**	.927**
	Sig. (2-tailed)		.310	.004	.000	.000	.000
	N	85	85	85	85	85	84
Marginal	Pearson Correlation	-.111	1	.633**	.395**	.069	-.166
	Sig. (2-tailed)	.310		.000	.000	.528	.132
	N	85	85	85	85	85	84
Small	Pearson Correlation	.308**	.633**	1	.927**	.647**	.231*
	Sig. (2-tailed)	.004	.000		.000	.000	.035
	N	85	85	85	85	85	84
Semi-medium	Pearson Correlation	.534**	.395**	.927**	1	.873**	.498**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	85	85	85	85	85	84
Medium	Pearson Correlation	.796**	.069	.647**	.873**	1	.815**
	Sig. (2-tailed)	.000	.528	.000	.000		.000
	N	85	85	85	85	85	84
Large	Pearson Correlation	.927**	-.166	.231*	.498**	.815**	1
	Sig. (2-tailed)	.000	.132	.035	.000	.000	
	N	84	84	84	84	84	84

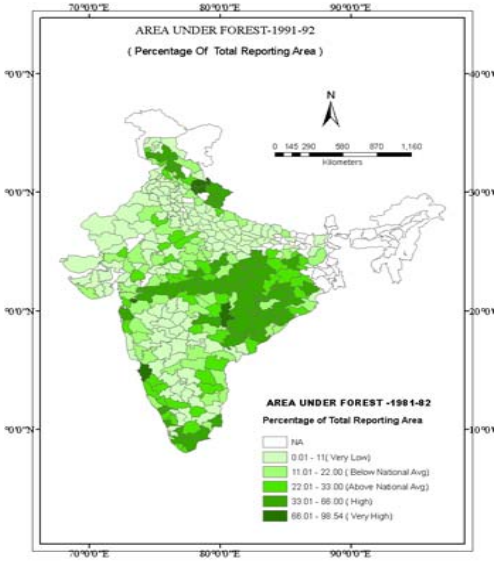
**. Correlation is significant at the 0.01 level (2-tailed).

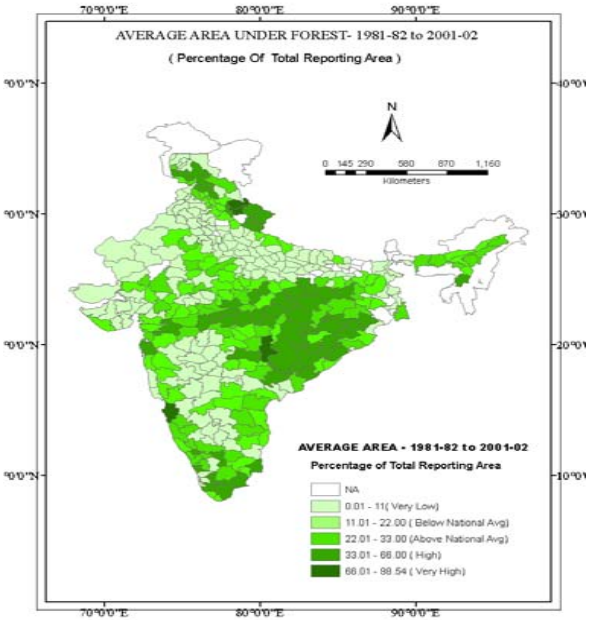
*. Correlation is significant at the 0.05 level (2-tailed).

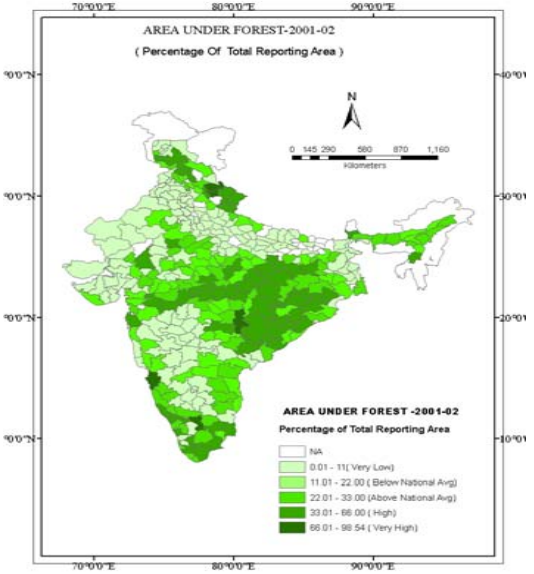
Appendix 2a

FOREST AREA (PERCENTAGE OF TOTAL REPORTING AREA – DISTRICTWISE – II)



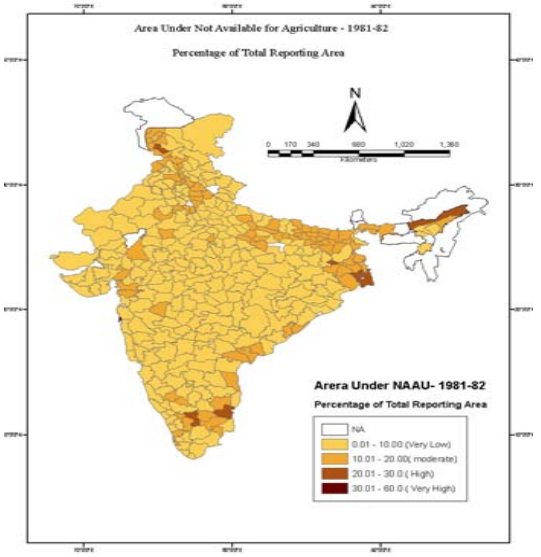


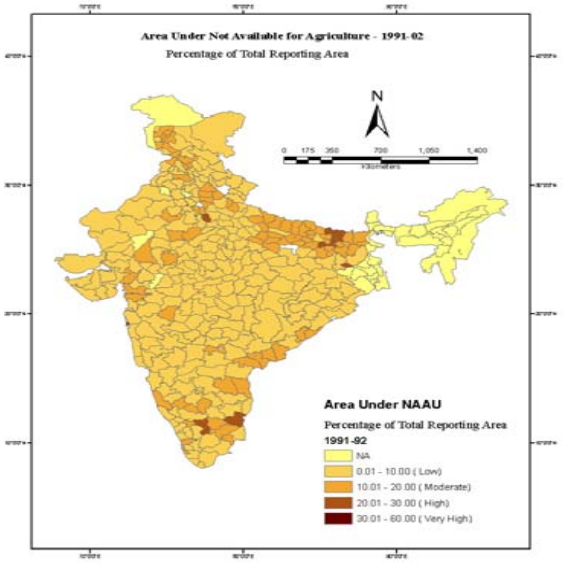


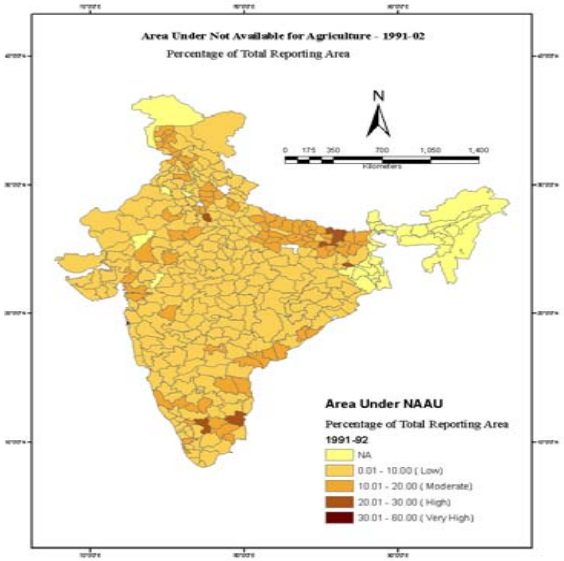


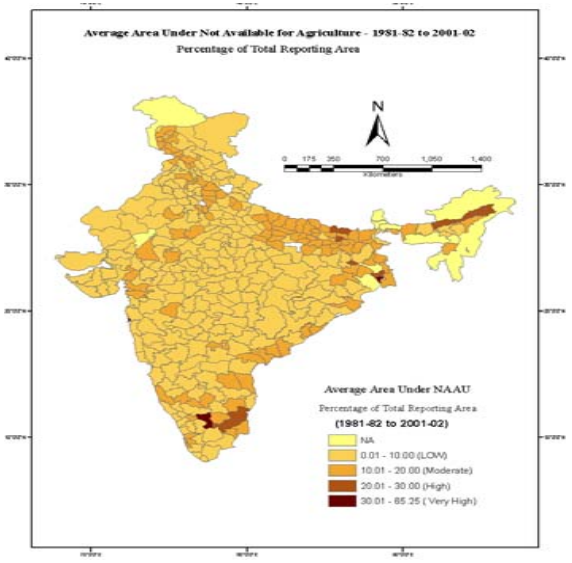
Appendix 2b

AREA NOT AVAILABLE FOR CULTIVATION (PERCENTAGE OF TOTAL REPORTING AREA)



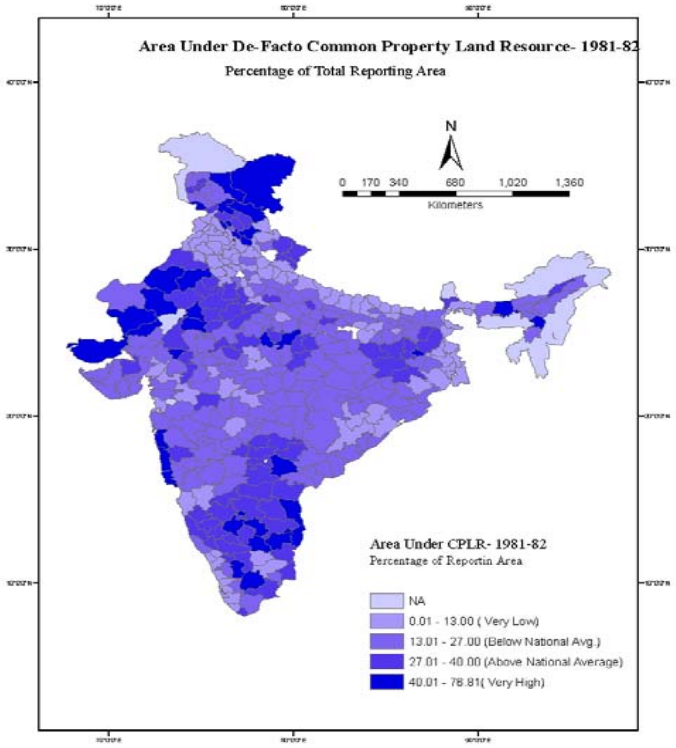


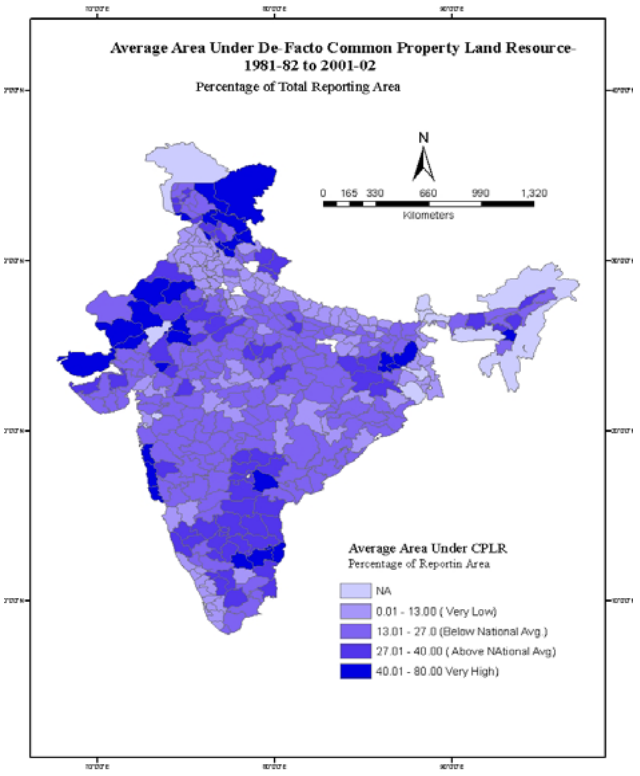




Appendix 2c

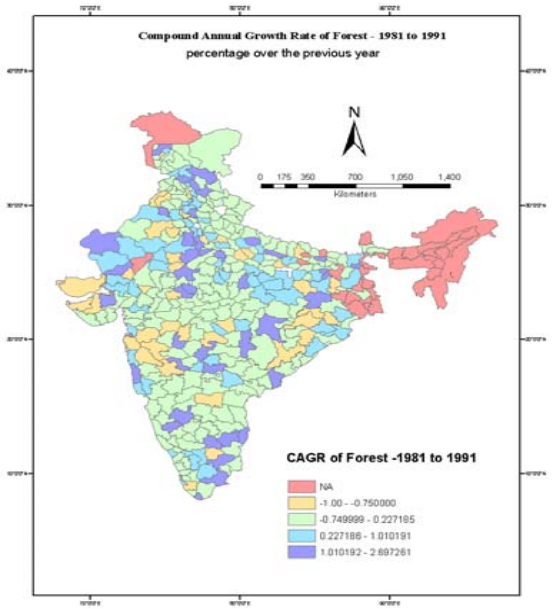
AREA UNDER DE-FACTO COMMON PROPERTY LAND RESOURCE (PERCENTAGE OF THE TOATL REPORTING AREA-I)

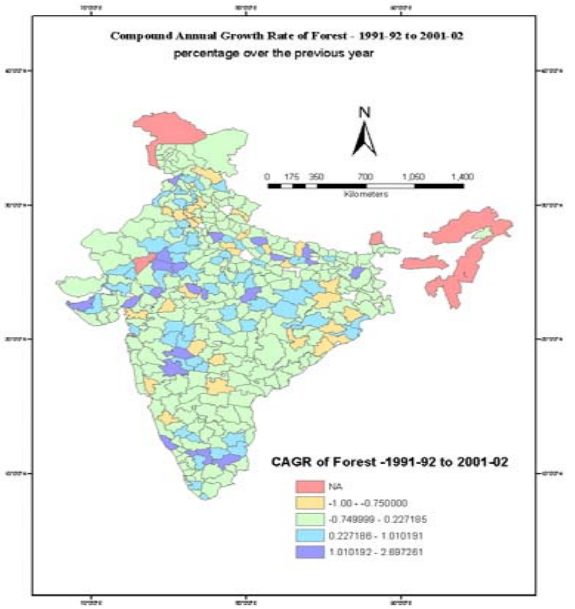




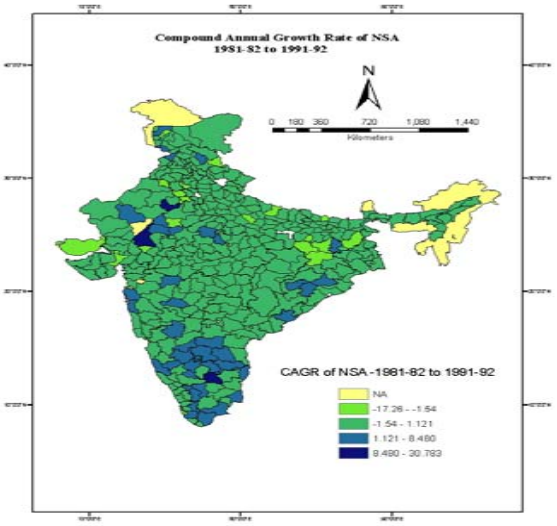
Appendix 2d

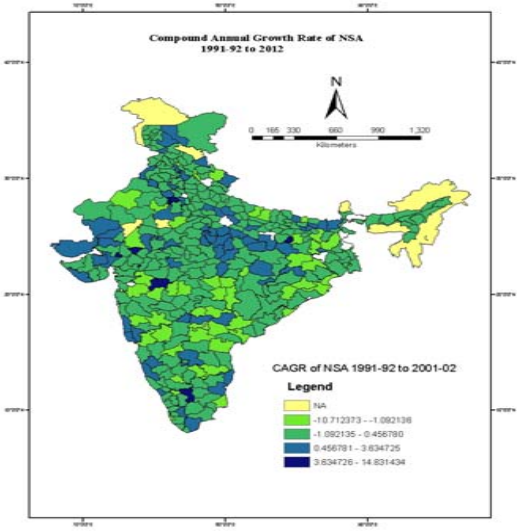
COMPOUND ANNUAL GROWTH RATE – FOREST





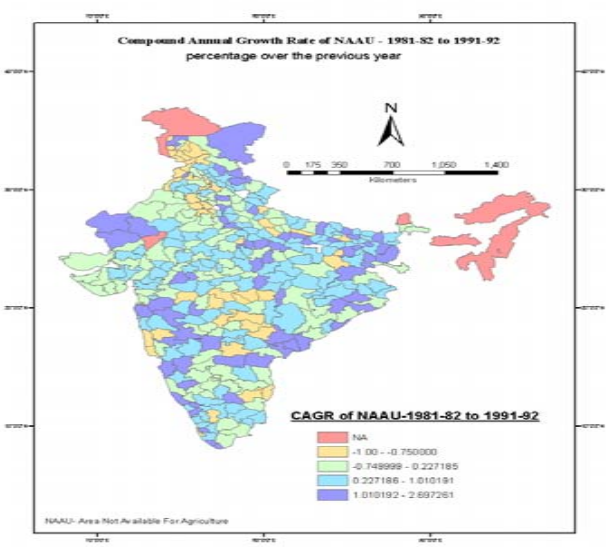
COMPOUND ANNUAL GROWTH RATE - NSA

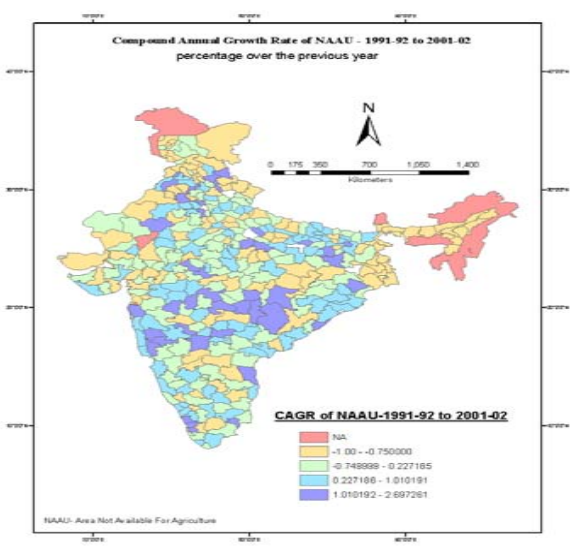




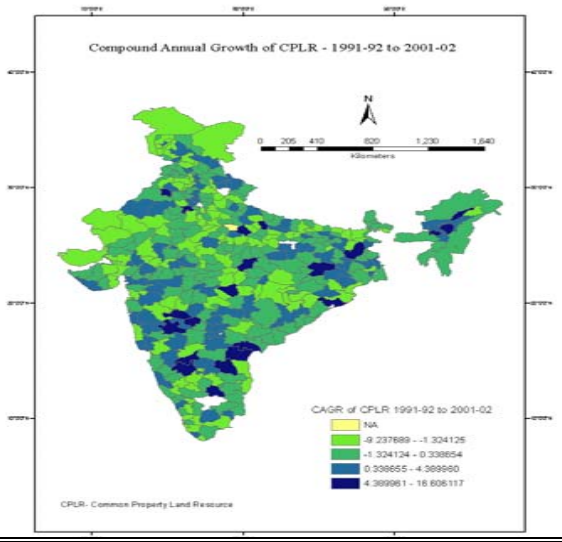
Appendix 2e

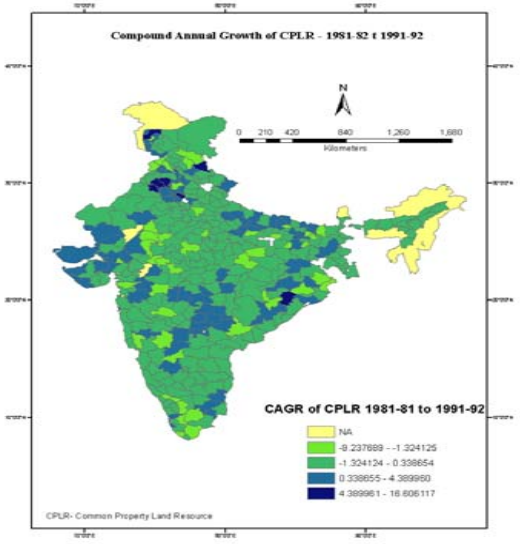
COMPOUND ANNUAL GROWTH RATE – NAAU





COMPOUND ANNUAL GROWTH RATE – CPLR



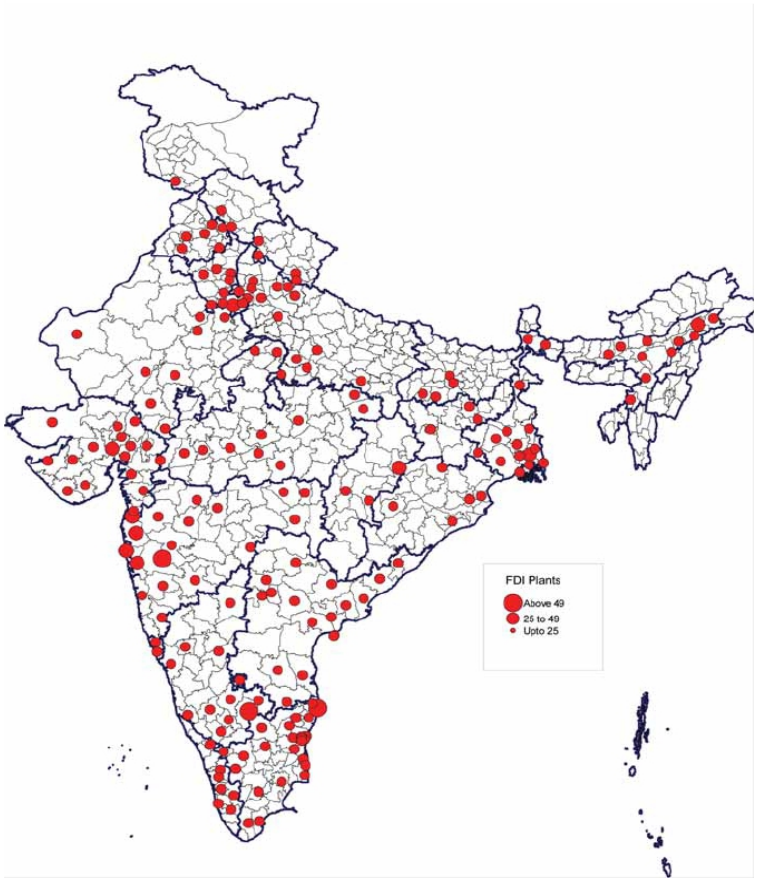


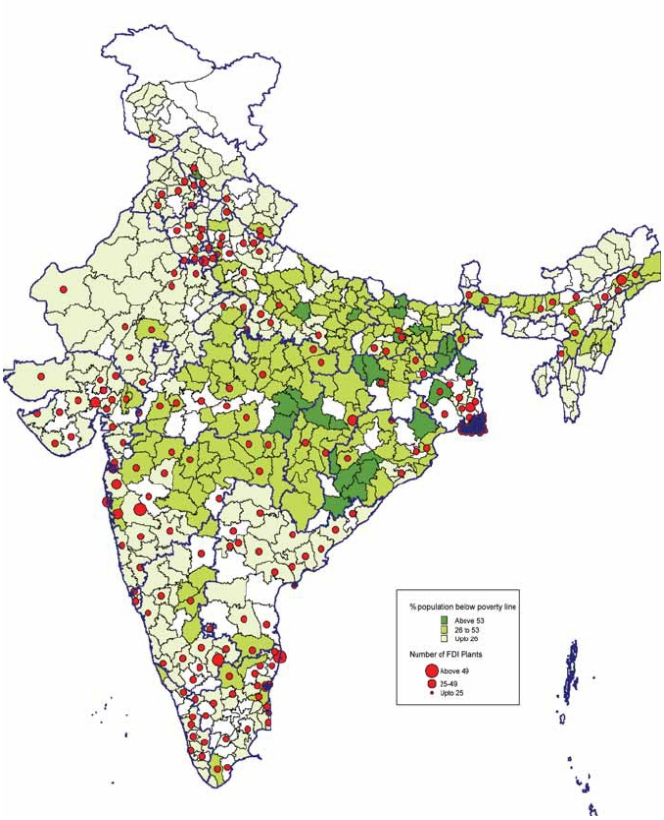
Appendix 4.e

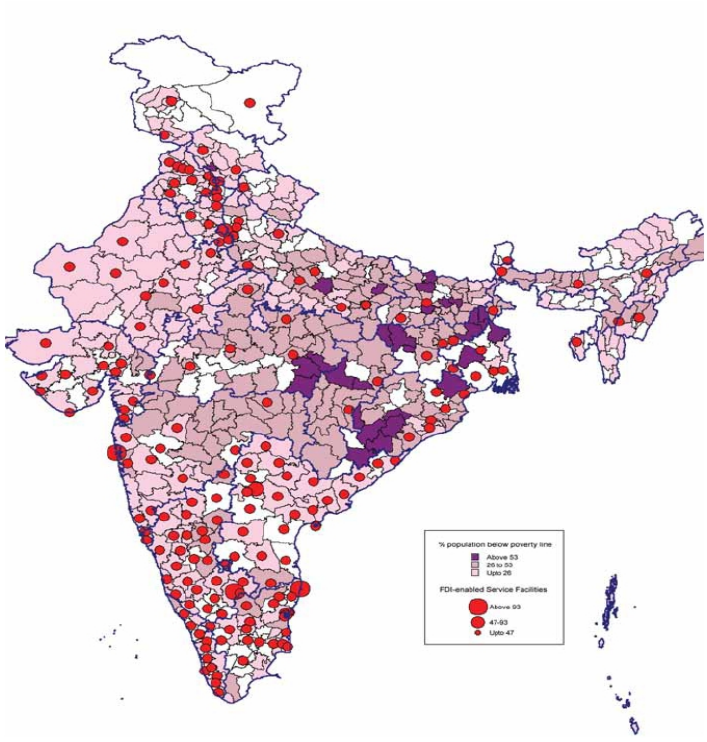
ap 1: Spatial Spread of FDI-enabled Manufacturing Plants

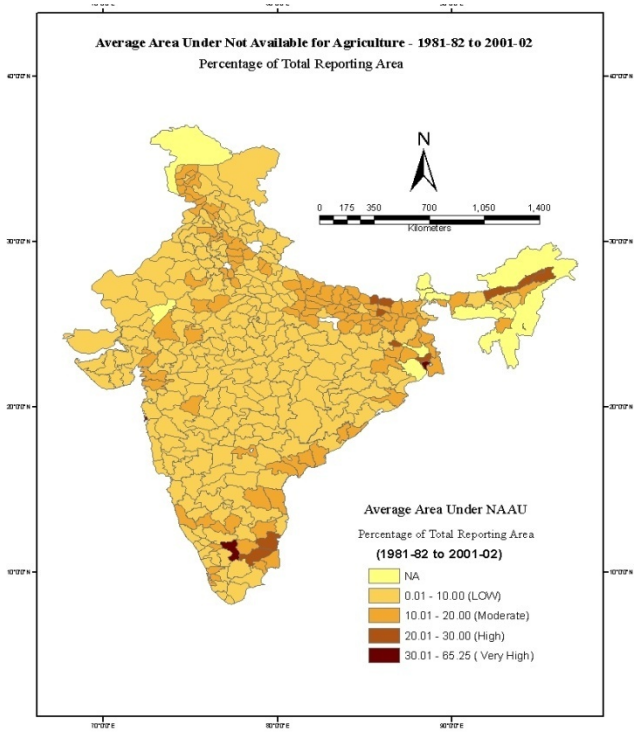
Map 5: FDI-enabled Plants Mapped with Poverty Levels: District Level

Map 10: FDI-enabled Service Facilities Mapped with Poverty Levels: District Level









Appendix 4

Table 4.a.1- Correlation Between Net Area Irrigated and *de-facto* CPLR

		NIA	Gz
NIA	Pearson Correlation	1	-.543**
	Sig. (2-tailed)		.000
	N	600	600
Gz	Pearson Correlation	-.543**	1
	Sig. (2-tailed)	.000	
	N	600	600

**. Correlation is significant at the 0.01 level (2-tailed).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.543[a]	.295	.294	2.24942	.087

a. Predictors: (Constant), NIA
b. Dependent Variable: Gz

4.b.2 Regression Result Based on the available data

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.736[a]	.541	.522	42.6870119
2	.821[b]	.674	.655	36.2618554

a. Predictors: (Constant), LIVESTOCK_T, TRACTOR, ELECTRIC_PS, DIESEL_PS, POWER_T,

b. Predictors: (Constant), LIVESTOCK_T, TRACTOR, ELECTRIC_PS, DIESEL_PS, POWER_T, MAR TO TOAL

c. Dependent Variable: CIL

ANOVAc

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	264319.295	5	52863.859	29.011	.000[a]
	Residual	224128.261	123	1822.181		
	Total	488447.556	128			
2	Regression	329341.975	7	47048.854	35.781	.000[b]
	Residual	159105.581	121	1314.922		
	Total	488447.556	128			

a. Predictors: (Constant), LIVESTOCK_T, TRACTOR, ELECTRIC_PS, DIESEL_PS, POWER_T,

b. Predictors: (Constant), LIVESTOCK_T, TRACTOR, ELECTRIC_PS, DIESEL_PS, POWER_T, ANNUAL

c. Dependent Variable: CIL

4.b.2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	18.731	9.859		1.900	.060
	DIESEL_PS	-.957	1.578	-.048	-.607	.245
	ELECTRIC_PS	-.308	.358	-.060	-.860	.391
	POWER_T	.249	8.858	.003	.028	.978
	TRACTOR	-3.523	5.053	-.074	-.697	.187
	LIVESTOCK_T	.098	.009	.725	11.477	.000
2	(Constant)	42.200	16.347		2.581	.011
	DIESEL_PS	-3.764	1.400	-.187	-2.688	.008
	ELECTRIC_PS	-.543	.321	-.106	-1.691	.094
	POWER_T	6.511	7.578	.070	.859	.392
	TRACTOR	-.181	4.319	-.004	-.042	.967
	LIVESTOCK_T	.128	.009	.940	14.677	.000
	ANNUAL	.030	.015	.118	2.029	.045
	MAR_TO TOAL	-2.559	.367	-.459	-6.980	.000

a. Dependent Variable: CIL

4-C Causality check on CPLR of fertilizer, Cropping Intensity and Irrigation intensity.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1447371.523	3	482457.174	9.298	.000[a]
	Residual	3.575E7	689	51888.271		
	Total	3.720E7	692			

a. Predictors: (Constant), IRG_INTEN, NPK_TC, CRP_INTSTY

b. Dependent Variable: CIL

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	220.848	65.597		3.367	.001
	NPK_TC	.000	.000	-.041	-.923	.356
	CRP_INTSTY	-.614	.624	-.053	-.984	.326
	IRG_INTEN	-.966	.435	-.132	-2.219	.027

a. Dependent Variable: CIL

4 d-1 correlation between the variables .

Correlations

		CIL	ANNUAL	_PS	IC_PS	_T	OR	NPK_TC	T	T	LROAD	TSTY	NIA	T	NO
CIL	Pearson	1	-.110**	-.113**	-.062	-.020	-.082*	-.128**	-.052	-.020	.002	-.161**	-.133**	.134**	-.087
	Sig. (2-tailed)		.004	.003	.102	.607	.030	.001	.171	.600	.949	.000	.000	.000	.063
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
ANNUAL	Pearson	-.110**	1	-.076*	-.034	.034	-.097*	.002	.005	.004	.159**	-.079*	-.086*	-.102**	.100*
	Sig. (2-tailed)	.004		.045	.377	.370	.010	.949	.896	.923	.000	.037	.024	.007	.034
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
DIESEL_PS	Pearson	-.113**	-.076*	1	.297**	.101**	.537**	.423**	.156**	-.055	.030	.346**	.469**	.221**	.239**
	Sig. (2-tailed)	.003	.045		.000	.008	.000	.000	.000	.146	.437	.000	.000	.000	.000
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
ELECTRIC_PS	Pearson	-.062	-.034	.297**	1	.338**	.106**	.424**	.512**	.091*	.547**	-.002	.280**	.458**	.552**
	Sig. (2-tailed)	.102	.377	.000		.000	.005	.000	.000	.017	.000	.964	.000	.000	.000
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
POWER_T	Pearson	-.020	.034	.101**	.338**	1	.195**	.238**	.217**	.063	.202**	.005	.195**	.178**	.182**
	Sig. (2-tailed)	.607	.370	.008	.000		.000	.000	.000	.097	.000	.905	.000	.000	.000
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
TRACTOR	Pearson	-.082*	-.097*	.537**	.106**	.195**	1	.455**	.134**	.096*	-.084*	.368**	.574**	.139**	.085
	Sig. (2-tailed)	.030	.010	.000	.005	.000		.000	.000	.012	.027	.000	.000	.000	.071
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
NPK_TC	Pearson	-.128**	.002	.423**	.424**	.238**	.455**	1	.490**	.295**	.397**	.334**	.631**	.317**	.555**
	Sig. (2-tailed)	.001	.949	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
PPMRKT	Pearson	-.052	.005	.156**	.512**	.217**	.134**	.490**	1	.381**	.491**	-.067	.358**	.395**	.586**
	Sig. (2-tailed)	.171	.896	.000	.000	.000	.000	.000		.000	.000	.076	.000	.000	.000
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
PSMRKT	Pearson	-.020	.004	-.055	.091*	.063	.096*	.295**	.381**	1	.253**	-.097*	.155**	.238**	.049
	Sig. (2-tailed)	.600	.923	.146	.017	.097	.012	.000	.000		.000	.011	.000	.000	.293
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
LROAD	Pearson	.002	.159**	.030	.547**	.202**	-.084*	.397**	.491**	.253**	1	-.120**	.219**	.566**	.652**
	Sig. (2-tailed)	.949	.000	.437	.000	.000	.027	.000	.000	.000		.002	.000	.000	.000
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
CRP_INTSTY	Pearson	-.161**	-.079*	.346**	-.002	.005	.368**	.334**	-.067	-.097*	-.120**	1	.522**	.104**	.246**
	Sig. (2-tailed)	.000	.037	.000	.964	.905	.000	.000	.076	.011	.002		.000	.006	.000
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
NIA	Pearson	-.133**	-.086*	.469**	.280**	.195**	.574**	.631**	.358**	.155**	.219**	.522**	1	.447**	.635**
	Sig. (2-tailed)	.000	.024	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
LVSTK_T	Pearson	.134**	-.102**	.221**	.458**	.178**	.139**	.317**	.395**	.238**	.566**	.104**	.447**	1	.634**
	Sig. (2-tailed)	.000	.007	.000	.000	.000	.000	.000	.000	.000	.000	.006	.000		.000
	N	693	693	693	693	693	693	693	693	693	693	693	693	693	453
MARG_NO	Pearson	-.087	.100*	.239**	.552**	.182**	.085	.555**	.586**	.049	.652**	.246**	.635**	.634**	1
	Sig. (2-tailed)	.063	.034	.000	.000	.000	.071	.000	.000	.293	.000	.000	.000	.000	
	N	453	453	453	453	453	453	453	453	453	453	453	453	453	453