

Social Institutions and Global Environmental Change - A Case Study, Agricultural Farming, South Kanara, India

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Introduction

In developing countries, poverty and population growth are the main causes for environmental degradation. In recent years there has been a growing recognition of the intimate link between poverty and environmental degradation (Jazairy et al., 1992; Sachs, 1994; Bekalo and Bangay, 2002). Bekalo and Bangay, (2002) further emphasize that poverty is both a cause and effect of environmental damage and, as such, in order to address the one, the other must also be addressed. The links between poverty and environmental degradation in China have been discussed by Rozelle et al. (1997). They argue that rich are more willing and able than their poorer counterparts to forego the immediate benefits from the marginal land's food output. For the majority of the world's population living in developing countries, the choice of making environmentally sustainable decisions is a luxury (Bekalo and Bangay, 2002). Wilson (2002) suggests that the embrace of new technology by small cultivators deepens their dependence on those with economic, social and political power.

India is one of the world's largest and oldest agricultural societies. Agriculture is a part of livelihood of most of the rural households in India. During the past decades the agriculture sector in India has undergone wide ranging changes in terms of productivity, growth pattern, influenced by market fluctuations, urbanization and change in climatic conditions. About 50 years ago farming was essentially a family pursuit, primarily for making a living, using the Green revolution technology, the system moved from national food deficit into surplus farming. Later, as farming increased, it become necessary for many farmers to move towards some kind of market farming. Green revolution, coupled with investments in irrigation infrastructure, expansion of credit, marketing and processing facilities led to a significant increase in the use of modern inputs. These developments raised agricultural productivity and led to a substantial increase in the supplies of various agricultural products for markets rather than for own consumption by the farm households. Indian agriculture grew at the rate of 1% per annum during the fifty years before Independence. In the post Independence India, agriculture has been growing at the rate of about 3% per annum. In the 1950's and 60s area under agriculture expanded substantially as fallows were reduced and culturable wastes were put under the plough. The overall growth in the production is the aggregated growth of several individual crops, cultivated over several sub-regions (Kothari, 1999, CMIE various issues).

During 1991-93 India introduced major reforms to industrial trade and exchange rate policy that helped India's emergence as one of the fastest growing developing countries. The economy has been further opened up on the export side by reducing export incentives and barriers. Domestic policy reforms are being undertaken to reduce market imperfections such as state monopolies, administered prices, and subsidies. Since 1990 annual GDP growth has averaged 5.6 percent and

consumer price inflation has averaged just 8 percent with performance on growth and price stability even stronger in more recent years. There has also been some important changes in agricultural policy since the early 1990s including removal of quantities trade restrictions required by the Uruguay Round Agreement on Agriculture (URAA) and initial steps to pare down regulation of domestic input and output markets (Ahluwalia and Little 1998, Rip Landes and Gulati A, 2004). As far as external trade is concerned, in the early 1990s, a few steps to liberalize agricultural trade were initiated about a year and a half after the July 1991 reforms, and these have been followed by a number of prominent reforms thereafter. Now, the exports of all major agricultural commodities, barring a few exceptions have been liberalized. These reforms have brought about some significant changes in agricultural trade (FAO 2003). The growth in the agricultural sector is crucial for food security of the country and development of the allied sectors such as horticulture, animal husbandry, dairy, and fisheries play a vital role in improving the nutrition health and economic status of the rural poor. Indian agriculture is prone to high levels of risks mainly due to the vagaries of nature such as uncertain monsoons, drought, flood, cyclone, heat waves, etc. The rain-dependent agricultural area constitutes about 60% of the net sown area of 142 mha. Indian agriculture continues to be fundamentally dependent on the weather and much of the high growth rates are a result of good monsoons (TERI 2003).

The study region with 100% dependency on monsoon has witnessed similar changes in agriculture over the years. The influence of global changes is noticed here at greater levels with observed substantial change in the land use / land cover with special reference to farming system thus affecting the ecosystem and contributing towards global environmental change. These changes are strongly influenced by number of institutions in the local level, which are at stake and play directly / indirectly an important role on the farming system in South Kanara. Focus of this paper is mainly on social institutions and how it has brought transformation in the global environmental change and affected the whole ecosystem of farming.

Global environmental change in the study region is mainly due to land use and land cover changes which is mainly caused by a gamut of socio-economic factors. The organization of the paper is as follows. While Section 1 covers the methodology and background of the study area, section 2 describes the social institutions responsible for changes in land use followed by changes in land use and land cover in the study area in section 3, Section 4 describes current and potential future impacts followed by conclusion in section 5.

1. Methodology and background

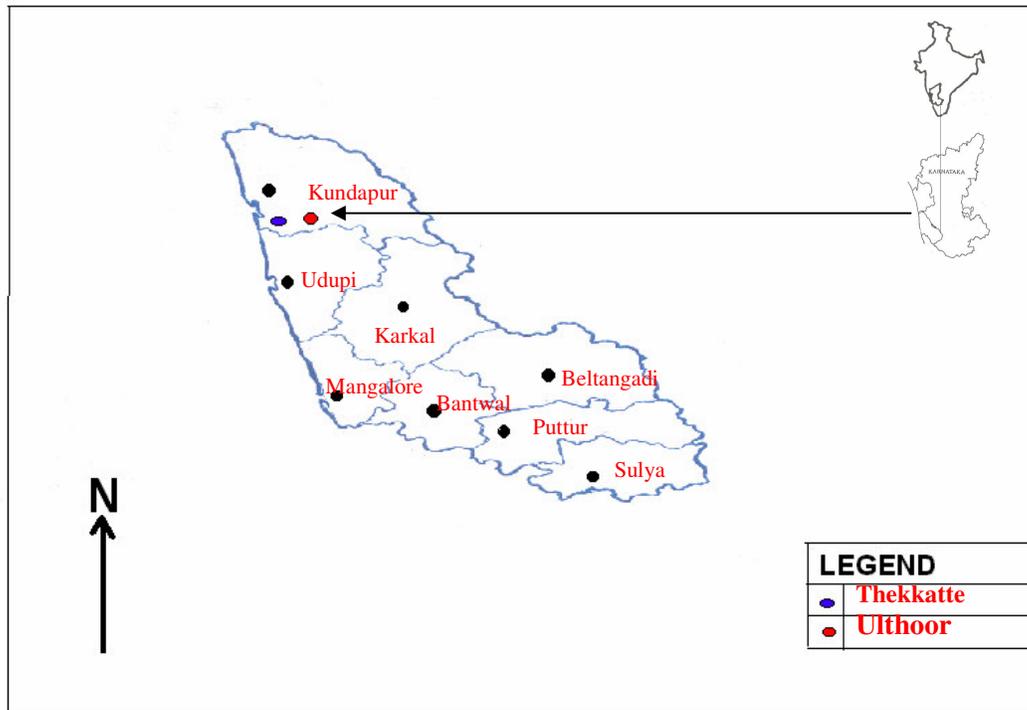
The paper presents the results of a case study carried out in South Kanara, Karnataka India. The methodology adopted for this study is participatory such as Rapid Rural Appraisals (RRA), primary surveys of households in the selected villages, Participatory Rural Appraisals (PRA) and open interviews of key personell in the region. A literature review and secondary data collection was also carried out initially to get an overall idea of various related issues.

Initially an RRA was conducted in the study area to have a better vision of the agriculture system in the study area. During this RRA, researchers visited a few farmers and local officials and discussed with them the issues of concern in the region regarding agricultural activity. This participatory survey was conducted with an open ended fully unstructured set of questions regarding the activity. Using information gathered from RRA, a structured questionnaire was developed for a detailed household survey and was administered after pilot testing. A total of 160 households were surveyed during the study. These data were analysed using EXCEL and SPSS software and the results are used in this paper.

The PRA exercise was carried-out in the study area to fill-in data gaps from the other approaches. The methods of PRA used were informal interviews, calendars, ranking and comparisons, timelines and flow diagrams; problems in agriculture activities, problem ranking, seasonal calendars of the agricultural activities in the region, seasonal wages and comparisons of important agricultural crops in the region were done during the PRA exercises. Open interviews were conducted with different stakeholders in the region.

The study region in South Kanara includes the districts of Udupi and Dakshina Kannada of Karnataka State in India. The agriculture in the study area is characterised mainly with small sized farms. The total agricultural area of the region is about 3140 sq. km owned by about 268,000 landholders, with more than 178,000 landholders owning less than 1 hectare of land. The agriculture in this region is highly monsoon dependent with an average rainfall of 4029 mm observed in every year. To achieve the objectives of this paper a small part of the region, two villages have been selected for a detailed study. The selected area of the study comprises of Thekkatte and Ulthoor Gram *Panchayats* of Kundapur *Taluka*, Udupi District in South Kanara (74° 45' to 74° 46' N and 13°24'45" to 13° 25' 30" E). Thekkatte village approximately consists of around 1000 households covering about 5.4 square km of total geographic area. Ulthoor village consists of around 500 households with 4.8 square km of geographical area. The geographical map showing the study area is given in Fig. 1 below.

Fig. 1. Geographical map of the study area



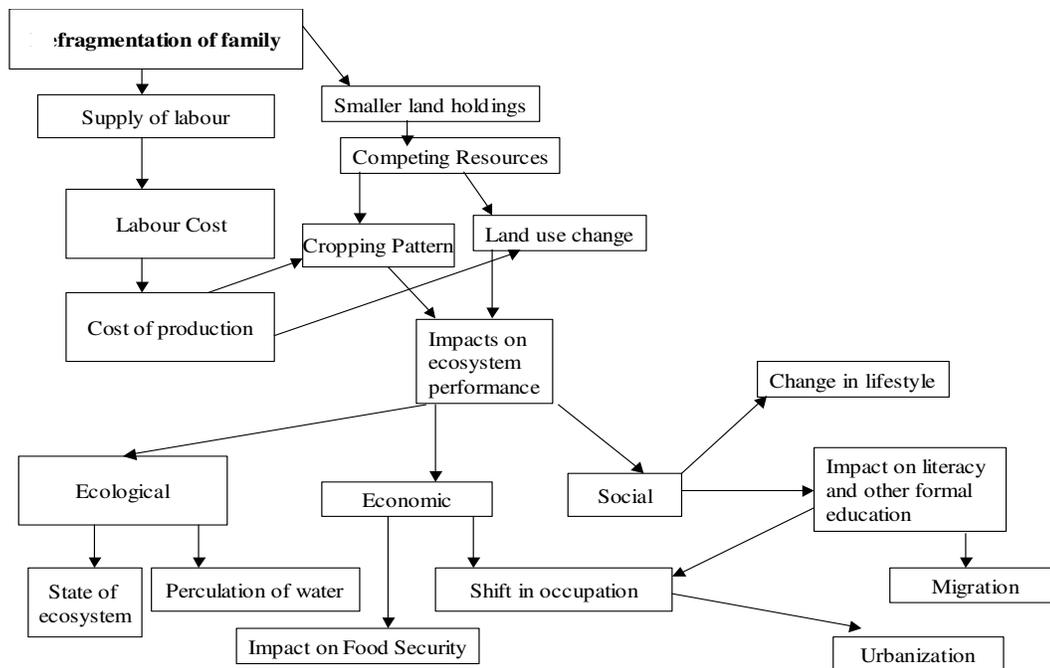
Paddy is the main crop of cultivation particularly in the coastal and middle east of South Kanara and this is grown in three seasons: *Kharif* (June to September), *Rabi* (October to January), and summer (February to May). Cash crops such as arecanut, coconut, cocoa, pepper and cashewnut etc are predominantly cultivated in the interior belt of the region. Besides this, pulses such as horsegram, blackgram, green gram and oil seed groundnut and commercial fibre crop sugar cane are also cultivated in this region. The agricultural economy in the region is mainly based on the bulk of arecanut, coconut, rubber and cocoa whereas paddy provides food security.

2. Social institutions causing changes

Though land use is constrained by environmental factors, it is the human environment interaction that determines the land use changes. Land as a fundamental factor of production has been tightly coupled to economic growth over the course of human history (Richards 1990). The human interactions leading to land use changes arise as a consequence of a very wide range of social objectives and hence the causal driving forces, motivating the same needs to be looked at. These underlying driving forces constitute both push and pull factors (arising from social needs) causing land use changes and thereby heading to environmental changes. The main changes that have been observed in the society and societal structure and thus impacting land use/land cover in the study area are presented in this section.

Fragmentation of families

Fragmentation of families and thus a break up of the agricultural land holdings is a common occurrence in the region. The joint family system that prevailed in the country for ages witnessed changes in the 20th century. In the joint families, no individual had ownership of land and property. This was jointly owned by the Hindu joint family. In recent years, there has been a change from joint to nuclear families, whereby the land is divided between the family members. The change from the joint family system to nuclear families causes a fragmentation of agricultural land in order to meet the demand for more houses and sharing of property between family members. The size of agricultural land holding by individuals is decreasing due to fragmentation of land across the years caused by a split in the joint families in the region. Smaller land holdings are less economical for cultivation. Similarly the use of machinery is also not feasible, both technically and economically, in small land holdings. Reduced size of the land holding creates less employment opportunities and many farmers shift to alternate livelihood options. Women of agricultural families shift towards jobs in small-scale industries or *beedi* rolling in the region. All these in turn force the farmers to either sell the land or apply higher levels of fertilizers to get more produce from the smaller area. Higher yields from lower land holdings become the main objective of the farmers leading to degradation of agricultural land. A conceptual framework of the impacts due to fragmentation of the joint family given below.



Migration related to increased literacy and seasonal nature of employment

Literacy levels in the region have been higher than that of other areas in rural India and have been increasing over the decades. An analysis of census data on literacy in the region reveals that there has been a 38% increase in literacy in the study region from the census year 1951 to 1991. This coincides with a 31% reduction of the workforce in the agriculture

sector. During RRA and PRA the people opined that the educated people, specifically youngsters find other livelihood opportunities and prefer not to work in the agricultural fields. Some of farmers in the study region have educated children working in other parts of Karnataka and India and fear that they may not even return to their own land. While education and search of suitable jobs has been one of the main factors for migration, the seasonal nature of employment in agriculture has also led to a shift in occupation/migration. Thus even those who are not very educated and earlier dependent on agriculture/agriculture labour have migrated for reasons of seasonality associated with agriculture. There is a lot of migration from these areas. The household survey revealed that 33% of the households in the region have members leaving this region. A majority (77%) of these migrants send remittance income back home. Besides, there is also pendulum migration. Twenty-five percent of the households have members who travel out of the region for work and return back.

Shortage of supply of farm labour

Shortage in the supply of farm labour has also led to problems in cultivating their agricultural lands and hence farmers are looking at other alternative use of land. Shortage of supply of labour has been intensely felt by most of the farmers. In the household survey in the study villages, around 57% of those surveyed were of the opinion and reported shortage of labour, a higher percentage of the large farmers reported non availability of agricultural labourers as a cause of grave concern. Small farmers generally engage their entire families itself on the farm the larger farmers employ agricultural labourers and hence this is a serious problem to the large farmers. The farmers have also reported that there is major difficulty in getting timely labour in rice cultivation. Increased levels of literacy and out-migration have reduced the supply of agricultural labour in the study region. Shortage of farm labour is mainly felt during sowing and harvesting season. The educated youth of the region do not prefer to work on the agricultural fields even if unemployed. These youth prefer white collar jobs and would rather remain unemployed.

Poverty and forced selling of land

During this study it was reported that one of the main reasons for selling the agricultural land to clay pits or domestic construction purpose is poverty. Agricultural land is the only asset and source of income to many of these small and marginal farmers. This farm land serves as emergency cash for the need of children's education, hospitalisation, marriage of their daughters and construction/renovation of old houses. Poor farmers, due to social constraints and need of money for reasons such as daughter's marriage, sell their farmland. . Dowry¹ is one of the serious social concerns in the region as reported by most elderly women in the FGDs. In spite of the high levels of education in the study region, the practice of the dowry the value of dowries is increasing in the region. Kumari, 1989 brings out, this traditional custom that was entrenched in the male dominated society has attained alarming proportion over the decades. The focus group meetings and discussions with women brought out that the dowry costs have been escalating and depends on the increases in direct proportion to qualification, job status and economic status of the groom. Though there are no instances of dowry harassment after marriage in the region as is the case in many parts

¹ Dowry or *Dahej* is the payment in cash or/and kind by the bride's family to the bridegroom's family.

of the country, it is extremely difficult to get ones daughter married without paying any dowry. Hence, parents with daughters are forced to sell off their land for the marriage expenses of the daughters. Also when the house is old, for renovation expenses or when the family is split, the need to construct a new house makes the farmers sell their land. The need of money for higher education of their children and accidents which make for very high hospitalisation charges also makes some farmers sell their land.

Continuous decrease in financial returns from agriculture

There is a decrease in financial returns from agriculture mainly attributed to the high cost of production in agriculture. The cost of agricultural production has been on the rise ever since the advent of green revolution. Farmers have reported that the green revolution led increased dependence on purchased inputs that has not only increased the cost of production but has also increased with the tendencies like imbalances in fertilizer use, over use of plant protection chemicals, mono cropping and neglect of organic manure etc. This inturn gave rise to several problems such as ecological damage, increased pests and diseases, yield decline. The high cost of labour has further contributed to the cost of cultivation. The Focus group discussions with the farmers have brought out that there is a tremendous increase in labour cost. Agricultural wages in the region is high. The current cost of labour was Rs. 100/- for men and Rs. 80 for women when the study was being carried out (currently the cost of labour ranges from Rs.120-150 depending upon demand). These wages are comparatively higher than other parts of the state/country. However, any comparison of agricultural wages across areas is not relevant unless the cost of living is considered. Cost of living is also high in the district. It has to be noted that though the agricultural wages in the district are the highest, the cost of living index has increased dramatically in South Kannada. (Cost of living increased by about 90 per cent in Dakshina Kannada.

The decrease in financial returns is as a result of increased input cost and corresponding stable output cost. It has to be noted that the input:output ratio in paddy is decreasing across the years. Fertilizer and labour prices have almost doubled in last decade meanwhile the price of rice is almost the same. The selling price of rice during the study period was Rs.8-10/kg and has been the same for almost 10 years. There is no remarkable increase in the price of paddy though all the input costs have increased. Even the government gives rice at a subsidised rate to people as rice is the staple food of the region. This factor makes the farmers lose interest in farming as buying rice works out cheaper than growing paddy in the region.

Competing resources serving as a push factor

From the finite area of land available within the region, there is growing need for housing, agriculture, animal grazing, provision of space for infrastructure etc. For a sustainable future equilibrium between all these uses needs to be found. The greatest area of land use conflict in this region is agriculture- housing. Another recent conflict has been observed in agriculture land-clay quarries. Increase in population and changes in socio-economic conditions of the people have led to a rise in demand for land for construction of residential houses, shops, establishments, roads etc. In this study region almost all the available land is under some economic activity or the other and hence any land required for non economic activity has to be taken from the cultivable land. During

the past 3-4 years the conversion of agricultural land to clay pits has been observed in the study area.

Changes in attitude of people such as attraction of short-term gains

The interactions between people and nature have reduced in the recent years. Over the years there has been a change in attitude of people towards agriculture. Many of these farmers, in the study area, are attracted towards short-term gains and hence the lure of earning good money to sell the agricultural fields for clay mining or sometimes for domestic construction. Increased need for houses creates more demand for clay mining. All these factors together serve for land use/cover change.

3. Land use and land cover change in the study area

Land-use and land-cover change are significant to a range of themes and issues central to the study of global environmental change. Any alteration in the earth's surface has major implication for the global radiation balance and energy fluxes, thus contributing to changes in biogeochemical cycles, altering hydrological cycles, and influencing ecological balances. Through these environmental impacts at local, regional and global levels, land-use and land-cover changes driven by human activity have the potential to significantly affect food security and the sustainability of the world agricultural product supply systems (<http://www.iiasa.ac.at/Research/LUC/>). This makes it absolutely necessary to evaluate the causes and the consequences of changes in land use and land cover. It is commonly believed that the agricultural area of a region first expands to provide food for local population growth and then contracts as urban areas spread. Vast amounts of highly productive agricultural land are lost to meet the need of the rising population (NAS, 2001). Changes from the agricultural land to non-agricultural uses are very common and a major concern in the study area. This is mainly the result of the social factors as mentioned in the previous section. While poverty related factors serve as push factors towards land use and cover change, demand for built land serve as pull factors for the same. The societal changes have had a high impact on the land use land cover. The main impacts in the study area are as follows.

1. Changes in crops and cropping pattern
2. Changes in seeds from traditional to HYV
3. Shift in organic manures to chemical manures
4. Fragmentation of agricultural land
5. Land use change from fields to built land and to clay pits

Change in Cropping pattern

Farmers in the study area are discouraged to cultivate paddy on account of lower returns from paddy in the recent years. Coupled with this is the labour intensive nature of paddy cultivation and lack of availability of labour. There has been a change in the crops grown and cropping pattern in the last few years. Changes in crops observed in the study area are of two types. One is irreversible change to another crop from the existing crops and other type is reversible change. Some farmers changed from usual paddy and pulse combination to coconut or sugar canes in some of their lands.

Others who grow paddy as their first crop changed the second crop of pulses to groundnuts or vegetables.

The farmers who could change paddy to coconut have either larger landholdings or those families with no members interested in continuing paddy, as it is highly labour oriented. This has caused reduction in paddy land and reduced demand for agricultural labourers to some extent. The temporary changes in crops from pulses to oil seeds gave the farmers good financial returns initially. But market fluctuation, decreasing yields and higher input costs make the farmers rethink and some farmers have already reverted back to pulses. The change from a variety of pulses to single groundnut crop causes loss of traditional agricultural biodiversity.

The usual pattern of cropping in the region is in *Khariff*(during monsoon) season, paddy, in *Rabi* (just after monsoon)and *summer* season paddy or pulses depending on the availability of water in the agricultural fields. This pattern varies across the agricultural land of three different types namely lowland, midland and upland. These land types are based on water holding ability of the land across the year, usually low land has good water holding power followed by midland and upper land. Table 2 shows the cropping pattern across three types of land presenting the *khariff*, *rabi* and *summer* seasons and changes.

Table 2: Crops grown in different seasons

	Changes	Khariff	Rabi	Summer
Lowland	Past	Paddy	Paddy	Paddy
	Present	Paddy	Paddy	*Pulses/vegetables
Midland	Past	Paddy	Paddy	Paddy/pulses etc
	Present	Paddy	*Paddy/pulses etc	*-
Upland	Past	Paddy	Pulses/groundnut	-
	Present	Paddy	*-	*-

* changes

The main changes over the years are a reduction in paddy growing. Growing paddy in all the three (*Kariff*, *Rabi*, *summer*) seasons is rarely observed in the study area. Across all types of land (lowland, midland and upland), the cropping pattern has changed across the years. The crop frequency of one season is reduced in all the types of land as shown in Table 1 and all farmers grow paddy the *Khariff* season, as there is no option to grow any other crop due to the heavy rains.

Changes in seeds from traditional to High Yield Varieties (HYV)

Use of the HYV seeds became popular in the state after the Green Revolution and increased areas were brought into HYV seed cultivation each year. The study area observes a similar behavior, with almost all farmers using HYV varieties of seeds. Traditional varieties of seeds are rarely found in the region. The reason for this stems from reduced farm landholding and the need to fulfill the food needs with increased production from the smaller farms. During the PRA it was noted that use of HYV seeds started around 1976 with the seed called *Masuri* and use of HYVs increased gradually to a peak during the 1980s and at present almost all seeds are HYV in the region. Non-availability of improved varieties of paddy seeds is noticed as a problem in the region.

This also contributed to a reduction in the paddy cultivation. Table 5 shows seed changes in the region as reported in the PRA. Even among the HYV it has been observed that many varieties were introduced and it has been changing across the years.

Table 3: Seed changes across years in the region

Years	Khariff Seed varieties	HYV/traditional
2003	Mo4 (75%)/ Palguna (20%)	HYV
	Masuri (little for self 5%)	HYV
2001	M04 (started)	HYV
1990	INT	HYV
1983	Palguna (started)	HYV
	Masuri	HYV
	MT 20	HYV
	MGLI5, 3	HYV
1976	Masuri (white rice)	HYV
1970	Hallaga, Kanwa and Karidadi	Traditional

HYV are nutrient and water intensive. Reduction in soil fertility in the region has lowered productivity. HYV seeds are also more susceptible to many pests, which traditional varieties would tolerate. The genetic erosion from diverse wild varieties to HYV varieties together with lower yield, have increased crop loss due to reduced pest resistance which serve as push factors for land use and cover change.

Shift from organic manure to chemical fertilizers

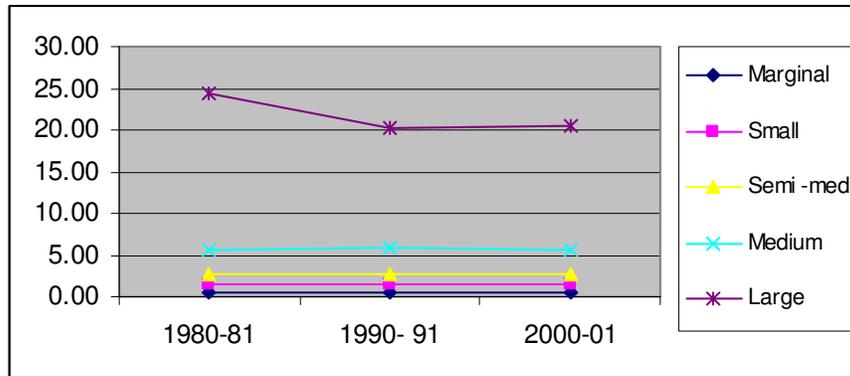
Organic manures were very commonly used in the region from former days. Farmers in the region use green leaves and cow dung, and compost as manure in the region. Besides this burnt soil (soil burnt using green leaves), paddy straws are also used as organic manure in the region. With the introduction of HYV seeds, chemical fertilizers were also introduced in the region and it is observed that now farmers use a combination of organic and chemical fertilizers in the region. Some farmers use cow dung for biogas generation and later they use the waste dung from the biogas unit for composting with green leaves for manure. Deforestation is noted as an issue of concern to many farmers as they are not getting enough green leaves. From the household survey it was observed that the use of chemical fertilizers is higher among the smaller land holding farmers as compared to the larger landholding farmers in the study area. Average fertilizer use by farmers who have a landholding up to 1 acre is 99 kgsacre-1 while those with 1-4 acres is 76 kgsacre-1 and those with more than 4 acres is 51 kgsacre-1 of fertilizers. Use of chemical fertilizers creates a nutrient imbalance and eventually degrades the land.

Fragmentation of agricultural land

The change from the joint family system to nuclear families causes a fragmentation of agricultural land in order to meet the demand for more houses and sharing of property between family

members. As is the case in most parts of India size of agricultural land holding by individuals is decreasing due to fragmentation of land across the years.. South Kanara district has holdings spread over 152448 hectares in the year 2000 –01 with 135199 farmers. Of these 86% fall under less than or equal to two hectares category and 4.12 % fall under more than four hectares size group (Department of Agriculture). The average size of holding is 20 ha for large farmers the average size for marginal farmers is 0.37. See fig for Trends in average size of holding for land of various sizes.

Fig. Trends in average size of holdings in the district over the years



From the above figure it can be seen that the average size of farms have reduced under all categories. In our study area as well, the studies have brought out that there has been a reduction in the size of land holdings. During the study period almost 90% of the farmers are with less than 1 ha land holding. The farmers have responded that fragmentation of land due to break up of the joint family system is one of the main reasons followed by sale of land in need of money. Among the large farmers there has been a major reduction in the average size of holdings². Smaller land holdings are less economical for cultivation. Similarly the use of machinery is not feasible, both technically and economically, in small land holdings. Reduced size of the land holding creates less employment opportunities and many farmers shift to alternate livelihood options. Women of agricultural families shift towards jobs in small-scale industries or *beedi* rolling in the region. All these in turn force the farmers to either sell the land or apply higher levels of fertilizers to get more produce from the smaller area. Higher yields from lower land holdings become the main objective of the farmers leading to degradation of agricultural land.

Land use change from fields to built land and to clay pits

Changes from the agricultural land to non-agricultural uses are a major concern in the study area. As mentioned in section 3, this is mainly the result of various societal reasons such as the break-up of joint families, poverty and forced selling of the land to meet immediate demands, cultural constraints such as payment of dowries for daughters etc. Due to the increasing demand for construction of houses, on account of the rise in nuclear families, a part of the agricultural land

² Government of India defines Marginal farmers as those with less than 1 hectare land, small farmers 1-2 hectares, Semi- Medium farmers are between 2-4 hectares, Medium 4-10 and large farmers have more than 10 hectares of land.

regularly changes into residential areas for most of the families in the region. The study area has been witnessing conversion of agricultural land for construction of houses and this has been increasing in the past 2 decades. Pic1. Shows conversion of a lush green paddy farm for residential purpose during the study period.



Pic 1. Agricultural land converted to residential purpose in the study area

Increase in construction has also created a demand for bricks and clay mining. This demand coupled with the lure of short-term gains by farmers has also significantly contributed to land use and cover change and they sell the land for clay mining. These mined-out agricultural lands are called clay pits, and are a matter of concern in the area as they attract migratory birds and these birds trouble the farmland for feeds. While poverty related factors serve as push factors towards land use and cover change, demand for built land serve as pull factors for the same.

4. Current and potential future impacts of land use/land cover change:

The main impacts of land use/land cover change are on population and the ecosystem. This section briefly describes these impacts

Impact on population

The direct impact of land use change on population is mainly evident on food security and employment opportunities for women.

Rice is the staple food of the region and hence many families in the region continue to cultivate the crop even if it is not economically profitable. It can be observed from the study that most of the cultivators use the product for self-consumption. Hence agriculture here is not market oriented and is important to the region in terms of food security. If they lose their land due to any reason, they are compelled to buy food grains for which they need to have money. While in the case of self-cultivation, the farmers are assured of food security even in the absence of any income to the household. As is the case of the study region it can be observed that 90% of the households cultivate for only self-consumption, while they pursue other allied activities for income generation. This means that a loss of agricultural land due to reasons such as poverty forced selling or attraction of short-term gains would also mean loss of food security.

Agricultural land use change for other purposes also means loss of employment opportunities to many agricultural labourers especially women. Although there is only 45% stake in agriculture in the study region, it has been noted that most women here are only involved in household tasks,

raising children and possible agricultural work. Change in land use from agriculture to any other would imply loss of employment to these women. While men can explore other work opportunities either in the area itself or in other regions, women's preoccupation with their basic obligations at home and the family, prevents them from taking up other activities.

The household survey also tried to capture the interest of people in the continuation of agricultural activity. 84.3% of the respondents in this region think that the activity should be continued/protected. Some of the reasons reported for continuing the activity are as follows: livelihood opportunity 39%; employment opportunity 9%; Food security 11%; Traditional activity 2%; promote greenness 6%. More than 10% of the respondents gave a combination of reasons to protect the activity such as source of livelihood and food security (6.3%), source of livelihood and overall development of the region (1.9%), employment opportunity and overall development (1.9%), food security and overall development (0.6%).

Impact on ecosystem

Agricultural activities impact on environment through soil quality, water systems, air quality, biodiversity, wildlife habitats and ecosystems. Environmental change is by-product of agricultural activity and policies at National and International level increase the environmental changes by modifying the behavior of producers (farmers) and consumer behavior.(Lingard 2002).There are multiplicities of factors that influence on ecosystem on account of land use and land cover changes. These would change the goods and services of the ecosystem. The main impacts as quoted in Lambin et al (2003) are on biotic diversity worldwide (Sala et al 2000), soil degradation (Trimble and Crosson 2000) and the ability of biological systems to support human needs (Vitousek et al, 1997). Main goods in the present ecosystem that are providing direct services are agriculture, livestock rearing, are providing food security and some minimal income. Food security is reduced and people dependent on other occupations and also biodiversity is go on changing in the region. Mined-out clay pits are became water bodies and attracting migratory birds. People have reported that these migratory birds destroy the agricultural crops in nearby farms and this is an issue of concern for the study region.

5. Conclusion

This study has focussed on changes in society and societal structure and their impacts on agricultural land. Using participatory methods, this paper addresses the issue of land use and cover change. It draws attention to the fact that, in addition to the intensification of resource use, major land use changes in India are also governed by changes in human dimensions over the years. These changes serve as push and pull factors towards land use and cover change. Low financial returns from paddy cultivation, break-up of joint families to nuclear families creating more demand for built land, demand for clay mining coupled with poverty and short-term gains, lack of availability of labour on account of low social status to agriculture labour, are the main causes for agricultural land degradation and subsequent land use and cover change.

The complex inter linkages between poverty, population and environmental degradation offer another dimension to the land degradation problem. Along with poverty, our study also illustrates the relationship between socio-cultural restrictions and environmental degradation. Daughters'

marriages in India are the parents' responsibility and unwedded girls are socially not well accepted. Poor farmers are forced to sell their land to acquire money to get their daughters married. Such immediate needs adopt a short-term perspective. Earlier studies (Bekalo and Bangay, 2002) also point out that immediate survival needs require a short-term perspective.

Population growth and agricultural resource degradation has been discussed by Cuffaro (1997). In the present case study, population growth connected with break-up of joint families and subsequent demand for built land has contributed significantly to the land use and cover change in the region. The role of the family as social capital has been discussed in previous studies. For example, Bubolz (2001) draws attention to the significant role of the family as the source, user and builder of social capital. Our research has demonstrated the role of society and the changes in its structure over the years in agricultural land degradation and land use and cover change.

The policy changes were expected to boost the agricultural sector as the most important in terms of share in the GDP in the mid-1990s. However, even when it is not the sector providing the largest share of GDP, the importance of agriculture is not likely to diminish because of its critical role in providing food, wage goods, employment, and raw materials to industries. Despite their preoccupation with industrial development, India's planners and policy makers have had to acknowledge the critical role of agriculture in the early 1990s by changing basic policy. Continuing increases in productivity, developing allied activities in rural areas, and building infrastructure in rural areas are essential if India is to continue to be self-reliant in food and agricultural products and provide a modest surplus for exports.

It can also be observed that most of the agricultural policies have failed to raise the welfare of agricultural community specifically in developing countries. Hence it is suggested that, allied activities in the rural areas needs to be developed without impacting the agriculture in the region. Any development of economic activity in the region should be done with proper protection of agriculture activity. Agricultural land conversion to non-agricultural purposes should be avoided.

Another suggestion is, strengthening of local institutions towards better integration with the goal of building long-term capacity and resilience to global environmental change. That is by framing proper property laws to avoid fragmentation or by promoting cooperative farming systems wherever farming in small-scale is not practicable.

This paper has attempted to illustrate the roles public policies and global environmental change. Here we can conclude that any environmental changes are not just due to technical advances or over exploitation of resources, which are due to policies, but also due to lack of resilience power of societal institutions.

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