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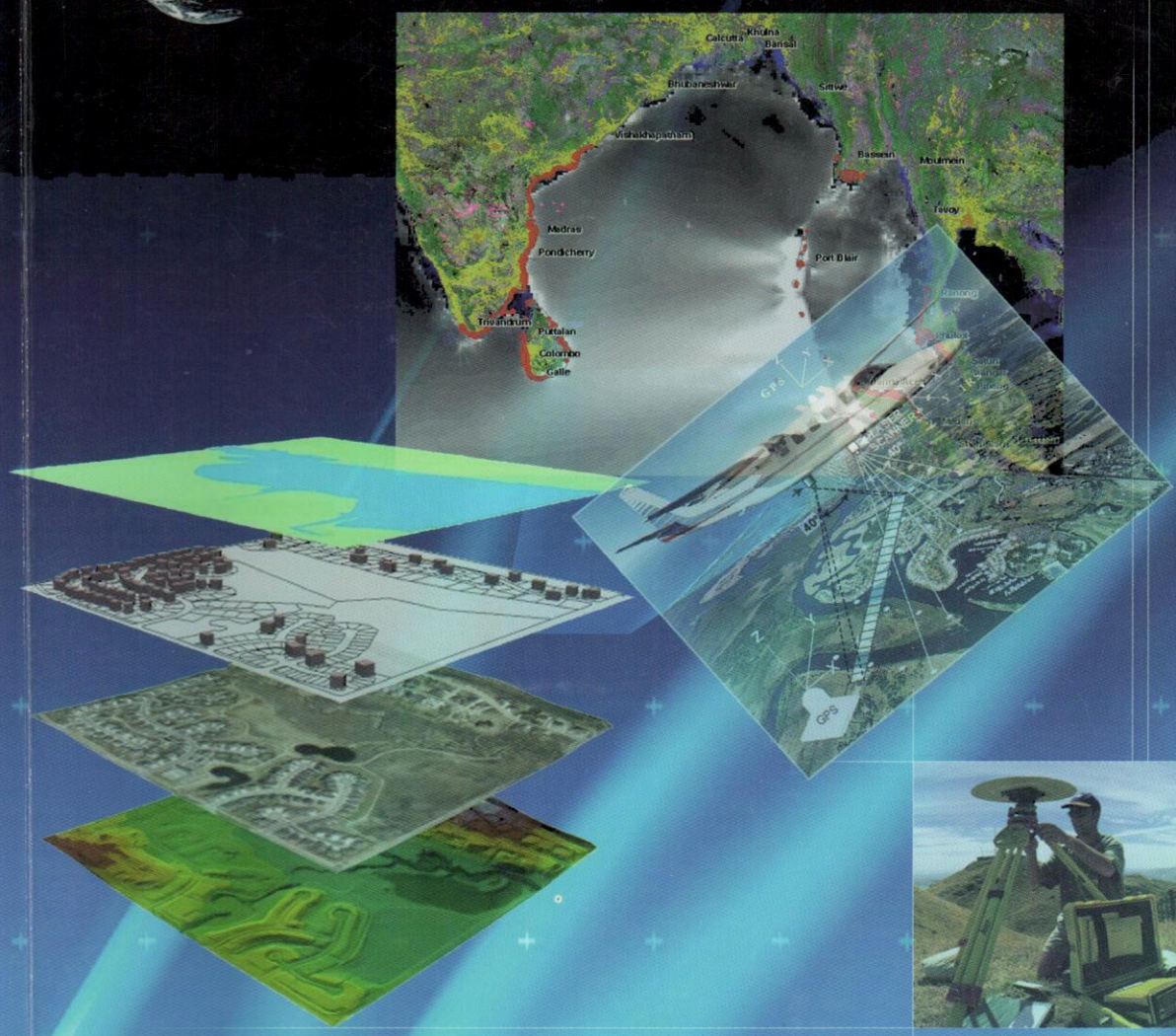

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DEFICIENCIES IN DEVELOPMENT PROGRAMS INDUCING MIGRATION IN RAINFED REGIONS IN INDIA

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ABSTRACT:

During recent decades per-eminence of agricultural sector in India has declined despite huge investments on Watershed Development Programs implemented for soil conservation and rainwater harvesting in rain-dependant regions of Peninsular India. Sub-optimal gains from these projects except in a few cases, has induced migration from rural areas to urban region that are ill equipped to take additional pressure. Increased inflow of rural people into urban areas with poor coping skills and deterioration of living condition in urban centers often culminate into social and political flash points forcing the authorities to undertake shortsighted and usually counter-productive measures to keep peace. The paper describes the prevailing socio-economic and environmental scenario in rainfed regions in India that force migration by rural population despite implementation of development projects at massive costs. The study analyses the underlying reasons for the lacunae in the programs and the necessity to urgently revamp them.

KEYWORDS: *watershed development program, rainfed regions, India, agriculture, migration, environment, sustainable development*

INTRODUCTION:

Watershed-based development is an accepted strategy for sustainable development of rainfed agriculture in the semi-arid and dry sub-humid regions in India. Watershed Development Program (WDP) is undertaken to ensure rural livelihood, conserve soil and water and for optimum utilization of natural resources and so it has attracted large public investment since 1980s and successive governments have continued to pledge more investments for the program. Rainfed agro-ecological regions encompass over 76.74 million hectare out of a total geog. area of 90.4 million hectare in the states of Andhra Pradesh, Maharashtra, Karnataka and Tamilnadu in the peninsular region of India (Figure1). According to Census of India (2001) over 71 million persons were involved in agriculture and allied activities in the four states as mentioned earlier, that contribute significantly to the national food stock. Watershed program is essential in the rainfed regions as perennial irrigation sources are poor and mean annual rainfall range between 300-800 mm across the region occurring in 23 – 28 rainy days in the form of thunderstorm inducing massive soil erosion and runoff (Katyal *et al.* 1996).

Rapid growth in population and the necessity to stay self-reliant in foodgrain production in view of the current world scenario have compelled the Govt. to make larger

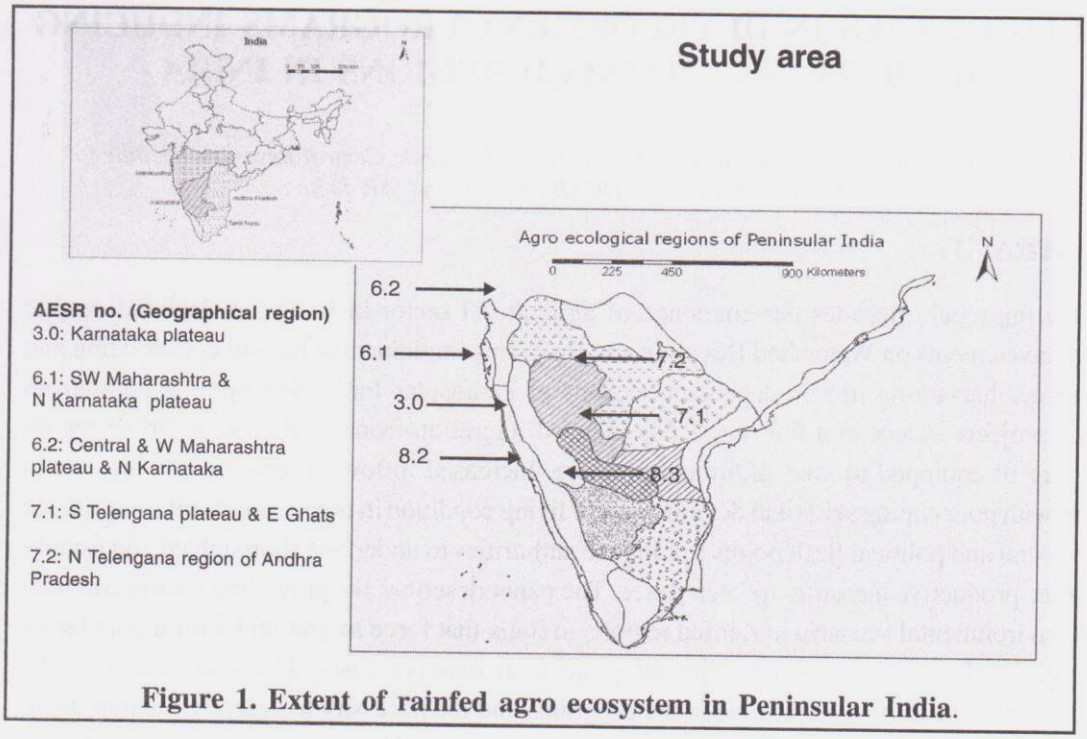

Figure 1. Extent of rainfed agro ecosystem in Peninsular India.

financial allocation for WDP in rainfed region, as current agricultural growth rate at 2.72% is low and unsustainable. Another major reason for increased investment in WDP is the poor returns accrued from large irrigation projects implemented in the state of Andhra Pradesh and in several others states, due to cost escalations and poor implementation of the projects due to sociopolitical constraints and due to ecological losses like soil erosion, land degradation, loss of biodiversity, inundation and water logging. Increasing economic pressure and competing demand for land in rainfed regions where agricultural productivity is low induces farmer to sell his agricultural land holding in view of uncertain climatic and socio-economic scenario. The government both at the central and at state-level have often resorted to short-sighted solutions like free electric power for farming sector in Andhra Pradesh besides subsidizing agricultural inputs, viz., fertilizers, seeds, etc., elsewhere to keep farmers bound to their land and desist from migrating to neighbouring urban centers (NCF, 2006).

Since 1971 rural migration has been marked in Andhra Pradesh - both from within and without. While in 1991, 20% of rural population in the state migrated, by 2001 this number increased to over 16.02 million persons. On the other hand, urban migration was less by a half i.e., approximately 7.4 million persons (Figure 2). Factors responsible for this exodus essentially relate to difficulties faced by farmers in agricultural sector and loss of sources of livelihood in the rural areas. In Andhra Pradesh it is noticeable that migration is higher among females when compared to Maharashtra and Orissa where young males migrate from rural

areas in search of livelihood. A study of reasons for out-migration by rural female indicates marriage as a major reason for out migration as rural male have fewer livelihood options in the current circumstance and hence alliances are avoided. Environmental factors as elsewhere in the world, are adversely affecting the remunerative capacity of rainfed agriculture and the prime driver of out - migration from rainfed regions (MA, 2005).

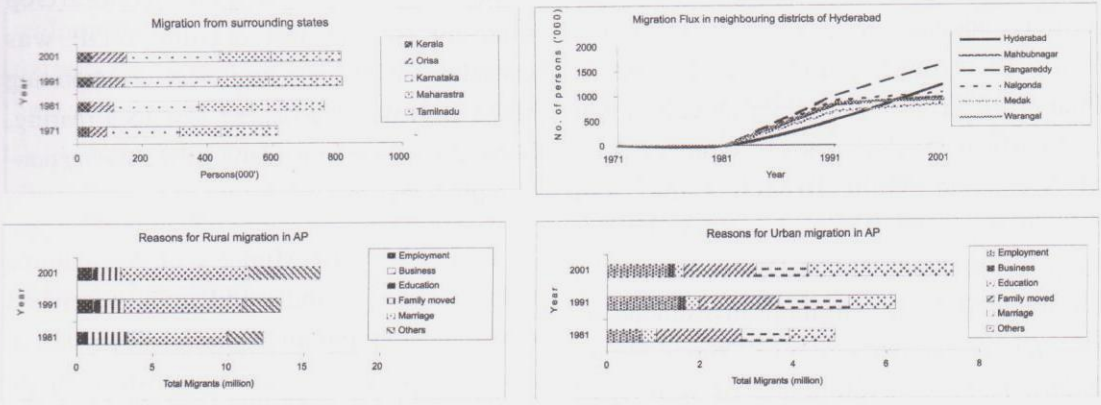

Figure 2.Trends in migration in Andhra

Background

Evaluation of WDP indicate that barring a few exceptionally successful watershed projects like Ralegaon Siddhi in Maharashtra, Sujala in Karnataka and Rayalseema Watershed Area Development Program (RWDP) implemented in Chitoor district of Andhra Pradesh (AP, 2006) and a few others, most of the projects have failed to deliver to ensure remunerative agriculture (Joshi *et al.*, 2005), provide decent livelihood or to insulate farmers from climatic hazards like drought and floods. Decision to migrate could either be personal or community-based and are often forced by loss of livelihood due to land degradation in rural areas. However migration provides only an interim relief, as farmers are unable to adjust in the urban environment owing to lack of suitable work-skills and are unable to participate in the urban economy, leading to hardship and alienation.

The present paper attempts to describe the current status of rainfed agriculture in the Telengana region of peninsular India, the types of developmental projects implemented to backstop rainfed agriculture and the causes and trends in migration in the region. Environmental drivers of migration like climatic variability and land degradation that affect agriculture have been described to explain social vulnerability of rural population in the region. The study illustrates the critical role of developmental projects like the watershed development for securing agricultural production in the rainfed regions and the necessity for their proper implementation in order to check rural migration. To substantiate the issues related to migration, changing trends in climate like increase in ambient temperature, reduction in rainfall volume, increase in rainfall intensity, reduction in number of rainy days, etc., have been discussed to assess their impact on the

farming community which is forced to migrate. In this rainfed region agricultural activity requires assured source of irrigation either through natural precipitation like the southwest monsoon or through irrigation projects. However, low returns from large irrigation projects undertaken in Andhra Pradesh through World Bank funding under the 2nd and 3rd Phases of Irrigation Project Development under which development of Command Area of Srisailem Right Branch Canal and Sriramasagar Project were undertaken to support 300 thousand households, has forced the World Bank to dub these investments as *efficacious but not effective* (World Bank, 2008). Hence, development of watershed projects and other small irrigation schemes have become critically important and Govt. is concentrating all its efforts on this front.

Research Setting

Southwest monsoon season (June-September) is the primary source of water for the rainfed agro-ecological regions of Peninsular India barring the coastal region of Tamilnadu which receives rainfall from north - east *returning* monsoon during October – December. Study indicates that there is a large variation in the number of rainy days in the recent years, i.e., in 2004 - a major drought year, the number of rainy days was 31 while in 1983 - a normal rainfall year, the number was 88 days. Rainfall is associated with thunderstorm that typically last for less than an hour often leading to soil erosion, flooding and overland runoff including severe topsoil losses and depletion of soil nutrients. Hence watershed-based development model was deemed most appropriate for the region and in 1973-74 the WDP was initiated by Dept. of Land Resources, Ministry of Rural Development (MoRD), Govt. of India under the scheme of Drought - prone Area Program (DPAP) for emphasizing water harvesting, storage and its for irrigating during critical crop phenophases in the region. WDP was considered as an umbrella project for supporting allied activities like fishery, livestock rearing, horticulture, market gardening, etc., during non-cropping season.

In 1974-75 the Ministry of Agriculture (MoA), Govt. of India undertook watershed development program to check soil erosion in areas where shifting cultivation was rampant in the country. In 1988-89 MoRD initiated the Integrated Watershed Development Program (IWDP) and in 1990- 1991 the MoA, started the National Watershed Development Program for Rainfed Area (NWDPRA). The key aspects of WDP have been the development of soil and water conservation structures (S&WC) like check-dam, stone weirs, contour bund, live bunds, vegetative cover, key-line plantation, grass way, etc., in order to provide impediments to overland runoff to check soil erosion and depletion of nutrients from agricultural fields, besides construction of physical structures to guide runoff to designated farm ponds and tanks created specially for water harvesting on the surface and allowing impoundment of rainwater to accelerate groundwater recharge. As WDP seemed a comprehensive program for achieving agricultural and ecological sustainability in rainfed regions in India, over 50.8 million hectares were treated under WDP till 2007 at a total cost of Rs.192512 million or US$ 4278

million (Planning Commission, 2007). If India is to achieve a sustainable agricultural growth rate of 4.0 to 4.5% by 2015 in order to, reduce food insecurity, poverty and check forced migration from the region, role of WDP in rainfed agriculture in India cannot be underestimated. The present paper discusses the importance of WDP and why some of them have failed to deliver and the consequences of this failure vis-à-vis agricultural production and income security in the rural areas in rainfed regions.

Data and Methods

The study is an outcome of a large research program on evaluation of sustainability of watershed project in rainfed regions in India. The methodology for the study included combining tools of Geoinformatics with conventional techniques of soil and water analysis and socio-economic survey. A number of secondary sources of data were seen and database created and thematic maps drawn using GIS. Evaluation of sustainability of watershed projects is based on biophysical and socio-economic indicators that have been constructed specifically for this study. The present paper is based on the outcome of this study that is currently continuing.

Watershed development programs have been evaluated in India by various agencies (Sreedevi *et al.,* 2004, Kerr *et al.,* 2002) while review of government policies pertaining to WDP have also been undertaken (Oliver Springate-Baginski *et al.,* 2004; Ratna Reddy *et al.,* 2004). In a meta-analysis of over 311 watershed projects implemented in India, Joshi *et al.* (2005) indicate that the mean B: C ratio of WDP in India was modest at 2.14 and the internal rate of return 22% which was comparable with all other rural developmental programs in India as they could not be expected to yield better. This is a sad state of affair and bodes ill for future prospects of rainfed agriculture in India.

To analyse the factors that affect performance of WDP, a multidisciplinary study was undertaken on 2005 on projects that were implemented between 1998-99 to 2003-04 by various agencies like Dept. of Agriculture, Govt. of Andhra Pradesh, research organisations like Central Research Institute for Dryland Agriculture (CRIDA - ICAR), MANAGE – National Institute of Agricultural Extension Management, National Institute of Rural Development (NIRD) and NGO named Deccan Development Society (DDS) and Centre for World Solidarity (CWS). The watershed projects belonged to 4th generation of WDP in India and had been funded by various central ministries like MoA, MoEF, MoRD, MWR and by private voluntary organisations. All projects selected for the study were located in northern Telengana region identified as AESR 7.2 (Velayutham, 1999) which experiences hot moist semi-arid climate, has deep loamy and clayey mixed red and black soils and a crop growing season that ranges from 120 to150 days and where rainfed agriculture is the main source of livelihood.

Results

Study indicated that despite large investments in the watershed projects, gains in agricultural productivity have been small. For instance, paddy yield ranged from 3 to 5 tons

per hectare in treated micro-watersheds while the District average for Rangareddy and Nalgonda were 2.59 and 3.1 tons per hectare, respectively. Yield in untreated fields where only traditional agricultural practices were in vogue, was found to be similar and occasionally better, i.e., 2.5 to 4.75 tons per hectare (DoAC, 2004). However, these yield levels are lower than those achieved in neighbouring states of Tamilnadu and Karnataka. Although sorghum yield was found to be higher in treated watersheds, gains from it was minimal as sorghum is no more an essential cereal and its usage and marketing is restricted to poultry feed. Due to availability of subsidized rice through Public Distribution System (PDS) also called the ration shop, preferences and food habits have changed in the region and traditional millet crops have lost pre-eminence.

Similarly, yield of other crops like cotton, oilseeds and pulses are low which has forced farmers to abandon agriculture in large pockets or changed land use to establishment of poultry farm, horticultural plantations, agro-based industrial unit like paddy milling, oil extraction and poultry feed production or sold them for urban uses like road construction, development of residential colonies, establishment of schools and colleges, locating industrial units, etc. The recent policy of Govt. of India's policy to permit land conversion for establishment of Special Economic Zones (SEZ) and the lack of long-term land use plans for any region has endangered the preservation of prime agricultural land in the country and the rainfed region which has a fragile ecosystem faces many hazards from this policy. This development is particularly highlighted in the urban- rural divide zone around Hyderabad Urban Agglomeration (HUA) which is located at the centre of the study area and is witness to rapid change in land use and land cover during 1970 to 2001 that have essentially occurred due poor performance in rainfed agriculture and growing impetus to urbanisation process in the region.

The present paper deals with the issue of failure of developmental programs like watershed projects and poor performance of rainfed agriculture as drivers of environmental migration, social vulnerability of the rural people and the political implications of migration in the region. According to Population Census of HUA region (2001), approximately 1.03 million persons are main workers out of which 95% were engaged in urban tertiary sector. In adjoining Rangareddy district, this group constituted 58% or over 580 thousand persons, however, in neighbouring districts of Mahbubnagar, Warangal, Medak and Nalgonda, rural workforce constituted a majority. The paper analyses the environmental factors for the low returns from agriculture in this region that induces migration by the rural workforce and its implications to the economy.

Poor economic returns from agriculture despite WDP

Analysis of agricultural income among farmers in treated watersheds indicated no spectacular gains after implementation of WDP

when compared to those from farmers in untreated watersheds. Net income and input costs among 168 farmers including 88 farmers from treated watersheds and rest from untreated watersheds from eight watersheds in the study area were assessed. Income among marginal farmers in treated watersheds owning <1 hectare land during 2006, 2007 and 2008 *Kharif* (monsoon) season did not show any improvement and ranged from a low of Rs.1311 to a maximum of Rs.38789 (US$ 28.81 to 852.50) per household. Income constituted largely of wages and returns from livestock herding. In case of small and semi-medium farmers having 1.0 to 4.0 hectares of land holdings, income pattern was similar, thus indicating no significant contribution from agriculture despite larger size of land holding. Income among small farmers in treated watershed ranged from Rs. 9434 to 48678/- (US$ 207.34 to 1070) while it was Rs. 12275 to 54490 (US$ 269.78 to $ 1197.58) among semi-medium farmers cultivating 2.0 – 4.0 hectares. Among medium farmers owning 4.0 to 10.0 hectares, income ranged from Rs.19749 to Rs.90250 (US$ 434 to 1983.51) during the corresponding years. It was also noticed that income among cultivators of paddy was higher when compared to those cultivating traditional rainfed crops like sorghum and castor. A few literate farmers could take the advantage of modern technology like ICT and e-kiosk and received higher returns from cultivation of vegetables, fruits and flowers for the urban markets.

Wages for hired labour formed a major component of cost of cultivation among semi-medium and medium farmers while small and marginal farmers cultivated their own fields. Net income was found to be lower than the earnings of a migrant labour in urban centers a fact that triggered exodus by marginal; and small farmers from rural community. Benefit: cost ratio was also calculated for each of the 168 farmers selected for the study across the micro-watersheds. It was noticed that B: C ratio was low among all categories of farmers in both - treated as well as untreated watersheds.

Poor agricultural resource base

Net sown area in the four major southern states was approximately 42.08 million hectares in 2004 while assured irrigation supported only 9.23 million hectares (Figure 3). Variations in rainfall and land degradation process have adversely affected agricultural resource base in the region. Land holding fragmentation due to sub-division has made landholding size uneconomical and in AP alone the proportion of marginal and small – holdings have increased from 57% (1956) when the state was formed, to 83% (2001). In contrast, the proportion of large holdings has declined from 9% (1956) to <0.5% (2001). By 2001, over 95% of land holdings in AP, accounting for 73% of area were smaller than 4 hectares each. Landlessness is also widespread in rural AP and according to the National Sample Survey (NSSO, 2006) it has the second highest number of landless people after Punjab as it indicates concentration of land among a few. In Karnataka 30.8% land is being cultivated by marginal and small farmers who account for 69.4% of all farmers in the state. In Maharasthra marginal and small farmers who

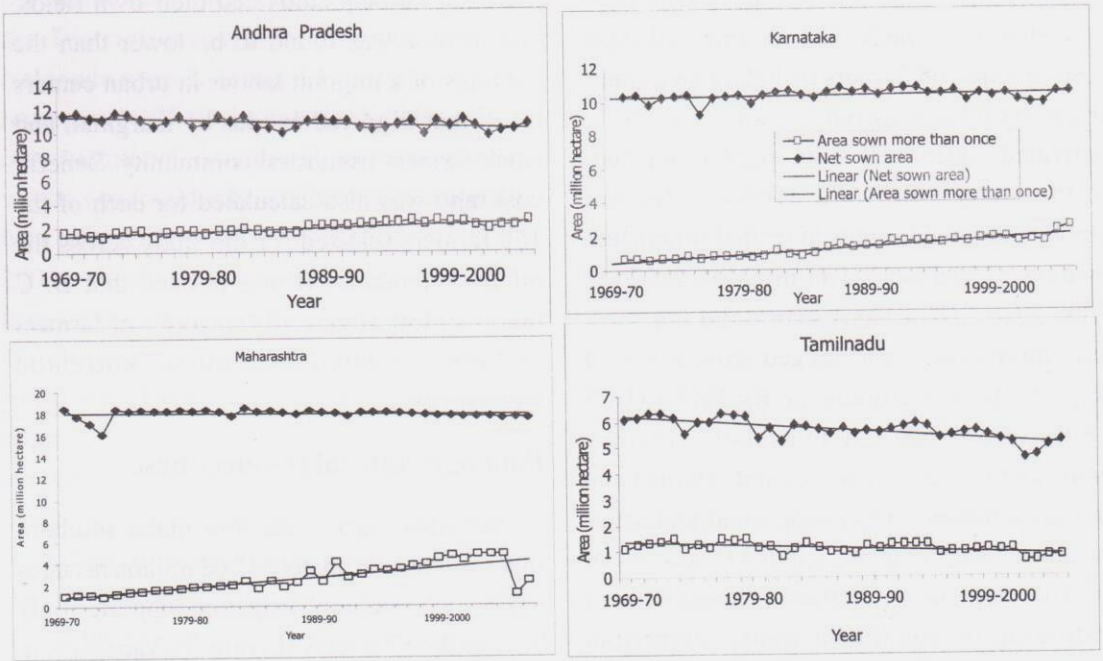

Figure 3. Slow decline in extent of net sown area and poor irrigation capacity development stalling increase in area sown more than once in southern states in India.

form 69.8% of all farmers cultivate 33.6% of agricultural land. In Tamilnadu 89.7% of farmers belonging to marginal and small category cultivate 53.8% of agricultural land. Obviously, more than 60% of all farmers belonging to marginal and small category cultivate 1/3 to ½ of agricultural land in the four states mentioned earlier, and as agricultural income is low, these resource poor farmers are highly likely to migrate during climatic aberrations.

Low agricultural productivity

Of the several reasons for migration from rural areas in rainfed region, low agricultural productivity and consequently poor economic returns are the primary causes. Poor natural resource base as mentioned earlier, also handicap developmental projects thus perpetuating a vicious cycle of low yield, land degradation and poverty. Although irrigation water availability would remain a constraint in the region due to paucity of perennial sources of water, paddy or rice dominates the agricultural production system despite low yields due to assured higher returns in comparison of other crops. In 2004 the state govt. of AP offered free electricity to farming sector as an electoral sop that has lead to over-exploitation of groundwater resulting in fall of water-table to 120 to 215 metres in Rangareddy and Nalgonda districts alone. Average paddy yield among marginal and small farmers owning < 2 hectares of land was 3.4 tons per hectare in 2005-2006 and 2.3 tons per hectare in 2006-2007 when compared to the District average of 2.78 and 3.02 tons per hectare (2005-2006) to 2.66 and 2.83 tons per hectare in 2006-2007 in Rangareddy and Nalgonda, respectively. Andhra Pradesh mean paddy yield was 2.93

tons per hectare in 2005-2006 and 2.98 tons per hectare in 2006-2007 (DES, 2007).

Yield improved slightly among farmers belonging to semi-medium and medium categories who owned 2 to 4 and 4 to10 hectares of land respectively, especially in case of paddy, pigeon pea and sorghum. However, yield levels were lower in all crops in these two districts when compared with the state average yields. Cash crops like sugarcane and groundnut yielded better in the above-mentioned two districts in 2007 when compared to the state average that helped in reducing hardship among farmers who were prone to take drastic steps like attempting suicide. According to the National Commission for Farmers (NCF, 2006) farmer indebtedness in Andhra Pradesh was one of the highest in the country, i.e., 82% that was a factor driving farmers to suicide. This forced the coalition government in 2008 to waive farm loans up to a tune of Rs.60000 million (US$ 1320 million) after the implementation of the National Rural Employment Guarantee Act (NREGA) scheme in 2005 for providing assured employment of 100 days to unskilled workers in rural areas. Due to low yields economic return from agriculture and allied activities was low with most farmers earning less than Rs.15000 to 16000 (US$ 330 to 352) in both types of watersheds.

Loss of surface water bodies

A factor that has significantly contributed to lowering of groundwater level is the drastic decline in number of surface water bodies and reduction in spatial extent of existing reservoirs in and around the urban agglomerations in the region. Studies indicate that in 1971 there were 1271 water bodies in an area of 3000 km^2 around HUA that fell to 960 by 2000. These losses have been attributed to encroachment of tank and lakebeds for building residential colonies. In case of Bengaluru city in Karnataka, the extent of agricultural land and water bodies have reduced while built-up area has increased by five folds. In Chennai the capital of Tamilnadu, urbanization, plantations and saline incursions along the coast have increased tremendously leading to decrease and contamination of fresh water sources. The impact of this phenomenon has been the failure of shallow bore-wells operated by the marginal and small farmers forcing them to abandon agriculture and migrate to urban centers.

Another disconcerting trend has been the mismanagement and destruction of historical surface water storage structures like tanks and ponds and a vast network of canals that were built by erstwhile Chola, Pandava and Vijayanagar kings that lead to a strong agricultural base and a thriving economy in the region. Since the independence of India in 1947, the traditional arrangements were done away with in the village and district level, the invaluable structures were slowly lost forever. In the Deccan region near Hyderabad, The Nizam rulers built two large reservoirs for supply of drinking water to the capital city in early 20^{th} century called the Himayatsagar and Osmansagar. Spatial extent of these two water bodies have shrunk, for e.g., the spatial spread of Himayatsagar shrunk from 1984.7 to 827.3 hectares during 1971 – 2001. During 2004 when a severe drought occurred in the region, the water spread fell to 180.9 hectares. Such

drastic reduction in surface water spread severely affected level of groundwater table and losses in agriculture leading to an exodus from rural areas.

Trends in Migration

A detailed analysis of human migration pattern in the Hyderabad, Rangareddy and Nalgonda districts of Andhra Pradesh indicated that of the total 39.2 million migrants in 2001, illiterate migrates accounted for 31% while literates were 19%. Marginal and main workers who migrated were 25 and 23% respectively. In rural areas illiterate main workers migrated while in urban areas literate non-workers did so. During 2001, 5.33 million persons migrated from rural areas of which 52% were male and the rest female; of 2.07 million migrants in urban areas this ratio was nearly equal among both gender. Literates dominated the category of recent migrants who have migrated in the preceding 5 years and males accounted for 55%. Trends in migration by various categories differ in rural and urban areas. Male main worker in Andhra Pradesh migrated comparatively less (42%), in rural areas it was it constituted 38% of 7.99 million persons while in urban areas it was 68% of 1.13 million persons. Among marginal workers, female migrants accounted for 98%. Among recent migrants category 83% were male; in rural area this ratio was 82% and in urban region it was 85%. Recent migration among male marginal worker in rural and urban areas was 17% and 23% respectively; however, the dominant migrant group among marginal workers was that of urban female who worked as household maids and helpers in small retail establishments in urban areas and earned reasonably well when compared to their counterparts in the rural areas (DCO, 2001).

Regional Migration

Analysis of inter-state migration in the region indicates that Andhra Pradesh receives a large number of migrants from surrounding states; most come from Karnataka followed by Tamilnadu and Maharashtra. Migratory flux was most in 2001 and districts of Rangareddy, Hyderabad, Warangal, Mahabubnagar and Nalgonda received most migrants in that order. In urban areas reason for female migration was attributed to matrimonial alliance while male migrant's decision was based more on family considerations and employment related issues. In rural areas reasons for rapid migration trend were employment, education, business, movement of family, etc., and more recently marriage and livelihood options have been mentioned.

By 2001, in Andhra Pradesh alone over 12.0 million literates and 11.44 million illiterates moved from one place to another of which 9.8 million were main workers, 2.4 million marginal workers and 11.24 million non-workers. Migration by illiterate, main and marginal workers was noticed to be higher in case of rural areas while literates and non-workers formed a larger segment among urban migrants. At village-level, female migrants belonged to the age group 15 - 40 years while male migrants moved till the age of 50 years. Both seasonal and permanent migration was obvious in rural areas and male migration was found to be strangely higher in places where developmental programs like the watershed

development program had been implemented. In untreated watersheds, seasonal migration was found to be higher when compared to permanent migration. Major reasons for permanent migration from treated watersheds are the insignificant gains accrued through WDP and poor livelihood options available to the neo-literates in the rural areas.

Discussion

Climatic variability - driver of environmental migration

Peninsular India has a dry / moist semi-arid to dry sub-humid climate with mean annual temp. range from 25 ^{0} to 29 ^{0}C and mean annual rainfall ranging from 500 – 800 mm. Study of variations in temp. since 1951 till 2007 indicate a rise in mean max. and mean min. temp. by 0.3^{0}C to 0.4^{0}C. For instance, mean max. temp. rose from 32.2^{0}C to 32.5^{0}C, in case of mean min. temp. it rose from 20.5^0 C to 20.9 ^{0}C. Due to high temp. regime, evaporative losses are also high and irrigation water requirements increase while water resource availability remains poor. The insidious rise in temp. have affected the monsoon rainfall pattern in the region and analysis of trend in southwest (SW) monsoon which provides 85 to 87 % of water - indicates a decrease in number of rainy days; it ranges 30 days (1996) to 88 days (1983) and is causing hardship to farmers as they find it difficult to modify their crop calendar according to the changes in rainfall pattern. Deviations in total annual rainfall (mean of 742.5mm) could range from 423.5mm (1972) to 1606.2mm (1975) and in 2005 total annual rainfall was 1143.5 mm - a surplus of 54%. Daily rainfall intensities have also varied and monsoon peak has shifted from September and October (CRIDA, 2006; 2007). Besides this large variations in inter-annual rainfall has been witnessed, for instance, during 2004, 2005 and 2006 rainfall recorded was 764.5mm, 1143.5mm and 705.4mm respectively; such variations create bottlenecks for agricultural operations. Intense daily rainfall induces severe soil erosion and does not help in groundwater recharge. Evenly distributed good rainfall is essential for a good crop-stand in rainfed regions in order to ease hardships faced by farmers. Study of long-term inter-annual rainfall pattern indicates a slight decrease in mean rainfall i.e., from 755mm to 742.5mm. While intra-annual rainfall pattern indicates a shift in the time of onset and withdrawal of SW monsoon in the region, date of onset has shifted from mid-June to last week of June or early July while withdrawal of monsoon has shifted from September to mid-October. Variability in SW monsoon rainfall necessitates drawing of Crop Contingency Plans and in the event of drought urgent distribution of suitable seed varieties to farmers in large quantities over a wide area at the shortest possible time often strains logistics and the preparedness leaves much to be desired, triggering migration by the most vulnerable section of the society.

Satellite data of IRS–1C & IRS-1D of LISS-3 sensor were analyzed for discerning changes in vegetative indices in the watershed development projects. The satellite data of two seasons – pre- and post-monsoon periods, i.e., for April - May and September -November were analyzed (1998 - 2006) which indicated that watershed projects had limited impact on

maintaining a good vegetative cover on the ground in the event of a rainfall deficit. Lack of vegetative cover not only causes fodder shortage but also desiccation and soil erosion in the event of a sudden downpour. The WDP that were implemented specifically for this purpose have failed to deliver and hence the landless people, small and marginal farmers who depend on agriculture for food and livelihood and on common pool resources in the village for fodder for their livestock, are forced to migrate with their livestock.

Land degradation - driver of migration

The undulating terrain in Peninsular India continues to be land degraded owing to water and wind erosion as in the rest of India. In Andhra Pradesh alone 12.23 million hectares out of a total geog. area of 27.44 million hectares is degraded owing to water-induced erosion and effective soil depth has been reduced to <15 cm in most places providing a poor foundation for agriculture. Most of the land parcels in the region belong to LCC -IV and poorer categories and are generally unsuitable for agriculture.

Soil fertility status in the region was generally low and was found to be poor in most soils in types of watersheds. For e.g., N content was < 280 kg / ha and similarly other major soil nutrients like P and K and soil OC were also found to be low which required incorporation of crop residues and biomass that were scarce owing to poor natural vegetation and lack of adequate water resources. To increase crop biomass and yield most farmers are unable to purchase adequate quantities of fertilizers owing to poverty, because of which low soil fertility persists resulting in low crop yield and lower income inducing a vicious cycle of poverty and forced migration despite large investments in WDP.

Social unrest - resultant of failure of WDP

Due to environmental constraints and climatic aberrations, the marginal and small farmers and the landless and poor in the rural areas are socially vulnerable which forces them to migrate to urban areas or get coerced by elements of social dissentions. In isolated regions in Telengana in Andhra Pradesh and surrounding states, medium and large farmers are forced to flee to the urban centers for safety owing to internal extremist elements ganging up against the state under the so-called the *Naxalite* movement. Unsustainable agricultural land use in drought-prone areas stokes the *naxalite* movement and the uneconomic size of land holdings owing to relentless sub-division and fragmentation has precipitated the issue. The vitiated political scenario has also contributed to this aberration resulting in decline in net sown area and increase in fallow land across the study area. Loss of livelihood in this manner induces migration of the poor and marginal rural persons to urban centers in search of livelihood.

Initiatives to support rainfed farming

Since 2005 the Govt. of India has decided to set up Special Economic Zones (SEZ), in order to infuse growth catalysts in rural regions like agro-based and process-based industrial units to resolve hidden unemployment in agricultural sector. However, farmers fearing loss of ownership of their landholdings are

opposing them leading to social unrests in several states in India. In order to provide impetus to economic reforms in the country, the government has also tried to build public-private partnership projects but few have been able to get off the ground. The economic boom of the 1990s took a heavy toll on agricultural sector as it faced maximum neglect by the government when it overlooked the necessity to develop minor irrigation schemes that had the potential to generate enormous rural employment, increasing extent of irrigated area, securing irrigation potential in the farmers' hand and ensuring social harmony in the rural areas. According to Ratna Reddy (2006) development of minor irrigation alone could have created 90 million man-day of employment along with food security in Andhra Pradesh annually during that phase.

In order to make amends and improve the livelihood security among farmers, the Government of India in 2005, promulgated several executive orders and initiated numerous social welfare schemes like the National Rural Employment Guarantee Act (NREGA) under which a person in rural area in any part of India was entitled for employment for 100 days during a year. The scheme aims to employ poor people in rural areas to create productive assets for the community in the village besides protecting environment, empowering rural women, reducing rural –urban migration and fostering social equity in the rural society (NFC 2006). The Eleventh Five-year Plan aims for a faster and more inclusive growth of farmers' welfare in the country (Planning Commission, 2007).

The National Commission for Farmers has drafted a National Policy for Farmers in India stating the necessity to put farmers first and making access to food easy by bring about improvement in livelihood opportunities and increasing income of farmers. The commission has underlined the necessity for creating rural infrastructure under *PURA (Providing Urban amenities in Rural Areas), Bharat Nirman* - a time-bound program to foster job-led economic growth in the villages, *Government program on Youth for Leadership in Farming (GPYLF), Sarva Siksha Abhiyan (SSA), National Rural Health Mission, National Horticulture Mission* besides many others, in order to develop rural areas, backstop agriculture and halt rural out-migration. Some of the suggestions for development of rural areas are setting up of Agri- Export Zones, Technology Parks, Food, Water, Fodder and Feed Banks, Seed and Gene Banks, Organic Farming, Rural non-farm initiatives, Bio-fertilizers, etc., for a large pool of 232 million persons involved in agriculture in rural areas in India. Undoubtedly, as and when such projects are implemented in the country, they would provide work to millions in rural areas and slowly and definitely halt the process of migration from rainfed areas.

Conclusion

Rainfed agriculture plays a major role in Indian economy and the in Peninsular India it is the major plank of development. Watershed development programs that had been implemented to revitalize and develop the region have failed, forcing the socially vulnerable in rural areas to migrate to urban areas in search of livelihood. There has been a spurt in migration in the region since 2001 owing to deterioration in agriculture as a result

of frequent droughts during 2002-2005 and consequently a loss in sources of livelihood in rural area.

In order to address this issue, the governments have initiated a number of rural schemes to check migration of agricultural workers from rural areas with little success. A major reason for failure in halting the exodus from rural areas is the faulty implementation of development projects like WDP. Alienation of rural people from mainstream development process and inaccessibility to land, water and forest by the poor in the village, have created social tension and upheaval in the region. Political compulsions of coalation governments have added to the prevailing situation making implementation of development programs in the right spirit for maximum benefit of farmers in the rural areas very difficult. Undoubtedly, WDP have the capacity to increase agricultural productivity in rainfed areas, if implemented properly. In order to improve this situation it is essential to improve the situation of the farmer by treating them as shareholders in agricultural enterprise rather than treating them as stakeholders in the developmental process. This would truly empower and ensure their livelihood against environmental risks and the necessity to migrate against their will. Halting of out-migration from rainfed rural areas is equally critical for the sustenance of rainfed agriculture as it is for the preservation of development process in urban areas within the region.

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