Strategic Assessments and Development Pathways for Agriculture in the Semi-Arid Tropics

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How Farmers Struggle to Survive in the SAT ?

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The Semi-Arid Tropics (SAT) account for 37% of the area and 37% of the population of India. They have a share of 46% of the gross cultivated area of the country but only 32% of the gross irrigated area. The mean normal rainfall in these regions is 965 mm as against the country's average of 1212 mm. As per the National Sample Survey for 1999-2000, monthly per capita expenditure in the Indian SAT is the lowest (Rs 472) and their poverty head count (24.3%) the highest among the different agroclimatic regions of the country. Low and variable rainfall, moderate population density, inadequate irrigation cover and high incidence of poverty all conspire to confine the farmers of the SAT to the vicious circle of low income, low investment capacity, high risk and low output. Soil erosion and water scarcity have caused land degradation due to which productivity growth has been slow even when new agricultural technologies were used.

Resumption of Village-Level Studies (VLS)

To examine the state of farming in the Indian SAT, Village-Level Studies were resumed in 2002, seventeen years after the first generation of such research (1975-1985) had ended. These studies were conducted in Aurepalle and Dokur villages in Mahabubnagar district of Andhra Pradesh state, Kalman and Shirapur in Solapur district, and Kanzara and Kinkheda in Akola district in Maharashtra state of India. Between 1975 and 2001, the total population of the six VLS villages increased by 41% and the number of households by 58%. A fresh census of households was carried out in each of the six villages and a representative sample was drawn while taking care to retain in it as many of the original households as possible. The sample size increased from 240 in 1975 to 446 in 2002. A few additional modules were added to the survey schedules used in the first-generation VLS. But owing to funding and manpower constraints, data were collected through surveys carried out once in a year, unlike the high-frequency rounds of data collection in the first generation.

Nonviability of Crop Enterprises

Unfavorable policies have compounded the inherent disadvantages of rainfed farming in the Indian SAT. Globalization of agricultural markets has lowered the real prices of commodities while at the same time input prices, particularly wages of agricultural labor, have consistently gone up. All these factors in concert have adversely impacted the viability of SAT agriculture.

The results presented in Table 1 show that the returns to land and management from irrigated crops like paddy, sugarcane and wheat were positive. Cotton, an irrigated crop in many areas, was profitable too at the margin. But rainfed crops like rainy-season sorghum, castor, pigeonpea and postrainy-season sorghum yielded negative returns, the exceptions being chickpea and soybean, which reported small profits. With several crops becoming unprofitable, the net crop income of an average household was negative in three of the six VLS villages. This stands in sharp contrast with the scenario in 1975-78, when the six villages had all recorded positive net crop incomes (Fig. 1).

Even in the three villages where net crop incomes were positive, income levels were nonsignificant compared to the present values of the net crop incomes from the

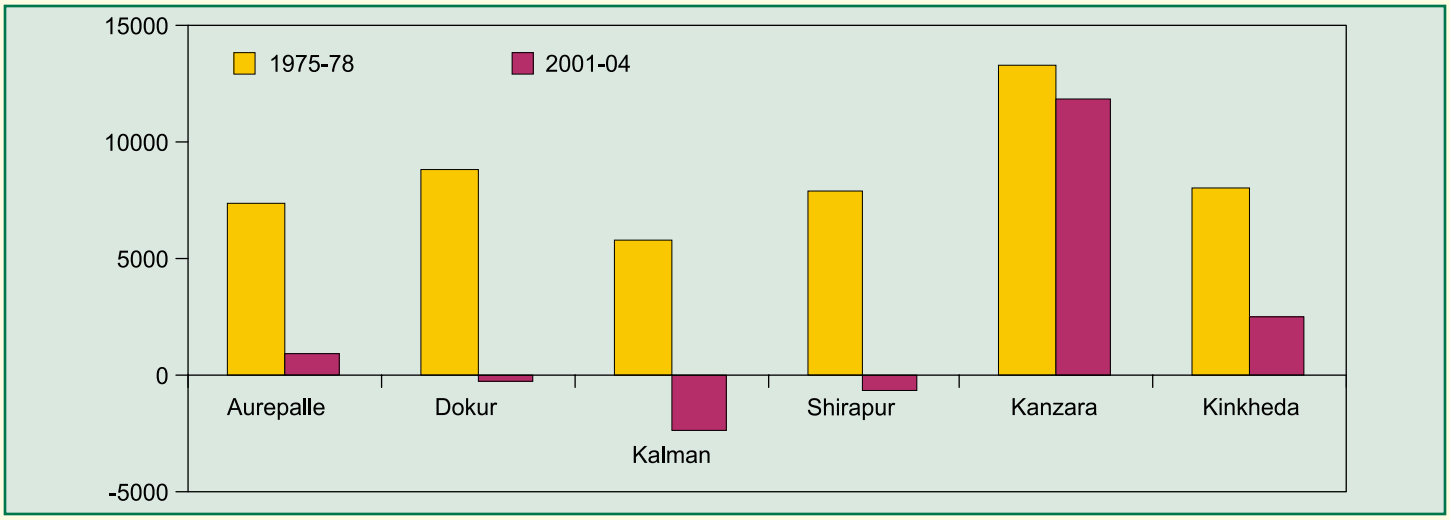

Figure 1. Average net crop income (Rs.) of households, 1975-78 and 2001-04.

base years (1975-78). Only in Kanzara was today's net crop income close to the net crop income of 1975-78 at 2001-04 prices. In real terms, the average net crop income per household fell by 77% between 1975-78 and 2001-04. This is no reflection on the technology used. In fact, the yield levels of several dryland crops have appreciably improved during this period. Yet, the viability of rainfed agriculture has been adversely impacted by globalization and policy bias. The reduction in the average operational landholding – from 5.90 ha in 1975-78 to 2.09 ha in 2001-04 – too has served to reduce income.

Table 1. Economics (Rs ha^{-1}) of crop production in six SAT villages (2001/02–2003/04).

Village	Crop	Average gross return (2001-04)	Average cost except land rent	Returns to land and manage-ment
Aurepalle	Cotton	5992	5943	49
	Sorghum (local)	1828	2825	−997
Dokur	Castor	2641	3455	−814
	Paddy	11268	8163	3105
Kalman	Sorghum (postrainy)	2553	2682	−129
	Pigeonpea	1625	2508	−883
Shirapur	Sugarcane	17063	12876	4187
	Chickpea	4514	3507	1007
Kanzara	Soybean	4919	4202	717
	Cotton	9137	7054	2083
Kinkheda	Sorghum (hybrid)	2996	3262	−266
	Wheat	4812	3558	1254

Economics of Livestock Rearing

Livestock is believed to have an income-stabilizing effect in rainfed areas, particularly during periods of drought. But evidence from the VLS villages does not support this contention. For instance, rearing of buffaloes yielded a return of Rs 2804 per animal per year after meeting the variable costs. The average return from a milch cow was even lower at Rs 1974. However, maintaining a pair of draft animals was more economical than hiring them. Rearing of small ruminants is normally profitable in low-rainfall areas but in the VLS villages this enterprise ended in losses in years when disease took a heavy toll of the flock. The average return over variable costs was only Rs 3520 per household. Kanzara and Shirapur recorded better returns than the other villages while Dokur and Kalman were at the other extreme.

Natural Resource Management (NRM) Investments

Since irrigation has become critical for the viability of agriculture, farmers do invest a lot on open wells and bore wells although the rate of success in striking water is quite low. Table 2 shows the investments made by farmers on open wells and bore wells between 1985 and 2004 in the six VLS villages.

Investment on prospecting for water was relatively low in the Akola villages where the rainfall regime is better and the villages are served by surface irrigation in the postrainy season. Investments were higher on open wells in the Solapur villages and higher on bore wells in the Mahabubnagar villages because of the very deep

Table 2. Investment (in Rs '000) by farmers in six VLS villages on open wells and bore wells, 1985-2004.

Village	Investment			
	Open wells	Bore wells	Total	Per household
Aurepalle	160	1168	1328	13.2
Dokur	71	1119	1190	14.8
Kalman	1514	288	1802	19.1
Shirapur	922	610	1532	17.4
Kanzara	390	99	489	9.4
Kinkheda	32	60	92	2.8
Total	3089	3344	6433	14.4

water table. Households in the six VLS villages spent an average of Rs 14429 on exploring for water between 1985 and 2004. In contrast, they spent only Rs 1487 on an average on soil and water conservation measures. Watershed development programs have reached only one of the six VLS villages so far.

Improvements in Living Standards

In spite of the decline in net crop incomes, the total income of an average household registered a substantial increase between 1975-78 and 2001-04. Net household income more than doubled owing to increased contribution from nonfarm labor, business, salaried jobs, caste occupations and migration. The proportion of households below the poverty line dropped from 75% in 1975-78 to 35% in 2001-04. This was reflected in the better consumption standards recorded during 2001-04. An average household from the VLS sample consumed 1964 calories of energy and 66 gm of protein per day (Table 3). Still, about two-thirds of the households were found to suffer from calorie deficiency and about one-third from protein deficiency. The average per capita income of the sample households was Rs 8368 per year—or US $ 0.5 per day. Per capita consumption expenditure was Rs 6463 per year. The income and consumption levels are very low when compared with the internationally accepted poverty line of $ 2 per day per person. The per capita income of the VLS households was only one-fourth of this standard.

Impacts of Drought

We have seen that crop and livestock enterprises hardly recovered their production costs even when a three-year average was considered. The situation is worse in a drought year, when the entire rural economy is thrown out of gear. The Mahabubnagar VLS villages faced a string of subnormal years but 2002-03 was particularly bad. The Solapur villages too faced a drought in 2003-04 and the Akola villages in 2004-05. Table 4 gives an account of the losses due to drought and the coping strategies followed by farmers.

Table 3. Nutritional standards of households in VLS villages (2001-04).

Village	Average consumption per capita per day		Households (%) with per capita consumption less than	
	Calories	Protein	2000 calories	50 gm protein
Aurepalle	2479	65	45	26
Dokur	2003	55	75	60
Kalman	1745	70	70	30
Shirapur	1722	61	71	40
Kanzara	1879	69	67	22
Kinkheda	1954	77	70	21
Average	1964	66	66	33

The probability of occurrence of drought and the income losses suffered by the people were much higher in the Andhra Pradesh VLS villages than in the Maharashtra villages. Nearly four-fifths of the farmers in Andhra Pradesh adopted coping strategies while a far lesser proportion (35.9%) did so in the Maharashtra

Table 4. Impact of drought and coping strategies in six VLS villages in Andhra Pradesh and Maharashtra, India.

Parameter/strategy	Average of Andhra Pradesh villages	Average of Maharashtra villages
Number of drought years in the last decade	5	2.5
Average shortfall in income due to drought (%)	50.1	22.9
Percentage of farmers adopting coping strategies	81.5	35.9
a. Borrowing money (%)	37.5	15.2
b. Sale of assets (%)	9.1	2.2
c. Shifting to nonfarm work (%)	29.3	37.2
d. Reducing expenditure (%)	5.5	26.7
e. Migration (%)	14.9	1.5
f. Reducing input use (%)	3.5	10.3

villages. The common coping strategies adopted were borrowing, shifting to nonfarm work, participating in the labor market and cutting down input use and consumption expenditure. Assets were sold as a last resort. Migrating long distances to find work was more common in Andhra Pradesh than Maharashtra.

Benefits from Poverty Alleviation Programs of Governments

The Union and State governments of India are implementing a number of welfare and developmental programs in the rural areas. Some of them aim to transfer critical assets like agricultural land, house sites, houses, toilets, etc. Some others aim at helping the rural poor dig or deepen wells, acquire agricultural tools and implements and take up other development activities on their farms. The Public Distribution System (PDS) supplies essential commodities at subsidized rates. During drought years, some cash relief is paid for buying inputs for the next crop and work is provided to the needy by way of special employment programs. The emphasis on different programs varies considerably between Andhra Pradesh and Maharashtra. The benefits received by an average household in the six VLS villages between 1985 and 2004 are presented in Figure 2.

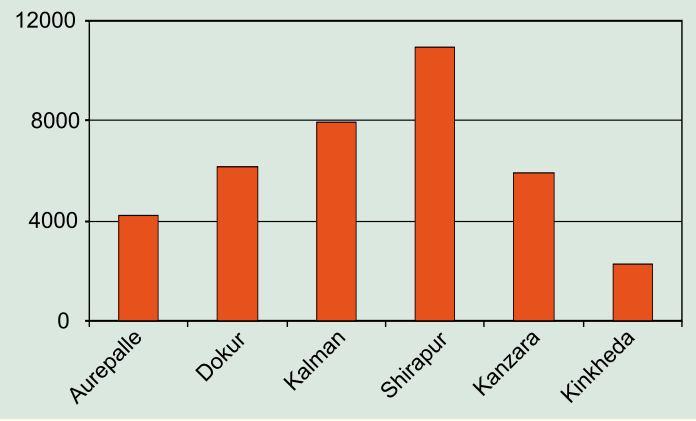

Figure 2. Benefits received per household (Rs.) from Government programs, 1985-2004.

Conclusions and Policy Implications

The evidence presented in this policy brief has shown that crop and livestock enterprises in the Indian SAT are hardly able to return any surplus. Agricultural households are shifting to nonfarm work, caste occupations, service, business and migration to make ends meet. The income levels of the sample households have roughly doubled over three decades but their average per capita income is still only about one half of one dollar, which is far lower than the international measure of poverty. The consumption standards have improved but there still is considerable undernutrition as well as protein deficiency. Recurrent droughts and growing water scarcity are perpetuating poverty and land degradation in the Indian SAT. Farmers invest substantially in water exploration to escape the wrath of drought despite the fact that the rate of success in striking water is very low. In acute drought years, rural people embrace several survival strategies. The help received from various government programs is considerable but not adequate to lift the households from the poverty trap.

The National Commission on Farmers headed by Dr MS Swaminathan has highlighted the plight of rainfed farmers in India. It pointed out that indebtedness is rampant among Indian farmers and that most of the suicides by farmers have taken place in the rainfed regions of the country. While there is a broad consensus on what ails rainfed agriculture in India, there is very little emphasis on the prescription to cure it. The recent package of Rs 16,000 crore announced by the government of India for 26 districts beset by the chronic problem of farmers' suicides is only a temporary palliative measure. Heavy investments are needed on Watershed Development Programs to reverse land degradation in the rainfed areas and to improve the water recharge. Rainfed farmers should be specifically targeted by credit institutions to meet their entire credit needs at a concessional interest rate of 3% per annum. The many types of risk they face should be covered by imaginative and subsidized insurance products. The glaring policy bias which has rendered rainfed farming nonviable over the last few decades should be reversed and substituted by policies beneficial to rainfed farmers.

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