REPORT

Ecological Crisis and Agrarian Distress in Bidar

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Foreword

Several cases of suicide by farmers in North Karnataka during the year 1997-98 have caused considerable concern all over the country. As part of a programme whose goal is the objective study of social crises where science and technology may have a role to play. NIAS deputed a team of two of its faculty, namely Dr P K Shetty of the Environmental Studies Unit and Dr A R Vasavi of the Sociology and Social Anthropology Unit, to make a field study. The results of Dr Vasavi's investigations are already available as NIAS Report R5-99. The present document by Dr Shetty examines the connections between the reported agrarian distress in North Karnataka and an ecological crisis that is developing there.

The two reports are complementary to each other, and neither necessarily reflects the opinions of the Institute.

Roddam Narasimha
Director, NIAS

Acknowledgement

At the very outset I thank Prof. Roddam Narasimha, Director, NIAS for his suggestion that this investigation be conducted, and his encouragement throughout the investigation. I wish to express my sincere thanks to the farmers, agricultural labourers, agricultural extension workers, doctors and members of the (three) grama panchayats, and also to Shri. Bhimanna Khandre, MLC, Dr. Vijay Kumar Khandre, MLA, Bhalki, Shri. Suraj Singh Rajput and others for providing valuable information during our visit to Maurambi, Siddeshwara, Nittur, Bhalki and Bidar. My thanks to Prof. S. Rajagopal, Dr. Shantha Mohan, Mrs. Asha Ramesh, Dr. M. G. Narasimhan of NIAS, and Dr. A. R. V. Kumar, UAS, Bangalore for their help and suggestions. I appreciate the help rendered by Maj. Gen. M. K. Paul (Retd.), Controller and Mrs. Vijayalakshmi, NIAS.

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Ecological Crisis and Agrarian distress

The many cases of suicide by the farmers of Bidar and North Karnataka districts reported in the year 1997-98 have generated concern among people from different walks of life. According to Mr. Assadi[1], Karnataka had no history of farmers committing suicide when crops or the market failed; other than agitations of largely market-oriented peasants, like the burning of their sugarcane fields in 1995-96 due to incapacity of the sugar factories to crush the surplus sugarcane, or the dumping of tomatoes on the roads in 1997 owing to inconsistency in market prices, agitations among farmers are comparatively rare. Now the question is why the farmers of North Karnataka took such an extreme step in 1997-98. The first incidence of a farmer's suicide in Karnataka was reported on 12 December 1997, when Mr. Shivaraj Mainalle of Siddeshwar village in Bidar district committed suicide. He had only 2.32 acres of land of his own, had taken 8 acres of land on lease from others and borrowed Rs. 8,000/- from Mr. Kallappa of his village and also Rs 2,400/- from a co-operative society for cultivation of tur (red gram)[2]. Mr. Mainalle's suicide was

followed by a series of other suicides in Bidar district in the next couple of months, of which the tally was said to be 23. There were several reasons attributed to this spate of suicides- such as crop failure, indebtedness, inconsistency in market prices, lack of irrigation facilities etc. To look into these reports in Bhalki Taluk of Bidar district, my colleague Dr. Vasavi *(see NIAS report R5-99)* and I visited three villages, namely Siddeshwara, Maurambi and Nittur in this taluk, during 24-29 August 1998. This report is mainly based on the discussions we had with farmers, agricultural extension workers, doctors and local administrative heads during our visit to these places.

Bidar, a district of North Karnataka having a total population of 12,55,799 (Census 1991), comprises five taluks, namely Bidar, Bhalki, Humnabad, Basavakalyan and Aurad. A brief profile of Bidar district is given in Table 1. This district covers an area of 5,458 km^2 of land and is surrounded by the districts of Nizamabad and Medak (Andhra Pradesh) on the East, Nanded and Osmanabad (Maharashtra) on the West and Gulbarga on the South, forming the tri-junction of the three principal cultures of the Deccan viz., Maharashtra, Andhra Pradesh and Karnataka.

The average annual rainfall is around 847 mm and the climate is dry throughout the year. May is the hottest month when the temperature reaches 42°C. The literacy percentage in

Table 1. A brief profile of Bidar district

	Aurad	Basava Kalyan	Bhalki	Bidar	Humnabad	Total
Total area (km^2)	1224	1206	1117	926	985	5458
Population (census 1991)	210040	246340	222918	331452	245049	1255799
Forest (ha)	2311	7143	2584	4655	8399	25092
Rainfall (mm)	840.1	674.1	939.2	940.7	841.7	847.1 (avg)
Trees and groves (ha)	–	–	–	–	–	11850
Agril. Land holdings ('000)	–	–	–	–	–	166027
Agril. Land area('000 ha)	–	–	–	–	–	465561
Total livestock	–	–	–	–	–	650230

(Source : Directorate of Economics and Statistics, Bangalore [1])

Bidar is 45% as compared to the state average of 55%[4] . Agriculture in Bidar district is mostly rain-dependent cultivation; only 8% of the land comes under irrigation[5] (Table 2). The district is part of the semi-arid and drought-prone belt witnessing periodic droughts, which however has not discouraged the dependency of the population on agriculture.

Table 2. Net irrigated area of Bidar district 1996-97

Source	**Area (ha)**
Canals	400
Tanks	1487
Wells	25695
Borewells	8295
Other sources	1349

Bidar and some of the other North Karnataka districts had faced a major drought in 1971-72. According to farmers, most of the crop failures before this drought were due to heavy rains, whereas crop failures after the drought were due to irregular or untimely rainfall. To recover the losses incurred due to the drought, farmers were forced to sell valuable mango, neem, tamarind and other trees growing on the boundaries or within the farm. In addition, the cattle population in these areas started depleting after the drought. Availability of organic manure for agriculture began to decrease.

In the early 1970s, the farmers of the region slowly switched over to capital intensive agriculture. Many companies provided easy credit for purchase of agro-inputs such as hybrid seeds, synthetic fertilizers, pesticides etc. Today, the majority of the farmers in this region have adopted such modern agricultural practices. The use of hybrid varieties, while being capital intensive and highly susceptible to pests and diseases, offered better profits to the farmers. They therefore switched to the new varieties in the place of indigenous varieties.

The farmers in these districts usually take up cultivation of kharif and rabi crops between June and December. Depending upon the irrigation facilities, summer crops are also taken up during January to May. Table 3 presents some of the commonly cultivated crops in this region during the different seasons.

Table 3. Some of the commonly cultivated crops

Season	Crops
Kharif crops (June-September)	green gram, black gram, jowar, tur (red gram), sesame , bajra etc.
Rabi crops(September-December)	rabi jowar, safflower, soybean, chilly, sunflower, chick pea, ground nut, etc.
Summer crops (January-May).	maize, banana. papaya, vegetables etc

Coming back to the main issue, the farmers took up the cultivation of kharif crops during June 1997. Due to insufficient rains in July and August 1997 (Table 4), there were heavy losses in the kharif crops, particularly green gram, black gram

and sesame. During September, the region received adequate rainfall which resulted in sowing of rabi crops. However, during November and December 1997, due to excess rains and cloudy weather, the growth of rabi crops was badly affected and this was followed by an outbreak of pests.

Table 4. The rainfall patterns of Bidar district during June to December 1997

Months	Bhalki		Bidar	
	Normal season (mm)	1997 (mm)	Normal season (mm)	1997 (mm)
June	151.3	**144.0**	131.0	**88.2**
July	198.8	**124.3**	182.0	**159.0**
August	203.2	**92.5**	180.0	**108.5**
September	227.6	**160.5**	191.0	**127.1**
October	53.9	**94.7**	65.2	**78.7**
November	12.7	**105.8**	18.9	**153.1**
December	7.8	**18.3**	7.0	**20.2**

Why did tur cultivators commit suicide?

Though both the kharif and the rabi crops resulted in heavy losses, it was found that most of the farmers who committed suicide cultivated the market-oriented tur crop. Interestingly, many farmers switched over to the cultivation of tur at the beginning of the 1990s because tur in the market fetched better prices compared to wheat, coarse cereals and other pulses. During 1997-98, tur was grown on more than 49,000 hectares in Bidar district and the farmers invested heavily in this crop, which promised higher open market prices (anywhere between Rs. 1,400 and 1,800/quintal). When the farmers

were desperate to sell their crop and repay loans, the prices crashed in the open market to Rs 1,050/quintal[1].

On the other hand, the cost of cultivation of this crop had gone up considerably when compared to most of the other pulse crops grown in this area. Table 5 presents the cost of cultivation and returns per acre of tur during the normal cropping season and in the year 1997-98.

Outbreak of tur pod borer

As I mentioned earlier, the climate in November-December 1997 was most favourable for the multiplication of many pests and diseases, particularly *Helicoverpa* or tur pod borer. In the last few years *Helicoverpa* has been devastating cotton crops in Guntur and Prakasam districts of Andhra Pradesh and also tur and other crops in Karnataka. This pest is widespread throughout the tropics, sub-tropics and warmer temperate regions of the world. In North India, it undergoes diapause (or becomes dormant) during December, but before that it is in abundance in tur and cotton, whereas in South India the insect remains active throughout the year. In favourable climates there is possibility of its outbreak during October-December.

Table 5. Comparative analysis of cost of cultivation and returns per acre of tur in normal season and in 1997-98

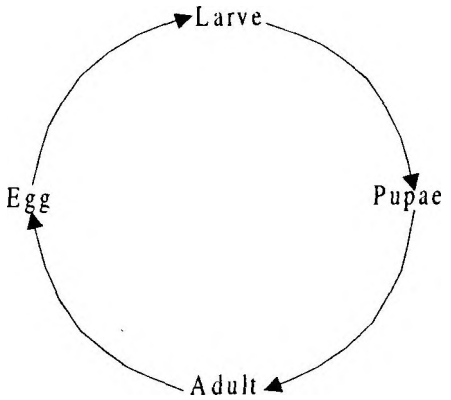
Components	Normal season	In 1997-98 (additional cost for extra 7 sprays)
Insecticide : Approx. 5 sprays/seasons; @ Rs. 200/Litre of insecticide (in 1997-98, a minimum of 12 sprays were made)	Rs 1000.00	Rs. **1400.00**
Power sprayer and labour charges for 5 sprays (Rs. 90/spray)	Rs. 450.00	Rs. **630.00**
Fertilizer: DAP (1 bag - 50kg/acre)	Rs. 410.00	–
Seeds (5kg/acre)	Rs. 150.00	–
Ploughing: Two initial ploughing Levelling	Rs. 300.00 Rs. 100.00	– –
Labour charge for sowing and fertilizer application	Rs. 150.00 Rs. 50.00	– –
Weeding: Manual weeding or herbicide intercultivation	Rs. 200.00 Rs. 100.00	– –
Other expenditure: Transport of power sprayer, bags etc.	Rs. 100.00	–
Harvesting: i. Labour charge for 4 Quintals ii.Transport - 4 bags @ Rs. 15/ bag iii. cleaning	 Rs. 420.00 Rs. 60.00 Rs. 140.00	 – – –
Total expenditure	(Rs. 3,630.00)	(Rs. 2,030.00)

	Total expenditure	**Total income**
Normal year	Rs. 3,630.00	Rs. 5,600.00 (4 quintals of tur @ Rs. 1400/quintal)
1997-98	Rs. 5,660.00	Rs. 2,100.00 (2 quintals of tur @ Rs. 1050/quintal)

(Source: Information collected from farmers during August 24-29, 1998)

Helicoverpa is a highly polyphagous pest which can feed on a large number of field crops and weeds (there are more than 180 host plants in South India) and has tremendous flying ability, facilitating migration from place to place. The main hosts of this pest are cotton, beans, maize, legumes and some of the alternatives like tobacco, tomato, sunflower and vegetable crops. This insect undergoes six larval instars or stages and normally takes 28-46 days to complete its life cycle (Fig.1).

Fig. 1 : Life cycle of *Helicoverpa* or tur pod borer



Adult: Lifetime 2-4 days, nocturnal moth.

Egg: hatching takes 2-4 days; spherical, 0.5 mm diameter.

Larvae: 6 larval instars; lasts 14-24 days at 27°C but 51 days at 17°C; full grown 40mm long, greenish or brown in colour with long dark or pale lateral bands.

Pupae: Pupation in soil; 16mm long; pupal development 10-14 days in tropics.

This is a polyandrous pest. This characteristic results in high fecundity (i.e., number of eggs laid by a female) and high survival percentage in adverse conditions. The pest is also more adaptive to environmental changes. Interestingly, under favourable conditions each female moth lays about 1000 or more eggs. According to Devrav Sawle, entomologist at Bhalki, the climate of Bidar during 1997-98, which was most favourable, would have probably resulted in the hatching of all eggs laid.

Why was there a pest outbreak ?

In 1997-98, the situation was totally out of control due to excess rain, particularly in the months of November and December 1997, and the climate (cloudy weather, high temperature and humidity) was most favourable for the multiplication of *Helicoverpa*. In addition, such favourable weather prevailed for a long duration of about 45 days. During this period, most of the crops such as tur, chick pea, sunflower, cotton etc., are in the fruiting or pod bearing stage. Under the high pest load, the larvae of this insect will not only feed on pods but also on the foliage, and can cut the growing tips. In addition, the farmers face difficulty in spraying pesticides uniformly because of the height of the tur plants which grow as tall as six feet, and also owing to the thick vegetative growth. Further, frequent rains along with the quick multiplication of the pests probably resulted in ineffectiveness of the pesticides.

Apart from tur, the farmers reported that the unfavourable climate of 1997-98 affected the yield of many other crops as well (Table 6). For example, the safflower crop completely failed in most of the farm lands in and around Bidar though it is less susceptible to pest attack. Similarly there was poor flowering and fruiting of mango and neem as well.

Table 6. The average yields (quintals) of some of the crops during a normal season and in 1997-98

Crops	Normal season	1997-98
Rabi jowar	8	1
Tur	4	2
Safflower	3	–
Green gram	3	1
Black gram	4	1
Bengal gram	6	0.5
Mango	Good bearing	Poor bearing
Neem	Good flowering	Poor flowering

(Source: Information collected from farmers during August 24-29, 1998)

Resistance of pests to pesticides

According to Mr. Baligar, Assistant Director of Agriculture at Bhalki, the farmers do not use the right kind of pesticides at the appropriate time. For example, to kill the egg or first, second and third instars of larvae of the tur pod borer, there are different insecticides available in the market. (If the larvae of the *Helicoverpa* are not controlled in the first three instars,

it would be difficult to control them in advanced stages or instars.) According to him, most of the time farmers either spray one chemical or mix two or more chemicals. When chemicals are mixed, they may not necessarily act synergistically and may be antagonistic to each other. For instance, a pesticide is considered effective when 50% of the finite insect population dies due to a particular dose of an insecticide. It is true that all the insects will not be killed when a pesticide is applied, so the progeny of the left- over population build up resistance and also become potentially more dangerous in the next generation.

Loss of the natural enemies of the pest

Improper and indiscriminate use of pesticides has adverse effects on the natural enemies of pests. According to farmers, some birds like crows, drongoes, mynahs, the small green bee- eater etc., are now not commonly found in the fields, also it has become essential to introduce the natural enemies of pests such as *Trichogramma,* sucking pests (green lace wings) and the nuclear polyhydrosis virus to bring down the pest population. Most of the crops have built-in mechanisms to decimate the population of the pests significantly but improper use of pesticides destroy the precious natural enemy fauna.

Chain of credit system

The private money lenders are mostly pesticide dealers or local merchants who sell the agro-inputs; some of them purchase the produce after the harvest. In Bhalki there are 25 dealers. The annual turnover of each dealer may vary anywhere between Rs.15 and 50 lakhs. These dealers get their supply of stock from the companies on credit. In turn, the dealers provide these inputs on credit to the farmers. According to one pesticide dealer, they supply the agro-inputs on credit only to those farmers whom the dealers know well and who can be relied upon to return the money after the harvest. There is a wide gap between the Maximum Retail Price (MRP) and the actual sale price of the pesticides supplied by different companies. During our visit, a dealer told us that a 5-litre container of Chlorpyriphos had a marked MRP of Rs. 1100/-, which the company had supplied to him at the rate of Rs. 550/-, so that he had the option to sell this product to farmers at rates ranging from Rs. 550-1100/-. Most of the time, dealers sold the products of those companies which give them maximum incentives or profit margins.

Indebtedness

Indebtedness has been common in this region particularly among small and marginal farmers and landless labourers (landholding details given in Table 7). Banks and co-operatives

generally give short-term crop loans, which are repayable after harvest in the same year; they provide loans only against security and after other formalities, whereas private finance corporations provide loans at high rates (36 percent per year). Though the latter interest rates are high compared to those of banks and co-operative societies, farmers prefer them because of fewer formalities and quicker disbursements. In private finance institutions, credit is not restricted only to agricultural activities but also covers agribusiness, marriages and religious functions. In Maurambi, a village in Bidar district having a total population of 900 with 275 households, there are 9 private finance agencies. In this village, Smt. Jijabai committed suicide because of indebtedness. She cultivated 14 acres of land in the absence of her mentally retarded husband. Smt. Jijabai had taken loans from a co-operative society and private financiers for agriculture and also for the marriage of her daughter.

Table 7. Details of agricutural landholdings and area in Bidar district

	Landholdings ('000)	**Area ('000 ha)**
Marginal (below 1ha)	22054	14195
Small(1-2ha)	63486	94157
Semi medium(2-4 ha)	50929	138795
Medium(4-10 ha)	24329	145466
large(more than10 ha)	5229	72948
Total	**166027**	**465561**

Tenancy

The tenancy or *lavani* system of cultivation largely prevails in this district despite its legal abolition in 1974. Most of the deceased farmers in this region, who had taken land on lease for cultivation, were not qualified to receive any institutional credit nor entitled to compensation in case of crop failure. This was the reason why many of them went to private financial corporations for assistance. When the crops fail they are answerable to the land owners, local merchants or money lenders from whom they have purchased the seeds and chemicals on credit. Also, agricultural labourers usually demand more wages or share from harvested crops during adverse climatic conditions. Apart from this, the inconsistencies in market prices and other reasons may have led the farmers to take the extreme step of committing suicide.

Pesticides kill not only pests but also farmers!

In the North Karnataka districts, pesticides are easily available in most of the villages and this has become the source for committing suicide. Pesticide-related poisoning and deaths are commonly reported in many of these places. It was reported that most of the time persons who consume pesticides are rushed to hospitals at district headquarter. Many lives can be saved if the patient gets proper treatment and immediate attention. According to Dr. Vaijinath Donagapura, at Bhalki,

he gets 100-150 pesticide-related poisoning cases during a cropping season. He said that patients complain of skin irritation, head ache, nausea, giddiness etc. Dr. Hanumasetty and the Health Superintendent of the Government Hospital at Bidar also agree that a large number of pesticide-related poisoning cases are reported in Bidar district particularly during cropping season.

Suggestions

Integrated Pest Management (IPM) programmes: *Helicoverpa* is an endemic pest in Karnataka, particularly in Bidar and Gulbarga regions. It is essential to popularize and also encourage the farmers to adopt IPM practices. After the harvest, ploughing of the field and exposing the pupae to the sun and predators may lead to decrease in pest population; practising crop rotation will also reduce the building up of pest populations. Sex pheromones have been demonstrated to be very effective in attracting male moths. Pheromone traps are available in the market as 'Heliothis lure' or 'Helilure', and installation of each trap costs around Rs. 30/-. Setting up of two or three such pheromone traps in a hectare can warn farmers about any build up of pest population. The onset (breaking of diapause) of pupae is haralded by the first male trapped. To bring down the foundation population, the eggs should be killed by *Trichogramma* (except in gram and tur). The early instar larvae are killed by *Helicoverpa*-nuclear

polyhedrosis virus. Along with these, other IPM programmes should be used extensively to control pests and diseases in this region.

The Extension service: In Bhalki taluk there are 121 villages and 35 gram panchayats. At present, each gram panchayat has one agricultural assistant; wherever it is required, their number should be increased. More importantly, extension workers should monitor pest and weather situations and advise the local farmers on a day by day basis during the cropping season. Extension workers should be trained and encouraged to organize more field demonstrations in line with the types of crops grown, common pests and diseases, and bio-pesticides and all other developments related to this field.

Supply of quality seeds and pesticides: A few farmers feel that sometimes they get substandard pesticides and poor quality seeds. It is necessary to monitor the pesticide and seed trade more strictly and subject the products to quality control and certification.

Future market: After the harvest of agro-produce, the farmers experience tremendous pressure particularly due to inconsistency in market price. It would be appropriate if the concerned agency ensures that the prices are not subjected to excessive fluctuation, so that farmers are assured of fair prices at any given point of time. On the other hand, the government's

initiative is required in bringing in the appropriate legislation, through which the manipulative practices in trading commodities can be brought down to a greater extent.

Rural credit system & revolving funds: Farmers, particularly small and marginal ones, and land-less labourers, prefer to go to private financiers because of easy accessibility of loans. Though the banks and co-operative institutions provide loans against security, because of lengthy formalities they are less approachable. It would be appropriate if the government agencies strengthen the rural credit system and also enforce ceiling on interest rates charged by private financiers through appropriate legislation. Regulating the methods of collection by private finance institutions is another point to be looked into. Most of the farmers who committed suicide in this region were the ones who had taken land on lease for cultivation. Such persons were not eligible for compensation. There should be some way in which these persons are supported during distress. At the time of distress or natural calamities, both State and Central governments do not announce adequate compensation to the farmers due to their own lack of funds. It is essential to look into the possibility of setting up a national revolving fund exclusively targeting agriculture and related activities that are frequently subject to vagaries of nature.

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