Survival Strategy of Farmers : An Ecological Explanation From West Bengal Farms

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ABSTRACT Conventional economic theory treats the 'Economic Man' as a maximizing agent in the sense that as a consumer he tries to maximize his utility and as a producer he tries to maximize his profit. Recent doubts about this maximising attitude has encouraged us to examine these hypotheses for some sample farmers in West Bengal. The objective of this paper is to examine the behaviour of our peasents with respect to their ecological consciousness, the rationality of their farming activity and the question of survivality.

Our empirical evidences show that the survival strategy of the farmers in recent years has not only forced them to behave irrationally in economic terms but also encouraged them to create ecological imbalances which later reflect themselves into the land, physical environment, plants, health, human beings, society, polity, economy and other animals. Thus, a conflict is inevitable sooner or later between economic growth per se and the eco-system with which we are inseparably linked.

INTRODUCTION

Conventional economic theory treats the 'Economic Man' as a maximizing agent in the sense that as a consumer his buying motive is to maximize his utility without any consideration whatsoever about the need for his survivality in the natural environment in which he lives, and as a producer or seller he is again assumed to maximize his profit disregarding the nature as well as the survivality of the human species as a whole.[1] This is common to both neo-classical and Marxian economics as such both of which are guiding the world of economics during the last hundred years or so. Some doubts have, however, been raised recently regarding the concept of an 'Economic Man' and the rationality of his maximizing behavior.[2]

In practice it is observed that millions of small and marginal farmers apparently try to maximize their short run profit knowingly or unknowingly. But since they lack the knowledge and training for optimum use of chemical fertilizers and pesticides, the fertility of soil falls at very fast rate thereby nullifying their short run apparent rationality. The result is simple: productivity of land falls even with increasing fertilizer use. Hence, behaving as they do can not be called as 'rational' in a dynamic context. To the best of our knowledge there is dearth of research work with reference to this particular problem.

Again, empirical evidences show that the decisions taken by the farmers in different parts of India regarding the selection of crops for cultivation as well as the pattern of sales of their crops are guided by considerations other than maximization of short run profit. The most important factor which guides the farmers to select crops for cultivation seems to be their desire to achive self-sufficiency in the matter of home consumption. As to the selling of crops, majority of the farmers are guided by the need for their survival with such an income flow to meet their continuous expenses over the whole year. Continuous income flows would obviously not be possible if the crops are sold at the maximum price generally prevailed in the peak season of agricultural operations. For these reasons it is argued that both consumers and producers have been behaving with non-maximizing rationality mainly due to their need for survival.

One may argue in this context that the survival strategy of the farmers in recent years has not only forced them to behave irrationally

in economic sense but also encouraged them to create ecological stresses or imbalances which later reflect themselves into the physical environment, plants, health, human beings, society, polity, economy and other animals. Thus a conflict is inevitable sooner or later between economic growth per se and the ecosystem with which we are inseparably linked[3]. According to Boulding (1970), "Ecology is a term used in the biological sciences to describe a total system of interrelated populations of different species. Such a system of interrelated populations is called an ecosystem. The concept is clearly extensible to social systems, which also consist of interacting populations of many different kinds." In the same manner, our social system also includes population of human artifacts like automobiles, houses, machines etc. as well as populations of domestic animals, vegetables etc. Finally, the ecosystem of the earth includes all these and the vast mass of forests, insects and other animals the existence of each of which is indispensable for the other.

With this background an attempt is made in this paper to examine the behaviour of our peasants with respect to their ecological consciousness and the rationality of their farming activities. Our discussion will be presented in the following order. First, we shall try to take some theoretical lessons from the works of some earlier authors in this field. Next we shall present some observations based on a field survey regarding the farmers' perceptions of the problem . Finally, we shall present a summary and make some observations of a concluding nature.

THEORETICAL LESSONS

We shall see here the consequences on the ecological aspects of agricultural practices by general farmers. The destruction of soil and the use of uncontrolled dozes of chemical fertilizers by the Indian farmers causing permanent damages to soil and health as well as future crop potentiality have been enormously accelerated during the last forty years after the Second World War. This is done by the farmers for immediate profits. The actual destroyers of soil need not themselves be the capitalist farmers, they may be poor and marginal farmers, share-croppers also-everybody is trying to secure by any means a large harvest of cash crops as a part of their survival strategy.

As a matter of fact, the indiscriminate and unscientific methods of cultivation resorted to by the farmers for raising yields have actually worked in hastening the Ricardian spectre of diminishing returns.[4] The ancients would calculate yield as a ratio of grain produced to that used as seeds. For them the constraining factor was seed-grain itself. But in contemporary world except under some large-scale farming community with strictly enforced government norms on quality considerations, millions of small independent farmers have resorted to pseudo-scientific techniques of cultivations to maximize their profit (knowingly or unknowingly) thereby reducing the fertility of soil in a permanent manner. The conclusions drawn by Lester Brown (1979) is worth remembering here, "Just as the extension of agriculture on to new lands runs up against diminishing returns, so do the development (and use) of water resources and expansion of the use of fertilizers. Most of the world's good croplands is already under the plow, and most of the easy-to-irrigate sites have already been developed. Further expansion of irrigation invariably involves moving up a steeply rising cost curve, either because new dam sites are less desirable or because water tables are falling"

Moreover, while the use of chemical fertilizers accounted for the rise in world food output during the last four decades, marginal returns to additional fertilizer use have already under strict diminishing returns in situations where the farmers have no training for scientific cultivation. Thus, for example, the fertilizer response curve in underdeveloped

agriculture like that in India achieves the peak too rapidly to fall forever thereby causing permanent damages to soil quality. Naturally, the less there is in the land, the more it has to be exploited further by any means. Hence, the short-run rationality of the farmers in backward agriculture comes into an inevitable conflict with the long-run viability of the farms.

Hence, the question of viability or survivality (Bhattacharya and Ghosh, 1989) of farms, or so to say, ecological farming must be verified in economic terms. The concept of surplus generating capability[5] is important in any analysis of viability.

Let us assume that a certain combination of labour (L_0) and capital (K_0) is invested by a farmer into a plot of land (D_0) at times t_0. It does not matter whether cropping intensity is 1, 2 or 3, if accounting is done in a full year. After one year,

total revenue = TR_0

total cost = TC_0

Then, (1) if $TR_0 = TC_0$ at the end of t_0, the farm will end up with no self-generating re-investable surplus at the beginning of time t_1. Hence the farm is not viable. It needs external funds to survive. In fact this was the cause of destruction of millions of small and marginal farmers during the early 20th century as emphasized by Lenin (1974).

(2) If $TR_0 > TC_0$, it implies surplus = $S_1 > 0$

But (a) if S_1 = total cost of living expenses of the farming household, then re-investable surlpus = $RS_1 = 0$. Hence the farm is not viable.

(b) Only if $RS_1 > 0$ to meet the rising cost of cultivation at time t_1, then the viability of the farm is assured.

It is in this context that a small survey was undertaken to check: (i) the ecological consciousness of practising cultivators, and (ii) the economic rationality of the farmers.

EMPIRICAL EVIDENCE

We shall be presenting here some empirical evidence regarding the ecological consciousness of the farmers and their survivality problem. First, we shall take the help of a large scale sample survey data undertaken by one of the present authors in a peasant movement belt in West Bengal during the mid-eighties (Chattopadhyay, 1990). The purpose of use of such data is to give an idea of the extent to which the households in a backward area are able to meet their survival requirements to accumulate a surplus from agriculture. Next, we shall use some data of case history type to probe certain questions regarding the farmer's behaviour towards the practice of ecological farming. We may now turn to the first set of data.

We collected data from 784 households spread over 19 villages in Naxalbari, Kharibari and Phansidewa regions of Siliguri subdivision in Darjeeling district of West Bengal[6]. Among other things, we collected information on land and livelihood of these households. The basic needs of consumption and production as considered here are: (a) consumption requirements which include needs for grain, clothing, housing etc. This was estimated to be Rs. 600/- per annum per adult member of the family at nominal prices. Given the family size, the total expenditure of the family can be obtained. An assumption made here is that in case of infants (below ten years), two such infants have the same consumption requirements as an adult; (b) cost of cultivation which includes hired labour cost (if any), the cost of hiring bullocks and ploughs, manures, seeds etc. Deducting (a) and (b) from the total value of production would then give the surplus. The households having the surplus are regarded as 'viable' households according to our framework.

Following this methodology, the number of household producing surplus in this region has been estimated as 49 out of 784 households, *i.e.*, only six per cent of total.

Table 1 shows that about 86% of total households are unable to meet their consumption requirements from the produce of their holdings and thus have no survival potentiality. This is understandable in view of the fact that

as mentioned earlier the area is so backward that the small peasant (with holdings less than 5 acres) and the landless or near landless households who form the bulk of the population of this region are not able to meet their consumption needs from this unirrigated mono-crop economy (Table 2).

Table 1: Distribution of households by survival potentiality

Potentiality	*No.of households*
I. Above subsistence (having agricultural surplus)	49 (6.25)
II. Mere subsistence (having apparently no such surplus)	62 (7.91)
III. Below subsistence (having no surplus)	673 (85.84)
All	794 (100.00)

Note: Figures in parentheses indicate percentage of total.
Source: Chattopadhyay (1990)

Table 2 clearly shows that the entire group of landless labourers is below the subsistence level. On the other hand, no one is found to be below the subsistence level among the large farmers.

Table 2: Proportion of households by survival potentiality according to size-class of operational holdings

Size-class of operational holdings (acres)	*Above subsistence*	*Mere subsistence*	*Below subsistence*
Below 5.00	4.86	11.14	84.00
5.00-10.00	26.58	27.85	45.57
Above 10.00	91.67	8.33	0
Landless	0	0	100.00

Source: Chattopadhyay (1990).

Further, our data show that the majority of the pure owner cultivators are able to meet their needs of production and consumption whereas the majority of tenant cultivators are not able to meet their basic consumption needs (Table 3).

From the above analysis one may be able to identify two sets of households where one has the potentiality for viability and the other has no potentiality at all. Again, between these two polar situations there are different types of farmers having different degrees of potentiality or no potentiality for survival.

Table 3: Proportion of household by survival potentiality according to types of tenure

Types of tenure	*Above subsistence*	*Mere subsistence*	*Below subsistence*
Pure Owner	34.37	29.69	35.94
Owner-cum-Tenant	9.09	25.45	65.46
Pure Tenant	0	12.82	87.18

Source: Chattopadhyay (1990).

We can now examine the three groups mentioned above and attempt to relate them to the more complex issue of ecological consciousness. From the view point of survival strategy the class of small peasants (including tenants) depending on a small piece of land submerged in a vast population of surplus labour in the countryside and thus having no alternative source of employment and income would try to produce the maximum output on his plot without bothering for any kind of ecological norms. He would try to improve the quality of land by small scale irrigation from any source and by using fertilizers without going into any optimum doze. He will tend to leave fallow as little land as possible, and try to cultivate as many crops as possible. In doing all these he may be expected to ignore entirely any ecological and environmental considerations.

However, a big or a middle peasant by his very position is at an advantage compared to the smaller peasant in so far as his capacity to apply capital and other monetised inputs is concerned. Even so, he would try to behave irrationally in so far as the selection of crops for cultivation and marketing of products are concerned. Thus they very often choose such crops which are not remunerative from the

view point of cost considerations but help to achieve their self-sufficiency in consuming home grown foods (Rudra, 1992). To achieve this aim they do not bother about the principle of profit maximization, nor even the principle of allocation of inputs with required dozes and norms resulting thereby into an ecological havoc in the field of agricultural operations.

Our above explanations can now be verified by some empirical data collected through some probing enquiry mentioned above. In this enquiry our approach was a mixture of the survey method and the types of questioning an economic anthropologist does. The investigation were carried out in the village, Parambua, in the district, Hooghly, in West Bengal in 1994 having 195 households and a large number of households are engaged in growing different crops. We selected 25 households out of 195 from this village to probe some subjective factors guiding the farmers in their farming decisions. The selection of village and respondents is done purposively.

It may be mentioned at the outset that although the survey is basically qualitative covering a very limited geographical area, the findings are really very interesting and suggestive for policy implications.

The questionnaire was formed in such a way as to answer two broad types of questions discussed earlier. First, whether the farmers are guided by any rational outlook by which is meant selection of crops and choice of technology are done so as to maximize profit, both in the short-run and in the long-run; second, whether the farmers are aware of the ecological problems relating to their farming practices.

RATIONALITY BEHAVIOUR

The major findings regarding the farmer's maximizing behaviour are analysed below.

(1) Interestingly, 92 per cent of the farmers do not take their cultivating decisions on the basis of any cost benefit analysis.

(2) Only eight per cent of the farmers generally try to assimilate two previous years' experiences while selecting crops and time for the current year decision.

(3) Most farmers do not have any idea about the expected cost benefit figures of his farm. They are guided by the decisions reached upon after having discussions with friends, relatives and neighbouring farmers who, they think, are well-wishers. Only the big and educated farmers generally take independent decisions although not strictly guided by any maximizing outlook.

(4) According to the big and educated farmers, lack of infrastructural facilities like soil testing laboratory, scientific training centres and the like are responsible for their non-optimizing attitudes with regard to selection, timing and method of cultivation.

ECOLOGICAL AWARENESS

The findings relating to ecological awareness of the farmers are many and varied.

(1) Although 100% of the farmers use inorganic fertilizers for 100% of the operational holdings, 80% of them have no idea about the appropriate dozes of the same to be used depending on the types of crops, quality of land and season of cultivation. Sadly speaking, only 16% of the farmers recognize the issue but do not follow it.

(2) Although every farmer has some vague doubts about the falling fertility of the soils in the region, nobody can think about cultivation without chemical fertilizers even in indiscriminate dozes. According to one estimate, the prescribed doze of 60 Kg DAP + 40 Kg Urea + 40 Kg Gromor per *bigha* for Rabi crops is seen with disdain by the farmers and very often they use twice the prescribed doze or an inappropriate mix thereby causing permanent damages to the soil.

(3) What types of chemical fertilizers they use are determined by the availability in the local shops and casual discussions in each "well-wishers" circle.

(4) In so far as long-run fertility of the soil is concerned, two very ominous observations

emerge (i) Most farmers do not care for falling long-run fertility caused by uncontrolled dozes of fertilizers, although the educated farmers admit that yield per acre has been falling in recent years. (ii) The inclination for over-doze is guided by the vague expectation that this may overweigh the falling intrinsic efficiency of soil but in every season they are surprised to see the reverse. Moreover, they consider the prescription of 20-30% of chemical fertilizers with organic manures like cowdung, compost and other bio-mass as being wrong.

(5) 84% of the farmers now-a-days do not use organic manures at all. They rather use these materials for fire for cooking.

(6) 100% of the farmers use chemical insecticides for all the plots and for all crops. None has ever seen and hence used any natural pesticides developed recently.

(7) As to the doze of pesticides, they very often apply thrice the prescribed dozes in the hope that this will kill all the pests and insects.

(8) 80% of the farmers just do not know that such over-doze in food crops may be dangerous for health. Even those who recognize the issue, think that it is irrational and immature not to use these pesticides. Interestingly, although only three farming households from the sample are illiterate, the educated households have never tried to read out the statutory warnings on the packages.

(9) Finally, 88% of the farmers have directly or indirectly helped in deforestation of their old paternal gardens and only three farmers have tried some sort of plantation programmes on their own. Interestingly, most farmers believe that rainfalls have declined in rural areas in recent years mainly because of rampant cutting of big trees.

CONCLUDING OBSERVATIONS

The empirical findings bearing on the survival strategy of the farmers and their ecological consciousness reveal the following:

(a) Most of the small and marginal farmers live simply below the subsistence requirement. Since they can not create any surplus for reinvestment, their survival potentiality in the future is bleak. Being desperate as they are for just managing their consumption requirement, they can not but ignore any ecological as well as environmental considerations.

(b) Only the class of big farmers are able to generate surplus produce for further reinvestment thereby achieving 100% survival rate. But even these big farmers while achieving the survival requirement somehow or other do not bother either for optimum allocation of inputs (including land and other monetised inputs) or for any long run fertility of land or so to say any ecological balance.

(c) Most farmers whether small or big practice cultivation for subsistence and/or surplus accumulation but do not go into any cost benefit analysis thereby nullifying the rationality hypothesis.

(d) Whereas no farmer has any knowledge and information about the appropriate dozes of inorganic fertilizers and pesticides, they indiscriminately use the same and are reluctant to use organic manures and insecticides thereby causing permanent damage to the quality of the soil.

This analysis is based on two separate research investigations carried out in two different regions during two different time points. To verify whether these results prevail in the same fashion in different parts of India, this study can be extended to some other regions designed suitably for this purpose.

NOTES

1. The neo-Malthusian theory in its various forms links population growth, shifting cultivation practices and deforestation which make the survivality of the tribal population in different parts of the world at stake. A substantial component of recent environmental studies on deforestation in Asia, Africa and Latin America posits a cause-effect relationship between all these aforesaid problems and lack of positive policy-actions by governments as well as non-government organisations (*See, for example*, Allen and Barnes, 1985; Peters and Neuenschwander, 1988; Russell, 1988). In general, exponential population growth in the three tropical continents with the corresponding needs for

food security, very high growth rate of per capita income and expenditure and lack of scientific knowledge are causally linked to excessive exploitation of limited world resources, deforestation and environmental degradation (Tinbergen, 1980). Moreover, the impact on the bio-sphere is very difficult to measure in quantitative terms. Accelerated demographic and economic development have contributed to local deterioration of the bio-sphere and the natural environment in which we live. Pollutions of air and water affecting both human and other species have been spreading at very fast rates. Major lakes have been deoxygenated, killing important varieties of fishes, plants and birds which would have otherwise maintained an ecological equilibrium.

2. See especially chapter 17 of Rudra (1992) and Boulding (1970).

3. As rightly pointed by Bernal (1969), "The world can not afford the time in which the peasant, however hard working and traditionally skilled, was illiterate and incapable of understanding science. It should be evident that the agricultural worker and the agricultural scientist, they may be both the same person, have to have a wider and deeper grasp of science than is required in any other branch of human activity".

4. Ricardo's preoccupation with dimishing returns was pre-mature because productivity of land rose many times since 1917. But it was nonetheless well-founded, because with the global economy growing at about 4% per annum, given a population growth rate of 2%, it should come as no surprise that each of earth's ecological systems is under serious pressure and the non-renewable resources are fast dwindling. Technological advances may for a time more than offset the declines in resource quality, but at some point in future even the most ingenious attempts to compensate for nature will no longer be adequate.

5. For viability, a farm has to generate enough surplus over and above the cost of living of the household at the current year such that the surplus income can meet up the cost of cultivation of the farm for the next year even at the same level of technology. If this surplus fails to meet the cost of cultivation, then it can resort to various credit facilities as available in rural areas. But how long? Hence, it must reinvest self-generating surplus.

6. Identification of various agrarian class categories was made on the basis of the villagers' perception and knowledge about the socio-economic status of the respective households in the village. In order to do this a PPS (Probability Proportional to Population Size) sample of 25% of the total revenue units *(moujas)* on the basis of 1971 Census listing was taken against each of the three police station areas (Naxalbari, Kharibari and Phansidewa) under study. This procedure was necessitated because of the large variations in the population. Nearly 32 *moujas* consisting of 90 *jotes* (villages) were selected in the three police stations. *See for details* Chattopadhyay (1990).

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