Madras Agric. J., 85(7-9): 433 - 437 July - September 1998
https://doi.org/10.29321/MAJ.10.A00779

SOIL QUALITY Vs FARMLAND PRICES IN THE NILGIRIS

C. SEKAR, C. RAMASAMY, C. KAILASAM
Tamil Nadu Agricultural University, Coimbatore - 3.

ABSTRACT

The present investigation was carried out to analyse the influence of qualitative and quantitative attributes on farmland pricing behaviour in Katteri and Jagathala watersheds in the Nilgiris district, Tamil Nadu. A total number of 120 respondents was contacted for the present study. The results obtained from the hedonic regression clearly demonstrated the influence of soil depth, soil wetness, percentage of crop lands, soil quality etc. on farmland prices. The choice variables viz. community housing, farm size, population change, population density and the interaction terms involving population density and soil quality did not show any significant impact on crop land price. The study further showed that the above variables explained 82 percent change in farmland price. The findings obtained would be useful for the land owners in making investment decisions on soil conservation based on the significance of the influencing variables on farmland price. The outcome of the research findings can be used in deciding the level of subsidies to be extended by the Government for conservation projects.

KEY WORDS : Hedonic, Kattery and Jagathala watersheds, Silt Yield Index, Dummy variable.

Soil and water are the twin gifts that nature has bestowed on humanity. Interaction of these two resources are vital for the existance of flora and fauna in the world. Eventhough some of our natural resources are replenishable, soil is not a renewable resource in the short run. Available literature indicate that the present level of soil conservation in India is far from impressive. In spite of the importance attached to soil conservation research, it appears that soil conservtion is still not a priority sector for agricultural producers. A possible reason for this neglect is that the technological advancement has led to enhanced yield even though soils have deteriorated over time.

It is estimated that out of the total geographical area of 329 million hectare (m.ha.) in India, about 167 m.ha (about 51 percent) are affected by serious water and wind erosion and culturable waste lands, 127 m.ha. subject to serious soil erosion and 40 m.ha degraded through gully and ravines (Singh & Venkataraman, 1990).

The recent analysis of soil erosion rates in India estimated that about 16.40 tonnes/ha of soil is lost annually due to agriculture and associated activities alone and of this about 29 percent is carried away by rivers into the sea (Kumar, 1991). During FYPs (Five Year Plans) soil conservation programmes were gradually taken up at the state level and diversified. Different organizations were developed for takingup programmes like Drought Prone Area Programme, Small Farmers Development Agency, Command Area Development Programme, Intensive Tree Development Programme, River Valley Projects, Hill Area Development Programme, etc.

Soil Erosion in the Nilgiris

Realising the crux of the problem of soil conservation and its dominant role in the production spheres of agricultural activities in the Nilgiris, the present study was conducted to understand the consequences of erosive practices and the farmland price. In the Nilgiris, the area prone to soil erosion is 6.81 lakh ha. It is found that the soil loss in the Nilgiris exceeds 40 tonnes/ha/year (Anonymous, 1993).

Information available on problems of land and water management shows that the high amount of intense rainfall with their high erosivity of soils coupled with moderate to very steep solpes make this hilly region prone to severe erosion. Besides, increased pressure on land has resulted in deforestation, expansion of cultivated agriculture into marginal area and intensification of agricultural activities in unsuitable lands. In view of what has been discussed above, a study was takenup in the Nilgiris district with the following specific objectives.

- ☆ to understand the nature of soil conservation practices adopted in the study region, and
- ☆ to study the changes in farmland values consequent to the changes in soil

characteristics and other related exogenous factors.

MATERIALS AND METHODS

In the Nilgiris, there are two major catchments viz., Kundah and Lower Bhavani. These two catchments have four sub-watersheds viz. Kundha, Lower Bhavani, Upper Bhavani and Moyar. The River Valley Project (RVP) wing of the Department of Agricultural Engineering with the assistance of All India Soil and Land Use Survey has identified 176 Sub-watersheds in the Nilgiris, which are again classified as very high priority, high priority, medium priority, low priority and very low priority based on Silt Yield Index (SYI).

For the present investigation, multi-stage sampling was followed. In the first stage, Coonoor block was chosen purposively. In the second stage also two very high priority watersheds were selected purposively. The selected watersheds are Jagathala and Kattery. Only in these two watersheds, the RVP wing of the Department of Agricultural Engineering has erected silt monitoring stations to record rainfall, soil loss, silt transportation rate etc. In the third stage, 12 villages were selected randomly at the rate of six villages per watersheds.

In the final stage, ten farms from each of the 12 sample villages were selected. Thus the sample size of 120 was arrived at. The data collected pertained to the year 1994-95 and the data were collected both from primary and secondary sources. The model employed for the present study is described hereunder.

Hedonic model :

Hedonic study was used to value the changes in the characteristics of farm land. The present analysis demonstrates the use of a hedonic model of factors of production to farm land values. The variables used in the present study are described in Table. 1. Land value is influenced by two measures namely, the susceptibility of the soil resource to erosion and the erosion that has already occurred on the land. Erosion control effort involves an expense for the farmer. This is captured by EROSION, which measures the inherent erosion potential of the soil type. The presence of erosion was

Table 1. Description of variables and statistics - I

Variable	Mean value	Standard deviation	Definition
PRICE	3.282	0.492	Price of land per hectare (lakh rupees)
SODEP	51.433	7.832	Soil depth (cm)
SOILWET	0.367	0.486	Dummy = Soil Wetness (1 if poorly (or) very poorly drained ; 0 otherwise)
DHOUSING	0.500	0.504	Dummy : Community housing (1 if located nearby : 0 otherwise)
SIZE	1.760	1.653	Farm size (ha)
PCROP	87.203	8.694	Percent cropland
SOILQUAL	2.117	6.804	Quality of soil rating (poor = 1 ; average = 2 ; good = 3)
POPCHGE	3.388	0.879	Percentage population change in the watershed between 1980-90 (percentage)
POPDEN90	3.359	2.177	Population density in 1990 (persons per ha)
SOILGD	0.543	0.675	Dummy : Good soil quality (1 if present : 0 otherwise)
SOILBD	0.400	0.494	Dummy : Poor soil quality (1 if present : 0 otherwise)
POPSOIL	0.864	0.614	Interaction term POPDEN 90 * SOILQUAL
POPCROP	35.869	43.360	Interaction term SOILWET * PCROP

considered in estimating soil quality (SOILQUAL) because land with sub-soil exposed partially is considered to be less productive.

Three hedonic regressions were run by changing or altering some of the explanatory variables. The rationale for runing three equations was to capture the exact influence of the certain qualitative variables viz.soil quality and the interaction effect either separately or in combination with the other variables included in the model. The first hedonic regression was run with all variables listed in the table except SOILGD, SOILBD and POPCROP. The second hedonic regression too included all other variables listed except SOILQUAL which was replaced with dummy variable representing land that was rated good or poor [SOILGD, SOILBD). The third hedonic regression considered the addition of an interaction term between soil wetness and percentage of cropland. Soil wetness is a dummy variable representing soils that require drainage for crop cultivation. Details on whether the land has been drained is implicitly available, since drainage must have occurred on poorly drained land used for cultivating crops. An interaction term between SOILWET and PCROP was also used to determine if the effect of poorly drained soil depends on land use.

The functional form of the hedonic equation was selected empirically by considering the residual sum of squares. Among the most common functional forms (linear, semi-log, log linear and inverse semilog] the linear from was found to be preferable to run the hedonic equation analysis for the present investigation.

RESULTS AND DISCUSSION :

Rainfall has been the major cause of soil erosion. Declining crop yield, restricted crop choice and land abandonment due to gully formation were the direct consequences, which contributed to declining farm income. The indirect effects were unemployment, migration and loss of fertile top soil and ecological imbalance. An examination of investment behaviour of farmers exhibited their preference towards contourbund with a weight of 49.17 percent followed by staggered trench with 23.33 percent, waterway with 18.33 percent and stonewell with 9.17 percent.

Hedonic study is widely employed to value changes in the characteristics of farm land. Miranowski and Hammes (1984), Bartic (1987), Palmquist and Danielson (1989) in their studies have demonstrated the advocation of hedonic techniques to value farm lands, farm land sales and land improvements and extent of urbanization, respectively. The inclusion of hedonic study would fulfill the requirements of the investigation in question.

The market price for crop land was modelled as a market for a differentiated factor of production because of the difference in the characteristics of the farmland. To demonstrate the use of land value studies in evaluating land improvement like soil conservation, hedonic techniques were applied. The hedonic regression results are presented in equations 1-3.

Hedonic regression results :

PRICE = 0.8910 + 0.0170 SODEP - 0.1172 SOILWET** +
[6.0925] [2.931] [-2.771]

0.501 DHOUSING** + 0.0064 SIZE + 0.0089 PCROP +
[0.505] [0.289] [2.119]

0.2130 SOILQUAL + 0.0590 POPCHGE + 0.1510 POPDEN90 -
[2.464] [1.586] [0.212]

0.2610 POPSOIL ....(1)
[-1.017]

$R^2 = 0.891$

Hedonic regression results involving soil quality replaced with dummy variable, land :

PRICE = 0.891 + 0.0040 SODEP** - 0.0459 SOILWET** +
[8.087] [2.198] [-2.049]

0.0512 DHOUSING + 0.0029 SIZE + 0.0042 PCROP**
[0.9326] [0.4240] [3.502]

0.0554 SOILGD** - 0.0068 SOILBD** + 0.0123 POPCHGE
- [2.388] [-2.345] [1.059]

0.0675 POPDEN90 - 0.1105 POPSOIL......................(2)
[-0.2691] [1.225]

$R^2 = 0.8320$

Hedonic regression results involving the interaction term WETCROP

PRICE = 0.8746 + 0.0159 SODEP** - 0.1773 SOILWET* +
[8.0942] [2.589] [-1.743]

0.0365 DHOUSING + 0.0060 SIZE + 0.0097 PCROP* +
[0.753] [0.270] [2.172]

0.1983 SOILQUAL* + 0.0581 POPCHGE + 0.0910 POPDEN90 -
[2.190] [1.561] [0.126]

0.3096 POPSOIL - 0.0090 WETCROP - .... (3)
[-1.136] [-0.529]

$R^2 = 0.8209$

* = Significant at 5 per cent level
** = Significant at 1 per cent level
[ ] = 't' values

It could be seen from the equations that all the variables had expected signs. Soildepth [SODEP], soil wetness [SOILWET], percentage of crop land [PCROP] and soil quality [SOILQUAL] emerged significant. While soildepth, soil wetness and soil quality were significant at one per cent level, the percentage of cropland was significant only at 5 percent level.

The analysis of co-efficient of multiple determination implied that about 89 percent of the land price was explained by the variables included in the model. The choice variables viz. community housing, farm size, population change, population density and the interaction term involving population density and soil quality did have any significant influence on land price.

In the results reported in equation (2), the independent variable, soil quality was replaced with dummy variable representing land that was rated good or poor as opposed to average. The R^2 measure was not significantly affected and the magnitudes and significance of the other explanatory variables were also essentially unchanged. The analysis indicated the significance of both the good and poor rated soil. But the poor quality soil had negatively influenced the land price. The results of the regression analysis were in confirmity with the expected outcome of the similar function employed elsewhere [Palmquist, 1989].

The results shown in equation (3) reflected the addition of an interaction term between soil wetness and land use. The inclusion of this interaction term had little statistical significance. The results for the other variables were scarcely affected by the addition of the interaction term although not surprisingly the 't' ratio was reduced for soil wetness, when that variable entered the regression in two forms. The newly introduced variable also did not have any significant impact on the price of farmland. The significance of the already significant variables had not shown any drastic change in the co-efficient values. The co-efficient of multiple determination also did not exhibit any significant change. Here also about 82 percent of the total variation in land prices were explained by both qualitative and quantitative attributes included in the model. Additional information obtained from the study could be useful for the individual land owners in making investment decision on soil conservation. The term soil depth is highly significant. Since the study region is a sloppy undulating terrain, soil depth determines the land value to a great extent. Similarly, the drainage is also a vital aspect which contribute to the farmland price. Due to extensive soil erosion in the study region, the suitability of the land for cropping always fetches higher price and thus it is significant. Similarly, soil quality is also an important contributing factor, significantly deciding farmland price as good quality soil in hilly areas are subjected to severe soil erosion. As such the community housing has no influence on farmland pricing. Since the study areas happened to be the remote hill tracts, its influence is not significantly felt. So also there had been no major changes in the population density in the last one decade and hence its impact on land price was not realised.

The farmland value supresses all other asset values in agricultural production. Therefore, understanding the formation and roles of farm land prices should command high research priority in resource economics. The empirical results provided qualified support for the proposed hypothesis implying that the farm land values rely heavily on qualitative characteristics viz.soil depth, soil wetness, soil quality etc. Hence one of the recommendations affirmed by this study is that considerable attention has to be devoted to analsing the consequences of soil characteristics and devising means to minimise the damage to farm land values. With regulatory controls like legislative means to check over exploitation, stringent measures against defaulters and strengthening of institution and orientation and training programmes will be a forebode in this direction.

Conclusion and Policy Implications :

The results obtained from the hedonic regression clearly demonstrated the influence of soil depth, soil wetness, percentage of crop lands, soil quality etc. on farmland prices. The choice variables viz. community housing, farm size, population change, population density and soil quality did not show any significant impact on crop land price. The study further showed that the above variables explained 82 percent change in farmland price.

The most important policy options emanated from the present study are furnished hereunder.

i. As the soil characteristics viz. soil quality, soil depth, soil wetness etc. are significantly influencing the farmland prices, the outcome of the research findings can be used in deciding the level of subsidies [based on the extent of soil erosion damage and changes in the soil characteristics] be extended by the Government for conservation projects to make the farmers convinced about the conservation farming.

ii. Promulgating legislative measures and regulatory control to check the over exploitation and misuse of land resource will ease the problem of pressure on land, besides protecting the original and indestructive properties of the parent soil resource.

REFERENCE

ANONYMOUS [1993]. Proceedings of the National Conference on Challenges of Watersheds, College of Agricultural Engineering, Tamil Nadu Agricultural University. 12-36.

BARTIC, TIMOTHY, J. (1987). The estimation of Demand Parameters in Hedonic Price Models. **J. Political Econ.**, 95 : 81-88.

GURMAL SINGH and VENKATARAMANAN, C. [1990]. Soil and Water Conservation Technology for Hilly, Ravine and Semi-Arid Black and Red Soil Region. **Indian J. Soil Conserv., 18** [1&2] : 1-7.

KUMAR, V. [1991]. Deterministic Modelling of Annual Runoff and Sediment Production Rate for Small Watersheds of Damodar Valley Catchment. **Indian J. Soil Conserv., 19** [1&2] : 727-31.

MIRANOWSKI, J.A., [1984]. Impacts of Productivity Loss on Crop Production and Management in a Dynamic Economic Model. **American J. Agrl. Econ., 66**: 61-71.

PALMQUIST, R.B. (1989). Land as a Differentiated Factor of Production : A Hedonic Model and its Implications for Welfare Measurements. **Land Econ., 65**: 23-38.

(Received : August 97 Revised : February 98)

Madras Agric. J., 85(7-9): 437 - 442 July - September 1998

INCOME AND EMPLOYMENT OF AGRICULTURAL LABOURERS IN TUTICORIN DISTRICT

N.R. PADMANABAN

Department of Agricultural Economics
Tamil Nadu Agricultural University
Coimbatore.

ABSTRACT

A study was conducted in Tuticorin district to analyse the income and employment pattern of agricultural labourers. The study indicated that the average annual employment per family was 494.25 mandays for males and 335.45 for females. Agriculture contributed a major share of 53.78 per cent of employment for males and 58.21 percent for females. The annual per capita employment for males in the study area was 268.83 mandays and for females it was 247.97 mandays. The average annual income per family was Rs. 22965.41, of which wage income accounted for 68.73 percent and non-farm income 22.78 percent. The mean annual per capita income was Rs. 7319.56.

KEY WORDS : Employment, mandays, per capita, respondents.

Farm productivity could be improved through optimum allocation of existing farm resources as well as through adoption of modern technologies. Among the various crucial inputs in agriculture, labour is an important one. The total workers in India has increased from 139.5 million in 1951 to 285.4 million in 1991, of which around 65 percent are agricultural labourers and cultivators, and they depends on agriculture. one of the biggest problem of agriculture labour has been their inability to organise themselves to bargain for their welfare (Barnala, 1977). In Tamil Nadu, the agricultural labour and cultivators constitute 69.4 percent of the total workers (13.6 million).

Labour markets in rural areas are narrow and often imperfect and exhibit inter and intra-regional