International Journal of Agriculture Sciences
ISSN: 0975-3710&E-ISSN: 0975-9107, Volume 10, Issue 2, 2018, pp.-4999-5001.
Available online at http://www.bioinfopublication.org/jouarchive.php?opt=&jouid=BPJ0000217

Research Article

FACTOR AFFECTING ADOPTION OF SOIL AND WATER CONSERVATION PRACTICES IN VINDHYAN REGION OF UTTAR PRADESH

LAL PANNA[1], BADAL P. S.[2] AND KUMAR SANTOSH[3*]

[1,2]Department of Agricultural Economics, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, 221005, Uttar Pradesh
[3]ICAR-Directorate of Weed Research, Jabalpur, 482004, Madhya Pradesh.
*Corresponding Author: Email-santosh.ageco@gmail.com

Received: December 28, 2017; Revised: January 08, 2017; Accepted: January 09, 2017; Published: January 30, 2018

Abstract- This study explores of the Vindhyan region of the Uttar Pradesh was selected as it is highly prone to degradation of natural resources. Out of three districts namely Sonebhadra, Mirzapur and Varanasi which come under Vindhyan region, Mirzapur district was randomly selected as a representative district of the region. The farmer's decision to adopt soil water conservation was analyzed with the help of Tobit Model. The Tobit model was estimated using the maximum likelihood procedure and only the most important explanatory variables were included in the model. The adoption of soil and water conservation shows that age (0.1760), family size (0.3639), farm size (0.9931), Source of Information about Market Information (0.1188), extension visit (.9031), training in natural resource management (0.903) and land tenure (0.3416) were significant. In Narayanpur block the level of diversification was higher in case of soil and water conservation adopters (0.33) as compared to non-adopters (0.25). Similar trend was observed in case of Pahari Block. Further production stability was also found higher in case of adopters of soil and water conservation measures as compared to non adopters in both the blocks.

Key word- Natural resources, sustainability, water conservation, production, stability.

Citation: Lal Panna, et al., (2018) Factor Affecting Adoption of Soil and Water Conservation Practices in Vindhyan Region of Uttar Pradesh. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 10, Issue 2, pp.-4999-5001.

Academic Editor / Reviewer:

Introduction

Seasonal changes in day length or photoperiod act as an external temporal clue to start a series of physiological processes. As a result, certain events like growth and spawning are restricted to specific times of the year. These photoperiodically controlled reactions suggests a capacity of the organisms to distinguish between short and long days and therefore to measure physical processes and phenomena. This measurement seems to be based, at least in some species, on originating rhythms [1].

Community based natural resource management (CBNRM) is often promoted by governments, NGOs and donors as a means of reducing poverty in rural communities, particularly through income-generation from various natural resource-based activities. Community based natural resource management envisages if rural communities have decision making authority over their natural resources and are able to benefit from the resources, they will use these more sustainably. In the past governments, development agencies and NGOs have experimental and found potential in this approach for generating income and jobs in rural communities and at the same time for promoting natural resource conservation (Braines Jones, 2006) [1].

The decision making process for the use of soil conservation practices is set in motion by the recognition of an erosion problem. That perception is viewed as a product of farmer's personal characteristics that might cause a more acute awareness of the seriousness of the erosion, coupled with the actual physical characteristics of the land he operates. Educational programmes can be used to heighten the perception of erosion problems. From an economic perspective, perception of the degree of erosion problem and its impact on short-term returns and land values should be highly correlated with the farmer's willingness and ability to pay for conservation measures. Once the erosion problem is perceived, the farmer decides whether to adopt conservation practices. Sustainable agriculture has gained acceptance as a conceptual and technological approach for shaping farming system of the future. Sustainable agriculture as the successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of environment and conserving natural resources (Food and Agriculture Organization, 199l) [2].

At farm level, decision making with regard to soil and water conservation (SWC) technologies is the most important natural resource management intervention, since it usually affects both land use and land management, and it often requires long term investments. Adoption and continued use of long term soil water conservation measures such as terraces and stone bunds which require high initial investment and subsequently regular maintenance are not common. However, practices such as bunding, mulching and zero tillage are common in practice. The Vindhyan plateau is situated at an altitude of between 315 m and 485 m from sea level and about 100 km South from the city of Varanasi in Uttar Pradesh. Climate is tropical monsoonal which includes a rainy season from June to September, a cool dry season (November- February) and a hot dry season (April-May). The Savanna grasslands which cover about 23 per cent of the region have been derived from tropical dry forests. Changes in land use pattern have been being observed over the past 30-40 years due to increasing anthropogenic pressure. Heavy uncontrolled grazing and intensive cultivation is now much in practice. The present study examines the impact of community based natural resource management on agricultural sustainability and livelihood Security in Vindhyan region.

Materials and Methods

In the present study multi-stage stratified random sampling technique was used for the selection of district, blocks, and villages. Vindhyan region of the Uttar Pradesh was selected for the study as it is highly prone to degradation of natural resources. Out of three districts namely Sonebhadra, Mirzapur and Varanasi which come under Vindhyan region, Mirzapur district was randomly selected to act as a representative district of the region. Selection of blocks formed the second stage of sampling. A list of all 12 blocks in Mirzapur district was prepared and two blocks namely Narayanpur and Pahari were randomly selected. Selection of villages formed the third stage of sampling. A list of all villages of the selected blocks was obtained, and 4 villages from each block were randomly selected. Thus, the total numbers of villages selected for the study were eight. Selection of farmers formed the fourth and the final stage of sampling. A list of farmers in each village was prepared and 20 farmers were selected randomly. Thus a total of 80 farmers were selected from each block making the sample size 160 for the whole district. These groups were categorized as marginal farmers (less than 1ha), small farmers (1 to 2 ha), medium farmers (2 to 4 ha), and large farmers (above 4 ha).

Table-1 *Details of the selected villages under different size groups*

S.No.	Blocks	Name of villages	Size groups				
			Marginal	Small	Medium	Large	Total
1.	Narayanpur	Gurahupur	7	5	4	4	80
		Gharwaspur	5	6	4	5	
		Garaudhi	6	5	4	5	
		Gopalpur	8	5	3	4	
2.	Pahari	Newaria	8	4	5	3	80
		Hinauti	7	5	4	4	
		Sindhaura	6	4	6	4	
		Shivgarh	5	7	5	3	

Ecological sustainability is the process of development which is compatible with quality and security of food supplies [3]. In the context of this study area, ecological security was assessed based on three indicators:

(i) Soil fertility status;
(ii) Management of pests and diseases;
(iii) Risk arid uncertainties.

Crop diversification was measured through the index of crop diversification (ICD) using the following formula:

$$ICD= I/[(R1+R2+... +Rn)/N_c]$$

Where ICD is the index of crop diversification, R_1 the ratio of sown area under crop 1, R_2 the ratio of sown area under crop 2, R_n the ratio of sown area under crop n, N the number of crops.

Crops occupying less than 1 % of the cropped area were excluded from the analysis. The five major crops: rice paddy, maize, millet, wheat and mustard, were taken into consideration. The stability of crop yield was examined by constructing an index based on farmer's subjective responses to a question related to yield trend. The index was constructed based on the following formula:

$$IPS= (f_i* 1 + F_c * 0.5 + F_d * C) / N$$

Where IPS is the index of production stability, f1 the frequency of responses indicating increasing yield, f the frequency of responses indicating constant yield, f_d the frequency of responses indicating decreasing yield, N the total number of responses.

The risk and uncertainties index was constructed based on the following formula [6]:

$$IPS = \log (ICD + IPS) / 2$$

Where IRU is the index of risk and uncertainties, ICD the index of crop diversification, IPS the index of production stability.

Results and Discussion

Institutional Framework

Different stakeholders in soil and water conservation were categorized according to their relative influence and importance : importance refers to those whose needs and interest are the priorities of aid while influence refers to the power certain stakeholder have over the success of a project Overseas Development Administration (ODA) advise the use of a matrix for assessing the influence and importance of stakeholder which can be transposed into a graph stakeholders in box A are of central importance to the project but have low local influence or power (such as women and the poor), those in box C have high influence but are not the main Target (ODA, 1995) [4].

High importance	**A** Trainers / Teachers / Students / Extension Workers, Agriculture Department	**B** Policy makers community leaders
Low importance	**C** Environmentalist	**D** Researchers, extension workers. NGOs, Farmers, Women, Poor
	Low influence	**High influence**

Table-2 *Summary of Variables*

Variables	Measures	Ho Sign
Age	Years	+
Farming experience	Years	+
Family size	Number	-
Farm size	ha	+
Source of information about new technology (SIT)	Yes = 1, No = 0	+
Source of information about market information (SIM)	Yes = 1, No = 0	+
Source of Off farm income	Yes = 1, No = 0	+
Frequency of extension visit	No. of meetings	+
Training in NRM (Yes = 1; No = 2)		+
Land tenure	If owned, Yes = 1 If leased, No = 0	

Dependent: Adoption of SWC measures

[Table-2] reveals that older farmers are more likely to practice all conservation techniques, farming experience imply farming knowledge gained over time and are importance in evaluating technology information (Feder et al., 1985) [**5**], off farm income, source of information about new technology, NRM, source of market information have better credit facilities and improving the literacy level in the district is a higher soil water conservation adoption in the district.

Table-3 *Estimated Tobit Model for Factors affecting of Soil and Water Conservation Programme*

Variable	Coefficient	Standard error	t-ratio
Age	0.1760	0.435	4.045*
Experience	-0.1494	0.3243	0.460
Family size	0.3639	0.1290	2.813*
Farm size	0.9931	0.3557	2.791*
Source of information new technology	-.3416	.1670	2.045*
Source of information about market	0.1188	.7865	0.151
Off farm income	-.1024	-.0349	2.934*
Frequency of extension visit	-.944	0.3045	3.100*
Training in Natural resource management	0.9031	.1689	5.346*
Land tenure	.3416	.1670	2.045*

Log likelihood function = -19.987, * Significant at 10% level, ** Significant at 1% level

The Tobit model was estimated using the maximum likelihood procedure and only the most important explanatory variables were included in the model.

The Tobit model for the adoption of soil and water conservation show that age (0.1760), family size (0.3639), farm size (0.9931), SIM (.1188*), extension visit (.9031), training in NRM (0.903) and land tenure (0.3416) were the significant.

Impact of Cbnrm on Agricultural Sustainability

Agricultural sustainability in the area was examined with the help of computation

of index of risk and uncertainty (IRU) comprising of index of diversification (ICD) and index of production stability. Value of all of ICD and IPS implied a desirable condition whereas a lower value was not desirable condition. In case of IRU a lower absolute value was desirable as it showed lower level of risk and uncertainty. Results of the analysis are presented in Table.

Table-4 *Agricultural Sustainability in Mirzapur District*

Blocks	Adopters			Non adopters		
	ICD	IPS	IRU	ICD	IPS	IRU
Narayanpur	0.33	0.68	0.29	0.25	0.57	0.39
Pahari	0.25	0.64	0.35	0.23	0.51	0.44
Total Mirzapur	0.27	0.65	0.33	0.25	0.54	0.41

It can be seen from the [Table-4] that in Narayanpur block the level of diversification was higher in case of soil and water conservation (SWC) adopters (0.33) as compared to non-adopters (0.25). Similar trend was observed in case of Pahari Block. Further production stability was also found higher in case of adopters of SWC measures as compared to non adopters in both the blocks. Consequently, the risk and certainty was found to be lower in case of adopter as compared to non-adopters in both the blocks and Mirzapur as a whole. This implies that as market access, credit support and input availability combined with other institutional supports improves, the agricultural sustainability improves. Similar observations were made by Rasul and Thapa (2003) [6] and Bhandari and Grant (2004) [7].

Conclusion

The older farmers are more likely to practice all conservation techniques, farming experience imply farming knowledge gained over time and are importance in evaluating technology information (Feder et al., 1985) [5], off farm income, source of information about new technology, NRM, source of market information have better credit facilities and improving the literacy level in the district is a higher soil water conservation adoption in the district.

The Tobit model for the adoption of soil and water conservation show that age (0.1760), family size (0.3639), farm size (0.9931), SIM (.1188*), extension visit (.9031), training in NRM (0.903) and land tenure (.3416) were the significant.

Narayanpur block the level of diversification was higher in case of soil and water conservation (SWC) adopters (0.33) as compared to non-adopters (.25). Similar trend was observed in case of Pahari Block.

Abbreviations:

SWC = Soil and Water Conservation
ICD = Index of Crop Diversification
IRU = Index of Risk and Uncertainties
ODA = Overseas Development Administration
SIT = Source of Information about New Technology
SIM = Source of Information about Market Information
NRM = Natural Resource Management

Acknowledgement:

This study forms the part Ph.D. Thesis submitted to Banaras Hindu University, Institute of Agricultural Sciences, Varanasi by first author. The technical support provided by the co-authors.

Author Contributions:

Panna Lal- Design of the experiment, data collection, data analysis and interpretation, drafting the article, Critical revision of the article and final approval of the version to be published.

P.S. Badal- Design of the experiment, data analysis, guidance in interpretation and facilities to conduct the experiment.

Santosh Kumar- Critical revision of the article, final approval of the version to be published.

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Conflict of Interest: None declared

References

[1] Jones B. (2006) Community-based Natural Resource Management in Botswana and Namibia, Discussion IIED, UK.

[2] FAO (1991) FAO/Netherlands Conference on Agriculture and Environment. S-Hertogenbosch, The Netherlands, 15–19 April 1991.

[3] Smith C.S., Mcdonald G.T. (1998) *Journal of Environmental Management*, 52, 10.1006/jema.1997.0162.

[4] ODA (1995) Guidance Note on Indicators for Measuring and Assessing Primary Stakeholder Participation (July). London: Social Development Department, Overseas Development Administration.

[5] Feder G., Just R.E. & Zilberman D. (1985) *Economic Development and Cultural Change,* 33(2), 255– 98.

[6] Rasul G., & Thapa G. B. (2003) *Land Degradation & Development,* 14, 495-508.

[7] Bhandari B.S. and Grant M. (2004) farmers attitudes towards community based watershed management approaches and programmes: A case study in the Kalikhola watershed, Nepal, post doctoral study Report, University of Calgary, Canada.