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Short Communication

EVALUATION OF CROP LOSSES CAUSED BY WILD ANIMALS AND THEIR RELATIONSHIP WITH GIVING UP FARMING: A CASE STUDY IN VULNERABLE AREAS OF MATALE DISTRICT

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INTRODUCTION

Adequate resources and simple life styles of people in history brought rare incidences of conflict with wildlife for their livelihood. But agriculture lands always influence by the competition of raising population and both wildlife as well as humans suffered. The farmers show a marked inability to successfully cultivate in areas frequent by wild animals and to co-exist with them (Bandara *et al.*, 2003). Therefore, despite the high demand for recreational and aesthetic values associated with wild animals, many species of them are viewed negatively by the farmers. Further, despite of all sources climatic risks, protection of crop is rarely possible from the losses made by wild animals, which saves significant amount of crop production to the country.

According to Bandara *et al.* (2002) establishing an appropriate mechanism to compensate the damage caused by elephants will encourage farmers to tolerate these animals. But it is a challenge to the government to design a management programme to control all kinds of vulnerable and less attractive wild animals such as monkeys, peacock, wild boar and giant squirrel, who made considerable crop losses. According to the views of field agriculture officers, the crop damage caused by wild animals are raising continuously to the level of quitting farming in some areas. Even there are ample assessments on human elephant conflicts, all wild animals that made agricultural losses assessed hardly in Sri Lanka. Therefore this study was aimed to identify the major wild animal species causing crop damages, affected crops, economic loss, farmer tendency and factors affecting for giving up farming.

MATERIALS AND METHODS

This study was based on a field survey conducted in Matale district during November 2012. Based on the views of Agriculture Instructors, two Divisional Secretariats (DS) of Dambulla and Wilgamuwa which were the most agriculture dominant and vulnerable to wild animal attacks were selected for the study. Agricultural households of each DS division were randomly and equally selected. The total sample

size was 60 households. The data were analyzed descriptively to ascertain major wild animal species causing crop damage and victim crops. Assessment of the economic value of crop losses caused by wild animals was obtained by interviewing farmers regarding the damages incurred by wild animals and using the retail price they obtained to the unharmed produce. Farmer tendency for quitting farming due to wild animal attack was analyzed using logistic regression model (equation 1). The dependent variable (Y) is binary (farmer quit farming = 1, continues farming = 0). The independent variables (X_i) are explained in Table 1.

$$L_i = \ln\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_i x_i \quad \text{.....equation 1}$$

Table 1. The definitions of the independent variables.

Category	Definition of variable
Age of the farmer	Age in years
Education level	Education rates as 1=grade 1-5, 2= grade 6-10, 3 = OL, 4 = AL
Experience in agriculture	Experience in agriculture in years
Income from agriculture (Rs.)	Total income earned from agricultural activities in year 2012
% loss of income	Total income loss incurred in year 2012 due to wild animal caused crop damage as a % from total agriculture income in year 2012
Preventive cost (Rs.)	Cost for preventing crop from wild animal attack in year 2012

RESULTS AND DISCUSSION

Dambulla farmers earned Rs. 776,000 of agriculture income in year 2012 and it was twofold higher than that of Wilgamuwa farmers. Wild animals made overall 19% and 23% loss of agriculture income (Figure 1) and giving up farming is anticipated by 47% and 37% farmers in Dambulla and Wilagamuwa DS divisions, respectively.

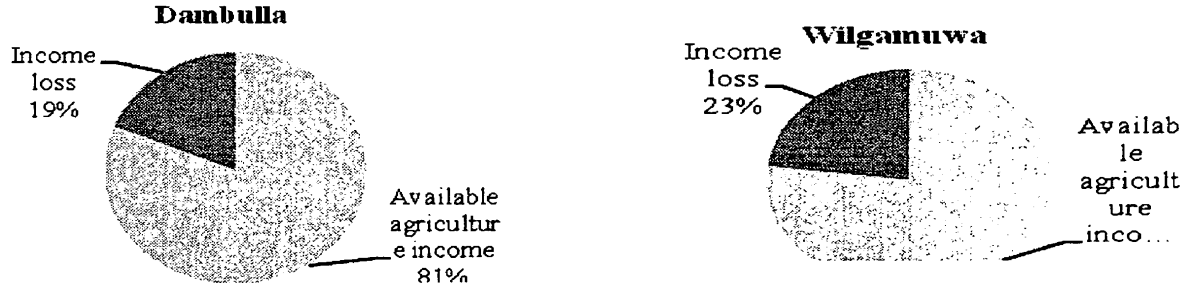

Figure 1. Percentages of available agriculture income and income loss due to wild animal damages in Dambulla and Wilgamuwa DS divisions in year 2012.

Paddy cultivation was highly affected by elephant, wild boar and peacock species. Percent income lost from paddy cultivation due to wild animals was 15% and 16% in Dambulla and 13% and 34% in Wilgamuwa DS divisions in *maha* 2011/12 and *yala* 2012, respectively. Other field crops chilli, cowpea and onion were affected by elephants, peacock and rats in Dambulla DS division. The total economic loss made in year 2012 was Rs. 132,111. A variety of other field crops such as maize, finger millet, green gram, ground nut, chilli and onion was affected by wild elephant and peacock in Wilgamuwa DS division and they made 24% income loss in year 2012. Beans, brinjal, cabbage, cucumber, long beans, okra, pumpkin and tomato were also affected in the selected area by wild elephant and peacock. The perennials banana, papaya, mango and coconut were also affected by wild elephants, monkeys and giant squirrels. The economic loss made for the perennials for an average farmer in year 2012 was 21% and 63% in Dambulla and Wilgamuwa DS divisions, respectively.

Table 2. Wild animals and their value of income loss in year 2012.

Wild animal	Dambulla			Wilgamuwa		
	Farmers affected in year 2012 (%)	Mean of agriculture income loss caused by wild animals in year 2012 (Rs)	Income loss as a % of total agriculture income	Farmers affected year 2012 (%)	Mean of agriculture income loss caused by wild animals in year 2012 (Rs)	Income loss as a % of total agriculture income
Elephant	73	123,342	16	97	51,470	17
Peacock	33	73,113	9	50	18,523	6
Monkey	27	37,781	5	-	-	-
Parrot	7	15,109	2	-	-	-
Wild boar	7	3,906	1	3	1,008	0
Rat	3	1,125	0	-	-	-

Giving up farming is significantly promoted by lower agriculture income and higher percentage of agriculture income loss originates by the wild animals for both DS divisions. The odds ratio depicts that a farmer who face higher income loss caused by wild animals have 1.09 times and 1.06 times more tendencies towards giving up farming than a less affected farmer in Dambulla and Wilgamuwa DS divisions, respectively. In addition, younger age and more experienced farmers significantly giving up farming in Dambulla DS division (Table 3).

CONCLUSIONS

Wild elephants, peacock and monkeys become nuisance to the Dambulla and Wilgamuwa farmers as they destroy the crop, valued nearly quarter of the agriculture

production. The economic loss associated with crop damages by wild animals significantly made farmers quitting farming in the vulnerable areas and trend further increases. Farmers are struggling with a solo effort by using traditional means of preventive measures to protect their valuable livelihood. Thus, this study emphasizes the need of grass-root level effective government programme to protect future agriculture while balancing the wildlife too in vulnerable areas.

Table 3. Results of the logistic regression model.

Variable	Dambulla				Wilgamuwa			
	Coefficient	SE	P value	Odds ratio	Coefficient	SE	P value	Odds ratio
Age of the farmer	-0.234*	0.130	0.074	0.79	0.03	0.090	0.740	1.03
Education level	-1.23	0.960	0.204	0.29	0.388	0.650	0.551	1.47
Years of experience in agriculture	0.232*	0.124	0.063	1.26	-0.099	0.137	0.467	0.9
Income from agriculture 2012	-0.000002*	0.000	0.093	1	-0.0000138*	0.000	0.030	1
% loss of income due to wild animals damage	0.082*	0.043	0.061	1.09	0.0597*	0.032	0.061	1.06
Preventive cost (Rs)	0.00007	0.000	0.459	1	0.0000737	0.000	0.684	1
Constant	6.389	4.320	0.139		0.543	3.311	0.870	
No of observations	30				30			
Log likelihood	-14.813		0.066		11.937		0.016	

Note: The coefficients are significant at p = 0.1 level.

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