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LOCAL PEOPLE'S PERCEPTIONS AND KNOWLEDGE LEVELS ABOUT OWLS AND THEIR CONSERVATION TO COMBAT RATS IN THREE DISTRICTS OF BANGLADESH

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ABSTRACT

The study was aimed to assess the knowledge, perception and attitude of people about owl and their conservation to combat rats. During the survey more than 90 people were asked to collect information regarding the owl population from three localities of Gazipur, Rajshahi and Jashore districts. The survey was conducted about the farmer's knowledge, attitude, and perception of owls to combat rats. The questionnaire was divided into different parameters viz., familiarity, owl awareness, misconception, food habits and conservation aspects of owl. Most of farmers (77.22 %) replied that they had seen only one species whereas 23.33% farmers reported on two species, 3.33% farmers reported three species. The familiarity of respondent about the spotted owlet, eagle owl and barn owl was 50%, 43.33% and 32.22%, respectively. More than 70 % gave positive and 28.89% gave negative response about owl. About 87.77% thought that owl had no harmful effect on human and the environment, only 14.44% thought owl is not good for us. Maximum respondent (93.33%) opined that they were known about the food habit of owl. Out of them cent percent opined that rat is the main food of owl. More than 76% respondent mentioned that public awareness can be an important tool for owl conservation whereas 15.55% mentioned on creating un-disturbing habitat or reserve areas and only 7.77% respondent opined to encourae tree plantation program.

Keywords: Awareness, knowledge, familiarity, misconception, conservation, owls, survey combating rats.

INTRODUCTION

Rats are one of the most important pests in crop fields in tropical Asian countries. The female rat becomes sexually mature when it becomes 3-4 months old. In plantations and fields, a female rat can reproduce once in every two months, giving

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birth to between four and eight offspring per litter (Singleton et al, 2003). At this rate, the rat population has the potential to increase 500 times each year. Due to the high reproductive rate of rats, an "explosion" of rat population is a common occurrence in plantations if no adequate control measure taken. The Barn owl (*Tyto alba*) has been found to be a very effective biological agent for controlling rats. Its use not only increases farmers' income by reducing rice losses and saving the cost of chemical rat killer, but it also saves crop fields from chemical pollution. An additional benefit is that the farmers become less exposed to harmful chemicals (Shehab, 2005, Smal, 1987).

Globally, local ecological knowledge and its role in wildlife conservation are increasingly receiving much attention (Huntington 2011, Berkes *et al*. 2000, Mmassy and Roskaft 2013). Local ecological knowledge is valuable in areas where human communities live inside and around protected areas (Trakolis 2001, Gandiwa *et al*. 2012). This knowledge is derived from the long-standing relationships between local people and their surrounding environment resulting in local people having good understanding about natural resources conservation through resource use, education and conservation awareness programs (Jalilova and Vacik 2012, Gandiwa *et al*. 2014). Information about local people's knowledge and perceptions about conservation is important in conserving wildlife and evaluating the success of conservation projects (Soto *et al*. 2001, Sundaresan *et al*. 2012).

The symbolic beliefs often shape the way in which animals are socially perceived and could condition human attitudes toward them. According to the socio-environmental context, they could raise positive protection attitudes or, conversely, they could generate aggressive attitudes which affect biological conservation goals (Campbell and Lancaster 2010, Silva-Rodríguez *et al*. 2006, Marques 2005). For example, in some rural communities, local people believe that certain nocturnal birds bring news (bad and good) when their song is heard in the village. As a result, people traditionally protect these birds, killing them being forbidden (Aillapan and Rozzi 2004, Silva-Rodríguez *et al*. 2006)

Owl is an important biological control agent for rat management. In Bangladesh owl's species are gradually decreasing day by day due to lack of

breeding places. Owls create their nests usually in large tree hole. Large trees are gradually destroyed day by day and so their breeding sources are also decreased. Local people's perceptions and attitude are also important about owl for natural conservation. This type of information is scanty in Bangladesh. In this context, the present study was conducted to know the local people's knowledge, perceptions and attitudes about owls and their ways of conservation.

MATERIALS AND METHODS

The study was conducted at three locations of Bangladesh namely sadar upazila of Gazipur, Mohanpur upazila of Rajshahi and sadar upazila of Jashore districts during July 2018 to June 2019. The study used an interview-administered questionnaire. The questionnaire included both open-ended and fixed response questions. The questionnaire was designed to evaluate the knowledge and perceptions of local people about Owl. Interviews were conducted in residents' homes, gardens, places of business, or in village streets. Interviewers recorded all responses directly using standardized survey forms. All interviews were conducted by a research assistant who had successfully completed at least twelve years of Higher Secondary Education (HSC) recruited from the local community, through oral interviews carried out during day in local language. The total response time was approximately 15 to 25 min. The research assistant administering the survey made initial contact in each village with the local village leaders to seek permission. A total of 21 sampling sites were selected for the survey. The maximum sampling sites were in rural areas. The following parameters were the part of questionnaire viz., crop cultivation, rat damage intensity in cultivated crop, rat management, familiarity with owls (owl sighting, types of owls, choice of owl), misconceptions about owls (sign of bad omen), awareness about owls, owl food habit, usefulness of owls and conservation etc. Data were grouped and summed by response categories. The responses were recorded on a data sheet and later transcribed into English and entered into a Microsoft Excel 2010 database. Where multiple responses were possible on an open-response question, data are presented as the percentage (%) of respondents giving each response, and may sum to over 100%.

RESULTS

Cultivation, rat damage information and management: Bangladesh is an agricultural country where majority of the rural population are involved in crop cultivation. Almost all farmers were medium to poor financially. The main crop in Bangladesh is rice. There were some landless farmers cultivated vegetables and other crops as main crop in their homestead areas. Majority of farmers (84.44%) reported that rice was their main crop whereas 15.55% farmer reported to cultivated wheat and only 11.11% farmers opined that they cultivate vegetables as their main crops (Table 1).

Table 1. Farmers' response on cultivation of main crop in the study area during 2018-19

District	Farmers' response on			
	Rice	Wheat	Vegetables	Other
Rajshahi	23	10	7	-
(n=30)	(76.67%)	(33.33%)	(23.33%)	-
Gazipur	30	0	0	-
(n=30)	(100%)	(0.00%)	(0.00%)	-
Jashore	23	4	3	-
(n=30)	(76.67%)	(13.33%)	(10.00%)	-
Average	25.33	4.67	3.33	-
(n=30)	(84.44%)	(15.55%)	(11.11%)	-

The perceived main limitation to rice cultivation was insect pest followed by rat as the second most problems of this crop. About 51% farmers reported that their crop fields were moderately damaged by rat whereas 34.44% farmers reported high damage and only 14.44% famers reported that the intensity of rat damage in their crop fields was very high (Table 2).

Table 2. Farmers' response on damage intensity in rice and wheat by rat in the study area

District	Farmers' response on		
	Very high	High	Medium
Rajshahi	3	12	15
(n=30)	(10.00%)	(40.00%)	(50.00%)
Gazipur	0	0	30
(n=30)	(0.00%)	(0.00%)	(100%)
Jashore	10	19	1
(n=30)	(33.33%)	(63.33%)	(3.33%)
Average	4.33	10.33	15.33
(n=30)	(14.44%)	(34.44%)	(51.11%)

Farmer used a range of methods to control rats. Most of the farmers (83.33%) used poison baiting whereas 24.44% farmers attempted to control rat by setting trap in their crop field. A small number of farmers (3.33%) did not use either trap or poison as control measure (Table 3), they used only some indigenous techniques for controlling rodents in their crop fields.

Table 3. Farmers' response on rat management techniques generally used for controlling the rats in their crop fields

District	Farmers' response on		
	Setting traps	Poison baiting	Others
Rajshahi (n=30)	16 (53.33%)	24 (80.00%)	0 (0.00%)
Gazipur (n=30)	0 (0.00%)	30 (100.00%)	0 (0.00%)
Jashore (n=30)	6 (20.00%)	21 (70.00%)	3 (10.00%)
Average (n=30)	7.33 (24.44%)	25 (83.33%)	1 (3.33%)

Familiarity with owls: Out of the total 90 people who responded to the questionnaire, 97.77% were familiar with owl whereas only 2.22% farmers had not seen owl in their entire life time (Table 4). The species related awareness varied among respondent of various locations in the study area. Most of the farmers (77.22 %) replied that they had seen only one species whereas 23.33% farmers reported two species, 3.33% farmers reported three species and only 1.11% farmers had seen more than three species is their localities (Table 5). On species related awareness of owls, they did not know the species name. They were able to express only the local names of observed owl species. Fifty percent farmers indicated owl species having little spotted owlet whereas 43.33% farmers mentioned it as an Eagle Owl) and only 32.22% farmers observed the Burn owl (Table 6).

Table 4. Farmers' response on the status of Owl as familiar bird in the study area

District	Farmers' response on owl observation	
	observed	Not observed
Rajshahi (n=30)	28 (93.33%)	2 (6.67%)
Gazipur (n=30)	30 (100%)	0 (0.00%)
Jashore (n=30)	30 (100%)	0 (0.00%)
Average (n=90)	29.33 (97.77%)	0.66 (2.22%)

Table 5. Farmers' response on the number of owl species known to them in the study area

District	Farmers' response on no. of owl species			
	One	Two	Three	Four
Rajshahi (n=30)	15 (50.00%)	15 (90.00%)	0 (0.00%)	0 (0.00%)
Gazipur (n=30)	30 (100%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Jashore (n=30)	20 (66.67%)	6 (20.00%)	3 (10.00%)	1 (3.33%)
Average (n=90)	21.66 (72.22%)	7 (36.66%)	1 (3.33%)	0.33 1.11%)

Table 6. Farmers' response on the name of owl species known by them in the study area

District	Farmers' response on owl species known to them			
	Barn owl	Eagle owl	Spotted owlet	Others
Rajshahi (n=30)	16 (53.33%)	23 (76.67%)	6 (20.00%)	0 (0.00%)
Gazipur (n=30)	0 (0.00%)	0 (0.00%)	30 (100.00%)	0 (0.00%)
Jashore (n=30)	13 (43.33)	16 (53.33%)	9 (30.00%)	0 (0.00%)
Average (n=90)	9.66 (32.22%)	13 (43.33%)	15 (50%)	0 (0%)

Awareness level of owls: A high percentage of respondents gave a positive response regarding the consumption of rats by owl while the rest responded negatively. More than 71% of the farmers who positively responded they considered owl as bird but 28.89 % responded did not like owl (Table 7).

Table 7. Farmers' response on their choices of owl as a bird in the study area

District	Farmers' response on owl as a bird	
	Yes	No
Rajshahi (n=30)	27 (90.00)	3 (10.00%)
Gazipur (n=30)	28 (93.33%)	2 (6.67%)
Jashore (n=30)	9 (30.00)	21 (70%)
Average (n=90)	21.33 (71.11%)	8.66 (28.89%)

Misconception about owls: Majority of the farmers (87.77%) thought that owl had no harmful effect on human and the environment, only 14.44% thought that owl is not good for them. About 15% farmers reported that it has evil effect on human being (Table 8) and a very small number of the respondents were ignorant. A proportion of participants (81.11%) showed positive emotion when seeing owls, while 18.89% showed negative emotion (Table 9).

Table 8. Farmers' response on the harmful effects of owl in the study area

District	Farmers' response on harmful effect of owl			
	Yes (harmful)	No (Not harmful)	Evilomen	Others
Rajshahi (n=30)	3 (10.00%)	27 (90.00%)	3 (10.00%)	0 (0.00%)
Gazipur (n=30)	0 (0.00%)	30 (100.00%)	0 (0.00%)	0 (0.00%)
Jashore (n=30)	10 (33.33%)	22 (73.33%)	11 (36.67%)	21 (70.00%)
Average (n=90)	4.33 14.44%)	26.33 (87.77%)	4.66 (15.56%)	7 (23.33%)

Table 9. Farmers' response on positive/negative emotion about owl in the study area

District	Farmers' response on positive/negative emotion about owl	
	Positive emotion	Neative emotion
Rajshahi (n=30)	6 (20.00)	24 (80.00%)
Gazipur (n=30)	0 (0.00%)	30 (100.00%)
Jashore (n=30)	11 (36.67%)	19 (63.33%)
Average (n=90)	5.66 (18.89%)	24.33 (81.11%)

Owls Food habits: Regarding the question related to owls food habit, majority of the respondent (93.33%) answer that they knew about the food habit of owl. Out of them cent percent opined that rat is the main food of owl, whereas 22.22% respondent thought insect is the main food and only 7.77% respondent opined shrew is the main food for owl (Table 10).

Table 10. Farmers' response on the food habits of owl in the study area

District	Known	Unknown	Farmers' response on the food habits of owl			
			Rat	Shrew	Insect	Others
Rajshahi (n=30)	30 (100%)	0 (0.00%)	30 (100%)	1 (3.33%)	9 (30.00%)	0 (0.00%)
Gazipur (n=30)	30 (100%)	0 (0.00%)	30 (100%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Jashore (n=30)	24 (80%)	6 (20%)	30 (100%)	6 (20%)	11 (36.67%)	0 (0.00%)
Average (n=90)	28 (93.33%)	2 (6.66%)	30 (100%)	2.33 (7.77%)	6.66 (22.22%)	0 (0%)

Benefit and conservation of owl: Question regarding the beneficial effect of owl, about 85% farmers replied that owl has a beneficial effect on the nature. Only 14.44% farmers thought it has no impact on nature. Majority of the farmers (85.55%) considered owl as a rat eater whereas 11.11% farmers considered it as environment

protector (Table 11). Regarding the conservation of owl 61% respondent opined that there is no necessity to conserve whereas 38.89% respondent opined that owl should be conserved. Question regarding way of owl conservation. 76.66% respondent mentioned that public awareness could be an important tool for owl conservation whereas 15.55% mentioned on creating un-disturbing habitat or reserve areas and only 7.77% respondent opined on strengthening of tree plantation program (Table 12).

Table 11. Farmers' response on the usefulness of owl in the study area

District	Farmers' response on				
	Usefulness		Helpful as		
	Yes	No	Environment Protector	Rat eater	Others
Rajshahi (n=30)	28 (93.33)	2 (6.67%)	6 (20.00%)	24 (80.00%)	0 (0.00%)
Gazipur (n=30)	30 (100%)	0 (0.00%)	0 (0.00%)	30 (100.00%)	0 (0.00%)
Jashore (n=30)	19 (63.33%)	11 (36.67)	4 (13.33%)	23 (76.67)	3 (10.00%)
Average (n=90)	25.66 (85.55%)	4.33 (14.44%)	3.33 (11.11%)	25.66 (85.55%)	1 (3.33%)

Table 12. Farmers' response on the conservation of owl in the study area

District	Farmers' response on					
	Need to conserve		Owl conservation options			
	Yes	No	Tree plantation	Not disturbing	Public awareness	Others
Rajshahi (n=30)	30 (100%)	0	7 (23.33)	8 (26.67)	15 (50.00)	0 (0.00%)
Gazipur (n=30)	0 (0.00%)	30	0 (0.00%)	0 (0.00%)	30 (100%)	0 (0.00%)
Jashore (n=21)	5 (16.67)	25 (83.33%)	0 (0.00%)	6 (20.00%)	24 (80.00%)	0 (0.00%)
Average (n=90)	11.66 (38.89%)	18.33 (61.11%)	2.33 (7.77%)	4.66 (15.55%)	23 (76.66%)	0 (0%)

DISCUSSION

The survey was conducted to assess the farmer's knowledge, attitude, and perception about owls. The questionnaire was divided into different parameters viz., familiarity, own awareness, misconception, food habits and conservation aspects of owl. The familiarity of respondent with spotted owlet, eagle owl and barn owl was 50%, 43.33% and 32.22%. respectively. More than 70 % gave positive and 28.89% gave negative response about owl activity. About 87.77% thought that owl had no harmful effect on human and the environment, only 14.44% thought owls are not beneficial. Maximum respondent (93.33%) knew about the food habit of owl. Out of them cent percent know that rat is the main food of owl. More than76% respondent mentioned that public awareness can be an important tool for owl conservation whereas 15.55% mentioned on creating un-disturb habitat or reserve areas and only 7.77% respondent opined about the encouragement of tree plantation program.

In Madurai, Tamil Nadu of India, Santhanakrishnan *et al.* (2012) reported that 54.2% of the respondents knew about two owl species 'Barn Owl' and Little about Spotted Owlet, 28.3% of the respondents told that rats are the staple food item while 30.1% knew about insects as food. More than 60% of respondents believed that owls are being hunted for food; 23.7% believed for its medical use. Of the respondents 69% showed strong belief superstitions about owls; 86% linked owls with sudden death while 72.3% responded that they have not seen such death directly but have heard of it; 19.4% mentioned it as a sign of evil and misfortune. Nearly 56% of respondents were of the view that artificial nest boxes attract owls towards agriculture fields and 65% confirmed the use of nest boxes as perching sites. Majority of people were classified as bad omen (53.2%) while 2.5%% were considered owls as beneficial; 14.5% emphasized that owls are birds; 6.2% considered them harmful while 3.5% as fearing birds.

In Panjab of Pakistan, Rashid *et al*. (2021) revealed that about 95% of people were familiar with owls in the agro-ecosystem. Only 15.6% of people thought that owls should be eliminated; 23.0% were of the opinion that owl's presence in a locality leads to ruination; 33.3% agreed that the owl's presence was a sign of bad omen; 41.8% considered them as signs of foolishness; 47.0% believed that owl's body parts were used for black magic purposes. In contrast, 50% of people acknowledged that owls are beneficial to humans; 60.3% knew that owls are the

enemies of rodents, 67.7% agreed that they are suppressors of rats and mice and 63.8% agreed that artificial nest boxes can serve as their nests and roosts. It was encouraging to know that 74.8% showed their willingness to enhance the owl's population on their farms, and 74.0% were willing to permit the installation of nest boxes in or near the villages. The study of attitudes of respondents towards owl will help to develop an effective conservation strategy and to boost owl's population in croplands for biological control of rats and mice.

Rodents are nocturnal mammals that are the destructive pest of agricultural crops. Destructive habits of rodents possess heavy economic loss to the agriculturists. In the agro-ecosystems, rodents caused significant damage to cereal crops (Jacob and Tkadlec 2010). Loss caused by the rodents to cereal crops such as rice, wheat, and maize is between 5–10% at the pre-harvest level in India and China. Post-harvest damage of these cereal crops is higher than pre-harvest loss (Abass *et al.* 2014). The average damage caused by rodents to cereal crops in Sichuan, province of China was studied as 320 kg ha^{-1} (Singleton and Brown 2003). The damage caused by the rodents in Philippines is 13.2% in the wet season while 8.1% in dry seasons (Stuart *et al.* 2011). The average damage caused by rodents to cereal crops such as wheat (10%), rice (19%), sugar cane (7.5%) and groundnuts (5.3%) (Beg *et al.* 2010).

Owls are also a nocturnal bird and prey at night. Rat and owl both are active at night, so it is easy to manage rat at night by owl. Owls are considered effective biological control agents for rats and mice populations in cultivated fields. (Mahmood-ul-Hassan *et al.* 2007 found during the pellet analysis of Barn Owl that consumption of rats and mice population at central Punjab (28%), at southern Punjab (14%) and southern Balochistan (93%). Variation in the dietary composition depends upon time of crop cultivation, harvest, and cropping pattern. The regurgitated pellets of Barn Owl in lower Sindh of Pakistan revealed small remnants of mammals (84%) and birds (25%) while from six districts of central Punjab (Pakistan), 75% of the diet of Barn Owl are comprised of *Suncus murinus* (Mushtaq-ul-Hassan *et al*. 2007). Insects were the main staple items of Little Spotted Owlet but the rodents stood at secondary importance.

It requires time to acknowledge owls as a biological control agent in the cultivated crop and different methods should be conducted to conserve Barn Owls.

The installation of nest boxes within a 500 m radius in agricultural fields plays a significant role in cultivated field at Beit Se'an valley, Israel. During five years, 86.7% of the nest boxes were occupied by Barn Owls. Erection of nest boxes is a very effective method for increasing Barn Owl population in agriculture fields (Meyrom *et al.* 2009).

Most of the misconceptions are related to stories of old times, when people were more fearful and tried to get the answer about their lives and the environment. Now the attitude of people, on the whole, was in favor of the owls. Decidedly more people had a soft corner for the owl because of their role in inhibiting the populations of rats and mice. This sort of attitude will make things easier for workers desiring to bring owl closer to cropland for biological control of rat populations.

CONCLUSION

Based on the findings it may be concluded that the people are little concerns about wildlife diversity and conservation. However, their concept can be interpreted in different ways depending on professional differences and knowledge levels of the respondents. The respondents have relatively limited knowledge about wildlife especially owl depending on sites. There is need to raise awareness on the importance of wildlife diversity and conservation through organizing training programs, seminars and workshops at different levels. These approaches would encourage the local people's concerns about the Owl conservation activities.

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REFERENCES

ABASS, A. B., NDUNGURU, G., MAMIRO, P., ALENKHE, B., MLINGI, N. & BEKUNDA, M. 2014. Post-harvest food losses in a maize-based farming system of semi-arid savannah area of Tanzania. *J. Stord. Prod. Res.* **57**: 49-57. DOI: 10.1016/j.jspr.2013.12.004.

AILLAPAN, L. & ROZZI, R. 2004. Una etno-ornitología mapuche contemporánea: poemas alados de los bosques nativos de Chile [A contemporary mapuche

ethnoornithology: winged poems from the native forest of Chile]. *Ornitol Neotrop*. **15**: 419-434. Spanish.

BEG, M. A., MUSHTAQ-UL-HASSAN, M. & NADEEM, M. S. 2010. The dynamics of rats and mice populations inhabiting wheat-sugarcane based croplands in central Punjab (Pakistan). *Pakistan J. Zool.* **42**(3): 311-323.

BERKES, F., COLDING, J. & FOLKE, C. 2000. Rediscovery of Traditional Ecological Knowledge as Adaptive Management. *Ecol. Appl.* **10:** 1251-1262. http://dx.doi.org /10.1890/1051-0761(2000)010[1251:ROTEKA]2.0.CO;2.

CAMPBELL M. & LANCASTER B. L. 2010. Public attitudes toward black bears (*Ursus americanus*) and cougars (*Puma concolor*) on Vancouver Island. *Soc Anim*. **18**: 40**-**57.

GANDIWA, E., GANDIWA, P. & MUBOKO, N. 2012. Living with Wildlife and Associated Conflicts in Northern Gonarezhou National Park, Southeast Zimbabwe. *J. Sust. Develop. Africa.* **14**: 252-260.

GANDIWA, E., ZISADZA-GANDIWA, P., MASHAPA, C., LIBOMBO, E. & MUBOKO, N. 2014. An Assessment of Local People's Participation in Natural Resources Conservation in Southern Zimbabwe. *E3 J. Environ. Res. Manage.* **5**: 042-046.

HUNTINGTON, H. P. 2011. The Local Perspective. *Nature.* **478**: 182-183. http:// dx.doi.org /10.1038 /478182a.

JACOB, J. & TKADLEC, E. 2010. Rodent Outbreaks: Ecol. Impac.. International Rice Research Institute (IRRI), Philippines.

JALILOVA, G. & VACIK, H. 2012. Local People's Perceptions of Forest Biodiversity in the Walnut Fruit Forests of Kyrgyzstan. *Intl. J. Biodiv. Sci.*, *Ecosys. Serv. Manage.* **8:** 204-216. http://dx.doi.org/10.1080/21513732.2012.696557.

MAHMOOD-UL-HASSAN, M., BEG, M. & ALI, H. 2007. Seasonal variation in the diet of the Barn Owl *Tyto alba stertens* in central Punjab, Pakistan. *Acta Zool. Sin.* **53**(3): 431-436.

MARQUES J.G.W. O PÁSSARO SAGRADO E O CAVALO DO CÃO. 2005. (biodiversidade, etnoecologia e catolicismo popular no Brasil) The bird sacred and cavalo do cão (biodiversity, ethnoecology and popular catholicism of Brazil) (PhD). Brazil: Universidade Estadual de Campinas; Portuguese.

MEYROM, K., MOTRO, Y., LESHEM, Y., AVIEL, S., IZHAKI, I., ARGYLE, F. & CHARTER, M. 2009. Nest-box use by the Barn Owl *Tyto alba* in a biological pest control program in the Beit She'an valley, Israel. *Ardea.* **97**: 463-467. DOI: 10.5253/078.097.0410.

MMASSY, C. E. & ROSKAFT, E. 2013. Knowledge of birds of conservation interest among the people living close to protected areas in Serengeti, Northern Tanzania. *Intl. J. Biodiv. Sci.*, *Ecosys. Serv. Manage.* **9:** 114-122. http://dx.doi.org/ 10.1080 /21513732.2013.788566.

MUSHTAQ-ul-Hassan, M., Ghazi, R. & Nisa, N. 2007. Food preference of the Short-eared Owl *(Asio flammeus)* and Barn Owl *(Tyto alba)* at Usta Muhammad, Baluchistan, Pakistan. *Turkish J. Zool.* **31**(1): 91-94.

RASHID, G. M., ALI, M. H., BUTT, A. & QADIR, A. A cross-sectional study on knowledge, attitude and practices related to owls in central Punjab, Pakistan. *Ornis Hungarica.* **29**(1): 66-81. DOI: 10.2478/orhu-2021-0005.

SANTHANAKRISHNAN, R., ALI, A. M. S. & ANBARASAN, U. 2012. Knowledge about owls among general public in Madurai District, Tamil Nadu. *Zoos' Print J.* **27**(2): 23-24.

SHEHAB, A. H. 2005. Food of the Barn Owl *Tyto alba* in southern Syria. *Acta Zoologica Cracoviensia.* **48**(1-2): 35-42.

SILVA-RODRÍGUEZ E. A, ORTEGA-SOLÍS G. R. & JIMÉNEZ J. E. 2006. Aves silvestres: actitudes, prácticas y mitos en una localidad rural del sur de chile [Wild birds: attitudes, practices and myths in a rural town in southern Chile]. *B Chil Ornitol*. **12**: 2-14. Spanish.

SINGLETON, G. R., HINDS, L., LEIRS, H. & ZHANG, Z. 1999. Ecologically-based Rodent Management. ACIAR Monograph series # 59. Canberra: ACIAR P. 494.

SMAL, C. M. 1987. The diet of barn owl *Tyto alba* in southern Ireland, with reference to a recently introduced prey species-the Bank Vole *Clethrionomys glareolus*. *Bird Study*. **34:** 113-125.

STUART, A. M., PRESCOTT, C. V., SINGLETON, G. R. & JOSHI, R. C. 2011. Knowledge, attitudes and practices of farmers on rodent pests and their management in the lowlands of the Sierra Madre Biodiversity Corridor, Philippines. *J. Crop Protec.* **30**: 147-154. DOI: 10.1016/j.cropro.2010.10.002

TRAKOLIS, D. 2001. Local People's Perceptions of Planning and Management Issues in Prespes Lakes National Park, Greece. *J. Environ. Manage.* **61:** 227-241. http://dx. doi.org /10.1006/jema.2000.0410.