

Short Communication

Bats and people in context of Nepal

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Technavio, a leading global market research company, recently reported that the global tequila market is expected to exceed USD 9 billion by 2019, growing at a compound annual growth rate of over 3% during the forecast period, 2015–2019 (Maida 2016). *Agave tequilana* plant is the source of commercial tequila and is by large pollinated by bats.

In terms of contribution to the global economy, bats play an important role by providing ecosystem services such as pollination, seed dispersal and pest regulation. Bats pollinate and disperse the seeds of economically important plants such as bananas, mangoes, guavas, cashews, almonds, dates, figs, tequila, hardwood timbers, and several medicinal plants. Bats pollinate 528 species of angiosperms (plants) globally (Kunz et al. 2011). The valuation of pollination and seed dispersal activity are very high, for example, the annual harvest of Durians (*Durio* spp.) pollinated by bats, is estimated at approximately USD 112 million (Morton and Murphy 1995). A faecal analysis showed that bats diet consists June beetles (*Elateridae*), click beetles (*Elateridae*), leafhoppers (*Cicadellidae*), planthoppers (*Delphacidae* family), spotted cucumber beetle *Diabrotica undecimpunctata*, Asiatic oak weevil *Cyrtopistomus castaneus*, and the green stinking bug *Acrosternum hilare* (Kunz et al. 2011). In the Midwestern United States, a colony of 150 big brown bats *Eptesicus fuscus* annually devours approximately 600,000 cucumber beetles, 194,000 June beetles, 158,000 leafhoppers, and 335,000 stinkbugs (Whitaker 1995), and potentially prevents the production of 33,000,000 cucumber beetle (corn rootworms) larvae (Krysan 1986). These arthropods globally destroy approximately 25–50% of crops (Pimentel et al. 1978, 1991 cited in Kunz et al. 2011).

Due to lack of scientific research in Nepal, we have limited knowledge of the ecosystem services provided by bats and other direct and indirect benefits to humans. However, a study targeting bats' diet in Pokhara, Nepal found that a total of eight families of plants were identified as species pollinated and five families of plants' seed were dispersed by bats (Sharma 2016). Other studies such as Giri (2009), and Dahal and Thapa (2010) also found proof of seed dispersal by bats in several species including Dumri or Cluster Fig Tree *Ficus racemosa*, Khasreto *Ficus hispida*, Rudrakshya *Eleaocarpus sphaericus*, Coffee *Coffea arabica* and Teju *Picrasama javanica*. Similarly, the author and his team have observed bats pollinating trees such as banana *Musa* spp., papaya *Carica papaya*, mango *Mangifera* spp., litchi *Litchi chinensis*, Indian gooseberry

Phyllanthus emblica, jackfruit *Artocarpus heterophyllus*, palm *Areca* spp., peepal *Ficus religiosa*, burflower tree *Neolamarckia cadambia*, eucalyptus *Eucalyptus* spp., and neem *Azadirachta indica*.



PHOTO 1: *Cynopterus sphinx* feeding on fruit of cluster fig tree.

Further, a total of nine insect orders – Coleoptera, Diptera, Hemiptera, Homoptera, Hymenoptera, Lepidoptera, Orthoptera, Trichoptera, and Thysanoptera, representing 25 families were identified in the droppings of bats from Mahendra cave and Nagarjuna cave (Pokhrel and Budha 2014). This points to the important role bats play as a biological control of agricultural pests, helping agriculture dependent communities.

Another example is the Chiuri *Diploknema butyracea* tree usually given as dowry from bride's parents, an important culture of the Chepang community in Makwanpur and Chitwan districts, Nepal. They extract butter from the fruit of these trees for livelihood. Although bat species such as Leschenault's Rousette *Rousettus leschenaultii* and Dawn Bat *Eonycteris spelaeon* are believed to pollinate and disperse the seeds of Chiuri, people hunt these bats for bushmeat during the flowering and fruiting season (Dahal et al. 2011).

Bat guanos, having high nitrogen content, is considered as good organic fertilizer by the farmers. In the past, farmers used to collect bat guanos from the caves to use as fertilizer. The trend has now decreased due to the availability of chemical fertilizers. A team, including the author, experimented the efficacy of bat guanos as fertilizer by collecting it from an old and abandoned house in Bahundangi, Jhapa district where a colony of false vampire bat *Megaderma lyra* was roosting, and applying in a tea plantation. The bat guanos proved to be an efficient

organic fertilizer, indicated by the improvement in growth of the plantation.

Most communities throughout the globe have negative attitude towards bats and perceive them as a symbol of ghosts, witches, bad omen, and vampires. In many parts of Nepal, people have negative attitude towards bats that has resulted in a decrease in bat population. For example – some communities believe bats harm their livestock by damaging their horns, some Newar communities in Kathmandu valley and others kill bats for flesh or oil as a cure of ear bugs, baldness, paralytic, asthma, arthritis, tuberculosis, alimentary, and renal diseases as well as cattle babesiosis, etc. (Tuladhar-Douglas 2008, Acharya et al. 2010). In contrast, some eastern cultures take bats positively. For example, during the middle and late Qing dynasty (1644–1911) China, bats were symbols of good fortune, long life, health, wealth, virtue, and serenity of mind (Allen 1962; Tupinier 1989). This tradition still persists but the values are diminishing in the wake of rapid modernization of Chinese society (Nabhan et al. 2010).



PHOTO 2: *Rousettus leschenaultii* killed by local people in Chitwan for bushmeat.

Although bat-watching has not flourished much as a potential eco-tourism supporting activity in Nepal, there are examples, in many countries and in Nepal of bats contributing to generate significant amount of money through eco-tourism. Congress Avenue Bridge located in the heart of downtown Austin, Texas hosts the largest urban bat colony in the world, estimated at 1.5 million bats, that attract around 140,000 people and earn about 10 million dollars revenue each year from bat watching¹. Thousands of domestic as well as international visitors visit *Chamere Gupha* (translated as bat cave), in Pokhara, every year which has potential to contribute significantly to eco-tourism.

People have benefited from the contribution of bats in agriculture, medicine and ecotourism since the time immemorial without recognizing their contribution.

In Nepal, economic valuation of the ecosystem services of bats needs to be studied to determine the level of human-bat relationship. It is important to make the general people aware about the importance of bats to provide real impetus for bat conservation in the long run.

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Biosketch

SANJAN THAPA is the Director of SMCRF. He is interested in the study and conservation of mammals including bats, rodents, lagomorphs, musk deer, small carnivores and otters.

¹ <https://tpwd.texas.gov/huntwild/wild/species/bats/bat-watching-sites/congress-avenue-bridge.phtml>. 26 April 2018