

## Capture Fishery of Koshi Tappu of Saptakoshi River, Nepal: Way Forward for Sustainable Management

*Tek Bahadur Gurung<sup>1</sup> & Umita Sah<sup>2</sup>*

**Abstract** The objective of this paper is to elucidate an overview of the inland fishery of Koshi Tappu area of Saptakoshi (Sapta means seven) River. The Saptakoshi is the largest river of Nepal comprised of seven large tributaries, namely Tamakoshi, Arunkoshi, Dudhkoshi, Tamurkoshi, Bhotekoshi, Sunkoshi and Indrawati. All of these tributaries flow down from high Himalaya down to southern plains. Therefore, due to large coverage, the Saptakoshi known to be endowed with more than 200 fish species but a recent compilation has shown 134 native and 7 exotic fishes. It is likely that more fish species could be recorded with further investigations. The Saptakoshi after entering into the southern plain spreads wide forming the Koshi Tappu over an area of about 175 km<sup>2</sup> (68 sq mi.) in the plains of eastern Nepal occupied by rivers, oxbow lakes, permanent ditches, ponds, water logged areas, farmland, forests, villages etc. Preliminary estimates showed that capture fishery is likely to comprise of predominantly 10 major fin fish species in addition to others with minor contribution, edible snails, bivalve, shrimp, *makhana (Euryale ferox)* and water chest nut (*Trapa* spp). The annual fish yield in Koshi Tappu is yet to be estimated. The per capita fish yield was as low as about 1-2 kg per fisher per day probably attributable to strict licensing system and provision of fish catching only by the use of cast net and women fishers' handmade 'covering net' known as *tappi jal* or *chauki jal*. Use of drag net, gill net, hook and line are prohibited. The fishers often use wooden boats for fishing activities. Recently, it was reported that the fishery in the area is under overfishing pressure. However, that might be the case outside the reserve area, because it is unlikely that fishing by the sole use of cast net and *tappi jal* would cause overfishing in such a vast area. Therefore, we conclude that fishery in Koshi Tappu should be reexamined considering the *win - win* strategy of conservation of wild animals and fishing livelihoods, minimizing conflict in park management and benefiting fishers living in the park and visitors. If indeed the fishery is declining, the reasons of the rapid depletion of fish stock should be analyzed to develop sound management strategies for sustainability given the added stressors of climate change and anthropogenic activities.

---

<sup>1</sup>National Animal Science Research Institute, Khumaltar, tek\_fisheries@hotmail.com

<sup>2</sup>Fisheries Research Program, Regional Agriculture Research Station, Tarhara, Sunsari

## 1. Introduction

In Nepal, the captured fisheries contribute ~0.4% of the total GDP employing thousands of fishers for livelihood with majority composed of women. The estimated total captured fish yield is 21,500 mt per year with a productivity of 18 kg/ha (CBS 2014). Nepal has three main river basins and a Mahakali River system. All these rivers flow down from the upper Himalaya towards the southern plain, ultimately draining into the Ganges River. The total length of the Saptakoshi River (hereafter 'Koshi') is 720 km. The water flow, ecology and fish biodiversity of the Koshi River has been known to be impacted by erratic rainfall, temperature rise, melting snow, glaciers burst, splash flood, deforestation, hydropower dams, use of water for agriculture and fisheries exploitations (Gurung et al. 2016). Moreover, it is likely that fish stock in the area has also been impacted by pesticides use in agriculture field, sand removal from river-beds and many other anthropogenic activities.

Recently fishing in Koshi River has been elucidated to be conflicting with birds and freshwater dolphin conservation activities (Paudel et al. 2016). Conflict between local people and park is a major conservation issue that is difficult to resolve (Limbu and Karki 2003). The local people may not favor the conservation activities because they cannot realize its long term importance, instead being driven by immediate needs for their livelihood (Bennett and Dearden 2014). All these dimensions are likely to create a negative impact on fisheries and depending communities in ensuring livelihood, food and nutritional security. The fishing based livelihood is one of the oldest systems in Nepal, as there are several ethnic communities adapted to occupy full time profession in fishing and other water-related activities (Gurung 2003, 2014). Such ethnic communities who are dependent on wetlands represent about 18% of the total population of the country (IUCN 2004). These communities recognize and harness social and traditional values associated with fishing in natural common waters, given the importance of fish and other aquatic products in human dietary system, religion and culture in the Nepalese society.

Fisheries have traditionally played an important role in the livelihood of dependent communities (Buckston et al. 2009; Thapa and Dahal 2009), as some communities have lived inside the park for centuries (Paudel et al. 2016). Other than fish, freshwater gastropods, bivalve and other invertebrates have been described for ethno medicinal use (Prabhakar and Roy 2009). The uses of such organisms are also known to be common in the Koshi Tappu area. However, further investigation is desirable to estimate the value of those natural products for livelihood, human nutrition and food perspectives. The main season of chest nut and makhana or fox nut (*Euryale ferox*) harvest is April to May. The fox nut is harvested mostly by female and children rather than by adult male.

Conventionally, sustainable fishery can be defined as harvesting of fish in a sustainable manner, where the fish population does not decline over time due to fishing practices (i.e., fishing removes old and bigger sized stock to provide recruitment opportunity to the newer, Krebs 2007). Mostly, overfishing has been considered major causes of fisheries depletion and collapse; however the global fish stocks depletion cannot be simply attributed to fishing alone (Hauge et al. 2009). Instead, other anthropogenic activities causing habitat destruction, pollution and climate change play a substantial role on fish depletion (Gurung 2013) as well

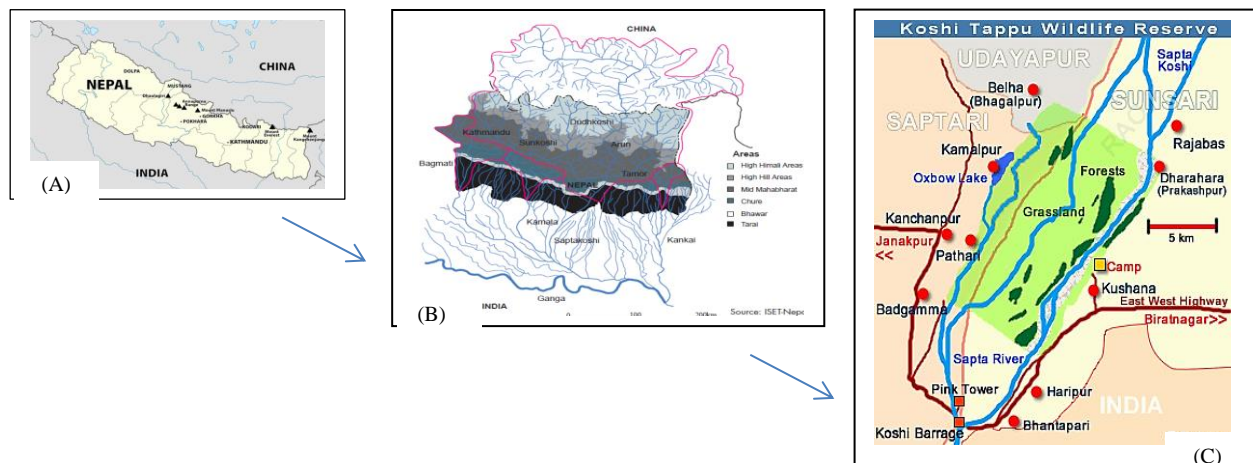
as natural factors such as preying of fish by aquatic mammals such as Dolphin in Koshi River (Paudel et al. 2016).

Past studies have shown that uncontrolled fish harvesting can severely deplete fishery resources depriving local fishers from their major source of subsistence (Dugan et al. 2010; Thapa and Dahal 2009). To cope with such a trend, advocacies to protect natural resources has been initiated and supported by the universal sustainable development goal's (USDG) agendas. To achieve some of these objectives, the present paper provides insights on ways to reduce threats to biodiversity and enhance ecosystem productivity through improved governance, planning and management.

## 2. Materials and Methods

### 2.1 Study area

The Koshi Tappu Wildlife Reserve is situated at the altitude of 75 to 81 m (246 to 266 ft). It is a protected area established in 1976 and designated as a Ramsar site in December 1987 covering 175 km<sup>2</sup> (68 sq mi) area in the Sunsari, Saptari and Udayapur Districts, Nepal (Fig. 12.1). The flood plain is comprised of grass marshlands, oxbow and swampy lakes, sand fields, gravels, boulders agricultural lands, where more than 93,323 people from 16,280 households are known to live in year 2009 (Khatri et al. 2012; Oza 2014).



**Figure 12.1.** Study area: (A) map of Nepal, (B) catchment area of Koshi, and (C) map of Koshi Tappu.

The information on the fish catch, yield, and ethnic communities were collected from secondary sources. To complement this, a pre-structured questionnaire based survey was conducted focusing on socio-economic elements such as the total number of fisher, ethnic communities of the area, fish catch, fishing methods and licensing system in addition to details on specific resources such as yield of water chest nut, *makhan*, shrimp, gastropod, bivalve, crab and turtles.

### 3. Fish, Fisheries, Ethnic Communities, Livelihood, and Conservation Activities in Koshi Tappu

Fisheries activities in Koshi Tappu might represent one of the oldest in Nepal. It is also likely that Koshi Tappu represents an area with the highest number of fish species aggregation in per unit area in Nepal because of the uniqueness of ecology formed by both the cold and warm climates well as land composition of the flood plain.

Subsequently, the Koshi River system probably represents the largest capture fisheries in Nepal, in terms of yield volume, fish species abundance and the number of fishers dependent for livelihood (Paudel et al. 2016; Gurung et al. 2016). Thapa (2008) reported 92 fish species from the Koshi River; 81 species were enlisted by Limbu and Subba (2011). Gurung et al. (2016) has shown compilation of 135 native fish species and 7 exotic species. It is proclaimed that 200 fish species may occur in the Koshi River indicating that more detail studies are required to obtain a holistic inventory. It is likely that there are new species yet to be discovered (Edds and Ng 2007) from Tamakoshi, Likhu, Bhotekoshi, Dudhkoshi, Arun, Indrawati and their hundreds of small and big tributaries. A study conducted by WWF (2015) has added several new species. Edds and Ng (2007) have also added seven fishes from eastern Nepal.

The dominant fish in capture fishery in Koshi Tappu are *Clarias batrachus*, *Heteropneustis fossilis*, *Wallago attu*, *Channa striatus*, *Channa punctatus*, Jalkappor (*Clupisoma garua*), Kanti (*Mystus seenghala*), Bhunna (*Notopterus notopterus*, *Notopterus chitala*), Mahseer (*Tor putitora*), freshwater eel (*Mastacembelus armatus*), Gainchi (*Macrogathus aculeatus*), Kotri (*Puntius* spp), Tengra (*Mystus cavacius*), Rewa (*Chagunius chagunio*), Rohu (*Labeo rohita*) and *Bagarius* spp (Figure 12.2). Except few, the composition of captured fish suggests that most fishing was probably carried on wetlands, oxbow lakes, ponds and banks of the river using the cast net and *tappi net* but not the mainstreams and deeper pools of the river.

Buckton et al. (2009) mentioned that fish from the wetlands in Koshi Tappu ranked the first among other collected or gathered food for consumptive and non-consumptive use, implying that fish is one of the most important source for food, income and livelihood. Many other studies reaffirmed that fisher's families were able to purchase rice and other foods after selling the fish caught from wetlands (Buckton et al. 2009; Thapa and Dahal 2009). The same study has rated fishing as the main occupation in terms of values provided by the wetlands in all areas of the Koshi Tappu Wildlife Reserve. Since the population living inside the Reserve is about 93,323; it can thus be estimated, if 10% of the total people are involved in fishing with 1 kg per day catch, then in a year the yield estimate reaches 3,406 metric tons. However, a true amount of fish capture per annum from the Koshi Tappu and the Koshi River system has yet to be estimated realistically. The main large market for selling fish is in Inuruwa and small markets are located at Laukahi and Sunsari. The captured fishes from the rivers are transported to the market usually on bicycles. Most fishermen prefer to sell the fish directly to consumers.

Our survey showed that mainly four to five ethnic communities were actively engaged in fishing and food fish gathering activities. Although there are several ethnic communities in hills and mountains associated with traditional fishing occupation, in Koshi Tappu *Mushhar*,

*Bardar, Sardar, Jhangad, Muslim, Batarr, Mukhiya, Malaha, Sahani and Urau* were specifically engaged in fishing as full- or part-time fishers for their livelihood. Paudel et al. (2016) mentioned involvement of 15 ethnic communities in fishing in Koshi Tappu area. Although there are no barriers for any other ethnic communities to enter fishing, usually the landless, poor and marginalized communities actively engage in fishing whether from the hill, mountain or plain. The main season for high fish catch was surveyed to be in October and November. March and April were the slack season. Women fishers locally use a gear called *tappi jal* or *chauki jal* for capturing fish for their household consumption. Besides such old and primitive trends, fishing for sports, recreation and tourism are also evolving slowly by amateurs and professionals in Nepal.

#### 4. Conservation Management and Fishing Conflict in Koshi Tappu

The major objective of the Koshi Tappu Wildlife Reserve is to protect biodiversity of the area. As a result, the use of gill net, drag net, hook and line, chemicals and other unconventional methods of fishing are prohibited. However, fishing by the use of cast net and *tappi jal* are allowed to local fishers living inside the park for their livelihood options. For any fishing activities, one requires to obtain the license from the park administration. Paudel et al. (2016) mentioned the use of gill nets in Koshi River, but our study revealed that the use of gill net inside the park was banned. The existing fishing by using cast net and *tappi jal* implies that the fishers can mostly collect fish from being close to the bank of the river, oxbows, small wetlands, ditches and shallow waters. The large deeper pools and areas with rapid flows of the vast river have been remained inaccessible implying that the great potential of the rivers and fish stocks is likely untouched, protected and underutilized. However, estimation of fish stock in water bodies is difficult unless modern and sophisticated methods are used (Welcomme 1983).

There are insufficient studies related to fish and fisheries of Koshi Tappu floodplains. One of the reasons could be the conflict of fishing activities with bird, dolphin and other conservation programs (Timsina and Ranjitkar 2014, Bhattarai 2015, Paudel et al. 2016). The conflicting situation in national parks among management, animals, farmers and fishers is common (Limbu and Karki 2003, Shrestha et al. 2006), probably due to high population density inside the park among others (Timsina and Ranjitkar 2014). Some ethnic communities were living there over more than 100 years (Paudel et al. 2016). Most people inside the parks are poor with low income and insecure living conditions. About 87% of people were involved in agriculture, but only 20% had food security (Timsina and Ranjitkar 2014). In such socio-economic conditions, the conflict and entrust (Bennett and Deardon 2014) become more inevitable due to scanty resource and opportunities. To mitigate the conflict, opportunities of livelihood to people without harming the targeted plants, animal, ecology and environment would be advantageous. Recently, the strategies for ending overfishing, but catching more fish has been proposed (Zhou et al. 2015). To plan any such intervention, primary data and information related to the number of fishers, annual fish catch, fish composition, contribution to livelihood, gear and crafts used, value chain, ethnic communities, conflict

with wildlife park management, inventory on fish species, flora and fauna, licensing system, transportation and market destination would be desirable.

One of the possible interventions for obtaining higher benefit in terms of biodiversity conservation and livelihood enhancement to communities is developing fishing tourism (Gurung and Thing 2016) in harmony with the Wildlife Reserve policies and regulations. The '*guru mantra*' of such strategic plan is to reduce fishing efforts as much as possible while bringing a higher positive impact on fisher's livelihood. It is said that a 2kg fish caught by local fisher might fetch only little income. Contrarily, if caught by tourist anglers then the price might indicate a much bigger payoff because the tourist is likely to spend on travel, transport, leisure, food, outfit clothing, beverages, guide, porters, recreation, fishing tools, equipment, baits and so on, thus benefiting all steps of the value chain (Gurung and Thing 2016). Therefore, by involving fishers in jobs other than fishing may reduce fishing efforts also in a way that fishes are likely to be conserved. Since, fishing is a regular activity (Photo 12.1, 12.2, 12.3, 12.4), thus, the activities might need to be regulated with the support of government, non-government agencies and local fisher's communities. People from fishing community could be offered jobs as a guide utilizing fishing related skills and services, or become involved in transport, food catering, home stay and others because the primary concern of the fishers is livelihood and income for family rather than the activity of fishing *per se*.



**Photo 12.1.** *Labeo rohita* (Rohu) captured in Koshi Tappu.

Recently it has shown that in many tourism activities the involvement of community at tour destinations are negligible, thus threatening the sustainability of such programs (Samarth 2014). Instead, urban elite operators are receiving the highest benefit out of the tour business. It has been argued the involvement of communities at destination is highly important for realizing sustainable tourism development. Ignoring poor stakeholders at destinations might cause conflicts (Bennett and Dearden 2014). Thus, Samarth (2014) has identified three key intervention areas for sustainable tourism: product development, marketing and the regulatory environment. If these arguments are correct, then interventions into fishing tourism must be initiated by involving fishers into service-related

activities for employment to enhance product development as an alternative to fishing, so tourists can experience high value fishing activities. The promotion of fishers into the value chain activities has been illustrated as one of the key fish conservation approaches (Gurung and Thing 2016).

The Koshi Tappu is one of the most attractive tourism places. There could be possibilities for developing lucrative angling based tourism in the area because the fish species (Gurung et al. in press) seem to be highly compatible and suitable to foster sport fishing. For example, mahseer (*Tor spp.*) is a world class sport fish having excellent tackling characteristics (McDonald 1944). Besides mahseer, minnows, *Channa*, catfishes and several other fishes form highly desirable fishing options for the Koshi Tappu.



**Photo 12.2.** Fried fish ready for serving on roadside restaurants, Nepal.

The fishing tourism is a multibillion dollar activity worldwide (Lemelina et al. 2012). It thus has immense potentiality to generate income for the enhanced livelihood of poor fishers along with protecting the fishes of the Koshi Tappu from being overfished (Gurung and Thing 2016). This approach is likely to be effective for protecting dolphin species as well as for averting potential danger posed by gill nets to them. This would also help maintain desirable fish abundance for Dolphin in the river. Because fishing by tourist will be an amateur activity, it will likely help conserve the fish population as most of the fishing would be of 'catch and release' type.

It seems that though there are allegations of overfishing in Koshi Tappu, but considering the strict licensing system, use of nets, crafts and fish captured by local fishers the fishery potential has been lowly undermined and under fished instead. Since the river flow in Koshi is reported to be dangerously increased hundreds-folds due to flooding in monsoon seasons (June-September), many of the conserved fish are likely to be flown down in flood, yielding no benefit to local people by conservation. In such circumstances, it is likely that the fishes in river should be fished before they are swept away by flood by allowing permissible fishing activities in the main river course.



**Photo 12.3.** Fishing by cast net.



**Photo 12.4.** Fisher women and kids involved in fishing activities in Koshi Tappu.

## **5. Way Forward for Sustainable Fisheries Management in Koshi Tappu**

The Universal Sustainable Development Goals (USDG) has prioritized sustainable management of forests to combat desertification and halt biodiversity loss among others (Osborn et al. 2015). Working in line with the agenda, however, there have been only preliminary studies on fish and fisheries to realize sustainable management of fishery resources in Koshi Tappu. Therefore, detailed work on developing strategies for sustainable capture fisheries should be conducted for sustainable management of Koshi Tappu fisheries. The Koshi is one of the trans-boundary rivers. Therefore, for conservation of rare, endangered fishes, a multilateral team could be envisaged. Since the river is endowed with aquatic biodiversity of global value supporting the livelihoods of millions, research and management activities on fisheries is inevitable.



## Acknowledgements

Thanks to Mr. Rim Chaudhary for collecting information from the Koshi Tappu and surrounding areas. Additional thanks to all staff at the Koshi Tappu Wildlife Reserve and the National Animal Science Research Institute (NASRI) for their support. Nepal Agricultural Research Council (NARC) has provided partial funding for this study. The authors gratefully acknowledged the valuable comments by Andrew Song and Shannon Bower on the earlier draft of the paper.

## References

- Bennett, N.J. & Dearden, P. (2014). Why local people do not support conservation: Community perceptions of marine protected area livelihood impacts, governance and management in Thailand. *Marine Policy* 44, 107-116.
- Buckton, S.T., Dahal, B.R., Simpson, M., Immink, A., Shrestha, M.K., & Murphy, S. (2009). *Managing wetlands for sustainable livelihoods at Koshi Tappu, Nepal*. Slimbridge, pp. 26.
- Bhattarai, M. (2015). Conservation issues and utilization of wetlands in Nepal: a case study from Koshi Tappu Wildlife Reserve. Faculty of Natural Sciences and Technology, Department of Biology, Norwegian University of Science and Technology (NTNU), pp. 31.
- CBS (2014). *Statistical information on Nepalese agriculture*, pp. 212. Singha Durbar, Kathmandu: Government of Nepal, Ministry of Agricultural Development, Division Agriculture Statistics Section.
- Dugan, P., Delaporte, A., Andrew, N., O'Keefe, M., & Welcomme, R.L. (2010). Blue harvest: Inland fisheries as an ecosystem service. Penang, Malaysia: WorldFish Center.
- Edds, D.R., & Ng, H.H. (2007). Additions to the ichthyofauna of Nepal, with a re description of *Neoeucirrhictys maydelli* (Teleostei: Cobitidae), Ichthyol. Explor. *Freshwaters* 18(2), 125-132.
- Gurung, T.B. (2003). Fisheries and aquaculture in Nepal. *Aquaculture Asia*, Network of Aquaculture Center in Asia (NACA).
- Gurung, T.B. (2013). Native fish conservation in Nepal: Challenges and opportunities, *Nepalese Journal of Biosciences* 2, 71-79.
- Gurung, T.B. (2014). Harnessing fisheries innovation for transformational impact in Nepal, *Hydro Nepal* 15, 53-59.
- Gurung, T.B., & Thing, A. (2016). Fishing tourism can support fisher's livelihood and fish conservation in Nepal: a value chain analysis. *Hydro Nepal* 18, 55-60.
- Gurung T.B., Gurung A., & Doody, T.M. (2016). Connecting flows, fish diversity and ecology in the Koshi Basin. In T.M. Doody, S.M. Cuddy, L.D. Bhatta (Eds.), *Connecting flows and ecology in Nepal: Current state of knowledge for the Koshi Basin*, pp 105-122. Sustainable Development Investment Portfolio (SDIP) project. Australia: CSIRO. Retrieved from [www.birdlifeneal.org/download-newsletter/41](http://www.birdlifeneal.org/download-newsletter/41).

- Hauge, K.H., Cleeland, B., & Wilson, D.C. (2009). Fisheries depletion and collapse. In *IRGC report "Risk Governance Deficits: An analysis and illustration of the most common deficits in risk governance"*, pp. 21. Geneva, Switzerland: International Risk Governance Council.
- IUCN (2004). A review of the status and threats to wetlands in Nepal. IUCN, the World Conservation Union, pp. 80.
- Khatri, T.B., Shah, D.N., & Mishra, N. (2012). Wild water Buffalo *Bubalus arnee* in Koshi Tappu Wildlife Reserve, Nepal: Status, population and conservation importance. *Journal of Threatened Taxa* 4(14), 3294-3301.
- Krebs, C.J. (2007). *The message of ecology*. Delhi, India: Indo American Books.
- Lemelina, R.H., Johnstona, M.E., Dawsonb, J., Stewartc, E.S., & Mattinaa, C. (2012). From hunting and fishing to cultural tourism and ecotourism: Examining the transitioning tourism industry in Nunavik. *The Polar Journal* 2, 39-60.
- Limbu, K.P., & Karki, T.B. (2003). Park-people conflict in Koshi Tappu Wildlife Reserve. *Our Nature* 1, 15-18.
- Limbu, K.P., & Subba, B.R. (2011). Status of key faunal in Koshi Tappu Wildlife Reserve after Koshi flood disaster 2008. *Nepalese Journal of Biosciences* 1, 41-54.
- McDonald, A.S. (1944). Circumventing the mahseer and other sporting fish in India. Mahseer fishing in Assam and the Dooars. *Journal of Bombay Natural History Society* 44, 322-354.
- Osborn, D., & Cutter, F. (2015). *Universal Sustainable Development Goals. Understanding the transformational, challenge for developed countries*. Report of a study by stakeholder forum. Stakeholders Forum, pp. 14.
- Oza, J. (2014). Resisting for the river: Local struggle against the proposed Saptakoshi river dam. Independent Study Project (ISP) Collection. Paper 1809. Retrieved from [http://digitalcollections.sit.edu/isp\\_collection/1809](http://digitalcollections.sit.edu/isp_collection/1809).
- Paudel, S., Levesque, J.C., Saavedra, C., Pita, C., & Pal, P. (2016). Characterization of the artisanal fishing communities in Nepal and potential implications for the conservation and management of Ganges River Dolphin (*Platanista gangetica gangetica*). *PeerJ* 4, 1563.
- Prabhakar, A.K., & Roy, S.P. (2009). Ethno-medicinal uses of some shell fishes by people of Kosi River Basin of North-Bihar, India. *Ethno-Med* 3, 1-4.
- Samarth (2014). Update tourism: creating a meaningful participation by the poor in tourism. *Samarth Nepal Market Development Program*. Retrieved from [5.http://samarth-nepal.com/sites/default/files/resources/set%20up%20%233\\_Update\\_Tourism%20\\_%20FINAL\\_1.pdf](http://samarth-nepal.com/sites/default/files/resources/set%20up%20%233_Update_Tourism%20_%20FINAL_1.pdf)
- Shrestha, A., Chhetri, R.B., & Khanal, S.N. (2006). An investigation on the park and people problems: Special emphasis on the impact on wetland surrounding vegetation due to overgrazing of livestock in Koshi Tappu wildlife reserve, Nepal (a case study of Kusaha VDC). *Kathmandu University Journal of Science, Engineering and Technology* 2(1), 1-15.
- Thapa, I., & Dahal, B.R. (2009). Sustainable wetland management for wildlife and people at Koshi Tappu Wildlife Reserve. *Banko Janakari*, Special Issue 36-39.
- Thapa, C.D. (2008). Studies on physicochemical parameter's and macrobiota with species reference to fishes in the wetlands of Koshi Tappu wildlife reserve and its surrounding, Doctoral thesis. Siliguri, West Bengal, India: North Bengal University.

- Timsina, T.P., & Ranjitkar, P. (2014). Factors influencing human wildlife conflict in communities around protected area – the case of Koshi Tappu Wildlife Reserve in Eastern Nepal. *International Journal of Scientific Research and Reviews* 3(1), 200-213.
- Welcomme, R.L. (1983). River basins. FAO Fish. Technical Paper 202, 60 pp.
- WWF (2015). Hidden Himalayas: Asia's wonderland new species discoveries in the Eastern Himalayas. *World Wide Fund for Nature* 2, 2009-2014.
- Zhou, S., Smith, A.D.M., & Knudsen, E.E. (2015). Ending over fishing while catching more fish. *Fish and Fisheries* 16, 716-722.