

Human–wildlife conflicts*

Human and wildlife conflict is much debated in recent times as it poses a major threat to survival of many wild animal species in different parts of the world. At the same time, it has also become a significant threat to local human populations. For example, it is shocking to learn that in Uttarakhand, during the past ten years over 722 leopards, 81 tigers and 241 elephants have been reported dead, many due to unnatural means. On the other hand, leopards, tigers and elephants collectively exterminated over 338 human lives and injured another 460 during the same period. Similar situation prevails in many other states, making the management of human–wildlife conflict as the most debatable issue. This underscores the need for appropriate solutions to minimize such conflicts; otherwise local support for conservation may decline in the near future. Are human–wildlife conflicts observed only in recent years? Is there a substantial increase in animal population in recent times or a perceivable change in animal behaviours? And, is there any solution to this problem so that human beings and wild animals can live in harmony? To answer some of these challenging questions, a workshop was held recently. A total of 88 participants representing the departments of forest, agriculture, horticulture and animal husbandry, representatives of NGOs, farmers, wildlife activists, and researchers attended this workshop. P. P. Dhyani, (G.B. Pant Institute of Himalayan Environment and Development (GBPIHED), Almora) deliberated the challenges of handling human–wildlife conflicts that have affected the day-to-day life; at places it has resulted in abandoning of the agricultural fields due to increased damage to crops by wildlife. S. S. Garbyal (Ministry of Environment and Forests (MoEF), Government of India) while delivering the keynote address apprised that various states in India present wide habitat diversity to support a varied

range of wild animals. However, due to increase in human population, road and infrastructure development, and encroachment to wild areas, the wildlife is struggling for appropriate habitats and prey. Highlighting many examples of human–wildlife conflicts all across the country, he elaborated that such conflicts used to happen in past as well; however, the frequency has increased in recent years. In view of a strong Wildlife Act in place in India, the wild animal populations have increased substantially. However, due to fragmentation and degradation in forest quality and size at many places the wild animals are not getting proper food, water and corridors for movements. Emphasizing the Government of India schemes/policies for elephants and leopards/tigers, Garbyal mentioned that diverse location-specific approaches are being implemented by selected state governments to handle the problem. J. C. Bhatt (Vivekanand Pravatiya Krishi Aunsandhan Shala) emphasized that the human–wildlife conflict subject is complex, and there is a need for both short term and long-term policies and planning to deal with the issue taking due care that people are not displaced while declaring any conservation reserve along with community empowerment to handle extreme situations. Lalit Pandey mentioned that there is a need to review existing conservation policies and make them equally sensitive to human and wildlife, although further discussions are needed on this matter.

There are as many as 30,000 elephants, 1700 tigers and 400–700 snow leopards in India (MoEF data). Many broad and location-specific issues were stressed that covered problems related to elephants in North Bengal and near Bhubaneswar, Odisha, snow leopard in Ladakh, leopard in Uttarakhand, Asiatic lion in Gir Forests, Gujarat, and wide-spread crop damage by Nilgai, monkey, wild boar, common deer in agricultural fields all over the country. In India, most suitable habitats for elephants are Kerala, Tamil Nadu, West Bengal and Uttarakhand. In North Bengal that comprises Jaldapara, Buxa and Maha Nanda

wildlife sanctuaries, there were nearly 150 elephants in 1995; number has increased to 600 in 2014. These elephants used to move freely between India and Nepal. However, due to fragmentation of habitats and other developmental activities, including development of tea gardens, cultivation of sugarcane and vegetables, and lack of water and food for animals, these elephants frequently visit human habitations, resulting in a conflict between them. Similar situation prevails in other parts of the country so much so that in the past five years nearly 500 people have been killed by elephants in different parts of India. Elephants need wide areas for movement, and food, and one can imagine the situation in Kerala and Tamil Nadu where huge populations of elephant exist.

Leopard and tiger are major threats in many areas. In Leh and Ladakh, the leopard used to prey on goats, dogs and even on children in rural areas, which led to conflicts between snow leopard and local population. However, in recent years the local government has initiated a scheme of ecotourism by involving local youths, and there are many tourists who come to see this animal and pay good fee, which has brought some change in local attitudes towards conservation of snow leopard. Gir Forest is amongst the best natural habitats for Asiatic lion and leopards; however, there are also reports of human–wildlife conflicts from there. Gujarat Forest Department has been working to develop an appropriate plan for this. There are many areas in the country where leopards frequently enter human habitations. It is the biggest example of degradation of a leopard's habitat along with the lack of prey and water resources. There are a few policies at various state government levels to address wildlife–human conflicts; however, majority of them are compensation schemes that operate only when wild animals damage human lives, domestic animals, crop fields and property. The compensation varies from state to state and often it is a time-consuming process. Except for leopard, there are no standard operating principles for other animals at the national level.

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Frequent damage to agricultural crops by Nilgai is reported from Delhi, Gujarat, Uttarakhand, Uttar Pradesh and many other places. Although there are provisions to kill this animal at agricultural fields after duly notifying each case by state authorities; unavailability of trained shooters and the associated religious beliefs hamper such operations. Wild boar has emerged as a major threat to agricultural crops in many states in view of tremendous increase in its population. In Jammu and Kashmir, farmers have been replacing their agriculture crops with horticulture crops to compensate the loss due to damage by wild boar. In Uttarakhand as well the problem of wild boar is severe. One of the reasons for increase in the number of wild boar in recent years has been linked with low populations of jackal and fox which used to prey on piglets. Since the populations of jackal and fox registered a decline in recent years, pig population and its impact on crop depredation have increased considerably. Similarly, an increase in monkey population in North India and their migration to cities and nearby habitation areas has become a serious problem. The state governments run different schemes for controlling monkey population. In Delhi, for example, under a project more than 14,000 monkeys were trapped and relocated into the nearby Bhati Asola sanctuary; however, the feeding cost under

such schemes is high. Sterilization practised as most reliable means to control their population was not cost-effective (Rs 2000 per case of sterilization).

The workshop resulted in many important recommendations to overcome human-wildlife conflicts. It strongly advocated for the need to develop standard operating principles for each wild animal at national level. Considering that most human-wildlife conflicts occur due to loss of natural habitats, encroachment to forest areas, and developmental activities, it was strongly emphasized to improve quality of forests with a view to maintain a healthy food chain balance by optimizing herbivore and carnivore population/ratio, and by augmenting the herbivore stock through plantation of native species, suitable fodder, wild edibles, fruits, and broadleaved species, control of forest fire, and captive breeding. Fencing of agricultural land by different means to control the destruction of crop fields by elephant and Nilgai in plain areas, and by monkey and wild boar at mid-hills was highlighted as an important issue that needs appropriate policy backing. Furthermore, development of simple mechanisms for speedy disbursement of compensation against wild animal-led damages to human lives, domestic animals, crop fields and property was suggested. Besides, need for a change in crop combinations and crop-

ping pattern by substituting crop species that are not so vulnerable to animal damage, such as ginger, cardamom, etc. in the hills, up-scaling of agriculture by creating incentives to stop out migration of workforce, simplification of permission procedure for killing wild boar in agricultural fields, development of sheds to capture monkeys in villages so as to hand them over to the Forest Department, prevent/guard against animal attacks, reinstating the old system of village patrolling, and formulation of appropriate pro-people policies were the other recommendations that emerged from the discussions. It was strongly emphasized that there is need for unique and innovative site and species-specific proactive measures to deal with human-wildlife conflicts. Therefore, a need for better cross-sectoral and interdepartmental coordination amongst forest-agriculture-horticulture-animal husbandry departments, frequent exchange of ideas on human-wildlife conflicts between Central and State governments, and dissemination of effective and efficient best practices were also underlined.

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MEETING REPORT

Application of Remote Sensing and GIS in Water Resource Management*

Use of Remote Sensing (RS) and GIS in natural resource and environmental monitoring has been advocated strongly in recent years. Considering this, a two-day workshop was organized. The major discussions in the workshop comprised (i) application of remote sensing and GIS

management such as water resource, retreat of glaciers, status of groundwater reservoirs and polluting water resources, if any, (ii) development of GIS, DEM and other hydrological models for water resource conservation and management, and (iii) use of such information system for enhancing recharge, improving governance and economy in water resource use.

In the welcome address Manju Sundriyal (Uttarakhand Science Education and Research Centre (USERC)) highlighted the importance of natural resources in general and water resource in particular and emphasized the challenges in con-

servation and management of glaciers, aquifers, catchment area and pollution of water reservoirs. She dwelt upon application of remote sensing and GIS in management of such resources.

Y. V. N. Krishnamurthy (Indian Institute of Remote Sensing (IIRS)) in his keynote talk pointed out that RS and GIS application is one of the best approaches to enable proper monitoring and managing of natural resources and for predicting their future trend. It helps in modelling and decision-making process. He mentioned that lack of awareness and casual approach of people is the prominent hurdle in water resource management. He

*A report on the two-day workshop on Application of Remote Sensing and GIS in Water Resource Management organized by Uttarakhand Science Education and Research Centre in collaboration with Uttarakhand Space Application Centre and Uttarakhand State Council of Science and Technology during 4 and 5 May 2014 at Doon University, Dehradun.