Ecotourism: An Opportunity for Biodiversity Conservation and Livelihoods

Amita Kanaujia*, Shivangi Mishra, Adesh Kumar, Daya Shanker Sharma, Ankit Sinha and Ruby Yadav
Biodiversity & Wildlife Conservation Lab, Department of Zoology,
University of Lucknow, Lucknow-226007, Uttar Pradesh, India
***Email:** kanaujia.amita@gmail.com

Introduction

Biodiversity is the variety of life, in all of its many manifestations encompassing all forms, (plants, animals and microorganisms) and at all levels of biological organization which includes genetic diversity, species diversity and ecosystem diversity (Christ *et al.*, 2003;Gaston and Spicer, 2004; Meduna *et al.*, 2009; CBD, 2012). The earth's biodiversity constitutes valuable natural resources in economic, cultural, aesthetic, scientific and educational terms, providing enormous amounts of both monetary and non-monetary benefits to humankind.

Ecotourism- Global Scenario

Ecotourism is defined as responsible travel to natural areas that conserves the environment and improves the well-being of local people. Ecotourism has been considered as the impetus and economic investment for management of natural resources (Kolahi *et al.*, 2013). Another important aspect of ecotourism is the encouragement of active participation by the local population in the conservation and education dimensions (Aramde *et al.*, 2012). Currently, ecotourism is becoming the fastest growing segment of tourism. On a global scale, ecotourism is

Ecotourism represents a set of principles that have been successfully implemented in various global communities, and are supported by extensive industry and academic research. Ecotourism is about uniting conservation, communities, and sustainable travel. This means that those who implement and participate in ecotourism activities should follow the following ecotourism principles

- â Minimize impact.
- â Build environmental and cultural awareness and respect.
- â Provide positive experiences for both visitors and hosts.
- â Provide direct financial benefits for conservation.
- â Provide financial benefits and empowerment for local people.

Ecotourism first grew out of the global environmental movement in the late 1970s. While the development and growth of ecotourism took various paths in different parts of the world, by the early 1990s, ecotourism, along with nature-based, cultural, heritage and adventure tourism, had become among the fastest growing sectors of the tourism industry worldwide.

Sustainable Tourism and Ecotourism

There is just a thin line of differentiation between sustainable tourism and ecotourism, which also shows that there is as such no absolute boundary between sustainable and unsustainable tourism (Eriksson, 2003). According to Weaver; Ecotourism exists within the broader classification of tourism types which, at an initial level, can be divided into 'mass tourism' and 'alternative tourism' (Fig.1). The differences between mass tourism and ecotourism are shown in Table 1.

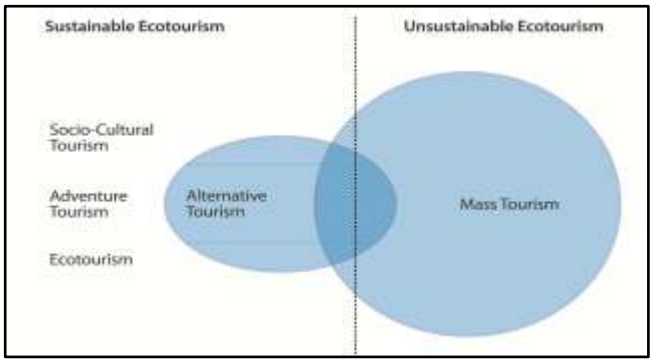

Fig. 1. Conceptual model of tourism (Eriksson, 2003)

Table 1: Distinct characteristics between mass tourism and ecotourism (Dorobantu & Nıstoreanu, 2012)

Characteristics of Mass Tourism	Characteristics of Ecotourism
Large groups of visitors	Small groups of visitors
Urban	Rural
Touristic general marketing activities	Eco-marketing activities.
Average prices for purposes of market penetration	High price with purpose of filtering the market
Impact on natural environment	Little impact on the natural environment
Advanced control options	Limited possibilities of control
Management based on macroeconomic principles	Management based on local economic principles
Anonymous relationship between visitors and local community	Personalized relationships between visitors And local community
General development goals	Local development objectives
Behavior-oriented leisure activities/entertainment, opponents to education and training actions	Loyalty in the process of training and education for appropriate conduct for the natural environment
Intensive development of tourism facilities	Reduced development of tourism facilities

Ecotourism is a component of sustainable tourism

Ecotourism is a component of sustainable tourism. In many ways, sustainable tourism exemplifies the relationship between ecotourism and sustainable development (Bansal & Kumar, 2011); Sustainable tourism will focus on three areas:

- â **Quality** – valuable experience for visitors and increased life quality for host communities through cultural identity, poverty reduction and environmental quality;
- â **Continuity** – exploitation is made at the optimum level that allows the preservation and regeneration of the natural resources;
- â **Balance-** between the needs of tourism industry, environmental protection, and local communities by an equitable distribution of benefits among stakeholders.

Importance of Ecotourism

1. Ecotourism occurs in natural areas (most often protected areas) and/or places of unique ecological or cultural interest.
2. Ecotourism contributes to conservation or preservation of the natural resources and promotes stewardship of natural and cultural resources.
3. Ecotourism should create necessary funds to promote permanent protection of ecological and socio-cultural resources.
4. The local residents accrue economic and social benefits thereby contributing to project's long-term success.
5. Ecotourism incorporates environmental and cultural education.
6. Ecotourism should be effectively managed for the long-term through minimal negative impacts on the host environment.
7. Ecotourism should provide a quality tourism experience.

Biodiversity Conservation through Ecotourism

Common approaches to protecting biodiversity include creation of parks and protected areas, establishment of natural reserves, and implementation of integrated conservation and development projects (ICDP), Establishment of Butterfly Parks, Sparrow Parks, Vulture safe zones, Vulture Restaurants etc. They vary in strictness of conservation in terms of human consumptive uses.

Protected Areas

Protected areas (PAs) play critical roles in safeguarding biodiversity and maintaining the crucial services provided by the natural systems. They have an important role in the evolving challenge of maintaining a sustainable world (Borrie *et al.*, 1998; Groombridge, 1992). Currently, more than 161,991 areas have been reported as PAs in the World Database of Protected Areas and the number continues to increase (Kolahi *et al.*, 2013). PAs have long been the only way to conserve ecological regions from the other forms of land These areas are therefore the cornerstone of most national strategies to protect Biodiversity and Natural resources (Hockings *et al.*, 2005; Leverington *et al.*, 2010) playing a key role in the sustainable utilization and attainment of natural resources. The success of the Ecotourism initiatives reflects the concern for achieving a balance between conservation of the sanctuary and livelihood of people living in and around it.

Zoo as Tourist Attraction

A zoo is a collection of wild animals in captivity and may include 'zoological gardens, biological parks, safari parks, public aquariums, bird parks, reptile parks, insectariums, and other collections of wildlife primarily for public exhibition, education, scientific, and conservation purposes'. The World Association of Zoos and aquariums states that, a zoo is a 'venue for researchers and visitors to meet, thus assisting with the public understanding of science and offering opportunities to raise awareness about research and its conservation implications' and has a 'powerful part in achieving global sustainability and should inspire people. As a tourist destination, zoos are the 'primary institutional location of wild animal presentation' and are very much part of the 'tourist trail'. Zoos as a tourist attraction are controversial because of the perceived conflicting roles of zoos (Harrison, 2004; Mazur, 2001).

Zoo's Role in Conservation

The mission of the World Association of Zoos and Aquariums, an international organization of zoos and aquariums, is to 'set standards for increasing achievement of conservation' among zoos worldwide. Integrated conservation consists of ex situ breeding of threatened species, public education, training and research, and support for in situ conservation of species (especially those with small among zoos and broader collaboration of zoos with other relevant organizations and institutions in various conservation initiatives.

Captive Breeding

Well-managed captive breeding programs in zoos are essential in maintaining a good collection of threatened species. On way to address this concern is for zoos to carefully select and prioritize the species that have to be bred in captivity. For each species, a genetic management strategy that is built on the genetic and demographic characteristics of the captive populations should be developed to avoid inbreeding, early mortality, and consequently population loss (Ellis & Seal, 1996).

National Parks and Sanctuaries

National Parks provide ample opportunities to the visitors to have a close encounters with the wilds. But what is so exquisite about the Indian National Parks is the variance that they are equipped with. Whether it comes to the flora, avifauna, and aqua fauna, or witnessing various wild forms in their natural surroundings on an elephant or inside a jeep, wild ventures in are simply amazing!. Some of the best jewels of Indian wilderness include the Great Himalayan National Park, Dachigam National Park near Srinagar, Corbett National Park in Uttar Pradesh, which is also a famous tiger reserve, Ranthambore National Park in Rajasthan, and Sundarbans National Park in Wildlife sanctuaries are established by IUCN category II protected areas. India has 515 animal sanctuaries referred to as wildlife sanctuaries category IV protected areas. Among these, the 48 tiger reserves are governed by Project Tiger, and are of special significance in the conservation of the tiger. Some wildlife sanctuaries are specifically named bird sanctuary, e.g., Keoladeo National Park before attaining National Park status. West Bengal. Worth visiting in the East Indian part in "The Land of Rhino" Assam is Kaziranga. Wildlife sanctuaries in India are as a desired Eco-system for rich wildlife and natural habitats

Butterfly Parks

Bannerghatta National Park, near Bangalore,

Fig.2: Butterfly parks to promote Butterfly Ecotourism

Fig. 3: Butterflies observed during Mud-puddling in Butterflies Park

Karnataka, was founded in 1971 and declared as a national park in 1974. In 2002 a portion of the park, became a biological reserve, the Bannerghatta Biological Park. It is a popular tourist destination with a zoo, a pet corner, an animal rescue centre, a butterfly enclosure, an aquarium, a snake house and a safari park. There are ancient temples in the park for worship and it is a destination for trekking. On 25 November 2006, Kapil Sibal, the Union Minister of Science and Technology opened India's first butterfly enclosure at the Bannerghatta National park. It occupies 7.5 acres (30,000 m^2) and houses a butterfly conservatory, a museum, and an audio-visual room. It is a humid tropical climate, with an artificial waterfall and appropriate flora to attract butterflies. The conservatory leads to a second and third dome, which house a museum containing dioramas and exhibits of carefully preserved butterflies (Fig.2). A successful Butterfly Garden/ Park has been set up in the KFRI Sub Centre Campus at Niambur.The prime objective of this project viz., setting up of an insectariums and butterfly house to facilitate education of the public on the significance of nature conservation (Fig.3).

Vulture Safe Zones

Vultures are a critical part of the food chain because they maintain a balanced ecosystem and prevent the unnecessary spread of disease. The dramatic decline of the Indian vulture population is directly linked to animal husbandry practices, namely the use of the painkiller Diclofenac, which is used to treat cattle. With this in mind, the concept of creating a, "Vulture Safe Zone" has been emerged. The Vulture Safe Zone area falls in the Bundelkhand geographic region of Madhya Pradesh, India, which comprises of Chattarpur, Tikamgarh, Ashoknager, Vidisa, Sagar, Damoh, Panna and Satna districts. Expected out-comes of this program include the reintroduction of vultures into the wild from captive breeding centers and the expansion of areas designated as Vulture Safe Zones.

Vulture Restaurants

A vulture restaurant is an undisturbed area where non-toxic, poison-free meat and carcasses are provided for vultures and other scavengers. This

Fig.4: Vulture Restaurant :Vultures feeding on non toxic, poison free carcass

supplementary feeding supports the vultures in times of food scarcity and when young birds fledge as well as provide a safe food source, vulture restaurants provide land owners with a clean and cost-effective way of disposing of waste and unwanted carcasses. (Fig.4). In the last decade, vulture feeding stations have been set up in South Asia (India, Pakistan and Nepal), South-East Asia (Cambodia) and similar programmes also exist in Africa and Europe (Bird Conservation Nepal 2009). In Namibia, the first vulture restaurant was established in 1987 in the Waterberg Plateau Park. The aim was to provide a regular, uncontaminated food source for the Waterberg's declining population of Cape Vultures, a globally threatened species. South Africa developed feeding stations for the Bearded Vulture in 1966 and for Cape Vultures from 1978 Vulture Restaurants at Nepal has been established at Ghachowk , Pokhra in Central Nepal during 2010, Pithauli Navalparsi in 2007 and Gaindahwa Lake established in 2009 . All these were established by Bird Conservation Nepal. The four new Vulture Restaurants were open one in Maharashtra and three in Punjab.In Nagpur Currently, there are six 'vulture restaurants' in Gadchiroli — Marakbodi, Made-tukum, Nimgaon, Yeoli, Navegaon, Krupala and Porla. The first Vulture restaurant was established in Uttar Pradesh in 2013 within Mahavir Swami sanctuary,Lalitpur. Tourist visits directly help to conserve the vultures by providing a sustainable way of feeding the birds. This may ultimately increase vulture breeding success and survival of fledglings once they are independent of their parents.

Sparrow Parks

The House Sparrow (*Passer domesticus*) is closely associated with human habitation and cultivation throughout the world from historic time. House sparrows are opportunist and are able to live wherever there are suitable nesting and roosting sites and enough food, predominantly seeds in winter and invertebrates in summer. The Sparrow is a human habitat companion. House Sparrows play an important role in our ecosystem like they feed their young ones the larvae of the alfalfa weevil and cut-worms, both of which harm alfalfa crops, bio-indicators, seed dispersals and pest control etc. A number of hypotheses have been put forward as possible causes of the decline of House Sparrows in Rural, urban and suburban habitats. Some of the observed and known threats like nests destruction by cats, interspecific and intraspecific competitions, blocking of nesting sites during renovation and predation etc. After concerning about the threats posed by House Sparrow and about their role in our ecosystem, various types of conservational measures are opted and in this, various types of artificial nests are also introduced. These artificial nests can easily be installed on houses for sparrows. The construction is quite simple and it can be used as an alternative for livelihood.

Fig. 5: Sparrow Nest-box helpful from both conservational aspects of House Sparrow and providing the livelihood to local people

Fig. 6: Putting up bat houses creates needed Bat roosting sites for these beneficial insect-eaters

A new theme of Sparrow Park should be initiated which is very easy to setup with the installation of numerous artificial nests in and around the park and plantation of numerous bushy plants such as *Bambusa vulgaris* (Bamboo), *Nerium indicum* (Kaner), *Vachellia nilotica* (Babool) etc. where the little sparrows can roost upon. The place must be ensured with special provision of food (Kakun is the most preferred food) and water. Sparrow Parks can thus make a perfect place for tourists where they can enjoy the sighting of House Sparrow in their natural habitat and help in their conservation. Conservational organizations can appoint various individuals for the regular monitoring of the birds and construction of artificial nests. This will be helpful from both conservational aspects of House Sparrow and providing the livelihood to local people (Fig.5).

Palm-Tree Barn Owl Park

Barn owls are found throughout most of the World, but populations are declining in eastern states. They inhabit every continent except Antarctica. The Barn owl is a cavity nester, preferring large tree cavities or shallow caves in cliffs as historical nesting sites. Due to lack of suitable nest cavities, barn owls often nest in a variety of unsuitable places that are not acceptable to landowners. These places include crevices between hay bales, air vents, window ledges, and open stairways. As a very opportunistic species, Barn owls will nest in unsuitable sites that offer promise, but end up with limited nesting success such as palm tree nests. Artificial nest box is put up on Palm Tree in an area and that area considered as palm tree Barn owl Park (Fig.7). Nest boxes will create more and better nesting sites, increasing the reproductive success of local owls, as well as helping to keep the nest sites in acceptable.

Amphibian Husbandry

Amphibians comprise a group of vertebrates that display an enormous diversity of natural histories. Within the three orders, anurans (frogs and toads), salamanders, and caecilians, there are more than 6,900 species (www.amphibiaweb.org) with potentially many hundreds more awaiting discovery and description. There are many reasons to keep amphibians in captivity including for purposes of exhibition, education, conservation, preservation, and for hobby and personal interests. Historically, zoos have included amphibians within their herpetology programs and displays; however, as they become more conservation-oriented (versus the menageries of the past), zoos will have to alter their collections to reflect their resources and capacities to carry out this work (Rabb, 2004) (Fig.8). The Amphibian Ark (www.AmphibanArk.org) has estimated that approximately 500 species of amphibians are in need of carefully managed *ex situ* help;

Fig.7: Palm Tree Provide a suitable place for the Nesting and breeding of barn owl

yet, today likely fewer than 31 species are in managed programs.

Construction of Amphibian Enclosures: Regardless of the size, material, or brand, all enclosures should be satisfy the physiological and behavioral needs of the animal, Prevent escape of specimens and food item, Be easy to maintain and Make it easy to monitor the animals.

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Fish Aquariums & Aquaculture

An Aquarium is a transparent tank or a bowl or an artificial pool where live fishes and other aquatic animals are kept.

Fig.8: Woodland Park Zoo uses large Rubbermaid tanks for developing embryos, eggs, and froglets and exhibit and dedicate the space to Amphibian Conservation

The Fish House at ZSL London Zoo- the first Public Aquarium: ZSL London Zoo's `Fish House' opened in May 1853, it was revolutionary for its time, the possibility of making tanks from large sheets of plate glass enabled visitors to have an underwater view of the life in tanks. Additionally it had only recently been recognized that fishes absorbed oxygen from water and replaced it with carbonic acid. Plants absorb this and return oxygen to the water leaving a more balanced system within the tanks. Although fairly simple in principle it was more difficult in practice to maintain a balance. These developments and the opening of the Fish House led to a Victorian craze for aquaria in the home (Fig.9).

Aquaculture includes fish farming in both fresh and saltwater. The term mariculture is often used for aquaculture that occurs in brackish and saltwater. Aquaculture products are grown in ponds on land or along the coast, and in the ocean in pens and cages or on lines.

Fisheries Have Critical Social and Economic Impacts: Fisheries long have played an historical, cultural, and economic role in coastal communities. For many, fishing isn't just a job— it's a lifestyle. Commercial and recreational fishers alike have deep cultural, social, and financial ties to fishing. Fisheries management strategies affect not only how many fish are allowed to be caught but also who gets what share of the total catch. Seafood is an important source of protein globally. More than 3.5 million vessels currently fish the ocean waters worldwide, and NOAA (the National Oceanic and Atmospheric Administration) projects that the global seafood demand will more than triple by 2025. Recognizing the need to continue to engage a broad and diverse group of people in the development of standards for responsible aquaculture, the World Wildlife Fund initiated eight roundtables, called Aquaculture Dialogues, to create standards that will minimize the key negative environmental and social impacts for selected species.

Turtle Based Ecotourism

The Queensland state government began the process of creating Mon Repos Conservation Park for the conservation of sea turtles in 1981. It offers a unique opportunity for visitors to catch a glimpse of a turtle's world. Turtle watching takes place at night under the guidance of QPWS rangers and volunteers. During the turtle season, evening visitors to Mon Repos Conservation Park pay a small fee for entry. The fee enables visitors to see the display on sea turtles at the information centre, participate in the presentation at the outdoor amphitheatre and join a group of up to 70 persons to be guided to the beach to

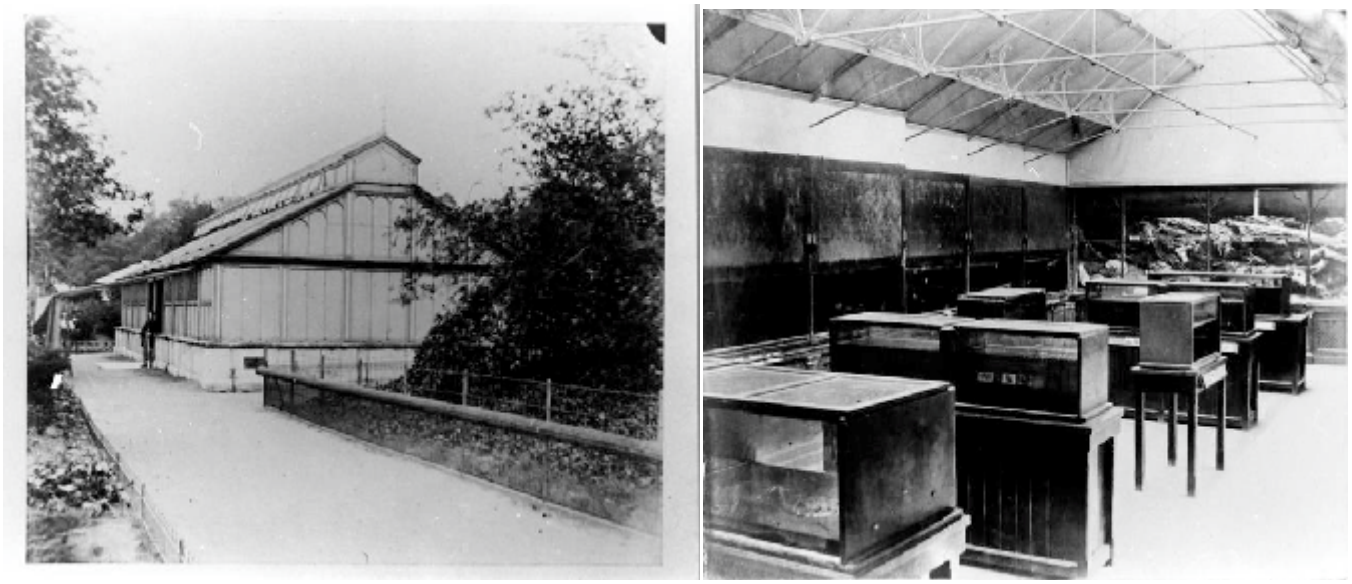

Fig. 9: Fish House: Exterior from the South,Circa 1875 and Inside the Fish House

see turtles nesting, if they appear, or to see hatchlings emerging at times when this occurs. Tourist operations are combined with collection of data about turtles which is used for scientific purposes.

Reptile Rehabilitation & Research Centre

There are various organizations, NGO's and conservational societies are working for their conservation like in India Kukrail breeding centre, Katerniaghat crocodile breeding centre, Kane crocodile sanctuary, Turtle survival alliance, WARCO, Madras crocodile trust etc. and International reptile conservation foundation, Wildlife SOS and Reptile conservation international etc. are few international associations working for their conservation. For turtles, conservation programs are being ran by organizations and breeding centers are established in different cities for providing the breeding space to lay eggs, especially to fresh water turtles, red-crowned roof turtle, spotted pond turtles etc.

Kukrail Reserve Forest / Picnic spot

The centre at Kukrail came up in the year 1978, in which there is a Gharial Centre. It is funded by Uttar Pradesh forest department (Fig.10). The Crocodile Sanctuary and breeding centre is the most renowned centres in India. Apart from breeding crocodiles in the park, crocodile eggs are also collected from the amganga, Suheli, Girwa and Chambal river banks. When young crocodiles come out of these eggs after artificial hatching at the center, they are fed and looked after till they become capable of defending themselves against other predators. This programme has contributed to the rapid improvement in the gharial's status not only in Uttar Pradesh but also in the neighboring states of Madhya Pradesh and Rajasthan. In fact, the captive-breeding programme for gharial is one of the two such successful wildlife conservation programs in the country. The Crocodile Rehabilitation and Research Centre is a crocodile breeding and rearing park at Neyyar, a popular tourist destination near the city of Thiruvananthapuram in Kerala, India. A crocodile farm was started at the site in 1977, accommodating around 44 mugger crocodiles. The number of crocodiles varies as muggers are raised and released to the Neyyar river and lake near the dam site.

Snake Park

There are 270 species of snakes in India out of which about 60 are highly venomous. The King Cobra found in India is one of the most beautiful snake and the largest venomous snake in the world. The big four member of highly toxic snakes in India are Nag "Indian cobra", krait, Russell's viper and Saw-scaled viper. Snake Park in Badu Kolkata and Nehru Zoological Park Hyderabad also refer as snake parks for conservation and educational purposes.

Fig.10 : Ghariyal Rehabilitation Centre,Kukrail Picnic Spot,Lucknow. (Source:Lucknow)

Snake Park: A well-appointed place for snake

Katraj Snake Park, Pune

One of the best of the few snake parks in India, Katraj Snake Park is housed in the much more modest Rajiv Gandhi Zoological Park. There is a plenty of reptiles including Indian rock python, king cobra and Russell's viper. There are over 22 species of snakes. Bannerghatta Snake Park, Near Bangalore: Located in a huge biological park, this snake park is famous for kraits and monitor lizards. Parassinikkadavu Snake Park, Kannur: There is a large variety of both venomous and non-venomous snakes including python, spectacled cobra, king cobra, kraitand pit vipers. There's also a live show where trained experts play and interact with snakes to try and eradicate various myths about snakes. Guindy Snake Park, Chennai: Formerly known as the Madras Crocodile Bank Trust, Guindy Snake Park is home to a varied collection of snake species like king cobra, pythons and vipers.

Wetlands Ecotourism

Bird watching has become a particularly important form of ecotourism and one that is particularly common for wetlands (Fig. 11). Canoeing, kayaking, and fishing also take place in wetlands. Ecotourism can educate landowners and businesses with regard to the functions and values of wetlands. It can provide landowners, local governments, and local businesses with economic and cultural incentives for conservation of wetlands and other resources. Wetland-related facilitates can, if properly sited and designed, both meet the needs of ecotourists while protecting resources. They also include interpretive centers, picnic facilities, parking lots, and food and lodging facilities on adjacent lands if properly sited and constructed. Even limited wetland-related facilities may play an important part in meeting regional needs.

At present stage, researches on wetland ecotourism mainly focused on status analysis and characteristic description and there have been no systematical theoretical method or research method for wetland ecotourism and research methods in landscape ecology and wetland ecological system were adopted as reference. Wetland ecotourism has a promising development prospect and constant

Fig.11: Ecotourism can educate students, landowners and tourists with regard to the functions and values of wetlands

exploration needs to be conducted by relevant researches to promote its development.

Recommendations

Ecotourism has become an important economic activity in natural areas around the world. It provides opportunities for visitors to experience powerful manifestations of nature and culture,

and to learn about the importance of biodiversity conservation and local cultures. Ecotourism also generates income for conservation and economic benefits for communities living in rural and remote areas.

- Joint research in ecotourism is a necessary tool in management of ecotourism activities.
- There is a need for long-term research on issues, as well as the investigation of other sites experiencing tourist pressures.
- Research is also needed to determine what levels and rates of tourist traffic trigger negative impacts on wild life. This will enable park managers to set levels that will minimize the impacts on the biodiversity the parks are established to protect.
- Promoting community-based enterprises that benefit the local communities, including carrying capacity of ecotourism sites are also important aspects that should be looked into future.
- In effect, science-based management of ecotourism and biodiversity conservation would make sound decision-making.
- Investing in research makes good business sense since the information generated in such activities pay off in customer satisfaction, value of the final tourist product, long-term economic sustainability, and appeal to mass media.
- Economic activity is one of the major drivers of biodiversity loss; Successful ecotourism requires maximizing its environmental and economic benefits while minimizing ecological damage. But unfortunately all the eco - tourism projects are not completely successful in attaining their objectives. Environmental deterioration and inequitable development, many a times has been found as ill impacts of eco- tourism.

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