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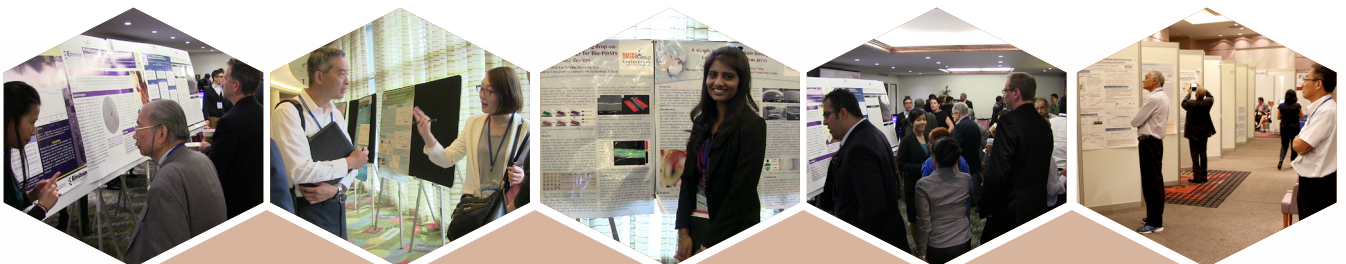
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Accepted Abstracts



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Genetic variation of Caucasian pit viper (*Gloydius halys*) populations in Iran using mtDNA marker

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The concept of genetic variation is a vital factor to investigate the effect of evolutionary process on genus *Gloydius* populations. Having a vast distribution in many parts of Asia, genus *Gloydius* (Serpentes: Crotalinae) is from the venomous group of snakes, and consists of thirteen species. Caucasian Pitviper (*Gloydius halys*) is scattered from Northwest to Northeast Iran in wide variety of terrestrial and mountainous, forestal and bush-lands habitats. This study aims to analyze biodiversity, genetic variation and genetic structure among the Caucasian Pitviper populations in Alborz habitats. For this purpose, 18 individuals representing two populations (northern and northeastern Alborz) were captured, and, some ventral scale specimens were collected. Polymorphism of a mitochondrial gene *Cytb*, was investigated in these samples. For this purpose, using PCR, a segment of this gene with 1067 base pair length was amplified and the amplified sequence was then subjected to sequencing. The genealogy analysis was conducted to determine the best evolutionary model using Bayesian and maximum likelihood approaches. Our results revealed that the Alborz populations were separated by 0.99 and 95.34 posterior probability and bootstrap values, respectively. Besides, 13 unique haplotypes out of 18 sequenced individuals (7 from northern and 6 from northeastern population), were analyzed and consequently a considerable distinction was detected between north and northeastern population haplotypes by 17 mutational steps. Also, a significantly high genetic variation ($F_{st} > 0.25$, $p < 0.01$) was found between populations in the north and northeast Alborz through the Analysis of Molecular Variance (AMOVA). On the other hand, using neutrality tests, the incidence of spontaneous expansion was determined in north and northeast populations. As a conclusion, we believe that the genetic distance between these two populations is due to their local adaptability. Hence, they can be considered as two distinct conservational units in terms of biodiversity conservational plans.

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Relative abundance, prey preference and niche partitioning of snow leopard (*Uncia uncia*) and Tibetan wolf (*Canis lupus chanku*) in Karakoram Pamir mountains

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Reliable information about predator's abundance, their feeding habits, potential habitats and niches is imperative to understand the ecological interactions among herders, herbivores and carnivores on shared habitats. Therefore, the present study endeavors to fill knowledge gaps for the sustainable conservation and management of the remaining lot of endangered Snow leopard and Tibetan wolf in Khunjerab National Park (KNP) in Pakistan and Taxkorgan National Nature Reserve (TKNR) in China. Our results revealed that the Tibetan wolf and Snow leopard as the major predators in KNP, with an estimated population size of 30-35 with 0.006 Snow leopards in per km². Also, out of estimated total 822.7 kg km⁻² (animal's km⁻²) biomass, it was found that that livestock and ungulates offered around 66% and 34% diet for Snow leopard and Tibetan wolf collectively. Through scat analysis, results showed that both these predators rely heavily on livestock to fulfill food requirements. Moreover, Tibetan wolf was found having a large niche separation with Snow leopard, whereas, Snow leopard was found comparatively having greater niche than the Tibetan wolf. In the same vein, considering the large biomass needs of the carnivores and the low availability of wild prey, human-wildlife conflict is therefore an inevitable and critical issue in the region. Trans-boundary efforts are necessary to develop conservation management schemes that protect threatened wildlife species as well as provide support and benefits to the local communities living adjacent to KNP and TNR in the Karakoram and Pamir mountains of China and Pakistan.

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Protection and preservation of the unicorn rhino in the 21st century from extinction

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The rhino population in Pabitora Wildlife Sanctuary had increased from 54 in 1987 to 74 in 1999 and in Kaziranga National Park it increased from 1164 in 1993 to 1552 in 1999. However, in Orang National Park, the rhino population decreased from 97 in 1991 to only 46 in 1999, mainly because of unabated poaching. In the anti-poaching operation in Pabitora since November 1997, large numbers of poachers were arrested and arms and ammunition were recovered. Kaziranga witnessed the lowest poaching in 1999 with only 4 rhino killed by poachers, down from 8 in 1998. Anti-poaching staff of Kaziranga arrested 18 rhino poachers in 1999, a marked increase from 2 in 1998. To ensure the future of the rhino in Assam, forest anti-poaching staff needs further government support. Habitat conservation and protection need to be given priority. Forest officials, the various collaborating NGOs and local people need to work together to conserve the rhino in the 21st century. The Kaziranga National Park (KNP) is one of the most successful stories of conservation of *Rhinoceros unicornis* in the world. From a population of a mere dozen rhinos in 1908, when the Kaziranga was declared a forest reserve, the population has grown to 1500 over 90 years of conservation. The rhino census conducted in Kaziranga in April 1999 recorded a population of 1552 compared with 1164 in 1993. The Poaching will remain as a major threat to the rhinoceros population. Therefore, anti-poaching efforts have to be improved and maintained. Receiving information in advance on the movement of poachers and wildlife smugglers is extremely crucial in apprehending illegal wildlife traders and disrupting their activities. This management technique needs enormous community participation and faith. In the same time the natural calamities like flood had also added as a chance for poaching due to restricted movement of Rhinoceros. The new possibilities of Forest Rights Act 2006 can be a help to draw the community faith and to minimize the gap between forest department and the fringe society. The recent technological intervention used in terms of unmanned aircraft to monitor the park has been measurably failed and is criticized as loss of public money. Before that some NGOs had also tried to use imported sniffer dogs to trace the movements of poachers. These practices were found to be a short term measure as both the government authority and NGOs has very limited links to the grass root abnormalities of the park that lies in connection with the problems of local communities.

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A contrast in sustainable energy and enforcement (The United States of America and Nigeria)

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The ideal of sustainability is a universal notion that has come in several packages such as: Reports (Brundtland Commission Report of 1987), conferences (such as the Rio de Janeiro Earth Summit of 1992 and 2012), etc. Hence, its applicability is not restricted to a jurisdiction but made manifest in several domestic laws and regional regulations, irrespective of the level of development of such region. This is because once there is an action that can cause environmental risk or deprive the preservation of resources for future generations, then the sermon of sustainability becomes a necessity. It even becomes more necessary for countries or regions that produce oil and gas because of the nature of risks associated with the exploration and production of oil and gas. The passive attitude towards issues of sustainability by some companies (especially in the upstream oil and gas sector) that reside and operate in Nigeria shows a clear disregard of the tenets of sustainability. There are several reports (as shall be explored in the work), on severe pollution from the upstream oil and gas sector by some multi-national companies (MNCs) operating in Nigeria. Interestingly, some of these MNCs are reputable for their sustainability strides in countries such as United States of America (USA). This is majorly because environmental offences are expensive in a country like USA (equally an oil producing state). A manifest reaction is the USA's reaction to the BP Macondo spill. This raises the question as to the extent of the applicability of environmental rules against acts that can be deemed as a manifest disregard of sustainable ideals by oil MNCs in Nigeria, in contrast to the USA. Even more, it raises the issue as to the strictness of existing laws in sanctioning severe acts of pollution in Nigeria.

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Characterizing husbandry practices and breeding objectives for Sheko cattle owners for designing conservation and improvement strategies in Ethiopia

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A survey was conducted through single field visits and interviews with 360 respondents in selected districts of Bench Maji Zone, Southwestern Ethiopia to assess the Sheko cattle farming system, breeding practices and identify cattle breeding goals and constraints for designing Sheko cattle conservation and improvement strategies. The total populations of true Sheko cattle in the sampled districts within each PA obtained by counting directly on the field were 2813. Under random mating, the inbreeding coefficient, in both mid-altitude (1.72) and lowland (1.35) agro ecological zones (AEZs) was higher than the maximum acceptable level (0.063). Results showed that mean Sheko cattle herd size of sampled household was 1.09 in mid-altitude and 1.29 in lowland AEZs. About 93.9% and 88.3% of the households, respectively, in mid-altitude and lowland do not have breeding bull. Random mating predominates in both mid-altitude (87.2%) and lowland (85%) AEZs. The reported peak season of mixing of the different Sheko cattle herd within a village start after the crop aftermath (February to May) was picked from the cultivated land, whereas, beginning from main rainy season in June to the end of crop harvesting time, usually on January smallholder farmers in both AEZs keep their cattle separately. The observed male to female mating ratio was 1:16.4 in mid-altitude and 1:8.6 in lowland. Sheko bulls were castrated at the age of 4.2 and 4.8 years in mid-altitude and lowland respectively. Appearance/confirmation was the most important trait in choosing of breeding male for both mid-altitude and lowland small holder Sheko owners; whereas, milk yield was the most important trait for the choice of breeding cows in both AEZs. The purpose of keeping Sheko cattle in mid-altitude area was for draught followed by milk, income, saving and dowry, in that order. In lowland agro ecology, milk production, draught power and income generation are the purposes for keeping Sheko cattle. In both AEZs feed shortage, disease and labour shortage were the most important cattle production constraints, in that order. It was concluded that an integrated system approach to breed conservation and improvement need to incorporate traits sought by the cattle keepers, the multiple roles of cattle, and the existing traditional herding and breeding practices.

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Nutritional ecology of the mona monkey (*Cercopithecus mona*) in Okomu National Park, Nigeria

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Mona monkey is one of the eight nonhuman primate species in Okomu National Park, a lowland rainforest in southwest Nigeria. Little is known about the varieties of plant parts it accesses as part of the diet and much less about the nutritional composition. We studied the feeding ecology of the monkey using field observations and opportunistic collection of food refuse. Nutritional contents of their diet were determined through proximate, fibre fraction and amino acids analyses using standard procedures. Their diet included 28 plants species in 19 families, 57% being fruits. *Gmelina arborea* fruit and *Jateorhiza macrantha* seed discovered in the study were not found in literature as the monkey's diet. Mona monkeys obtained 79% of their diets within the Park. The proximate contents of the foods were higher during the dry season. Percent crude protein of 7.02 ± 1.92 (n=14) is within the 6.4-8.0% recommended by National Research Council for primates in captivity. Amino acids cysteine and methionine had the least values. A good management plan where monkeys obtain all their food resources from within the park is recommended in order to adequately conserve them.

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Mitigating impacts of projects on biodiversity conservation in Uganda

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Introduction: This study provides light on the impact of implemented projects on biodiversity in Uganda in terms of harmful and enhancing projects. Biodiversity harmful projects are defined as the type of projects that destroy or lead to biodiversity loss during their implementation, while biodiversity enhancing projects are those that lead to biological diversity during their implementation.

Objective: The objective of the study was to assess the impact of implemented projects in the communities on biodiversity conservation and management in Uganda.

Methods: The data used in this analysis was obtained from Uganda Bureau of Statistics (UBOS) previously collected during the National Service Delivery Survey (NSDS 2008). Multiple correspondence analysis (MCA) was used to derive the different impact dimensions of projects on biodiversity among the communities in Uganda.

Results: Implemented projects in the communities impact biodiversity both positively and negatively. Findings revealed that livestock improvement/restocking/breeding contribute about 30% on the biodiversity positive impacts, while introduction of improved crop variety at about 20% and agricultural technology at about 11.4%. Furthermore, construction of new road/bridges are the leading projects in destroying biodiversity accounting for about 13.5% of the variation in negative impacts, while construction of toilet/latrines and health units accounts for 11.8% and 9.4% respectively of the variation in biodiversity loss.

Conclusions & Recommendations: Construction related projects impact negatively on biodiversity in their implementation, while agricultural related projects are the leading agro-biodiversity enhancing projects in Uganda. This implies that work sectors must play an important role in biodiversity conservation in Uganda. Secondly, construction and agriculture related projects should endeavour to allocate a percentage of the project budget equivalent to expected impact on biodiversity towards its management and restoration.

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Conservation ecology of red panda (*Ailurus fulgens*) in Himalayas

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Red panda (*Ailurus fulgens*) is listed as endangered in IUCN red data list, protected for Nepal and distributed in Himalaya region of Nepal, and is commonly known as "Habre" in Nepalese language. The species is distributed in different protected areas of Nepal, however the detailed information on ecological, biological and conservation aspect are still lacking. The study was conducted in Dhorpatan Hunting Reserve (DHR), Nepal to investigate diet, habitat preference and distribution of red panda. Micro histological fecal analysis methods were used to investigate feeding species on red pandas' diet. The habitat preference of red panda was analyzed by using Ivelve's electivity index. A total of 120 plots were laid out for sampling the vegetation (trees, shrubs, and herbs respectively) and habitat features. Red panda preferred gully with forest area and tree species *Acer caesium* (IV=1). Most important forest species in the habitat of red panda were *Abies spectabilis* (IVI=66.22) and *Betulautilis* (IVI=17.15) with ground cover of *Arundinaria* spp. Red panda preferred 3000-4000 m elevation range, 26-50% slope, 51-75% crown cover and 26-50% ground cover. *Arundinaria* spp. was found as a major (81.7%) diet of red panda. For protecting this species human consumption of the *Arundinaria* spp. should be discouraged.

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The path to reaching ecological civilization as a developing nation through the knowledge of ecological footprint

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Statement of the Problem: Ecological footprint measures the cumulative effect of impact of human activities on the environment; its increase has become an environmental threat to mankind. It is expressed as the amount of land required to sustain human use of natural resources influenced by the human population, consumption per person, global natural resources and water intensity. The aim of this paper is to provide a comprehensive review on Ecological Footprint in developing nations in other actions and how they can sustain and attain ecological civilization.

Methodology: This article, reviewed papers and data discussing ecological footprint and related environmental topics, from online search engines, journals and reports of the United Nations and the department responsible for environment and development, reports of international agencies with effort from few governments. The Anthesis ecological footprint calculation model was used to determine the ecological footprint of a developing nation used as a case study. The relationship between ecological footprint and other sustainability measuring scales were reviewed and compared with values of the ecological footprint of nations.

Findings: It was revealed that most developing nations are experiencing varying degrees of ecological deficit with depleting reserves and these poor countries are worse hit by the ecological impact; many of them are yet to fully initiate their nations' plans, and with their respective economies heavily relying on high carbon emission growth model, it has resulted in worsening environmental degradation and extremes of weather conditions. Hence there is a need to urgently intervene globally and nationally.

Conclusion & Significance: The article advocates for changes in every aspect of human lives and also advocates for international collaborations with financial incentives, and aid for these poor developing nations will ensure that they eventually shift away to more eco-friendly energy efficient system. Recommendations were made to help mankind attain ecological civilization.

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Modeling the impact of highland settlements on ecological disturbance of streams in Choke Mountain Catchment: Macroinvertebrates' assemblages and water quality

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Human disturbances of waterways in Ethiopian highlands have increased throughout the last century due to population growth and increased land use. Despite this there is a lack of knowledge on macroinvertebrate responses to human disturbances and the application of biological monitoring in tropical highland waterways in general. In this study, we have evaluated the human impact on the ecological integrity of the Chemoga River catchment in the Choke mountain watershed at the northwestern region of the Ethiopian highlands. During wet and dry seasons, the water quality and macroinvertebrate assemblages were assessed. Multivariate statistics and Canonical Correspondence Analysis (CCA) were used to identify factors influencing macroinvertebrate community structures in highland streams in the northwest regions of Ethiopia. A total of 66 taxa of benthic macroinvertebrate were recorded, among which Diptera (38%) and Coleoptera (21%) were the dominant. The biomonitoring results revealed a severe decrease in the ecological integrity of the Chemoga River in terms of macroinvertebrate composition at higher altitude. The ordination and cluster analysis clearly indicates extremely low macroinvertebrate diversity at sites where human impact is severe and a strong effect of altitude. Moreover, anthropogenic activities may have caused changes among physicochemical parameters, which have led to depletion of aquatic macroinvertebrates in the Chemoga River. These results highlight the need to protect the ecology of Chemoga River and that of similarly degraded watersheds in the Ethiopian highlands.

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Monitoring of climate change impacts on biodiversity species in Niimi National Park

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Climate change has become a burning issue in the 21st century. These negative impacts are causing serious harm to the living beings particularly the biodiversity. These current monitoring activities were done in Niimi National Park in Gambia in order to assert the extent of the negative impacts of change impacts on biodiversity species in Niimi National Park and to come out with a possible recommendation for future actions. The monitoring activities were done in eight sample sites, comprise of the following: monitoring of birds populations in eight sites, shell fish measuring and counting, monitoring of the status of mangroves and its growth rate, sampling the soil to determine the amount of soluble salt in the soil organic matters and soil pH, water sampling to determine temperature, turbidity, salinity, etc., socio economic survey on the fish stock and the state of fish stock before and now.

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The search for effectiveness of the Paris agreement

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The aim of this paper is to analyze the Paris Agreement, which was published in the 21st session of the Conference of the Parties on Climate Change, COP 21 that took place in December 2015 in Paris, France. The importance of this theme for reaching the sustainable development goals, including the climate action, is equally analyzed. The study's starting points are the Framework Convention on Climate Change published in Rio de Janeiro in 1992 at the United Nations Conference on Environment and Development and its consequently interaction for sustainable development; and the achievements and failures within the Conference of the Parties and the COP 21, which resulted in a document of great international repercussion especially because of the urgent necessity of adopting measures against the climate changes which have dramatically affected life on Earth. This paper's main approach is the discussion of the effectiveness of the objectives laid down in the Agreement. These objectives include measures of mitigation, adaptation, damage reduction, liability. Additionally, financing resources and technology transfer are directed to developing countries to put into effect such measures for making it possible to cope with climate change. In order to achieve the objectives of the Paris Agreement and its interaction with the sustainable development goals, this paper makes a parallel between the principles of cooperation and information, highlighting environmental education which is included in international analyzed documents of climate change and in two of the goals of sustainable development, namely quality education and partnerships for the goals. In conclusion, for giving effectiveness to the COP 21, it is imperative to develop a environmental education and culture of solidarity among peoples and nations so that every member of society assumes their responsibility towards the climate change issue, since this problem belongs to everyone and must be seriously faced primarily by developed countries. Developing countries are not excluded from searching for new courses of action towards sustainable development in order to guarantee the continuity of life in our planet.

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Innovative way to handle wildlife rescue which aims for zero casualties during rescue operations: Wildlife Rescue Bike

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Conflict between wildlife and humans are increasing globally with the habitat destruction and the increase in the population of tigers, elephants and leopards in India. With the aim to develop a technology for safe handling of wildlife – human conflicts and safe patrolling in the wilderness, Myvets Charitable Trust & Research Centre developed “Wildlife Rescue Bike”. In most of the reported cases of leopard rescue during conflicts, majority of forest officials gets injured and there are incidences wherein villagers also got injured during the rescue operation while going near the leopards; as conflict creates fear in the mind of people and they counter-react by beating the wildlife to death or by killing them directly. New technologies will revolutionize the way we handle the wildlife–human conflicts and wildlife conservation, it can be used as a effective and powerful tool for wildlife conflicts mitigation worldwide. The device has been used in India in wildlife terrain and is very effective to provide safety to the forest officials & wildlife veterinarians during the leopard – human conflicts, night patrolling and during tranquilization of wild leopards & tigers for rescue. Key Features of this Wildlife Rescue Bike are: 1. Close monitoring, patrolling & surveillance of wildlife in protected areas; 2. Provides complete cover during wildlife rescue operations; 3. The Wildlife Rescue Bike will give 360 degree panoramic view for darting; 4. It comes with blow gun, tranquilization equipments, dart guns, ropes, stick, binoculars, anti-venom & first aid kits; 5. Contemporary & dynamic design; 6. The bike is covered from all the sides with iron-net to ensure the protection of forest guard from the attack of wild animal; 7. The front-handle wheel gap is further protected from inside with additional iron-net and horizontal rods, so that the wild animal cannot enter from front wheel gap; 8. The main frame is attached to bike guard and supported with additional vertical-adjustable stands, which can neutralize the force of wild animal attack, and the bike will not topple down; 9. The wildlife veterinarian can dart the animal from all sides, with minimum adjustment; 10. The ground clearance is 200 mm; 11. The Wildlife Rescue Bike is also provided with the LED lights at four sides, so that during patrolling in night they can keep watch from all angles; 12. The frame has a provision for keeping the rescue operation equipments’ viz. water bottles, dart gun, blow pipe, ropes, medicine bag, sticks, etc.; 13. The Wildlife Rescue Bike has a provision to cover with the forest landscape print, which will camouflage with the surrounding. These will reduce the stress on the animal during rescue operation as well as it will reduce the chance of counter attack of leopard on bike during the operation.

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Effects of dispersal and density of leopard (*Panthera pardus fusca*) on severity of conflict around Gir PA, Gujarat, western India

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Common leopard (*Panthera pardus fusca*, Mayer) is at global dislike, principally due to conflict with humans at the boundary of the most of the parks. Opportunistically, high density and long dispersals of leopards may contribute significantly to draw them towards periphery specifically where they co-exist with other sympatric competitor. A long term history of leopard human conflict cases was obtained from the forest department (WDS, Gir), and was maintained on complaints of villagers regarding leopard problems at the boundary of the Gir PA. The conflict status was analyzed and resulted with consistent increase in numbers ranged from 4 during 2000 to 200 during 2012. Leopard density was estimated as an avg. 3.47 ± 0.28 individuals/100 km² along with high occupancy rate 0.915 ± 0.024 respectively using mark-recapture matrix. The movement and ranging pattern of radio-collared leopard was recorded ca. 11 kms in each dispersal effort during 2002 to 2005 towards human vicinity and finally established home range of ca. 70 km² in agro-farm at the coastal site. As the leopard is a least studied and most problematic large carnivore out-side protected areas, its conflict resolution strategy would be more successful with the information on the abundance, preferable home range size & movement pattern respectively.

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Abundance and diversity of insects associated with citrus orchards in two different agroecological zones of Ghana

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Statement of the Problem: Citrus is one of the world's major fruit crops recognized for its popularity in contributing to food and nutritional security. Citrus orchards serve as a habitat for plethora of arthropods including harmful and beneficial insects. However, these beneficial insects such as butterflies, moths, bees, predators, parasitoids face the same fate as harmful insects during pesticide and herbicide applications. An inventory of an entomofauna associated with citrus orchards is poorly documented making it difficult for an economically and ecologically sound integrated pest management (IPM) strategy to be adopted.

Aim: The purpose of the study was to document entomofauna associated with citrus.

Methodology & Theoretical Orientation: A passive sampling technique using malaise, flight interception, pit fall, forceps and yellow pan traps were utilized on monthly basis for a period of six months in two agro-ecological zones of Ghana.

Findings: A total of 20,285 individual insects belonging to 387 species from 107 families and 13 orders were recorded. Diversity indices such as Shannon-Wiener index, Pielou's evenness and Margalef index were higher in the Coastal Savannah zone than the semi-deciduous rainforest zone during both the wet and the dry seasons. *Oecophylla longinoda* Latreille was the most dominant insect species in each agroecological zone, however, they were more abundant in the semi-deciduous rainforest than the Coastal Savannah zone. Nine percent (9%) of all the 387 insects collected were pests of citrus.

Conclusion & Significance: Citrus orchards are potential habitats for insect biodiversity conservation. We recommend that management tactics which have less or no negative effects on natural enemies, pollinators among others, but can effectively suppress insect pest populations and should be adopted. Our study has also provided the first comprehensive inventory of insect species associated with citrus agroecosystems serving as a baseline data for further studies to encourage adoption of economically sound IPM approach for citrus production.

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Avifaunal diversity needs attention and conservation? Status report from Chennai

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Understanding the diversity and structure of bird communities is essential to delineate the importance of regional or local landscapes for avian faunal conservation. Birds are an essential "bio-indicator" and are very sensitive to environmental changes. The use of bio-indicator as a tool in conservation of landscape ecology is becoming widespread. Based on this aspect, we have taken an effort to study the avifaunal diversity of south Chennai lakes and also to conserve the lakes from anthropogenic activities. A random survey was conducted in five lakes of south Chennai from 2013 onwards. We recorded 43 different bird species belonging to 29 families and 12 orders. The results revealed that, in the habitat status, 11 species come under resident migrant and 32 species come under resident. Moreover, from the noticed species 1 sp. is very common, 22 sp. are common, 9 sp. are rare and occasionally 11 sp. were noticed. According to the International Union for the Conservation of Nature (IUCN) Red list 2015 status, we have recorded near threatened 3 sp., (*Pelecanus philippensis*, *Mycteria leucocephala*, *Threskiornis melanocephalus* and least concern 40 species. Among these 43 species, 17 sp. are terrestrial and 26 sp. are aquatic. These bio-indicators are a good medium for pollination, seed dispersal and biological control and even they play a vital role to continue the ecological cycle. Increasing urbanization, industrialization and other anthropogenic activities are posing a great threat to this avifaunal diversity.

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