



Photo courtesy: Nikunj Gajera

Editors note.....

Dear All,

This issue of *guide.net* features articles of diverse nature. Similar to earlier issues, it portrays some emerging and existing issues *vis-vis* Kachchh biodiversity and environment and in-house activities of GUIDE. These articles are yet another indication that Kachchh ecology and environment are fascinating and there are many spheres that are yet to be unraveled. As we explore deep into different facets of arid ecology of Kachchh, it is becoming clearer that in an arid ecosystem such as Kachchh, people's livelihood and environment is intricately interwoven. It is gratifying to learn that *guide.net* within its short span of existence has made positive strides to understand and unravel this people-environment binding.

It is a pleasure that constructive feedback of our readers is increasing with every issue of the e-newsletter. When *guide.net* was launched its simple aim was to serve as a platform to readers to share, augment and get informed of various developments in the arid ecology. Crossing this line, it is now used as a vehicle to launch new ideas and finding new avenues for research which will address many of the existing questions. With every issue our endeavour is to provide a stronger and wider platform to ecologists to explore and present new avenues.

True to our original goal, with every issue, *guide.net* will continue to present a mixed package of science articles, in-house news, information about upcoming conferences/seminars and symposia in arid and marine/coastal ecology. As always, we earnestly solicit readers' views and constructive criticisms to improve our journal. Thus, from next issue onwards, we look forward for having your constructive comments to be included in a separate section of the e-newsletter.

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Biodiversity and Conservation

The chase still continues: *Caracal caracal*

Carnivores are one of the most studied animals on the planet but still some species lack this attention and not much is known about their actual status and distribution around the world. One such carnivore is Caracal, though known to be found in some parts of central and western India but its actual distribution and status still remains a question of scientific interest.



<http://www.taringa.net/post/ecologia/17988111>

Not much work has been done so far on Caracal in India and particularly in Kachchh, the western most part of the country. As a part of the project "Status and Distribution of Caracal in Gujarat", intensive field studies are going on for searching this species and assessing its status in Gujarat. Around 4-5 incidents were reported by the researchers where the species was directly sighted but by the time they tried to click a photograph of the individual it was on its toes.

A field survey was recently conducted by our team at Nakhatrana taluka of Kachchh district, the team was working in Bagpat reserve forest area for assessment of suitable sites where camera traps could be placed. Around 7pm we spotted a Caracal that was about 70-75 m away from us hiding behind a bush. The individual was spotted in mixed thorn forest and the location was 23°25'28.5"N and 69°14'46.4"E at an altitude of 119m. The moment we tried to reach out

for our camera the animal went away like a bullet and couldn't be traced after that but left a clear pug marks for our confirmation.



We conducted the survey for more than 10 days at Nakhatrana but couldn't sight the animal again. We came across other mammalian species like Porcupine, Hyena, Jackal, Desert cat, Desert gerbil, Wild boar, Nilgai and Chinkara but Caracal remained elusive. This confirmed the rareness of the species and also its low population. Local villagers and Maldharis were interviewed for information on presence of Caracal in the area and their experiences/answers were documented for future reference. Our team is working continuously on and off the field to locate the habitat and assess the present population status of the species. The study till now confirms the presence of the species in Kachchh through indirect evidences (such as pug marks, information gathered from villagers and forest officials) and direct sightings.

With these evidences flowing in, we move on with more confidence to chase the one who is still on the run - The CARACAL.

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Conservation / management of threatened Sharks and Rays

In the last two decades, marine biodiversity is under increasing threat, primarily as a result of over-harvesting, pollution and direct and indirect impacts of climate change. At present, around 45% of the world's human population lives within 100 km of the coast and this proportion is increasing. With the median global human population predicted to increase to over 9 billion by 2050 and more people choosing to live along the coastal fringes, marine habitats are likely to suffer. Sharks and rays are highly mobile species that are not associated closely with the sea floor and primarily live in the open ocean away from continental landmasses.

Many of these species reproduce relatively late (2-21 years) and have long life spans (8-65 years), with longer gestation period and few offspring. As such, many of them are especially vulnerable to over fishing because they have a slow rate of population growth. Sharks and rays are regularly taken as incidental by-catch by fisheries targeting tuna and swordfish. As new markets develop and traditional food fish decline, they are targeted. Shark fishing is often still driven by the high demand for shark fins, which are traded internationally for use in the Asian delicacy (shark fin soup). The number of sharks and rays caught has been poorly reported globally, however, primarily because domestic or international regulations for reporting catch and by-catch are not in place, not enforced, or ineffective. Additionally, finning bans are often implemented through complicated fin to carcass ratios aimed at ensuring that the weight of shark carcasses and the weight of fins landed correspond. This shortage of information limits assessment of these species' status and conservation.

Globally, 32% of all sharks and rays are threatened (6% endangered and 26% vulnerable). A further 24% are considered to be close to meeting the criteria for a Threatened category, being assessed as Near Threatened, 19% are assessed as least concern, and 25% are considered data deficient. Many threats are faced by sharks, rays and their relative groups in India due to commercial fishing, recreational fishing, incidental catch, over-exploitation, coastal development, declining water quality *via* pollution, toxic chemicals, marine debris, anthropogenic pressures, tourism and boating activities.

The International Union for the Conservation of Nature (IUCN) Red Data List is the most complete record of the worldwide status of plant and animal species. It uses a single homogeneous set of red data list criteria to appraise the extinction hazard of thousands of species and sub-species worldwide. Each evaluation is sustained by detailed documentation (with information on ecology, life history, distribution, habitat, threats, population trends and conservation measures). To date, 67 species of elasmobranchs are considered critically endangered or endangered by IUCN. Sharks, rays and their relative group (elasmobranchs) populations are threatened primarily due to high rates of direct fishing and by-catch mortality in global fisheries, but also by marine pollution, habitat destruction and climate change. As such, dramatic declines in abundance are reported from many parts of the world. These negative trends,

combined with the importance of elasmobranchs and their high value for tourism, have prompted attention from scientists, conservation and management organizations, media and public. Thus, initiatives to arrest and reverse these trends are underway.

Threats faced by sharks and rays and their relatives in Gujarat coastal waters may be reduced through appropriate management plans and actions at national, regional and local levels. Such actions can be undertaken by Sharks Specialist Groups (SSG) in association with wildlife/forest departments, fisher folk groups, coastal dwellers, students, tourism operators, industrialist and individuals. SSG may be involved in mitigation activity available at the regional and local levels in relation to threats. It also supports to formulate government legislation and regulations to reduce over-exploitation. SSG and local governments may also help in reducing the impacts of tourism by working with tourism operators to promote ecologically sustainable activities and support the development of accredited eco-tourism operations.

Awareness Programs

- Community education and awareness programs by SSG may help in reducing the amount of nutrients from households entering water drains.
- Awareness creation to the community groups could help in protecting / restoring breeding grounds.
- Awareness creation on by-catch issues may increase the status of live sharks and rays.
- Fisher folk community groups and coastal dwellers shall ensure that their boat engines are well maintained and that hulls are kept clean.
- Awareness on protected area issues to fisher folk communities, coastal dwellers, publics and tourists would help in increasing sharks and rays diversity.
- Recommendations issued by SSG should be incorporated with coastal and marine resource management plans and fisheries management plans.

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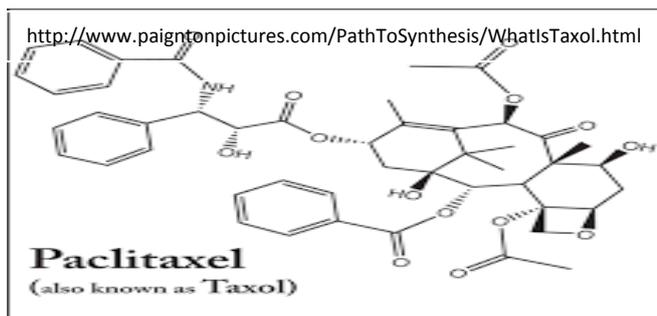
Can endophytic fungi from medicinal plants of Kachchh be a potential resource for bioactive compounds?

Kachchh, the largest district in India, is located in North-western part of Gujarat and covers an area of 45,652 km². This district is basically a broad stretch of dry land comprising hills and deserts with a fertile coastline. In spite of the dearth of water, the Kachchh is rich in plants. Medicinal plants fetch global attention due to the fact that the herbal drugs are cost effective, easily available and with trifling side effects. Plants

harbour microorganisms, collectively known as endophytes. Several pharmaceutical compounds produced by medicinal plants are reportedly produced by their endophytic fungi. Discovering the unexploited natural products from the endophytes isolated from medicinal plants enhance the chances of finding new compounds. Hence, it is imperative to study the medicinal plants for their endophytic mycoflora for biodiversity and also to establish their medicinal properties. Natural product drug discovery has recaptured the interest due to low production costs, structural diversity, and numerous uses of active compounds to treat various diseases. Awareness has been directed towards medicinal plants as these plants have been traditionally used to treat numerous diseases. Medicinal plants are not only explored to isolate novel bioactive compounds for rapid development of drug-resistant pathogens but also to preserve world's ever diminishing biodiversity. To date, the investigation on endophytic microbes of Kachchh medicinal plants are still in its infancy.

Endophytes are plant associated microorganisms that live within the living tissues of the host plants without causing any harm to them. Large groups of microorganisms are found in endophytic association with plants like fungi, bacteria or actinomycetes with sundry biological activities exploited for human health and welfare. Natural constituents from plants are derived from leaves, bark, fruits, flowers, seeds, roots, etc. Some of the endophytic microorganisms enhance the production of secondary metabolites with promising source of novel compounds as that of plant.

Natural products from fungal endophytes have a broad spectrum of biological activity. The reported bioactive products include antibiotics, antimycotics, antiviral compounds, antipathogens, immunosuppressants, anticancer agents, antioxidants, insecticides, and other biologically active substances. Endophytic fungi isolated from medicinal plants are more likely to exhibit pharmaceutical potentials. Taxol, a highly functionalized diterpenoid, isolated from Yew tree was the world's first billion dollar anticancer drug. In addition, some plants producing bioactive natural products have associated endophytes that generate same natural products. A group of researchers during 1993 isolated a novel taxol producing fungus *Taxomyces andreanae* from *Taxus brevifolia*. Since then, Taxol is reported in many genera of fungal endophytes either in association with Yew or without association, such as *Taxodium distichum*, *Wollemia nobilis*, *Phomopsis longicolla*.



Antioxidant activity of an endophyte *Xylaria* sp. was reported from *Ginkgo biloba*. The endophytic fungus isolated from inner bark of *Nothapodytes foetida* produces camptothecin, an anticancer drug. A group of researchers screened fungi from Chinese medicinal plants for anti-human immunodeficiency virus type 1 activity, and found that fungi isolated from *Dendrobium* sp. and *Taxus* sp. exhibited potent anti-HIV activity in an *in vitro* 3-(4,5-dimethyl-2-thiazoyl)-2,5-diphenyl-2H-etrazolium bromide assay. All these indicate that endophytic fungi of medicinal plant are a rich resource of bioactive natural products with potential pharmaceutical values.

The bioactive compounds obtained by extraction from endophytes occurring in natural sources have some demerits such as seasonal, climatic and ecological problems involved with the extraction. Hence, an innovative approach is needed to obtain such compounds. The biotechnological techniques by using various microorganisms appear promising alternatives for determining a cost-effective and renewable resource of high-value bioactive products. Endophytes as drug source will help to conserve biodiversity and drug resistance as they are an alternate source of drugs. In future, the conventional methods of drug discovery may be replaced by the endophytes. Thus, importance of endophytes from medicinal plants and their bioactive secondary metabolites in pharmaceutical applications are desired to be explored in Kachchh, Gujarat.

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Solid Waste Management

Sustainable Solid Waste Management

Waste is defined as any material that is not useful and does not represent any economic value to its owner, the owner being the waste generator. Depending on the physical state of waste, wastes are categorized into solid, liquid and gaseous. Solid wastes are categorized into municipal wastes, hazardous wastes, medical

wastes and radioactive wastes. A solid waste management (SWM) system includes the generation of waste, storage, collection, transportation, processing and final disposal. Generation of MSW has an obvious relation to the population of the area or city. Urbanization and industrialization, increasing population levels, booming economy, rapid urbanization and the rise in community living standards have greatly accelerated the municipal solid waste generation rate in developing countries. The reason behind it is mainly changing lifestyle, food habits and change in the living standard.

Sources	Solid waste Components
Residential	Food waste, paper, cardboards, plastics, textiles, glass, metals, ashes, special wastes (bulky items, consumer electronics, batteries, oil, tires) and household hazardous wastes
Commercial	Paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes
Institutional	Paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes
Municipal services	Street sweepings, landscape and tree trimmings, general wastes from parks, beaches, and other recreational areas

Gujarat with an area of 196,077 km², has a coastline of about 1,600 km. The state is bordered by Rajasthan to the north, Maharashtra to the south, Madhya Pradesh to the east and the Arabian Sea as well as the Pakistan province of Sindh on the west. Its population was 60,383,628 as per census data 2011. The population density is 308 persons/km² that is lower compared to the national average. There are 26 administrative districts in the state in four regions of Gujarat. The present citizens of Gujarat are living in times of unprecedented economic growth, rising aspirations, and rapidly changing lifestyles, which will raise the expectations on public health and quality of life.

MSW can be broadly categorized into three groups viz., compostable, recyclables and inerts. Compostable or organic fraction comprises of food waste, vegetable market wastes and yard waste. Recyclables comprise of paper, plastic, metal and glass. Waste composition dictates the waste management strategy to be employed in a particular location. Organics in MSW are putrescible, and are food for pests and insects and hence need to be collected and disposed off on a daily

basis. The amount of recyclables like paper and plastic in MSW dictates how often they need to be collected. Recyclables represent an immediate monetary value to the collectors. Organics need controlled biological treatment to be of any value, however due to the general absence of such facilities, organics do not represent any direct value to informal collectors.

MSW components	Materials
Compostable	Food waste, landscape and tree trimmings
Recyclables	Paper, cardboard, plastics, glass, metals
Inerts	Stones and silt, bones, and other inorganic materials

Government of Gujarat has set up a state level committee headed by the Principal Secretary, Urban Development and Urban Housing Department and a sub-committee headed by a subject expert to identify systems for solid waste management reported. All cities and towns have been advised to implement the recommended systems. Regional and state level workshops are conducted to provide training to all responsible officers of ULBs and action plans have been prepared for almost all the cities through the Gujarat Municipal Finance Board, a nodal agency of the state government and City Manager's Association, Gujarat. The state government has sanctioned Rs 22 crores since 2000 to ULBs of class I cities/towns for the procurement of tools and equipment. Government of Gujarat has passed a resolution to allot land to municipal corporations at 25% of the market value and to smaller local bodies on a token lease rent for a period of 30 years for treatment and disposal of waste. Thus, 147 out of 149 cities and towns have been able to earmark appropriate land and these sites have been duly authorized by the state pollution control board for treatment and disposal of waste.

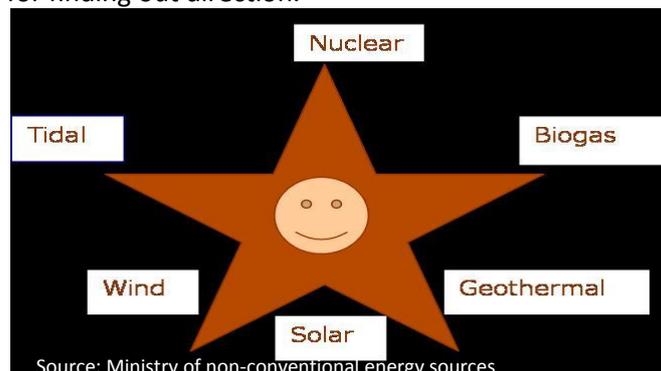
Earlier composting in India was made out of cow dung and other agro-waste. Nevertheless, compost made out of urban heterogeneous waste is found to be of higher nutrient value than that made out of cow dung and agro-waste. Composting of MSW is, therefore, the most simple and cost effective technology for treating the organic fraction of MSW. Full-scale commercially viable composting technology is already demonstrated in India and is in use in several cities and towns. Its application to farm land, tea gardens, fruit orchards or its use as soil conditioner in parks, gardens, agricultural lands, etc., is however, limited due to poor marketing.

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Non-conventional energy sources: prospects in India

Energy consumption in India is 4th highest after China, USA and Russia. The total primary energy from crude oil was 29.45%, natural gas 7.7%, coal 54.5%, nuclear energy 1.26%, hydroelectricity 5.0%, wind power, biomass electricity, solar power 595 MT during 2013. For intake in net imports, energy consumption in India during 2013 was nearly 144.3 MT of crude oil, 16 MT of LNG, 95 MT of coal totaling to 255.3 MT of primary energy which is equal to 42.9% of primary energy.

The non-conventional sources of energy are abundant. According to energy experts, the non-conventional energy potential of India is estimated at about 95,000MW. These are renewable resources. The non-conventional sources of energy can be renewed with minimum effort and money. Non-conventional sources of energy are pollution-free and eco-friendly. In India non-conventional energy sources consist of infinite, natural, and restorable. In the beginning, wind energy was used in windmills for taking out water and pounding grains. Running water and wind were applied for finding out direction.



Tidal energy

For electricity generation, dams are built near estuaries to make use of inward and outward water current and surges. Subsequently, the water is used to power turbines *via* the generation of available water. For cost-effective performance, tidal surge should be 7m. In Gujarat, the Gulf of Khambat is appropriate for electrical energy from the energy generated by high and powerful tides moving into small brooks.

Wind energy

It is used for drawing water, which is an essential requirement in watering agricultural lands in the rural areas. In addition it can be utilized for electricity generation. In India states like Tamil Nadu, Gujarat, Orissa, and Maharashtra are regarded as superior areas with respect to this type of energy. Places that have regular and rapid wind flows are appropriate for

this type of power generation. Other than windmills, wind farms are there as well.



Solar energy

Several tiny and medium scale solar power plants have been intended for countryside areas in India. Till now, some of the effective uses of solar energy include water heating, food preparation, area heating and removal of salt from water, and drying of harvest. Solar voltaic systems, solar thermal systems and solar energy centre are some of the means of generating solar energy. The biggest solar photovoltaic power plants are Gandhinagar Solar Plant, Thyagraj Stadium Plant, Azure Power and REHPL-Sadeipali.

Geothermal energy

It is an application of natural temperature, which prevails on the exterior and below the earth, predominantly in the fissures and holes within the outer shell of earth.

Biomass

It is broadly utilized in domestic circles for preparing food and warming. Smoke-free ambience, improved health-care, and better quality of life and education are some of salient benefits of biomass.

Energy plantation

The plants in this category provide wood coal, fuel wood, power, hay and most notably opportunities for agricultural service. With the gasification plan, these energy plantations spanning around 8000 ha generated nearly 1.5 MW power every year.

Bagassee oriented power plants

It is a sugar mill disposal which has the capacity generate 2000 MW additional electrical energy at the time of grinding period. The energy generated may be used in fulfilling the mill's own initial needs and for watering farm areas for supplying local power system.

Energy from urban disposables

A pilot plant is proposed in Delhi for generating energy from urban disposables.

Animal, agricultural and human excretions

Gobar Gas plants have been used in rural areas for making them self-reliant in their energy requirements. The energy regenerated in this system is used in food preparation, lighting roads and houses, and satisfying the water supply needs of rural community. The steps for enhancing non-conventional energy sources in India should be more relevant. The largest percentage of energy is used in household kitchens of India. Cow dung and wood are regarded as global sources of energy. Unfortunately, the conventional chullahs are uneconomical modes of preparing food. The better categories of effective and smoke-free chullahs assist in protecting wood fuel.

The geo-thermal energy sources dealings in our country is not affluent, even on domestic grounds the prospects are meager. Nonetheless, endeavors are on for the exploitation of the Manikaran thermal springs in the state of Himachal Pradesh. Energy generated on this can be used for operating cold storage plants.

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Climate Change

Climate change and its uncertainty

Climate change has long since ceased to be a scientific curiosity, and is no longer just one of many environmental and regulatory concerns. It is a growing crisis with food production, economic, health and safety, security, and other dimensions. Gradual shift in weather patterns, for example, threaten food production through increased unpredictability of precipitation, rising sea levels contaminate coastal freshwater reserves as salinity ingress land-wards and increase the risk of catastrophic flooding, and a warming atmosphere aids the pole-ward spread of pests and diseases once limited to the tropics. Though the link between the extreme weather events and climate change is not scientifically proved, the recurring events during the recent years in India give us a warning signal for climate change and related uncertainty. Cloud burst at Gudalur-Ooty (Tamil Nadu) on 26th June 2013 and floods in Assam on 3rd July 2013 (affected about 1,10,000 people), West Bengal on 15th July 2013 (affected about 2,00,000 people), Chandrapur (Maharashtra) on 5th August 2013 (economic loss of INR 1835 crores) and Uttrakhand on 13th November 2013 (affected about 1,10,000 people) are some of the unpredictable recent events that considerably damaged the economy and impacted human beings. In Andhra Pradesh three severe

cyclones hit during the year 2013; cyclone-Mahesan on 8th May, cyclone-Helen on 21st November and cyclone-Leher on 28th November affected many areas and caused several thousand crores of economic losses. Cyclone-Phaillin hit on 12th and 13th October 2013 mainly along Odisha and part of Andhra Pradesh coast causing damage over INR 4000 crores.

Drylands cover two-fifths of Earth's land surface and are home to 2.3 billion people worldwide. They are highly unpredictable ecosystems, characterized by low, erratic rainfall and high inter-annual climatic variability. Kachchh district, located on the western part of Gujarat spreads over 45,652 km² and falls completely under drylands. The district is known for its uncertainty woes with climate pattern, which though was observed since the mid 20th century, but looked upon as cyclical changes. Later it was understood that the change in climate is abnormal. Meager information on these issues in Kachchh necessitates a serious undertaking of clear understanding and need for climate change dialog and adaptation. Thus, the present study was undertaken by GUIDE in collaboration with STEPS centre of Sussex University, UK, to understand the effects of climate change and its uncertainties in Kachchh.

A detailed field study to understand the perception of local villagers ("below" category respondents) was conducted at villages like Jakhau (coastal), Kanmer (agro-pastoral) located along the fringe of Little Rann of Kachchh and Banni (grasslands) located on the edge of Greater Rann of Kachchh. These make the study villages more vulnerable to even slightest changes in climate. Apart from this, interviews and discussions were also held with "above" category respondents (scientists, professors, bureaucrats) and "middle" category respondents (NGO representatives, local officials, village heads and teachers) to understand the views on climate change and its uncertainty.

Respondents of all categories stated that climate change is very sensitive to all livelihood resources including grassland, coastal zones, animal husbandry, water resources, forests, fishery and urban areas. However, their views on impact of climate change on livelihood were different. The "above" category respondents were of the view that coastal zones are more vulnerable while "middle" category respondents rated water resources as most significant and the "below" category respondents said it is site specific, however, animal husbandry and agriculture are the major concerns. In Kachchh, rural population is predominantly dependent on agriculture and animal

husbandry, which in turn is highly dependent on the south-west monsoon.

An integrated and coordinated approach is urged to tackle climate change and related uncertainties. More awareness and educational programmes and change in life style are requisite. Scientific knowledge is the most effective foundation for understanding and developing coping strategies for climate change issues, however, developing an integrated approach to deal with climate change related uncertainties through effective interactions at all levels under a common platform involving people's perception who form the major target in such schemes is vital.

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NDVI - Indicator of Green Patches of Land

Normalized Differential Vegetation Index (NDVI), in remote-sensing is important to determine vegetative index for analyzing vegetative conditions in the Region of Interest (ROI). Healthy or dense vegetation absorbs most of the visible light and reflects a large portion of the near-infrared light. While unhealthy or sparse vegetation reflects more visible light and less near-infrared light. NDVI is calculated from the visible and near-infrared light reflected by different vegetation types. The formula for calculating NDVI is:

$NDVI = (NIR - VIS) / (NIR + VIS)$ or $NDVI = (NIR - Red) / (NIR + Red)$, where, NIR is Near Infrared and VIS is Visible light.

Value of NDVI for a given pixel always ranges from -1 to +1. Green leaves never give a value closer to zero. While zero means no vegetation and closer to +1 indicates the highest possible density of green leaves. The density of green on a patch of land, researchers must observe the wavelengths of Visible and NIR reflected by different plants. When sunlight strikes a particular object, certain wavelengths of the colour spectrum are absorbed and others are reflected back in the atmosphere. Plant leaves absorb visible light that ranges from 0.4 - 0.7 μm for use in photosynthesis. While the cell structure of the leaves, strongly reflects NIR that ranges from 0.7 - 1.1 μm .

An Image Interpreter can compute the fraction of photosynthetically active radiation that is absorbed by vegetation by using various NDVI formulae for various Satellite imageries. If plants absorb more visible sunlight then it is more productive thus reflecting healthy vegetation. Further, NDVI value can be averaged to establish the specific normal growing conditions for vegetations in the selected ROI for a particular duration throughout the study period.

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Events in GUIDE

National Symposium on “Dryland Birds: Strategy for Conservation and management”

Birds, the second largest diversified group of vertebrates after fish, are one of the well recognized indicators of the health of an ecosystem. Birds play number of roles in ecosystem, thereby providing several ecosystem services viz., provisioning, regulating, cultural and supporting services like predation, pollination and seed dispersal. Birds occupy multiple habitats, wherein drylands form one of the important areas though it experiences harsh environmental conditions. Drylands (including dry sub-humid, semi-arid, arid and hyper-arid lands) cover 41.3% of the earth's land surface and dryland biodiversity plays a pivotal role in the global fight against poverty, climate change and desertification.

The status of dryland biodiversity perhaps is not quite clear. The IUCN has identified 1300 locations in drylands where the conservation and management of biodiversity is very essential. Overall, 10,000 mammals, birds and amphibian species are estimated to be found in drylands of the world (i.e. 64% of birds, 55% of mammals and 25% of amphibians). Among the total recorded bird species, 3% are endemic to drylands. Birdlife International has identified 217 Endemic Bird Areas (EBAs) worldwide of which, 24 are within drylands. In India, drylands cover about 228 million ha, which forms 69% of country's land area, in which vast majority is located in Rajasthan and Gujarat.

Our knowledge about the status and threats to dryland biodiversity of India especially on birds is limited. Many species of dryland birds are under threat of extinction due to natural or anthropogenic activities. Therefore, to delineate future strategies for the conservation of avifauna in dryland habitat, an attempt was made by GUIDE through “National Symposium on Dryland Birds: Strategy for Conservation and Management”, which aimed at bringing researchers, professionals and amateur bird watchers together in a single platform to discuss exchange and share their experiences in the field of ornithology with respect to drylands. Further, it was also aimed to delineate future strategies for the conservation of birds in dryland habitats.

The symposium was organized at Court Hall, K.S.K.V. Kachchh University, Bhuj-Kachchh on 9th and 10th January 2015. A total of 211 delegates from 11 states of the country participated. Total 42 abstracts were selected for the presentation under 4 thematic areas.

Shri R.V. Asari, IFS (*Retd.*) Director, GUIDE, gave the welcome address. In his address, he discussed the importance and need of conservation of dryland birds.



The symposium was inaugurated by Dr. P.A. Azeez, Director, Salim Ali Centre for Ornithology and Natural History (SACON), Coimbatore. He mentioned that habitat degradation, overexploitation of biological resources, introduction of exotic species, pollution, industrial and agricultural development, habitat loss, exploitation of water resources are causing threats to the avifauna of dryland regions.



Dr. J.A. Khan, Chairman, Gujarat Biodiversity Board (GBB), Gandhinagar, delivered the keynote address. He deliberated upon the importance of dryland bird's conservation for the country and emphasized upon the necessity of awareness generation about the dryland birds through various programmes. Dr. Khan highlighted some historical accounts of birds, status of biodiversity including birds in drylands and other related aspects.



Dr. A.P. Singh, Member Secretary, GBB, highlighted various aspects of dryland Birds, especially on the status of birds in Gujarat. Shri. U.D. Singh, Chief Conservator of Forests, Kachchh, highlighted the importance of bird's conservation in dryland of Kachchh, which is one of the gateways of birds in India.



Many distinguished guests and eminent personalities actively participated in the symposium: Shri. S.G. Mankand, Ex-Chief Secretary, Govt. of Gujarat and Chairman, GUIDE, Bhuj; Smt. Vijayalaxmi Seth, Ex-Chief Postmaster General, Gujarat and Vice-Chairman, GUIDE, Bhuj; Prof. V.C. Soni, Saurashtra University; Prof. K.K. Sharma, Ex-Vice Chancellor, M.D. University, Ajmer; Prof. Geeta Padate, M.S. University, Vadodara; Prof. B.M. Parasarya, Agriculture University, Anand; Dr. Y.V. Jhala, Scientist-G, Wildlife Institute of India. Around 200 academics, scientists, naturalists, students and forest department officials had participated.



The Ist technical session on 'Dryland Scenario – Status and Distribution' was chaired by Prof. V.C. Soni and Co-Chaired by Prof. Geeta Padte. In the session; Mr. Arpit Deomurari, Foundation for Ecological Security (FES) and Prof. K.K. Sharma, Former Vice-Chancellor, MDS University, Ajmer, delivered invited lectures. It was followed by 11 presentations from young scientists. The presentations in this session included: efforts and on-going programme on identifying data gaps in bird species distribution in various landscapes, provisions of Indian Biodiversity Information System (IBIS), and strengthening of IBIS platform for effective interaction among stakeholders.



Application of bioacoustics as a tool in bird taxonomy studies and conventional approach such as Visual Encounter Survey, and Call Counts versus bioacoustics tools for bird species identification were stressed. Various provisions of Biological Diversity Act, and the efforts made by GBB in documenting the avian diversity of the state and its conservation involving communities at grass-root level was also discussed in the session along with Access and Benefit Sharing (ABS) mechanism in conservation and sustainable utilization of biological resources. The need for delineating Important Bird Areas (IBA) outside protected areas, historical information on birds in drylands, use of advanced tools in bird studies and legal and institutional provisions in conservation of avian diversity were also discussed during the session.

The IInd technical session on 'Ecosystem Services of Birds' was chaired by Dr. P.A. Azeez and Co-Chaired by Dr. A.V.R.L. Narsimhacharya. The session focused on various ecosystem services rendered by birds, gaps in our knowledge, birds with special reference to agro-ecosystem, and various threats in the agricultural landscape including pesticide poisoning, vanishing hedges, nesting cavity loss, habitat loss due to infrastructural developments and the importance of eco-friendly management of agro-ecosystem for conserving birds.

The IIIrd technical session on 'Issues and Threats on Birds' was chaired by Prof. K.K. Sharma and Co-Chaired by Dr. N.A. Dharaiya. The discussion in this session included eco-tourism initiatives, status of Houbara bustard and Stoliczka's bushchat in the Bhal area of Gujarat, relative abundance and extent of damage by avifauna on fruit crops, impact of urbanization on avian diversity and density in Kachchh, impact of water quality on macrofauna abundance in mangrove ecosystem of Gulf of Kachchh, and enhancing public awareness for bird conservation.

The IVth technical session on 'Conservation and Management of birds' was chaired by Dr. A.P. Singh and Co-Chaired Dr. I.R. Gadhvi. The session focused on

insectivorous birds and prey base in select wetlands in Gujarat, status and conservation of birds of southern tropical thorn forest of Great Indian Bustard Sanctuary in the Deccan Plateau, people's perception on conservation of common birds in select villages of Kachchh district, status of Bustard habitat and future conservation plans for threatened birds in Kachchh.

The valedictory session was presided over by Shri. R.V. Asari and addressed by Prof. V.C. Soni, Saurashtra University, Rajkot. The participants / delegates concluded that conservation of dryland birds is an important issue and the conservation and management should focus on birds and its habitats. Kachchh is significant for birds, it being a gateway for migratory birds to India. Further, the conservation and management plan for Kachchh is a massive task under the present phase of developments, desertification and climate change scenario, urbanization, and industrialization in Kachchh. It is also essential to promote awareness to people through Biodiversity Monitoring Committee (BMC) and other awareness programmes for sustainable utilization of natural resources and thereby conserving its biodiversity.

The key note speaker, distinguish guests, delegates and other participants also made a field trip to Charri Dhand Conservation Reserve on 10th January 2015, which is one of the Important Bird Areas (IBAs) of Kachchh.

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Symposium/ Workshops/ Conferences

Vibrant Gujarat (Global Summit 2015)

Gujarat has been organizing a Biennial Vibrant Gujarat Global Investors' Summit since 2003 for fostering development in industrial and social sectors through promotion of investments and collaboration in Gujarat. The Vibrant Gujarat Summit provides opportunities to exhibit strengths and core competencies of Gujarat to potential investors and partners in different sectors. Since Vibrant Gujarat Global Investors' Summit 2011, Education Sector has been included as one of the development sectors. GUIDE is identified / recognized as one of the leading research and academic Institute's from Gujarat by various government departments and institutes. Thus, the Education Department, Government of Gujarat, is inviting GUIDE to participate in Vibrant Gujarat Global Summit since 2013 onwards. This time also GUIDE was invited by the Education Department, Government of Gujarat, to participate in

Vibrant Gujarat Summit 2015 during 7-13 January 2015 at Mahatma Mandir, Gandhinagar, Gujarat. The Vibrant Gujarat 2015 was inaugurated by the Honorable Chief Minister of Gujarat, Smt. Anandiben Patel. Other important Dignitary such as Sushma Swaraj, Foreign Minister; Rajnath Singh, Home Minister; Vankeiya Naidu, Minister for Urban Development also visited the exhibition.



Dr. Jayesh Bhatt (Nodal person), Mr. Ajay Gohel (Research Fellow) and Mr. Bhagirath Pardva (Research Fellow) actively participated and displayed institute's expertise in various disciplines. In continuation, a series of meeting were held to discuss various issues related with design and display material relevant to the theme at Knowledge Consortium of Gujarat (KCG), Ahmadabad, which is participated by Shri R.V. Asari and Dr. Jayesh Bhatt as and when organized. The institute was allotted a stall of 12 m² on complementary basis. The theme for the education pavilion was 'Holistic Development through Education' for the Vibrant Gujarat 2015. Display material such as posters, banners, publications, books etc. were prepared to exhibit in the stall as per the theme.



There were 90 various stalls allotted to different universities, institutes and organization under different specific heads in Education Pavilion-2. Saurashtra University, M.S. University, S.P. University, GTU, Veraval Somnath Sanskrit University, Junagadh Agriculture University, Navsari Agriculture University, Nirma University, Gujarat Forensic University, Central University, Hem. North Gujarat University, CHARUSAT, Veer Narmad South Gujarat University, Kachchh University, IRMA, Reliance, Physical Research Lab., GIDR, are a few who participated in the summit. A memento for participation was given to each institute.



Though the summit was open for public for only three days, good number of people visited the stalls every day including many foreign delegates from Australia, US, UK, Japan and China. The State Ministers, Shri Bhupendra Singh Chudashma; Cabinet Education Minister, Shri Nanubhai Vanani; State Minister, Smt. Vashu Trivedi visited Education Hall. GUIDE's stall was visited by school / college students, school teachers, professors, researcher, corporate officials, parents and many business people. Many institutes and universities showed interest in getting associated with GUIDE.

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CGPL workshop

A workshop on Corporate-Community Partnership for Mangrove and Biodiversity Conservation in Kachchh was organized on 14th March, 2015 at CGPL Field Hostel, Central Gujarat Power Ltd. (CGPL), Kachchh, Gujarat. The major objective of this workshop was to analyze means and ways to augment corporate-community partnership for mangrove and other coastal biodiversity conservation. It was organized by CGPL in partnership with GUIDE and Mangroves for Future Initiative of the International Union for Conservation of Nature (IUCN-MFF), New Delhi. The workshop was conceived by CGPL, which is a stakeholder and partner in the ongoing IUCN-MFF funded project on Corporate-Community Model creation being implemented by GUIDE. Around 30 participants including officials of Sustainability and Environment Department, GUIDE faculty and scholars, officer of IUCN-MFF, executives of CGPL, representatives from different corporate houses of Kachchh and Non-Governmental Organizations (NGOs), and other interested stakeholders attended the workshop. Presentation by eminent participants was followed by focused deliberations on following issues:

- Mangrove and community participation,
- Linkage between mangrove and fisherman community, and
- Mangrove and biodiversity issues

Concrete and actionable agendas and programs were mooted as an outcome of this final deliberation.

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➤ Dr. V. Vijay Kumar, Additional Director, GUIDE, along with Sh. Prakash M. Patel, Dr. K. Karthikeyan and Dr. Rohit Kumar Patel, attended the workshop on 'Sustainable Development and Water Management' organized as part of the Ministry of Water Resources, River Development and Ganga Rejuvenation, New Delhi on 16th January 2015 at conference hall, Jilla Panchayat, Bhuj-Kachchh. Sh. Patel delivered a lecture on 'Water Conservation and Management' in the workshop. Further, this workshop was simultaneous conducted in all the district headquarters of the country on the same day.



Awards and Honours

Mr. Piyush M. Vaghasiya and Mr. Bhagirath R. Pravda both working as Junior Research Fellow in GUIDE participated in '8th National Level Science Symposium 2015', organized by Christ College, affiliated to Saurashtra University, Rajkot on 22nd February 2015. They presented a poster in the research category in Botany and stood IInd in the competition.



Appointments / Promotions



Dr. Bhatt Jayeshkumar Bhanuprasad is promoted as Scientist, Terrestrial Ecology Division, GUIDE. Dr. Bhatt is Ph.D. in Botany from M.S. University, Baroda and has studied the flora of Western Kachchh. He holds Diploma in M.Phil. Level course (Resource Management) from Indian Institute of Forest

Management (IIFM), Bhopal. He was associated with Botanical Survey of India and Saradar Sarovar Submergence Area Project. His areas of interest include plant taxonomy, biodiversity conservation, and ecology and environment. Dr. Bhatt has 20 years of experience with the Gujarat State Office of World Wide Fund for Nature (WWF), India.



Dr. Nikunj B. Gajera is promoted as Scientist, Terrestrial Ecology Division, GUIDE. He is Ph.D. in Zoology (Ornithology) from K.S.K.V. Kachchh University, Bhuj, Gujarat. He has 10 years of research experience on animal

ecology and behavior. His research interests are behavioral ecology, taxonomy, traditional ecological knowledge and biodiversity conservation. Dr. Gajera was involved in 18 research projects on various aspects of biodiversity, climate change, irrigation and EIA. He has 21 research papers in national and international journals, 4 books, 3 chapters in books, 12 abstracts in seminars and conferences to his credit. He has also attended 8 workshop/training and leadership courses.



Dr. Rohit Kumar M. Patel, is promoted as Scientist, Terrestrial Ecology Division, GUIDE. He is a doctorate from Hemchandracharya North Gujarat University, Patan. His research focused on floral diversity, phyto-

sociology and ethno-botany of western Kachchh region. Dr. Patel has 8 years of research experience in taxonomic inventory of flora, digital herbarium, medicinal plants inventory, documentation of traditional knowledge, and conservation of biological diversity. He is actively associated with the group of the angiosperm plant taxonomy. He has 9 research papers in national and international peer-reviewed journals, 1 book chapter and 4 books. He has participated and presented papers in 27 national and international conferences, seminars and symposium. He has also undergone training in 'Taxonomy and Applications of Grasses'.

- **Mr. Mukesh Koladiya** is promoted to Project Fellow (Terrestrial Ecology Division) position.
- **Ms. Devi V.** is promoted to Project Scientist (Environmental Laboratory) position.
- **Mr. Pravin Ram** has joined GUIDE as Analytical Chemist (Environmental Laboratory).

Upcoming conferences

- Regional technical meeting on 'Conservation and Development Strategy' and 'Regional Cooperation Framework' for Kanchenjunga Landscape Conservation and Development Initiative, 3-4 Jan 2015, Chalsa.
- 4th International conference on Applied Life Sciences, 15-17 Sep 2015, Mumbai. Organized by International Society for Applied Life Sciences.
- Current Scenario and Future Prospects of Biology and Biotechnology in Diverse Sectors (CSFPB-15), 22-24 Oct 2015, Sathyamangalam, Tamil Nadu. Organized by Bannari Amman Institute of Technology-Society for applied biotechnology.
- 3rd International Plant Physiology Congress: Challenges and Strategies in Plant Biology Research, 11-15 Dec 2015, New Delhi.
- NIO 50th Jubilee and International Indian Ocean Expedition Symposium, 30 Nov - 4 Dec 2015. Organized by National Institute of Oceanography, Goa.
- National Conference on Climate change, biodiversity and sustainable capacity building, 22-25 May 2015, Srinagar, Kashmir. Organized by Global Scientific Research Foundation.
- International Conference on Innovative Research & Technology ICIRT-2015, 23-24 May 2015. Organized by Sri Venkateswara College of Arts and Science, Dharmapuri, Tamil Nadu.
- IPP Congress - 3rd International Plant physiology congress, 11-14 Dec 2015. New Delhi, India.
- International Conference on Renewable Energy and Sustainable Environment (RESE-2015), 3-5 Aug 2015, Pollachi, Tamil Nadu.



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