



Photo courtesy: Swati Das



Photo courtesy: Rachna Chandra

Editors note.....

Dear all,

Warm greetings for a prosperous and intellectually stimulating New Year - 2015, to the readers of *guide.net*.

As always, let us all hope that this New Year - 2015 will pave further way for a clean and green environment with people understanding and adapting a greener lifestyle.

It is heartening that our *guide.net* is entering its successful fourth year. At this juncture, we extend our warm gratitude to the contributors who evinced overwhelming interest to publish in *guide.net* and who brought to light several advancements and progresses happening in desert ecology and environment. Our all out appreciation goes to them.

In a slight departure from our earlier practice, henceforth every issue of *guide.net* will be theme based and article relevant to the chosen theme will be included. This issue is dedicated to themes such as arid biodiversity and conservation, invasive species in arid terrestrial and marine ecosystems, and industrialization and sustainability in arid zones. One area of special interest would be invasive species in terrestrial and coastal environment. Though due attention is being paid to invasive and alien species such as *Prosopis juliflora*, terrestrial or coastal species seldom attracted our attention. More so, in case of coastal alien species where there seems to be no study at all notwithstanding the truly maritime nature of Kachchh coast. It is hoped these broader scope will stimulate contributors to come out with articles of depth and content while broadening the space for more thought provoking discussion. Contributors are further encouraged to identify and explore areas that are hitherto untouched *vis-a-vis* Kachchh and other arid environment. It is to be remembered that identifying issues is half solving it. Hence, contributors will have to delve deep on the issues of arid ecosystems in the light of fast changing Kachchh arid environment due to aggressive industrialization and the entailing socio-economic, resource utilization patterns.

We again thank our contributors and wish them all a happy and prosperous New Year - 2015.

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Arid Biodiversity and Conservation

Caracal: One of the least studied carnivore

Caracal (*Caracal caracal*) was first recorded by Von Schreber in 1776 from the Western Cape, South Africa. Initially, Caracals were taxonomically grouped with the lynxes, owing to morphological similarities. On the other hand, Werdelin in 1981 affirmed no phylogenetic relationship between them. Thus, the caracal was reclassified into the genus *Felis*. Nevertheless, it has now been grouped in a separate genus, *Caracal*.

Caracal is a medium sized cat species and is solitary in nature. While the males are larger and weigh between 12 kg and 18 kg, the females are smaller. They do not have any distinct markings in their coat but differ in coloration in different habitats, such as; caracal from semi-arid area has pale-reddish coat while caracal from areas of higher rainfall has sandy brown to brick red coat. All Caracal spp. have white hair around the eyes and cheeks and darker guard hairs along the back. Caracals have distinctive black, tufted ear tip that is its typical identifying characteristics from other cat species. Other distinguishing features are their large paws and each paw has muscular, heavily built claws that are retractable, its hind legs are longer than its front that help in leaping. The short and strong tail helps to achieve balance and control when they jump to catch prey. The word caracal came from Turkish word *karakulak* which means 'black ear'. In India, Caracal is known by different names; in Rajasthan it is known as '*Mor-mar-Bhageri*' because caracal often killed peacock in this region and in Gujarat it is known as '*Harnotro*' which means haran (Chinkara) like colour.

Caracals are extremely alert, active and often jump to catch the flying prey. Caracals are hunter killers and use speed and surprise to attack and kill their prey. Caracals generally do not scavenge except during scarcity of food sources. The arrangement of dentition in Caracal, attached with thick zygomatic arch and a tall coronoid process, allows for tremendously commanding bite on

the prey. Caracals have a tendency to attack the prey on the backside or on the nape of the neck where there is a rich blood supply and whose disruption leads to sudden death of the prey.

Caracal is the least studied species among the carnivores found in India and has been placed in Schedule - I Category under Indian Wildlife Protection Act (IWPA) (1972) and least concern by IUCN Red-list Category. Very little is known about Caracal ecology, population status and behaviour because it has been rarely observed in the wild. Most of the detailed studies were carried out in South Africa and Israel, where the Caracal is very common.



Source: <http://en.wikipedia.org/wiki/Caracal>

Due to change in habitat quality and land use patterns the species has become vulnerable to extinction in its natural habitat. In India the population of Caracals exist in thorn scrub forest of western region, particularly in Rajasthan and Gujarat State. Unfortunately, in India the exact population estimation has not been made yet but earlier reports during 1980s record that there are <10 to 15 individuals present in Kachchh district of Gujarat, and there are <50 individuals in Rajasthan. Due to habitat losses or degradation and changes in land use pattern in India the caracal population is declining throughout their ranges. In Rajasthan, they are restricted to only two protected areas i.e. Sariska and Ranthambhore Tiger Reserve.

The fact that Caracal may be close to extinction in India makes it imperative to investigate its status, distribution, habit and habitat requirements and threats in order to conserve this species. In tune with this requirement, Gujarat Institute of Desert Ecology (GUIDE), Bhuj, is carrying out a study on “status and

distribution of caracal in Gujarat”. As the information about caracal status and distribution in Gujarat is still lacking, our objective in the study is to provide baseline information about population, distribution, diets, and potential habitats of caracals in Gujarat using remotely triggered cameras and opportunistic observations. Furthermore, such information will be crucial for developing conservation and management strategies for the Caracal.

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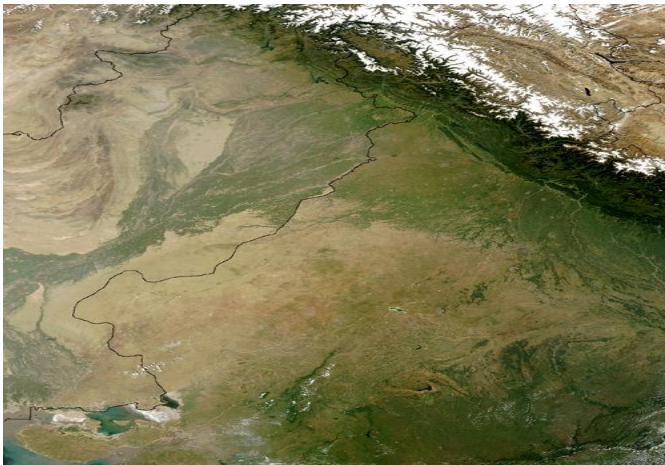
The Thar Desert

The desert also known as the Great Indian Desert and Marusthali (land of the dead) is a large, arid region in the north-western part of the Indian subcontinent and forms a natural boundary running along the border between India and Pakistan. Thar desert encompasses more than 200,000 km², within the Indian state of Rajasthan covering the districts of Jaisalmar, Barmer, Bikaner and Jodhpur and some region of the states of Punjab, Haryana and Gujarat. It is the world's 9th largest subtropical desert. The Thar desert extends from the Sutlej River, surrounded by the Aravali range on the east, by the salt marsh known as the Great Rann of Kutch on the south (parts of which are sometimes included in the Thar), and on the west by the Indus River. Its boundary to the large thorny steppe to the north is ill-defined. It lies mostly in the Indian state of Rajasthan, and extends into the southern portion of Haryana and Punjab and into northern Gujarat.

The Thar desert slopes imperceptibly towards the Indus Plain and surface unevenness is mainly due to sand dunes. The dunes in the south are higher, rising sometimes to 152 m whereas in the north they are lower and rise to 16 m above the ground level. The soils of the arid zone are generally sandy to sandy-loam in texture. The consistency and depth vary according to topographical features. The low-lying loams are heavier and may have a hard pan. Some of these soils contain a high percentage of soluble salts in the lower horizons, turning water in the wells poisonous.

The origin of the Thar desert is a controversial subject. Some consider it to be 4000 to 10,000 years old, whereas others state that aridity started in this region much earlier. Another theory states that this area turned to desert relatively recently: possibly around 2000 - 1500 BC. Around this time the Ghaggar-Hakra ceased to be a major river. It now terminates in the desert but at one time it was a water source for the Indus Valley Civilization centre of Mohenjo-Daro. It has been observed through remote sensing techniques that

late quaternary climatic changes and neotectonics played significant role in modifying the drainage courses in this part and a large number of palaeochannels exist.



Most studies did not share the opinion that the palaeochannels of the Sarasvati River coincide with the bed of the present day Ghaggar and believe that the Sutlej along with the Yamuna once flowed into the present riverbed. It has been postulated that the Sutlej was the main tributary of the Ghaggar and that subsequently the tectonic movements might have forced the Sutlej westwards, the Yamuna eastwards and thus dried up the Ghaggar-Hakra. Studies on Kalibangan in the desert region by Robert Raikes indicate that it was abandoned because the river dried up.

Stretches of sand in the desert are interspersed by hillocks, and sandy and gravel plains. Due to diversified habitat and ecosystem, vegetation, human culture and animal life in this arid region is very rich in contrast to other deserts in the world. About 23 species of lizard and 25 species of snakes are found here, many of which are endemic to the region. Some wildlife species, which are fast vanishing in other parts of India, are found in Thar desert in large numbers viz. blackbuck (*Antilope*

cervicapra), chinkara (*Gazella bennettii*) and Indian wild ass (*Equus hemionus khur*) in the Rann of Kutch. There are certain factors responsible for the survival of these animals in the desert. Due to the lack of water in this region, transformation of the grasslands into cropland has been very slow. The protection provided to them by local community, the Bishnois, is also a factor. Other mammals of the Thar area include a subspecies of red fox (*Vulpes vulpes pusilla*) and a wild cat, the caracal. The region is a haven for 141 species of migratory and resident birds.

The natural vegetation of this dry area is classified as Northern Desert Thorn Forest occurring in small clumps scattered more or less openly. Density and size of patches increase from west to east following the increase in rainfall. Many species of Eucalyptus, Acacia, Cassia and other genera from Israel, Australia, USA, Russia, Southern Rhodesia, Chile, Peru and Sudan have been tried in Thar Desert. *Acacia tortilis* has proved to be the most promising species for desert afforestation and jojoba is another promising species of economic value found suitable for planting in these areas. There are 11 national parks in the Thar desert area, the largest of which are the Nara Desert Wildlife Sanctuary and the Rann of Kutch. Others include: Desert National Park, Jaisalmer (3162 km²) is an excellent example of the ecosystem of the Thar Desert, and its diverse fauna. The endangered Great Indian Bustard (*Chiotis nigricaps*), blackbuck, chinkara, fox, bengal fox, wolf, and caracal are seen here.

High velocity winds blow soil from the desert, depositing some on neighbouring fertile lands, and causing shifting sand dunes within the desert, which bury fences and block roads and railway tracks. A permanent solution to this problem can be provided by fixation of the shifting sand dunes with suitable plant species and planting windbreaks and shelterbelts.

The Thar is one of the most heavily populated desert areas in the world and the main occupation of people living here is agriculture followed by animal husbandry. Agriculture is not a dependable proposition in this area—after the rainy season, at least 33% of crops fail. Animal husbandry, trees and grasses, intercropped with vegetables or fruit trees, is the most viable model for arid, drought-prone regions. Overgrazing due to high animal population, wind and water erosion, mining and other industries result in serious land degradation. The agricultural production is mainly from the Kharif crops. The Kharif crops grown in the summer season are seeded in the months of June and July. In past few decades the development of canals, tube wells, etc. has

changed crop pattern. Now the desert districts in Rajasthan have started producing rabi crops like wheat, mustard, cumin seed, etc. The people have started growing cash crops too. The Government of India has started a centrally sponsored scheme under the title of Desert Development Programme based on watershed management with the objective to check the spread of desert and improve living condition of people in desert.

In the last 15 - 20 years, the Rajasthan desert has seen many changes, including a manifold increase of both the human and animal population. Animal husbandry has become popular due to the difficult farming conditions. At present, there are 10 fold animals per person in Rajasthan than the national average, and overgrazing is also a factor affecting climatic and drought conditions. Thar region of Rajasthan is the biggest wool-producing area in India. Chokla, Marwari, Jaisalmeri, Magra, Malpuri, Sonadi, Nali and Pungal breeds of sheep are found in the region. Of the total wool production in India, 40-50% comes from Rajasthan. The sheep-wool from Rajasthan is considered best for carpet making industry in the world. The wool of Chokla breed of sheep is considered of superior quality. The breeding centres have been developed for Karakul and Merino sheep at Suratgarh, Jaisar and Bikaner. Some important mills for making Woolen thread established in desert area are: Jodhpur Woolen Mill, Jodhpur; Rajasthan Woolen Mill, Bikaner and India Woolen Mill, Bikaner. Bikaner is the biggest mandi of wool in Asia.

Forestry has an important part to play in the amelioration of the conditions in semi-arid and arid lands. If properly planned, forestry can make an important contribution to the general welfare of the people living in desert areas. Fire wood is their main fuel; of the total consumption of wood about 75% is firewood. Rajasthan has a forest area of 31150 km². This is about 9% of the geographical area. The forest area is mainly in southern districts of Rajasthan like Udaipur and Chittorgarh. The minimum forest area is in Churu district with an extent of only 80 km². Thus, the forest is insufficient to fulfill the needs of firewood and grazing in desert districts.

The most important tree species in terms of providing a livelihood in Thar desert communities is *Prosopis cineraria*. *Prosopis cineraria* provides wood of construction class. *Prosopis cineraria* is much valued as a fodder tree. The trees are heavily lopped particularly during winter months when no other green fodder is available in the dry tracts. There is a popular saying that death will not visit a man, even at the time of a famine,

if he has *Prosopis cineraria*, a goat and a camel, since the three together are known to sustain a man even under the most trying condition. The forage yield per tree varies greatly.

The people have a great passion for folk music and folk poetry. About 40% of the total population of Rajasthan state live in the Thar desert. The main occupation of the people in desert is agriculture and animal husbandry. The Thar Desert is the most densely populated desert in the world, with a population density of 83 people per km² against 7 per km² in other deserts.

Thar Desert provides the recreational value in terms of desert festivals organized every year. Dressed in brilliantly hued costumes, the people of the desert dance and sing haunting ballads of valor, romance and tragedy. The fair has snake charmers, puppeteers, acrobats and folk performers. Camels, of course, play a stellar role in this festival, where the rich and colorful folk culture of Rajasthan can be seen. Camels are an integral part of the desert life and the camel events during the desert festival confirm this fact. Special efforts go into dressing the animal for entering the spectacular competition of the best-dressed camel. Other interesting competitions on the fringes are the moustache and turban tying competitions, which not only demonstrate a glorious tradition but also inspire its preservation. Both the turban and the moustache have been centuries old symbols of honour in Rajasthan. Evenings are meant for the main shows of music and dance. Continuing till late into the night, the number of spectators swells up each night and the grand finale, on the full moon night, takes place by silvery sand dunes.

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Ginger Prawn (*Metapenaeus kutchensis*) -An endemic species of Little Rann of Kachchh (LRK)

Gulf of Kachchh (GoK), one of the major natural repositories of biodiversity, is considered as a highly productive ground for fisheries along the northwest coast of India. Fishery, which is considered as one of the major livelihood options for fishermen, not only meets food security but also provides many auxiliary employment opportunities to the coastal inhabitants. Fishery as a profession provides significant opportunity to generate monetary income for the coastal communities dwelling in Little Rann of Kachchh (LRK). In addition to economic benefits, this sector has also shaped and preserved the unique cultural and social fabric of the coastal communities along the Kachchh and continues to define an important segment of maritime resources. However, commercial fishery, over

exploitation and diverse stress factors like brine release from salt pan and significant increase in pollution level due to increased number of industries, shore based infrastructures, accelerating climate variability and vulnerability threaten the fishing community's present and future in this area. Hence, there is an urgent action required to address the increasing pressures and irrational exploitation in order to ensure sustainability of fishery in LRK. Among many fishery resources, prawn resources of the area play a major role in fetching economy to the locals because of its lucrative demand both in domestic and international market. Among prawn resources, Ginger Prawn (*Metapenaeus kutchensis*) plays significant role in economic generation. The uniqueness of Ginger Prawn fishery is mainly because a) it is endemic to the Kachchh region, b) it is highly seasonal and production lasts only for two months (August–September), and c) it fetches good return and has high market value and demand.

The seasonal fishery of Ginger Prawn is a significant source of livelihood for the weaker sections and



Source: www.sealifebase.fisheries.ubc.ca

socio- economically backward part-time fishermen in GoK region in Gujarat. During the southwest monsoon, highly productive estuarine conditions provide nursery grounds for various species of fish and shellfish in LRK. A large number of post larvae of prawns migrate in the region and provide a short time opportunity to the fishermen for maximum exploitation of the fishery by the use of traditional gears. The fishermen involved in the fishery during this particular time period in the region are part-time fishermen; during lean fishing period, they earn their livelihood by working as daily wage laborers in the salt pans and adjacent cement factories. The short-term Ginger Prawn fishery renders a huge economic opportunity and fetches them high monetary benefits to support their family for the rest of the year. However, this irrational overfishing of the juveniles may lead to a complete collapse of this part time fishery in the area due to decrease in spawning stock biomass over the years.

In view of the fragile nature of ginger fishery, it is prerequisite to generate awareness on resource over exploitation and depletion among the fishermen. There is also an urgent need to organize training programmes for introduction of alternative livelihood options such as

cage and pen culture techniques, product diversification and value addition techniques as well as establishment of proper marketing channel to improve the situation without impacting post larval population of prawns. Thus, an urgent need to understand and assess current status of the Ginger Prawn in the region is vital. Hence, an immediate attention is needed to understand the situation and provide cost effective solutions that not only reduce pressure from overharvesting of the population of the species but also consider sustainable livelihood option. For the rational exploitation of the species, aquaculture diversification, proper post harvesting technique, etc. need to be taught to the local fishermen.

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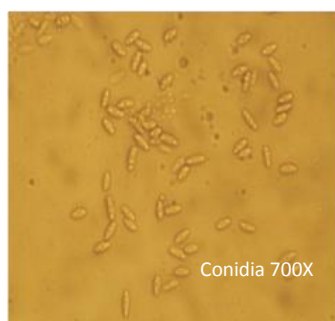
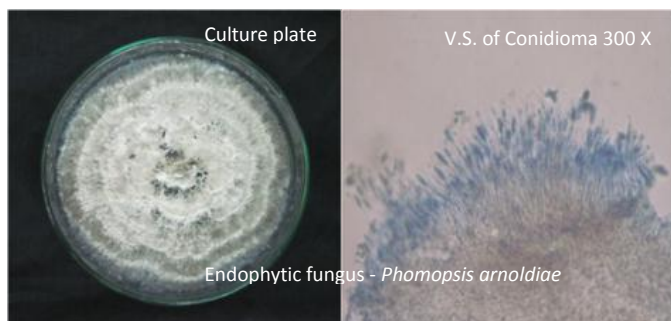
Industrialization and sustainability in Kachchh

Mangrove endophytes - Promising candidates for pharmaceutical applications

Kachchh district is situated in the north-western part of Gujarat in India. It covers an area of 45,612 km² and is the largest district in the country. Kachchh District is surrounded by the Gulf of Kachchh and the Arabian Sea in South and West, respectively, while Northern and Eastern parts are surrounded by the Great and Small Rann (seasonal wetlands) of Kachchh, respectively, thus virtually appearing as an island. Mangroves grow in saline coastal habitats. After West Bengal, Gujarat's mangrove cover is the second largest in the country. According to the Forest Survey of India (2009), the largest mangrove cover in Gujarat was in Kachchh (775 km²), followed by Jamnagar (157 km²) and Bharuch (42 km²). At present, 08 true mangrove species viz., *Avicenna marina*, *Avicenna officinalis*, *Avicenna alba*, *Aegiceras corniculatum*, *Acanthus illicifolius*, *Cerriops tagal*, *Rhizophora micromata* and *Soneratia opletata* belonging to 06 genera have been recorded in Gujarat. *A. marina* is the dominant species, which constitutes over 95% of total mangrove trees in Gujarat. Despite its extent, associated faunal and floral diversity of Kachchh mangroves is least investigated.

Endophytic fungi are reported from plants growing in various environments. Few researchers have investigated the endophytes from mangroves. Mangrove harbours a rich diversity of intertidal fauna and flora. In addition to their refined morphological and physiological adaptations, the production of bioactive secondary metabolites plays a vital role in the constant rivalry of mangroves with other plants, animals and microorganisms for the inadequate resources in their

habitat. Moreover, their unique living conditions are assumed to predetermine mangroves as potential source for the isolation of endophytic fungi. To date, the checklist of mangrove fungi revealed that a total of 625 fungi have been isolated and identified from mangrove trees and a wide array of bioactive compounds was identified with high chemical diversity. In healthy mangrove leaves of eastern part of Thailand, 23 out of 150 endophytic fungi produced secondary metabolites with antifungal activity (Khruayay et al., 2012). *Kandelia candel* was found only in two locations of the West coast, while *Heritiera fomes* and *Nypa fruticans* were recorded in one location of East coast of India. Therefore, these endemic / endangered plants need special attention for mycological assessment as mangroves are threatened by human interferences.



As a pioneer tree species of mangrove forest ecosystems, *A. marina* (Family-Verbenaceae) is a cosmopolitan species and widely distributed along tropical and subtropical coastlines. To date, 66 chemical components were isolated from

different parts of *A. marina*, and 57 metabolites were obtained from its endophytes. Although the compounds produced by the endophytes were not found in the host of *A. marina* but still xyloallenoide A, aromatic allenic esters from the endophyte and some glucosides from the host possess the same structural unit and finally concluded that they all use the same compound as biosynthetic precursor (Zhu et al., 2009).

A new topoisomerase inhibitor, (+) - 3, 3', 7,7', 8,8' - hexahydroxy-5,5' dimethylbianthraquinone was isolated from mangrove endophytic fungus no: 2240. The endophytic fungal strains displaying both topoisomerase I inhibitory and antitumor activity indicate their potential ability of producing antitumor compounds targeting at topoisomerase I. Three metabolites named phomopsin A, B and C and two

compounds i.e. cytosporone B and C were isolated from mangrove endophytic fungus *Phomopsis* sp. ZSU-H76 at South China Sea. The compound Cytosporone B and C inhibited the growth of *Candida albicans* and *Fusarium oxysporum*. The structural activity analysis of secondary metabolites of mangrove fungi indicated that the hydroxyl group acts as a vital component for their cytotoxic activity. The mangrove fungi possess active metabolites with some novel chemical structures that belong to diverse chemical classes such as alkaloids, terpenoids, phenol, tannins, steroids, etc. In addition to variety of bioactive compounds, mangrove endophytic fungi also produce anthraquinones, eniatin G and xyloketals. Anticancer activity of 14 anthracenedione derivatives separated from the secondary metabolites of the mangrove endophytic fungi, *Halorosellinia* sp. (No. 1403) and *Guignardia* sp. (No. 4382) potentially inhibited the growth of KB and KBv200 cells.

In addition to various chemical diversity and biological potential of endophytes, mangrove derived endophytic fungi represent an interesting source of new lead structures for medical and agrochemical applications. The practical applications of mangrove endophytic fungi are multiple, as potential biocontrol agents, sources of novel metabolites for therapeutics, plant protection and other industrial applications. In general, the production of secondary metabolites that are potentially useful for pharmaceutical and agricultural applications is widespread among mangrove endophytic fungi. Hence, a vast search for mangrove endophytic fungi from Gujarat must be focused to provide an insight in future to understand the diversity and the bioactive compounds to reveal its importance in clinical studies.

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Coastal and Marine Ecosystem (arid zone)

Industries and mangrove conservation in Kachchh

Since early 1990s industrialization in Kachchh is accelerating at a fastest pace and the last two decades witnessed emergence of an assortment of industries like thermal power plants, Special Economic Zones, Ports, Jetties and cement plants. Most of these industries are coastal in nature due to availability of vast arid zone, which, though seemingly barren are highly productive and rich in floral and faunal diversity in their own way. Most of these coastal industries are situated either amidst thick mangroves or in their close proximity. These coastal industries are very often mandated by the Ministry of Environment & Forests (MoEF) to take up mangrove conservation through

plantation as a compensatory measure. Massive plantation efforts which run into hundreds of hectare are genuinely launched by coastal industries spending huge manpower and financial resources. To cite a few instances, Adani Ports and Special Economic Zone and Kandla Port Trust alone have carried out mangrove plantation to the extent of 2200 ha in different parts of Kachchh coast. Mangrove plantation carried out at such a huge cost and manpower in Kachchh in general and in Gujarat as a whole is afflicted by some inherent technical and legal problems, which, if addressed properly will yield ecosystem benefits manifold higher than the present level. Some of these prominent issues are analysed here.



Photo courtesy: G. A. Thivakaran

The first and foremost hurdle coastal industries face is non-availability of technically appropriate coastal belt to carry out mangrove plantation. Suitable intertidal belts at creek systems, mudflats and estuarine regions are often occupied by industries for expansion or they fall under the jurisdiction of state forest department, rendering the area unavailable for mangrove plantation or rehabilitation activities.



Photo courtesy: G. A. Thivakaran

The erroneous belief that mangroves can be planted in any coastal belt leads revenue authorities to allocate sandy coastal areas to aspiring industries where plantation is quite impossible. Since procuring alternate site is time consuming and often impossible, industries

are left with no other alternative but to carry out mangrove plantation; this turns out to be a huge failure with poorest or no survival at all.

While there are enormous scope for other mangrove conservation measures such as rehabilitation and restoration through physical means, invariably in almost all ventures only plantation is undertaken. Attempting other conservation measures after a thorough understanding the underlying cause for degradation in a site specific manner is mostly likely to yield better results.



Photo courtesy: G. A. Thivakaran

Majority of the mangrove plantation in Gujarat adapt a method called Raised Beds (locally called Opla method). In this method, square or round earthen beds of 1 m are raised and propagules are dibbled on its surface. Raised beds are supposed to negate tidal currents thus preventing seedling dislodge. Though this method initially show promising results, after a year, grown saplings as a whole are dislodged as the sediments in the raised beds are carried away in the tidal currents. Often total wash-out of whole plantation is witnessed where this method was followed. However, this method if properly used in a site specific manner it could yield better results.



Photo courtesy: G. A. Thivakaran

While industry funded-community oriented mangrove plantation has proved successful on several counts,

industries in general are reluctant to deal with the coastal communities directly for mangrove plantation. This tendency is exhibited by all coastal industries in Gulf of Kachchh (GoK). Industries as such are reluctant to hand over the whole responsibility of fund management and plantation execution to the community. Industries often perceive the community as a 'beneficiary' and not as 'partners' in this venture. Lack of trust towards each other is palpable. This perception of both industry and community needs to be altered to achieve success of their total participation in the mangrove conservation effort. On the whole, the perception and mind-set of industry and community towards each other calls for a shift to create a viable model of Industry-Community based mangrove conservation.

Though huge coastal mudflats have been brought under plantation in both the shores of GoK by forest department, industries and other agencies, success rates are often dismal. Factors like faulty site selection, poor technical knowledge and understanding of the bio-physical factors that govern mangrove plantation /rehabilitation are the major cause for failure. Once these shortcomings are meaningfully addressed, Kachchh planted mangroves will become a highly functional entity discharging its entire ecosystem functions fully.

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Symposium/ Workshops/ Conferences

➤ The 5th International Conference on Drylands, Desert and Desertification was held in Israel, during 17th - 20th November 2014. Dr. V. Vijay Kumar, Additional Director, GUIDE, attended and presented a paper, 'Climate change and its uncertainty in drylands of Kachchh, Gujarat, India'.



➤ UK-Israel and Dryland Symposium was held in Israel on 20th November 2014. Dr. V. Vijay Kumar, Additional Director, GUIDE, presented a paper on Natural Resource Management in Dryland of Kachchh - Pathways towards Sustainability under Desertification and Climate Change.

➤ It was like a dream come true for both Ms. Swati Das and Mr. Nithul Lal, research scholars of GUIDE, to visit UK during 30th November - 15th December 2014. It was an educational tour, a part of UKIERI (UK-India Education and Research Initiative) project 'Ecosystem assessment of the habitats in the Kachchh District; planning for biodiversity and livelihoods into the future' to enhance educational links between India and UK. The project aims to generate a management plan based on landscape character and ecosystem services assessment of Kachchh district. The trip was a part of training program about the project's aims, objectives, ecosystem services, landscape character assessment and management plan.



The trip enabled them towards completion of Natural Area profile's data collection sheet with the UK researches and Ph.D. /M.Sc. students of University of Greenwich. Ms. Swati and Mr. Nithul gave presentation on their work to M.Sc. and PhD students of University of Greenwich. They attended Christmas Ball at University of Greenwich in traditional costume with M.Sc students, attended a pantomime. They visited London to attend relevant lectures. They attended residential weekend fieldtrip with M.Sc. students and

Ph.D. students of UK and learned about phase-1 habitat survey.

➤ **Dr. K. Karthikeyan** and **Mr. Ratansinh Chaudhary**, GUIDE, undertook a training programme on 'Analytical Techniques for Environmental Auditors' conducted by L. D. College of Engineering at Ahmedabad and Gujarat Pollution Control Board at Gandhinagar during 07th - 09th October 2014.

➤ **Dr. K. Karthikeyan** and **Mr. Mayur. K. Goswami**, GUIDE, attended "WASTECH" – An International Summit and Expo - '4 R's – A Way to Sustainability', which was jointly organized by Confederation of India Industry and Gujarat Pollution Control Board during 21st - 23rd November 2014 at Mahatma Mandhir, Gandhinagar.

➤ **Dr. B. Anjan Kumar Prusty**, GUIDE, attended a workshop 'Compliant Dioxin analysis in Food, and environmental samples - sample preparation and method optimization, organized by Agilent Technologies Pvt. Ltd. at their Centre of Excellence in Bangalore on 27th November 2014.

➤ National Academy of Sciences, India (NASI), Allahabad organized a symposium on Desert Science - Opportunities and Challenges, held at Jai Narayan Vyas



University, Jodhpur during 4th - 5th December 2014. **Dr. V. Vijay Kumar**, Additional Director, GUIDE, delivered a talk on Reclamation of Greater Rann of Kachchh, Gujarat - A Pilot Approach. **Shri. R. V. Asari**, Director, GUIDE also attended the symposium.

➤ **Dr. B. Anjan Kumar Prusty** and **Dr. Rachna Chandra** of GUIDE, attended a workshop 'Atomic Spectroscopy: MP-AES & ICP-MS for environmental monitoring – issues in sample preparation, clean chemistry and method optimization, organized by Agilent Technologies Pvt. Ltd. at their Centre of Excellence in Manesar on 16th December 2014.

Events in GUIDE

Swachhh Bharat Abhiyan

The father of nation Mahatma Gandhi has rightly said "Sanitation is more important than independence". He

emphasised on cleanliness and sanitation that are integral part of society and necessary for a healthy living. He dreamed of a life with proper sanitation and clean environment for every individual of the nation. To make the dream of Gandhiji come true, the present Prime Minister Sri Narendra Bhai Modi launched a mission for a Clean India called *Swachh Bharat Abhiyan*, on the occasion of Gandhiji's 150th birth anniversary. Huge number of Govt. employees, students and commoners from the entire nation participated in this incredible mission. GUIDE also participated in the Clean India Mission on 2nd October 2014. We were privileged to clean our campus and it was really a fantastic experience. The Clean India programme lasted till for 3 hrs and we were fortunate enough to have our Campus a cleaner one.



The session made us confront both the biodegradable and non-biodegradable wastes. The mission gave the opportune moment when we accomplished the activity with a bright smile. I was personally a little annoyed and disappointed with the dumping practices which we ignore in our busy life, and I feel *Swachh Bharat Abhiyan* is a right step to prevent it. The Scientific approach on disposal of Solid waste requires proper Collection, Transportation, Segregation and Treatment. There are rules and regulation *viz.* Municipal Solid Wastes (Management & Handling) Rules, 2000 that was formulated for proper disposal of Solid Waste, but due to lack of awareness and improper disposal practices, it has become a threat to the environment as well as the living beings.



No doubt *Swachh Bharat Abhiyan* is going to be written in golden letters in the Indian history but in my point of view, Swachhata should maintain a proper scientific

approach, disposal practices and awareness. The *Swachh Bharat Abhiyan* should come up with the agenda of "Clean India - Green India".

S. C. Mahapatra, <scm.101mahapatra@gmail.com>, GUIDE

Collaborations and MoUs

➤ **Dr. V. Vijay Kumar**, GUIDE, and Prof. Boris Zalzman, Director, BIDR, Israel, inked MoU for academic and research collaboration on 20th November 2014 in Israel. This collaboration enables exchange programme for scientists, modern technologies and scientific literature, organizing joint conferences and other scientific meetings, joint education and training, joint studies and experiments and joint publications of scientific papers on the results of joint projects between the organizations.

➤ The Chairman and Director, GUIDE along with Additional Director held a meeting with Director and Senior Scientists of CAZRI, Jodhpur on 1st December, 2014 and both the organizations mutually agreed to have research collaborations in areas of mining restoration, management of *Prosopis juliflora*, etc.

Appointments

The following people are newly appointed in GUIDE:

- Mrs. Ch. Esther Rani (Junior Research Fellow, Division of Coastal and Marine Ecology),
- Ms. Bhavini. S. Ganatra (Junior Research Fellow, Division of Coastal and Marine Ecology),
- Ms. Sunita Maheshwari (Chemist – Environmental Laboratory),
- Mr. Soumya Ranjan Mishra (Junior Research Fellow, Division of Terrestrial Ecology),
- Mr. Bhajotar Prakash (Laboratory Attendant, Division of Terrestrial Ecology), and
- Mr. Gopesh Sharma (Junior Research Fellow, Division of Environmental Impact Assessment).

Upcoming Conferences in India and abroad

1. 10th International Conference on Ecosystems and Sustainable Development, 03rd - 05th June, 2015, València, Spain, <http://www.wessex.ac.uk/15-conferences/ecosud-2015.html>.
2. International Conference on Coastal Cities and their Sustainable Future, 07th – 09th July 2015, UK, <http://www.wessex.ac.uk/15-conferences/coastal-cities-2015.html>.
3. 05th International Conference on Environmental Pollution and Remediation, 15th - 17th July 2015, <http://icepr.org/index.html>.

4. (IOCSEA2015): 2nd International Ornithological Congress of Southeast Asia, Khon Kaeu, Thailand, 20th – 23rd July 2015, <http://www.sc.kku.ac.th/iocsea2015/index.html#>.
5. EMAPi 2015: 13th International Conference on Ecology and Management of Alien Plant Invasions, 20th – 24th Sep 2015, Hawai'i Island, USA, <http://www.emapi2015.hawaii-conference.com>.
6. 3rd Annual International Conference on Ecology, Ecosystems and Climate Change, 13th – 16th July 2015, Athens, Greece Athens, Greece, <http://www.atiner.gr/ecology.htm>.
7. International Conference on Biodiversity and Conservation 2015 (ICBC2015), 26th - 28th May 2015, Tanjong Malim, Perak, Malaysia, <http://icbc2015.upsi.edu.my/>.
8. Desertland II, Conference on Desertification and Land Degradation, 16th – 17th June 2015, Ghent, Belgium, <http://www.desertland.eu/>.
9. National Seminar on Advances in Environmental Science & Technology: A Way Forward to Clean & Green Environment, 28th Feb 2015, Institute of Science & Technology for Advanced Studies & Research, Vallabh Vidyanagar, Gujarat, <http://www.istar.edu.in/EST/nsaest2015.htm>.
10. Science for the environment conference 2015, 3rd International conference, 01st – 02nd Oct 2015, Danish Centre for Environment and Energy, Aarhus, Denmark, <http://dce-conference.au.dk/>.



Photo courtesy: Swati Das



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