

Guide.net

Quarterly Newsletter



Gujarat Institute of Desert Ecology

Bhuj-Kachchh, Gujarat, India.

CONTENTS

1	<i>Will microbial life be sustained in saline desert, Banni?</i>	3
2	<i>Classical Taxonomy-a fading Science?</i>	5
3	<i>Herbarium at a Glance</i>	7
4	<i>Rain water harvesting- Everlasting solution to water scarcity of Kachchh</i>	10
5	<i>Ocean Resources- Future of Mankind</i>	13
6	<i>Marine Biological Research in Gujarat-Some Comments</i>	17
7	<i>Limbo</i>	20
8	<i>GUIDE's Book Publications</i>	24
9	<i>Upcoming Events in Dryland Science</i>	25

Editor :

Dr. G. A. Thivakaran

Editorial board:

Dr. Nimisha Tripathi

Dr. Arun Kumar Roy Mahato

Dr. Pranav Pandya

Mr. Nainesh Patel

Ms. Devi Valuswami

Graphic Design

Mr. Dayesh M. Parmar



Editor's Note

Seemingly arid, Kachchh district is fascinating to environmentalists, architects, sociologists and artisans due to its inherent peculiarities, culture, history and people's steadfastness to calamities. From time immemorial, people, fauna and flora of Kachchh have adopted and adapted a life in consonance with arid nature of the land which enabled them to be so resilient and to withstand and to overcome major natural calamities and harshness. This determination in the face of adversity has become an inherent and inbuilt quality that needs to be strengthened and emulated in all walks of life. These natural traits are common to both people and the milieu they live in.

Besides, ecology and environment of Kachchh throw several challenges to scientists and environmentalists that need sustained exploration and investigation on different environmental facets of Kachchh. Diverse ecological settlements like arid coastal zone, Little and Great Rann of Kachchh, thorn forests and Banni grassland and its exclusive faunal and floral components like wild ass, chinkara, hyena, Great Indian bustards and arid mangroves render the zone biologically rich in spite of its natural aridity.

In view of these environmental and ecological peculiarities and the need to explore them scientifically Gujarat Institute of Desert Ecology (GUIDE) came into existence during 1995 at Bhuj. Ever since its inception, it is the sole priority of GUIDE, as enshrined in its mission statement to work to "*ameliorate human misery in desert ecosystems, following sound ecological principles and carefully using scientific knowledge, imaginative technology and capital*".

Objective of this stated mission became all the more important and urgent in the face of seminal transformation that various ecosystems of Kachchh is either facing or undergoing in the aftermath of industrial development in Kachchh. To live up to this stated noble cause, GUIDE has been undertaking multifaceted research on different ecosystems of Kachchh like Banni grassland, mangroves and Rann including their fauna and flora. Through many of its sponsored and self-funded investigations GUIDE constantly strives to create a bridge between people and their environment. In addition, GUIDE's technical expertise and knowledge base is extended to local people, many government, non-government agencies and corporate houses to address varied environmental issues that are specific to arid zones like Kachchh. Overall objective of these activities is to ensure human welfare through the creation of a sustainable environment. In its 17 years of existence, the cumulative experience of GUIDE has proved that the task of achieving a trade-off between environment and economic development is complex and needs long term effort to understand the dryland ecosystem function in totality.

The present humble initiative of GUIDE is to bring out a newsletter, 'Guide.net', largely aims to create awareness about arid environment. It stems from the fact that all our efforts towards development need to be environment-friendly. It is increasingly understood that economic wellbeing at the cost of environmental sustainability is counterproductive and yields only short-term gains. It is earnestly hoped that bringing out "Guide.net" will be another step towards avowed objective of GUIDE.

From Joint Director's Desk

GUIDE has initiated a collaborative research programme on "*Climate Change and Uncertainty from Below and Above*" with STEPS centre of Sussex University, UK. As part of this initiative, an inception meeting of project partners was held at Kolkata. Dr. V. Vijay Kumar has represented GUIDE and attended the meeting at Kolkata and visited Kolkata and Sunderbans during the period between 21st and 26th August 2012. Active discussions and project planning exercise were carried out along with the members of STEPS centre like Dr. Lyla Mehta, Dr. Gerry Bloom, Dr. Jeremy Allouche, Dr. Rob Byrne, Dr. Terry Cannon, Ms. Harriet Dudley, Mr. Justin Pickard and project partner representatives includes; Dr. Alankar and Sh. PritpalRandhawafromJawaharlal Nehru University, Sh. ShaileshVyas from Satvik, Bhuj and Indian Institute of Health Management Researchrepresentativeslike





Dr. BarunKanjilal, Mrs. UpasonaGhosh and Dr. Manasee Mishra. The team has also visited Sunderbans and its many islands and interacted with the local communities.

Sh. R.V. Asari, IFS (Retd.) has visited Watershed project areas in Pachchham villages on 31st July 2012 along with the Watershed Project Team. He has supervised the entry point activities of the project and also interacted with the local villagers. Further a visit to Banni was made on 1st September 2012 and discussed on the implementation of Banni project along with President and members of the Maldhari Sangadan.



Dr. V. Vijay Kumar has delivered a lecture on 29th August 2012 on "Climate Change" in the Inspire programme conducted by the Department of Chemistry of the KSKV Kachchh University.

Dr. V. Vijay Kumar had a discussion with students from Munster and other German Universities on 8th September 2012 and delivered a lecture on "Ecology of Kachchh and Importance of Grassland Ecosystems".

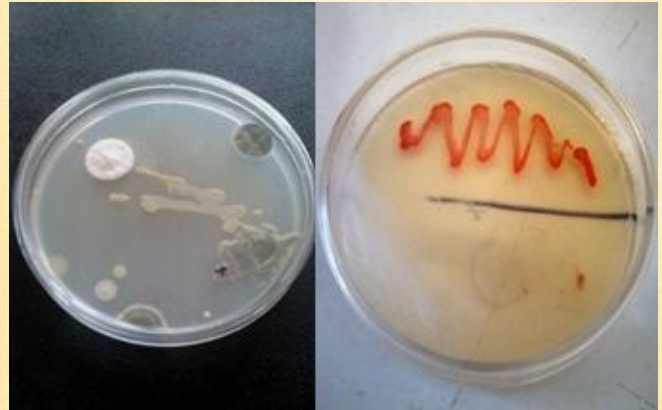


Will microbial life be sustained in saline desert of Banni?

India is very diverse in terms of geographical orientation and the states where most of the land area is covered as desert includes Gujarat and Rajasthan. Desert areas are unique ecosystems and considered to be lifeless due to their extreme environmental conditions which result in the survival of only few biological species. Interestingly, microbes are also found in deserts; however, bacteria and fungi reported from deserts are very different from those found in other environments. They are also adapted to live under stressful conditions, surviving without nutrients, water, shade or interaction with other species. These microbes inhabiting desert and arid conditions may be treated as extremophiles which has special features distinguishing them from microbes of other habitats. In spite of their prevalence in such harsh environments only scarce information is available on these microbial communities including their role in that ecosystem and their mechanism of survival and their importance in sustaining other life forms. One such region is Banni grasslands, once known as Asia's finest grassland, now craves for research attention for exploration of microbial community.



Fungal strains from saline soil.



Microbial growth in saline soil and Pigment producing bacterial strain from saline soil.



Banni region situated along the northern part of the Kachchh region of Gujarat in India is even more unique, a grassland with inherent salinity experiencing extreme arid climate, providing a typical saline desert as well as grassland environment. It also has many wetlands which serve as a habitat for migratory and resident birds and mammals. This particular region has undergone many changes in the recent past due to natural and anthropogenic intervention. Long term geographical disturbances have made significant effect on the biological diversity of this region and have undergone severe desertification and now hold the status more of a desert than of grassland.

A large portion of microbial diversity is still undiscovered from extreme environments. Grasslands of Banni is one such region which has not been explored earlier for the microbial diversity. Very few research works have been targeted towards this unique ecosystem. Hence addressing such population from an arid, salt region is mandatory and the microbial flora is expected to be different with respect to varying phenomenal role. In addition, its tolerance to hard climates and soil salinity warrant consideration as a possible key contributor for its application in the field of biotechnology.

Thus, it is essential that the researchers and environmentalists should now focus on exploration of microbial diversity in saline environment such as Banni region in view of its scope for identifying novel halo tolerant microbial genera. Unraveling the unique biology and ecology of such microbial life may contribute positively in several ways. This also will be useful in generating a knowledge base of microbial diversity and their bioprospects which in turn will serve as a doorway for other unexplored and barren lands. It is not a hyperbole that deserts even though appear to be devoid of life, still harbors a wealth of microbial life having inimitable features that should be explored to find out the hidden prospects.

Karthikeyan, K.

Gujarat Institute of Desert Ecology
P.B.No.83, Mundra road,
Opp. Changleshwar temple,
Bhuj-Kachchh, Gujarat-370001, India



Classical Taxonomy-a fading Science?

With our scientific knowledge till date, earth is the only planet having rich biological diversity in terms of flora and fauna. Yet, our knowledge limits to only 6% of total global biodiversity, leaving for us a big assignment of knowing our co-dwellers on the globe. Looking to this need and importance of grouping animals,

Taxonomy, the art of grouping and knowing the organisms based on their biological characters has been known as “world’s oldest science”. This science attempts to solve our problem of logically grouping organisms and to probe the evolutionary relationships. Unlike other branches, beauty of this science lays in calling this as an art too since early ages. To our unluck, we are losing this art to some extent in calling ourselves more modernized and equipped with latest tools. Taxonomy, considered once as the classical subject and the base of the organism has now been shadowed by the allied and integrated sophisticated sciences. The later may look like exaggeration, but similar views are now being expressed by many field ecologists, taxonomists and academicians around the world. This notion is strengthened by the fact that though we are presently well versed with molecular techniques, we at some level have failed to revise the

basic monographs given by classical taxonomists. This implies that we have either failed to modernize the science of classical taxonomy or those earlier taxonomists were too strong in their era....? Certainly, the second possibility can be difficult to digest. Some of the manuals and monographs given by earlier classical taxonomists are still followed in modern world after many decades and some are even century old. This shows the importance of taxonomic science.

Identification of an organisms and deriving its taxonomic position, though basic, is essential for studying organism’s ecology, habitat, threat and much more. Modern techniques are important as they serve as taxonomic infrastructure and a powerful research tool to assist accurate identification and resolving taxonomic complications. Importance of these cannot be denied, but, the accessibility and applicability of these infrastructure and techniques are limited and not within the reach of every researcher and student in India. In the present context of taxonomy, many of the terrestrial habitats lack baseline data or even the inventory of organisms especially the lower forms. lacuna is so conspicuous in marine realms. Students and researchers in many cases do not get

*“The first step in wisdom is to know the things themselves;
this notion consists in having a true idea of the objects;
objects are distinguished and known by classifying them methodically and giving them appropriate
names. Therefore, classification and name-giving will be the foundation of our science”*

— *Carolus Linnaeus, Systema Naturae (1735)*

attracted towards research in taxonomy or field ecology (except some known vertebrates) and majority of the academic and scientific communities get drawn towards modern/sophisticated science in ecology and biology (for dissertation, research projects and PhDs) instead of basic work. A steep decline is seen in students opting for basic science for their bachelors and master degree. This has resulted in acute shortage of students opting for basic science subjects in several colleges and sharp increase in integrated science courses. This unfortunate neglect of a basic science like taxonomy is now reflected by scarcity of JRFs, SRF's, especially for field and taxonomy related projects. The future generation may lack the base knowledge of what is classification? What are different phyla..? How they are differentiated...? etc.

It is paradoxical that while realizing the importance of biodiversity conservation and promoting it we neglect its basic element namely inventory of flora and fauna at state or a regional level.

Even, a word 'inventory' which looks very simple and mostly ignored, has a great importance as this needs to have a taxonomic base. Sometimes, just check listing of lower invertebrates turns out to be a great challenge and needs thorough taxonomic study and proper identification. Internet has enabled good access to the data worldwide and can be a great help to taxonomists. But many times this has just become a match making of animal photographs without studying the basic morphological and taxonomic characters.

The hand drawings, study of preserved specimens, use of camera Lucida in lower invertebrate study and sketches of animal morphometry, identification manuals with detailed characters, etc. which requires patience and spending long hours with microscope are losing their scientific merit and attraction. The science of identifying organisms which always raises a curiosity of what the organism is? ...how it differs? is fading out. If the condition persists, it can be a real serious issue to nation's biodiversity and a big question to the policy makers who talk of conservation.

Pranav J. Pandya

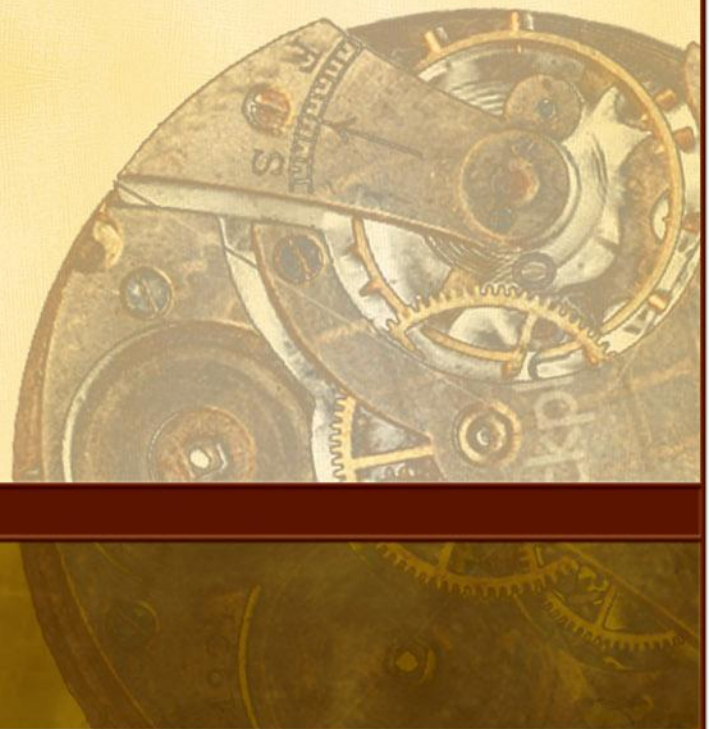
Gujarat Institute of Desert Ecology
P.B.No.83, Mundra road
Opp. Changleshwar temple,
Bhuj-Kachchh, Gujarat-370001, India

Herbarium at a Glance



Conservation of biodiversity is the most emerging issue in the debate of sustainability of the natural resources. This issue mainly targets vulnerable ecosystems or habitats. It is well-known that plants play a crucial role as they are the primary producers in each ecosystem. Thus addressing such crucial issue needs to have more detailed information on plants. Preparation of herbarium is the most suitable solution and digitization is an advanced step in the field of plant taxonomy. Collected and preserved specimen provides enormous economic and scientific returns to society and is irreplaceable resource that must be preserved for future generations.

Specimens provide the foundation of nomenclature, the basis for identification, the common reference for communication and the vouchers for flora and an excellent material for evolutionary and genomic studies. Molecular and morphological characters that allow us to reconstruct the history of life can be obtained from herbarium specimens. All fields of biological science from the level of molecular biology to ecosystem science are dependent on collections, not just for application of names but as the basis for referencing all aspects of but as the basis for referencing all aspects of biodiversity.

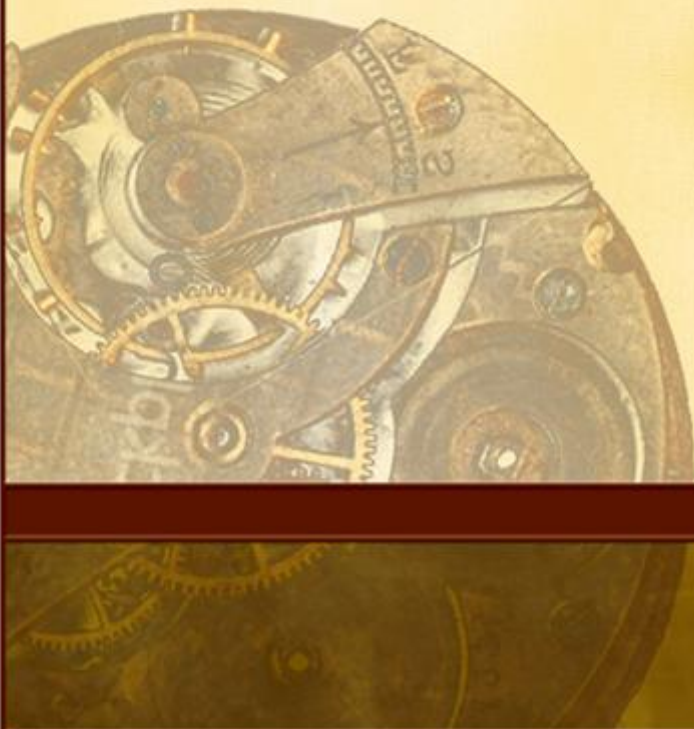


Beyond their scientific importance, herbarium collections offer many benefits to society by providing data or reference materials for critical endeavors such as agriculture, human health, bio-security, forensics, control of invasive species, conservation biology, natural resources, and land management. Herbarium collections provide a wealth of information on our natural heritage and extend back hundreds of years; thus they provide the only reliable and verifiable record of the changes to our flora during the expansion of human population.

Since the last decade, the term virtual (digital) herbarium has gained momentum and popularity among the taxonomists as well as other stakeholders. The major objective of establishing a virtual herbarium is to enhance the longevity of specimen as well as to improve its availability to wide spectrum of researchers. Major Herbarium participate in the international loan programs, where a researcher can request specimens to be shipped in for study.

This shipping contributes to the wear and tear of specimens. If, however, digital images are available, images of the specimens can be sent electronically. These images may be a sufficient for the specimens themselves; alternatively, the researcher can use the image to preview the specimens, to which ones should be sent out for further study. This process cuts down on the shipping, and thus the wear and tear of the specimen, as well as wait times associated with shipping. Additionally, virtual Herbarium can also be used to increase public awareness of Herbarium. Some Herbarium make their specimen databases publicly available on the internet. Digital images of specimen can be added to these databases to allow the public to further engage with the material. Some Herbarium also capitalize on their images by selling herbarium prints and greeting cards featuring particularly attractive specimen.

In the context of Gujarat, Maharaja Sayajirao University of Baroda, Vadodara and Sardar Patel University, Vallabh Vidyanagar are having good collections of angiospermic floral specimens. Since both these locations are far from the Kachchh district, Kachchh needs to have its own herbarium. Such herbarium enhances the interest of students as well as locals to know more about the desert flora.



Gujarat Institute of Desert Ecology (GUIDE), a premier research institute located in the district headquarters Bhuj, is having the more than 17 years of experience in the field of ecology and taxonomy. During various research projects carried out in the last 17 years, very large number of plant species specimen have been collected across the district and its adjoining area. In view of these huge collections and absence of an authentic herbarium for desert plants, GUIDE has decided to develop one such herbarium and museum in the institute. One of the major objectives of this herbarium would be to cover wider user group by developing digital herbarium.

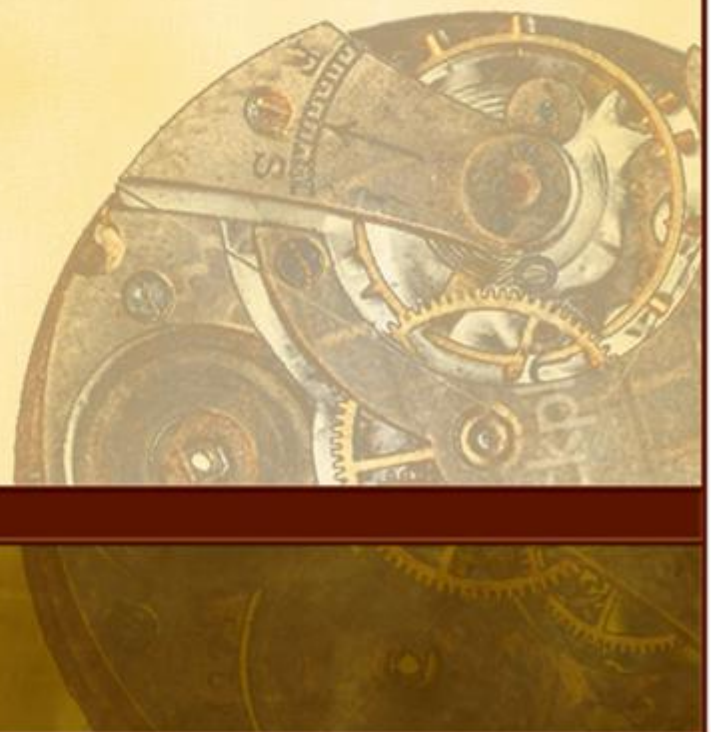
Kachchh district supports more than 950 angiospermic plant species including more than 700 wild species. Initially, wild species will be focused than covering the entire angiospermic flora of the district. At present, more than 300 specimen of various species were mounted and the process of collecting new specimen is being undertaken by Dr. Rohit Patel and Dr. MitalKanerlia.

After preparing the herbarium of 300 wild species, it will be authenticated by the Arid Zone Circle, Botanical Survey of India, Govt. of India. The authenticated herbarium will provide reference materials to the various stakeholders across the state and at national level.

Rohit Patel

MitalKanerlia

Gujarat Institute of Desert Ecology
P.B.No.83, Mundra road
Opp. Changleshwar temple,
Bhuj-Kachchh, Gujarat-370001, India



Rain water harvesting- Everlasting solution to water scarcity of Kachchh

Kachchh is the largest district in the state of Gujarat and second largest in India, covering an area of 45,652 km². The area represents a dryland with vast portion affected by saline water and this area is named as 'Rann'. The climatic uncertainty, rocky bed material and salinity render the area water scarce, limiting groundwater recharge in profound manner. In spite of the scarcity of water, the area is rich in agriculture where crops with less water requirements are cultivated. This region receives an average rainfall of around 14 inch (335mm) every year. Moreover, the rainfall of entire rainy season floods the area in just few days. This type of flooding rains results in poor ground water percolation and storage, causing most of the rainwater to drain off in the sea, leading to water scarcity in just few months. Kachchh is considered to be a drought-prone district as incidence of droughts is reported in every two to three years in a cycle of five years. Due to 406 km long coast line, the area has high salinity ingress problem. Geology of the region such as rocky stratum in subsurface layers hinders the groundwater recharge, amplifying salinity ingress in the coastal belt. Most of the people and agriculture depends on the groundwater in the absence of potential

surface water resources. Groundwater resource is highly restricted as the groundwater level in most of the regions is below 300 meters.

Because of such short duration of rain (100 hrs out of 8,760 hrs in a year) impermeable geological nature of the land, most of the rainfall tends to flow away rapidly, leaving very little for recharge of groundwater. Moreover, our present system and watersheds are inadequate to utilize and store maximum amount of this rain water. The traditional systems still being practiced in some rural areas like 'Virdas' (a pit in an identified aquifer) and wells fulfill water requirement. Comparing this rural traditional practice, traditional water harvesting systems in cities have been neglected and fallen into disuse, worsening the urban water scenario. This has called for a rethink on adaptation of Rainwater Harvesting (RWH), especially for drylands like Kachchh.

Rain Water Harvesting provides self-sufficiency to water supply; it is cost effective with low maintenance; recharges ground water and improves its quality; provides high quality water with low in minerals and reduces soil erosion and flooding in urban areas.

Post 2001 earthquake, Kachchh is witnessing fast industrial and urban development with greater water demands for public and industries. Increasing dependency on groundwater amplifies the stress on natural aquifers. RWH method especially for the urban areas is a viable alternative to fulfill the domestic and industrial water demands. This can overcome water scarcity as well as recharge the aquifers by increasing the water table. The successful implication of these methods is being done on large scale in cities like Chennai, Bangalore and Delhi where rainwater harvesting is a part of the state policy. The legal mandate and its strict adherence of RWH structure installation in existing and new constructions can have better future prospects. Apart from residences, the same can be legally enforced for every public and private construction, including Government offices, schools, hospitals, commercial complexes, industries, sheds, etc. Elsewhere, countries like Germany, Japan, United States, and Singapore are adopting rainwater harvesting which has yielded phenomenal results. Following RWH methods can be adopted to harvest the rain water;

- Capturing runoff from rooftops
- Land based Rain Water Harvesting
- Road side rain water harvesting
- Capturing runoff from local catchments

Rainwater Harvesting (RWH) from roofs is a simple low cost technique that has been traditionally practiced for hundreds of years in the desert areas of India. This roof water harvesting system provides immediate relief from drinking water scarcity and it has the potential to provide sustainable relief from water scarcity, addressing the water needs of all. Consider our own building with a flat terrace area of 100 sq m. Assume the average annual rainfall in an area is approximately 300 mm (24 inches). If the terrace floor is assumed to be impermeable, and all the rain that falls on it is retained without evaporation, then, in one year, there will be rainwater on the terrace floor to a height of 300 mm. This can serve the 5 persons' need for 50 days.

Apart from roof top collection, land based water recharge can add to the ground water table which is otherwise minimal in area like

Kachchh. Recharge of groundwater through storm runoff from roof top water collection, diversion and collection of runoff into storage tanks from pavements, play grounds, parks, parking plots, road sides and other vacant places can be thought of by Village Panchayats/Municipalities/Municipal Corporations and other Government Establishments. Proper awareness and subsidized installation systems can be encouraged along with implementation of the policy.

Rain water harvesting is made compulsory in many states of India considering the deforestation and reduction in ground water level. Rainwater harvesting appears to be the only alternative in the urban areas to secure drinking water supply and it has been considered as a sustainable and viable solution for improving the potable drinking water supply in areas like Kachchh. It is therefore essential to train more people in the field of rain water harvesting, so that all Kachchh houses can be equipped with RHW system and recharge the dryland.

Different ways to conserve water in your home

- Use a bucket when you wash your car rather than a hose. This would help avoid a large amount of water from being wasted. Also, wash your vehicles close to your lawn or garden
- Do not unnecessarily flush toilets

- Wash fruits and vegetables in a bowl filled with water, this will help in reusing the same water for potted plants
- Fill swimming pools and also bath tubs at slightly lower levels to avoid water loss
- Do not over water trees and shrubs. This will not only waste water but is also harmful for the trees and shrubs
- Make sure that water faucets are completely closed after use, turn off the water when you wash hand
- Do not water the grass when it is raining
- Use a broom to clean your sidewalk and driveway rather than a hose.

LekaMeera

Gujarat Institute of Desert Ecology

P.B.No.83, Mundra road

Opp. Changleshwar temple, Bhuj-Kachchh,

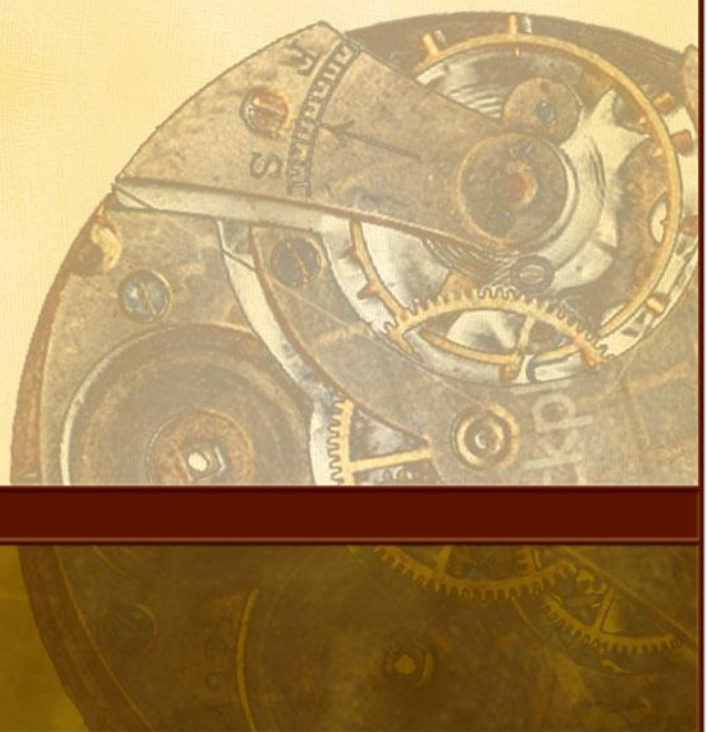
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“Sustainably Use Water”

Ocean Resources- Future of Mankind

The word 'Ocean' is derived from the Greek word 'okeanos' who is the God of water. Oceans cover 71% of the total area of the earth. In that sense, earth is truly a water planet. The ocean as a word looks very simple; but it is not simple as the word looks. It is huge and wide containing all the stuff from food to energy. As a five letter word, it largely represents the world as a whole and paradoxically, the world also contains only five oceans namely, Pacific, Arctic, Indian, Atlantic, and Antarctic. Future of human race for its food, power, transport and all other conceivable requirements will depend on oceans as resources are bountiful in this realm of planet earth.

Ocean resources are already being utilized for the welfare of humans. Nearly 80% of the human population in the world lives within 60 miles of the coast. These 80% of the people directly or indirectly depend on oceans for their needs. This article attempts to consider the resources of oceans which are plenty enough to build a prosperous and sustainable future for the upcoming generations. The oil and natural gas are the cardinal resources powering the industrial sector as the entire world depend on these resources for the day today activities.



The world will stand still without the natural gas, oil and coal. Imagine the world without these resources; there will not be any cars on road; no train will be on rail, no flights in air; no ships on seas and no electricity. These resources are so seminal for a country's development. Excessive and unsustainable usage of resources in recent years has rendered their resource base in land dwindling, in turn paving way for all environmental ills of the world. In the past three decades the usage of energy has risen to 70%. The International Agency for Energy Consumption (IAEA) in Paris estimates that the usage will increase to another 50% by the year 2030. The current estimation of oil deposits was 157 billion tons; of that 26% (41 billion tons) is in offshore regions. The annual production and supply will not be able to keep pace with increasing demand, since the oil usage has been increasing by 3.9 billion tons annually. The consumption of natural gas is also registering a steady increase and it reached the usage of 3 trillion

cubic meters in 2007 which was 520 million cubic meters in 2001. The offshore gas production currently is 65 trillion cubic meters accounting for a good 35% of the world production. Out of this, 20 percent is from the North Sea and Australia and 15 percent is from the Gulf of Mexico and Middle East. The Natural gas and oil are being extracted from the seas for decades. As of now, ores and mineral deposits of oceans have attracted little attention despite huge deposits found in offshore regions as the price of exploring and exploiting these minerals are not economically feasible. In future, these ocean based mineral resources will be the only sources of many minerals as land locked resources are fast depleting. Many nations and multi-national corporate houses are planning to excavate the most abundant mineral resource of the ocean namely the manganese and sulphur nodules from the deep sea. Besides this mineral resource, the Ocean holds awful treasures like diamond, gold, tin, titanium, oil, gas, gravel and sand albeit in least concentration. However, the enormity of the seawater and vastness of the ocean renders these elements' future exploitation economically unfeasible. Nevertheless, efforts are underway to expand the ocean mining into deep sea waters. The major focus is on the manganese nodules, which are usually located at the depths below



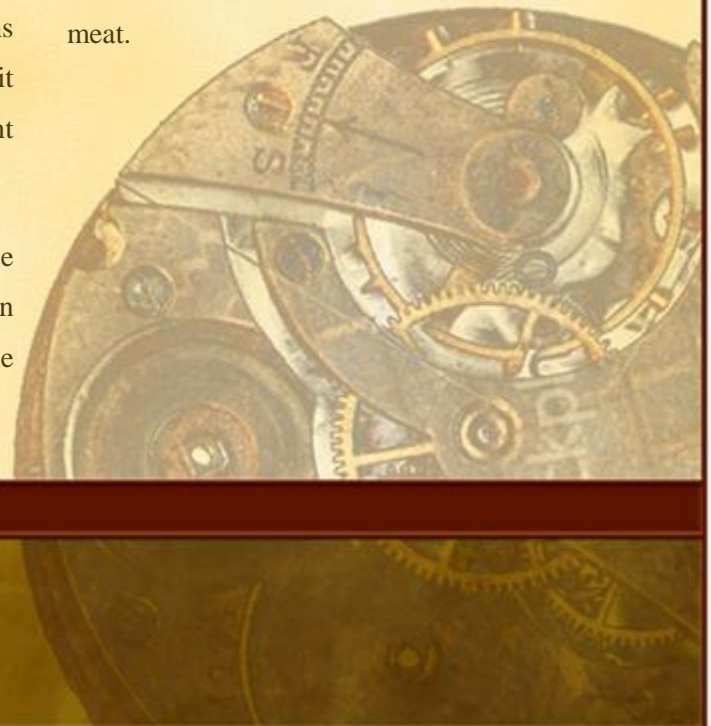
4000 meters, gas hydrates between 300-5000 meters, cobalt crusts between 1000-3000 meters and sulphides and sulphide muds are at the depth of 500-4000 meters. Covering the huge areas of the deep sea, manganese nodule masses are up to 75 kg per sq.km. They are mainly composed of manganese, iron, silicates and hydroxide. These nodules will grow very slowly at a rate of one to three millimeters per million years. Peru basin and the Indian Ocean harbor manganese nodules in an area of 9 million sq.km-an area, equaling the continent of Europe. This easy availability of mineral ores will turn into a crowd-puller in the face of growing industrialization.

Besides oil, natural gas and minerals resources, the potential for non-conventional energy production from the ocean is immense. Almost 90% of the global wind energy is contained in the turbulence of the oceans. The Wind, Waves and currents together contain 300 times more energy than the humans are currently consuming. This abundant source of energy still remains untapped. It is only recently humans have started harvesting these energy resources and it is expected major portion of our energy requirement in future will be met from these resources.

Oceans are also providing important food for the world in the name of fish and it also represents an important sector in the world economy. The estimated landed value of the fish globally is around

economic products in the open oceans. Sea weeds, 90 billion USD. Unlike other ocean resources, fishery resources of the oceans are under threat due to the over exploitation. To avoid the threat to the fishery resources of the oceans, Mariculture is increasingly becoming popular in recent decades. Mariculture is a specialized branch of aquaculture involving cultivation of marine organisms for food and other finfish and shell fish like prawns, oysters, the non-food items like fish meal, nutrient agar, jewelry (pearls) and cosmetics are the items producing through the mariculture.

The total biomass production by mariculture was 37,293 MT which yielded economic benefit of \$181and and \$230.8 million during 2004 and 2005. Further promotion of mariculture will reduce our overdependence of natural fishery, rendering it more sustainable along with other benefits like better quality fishes and high protein meat.



In short, mariculture has a major role to play in the coastal development and hiking the economic growth of a country.

The sea is acting as a bridge between the countries. Goods transportation by sea route is cheaper and economically more viable. The world without sea transportation between countries will be costlier by two times than now. Shipping plays a vital role in the world's economic growth.

Approximately 95% of the every country's exim merchandise is moving by the sea only. The transport by the ships is not only for the purpose of trades. It is useful in the transportation of humans from one country to another in a cheaper manner. The ocean is a best transport pathway for the peoples other than a person having sea sickness. The Ocean is also helping in strengthening the military power of countries. Ships with huge cannons and flight carriers are the best for military defense of a country. The ocean is the natural security force for a country to protect it from the enemies. Undoubtedly, future world is going to be at the mercy of the oceans for each and every of its needs.

The terrestrial resources are dwindling in a very rapid manner since human demand on land based resources is surpassing the supply limits and the time for regeneration. This dwindling terrestrial resources reveal that the oceans are the only hope for our future existence and wellbeing. But we should utilize those resources in a sustainable manner or else the resources in the oceans also will dwindle at one point of time. The future world is definitely going to depend on the oceans for electricity, oil, natural gas, transport and minerals. The perfect planning for extraction of these resources from oceans and sustainable resource utilization only will help us survive for long. We, as a race have lately realized that for the sake of the country's development, we are drastically over utilizing the resources without any forethought about the future. Our future depends on how sustainable we are in utilizing the resources whether it is from land or from oceans. As is often said, we have only inherited this earth and its resources from our previous generation and it is our moral duty to leave it back to our posterity intact. The oft repeated following quote is worth remembering again.

G. Nandagopal

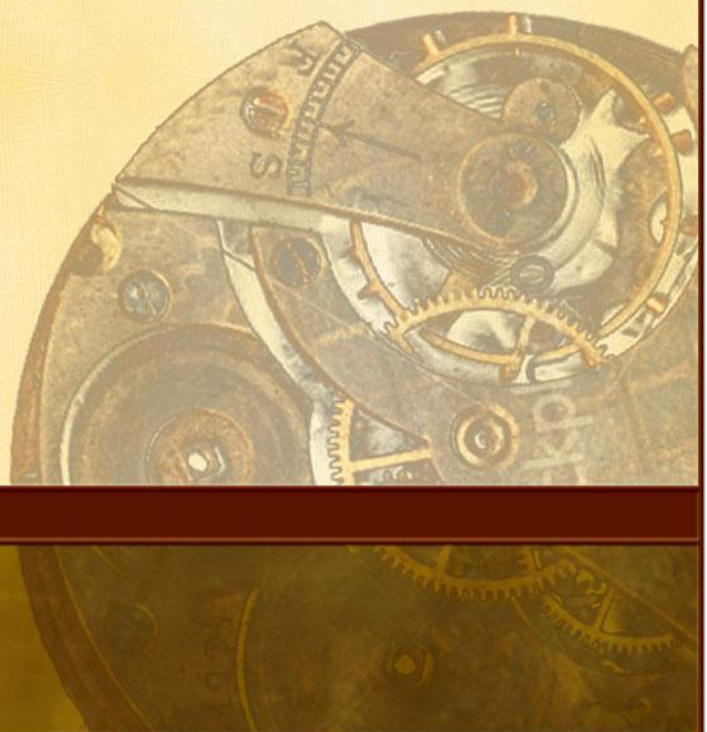
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“SAVE THE OCEAN” “SAVE THE RESOURCES”

“SAVE THE EARTH” “SAVE THE FUTURE LIFE OF ORGANISMS”

Marine Biological Research in Gujarat-Some Comments

Gujarat has a vast extent of coastline of about 1,640 km, with rich diversity of coastal and marine ecosystems with unique habitats which shelter some important marine plants and animal species. Despite its predominant semi-arid and arid climate, the state also has many rich ecosystems where floristic and faunal components of biodiversity are abundant. Gujarat state has two gulf systems, namely Gulf of Kutch and Gulf of Khambhat, out of three Gulfs of India. The vast coastline of Gujarat has a remarkable feature' of the extreme diversity of ecosystems like sandy beaches, estuaries, muddy and rocky coasts, coral reefs, mangroves, creek systems and bays. Gulf to Kachchh, covering an area of 7350 sq. km. with its shallow inertial zone and chain of islands, has one of the richest marine habitats in this subcontinent. The entire southern coast of the Gulf in Jamnagar district is ringed by cluster of 42 islands; many of them are fringed by coral reefs and mangrove vegetation. Some of these unique and rich areas have been protected for conservation, mostly under marine Protected Areas (MPAs). Despite their tremendous ecological and economic importance and the existence of a substantial policy and regulatory framework, Gujarat coastal



and marine ecosystems are under increasing threat. Numerous direct and indirect pressures arising from different types of economic development and associated activities are having adverse impacts on coastal and marine biodiversity. Coastal industrialization, Habitat destruction and fragmentation, increasing sea traffic, overexploitation of species and associated destructive harvesting practices, and the impacts of agricultural, domestic and industrial sewage are some common threats to coastal environment in Gujarat. Additionally, climate change is likely to have a growing impact on coastal and marine ecosystems, including a likely increase in extreme weather events as well as sea level rise, warming of the sea surface temperatures and ocean acidification. Coastal habitats are also subject to powerful natural disasters, such as tsunamis, cyclones, hurricanes and storms. Indirect drivers of ecosystem change include demographic, socio-political, cultural, economic and technological factors.

Expansion and updating information on the extent of biological wealth is a basic requirement for biodiversity conservation and management planning. The need to characterize species in terms of conservation status such as extinct, threatened, vulnerable, etc., is urgent for prioritizing conservation efforts. Furthermore, the conventional valuation of the production of biological resources fails to account for depletion and loss of species, degradation of ecosystems, and loss of biological diversity. In most cases, highly valued biological resources are limited to the economically important or those that sustain human life. But from an ecological perspective, every species has an ecological niche that is necessary for sustaining other life forms. The lack of information on the ecological linkages among species or ecosystems, and hence their monetary equivalents results in undervaluation and their subsequent degradation. Estimation of current uses and values of biological diversity and its status is urgently needed for future holistic planning for safeguarding biological diversity.

Despite having high coastal biodiversity, attention of Gujarat research community on the baseline aspect of coastal and marine biodiversity is lacking. Basic inventory on the existing biological diversity (flora and fauna) is patchy

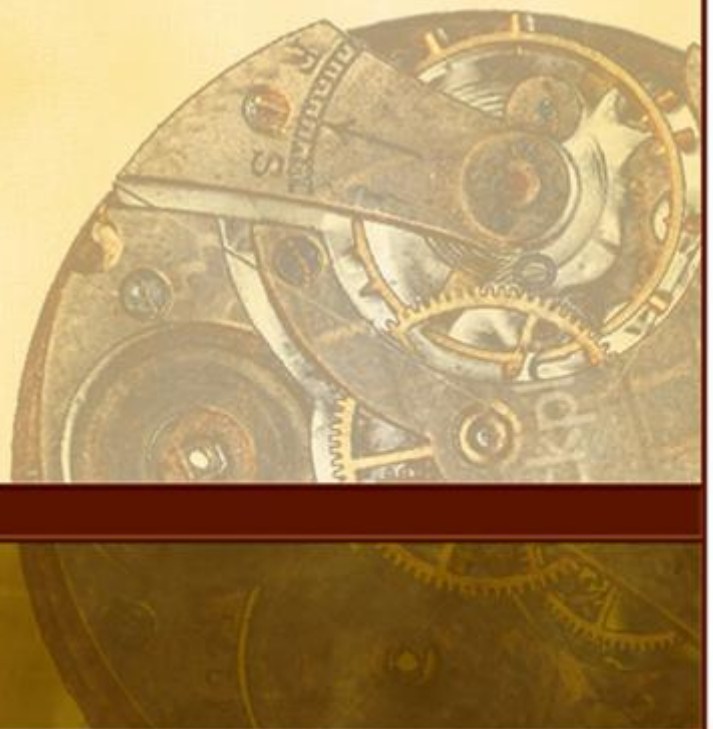
and outdated in majority of the cases. Majority of the fauna and flora, especially the highly threatened and endangered species are yet to be properly inventoried and catalogued. Lack of research institutes, especially the one purely dedicated to marine biological studies could be a major reason for the absence of proper documentation and data base of marine biological diversity of Gujarat. Presently, only few research institutes and university departments work on marine diversity which is also fragmented and only pockets of work is done. Another major reasons for lack of interest in marine biological studies could be that only very few academic courses are offered in marine biology by the state universities which results in poor generation of scientifically competent manpower. So it is important to develop a specialized higher educational field based programme in marine ecology with an emphasis on rigorous scientific research, hypothesis testing, taxonomy and conservation. In this connection, it is prudent to establish a new research institution to do this work in this area.

Cause for environmental degradation is due to incomplete appreciation of the environment and its biodiversity resources. Prevailing educational system should equip the students to gain an up to date knowledge and provide them with opportunities to directly interact with the environment.

Creating an academic atmosphere that will tackle the present knowledge gap and produce enough marine biologists seems to be the need of the hour as far marine biological research in Gujarat is concerned.

V. Devi

Gujarat Institute of Desert Ecology
P.B.No.83, Mundra road,
Opp. Changleshwar temple, Bhuj-Kachchh,
Gujarat-370001, India



લીમડો

પૃથ્વી પરનું કલ્પવૃક્ષ એટલે લીમડો, ચૈત્ર મહિનો શરૂ થતાની સાથે જ લીમડો, લીલોછમ્મઓઢીને પીળાશ પડતા ઝીણા સફેદ ગુમખાઓથીમહોરી ઉઠે છે. ચૈત્ર મહિનાનાઆકરા તડકામા મુસાફરોને ઠડો છાયડો આપતુ આ વૃક્ષ, ઠડકની સાથે- સાથે ચોખ્ખી અને આરોગ્યપ્રદ હવા પણ આપે છે. એટલા માટે જ કદાચ આપણા વડવાઓ, રાજા-મહારાજાઓ રસ્તાઓ ઉપર, શાળાઓમા, ગામના પાદરમા, મદિરોમા તથા ઘરનાઆગણામા લીમડો વાવવાનું કહેતા. તો આવોઆ પૃથ્વી પરના કલ્પવૃક્ષની જાણકારી મેળવીએ.

લીમડો એટલે દ્વિદળી વર્ગના મેલિયસી કુળની વનસ્પતિ છે. જેનું વૈજ્ઞાનિકનામ *Azadirachta indica* A. Juss. છે. કાયમમાટે લીલું, વિશાળ ૧૨ મીટર થી ૧૮ મીટર ઊંચું અને ૧.૮ મીટર થી ૨.૫ મીટર નો ઘેરાવોઘરાવતુ આ વૃક્ષ બધાજ પ્રકારની જમીનમા ઉગીનિકળે છે. તેમજ સૂકી, પથરાળ, છીછરીજમીનમા કે કેટિશયમયુક્ત કઠણ જમીનમા તે વધારે સારીરીતે ઉગીનિકળે છે. ઘેરી ભૂખરી, ખરબચડી અને અદરનીતરફ લાલાશ પડતીછાલ ઉપર ત્રાસી તિરાડોવાળી તેનીમજબૂત શાખાઓચારે તરફ ઘેઘૂર રીતે ફેલાયેલી હોય છે. આછા પીળા (સફેદ) રંગના તેના પુષ્પો ગુચ્છ સ્વરૂપે ગોઠવાયેલા અસખ્ય માત્રામા ચારેકોર સગઘ ફેલાવતા હોય છે.

આ વૃક્ષ તો જમીનની ફળદ્રુપતા અને જલગ્રહણ ક્ષમતામા વધારોકરે છે. લીમડો એ પૃથ્વી પરનું એક એવું વૃક્ષ છે જેનાતમામ અગો ઔષધતરીકે વપરાય છે. આયુર્વેદ અનુસાર લીમડો ઠડો, કડવો, લઘુગ્રાહક, તીખો, અગ્નિમદ કરનાર, સોજ



મટાડનાર, ઘા રૂઝવનાર તથા બાળકો માટે હિતકર છે. લીમડાના પર્ણો કીટકવધિ અટકાવનાર તથા મચ્છરની ઈયળોનો નાશ કરનાર છે. તેની કુમળી ડાળીઓ દત્તરોગો માટે ઉપયોગી છે. લીમડાના પાન અને કુમળી ડાળીઓ ચારા સાથે ભેળવીને ઢોર, બકરીઓને ખવડાવવાથી પ્રસવ પછી ઢોરના દુધનો સ્ત્રાવવધે છે. ઢોર માટે તે વાતહર અને પાચ્ય છે.

લીમડાના કુણા પાન મરી સાથે લેવાથી આંતરડાના કૃમિનાશ પામે છે તો કુમળા પાનનો લેપ બળિયાના ચાદા પર અકસીર છે. લીમડાના તામપાક્ષ પાન, બાવચી અને ચણા ના બીજ માથી વૈદ્યોએ બનાવેલું ઔષધ સફેદકોઢમા ખૂબ અસરકારક મનાય છે. કુમળા પાનનો ૧૦% જલીય નિષ્કર્ષ રૂધિર ગઠાવાની પ્રક્રિયાને ઢીલમા નાખે છે. તાજા પર્ણોનો કાઢો વિષાણુરોધક છે તો ગરમ આસવ કુલેલી ગથિઓ, ઉઝરડા અને મચકોડ પર વેદના હરતરીકે ઉપયોગી છે.

ઘઉં અને જુવાર જેવા ધાન્ય પાકોનો સગ્રહકરતી વખતે લીમડાના સૂકા પાન તેની ઉપર રાખવાથી ફૂદા, સઢિયા, ધનેડા જેવા જતુઓથી અનાજને રક્ષણ મળે છે.

લીબોળીઓ પાકી જાય ત્યારે તેમનો ગર પશુ-પક્ષીઓ અને મનુષ્યો મોજથી આરોગે છે. જે રેચક, શામક,

તાવ મટાડનાર તથા કૃમિનો નાશ કરનાર છે.

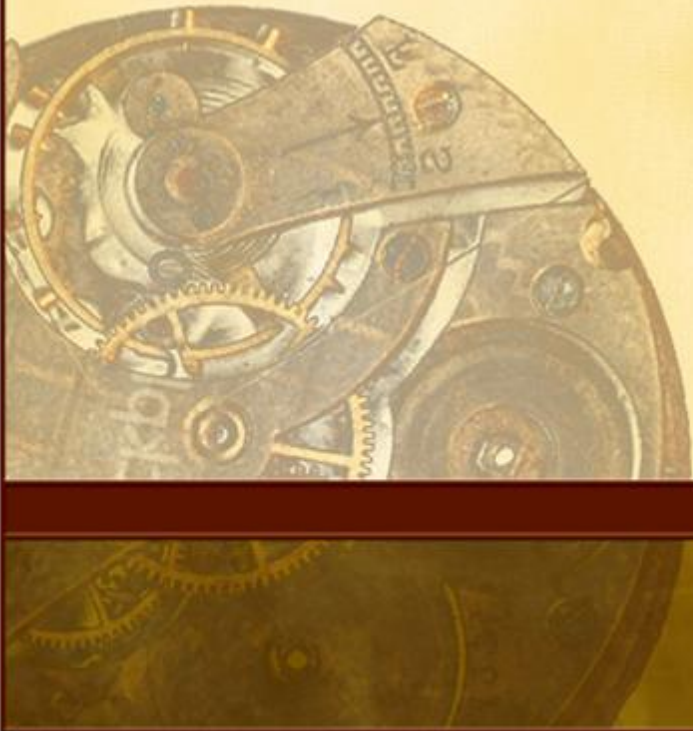
મૂત્રમાર્ગનારોગો અને હરસ-મસામા તે લાભદાયી છે. લીબોળીનું ચૂર્ણ એ મધૂપ્રમેહનારોગી માટે પણ લાભદાયી છે. લીબોળીના બીજનું ચૂર્ણ કઠોળમા નાખવાથી ભૂડ કે બૂકિકભમરા જેવા જતુઓથી ૮ થી ૧૨ મહિના સુધી રક્ષણ કરે છે. ઉપરાત કઠોળને ઘોઈને રાધવાથી તેમા લીમડાનો સ્વાદ કે સુગંધ રહેતા નથી.

લીબોળીના મીજમા ટ્રાયટર્પેનોઈડ, સેર્લેનિન અને એઝાઈરેકિટન નામના તત્વો રહેલા છે. જે કિટકોની ખોરાક ખાવાની પ્રક્રિયાને અવરોધે છે. તેથી ખેતરોમા તેનો વિપુલ પ્રમાણમા ઉપયોગ કરવા તેના યોગ્ય સૂગણો તૈયાર કરવામા આવે છે.

મીજમાથી લીલાશ પડતા પીળા-બદામી રંગનું કડવું તેલ (૪૦% થી ૫૦%) મળે છે. જેને ‘ માર્ગોસાનું તેલ’ તરીકે ઓળખાય છે. જે ચામડીના અસાધ્યરોગોમા વાપરવામા આવે છે. તે સઢિવા, રક્તપિત અને મચકોડમા બહારના ભાગે પણ લગાડવામા ઉપયોગી છે.

લીમડાની છાલમાથી સ્વરછ, ચમકદાર કથથાઈ રંગના ગુદ્દરનો સ્ત્રાવ થાય છે. જે ‘ ઈસ્ટ ઈડાયાગમ’ તરીકે ઓળખાય છે. જે વધારે સમય પછી કાળો પડી જાય છે અને નાના ગાગડા સ્વરૂપે હોય છે. તે પાણીમા દ્રાવ્ય છે. સ્વાદમા કડવો હોતો નથી.

પૃથ્વી પરનું આ કલ્પવૃક્ષ ઠંડક આપનાર, કડવો રસ ધરાવે છે. જેનું સેવન કરવાથી અશુભ થતું નથી જેના ઉપયોગી સર્વેનું માત્ર કલ્યાણ જ થાય છે તથા ચામડીનારોગો દુર કરનાર છે.



જે જુદા-જુદા પ્રદેશોમા વિવિધનામોથીઓળખાય છે. તેને અગ્રેજીમા 'નિમ ટ્રી'કહેવાય છે. રોગચાળો ફાટી નીકળે ત્યારે આજે પણ ઘરના વડીલો ઘરના બારી-બારણા ઉપર લીમડાનીતાજી ડાળખીઓના જુમખા બાધે છે. ઉપરાત લીમડાનો ધૂમાડો પણ કરે છે જેથી ઘરની અદરઆવતા વિષાણુઓનોનાશથાય છે, ઉપરાત વિષાણુયુક્તહવાઆવતી અટકે છે.

ચૈત્ર મહિનામા લીમડાના કુમળા પાન કે પુષ્પોનો રસ પિવામા આવ અથવા તો તેની સાથે હિંગ, મરી, સિંધાદુણ, જીરૂ, અજમો, આમલી અને ગોળ મેળવીને ખાવાથીબીમારીનાકોષો દુર રહે છે. અને આપણા શરિરને નિરોગીબનાવે છે. આથી ચૈત્ર મહિનામા લીમડાનુ સેવનકરવુ કે તેનો રસ પિવાથી શરીરને ઘણા બધા ફાયદાઓથાય છે.

લીમડામા ફૂલ આવવાનો સમય ચૈત્ર મહિનાનો હોય છે. એટલે કે ગુજરાતીમહિનાઓમા ફાગણ મહિનોઉતરતા લીમડા ઉપર મહોરઆવવા લાગે છે અને આ ફૂલનો ઉપયોગ દવાતરીકે વધારે ઉપયોગી છે. ચૈત્ર મહિનાના પહેલા પદ્મદિવસ દરરોજ સવારે એક ગ્લાસ લીમડાના ફૂલનો રસ (રસ પીવાની રીત:આખીરાત ફૂલ ને પાણીમા પલાળીને તે પાણી સવાર ગાળીને પીવુ) પિવાથી એવુ માનવામા આવે છે કે આખુ વરસ નિરોગીરહેવાય છે. એટલે કે કોઈ પણ પ્રકારનાનાના-રોગોથતાનથી અને ખાસ કરીને તાવ તો એક વર્ષ સુધીઆવતોનથી. એટલા માટે મોટી ઉમરના માણસો અને ખાસ કરીને ગામડાના માણસો લીમડાના ફૂલનો રસ નિયમિત૧૫ દિવસ સુધી પિવે છે જેથી કોઈ પણ પ્રકારની બિમારીઓ તેનાશરીરમા જેવા મળતીનથી.

લીમડા ઉપર થતી'ગળો' એટલે કે એક પ્રકારની વેલ, જે લીમડાનોઆધારરાખીને મોટી થાય છે પરતુ તે લીમડા સાથે વિટળાયેલ હોવાથી તે પણ સ્વાદમા કડવી હોય છે. ખાસ કરીને તાવ જેવીબિમારીમા ગળોનો રસ પિવામાઆવે છે અનેઆઆયુર્વેદીકદવાતરીકે ઉપયોગમા લેવાય છે અને આના કારણે ડાયાબિટીસ જેવારોગ ઉપર પણ કાબૂ મેળવવામા સફળતામળીરહી છે.

એમ. એચ.કોલડીયા

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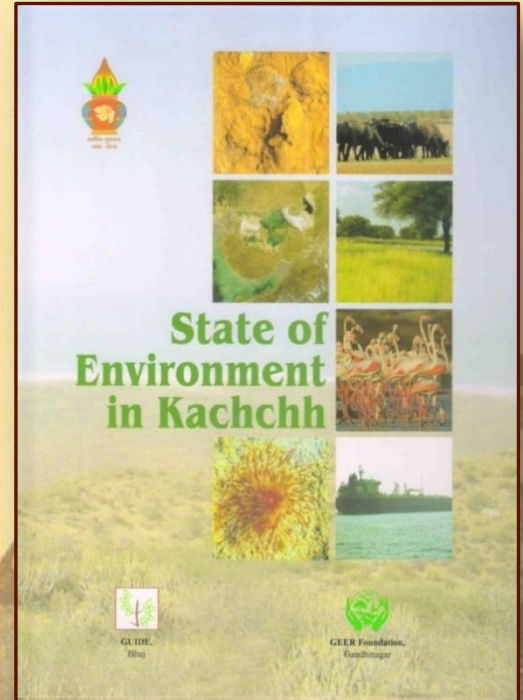
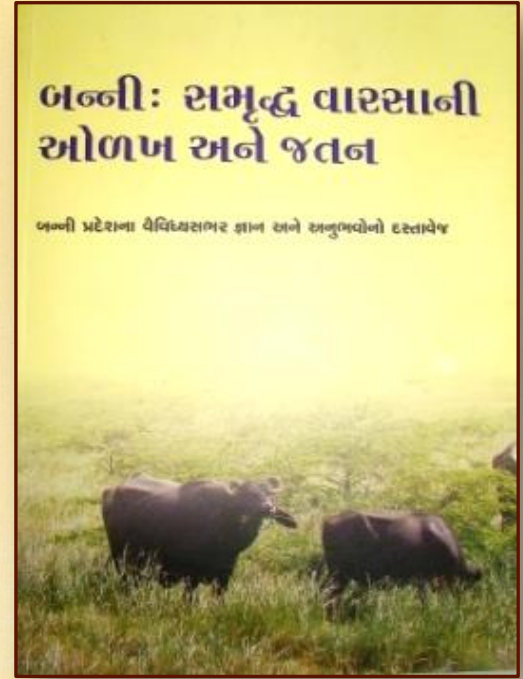
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ગુજરાત ઈન્સ્ટીટ્યુટ ઓફ ડેર્ઝટ ઈકોલોજી



BOOKS PUBLISHED BY GUIDE

- 1) **Banni: SamrudhdhVarsaniOrakhaneJatan**, a mirror of life in Banni in Gujarati language was released on 10th May, 2010 by the honorable Chief Minister ShriNarendraModi. It was published by Gujarat Institute of Desert Ecology (GUIDE) and Gujarat State Forest Department, Kachchh Circle, Bhuj - Kachchh with the support of Gujarat Forest and Environment Department and edited by *Charkha* (Mr. Sanjay Dave and Ms. UtkanthaDholakia), Ahmedabad. The book is divided into six sections along with statistics and photo gallery describing various aspects of Banni such as Geographical position, Biodiversity, Social aspects, Cultural heritage, Status of basic amenities, Animal husbandry related issues and traditional knowledge.
- 2) **State of Environment of Kachchh (SoEK)** is a comprehensive report on the present status of Kachchh environment. This book, published by Gujarat Institute of Desert Ecology, Bhuj in collaboration with Gujarat Ecological Education and Research Foundation, Gandhinagar as a part of Gujarat *SwarnimJayanti* celebrations, is an attempt to underline the need and urgency to manage our natural resources and environment in a more sensible and sustainable manner. Different facets of Kachchh ecology and environment like Geology, Coastal Ecology, Water, Agriculture, Grassland, Forest, Biodiversity and Industrial development have been covered in this volume. These chapters are contributed by Scientists and eminent people from reputed organisations like Gujarat Mineral Development Corporation Ltd., Space Applications Centre (ISRO), Centre for Policy Research, Sardarkrushinagar Agricultural University, Gujarat State Forest Department, Gujarat Ecological Education and Research Foundation, CEPT University and Gujarat Institute of Desert Ecology.



Upcoming Events in Dryland Science

EcoSummit 2012-Ecological Sustainability-Restoring the planet's Ecosystem services
September 27-30, 2012, Great Columbus Convention Centre, Ohio, USA

The Ohio State University
Morpc-Mid Ohio Regional Planning Commission
ESA-Ecological Society of America

The African Green Revolution Forum (AGRF)
26 September to 28, September, 2012
Sylvia Mudasia-Mwichuli, Thebe Ikalafeng
Arusha, United Republic of Tanzania

The 11th meeting of the conference of the Parties (COP 11) to the Convention on
Biological Diversity (CBD)- 17, October to 19, October, 2012-Hyderabad, India
Ministry of Environment and Forests, Government of India, New Delhi

First Global Soil Week 2012 - Soils for Life
18, November to 22, November, 2012- The IASS Global Soil Forum, Berlin, Germany

International conference on forest mountain and people
12, December to 13, December, 2012- Colombo, Srilanka
International Center for Research & Development (ICRD)

4th international conference on Drylands, Deserts and Desertification (DDD)

12, November to 15, November, 2012- Ben Gurion University, Israel

The Jacob Blaustein Institutes for Desert Research, (UNESCO), (UNCCD) and the Israeli Foreign Ministry

11th International Conference on Dryland Development : “Global Climate Change and its Impact on Food & Energy Security in the Dry lands”

18, March to 23, March, 2013- Beijing, China

International Dryland Development Commission (IDDC) hosted by the CAS and CAREERI (China), APAARI

Global Environmental Change and Human Security

The Need for a New vision for Science, Policy and Leadership (Climate Change as an Opportunity)

22 November 2012 - 24 November 2012, Conference exact location will be announced shortly, Marrakech, Morocco.

Water Resources and Sustainable Development

24 February 2013 - 25 February 2013 Ecole Nationale Supérieure de l'Hydraulique, Algiers, Algeria

INTECOL & British Ecological Society Congress

8 August 2013 - 23 August 2013

International Convention Centre at ExCeL, London, United Kingdom

Utilization and protection of halophytes and salt-affected landscapes

4 September 2013 - 6 September 2013,

Kecskemet, Hungary



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Gujarat Institute of Desert Ecology

P.O. Box No. 83, Mundra Road,

Bhuj, Kachchh-370001,

Gujarat, India

Tel: 02832-329408, 235025 Fax: 02832-235027

Website: <http://www.gujaratdesertecology.com>