Gujarat Institute of Desert Ecology

Annual Report 2018-19

Contents

Front and Back cover: Manoj Dholakia

GENESIS

Gujarat Ecology Commission set up by the Government of Gujarat signed a Memorandum of Understanding, in the gracious presence of the Hon. Chief Minister of Gujarat, with The Jacob Blaustein Institute for Desert Research, Israel, on 9th September 1993, for (i) rehabilitation of degraded soils to increase production of bio-mass, (ii) to assist in preparing plan for restoration of degraded eco-systems, and (iii) to assist in planning of a Centre of Desert Ecology in Kachchh. Subsequently, Prof. Uriel Safriel, Director of Mitrani Centre of Desert Ecology, Israel visited Kachchh in May 1994. Based on his recommendations, Government of Gujarat, Forests and Environment Department vide Resolution dated 10th January 1995 accorded administrative sanction to establish Institute of Desert Ecology. Thus, Gujarat Institute of Desert Ecology was established at Bhuj, Kachchh district as an autonomous body and was registered as a Society and a Public Trust.

MISSION

GUIDE will catalyse the process of ameliorating hardships to human beings in desert ecosystems of Gujarat, following sound ecological principles and carefully using scientific knowledge, imaginative technology and capital.

MANDATE

- Focus on desert and arid ecosystems of Gujarat, with special emphasis on Kachchh,
- Develop a benchmark database for ecosystems of Kachchh and thereafter undertake continuous monitoring and trend-analysis through specific research activities,
- Identify problem areas and evolve appropriate solutions and management strategies, with the help of applied research,
- Formulate and implement relevant projects that would provide models for emulation,
- Disseminate ecological information and communicate action plans to suit local conditions, through extension and other programs, and
- Provide consultancy and training to NGOs, Government officials, corporate sectors and other natural resource managers, in the principles of ecology, integrated management and sustainable development.

DIRECTOR'S NOTE

Gujarat Institute of Desert Ecology (GUIDE), stepping into its 24th year, continues to function as a pioneering dryland research institute striving to address the needs of the community through its research agenda. In order to fulfill its avowed mandate to achieve a synergy of science and community in the field of ecology and environment, GUIDE has made added progress.

To fortify its scientific manpower and boost its reach, GUIDE has recruited project scientists Dr. V. Selvakumar, Dr. S. Sivaraj and three project staff. Seven doctoral scholars, 18 postgraduate and 10 undergraduate students from various universities and colleges across the country have undertaken their dissertation works under GUIDE's scientists.

Considering the expertise of GUIDE in Mangrove research and restoration, Mangrove Society of India (MSI) recognized GUIDE as a Chapter of Mangrove Society of India for the Gujarat region on 28th April 2018.

The Environment laboratory of GUIDE has been accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL), Quality Council of India on 12th February 2019.

The project on "Climate Change Mitigation and Enhancing Livelihood Options through Seaweed Cultivation and Conservation - A Model Development for Gujarat" has been approved by the Climate Change Department, Gandhinagar through Gujarat Energy Development Agency on 8th March 2019. The study attempts to create a model for seaweed cultivation in Gujarat coast using standardized technology, which will have a long-lasting implication in terms of climate change control through sequestering atmospheric carbon and creation of livelihood opportunities to the coastal populace of Gujarat.

A project on "Seawater Quality Monitoring (SWQM)" under Coastal Research Scheme (CRS) of Ministry of Earth Sciences, Government of India through National Centre for Coastal Research (NCCR), Chennai sanctioned to GUIDE on 27th March 2018. Under the scheme, GUIDE has been allotted to study the marine environment of Vadinar, Hazira and Veraval of Gujarat Coast to monitor the changes in Physical, Chemical, Biological and Microbiological characteristics in the seawater and sediment quality.

Dr. V. Vijay Kumar was appointed as a member of the Standard Development Group (SDG), an apex body of the Network for Certification and Conservation of Forests (NCCF).

Dr. V. Vijay Kumar participated in the final project workshop on "Climate Change, Uncertainty and Transformation" held at IIT, Mumbai during the period between 1st and 3rd May, 2018. He has also participated and shared his insights in a Workshop organized on "Doubling Farmer's Income by 2022 – A Strategic Initiative" which was organized by the Agriculture, Farmers Welfare and Cooperation Department, GoG, Gandhinagar at Anand Agricultural University, Anand held between 1st and 2nd June 2018. A meeting of the State Level Project Monitoring and Review Committee GEER

NAFCC Climate Change project was attended by Dr. V. Vijay Kumar held on 8th October 2018 at NABARD, Ahmedabad.

Dr. V. Vijay Kumar was part of the inception workshop – TAPESTRY, a project at IIT, Mumbai held between 7th and 12th January 2019.

He has delivered a special talk on "Gandhiji and Environment" in the International conference on "Remembering and Re-evaluating Mahatma Gandhi" on his 150th birth anniversary held on 8th - 9th February 2019 at KSKV Kachchh University and emphasized the need of adapting Mahatma's idea of Vasudhaiva Kutumbakam (the world is one family) as a solution to address the environmental issues of the century.

Dr. V. Vijay Kumar attended the review team meeting on "Role of Forest and Environment Department in Disaster Management" held on 12th February 2019 at Gujarat Institute of Disaster Management (GIDM), Gandhinagar. He also took part in a conference on "Whale Shark" organized by Wildlife Trust of India, New Delhi and Gujarat State Forest Department held during 14th - 15th March 2019.

Dr. Arun Kumar Roy Mahato delivered a talk on "Coral Reef and its conservation" in the seminar on "Conservation and Management of Coral Reef" organized by Forest Department, West Division, Kachchh on 28th March 2018 at Naliya, Kachchh. He on behalf of the Director attended the Asia-Pacific Regional Workshop on "Combating Desertification and Land Degradation" organized by United Nations Convention to Combat Desertification (UNCCD) and co-hosted by MoEF&CC, Govt. of India during 24th - 27th April 2018 at New Delhi.

Dr. Arun Kumar Roy Mahato, was conferred with "Science Investigator Award for Ecological Research" by Biologix Research and Innovation Centre Pvt. Ltd., India on the occasion of International Conference on Agriculture, applied and Allied Science, held on 28th and 29th April 2018 at Jawaharlal Nehru University (JNU), New Delhi.

He has also delivered a talk on "Caracal- a lesser known fauna of Kachchh: Problems, Challenges and Conservation Strategies" in the seminar on "Conservation and Management of Lesser Known Mammalian Fauna" organized by Forest Department, Kachchh on the occasion of Wildlife Week on 7th August 2018.

Dr. K. Karthikeyan has attended one day training programme on "Changes in ISO / IEC 17025: 2005 to ISO / IEC 17025:2017" organized by National Accreditation Board for Testing and Calibration Laboratories (NABL), Quality Council of India on 30th April 2018 at Ahmedabad. Mr. Bhagirath Paradva presented a joint paper "Diversity and phytosociology of arid vegetation in different habitats of Rapar taluka, Kachchh, Gujarat" in the International Biodiversity Congress organized by Forest Research Institute (FRI), Dehradun held between 4th and 6th October 2018. Ms. Dipmala Gajjar participated in the Science Academies Refresher course on "Plant Taxonomy and Ethnobotany" organized by Department of Botany, Rohtak University, Haryana during the period between 8th and 22nd October 2018. Ms. Dipti Parmar presented a poster on "Primary observations on thorny vegetation and rare endangered species of *Jambudia vidi* in India" in the International symposium on the conservation of angiosperm diversity of XXVIII Annual conference of Indian association for angiosperm during 29-31st October 2018.

Ms. Dipmala Gajjar participated in the Mission Eco Next-The Eco Media Lab-workshop" organized by Dept. of Earth and Environment Science, KSKV Kachchh University on 28th - 29th November 2018. Mr. Bhagirath Paradva and Mr. Rakesh Poptani participated in the "Nature Education Camp for Resource Persons" organized by the Forest Department at TRC, Gandhinagar held on 6th-7th January 2019. Dr. V. Selvakumar participated in the programme on "Capacity building of NGOs working with Self Help Group Promoting Institution (SHPI)" organized by Bankers Institute of Rural Development – (BIRD), Lucknow during 31st January to 2nd February, 2019. Mr. Dayesh parmar presented a paper "Identifying and evaluating landscape fragmentation effects on nomadic pastoralists' mobility: a case study in Kachchh, Gujarat" co-authored by Dr. Matthieu Salpeteur (IRD, France) and Mr. Ajay Gohel (GUIDE) in the conference on "Living Lightly: Pastoralism in a Changing World - 2019" held at Indian Institute of Science Education and Research (IISER) from 15th to 17th February, 2019. Dr. G. Jayanthi received a certificate of contribution as a Guide for the research on "Cleaner production and clean technology" from Gujarat Cleaner Production Centre on 28th February 2019.

Dr. K. Karthikeyan delivered a keynote address on "Multifaceted perspectives of microbes in Environmental sustainability" in the "National Conference on Biological Tools for Sustainable Development' (BTSE)" on 2nd March 2019 organized by Department of Biosciences, Veer Narmad South Gujarat University, Surat.

Dr. G. Thirumaran delivered an invited talk on "Seaweed Diversity, Species Richness and Employment Opportunity" as part of the "World Wildlife Day Celebration 2019 - Life Below the Water: For People and Planet" on 3rd March 2019 organized by GEER Foundation, Gandhinagar. Dr. Arun Kumar Roy Mahato was a key resource person in the workshop on "Developing a Conservation Plan for Indian Grey Wolf (*Canis lupus pallipes*)" organized by Gir Forest Department, Sasan Gir, Gujarat on 5th March 2019. Dr. Jayesh Bhatt and Ms. Dipmala Gajjar delivered an invited talk on "Medicinal Plants of Kachchh and cultivation as an alternative livelihood" in the awareness programme for the farmers organized by Gujarat Medicinal Plant Board at Sarkari Ayurvedic Udyan, Nani Reladi, Kachchh on 8th March 2019.

Dr. Arunkumar Roy Mahato delivered a key note lecture on "Environmental Impact Assessment: Importance and its Role in Environmental Conservation and Sustainable Development" in the seminar on "Environment Impact Assessment" organized by Department of Environmental Studies, The M S University, Vadodara on 22nd March 2019. He has also attended the two-day advanced regional workshop on "Biological Diversity Laws in India" hosted by Institute of Law, Nirma University, Ahmedabad on 29th and 30th March 2019.

The researchers of GUIDE have attended technical training and capacity building programmes organized by various agencies. Mr. T. Dhananjayan has attended the training program on "Laboratory Management System & Internal Audit as per ISO/IEC 17025:2017" from 22nd to 25th October, 2018 at FFTS Mumbai. Ms. Monika Sharma and Ms. Ami Lakhani attended

training on "Laboratory Quality Management System and Internal Audit as per ISO / IEC 17025:2017." held at Ahmedabad Textile Industry's Research Association (ATIRA), Ahmedabad, from 27th to 30th December 2018. Mr. Rakesh Poptani attended the National workshop on "Assembly and Application of Foldscope" organized by Department of Biogas Research and Microbiology, Gujarat Vidyapith, Gandhinagar from 5th to 6th March 2019.

Students from across the country are visiting GUIDE for the exposure on different aspects of ecology and environment. Divya Brahmlok Global Academy students (90 students) had visited GUIDE on 31st July 2018. National Green Skill Development Trainee (22 students) from ZSI and BSI, Jodhpur, visited herbarium and nursery of GUIDE on 6th October 2018 and 35 post graduate students from Solapur University, Maharashtra visited herbarium and nursery on 3rd January 2019.

Dr. Alvaro Camina Cardenal from World Bank, Washington, DC and Dr. Arun Venkatraman from ERM, Bengaluru have visited GUIDE on 19th January 2019 for the discussion on "Long term Bird baseline assessment for 250-350 MW wind firm development in Kachchh". The faculty and students from PSG College of Arts and Science, Tamil Nadu visited GUIDE as part of exposure visit on 26th February 2019. The volunteers from White Desert NGO, Kachchh, staff and teachers from NIIT and St. Andrews School, Bhuj Kachchh along with students have visited our Environmental Laboratory on 24th March 2019 to understand the analytical techniques and its application in research.

Scientists and researchers have published 13 research articles in National and International journals. The journal club of GUIDE is active and impactful research articles are being discussed to increase the scientific capabilities of the research staff.

GUIDE has celebrated the important World Days concerning environment i.e. Annual Save the Frogs Day, Otter Day, International Day for Biological Diversity and World Mangrove Day. The special deliberations have also been arranged as part of the events to celebrate and revel in the magnificence of our planet, our environment and the plethora of life that exists upon it.

THRUST AREA

- Desertification and land degradation process
- Biodiversity assessment and conservation studies
- Restoration of degraded ecosystems including grassland, forests, wetlands, mangroves etc.
- Ecological restoration of mining and industrial areas
- Regional environmental assessment and planning
- Socio-economic studies for development options
- Natural resource management in arid and semi-arid zones (rangeland ecology, agro-ecology)
- Impact of invasion by exotic and introduced species
- Remote sensing & GIS applications for biodiversity conservation and environmental planning
- Coastal biodiversity and coastal monitoring
- Seaweed and Polyculture activity
- Development and conservation options for Rann of Kachchh
- Watershed development and management

SERVICES OFFERED BY GUIDE

Research

- Marine Ecological Impact Assessment studies of port and coastal industries
- Ecological health assessment (Benthic faunal diversity)
- Terrestrial Biodiversity assessment and conservation studies (Biodiversity Action Plan-BAP)
- Remote sensing & GIS applications for biodiversity conservation & environmental planning
- Climate vulnerability studies
- Environmental monitoring of matrices such as Air, Stack, Water, Soil, Sediment & Industrial effluents etc.
- Environmental Auditing
- NABL Accredited Laboratory services as per ISO / IEC 17025: 2005
- Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP)
- Social Impact Assessment (SIA) and Social Impact Management Plan (SIMP) and Social Audit
- Feasibility studies for Community Development projects
- Monitoring and Evaluation:
  - 3rd party evaluation for CSR projects
  - Geo-tagged, mobile app-based surveys
  - Data analysis and visualisation

Capacity Building and Knowledge Management

- Provide Training, develop knowledge products, information, education and communication (IEC) materials in the areas of sanitation, hygiene, health, water conservation and safe usage, environmental awareness, biodiversity conservation, and Natural Resource Management, seaweed and polyculture, Laboratory Analytics and Mushroom cultivation.
- Capacity Building of NGOs in real time data collection and to take data driven decisions
- Community Outreach and Implementation Activities
- Mangrove Restoration and plantation activities
- Implementing Government/CSR funded Watershed development, carbon neutral livelihood projects and environmental conservation initiatives.
- Build community-based climate resilience technologies and cool roofs.
- Promote social / village forestry in the rural and urban areas to increase biodiversity and to reduce heat stress.

Teaching and Research Guidance

- GUIDE scientists are actively involved in guiding Ph.D. and Masters degree students at GUIDE from various universities across the country. They are also guiding Bachelors students in Marine Sciences from the Government Science College, Mandvi, and Government Engineering college, Bhuj, Gujarat.

INFRASTRUCTURE

Campus

GUIDE campus is spread over 04 acres with a substantial green cover. The campus encompasses earthquake resistant main institute building with administrative block, laboratory, RS and GIS Cell, Environmental Audit Cell, library and board room. Earthquake resistant hostel block with 08 double occupancies is located adjacent to the institute, which provides well-furnished accommodation and dining facilities to researchers.

Apart from this, there are 12 quarters for scientists and a Director's bungalow within the campus. A green house and mushroom cultivation chamber are located in the campus for experimental purpose. The campus is rich in biodiversity with more than 250 species of plants and 72 bird species. Many birds bread within the campus with more than 100 nests of house sparrows. The Scientists of GUIDE also identified and cultivating rare medicinal plants within the campus. About 123 medicinal plants have been identified including *Commiphora stocksiana, C. wightii, Grewia tenax, Cassia fistula, Azadirachta indica, Tinospora cordifolia, Tecoma undulata, Capparis cartilaginea, Adansonia digitata, Acacia nilotica, Prosopis cineraria, Vitex negundo, Cassia auriculata*. GUIDE is also in the process of propagating endangered and rare plants of Kachchh in the campus to create a seed bank for further plantations.

Analytical Laboratory

The environmental laboratory of GUIDE is accredited by National Accreditation Board for testing and calibration Laboratories (NABL), Quality council of India in the field of chemical testing as per ISO/ IEC 17025:2005. The laboratory is equipped with state-of-art facilities instruments/equipment viz., Atomic Absorption Spectrophotometer, UV-Vis Spectrophotometer, Flame photometer, Respirable Dust Samplers, Spectro fluorophotometer and Ion Chromatography, to facilitate analysis of air, water, wastewater, soil, sediment for physical, chemical, microbial and biological parameters. The laboratory facilities at GUIDE undertake regular analysis of environmental samples related to its in-house research activities, industrial sectors, local agriculturists and NGOs. The laboratory consists of internal units like water and soil, microbiology, marine, chemical,

instrumentation and Environmental Engineering, Monitoring & Audit.

Herbarium and Museum

The herbarium has great significance and is essential for the study of plant taxonomy, geographic distributions, and the stabilizing of nomenclature. Well established herbarium facility with vast collection of angiosperms of Gujarat State is available as a reference centre for students and researchers. A total of 1011 floral species and around 5600 herbarium sheets are stored scientifically at GUIDE. Specimens of intertidal molluscan shells from Kachchh and Jamnagar coastal habitats are preserved as ready reference materials. Attempts are being made to set up a museum of marine fauna of Gulf of Kachchh.

Library and Documentation

GUIDE's library houses 1406 books on different aspects of the environment including ecology and climate change. A separate documentation unit with around 597 technical and research reports has also been maintained.

PROJECT HIGHLIGHTS

DIVISION OF TERRESTRIAL ECOLOGY – COMPLETED PROJECTS

1. BIODIVERSITY ACTION PLAN FOR DEENDAYAL PORT TRUST AND ITS SURROUNDING AREAS

Funding Agency : Deendayal Port Trust, Gandhidham, Gujarat

Project Team : Arun Kumar Roy Mahato, Jayesh B. Bhatt, Nikunj B. Gajera, Durga Prasad Behera, G. Thirumaran, K. Prabhu, Mukesh H Koladiya, Bhagirath Paradva, Rakesh Poptani, Ajay K. Gohel and Dayesh Parmar

Project Duration : September 2017- June 2018

The Biodiversity Action Plan (BAP) was prepared for conservation and enhancement of the biodiversity in and around the Deendayal Port, Gujarat and thereby contribute to the maintenance of national and global biodiversity. The study reported a total of 157 species of flora belonging to 110 genera and 43 families. Additionally, four species of mangroves viz. *Avicennia marina, Rhizophora mucronata, Aegiceras corniculatum*, and *Ceriops tagal* were recorded from the study area. The buffer zone of the study area supports twenty-eight (28) different agricultural crops. Total 302 faunal species were found in the study area which included; 237 species of vertebrates and 65 species of invertebrates. The study also reported 7 Rare and Threatened (RET) species of plants; 3 Globally Threatened species and 20 Nationally Threatened species from the study area. Biodiversity Action Plan of Rare and Threatened species, globally and nationally threatened species along with species action plan and habitat action plans were also prepared to conserve the biodiversity of the region.

2. STUDY OF ECOLOGICAL STATUS OF AROUND 6000-ACRE LAND UNDER DEENDAYAL PORT TRUST AT GULF OF KACHCHH COAST, BETWEEN VILLAGE JANGI AND BHACHAU KACHCHH, GUJARAT

Funding Agency : Deendayal Port Trust, Gandhidham, Gujarat

Project Team : Arun Kumar Roy Mahato, G.A.Thivakaran, B. Anjankumar Prusty, Rachna Chandra, Jayesh B. Bhatt, Durga Prasad Behera, Nikunj B. Gajera, Dayesh Parmar, Mukesh H. Koladiya, Bhagirath Paradva

Project Duration : April 2018 - July 2018

As directed by the District Level Coastal Regulation Zone (CRZ) revise Committee, Deendayal Port Trust (DPT), Kandla, Gujarat has allotted the task to GUIDE to evaluate ecological status of the area of 1618.91 ha located near Bhachau which was leased out to the Salt Industries by DPT. GUIDE has carried out an ecological assessment of the area to formulate the restoration and monitoring plan. The study highlighted that the mud flats encompass 52.48% of the land cover within the leased-out area followed by mangrove vegetation (31.99%), salt marshes (8.37%) and inundated area (7.16%). A total of 319.28 ha on the north-western part of the leased-out area was altered/cleared. Satellite imageries revealed that the mangrove vegetation cover has increased during the period of 2013 – 2018. Further, the study has developed a restoration and monitoring plan to re-establish the altered region ecologically.

3. BIODIVERSITY STATUS ASSESSMENT AND CONSERVATION AND MANAGEMENT PLAN FOR WILDLIFE IN CORE AND BUFFER AREAS OF THE PROPOSED BHUJ CEMENT PLANT AND MUDHVAY LIMESTONE MINE SUB BLOCK B OF M/S. SHREE CEMENT LIMITED NEAR MALDO AND MUDHVAY VILLAGES OF LAKHPAT TALUKA, KACHCHH DISTRICT, GUJARAT

Funding Agency : Shree Cement Ltd., Bhuj, Gujarat

Project Team : Arun Kumar Roy Mahato, Jayesh B. Bhatt, Nikunj B. Gajera, Durga Prasad Behera, Mukesh H. Koladiya, Bhagirath Paradva, Viral Vadodariya, Rakesh Poptani, Dipmala A. Gajjar, Dayesh Parmar

Project Duration : July 2018 - November 2018

The implementation of the developmental projects needs to adhere with ecological integrity and biodiversity values of the region. Considering, the statutory requirement of environmental clearance, Shree Cement Ltd (SCL), Bhuj solicited GUIDE to assess the status of biodiversity and wildlife, and its conservation and management measures in the core and buffer areas around the proposed sites. The study reported 114 species of flora belonging to 91 genera and 42 families; 166 species of fauna including 128 species of major terrestrial vertebrate and 38 marine fauna. The terrestrial vertebrate fauna included 11 species of herpetofauna, 102 species of birds and 15 species of mammals. In addition, 03 species of fish, 02 species of crab and 31 species of molluscs were also recorded. Geographically, 84 faunal species were reported from the core area and 166 faunal species were recorded from the buffer zone. The potential impacts on biodiversity due to limestone mining, cement plant and its associated activities in the core and buffer zones were evaluated and subsequently Conservation and Management Plan (CMP) was submitted to SCL to alleviate the potential impacts.

4. WILDLIFE MITIGATION PLAN (WMP) FOR FOUR LIMESTONE MINE LEASES, RATADIYA VILLAGE, BHUJ TALUKA, KACHCHH, GUJARAT

Funding Agency : Kutch Stone Mines and Minerals Bhuj, Kachchh

Project Team : Arun Kumar Roy Mahato, Jayesh B. Bhatt, Nikunj B. Gajera, Mukesh H. Koladiya, Bhagirath Paradva, Rakesh Poptani, Ajay K. Gohel and Dayesh Parmar

Project Duration : May 2018-July 2018

Four limestone mine leases of M/s. Kutch Stone Mines and Minerals, at Ratadiya village of Bhuj is located near to the Eco-Sensitive Zone of the Kachchh Desert Wildlife Sanctuary. The project proponent allotted a task to GUIDE to prepare the wildlife mitigation plan for the suggested mine leases in order to obtain the required environmental clearance from the National Board for Wildlife (NBWL). GUIDE survey recorded 105 plant species, belonging to 93 genera and 38 families. Total of 78 species of fauna i.e. 9 species of herpetofauna, 57 species of birds and 12 species of mammals were recorded during the study. Based on the study, Wildlife Mitigation Plan (WMP) was drafted to mitigate the possible impacts by the mines and their associated activities on wildlife in the region.

5. WILDLIFE MITIGATION PLAN (WMP) FOR 28 HA CHINA CLAY MINE LEASE, NALIYARI TIMBO VILLAGE, BHUJ TALUKA, KACHCHH, GUJARAT

Funding Agency : Mr. Rambhai V. Gadhvi, Bhuj

Project Team : Arun Kumar Roy Mahato, Jayesh B. Bhatt, Nikunj B. Gajera, Mukesh H. Koladiya, Bhagirath Paradva, Rakesh Poptani, Ajay Gohel and Dayesh Parmar

Project Duration : May 2018-July 2018

The project proponent owns a China Clay Mine Lease of 28 ha. located at Naliyari Timbo village of Bhuj. It is located near to the Eco-sensitive Zone of the Kachchh Desert Wildlife Sanctuary. Hence, as a part of the statutory requirement to obtain necessary environmental clearance from National Board for Wildlife (NBWL), the project proponent approached GUIDE to prepare Wildlife Mitigation Plan (WMP) for the proposed mine leases. GUIDE has undertaken an intensive monitoring program to measure the effectiveness of mitigation in reducing changes in wildlife habitat availability. In total, 72 plant species belonging to 66 genera and 30 families were recorded. A total of 64 species of fauna including 9 species of herpetofauna, 46 species of birds and 9 species of mammals were also documented in the study region. The Wildlife Mitigation Plan (WMP) was prepared and bestowed to mitigate the possible impacts on wildlife in the adjacent areas of the proposed mine site.

6. CLIMATE CHANGE, UNCERTAINTY AND TRANSFORMATION

Funding Agency : Norwegian University of Life Sciences, Noragric

Project Team : V. Vijay Kumar, Lyla Mehta and Shilpi Srivastava

Project Duration : May 2016 – May 2018

GUIDE is a part of the collaborative research programme entitled "Climate change, Uncertainty and Transformation" funded by Norwegian University of Life Sciences. Climate related uncertainty defined as the inability to predict the scale, intensity, and impact of climate change on human and environments. The study has been conducted with the aim of exploring discourses and practices of climate change uncertainty and transformation from 'below' and from 'above' and how they interact in diverse settings in India.

The study showed that responses from 'above' i.e. Planners and Policy makers etc. tend to be directed towards controlling and minimising the uncertainty through top-down techno – managerial solutions whereas scientists tend to depend on quantitative assessments and models build on probabilistic scenarios. These may have little to do with the living experiences of the people in the Global South as they are highly susceptible to the impacts of climate change. The study found that diversity in the knowledge and approaches are essential to understand and facilitate adaptation strategies. The final workshop of the project was held at IIT, Mumbai during the period between 1st and 3rd May, 2018. In continuation of this project, a new project namely TAPESTRY was approved and the inception workshop was organised at IIT between 7th and 12th January 2019. This workshop was attended by project partners and collaborators including members from University of Sussex, UK; Norwegian University of Life Sciences, Norway; Indian Institute of Health Management Research, Jaipur; Indian Institute of Technology, Mumbai; Kyoto University, Japan; All India Disaster Mitigation Institute, Ahmedabad; Sarai, New Delhi; GUIDE and Sahjeevan from Bhuj, Kachchh.

DIVISION OF TERRESTRIAL ECOLOGY – ONGOING PROJECTS

7. STATUS, SURVEY, DISTRIBUTION AND ECONOMIC EVALUATION OF MEDICINAL PLANTS OF KACHCHH DISTRICT, GUJARAT

Funding Agency : National Medicinal Plant Board, (NMPB), New Delhi

Project Team : Jayesh B. Bhatt, Arun Kumar Roy Mahato, Bhagirath Paradva, Rakesh Poptani and Ajay K. Gohel

Project Duration : December 2015 to December 2018 (Six-month Extension)

The project emphasizes the diversity and distribution of medicinal plants in Kachchh district. Further, it documents the indigenous knowledge systems associated with the utilization of medicinal plants and to evaluate the value of medicinal plants in the local market. GIS based mapping is being prepared to mark the high medicinal plant diversity areas and suggest suitable measures to conserve, manage and utilize them in a sustainable manner.

8. ECOLOGICAL STUDIES ON BIRDS OF PREY IN LITTLE RANN OF KACHCHH: PARADIGM SHIFT IN SPECIES ASSEMBLAGE IN SALT MARSH ECOSYSTEM.

Funding Agency : Gujarat Forest Research Institute

Project Team : Anjan Kumar Prusty, Arun Kumar Roy Mahato, Nikunj B. Gajera, Viral Vadodariya and Mukesh H. Koladiya

Project Duration : April 2017 to June 2019

The study aims to assess the status, distribution, population trends and gradients of raptors, its habitat use and resources used by selected species of raptors, species assemblage and foraging guild.

9. EX-SITU CONSERVATION OF THREATENED AND HIGHLY UTILISED MEDICINAL PLANT (*Commiphora wightii*) IN SARKARI AYURVEDIC UDYAN, NANI RELADI-BHUJ KACHCHH

Funding Agency : Gujarat Medicinal Plant Board, Gandhinagar, Gujarat

Project Team : Jayesh B. Bhatt, Arun Kumar Roy Mahato, Bhagirath Paradva and Rakesh Poptani

Project Duration : July 2016 to July 2020

The project aims to revive Rare, Endangered and Threatened species (RET) resource base, to provide seeds and planting materials of RET species for *in-situ/ex-situ* conservation and to facilitate farmers to cultivate highly utilized medicinal plant species and motivate the entrepreneurs to invest in the sector.

10. SUSTAINABLE TAPPING OF GUGGAL (Oleo-Gum-Resin) FROM *Commiphora wightii*

Funding Agency : Institute of Trans Disciplinary Health Science and Technology, Bengaluru

Project Team : Jayesh B. Bhatt, Bhagirath Paradva

Project Duration : March 2016 to March 2019 (Revised for 2 years)

The project targets to conserve the threatened and highly demanded medicinal plant *Commiphora wightii* (Oleo-Gum-Resin) by adapting sustainable tapping techniques. In addition, the team will also train the foresters / guards on sustainable tapping of Guggal to widen the conservation efforts.

11. PHYTO SOCIOLOGY, DIVERSITY AND DISTRIBUTION OF CLIMBERS IN DRYLAND ECOSYSTEMS OF KACHCHH, GUJARAT

Funding Agency : Women Scientist Programme (DST-WOS-A), Department of Science and Technology, New Delhi

Project Team : Dipmala Gajjar and Arun Kumar Roy Mahato (Mentor)

Project Duration : March 2018-June 2021

Climbers are one of the important groups of plants which play a vital role in various ecosystems and support numerous animal species to survive. Besides this, climbers provide many ethno-medicines for various human and domestic animals. However, few studies have addressed and explored the ecological significance of climbers, its community structure and distribution in various habitats and ecosystems, especially in dry land areas when compared to other vegetation types. The floristic diversity of this dryland district i.e. Kachchh is facing natural as well as anthropogenic threats. In view of the above, the present study is initiated to assess lianas diversity, its phyto sociology, community structure and distribution in various ecosystems of Kachchh district and provide suitable conservation measures.

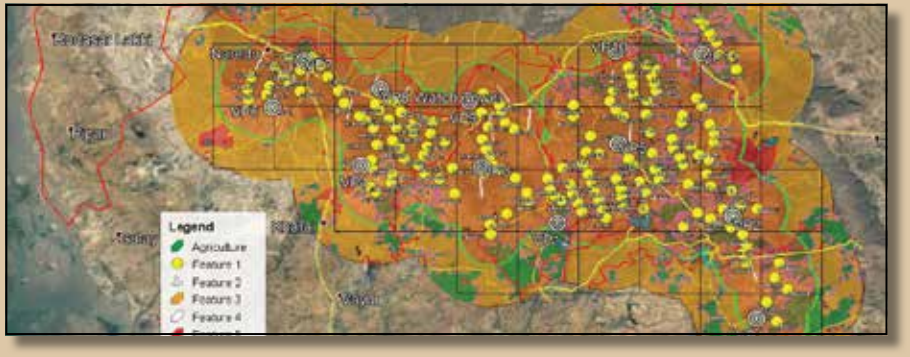
12. LONG TERM BIRD BASELINE ASSESSMENT FOR 250 – 300 MW WIND FARM SITE NEAR BARANDA, NAKHATRANA, KACHCHH DISTRICT, GUJARAT

Funding Agency : Environment Resource Management (ERM), Gurugram

Project Team : Nikunj B. Gajera, Arun Kumar Roy Mahato, Mukesh H. Koladiya and Viral Vadodariya.

Project Duration : November 2018 - June 2019

Environmental Resources Management (ERM), Gurugram is a consultant for environmental study for the proposed Wind Power Plants at Baranda area of Kachchh of Enel Green Power. ERM entrusted GUIDE to initiate the assessment on bird survey. The objectives of the study are to develop a comprehensive baseline in order to understand the avifaunal diversity, identify target species of conservation significance such as IUCN Red-List Critically endangered (CR), Endangered (EN) and restricted range species or any migratory species in the project area. Four intensive surveys have been planned in the area, of which, three surveys have been completed.



13. PREPARATION OF MICROPLANS FOR FOREST VILLAGES OF KACHCHH EAST FOREST DIVISION

Funding Agency : Kachchh East Division, Gujarat State Forest Department (GSFD), Bhuj

Project Team : Mukesh H. Koladiya, Arun Kumar Roy Mahato, Ajay K Gohel and Viral D. Vadodariya.

Project Duration : March 2019 - June 2019

The project aims: to prepare a conservation plan for *Commiphora wightii* and support to conserve the overall biodiversity in 16 villages within East Forest Division. The project focuses to improve the infrastructure and support the livelihood development of the region.

14. PREPARATION OF MICROPLANS FOR FOREST VILLAGES OF KACHCHH WEST FOREST DIVISION

Funding Agency : Kachchh West Division, Gujarat State Forest Department (GSFD), Bhuj

Project Team : Mukesh H. Koladiya, Arun Kumar Roy Mahato, Ajay K Gohel and Viral D. Vadodariya.

Project Duration : March 2019 - June 2019

The project will conserve *Commiphora wightii* in 28 villages of Kachchh west forest division and enhance the infrastructure and livelihood development. In addition, the conservation plan for overall biodiversity will be prepared.

PROJECT HIGHLIGHTS

DIVISION OF COASTAL AND MARINE ECOLOGY – COMPLETED PROJECTS

1. HOLISTIC MARINE ECOLOGICAL MONITORING OF DEENDAYAL PORT ENVIRONMENT WITH SPECIAL REFERENCE TO BIODIVERSITY AND PREPARATION OF MANAGEMENT PLAN

Funding Agency : Deendayal Port Trust, Gandhidham, Gujarat

Project Team : G. A. Thivakaran, Rachna Chandra, K. Karthikeyan, Nikunj Gajera, S. Sivaraj, Keyur Modi, Viral Barot, Hirji K. Dangar, Raj. A. Joshi

Project Duration : May 2017 to April 2018

Deendayal Port Trust (DPT) intends to develop 7 integrated facilities within its port area and approached for environmental clearance. MoEF & CC directed DPT to carry out a comprehensive study on the marine ecology of the port in order to document the present status of the marine environment, and to conserve its fragile ecosystem through appropriate management plan. The task of studying the marine environment was assigned to GUIDE. As per the directives of the ministry, two seasonal studies were carried out during July and August 2017 and in March 2018. Four species of mangroves, 23 species of intertidal fauna, 29 species of microbenthic fauna, 18 species of phytoplankton, 19 species of zooplankton and 91 species of avifauna were recorded. With this background of marine ecological status, the management plan was prepared and a draft report was submitted.

2. MARINE ECOLOGICAL IMPACT ASSESSMENT AND PREPARATION OF MANAGEMENT PLAN FOR OUTER HARBOUR EXPANSION PLAN AT HAZIRA, SURAT BY ADANI HAZIRA PORT PRIVATE LTD. (AHPPL)

Funding Agency : Adani Hazira Port Private Ltd. (AHPPL) Hazira, Surat

Project Team : K. Prabhu, S. Sivaraj, D. P. Behera, Nikunj B. Gajera, K. Karthikeyan, Dayesh Parmar, Viral Barot, Keyur Modi

Project Duration : April 2018 - December 2018

Marine biodiversity assessment and the impact due to the proposed development was carried out as per the Terms of Reference (ToR) issued by MoEF & CC for all marine biological components including intertidal and subtidal biota, mangroves, macrobenthos, turtles, avifauna, phyto and zooplankton, corals and coral associated communities, molluscs, seagrasses, seaweeds fishery resources and other marine biota within in a radius of 10 km around the proposed development at AHPPL. The study has recorded 20 species of intertidal fauna, 23 species of macrobenthos, 25 species of zooplankton and 102 species of avifauna. The impacts on the marine realm have been identified and the management plan with the appropriate measures was prepared.

3. ASSESSMENT AND MONITORING OF MANGROVE PLANTATION (1300 HA) CARRIED OUT BY DEENDAYAL PORT TRUST (DPT) KANDLA, GUJARAT

Funding Agency : Deendayal Port Trust, Gandhidham, Gujarat

Project Team : G. A. Thivakaran, Rachna Chandra, G. Thirumaran, K. Prabhu, Durga Prasad Behera, Viral Barot

Project Duration : August 2017 - September 2018

Deendayal Port Trust (DPT) during its different expansion activities has been mandated by the MoEF & CC to carry out mangrove plantation since 2006 for the purpose of environmental clearance. Mangrove plantation in 1300 ha has been carried out by the DPT within their port area. The task of assessing the survival of mangrove plantation, its health and growth including their ability to sequester carbon was assigned to GUIDE. The study report emphasised the imperative measures including deepening and desilting natural canals, clearing the blockages etc, to improve the well-being of mangroves.

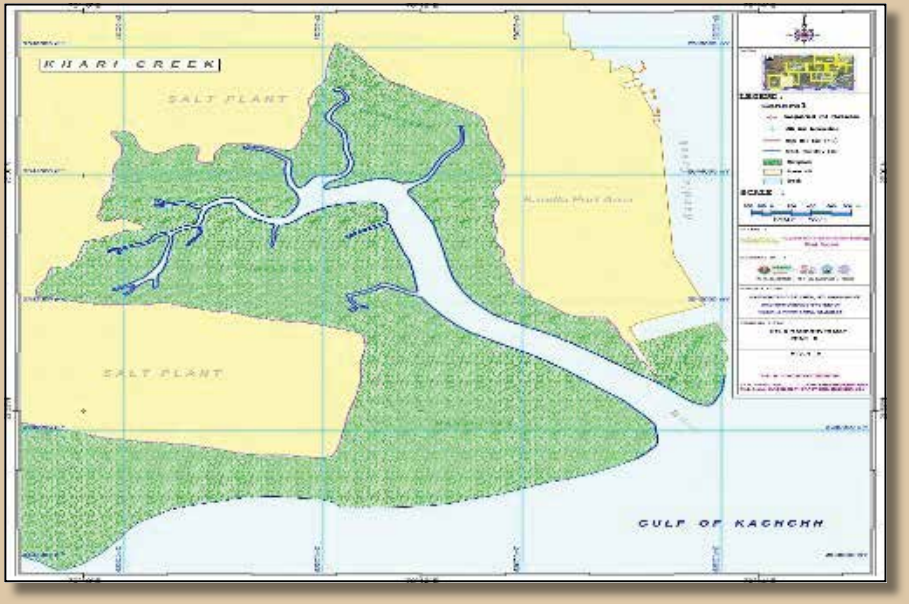
4. COMPREHENSIVE AND INTEGRATED CONSERVATION PLAN FOR DEENDAYAL PORT MARINE ENVIRONMENT WITH SPECIAL REFERENCE TO CREEK BATHYMETRY, MANGROVES, HIGH TIDE LINE AND BUFFER ZONE

Funding Agency : Deendayal Port Trust, Gandhidham, Gujarat.

Project Team : G. A. Thivakaran, K. Karthikeyan, Dayesh Parmar, Abhiroop Chowdhury

Project Duration : May 2017 to May 2018

Deendayal Port authorities intend to develop 7 integrated facilities to meet the ever-increasing cargo handling demands of the Port. While according to environment clearance to the development initiative, MoEF & CC, New Delhi has stipulated to carry out a comprehensive and integrated conservation plan after assessing creek bathymetry, mangroves and its buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary to maintain the fragile ecological conditions. Thus, DPT assigned the task of carrying out this holistic study to GUIDE. In accordance with this assignment, GUIDE carried out a detailed investigation to formulate a holistic conservation and management plan for the port. In addition, temporal changes (disappearance and expansion) of the mangrove ecosystem over the decades were investigated through GIS and RS techniques. Based on these investigations, a detailed and comprehensive conservation and management plan for the creek systems and mangroves was suggested.



5. MANGROVE MAPPING THROUGH SATELLITE IMAGERY IN THE ESSAR BULK TERMINAL LIMITED AT HAZIRA, SURAT DISTRICT, GUJARAT, MAY – 2018

Funding Agency : ESSAR Bulk Terminal Limited, Hazira, Gujarat

Project Team : G. Thirumaran, Dayesh Parmar, and Keyur Modi

Project Duration : January 2018 – December 2018

Natural mangrove patch is located in between the port expansion area of ESSAR Bulk Terminal Limited (EBTL), towards the north side from seashore and west side from Tapi estuary. In order to ensure the ecological health of the natural mangrove stands in the industrial vicinity, MoEF & CC has directed EBTL to study mangrove area using satellite imagery. Another mandate is to conserve this ecosystem by formulating conservation and management plan for the mangroves through scientific investigation. Therefore, EBTL approached GUIDE to study the mangrove patch through satellite imagery and investigate the long-term temporal mangrove cover changes in the surroundings of EBTL. The study found that about 23.37 ha of mangrove area has been increased. Desiltation of natural canals and enhancing tidal flushing rates through new canal formations have been recommended to enhance the growth of mangroves.

6. MARINE ECOLOGICAL SURVEY OF KARNATAKA COAST WITH SPECIAL REFERENCE TO BENTHOS

Funding Agency : Ocean Science Pvt. Ltd. Mumbai

Project Team : Durga Prasad Behera and S. Sivaraj

Project Duration : December 2018 - May 2019

The project aims at mapping the diversity and distribution pattern of macro benthic fauna in Karnataka coastal waters. Totally, 26 species of macro fauna were recorded in the present study. Of these, polychaetes topped the list with 15 species. Molluscs were the next dominant group in the order of abundance with 06 species followed by Others with 05 species. Among the polychaetes, *Prionospio pinnata*, *Notomastus* sp., *Nereis* sp., and *Polydora* sp., were the most commonly occurring species in the samples collected in Karnataka coastal waters. Among the molluscs, *Meretrix* sp., *Pharella* sp., *Crassostrea* sp., and Others amphipods and sea star were found as common species during the study.

7. ASSESSMENT OF MARINE ECOSYSTEM USING CONVENTIONAL AMBI AND GENETIC TOOL gAMBI

Funding Agency : S. Sivaraj and G. A. Thivakaran (Mentor)

Project Team : Science and Engineering Research Board (SERB)

Project Duration : August 2016-August 2018

The marine environments are facing significant impacts from different sources, and these changes in the marine ecosystem that led to dwindling biodiversity, and thus decreased opportunities for livelihood and aggravating poverty. As the ecosystem health incorporates ecological, social and economic issues, it is essential to assess the health of an ecosystem holistically. The present study was conducted in Burmanallah and Chidiyatappu coastal waters in south Andaman. Totally, 74 macrobenthic fauna were identified and classified as five ecological groups (EG-I to EG-V) based on AZTI model. The percentage composition of the ecological groups was viewed as EG-I contains (62%), EG-II (24%), EG-III (11.5%) EG-IV (1.5%) and EG-V (1%). As regard to ecological health assessment, Burmanallah and Chidiyatappu coastal waters were categorized as undisturbed or pristine in nature. Similarly, M-AMBI values calculated varied between 0.792 and 0.979 and the ecological grade falling between "good" and "high" status. The frequently occurred 21 polychaete species were barcoded (SERB-1 to SERB-21) and the same has been submitted to National Center for Biotechnology Information (NCBI), USA.

DIVISION OF COASTAL AND MARINE ECOLOGY – ONGOING PROJECTS

8. HOLISTIC MARINE ECOLOGICAL MONITORING OF DEENDAYAL PORT ENVIRONMENT WITH SPECIAL REFERENCES TO BIODIVERSITY AND PREPARATION OF MANAGEMENT PLAN PHASE -II

Funding Agency : Deendayal Port Trust, Kandla, Gujarat

Project Team : G. A. Thivakaran, Rachna Chandra, Nikunj B. Gajera, K. Prabhu, Durga Prasad Behera, S. Sivaraj, Dayesh Parmar, Viral Barot, Keyur Modi, Raj. A. Joshi

Project Duration : May 2018 - April 2019

In continuation to the previous year, DPT has assigned the task to GUIDE to assess the distribution of marine faunal and floral groups in the Gulf of Kachchh (Gandhidham, Bhachau and Morbi taluka). The study will also draft the Biodiversity Management Plan (BMP) to safeguard the fragile nature of the region.

9. EXPLORATION OF ENDOPHYTIC MICROORGANISMS FOR NOVEL BIOACTIVE COMPOUNDS FROM MANGROVE ENVIRONMENT OF KACHCHH, GUJARAT

Funding Agency : University Grants Commission (UGC), New Delhi

Project Team : G. Jayanthi and G. A. Thivakaran (Mentor)

Project Duration : April 2014 – April 2019

The project focuses on the remarkable subsistence of endophytes in mangrove species i.e. *Avicennia marina*. samples viz., leaf, stem and pneumatophore were collected from various locations in Kachchh. The present study investigates the diversity and biology of endophytic microbes existing under adverse conditions and the microbial relationship with mangroves found in Kachchh district. The potent endophytic microbial stains were identified through antimicrobial, antioxidant and enzyme activity, and identification of the species was done by gene sequencing. The bioactive compound was extracted and structural elucidation was performed using UV, FT-IR, NMR and GC-MS. The compound JKN1 was further submitted for in-vitro anticancer activity. The isolate 7123, *Cladosporium tenuissimum* (MG430269) and isolate 7125, *Memnoniella echinata* (MG430270) were submitted to National Centre for Biotechnology Information (NCBI), USA.

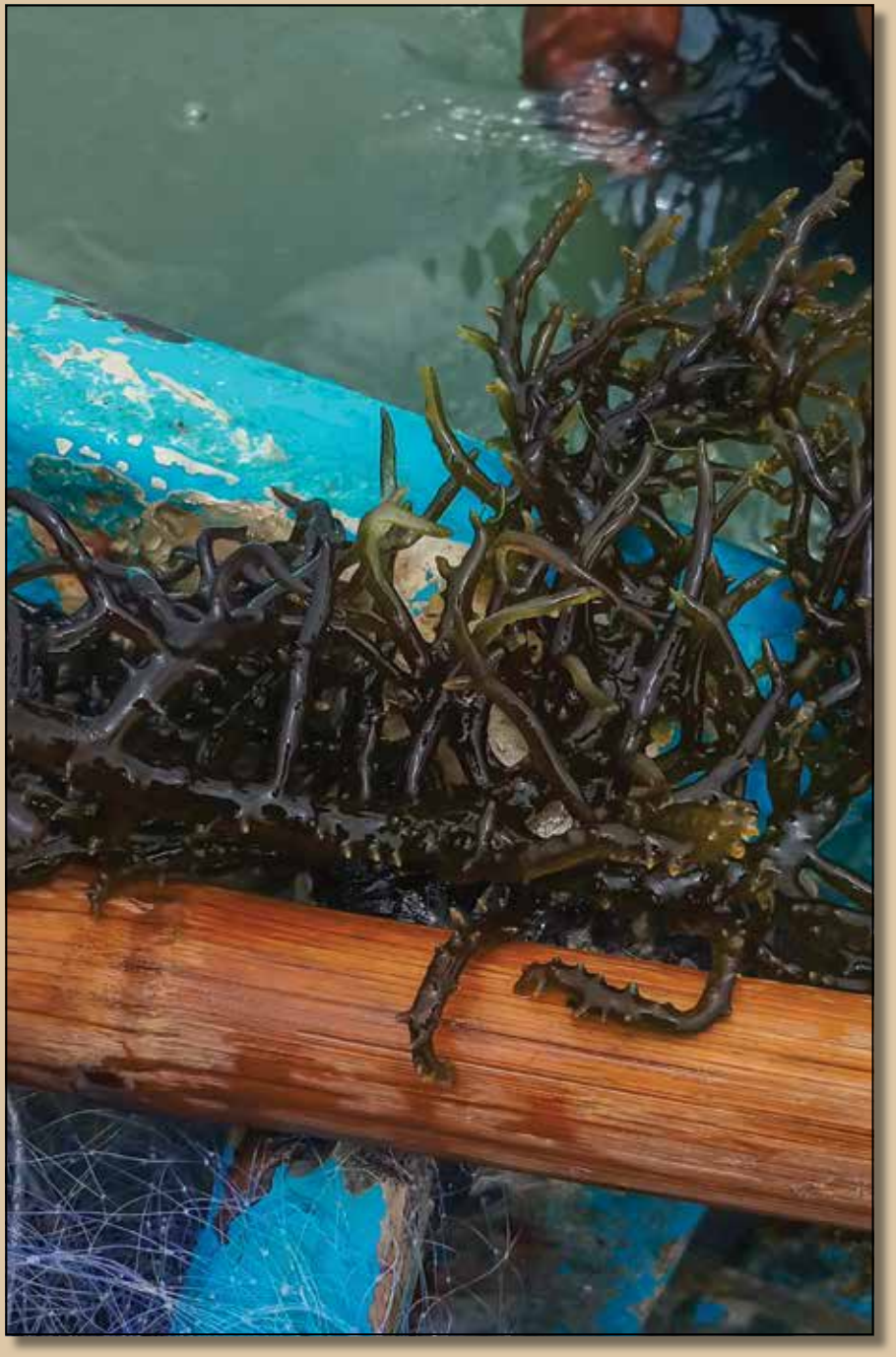
10. CLIMATE CHANGE ADAPTATION FOR NATURAL RESOURCE DEPENDENT COMMUNITIES OF KACHCHH DISTRICT: ENHANCING RESILIENCE THROUGH WATER AND LIVELIHOOD SECURITY AND ECOSYSTEM RESTORATION - NAFCC PROGRAMME (SEAWEED CULTURE)

Funding Agency : NABARD-GEER Foundation under Gujarat NAFCC Scheme

Project Team : G. Thirumaran, Durga Prasad Behera, K. Prabhu, S. Sivaraj, V. Selvakumar, Keyur Modi, Ajay K. Gohel and Viral Gadhvi

Project Duration : January 2018 – December 2020

National Adaptation Fund for Climate Change (NAFCC) is an agency established by the Government of India to support the communities that are vulnerable to the adverse effects of climate change. The aforesaid project is sanctioned to GEER foundation, Gandhinagar in which GUIDE is one of the project partners. GUIDE is implementing seaweed cultivation as an alternative livelihood among the fishing communities of Kachchh. The utilisation and market space for the seaweed is increasing in the domestic and international markets as it is used in the food and pharma industries. Initially, increased daily growth rate and good survival was very well observed. However, salinity escalation due to failure of monsoon in the project location of Kachchh affected the seaweed growth.



11. CLIMATE CHANGE ADAPTATION FOR NATURAL RESOURCE DEPENDENT COMMUNITIES OF KACHCHH DISTRICT ENHANCING RESILIENCE THROUGH WATER AND LIVELIHOOD SECURITY AND ECOSYSTEM RESTORATION - NAFCC PROGRAMME (POLYCULTURE)

Funding Agency : NABARD-GEER Foundation under Gujarat NAFCC Scheme

Project Team : G. Thirumaran, Durga Prasad Behera, K. Prabhu, S. Sivaraj, V. Selvakumar, Keyur Modi, Ajay K. Gohel and Viral Barot

Project Duration : January 2018 – December 2020

Polyculture is the practice of culturing more than one species of aquatic organisms in the same unit (marine, freshwater pond, streams and rivers) in order to fulfil the world's demand. This method utilizes locally available resources to construct floating cage structures with enclosed fishnets, synthetic ropes, buoys and anchors. Thus, polyculture will provide high economic returns than other aquaculture activities. This technique is economically, socially and environmentally sound. Hence, GUIDE is implementing the polyculture activity at select villages of Kachchh district of Gujarat. Upon successful seed stocking, the species were grown well initially with average length of 9.8 cm with mean weight of 12 gms. However, due to failure in monsoon at the project sites of Kachchh impacted the growth and survival.

12. CLIMATE CHANGE ADAPTATION FOR NATURAL RESOURCE DEPENDENT COMMUNITIES OF KACHCHH DISTRICT ENHANCING RESILIENCE THROUGH WATER AND LIVELIHOOD SECURITY AND ECOSYSTEM RESTORATION-NAFCC PROGRAMME (TRAINING AND CAPACITY BUILDING)

Funding Agency : NABARD-GEER Foundation under Gujarat NAFCC Scheme

Project Team : G. Thirumaran, Jayesh Bhatt, Durga Prasad Behera, V. Selvakumar, Keyur Modi and Ajay K. Gohel

Project Duration : January 2018 – December 2020

The project aims to enhance the climate change adaptive capabilities of the natural resource dependent communities by offering the alternative livelihoods that highly coexist with their traditional livelihood options. In this context, the fishermen community of Kachchh has been trained on community-based mangrove restoration, seaweed culture and Polyculture activities. Totally, 10 open trainings have been conducted in 9 villages (7 villages in Abdasa and 2 villages in Mandvi) had about 647 villagers (209 females and 438 males) had participated and benefitted from the training programmes. Four beneficiary training and one exposure visit to Central Salt and Marine Chemical Research Institute (CSMCRI), Bhavnagar has been arranged for the beneficiaries from the villages of Abdasa taluka (Valavarivandh, Bhangodiwandh, Mohadi, and Niminivandh).

13. MARINE ECOLOGICAL STUDIES OF DAMAN COAST

Funding Agency : Ocean Science Pvt. Ltd., Mumbai

Project Team : Durga Prasad Behera and S. Sivaraj

Project Duration : June 2019 - December 2019

Biological studies of benthic fauna, planktonic community and fisheries resources in the Daman coastal waters is being assessed by GUIDE as per the requirement of Ocean Science Pvt. Ltd., Mumbai. The study is in progress.

14. MANGROVE BIODIVERSITY ENRICHMENT IN AND AROUND ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED (APSEZL), KACHCHH, GUJARAT

Funding Agency : Adani Foundation, Mundra, Kachchh, Gujarat

Project Team : G. A. Thivakaran and Rachna Chandra

Project Duration : September 2018 – November 2019

Mangrove restoration activities in Gujarat are one of the best examples of habitat restoration in the world, the mangrove restoration in Gulf of Kachchh (GoK) is largely confined to single species, comprising of *Avicennia marina*. Thus, Adani Foundation at Mundra taluka of Kachchh approached GUIDE, to initiate multi-species plantation of mangroves in Kachchh. It is felt that a mangrove biodiversity park of its kind will help to disseminate knowledge on the mangrove ecosystem and simultaneously conserving the species. Till now, 05 mangrove species have been identified for plantation.

Since, some of these species are not readily available in Kachchh, their seeds / propagules are being procured from various states across the country (Machilipatnam in Andhra Pradesh, Pondicherry, Pichavaram in Parangipettai, Tamil Nadu, Kandla and Jamnagar in Gujarat). Till date around 80,000 mangrove seeds/propagules have been sown in nursery beds. The activities are in progress.

PROJECT HIGHLIGHTS

DIVISION OF ENVIRONMENTAL IMPACT ASSESSMENT – COMPLETED PROJECTS

1. RAPID ASSESSMENT OF ICHTHYOFAUNA RECRUITMENT INTO KEOLADEO NATIONAL PARK FROM GOVARDHAN RIVER AND PANCHNA DAM

Funding Agency : Office of Chief Wildlife Warden, Jaipur, Government of Rajasthan

Project Team : Rachna Chandra, Deba Prasad Das and Sonia Benjamin

Project Duration : September 2018 - January 2019

The wetland ecosystem of Keoladeo National Park (KNP) has been under a dynamic hydrological regime, as it has been receiving water from multiple sources viz., Chambal river, Govardhan canal and Panchna dam. These sources have their specific ichthyofaunal composition, which could be different with reference to the species, either breeding in the KNP and/or being recruited traditionally from Ajan dam. Thus, different sources of water in the KNP could potentially play a vital role in influencing the diversity of birds visiting the Park. Hence, the present investigation was undertaken to assess and analyze the variations in the fish (fingerlings) recruitment into KNP during 2018 and to compare the present scenario with that of the earlier investigations. The study reported 16 fish species during the survey with one unidentified species.

2. SOIL SAMPLES FROM THE VICINITY OF M/s. GALLANTT METAL LTD. SAMAKHIYALI, GUJARAT

Funding Agency : M/s. Gallantt Metal Ltd., Samakhiyali, Kachchh

Project Team : Rachna Chandra, Pratik D. Sengani, Saket Kashyap, Arjan K. Rabari and Hiren V. Chavda

Project Duration : January 2019 – February 2019

The M/s. Gallantt Metal Ltd. (GML) had proposed expansion for manufacturing of Sponge Iron (3,73,500 TPA), M.S. Billets (4,28,500 TPA), MT Bars (4,22,400 TPA), and MS Rolled Bar (6,843 TPA). In this connection, the Project Proponent had applied for clearance from MoEF & CC. The steering committee of MoEF & CC has asked the Project Proponent to conduct the soil quality and microbial analysis in samples collected within 10 km from the proposed expansion site. Thus, GML approached GUIDE to carry out the study. The analysis of samples found a high level of Potassium and Nitrogen and the presence of bacterial strains which are capable of producing Cellulase and Amylase enzyme. Thus, it was suggested to introduce efficient microbes to soils which would improve Carbon percentage and subsequent crop yield.

DIVISION OF ENVIRONMENTAL IMPACT ASSESSMENT – ONGOING PROJECTS

3. REGIONAL STRATEGIC IMPACT ASSESSMENT FOR DEENDAYAL PORT REGION

Funding Agency : Deendayal Port Trust (DPT), Kandla, Gujarat

Project Team : Rachna Chandra, B. Anjan Kumar Prusty, G. A. Thivakaran, Arun Kumar Roy Mahato, Nikunj B. Gajera, V. Selvakumar, Jayesh Bhatt, Deba Prasad Das, Pratik D. Sengani, Sonia Benjamin, Dayesh Parmar, Ajay K. Gohel, Bhagirath Paradva, Mukesh H. Koladiya, Rakesh Poptani, Arjan K. Rabari and Hiren V. Chavda

Project Duration : September 2017 to November 2018

Deendayal Port in Kachchh District of Gujarat State is a gateway Port to the hinterland in western and northern states of India. As part of its periodic expansion and modernization plan, DPT has proposed 07 integrated facilities (Stage I) within the existing port facilities. The Regional Strategic Impact Assessment (RSIA) study was conducted based on strategic consideration in order to design a policy framework for the development of the region. The main purpose of such a strategic approach was to arrive at an environmental regulatory regime consistent with long term goals of sustainable development of the region.

4. METAL UPTAKE AND STRESS RESPONSES DURING CHELATE ASSISTED PHYTOEXTRACTION PROCESS: EFFECT OF SOIL TYPE, METAL CONCENTRATION AND CO-METAL ION

Funding Agency : DST - INSPIRE Faculty Award Scheme, Government of India

Project Team : Rachna Chandra, Soumya Ranjan Mishra

Project Duration : June 2013 – June 2019 (01-year extension)

Heavy metals are well known for their toxic characteristics, mobility, persistence in the environment and non-degradability. Mining activities have direct contribution of heavy metal pollution in soil. Several technologies have been developed for clean-up, of which plant based techniques outweigh conventional ones. Phytoextraction is one such technique which is sustainable and eco-friendly in decontaminating the soils. Thus, considering the major developments happening in past decades, the project is designed to:

i) assess the impact of governing factors on metal uptake;

ii) devise strategies for extraction of metal (s) from mill tailings, and

iii) cost-effective analysis of the technique in the Indian scenario.

DIVISION OF NATURAL RESOURCE MANAGEMENT – ONGOING PROJECTS

1. TRAINING OF INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP) PROJECT IN KACHCHH

Funding Agency : Gujarat State Water Shed Management Agency (GSWMA), Gandhinagar, Gujarat

Project Team : Prakash M. Patel, Geeta Goswami, Amit. J. Ghodasara and Jayraj R. Mori

Project Duration : August 2016 - March 2020

Gujarat State Watershed Management Agency (GSWMA) under the Commissionerate of Rural Development has sanctioned Watershed training project to GUIDE. This is mainly focussing on the Capacity building of farmers, Self Help Groups (SHG) and Village Water Committee (VWC), etc. and generate awareness about rules and regulation of GSWMA. In total 100 training sessions were organized and 5000 villagers were benefitted.

2. INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP) - 41

Funding Agency : District Watershed Development Unit (DWDU), Kachchh, Gujarat

Project Team : Prakash M. Patel, Geeta Goswami, Amit. J. Ghodasara and Jayraj R. Mori

Project Duration : June 2013 - May 2020

The IWMP – 41 was initiated to address various issues like water scarcity, degradation, and ground water depletion and improve the land status etc. of Kumbhariya, Valadiya Bitta (East), Valadiya Bitta (West) and Bhuvad villages of Anjar Taluka, Kachchh district through soil, water and other site-specific amendments, thereby improving the socioeconomic status of the population.

3. INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP) – 44

Funding Agency : District Watershed Development Unit (DWDU), Kachchh, Gujarat

Project Team : Prakash M. Patel, Geeta Goswami, Amit. J. Ghodasara and Jayraj R. Mori

Project Duration : September 2017 - December 2022

The Integrated Watershed Management Programme (IWMP- 44) was sanctioned by the District Watershed Development Unit (DWDU), Kachchh, Gujarat during September 2017 to improve the land status by various soil, water and other site-specific amendments of the Deshalpar village located in Rapar taluka of Kachchh district. The core objective of the programme is to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as soil, vegetative cover and water. The programme activities lead to the prevention of soil run-off, regeneration of natural vegetation and recharge of the ground water table. It enables multi-cropping and diverse agro based activities. This promotes sustainable livelihood option for the nearby population.

4. RESTORATION OF WATER HARVESTING STRUCTURES UNDER GUJARAT NAFCC PROJECT

Funding Agency : NABARD - GEER Foundation under Gujarat NAFCC Scheme

Project Team : Prakash M. Patel, Arun Kumar Roy Mahato, Geeta Goswami, Amit. J. Ghodasara and Jayraj R. Mori and Ajay K. Gohel

Project Duration : March 2018 to March 2020

The Project aims to build and restore the water harvesting structures to enhance the climate change adaptive capabilities of the communities of Kachchh, Gujarat. The interventions will help in prevention of soil run-off, regeneration of natural vegetation and revive the ground water table. It will further rejuvenate the agro based activities and improve the quality of life of the nearby population. The project is in progress.

PROJECT HIGHLIGHTS

DIVISION OF ENVIRONMENTAL LABORATORY – COMPLETED PROJECTS

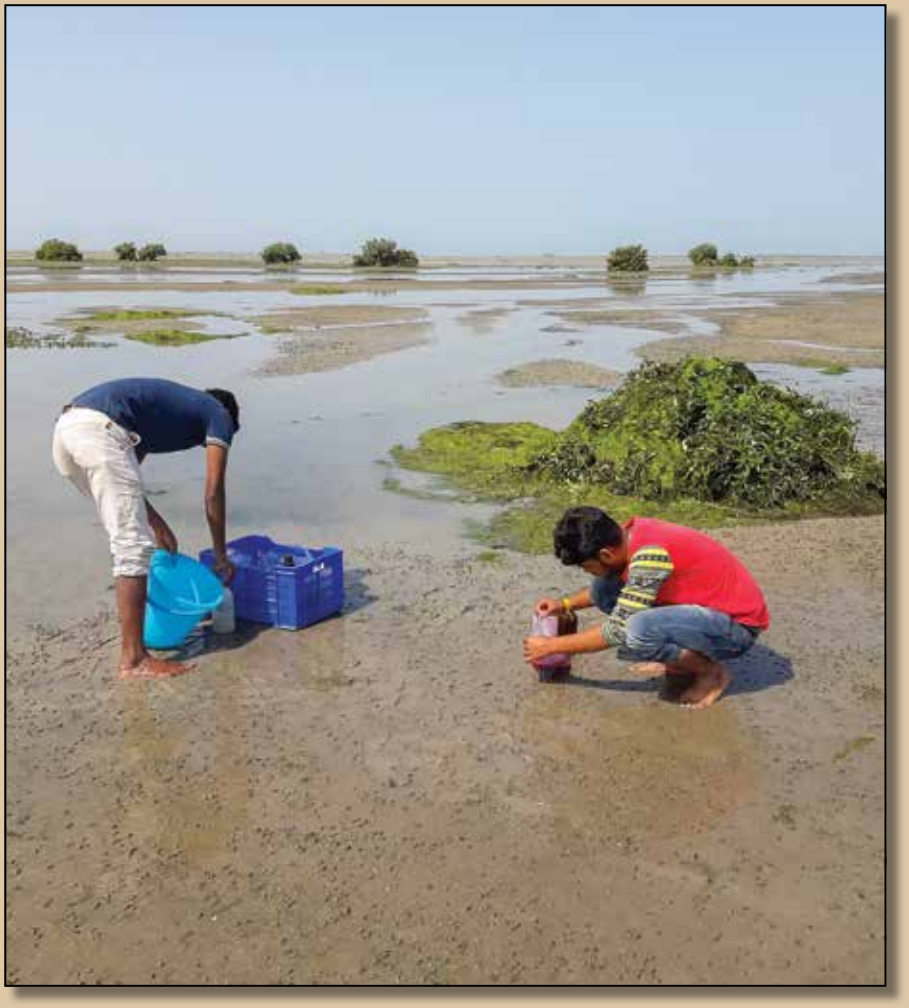
1. MARINE MONITORING STUDIES AT CRUDE OIL TERMINAL (COT), VADINAR, GUJARAT

Funding Agency : Bharat Oman Refineries Limited, Jamnagar, Gujarat

Project Team : K. Karthikeyan, G. Thirumaran, K. Prabhu, S. Sivaraj, T. Dhananjayan Hirji K. Dangar, Monika R. Sharma, Ami D. Lakhani, Aliya Naz, Keyur Modi, Raj. A. Joshi, Jayanti. P. Barot

Project Duration : April 2016 - March 2019

Marine Environmental health of the Crude Oil Terminal and the SBM of Bharat Oman Refineries Limited (BORL) was entrusted to GUIDE since 2011. BORL, a company has set up a 6 MTPA refinery at Bina, Madhya Pradesh. The current study location is on the Southern shore of Gulf of Kachchh (GoK) around 50 km west of Jamnagar, has been set up to import crude oil. In this connection, the marine environmental monitoring task has been given to GUIDE to monitor SBM and inter-tidal location adjoining the Crude Oil Terminal (COT). In this regard, monthly monitoring studies were being carried out by GUIDE since August 2011. This ecological study encompasses water and sediment quality, biological quality, inter-tidal and sub-tidal fauna and planktons. The study clearly shows that the marine environmental health of the study area, Vadinar, has not been affected due to the ongoing activities and also comparable with the earlier studies conducted by GUIDE. Regular studies of similar kind need to be conducted in order to understand the likely impacts of the ongoing activities and which in turn can maintain the marine ecological health of such ecosystems.



2. EVALUATION OF MICROBIAL CONTAMINATION OF WATER SOURCES IN SELECT LOCATIONS OF KACHCHH, GUJARAT

Funding Agency : Arid Communities and Technologies, Bhuj-Kachchh, Gujarat

Project Team : K. Karthikeyan, T. Dhananjayan, Hirji K. Dangar, Monika R. Sharma, Ami D. Lakhani, Raj. A. Joshi

Project Duration : April 2018 – March 2019

The study aimed to assess the microbial contamination in the groundwater of Bhuj taluka, Kachchh. To understand this, the samples were collected during the two seasons from the pre-determined sampling points identified by the client. Sources were categorized based on the utilization pattern of the water. From the study, it is understood that the ground water in the collected samples contained the chemical constituents and microbial contaminants beyond the prescribed limits. The technical report of the study along with the management plan emphasizing the use of safe water among public was detailed out.

3. MARINE ENVIRONMENTAL MONITORING AT VADINAR OIL TERMINAL LIMITED, GUJARAT

Funding Agency : Nayara Energy Ltd., (Formerly ESSAR Oil Ltd.,), Jamnagar, Gujarat

Project Team : K. Karthikeyan, G.Thirumaran, K. Prabhu, S. Sivaraj, T. Dhananjayan, Hirji. K. Dangar, Monika. R. Sharma, Ami. D. Lakhani, Aliya Naz, Keyur Modi, Raj. A. Joshi, Jayanti. P. Barot

Project Duration : April 2016 – March 2020

Essar Oil Refinery, a Marine Terminal termed as Vadinar Oil Terminal Limited (VOTL) comprises of SPM, product berths, pipelines, etc has been established to facilitate the supply of crude oil to the refinery. The entire marine operations of the Marine Terminal is being executed through VOTL which is situated at Vadinar. In order to monitor the Marine environment of Vadinar, GUIDE was given the task by VOTL to monitor and assess the marine ecological status of the environment at critical locations in and around the terminal and it's offshore facilities. In this regard, 9th consecutive year monthly monitoring of Vadinar was entrusted to GUIDE. The study on monthly basis indicated that there are no significant changes in the marine environmental quality with special reference to water and sediment which clearly indicates that the marine ecology of the area has not been affected due to the ongoing operational activities. But in order to understand the likely impacts due to ongoing activities and to maintain the health of such ecosystem, regular monitoring in and around Vadinar should be continued to identify the trend to enable corrective measures, if required.

4. ENVIRONMENTAL AUDIT FOR SCHEDULE-I INDUSTRIES

Funding Agency : Industries (As per GPCB guidelines)

Project Team : K. Karthikeyan, Ratansi Chaudhary, Anjali Thomas, Mahesh. P. Dafda,

Project Duration : January 2015 – December 2020

GUIDE since 2014 is recognized as Schedule-1 Environmental Auditor by Gujarat Pollution Control Board, Gandhinagar to conduct Environmental Audit of Industries of Gujarat. Environmental Audit is basically a management tool which comprises of an organized evaluation procedure for performing the Environmental Management protocols in an industrial setup in order to ensure waste prevention, waste reduction and to maintain other regulatory compliances. The major task of the Environmental Auditors is to monitor and evaluate the Environmental Management System (EMS), suggest and recommend necessary improvement of EMS in the industries. With the above-mentioned objectives, this scheme is being functional since last 10 years by GPCB through various Recognized Environmental auditors (Schedule – I and II). GUIDE is one among the 34 Schedule - I Auditors in the state and GUIDE's team comprises of four members of Environmental Auditors with the following subject expertise:

Dr. K. Karthikeyan, Senior Scientist and Laboratory Head (Microbiologist)

Mr. Ratansi Chaudhary, Senior Scientific Assistant (Chemical Engineering)

Ms. Anjali Thomas, Senior Scientific Assistant (Environmental Engineering)

Mr. Mahesh. P. Dafda, Scientific Assistant (Chemistry)

Environmental audit is being done on a seasonal basis, i.e., thrice in a year which includes Ambient Air monitoring, Stack monitoring, Water, Wastewater, STP and trade effluent analysis, and Noise monitoring. The audit work intends to gather information on the industrial processes adopted by the system.

5. STUDIES ON DREDGED MATERIAL FOR PRESENCE OF CONTAMINANTS (EC & CRZ Clearance accorded by the MoEF&CC, GoI dated 19/12/2016- Specific Condition no. VII)

Funding Agency : Deendayal Port Trust, Gandhidham, Gujarat

Project Team : K. Karthikeyan, G. Thirumaran, G. Jayanthi, K. Prabhu, S. Sivaraj, Dayesh Parmar, T. Dhananjayan, Hirji K. Dangar, Monika. R. Sharma, Ami. D. Lakhani, Dipti. L. Parmar, Keyur Modi, Raj. A. Joshi

Project Duration : November 2018 – November 2021

Deendayal Port authorities intend to make developmental initiatives and approached the Ministry of Environment, Forests and Climate Change (MoEF & CC) for environmental clearance. Hence, MoEF & CC directed the port authorities stipulated to carry out "Studies on dredged materials for the presence of contaminants" as per the EC & CRZ Clearance accorded by the MoEF & CC, GoI dated 19/12/2016, Specific Condition No. vii and the task of carrying out the study was given to GUIDE. In this regard, DPT has assigned the task to GUIDE for a period of three years (2018-2021) at two specified dumping locations. This study envisages the assessment of physio-chemical characteristics in the dredged materials in the dumped locations as earmarked by "The Central Water and Power Research Station (CWPRS), Pune. In this connection, the study was taken up for evaluation of dredged materials for the presence of contamination through a methodical investigation comprising physical, chemical and biological parameters with special reference to heavy metal, Petroleum hydrocarbon etc. During every quarter, marine water samples (surface and bottom) and bottom sediment samples from two locations, i.e., from Offshore and from creek were sampled and analysed. Based on the data gathered from the project, suitable management plan for managing such dredged materials was suggested.

6. MARINE ECOLOGICAL STUDIES FOR REVAMPING PIPELINES OF OIL JETTIES OF DEENDAYAL PORT TRUST, KANDLA, GUJARAT (Part of Environmental Impact Assessment)

Funding Agency : Metallurgical & Engineering Consultants Limited (MECON Ltd.), A Public Sector undertaking under the Ministry of Steel of the Government of India, Ranchi, Jharkhand

Project Team : G. A. Thivakaran, K. Karthikeyan, Rachna Chandra, K. Prabhu, Durga Prasad Behera, Dayesh Parmar, Raj. A. Joshi, Jayanti. P. Barot

Project Duration : May 2018 – August 2019

The present study includes different marine biotic components as stipulated in the work order of MECON Limited, Jharkhand. A detailed holistic approach has been followed to document different components of marine biodiversity within the Deendayal Port area. The biological variables investigated in the present study are as follows: mangroves, intertidal fauna, subtidal macro and meio fauna, phyto and zoo plankton, halophytes, sea grasses, seaweeds, fisheries, and other socio-economic information of the local communities.

7. MONITORING OF GROUNDWATER AND EFFLUENTS FROM TEXTILE DYEING UNITS OF DIFFERENT TALUKA OF KACHCHH, GUJARAT

Funding Agency : Hunnarshala Foundation, Bhuj-Kachchh

Project Team : K. Karthikeyan, T. Dhananjayan, Hirji. K. Dangar, Monika R. Sharma, Ami.D. Lakhani, Raj. A. Joshi

Project Duration : April 2016 – March 2019

The present study focusses on the quality of ground water and textile effluents generated by the urban and rural textile units in the clusters of Kachchh. In this project, ground water samples from various locations of Kachchh district such as Anjar, Mundra, Mandvi, Bhuj, Ajrakhpur, Dhamadka, Nagore road were collected and studied for the presence of chemical constituents. A part of the samples were also subjected for extraction and analysis of traces/ intermediates of textile dyes using GC-MS based on outsourcing through NABL Accredited laboratory. The data gathered from the project was compared with the permissible limits based on BIS limits.

8. STUDY ON SOIL CHARACTERISTICS WITH REFERENCE TO AGRICULTURAL ACTIVITIES

Funding Agency : Shri Kutchi Leva Patel Samaj, Bhuj, Gujarat

Project Team : K. Karthikeyan, T. Dhananjayan, Hirji. K. Dangar, Monika. R. Sharma, Ami. D. Lakhani, Dipti. L. Parmar.

Project Duration : April 2018 – March 2019

GUIDE was approached by Shri Kutchi Leva Patel Samaj, Bhuj for analysis of soil samples from different talukas of Kachchh district for various physico-chemical characteristics including major and minor soil nutrients. In this regard, around 320 soil samples collected by the farmers from the agricultural land were submitted to the Laboratory by Shri Kutchi Leva Patel Samaj. All the soil samples were processed for analysis as per the standard protocol and the results obtained were compared with suitable ranges for agricultural purpose. Most of the samples analysed under this project revealed the presence of major and minor elements at required concentrations.

9. ANALYSIS OF MICROBIAL CHARACTERISTICS OF BENTONITE

Funding Agency : Innovation and Knowledge Centre, Ashapura Minechem Ltd. Bhuj, Gujarat

Project Team : K. Karthikeyan and Monika. R. Sharma

Project Duration : April 2018 – March 2019

The aim of the study was to analyze the bentonite and various other mining materials for microbial characteristics and Quality checks for various microbial species including Total bacterial count, Total fungal count, Total yeast count, Total mould count, Total Actinomycetes, *E.coli* sp., *Vibrio* sp., *Pseudomonas* sp., *Salmonella* sp., *Shigella* sp., etc. This was done as per the requirement to check the suitability of the samples for application in various industries.

10. SIMULATION STUDY TO CHECK THE PERMEABILITY OF SLURRY IN BENTONITE AND GCL LAYER

Funding Agency : Innovation & Knowledge Center, Ashapura Group of Industries, Bhuj, Kachchh, Gujarat-370020

Project Team : K. Karthikeyan and Ratansi. M. Chaudhary

Project Duration : September 2018

The aim of the study was to understand the efficacy of bentonite and Geosynthetic clay liner (GCL) layer on permeability and to witness the experiment being conducted pertaining to the application of pressure in the slurry sample on the Bentonite and GLC layer, Environmental Audit team was called for to check the experiment at Innovation and Knowledge Centre, Ashapura Minechem Ltd. From the experiment, it is understood that even after applying more than 5 times higher hydraulic pressure (10 psi) than calculated hydraulic pressure (1.39 psi) on Bed layer of Bentonite + GCL, no liquid discharge or permeation was observed through the Bed layer during the entire duration of the experiment upto 30 mins.

11. ADEQUACY REPORT FOR CONSENT TO ESTABLISH OF M/s BUNGE INDIA PVT. LTD.

Funding Agency : M/s Bunge India Pvt. Ltd., Kandla

Project Team : Dr. K. Karthikeyan, Ratansi. M. Chaudhary and Anjali Thomas

Project Duration : October 2018

The main aim of the study was to assess the pollution load and to check the water consumption in the production plant due to the proposed increased production capacity. To perform this, the Engineers from Environmental audit team conducted a visit at the plant and thoroughly studied the related process systems of the industry. Further, the proposed Environmental management system was studied based on the data furnished by the industry which includes item wise production, water consumption and waste water generation. The ETP outlet sample was also analyzed to evaluate the EMS to cope up with the estimated pollution load after the proposed installation.

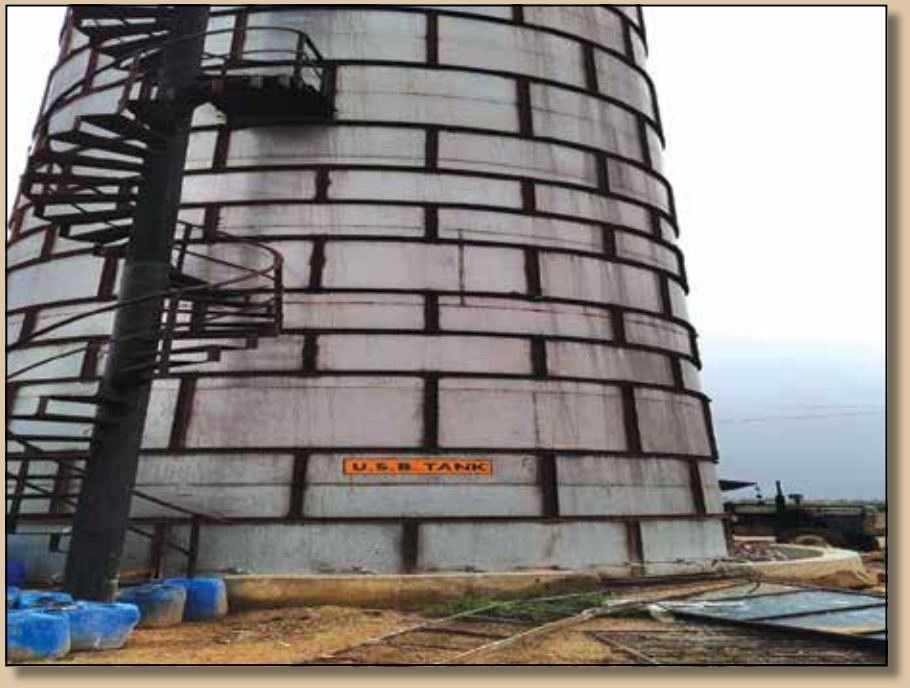
12. ADEQUACY REPORT FOR EFFLUENT TREATMENT PLANT (ETP) OF M/s DIVYA DAIRY PRODUCTS

Funding Agency : J. B. Environmental Consultants, Bhuj, Gujarat

Project Team : K. Karthikeyan, Ratansi. M. Chaudhary and Anjali Thomas

Project Duration : November 2018

The aim of the study was to assess the load of pollution and to check the water consumption in the production plant of M/s Divya Dairy products located at Lakhond, Bhuj, due to proposed increased production capacity. In this regard, J. B. Environmental Consultants has entrusted the task to GUIDE to conduct a visit and submit the adequacy report for the proposed expansion. For this, Engineers from Environmental Audit team visited the plant and studied on the pollution load due to the proposed activities. Further effluent sample was collected and subjected for analysis of various parameters which revealed that all the physico-chemical characteristics of the effluent were well within the limits as prescribed by GPCB.



EVENTS IN GUIDE

10th Annual "Save The Frogs Day"

The 10th Annual "Save The Frogs Day" was celebrated at GUIDE on 30th April 2018. This programme witnessed the participation of research staff of GUIDE, Dy. Conservator of Forest (Kachchh-West) and his team, students from R. R. Lalan College and K. S. K. V. Kachchh University, Bhuj.

World Otter Day

World Otter Day was celebrated in GUIDE on 19th May 2018. Mr. Akshit Suthar, Member, IUCN-SSC - Otter Specialist Group has delivered a talk on "Status of Smooth-coated Otter in Gujarat and their conservation issues". The participants included GUIDE's research staff, research scholars from K. S. K. V. Kachchh University, Bhuj and S. P. University, Vallabh Vidya Nagar, Anand.

International Day for Biological Diversity

International Day for Biological Diversity was organized in GUIDE on 22nd May 2018. The deliberations have covered the historical issues of the said event which includes 25 years of action for Biodiversity conservation.

Special Talk: The river itself warns us: Local knowledge of flood forecasting in the Gandaki river basin, India

Mr. Amitangshu Acharya, University of Edinburgh, UK delivered a talk entitled "The river itself warns us: Local knowledge of flood forecasting in the Gandaki river basin, India" on 8th June 2018. The participants included GUIDE's research staff, students from PSG Arts and Science College, Coimbatore, and G. G. I. P. University, Delhi.

Special Talk: Conservation in a Changing World

Two distinguished academicians / researchers Dr. P. K. Mathur, Former Professor and Dean, Wildlife Institute of India, Dehradun, and Dr. Omvir Singh, Senior Principal Scientist, Forest Research Institute and University, Dehradun visited GUIDE on 15th June 2018. Dr. Mathur delivered a talk entitled "Conservation in a Changing World". GUIDE scientists, research scholars and dissertation students were part of the event.

World Mangrove Day

GUIDE has celebrated 'World Mangrove Day' on 26th July 2018. The programme was attended by forty-five participants. As part of the programme, a video on mangroves was screened and two invited talks were delivered by Dr. M. Trivedi and Dr. S. Sharma from the KSKV Kachchh University, Bhuj-Kachchh on the significance of mangrove with reference to Carbon sequestration and mangroves as a livelihood option.

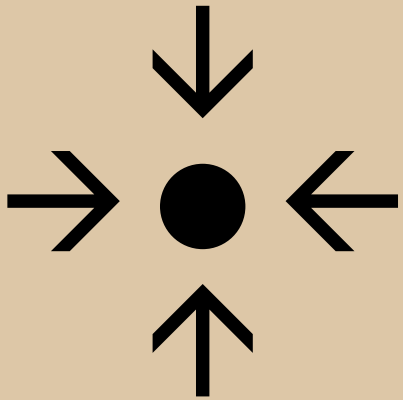
GUIDE'S COLLABORATIONS
(Past and Present)

MoU / International Collaborations

- Blaustein Institutes for Desert Research (BIDR), Israel
- Institute of Development Studies, University of Sussex, Brighton, UK
- Massey University, North Palmerston, New Zealand
- Norwegian University of Life Sciences, Norway
- The University of Greenwich, London, UK
- Le Centre National De La Recherche Scientifique (CNRS) and Centre d'Ecologie Fonctionnelle et Evolutive (CEFE), Montpellier

MoU / National Collaborations

- Institute of Trans-Disciplinary Health Sciences and Technology (ITDHST), Trans Disciplinary University (TDU), Bengaluru
- ICAR-Central Institute for Brackish Water Aquaculture (CIBA), Chennai
- The Centre of Advanced Study in Marine Biology, Annamalai University, Chidambaram, Tamil Nadu
- C.C. Shroff Research Institute, Mandvi – Kachchh, Gujarat
- Central Arid Zone Research Institute (CAZRI), Jodhpur, Rajasthan
- Central University of Rajasthan (CURAJ), Ajmer, Rajasthan
- Centre for Advanced Study in India (CASII), Bhuj, Gujarat
- CSIR - National Environmental Engineering Research Institute (NEERI), Nagpur, Maharashtra
- CSIR - National Geophysical Research Institute (NGRI), Hyderabad
- Gujarat Environmental Management Institute (GEMI), Gandhinagar, Gujarat
- Gujarat National Law University, Gandhinagar, Gujarat
- Institute of Science and Technology for Advanced Study and Research (ISTAR), S.P. University, Vallabh Vidyanagar, Gujarat
- K.S.K.V. Kachchh University, Bhuj-Kachchh, Gujarat
- Knowledge Consortium of Gujarat (KCG), Gandhinagar, Gujarat
- Pandit Deendayal Petroleum University (PDPU), Gandhinagar, Gujarat
- SANDHAN, Gandhinagar, Gujarat
- Network for Certification and Conservation of Forests (NCCF)



INTERNATIONAL, NATIONAL MEMBERSHIPS AND RECOGNITIONS
(Past and Present)

GUIDE is an active member in several national and international programmes in the area of climate change, biodiversity conservation, combating desertification, etc. Additionally, GUIDE has recognitions at various levels with many organizations and has been recognized in many fields.

Memberships

- Global Network of Dryland Research Institutes (GNDRI), Israel
- International Society of Zoological Sciences (ISZS), China
- International Union for Conservation of Nature (IUCN), Switzerland
- Ocean Expert, Intergovernmental Oceanographic Commission of UNESCO
- International Hydrological Programme (IHP)

Recognitions

- GUIDE is an Expert Organization on 'Combating Desertification' recognized by the ENVIS Centre on Combating Desertification, hosted by CAZRI and sponsored by MoEF & CC, Govt. of India, New Delhi.
- GUIDE is recognized as Environmental Auditors for Schedule - I Industries of Gujarat by the Gujarat Pollution Control Board (GPCB), Gandhinagar.
- GUIDE is recognized as Scientific and Industrial Research Organization (SIRO) by the Department of Science and Technology (DST), Govt. of India, New Delhi.
- GUIDE laboratory was recognized as State Air & State Water Laboratory by the Gujarat Pollution Control Board (GPCB), Government of Gujarat, Gandhinagar.
- Education and Research Institute by the K.S.K.V. Kachchh University, Bhuj.

Accreditations

- National Accreditation Board for Testing and Calibration Laboratories (NABL), Quality council of India in the field of chemical testing as per ISO / IEC 17025:2005
- National Accreditation Board for Education and Training (NABET), Quality Council of India (QCI), New Delhi.

Awards

- Kutch Ratna Award for Environment by K.S.K.V. Kachchh University, Bhuj, Gujarat
- National Education Leadership Award by Dainik Bhaskar, Mumbai

CONSULTANCY SERVICES OFFERED BY GUIDE

1. A&C Enterprise, Bhuj
2. Agrocel Industries Limited, Quality Control Department, Dhordo, Kachchh
3. Agrocel Industries Pvt. Ltd, Bhuj, Kachchh
4. AMW Auto Components Ltd, Bhuj - Bhachau Road, Kachchh
5. Arid Communities and Technologies, Bhuj – Kachchh
6. Ashapura International Limited, Kachchh
7. Ashapura Perfoclay Ltd, Bhuj
8. Balkrishna Industries Ltd, Bhuj
9. C. C. Shroff Research Institute, Mandvi
10. The Centre of Advanced Study in Marine Biology, Annamalai University, Tamilnadu
11. Dept. of Chemical Engineering, Government Engineering College, Bhuj
12. Dept. of Environmental Engineering, Government Engineering College, Bhuj
13. Dept. of Chemistry, KSKV Kachchh University, Bhuj
14. Dept. of Earth and Environmental Sciences, KSKV Kachchh University, Bhuj
15. Dept. of Environmental Sciences, PSG College of Arts and Science, Coimbatore.
16. District Watershed Development Unit, Bhuj
17. Dorf Ketal Speciality Catalyst Pvt. Ltd., Adani Port & SEZ, Mundra.
18. Geeta Cooling System, Bhuj – Kachchh
19. Gorasiya Farms, Kachchh
20. Greencindia Consulting Private Ltd., Ghaziabad
21. Gujarat Mineral Development Corporation Ltd., Lakhpat, Kachchh
22. Gujarat State Forest Development Corporation, Kachchh, Gujarat.
23. Haresh Construction Co, Mundra.
24. Hunnarshala Foundation, Bhuj-Kachchh.
25. ILARK Hotel, Bhuj
26. Innovation and Knowledge Centre, Ashapura Minechem Ltd. Bhuj
27. Irrigation Department, Bhuj
28. JB Envirotech, Bhuj
29. Kalinga Watertech Pvt. Ltd
30. M & N. Virani Science College, Rajkot
31. Nalanda Engicon Pvt. Ltd., Bhuj
32. Phillips Carbon Black Ltd, Mundra
33. Satvik: Promoting Ecological Farming, Mundra Relocation site, Bhuj.
34. Sejwala Matham, Bhuj
35. Shakthi Water Supply, Bhuj Road, Mundra– Kachchh
36. Shiv Hydromet, Rajkot.
37. SPM Arogyadham, Bhuj
38. Suzlon Energy Limited, Nakhatrana, Kachchh
39. Suzlon Global Services Ltd, Gandhidham
40. SVCT House, Bhuj
41. Top Build Concrete Pvt, Ltd. Dhunai, Mandvi – Kachchh.
42. USB Chemicals, Bhuj.
43. Vivekanad Rural Development Institute, Mandvi – Kachchh
44. Welspun Corp Ltd (Pipe Division), Anjar

IMPORTANT VISITORS

- Mr. Sudhir Ahluwalia, Former IFS & Writer
- Sh. B. J. Asari, DCF, Kachchh (W)
- Mr. Akshit Suthar, Member, IUCN-SSC (Otter Spl. Group)
- Dr. P. K. Mathur, Former Professor and Dean, Wildlife Institute of India, Dehradun
- Dr. C. Venkataraman, Former Director, Zoological Survey of India, Kolkatta
- Dr. Alfred R. Selvakumar, Associate Director and Dr. S. Sundaramoorthy, Associate Director, Indomer Coastal hydraulics Pvt. Limited, Chennai
- Dr. A. K. Varshney, IFS (Retd.), Former APCCF, Gujarat.
- Dr. P. A. Azeez, Former Director, SACON, Coimbatore and his team.
- Dr. Arun Kadam, Scientist (Retd.), National Institute of Oceanography, Mumbai
- Ms. Arpi Thaker, Department of Biotechnology, NBRI, Lucknow
- Dr. Vinod Maina, Head, BSI Regional Station, Jodhpur.
- Dr. Sanjeev Kumar, Head, ZSI Regional Station, Jodhpur.
- Dr. Omvir Singh, Senior Principal Scientist, Forest Research Institute and University, Dehradun
- Dr. K. Shanthi, Associate Professor, Department of Environmental Sciences, PSG College of Arts and Sciences (Autonomous), Coimbatore
- Dr. Alvro Camina Cardenal, Environmental Specialist, International Finance Corporation – World Bank, Washington, DC 20433
- Dr. Arun Venkataraman, Director, ERM, Bengaluru
- Prof. Nobuhito Ohte and Dr. Ranit Chatterjee, Kyoto University, Japan
- Mr. Amitangshu Acharya, Doctoral Scholar, College of Science and Engineering, University of Edinburgh, UK

PUBLICATIONS

Research Papers

Amit, P and Mahato A.K.R. (2019). The Forest of Reverence (Sacred Groves) in the Arid Biogeographic Province of India: a Literature-based Comparison with the Sacred Groves of the Arid Deserts of The World. Ambient Science, 2019: 06(1); online DOI:10.21276/ambi.2019.06.1.rv01.

Bhupat, B., Vibhuti, B. R. and Mahato A.K.R. (2018). Hair identification key of Domesticated Horse *(Equus ferus)* from the Saurashtra Region of the Gujarat, India. European Journal of Biomedical and Pharmaceutical Sciences, 5 (4): 1070-1073.

Dhananjayan, T, Prabhu, K. and Karthikeyan, K. (2019). Bioaccumulation of heavy metals in marine and freshwater fishes of Sikka, Jamnagar coast of GoK, Gujarat. International Journal of Life Sciences Research, 7(2):179-185.

Dhananjayan, T. and Karthikeyan, K. (2019). Occurrence of total petroleum hydrocarbon and total organic carbon in the sub-tidal and inter-tidal sediments of Vadinar coast, Gulf of Kachchh. International Journal of Life Sciences Research, 7 (2): 252-258.

Gajera, N., Priyanshu, J. and Nishith, D (2018). Highway Mortality of Vertebrate Species in the Aravali Mountain Range of North Gujarat, India. PARIPEX - Indian Journal of Research, 7(10):106-108.

Harish, P. and Mahato A.K.R. (2018). Status and distribution of aquatic birds in the Thol Lake environment, Gujarat. International Journal of Fauna and Biological Studies, 5(4): 87-92.

Harish, P and Mahato A.K.R. (2018). Temporal pattern of flock size among Aquatic bird species in Thol Lake, Mehsana, Gujarat. International Journal of Zoology Studies, 3(1):188-191.

Li J., Amy, L., Lusher, J. and Prabhu, K. (2019). Using mussel as a global bioindicator of coastal microplastic pollution. Environmental Pollution, 244: 522-533 (Impact factor-5.714).

Mishra S R and Chandra R, (2018). Removal of Cd (II) from Aqueous Solution Using Dried Plant (*Azadirachta indica*) Biomass. Asian Journal of Chemistry, 30(8): 1829-1835.

Muthuvelu, S., Bharathidasan, V., Sivaraj, S. and Murugesan, P (2018). Benthic Polychaetes: A Veritable Indicator of Ecosystem Health. International Journal of Life Sciences Research, 6, (3) : (540-553).

Prabhu, K., Anbukkarasu, S. and Subramanian, B (2019). Cytotoxic properties of starfish Stellaster equestris off Southeast coast of India. Channels in Life Sciences. (In press)

Sivaraj, S., Muthuvelu, S. and Thivakaran, G. A. (2019). Assessment of Effluent Stressed Ecosystem of Cuddalore Coastal Waters – a Bio-Indicator Approach. Thalassas: An International Journal of Marine Sciences, https://doi.org/10.1007/s41208-019-00128-4. (Impact Factor-0.576).

Vibhuti, B., Raval, B. B., Mahato A.K.R. and Singh, A. P (2018). Tricho-taxonomic study of guard hairs of three species of bovidae of Saurashtra region of Gujarat, India. International Journal of Zoology and Applied Biosciences, 3(3): 387-398.

Book Chapter

- Vidhisha, V., Vijay Kumar, V. and Mahato A. K. R. (2018) Desertification, Climate Change and Biodiversity in Kachchh Drylands. (In: Press)

Conference Proceeding

- Paradva, B. R., Poptani, R. A., Bhatt, J. B. and Mahato, A. K. R. (2018) Diversity and phyto-sociology of arid vegetation in different habitats of Rapar taluka, Kachchh, Gujarat, Proc. International Biodiversity Congress, Dehradun.

MICROBIAL STRAINS SUBMITTED IN GENBANK WITH ACCESSION NUMBER

- Karthikeyan, K., Jayanthi, G., Tiwari, V., Mishra, B. K., Bhargava, P., Soni, S. R. and Bagatharia, S. B., *Bacillus drentensis* strain BAB-6965. GenBank accession number - MF351825.
- Karthikeyan, K., Jayanthi, G., Tiwari, V., Mishra, B. K., Bhargava, P., Soni, S. R., and Bagatharia, S. B., *Bacillus aryabhattai* strain BAB-6966. GenBank accession number - MF351826.
- Karthikeyan, K., Jayanthi, G., Tiwari, V., Mishra, B. K., Bhargava, P., Soni, S. R., and Bagatharia, S. B. *Bacillus subtilis* strain BAB-6973. GenBank accession number - MF351830.
- Karthikeyan, K., Jayanthi, G., Tiwari, V., Mishra, B. K., Bhargava, P., Soni,S. R. and Bagatharia, S. B. *Bacillus aryabhattai* strain BAB-6974. GenBank accession number - MF351831.
- Karthikeyan, K., Jayanthi, G., Tiwari, V., Mishra, B. K., Bhargava, P., Soni, S. R. and Bagatharia, S. B. *Pseudomonas nitritireducens* strain BAB-6975. GenBank accession number - MF351832.
- Karthikeyan, K., Jayanthi, G., Mishra, B. K., and Bhargava, P. *Cladosporium dominicanum*. GenBank accession number - MH173839.
- Karthikeyan, K., Jayanthi, G., Mishra, B. K., and Bhargava, P. *Amesia nigricolor* isolate b1. GenBank accession number - MH173840.
- Jayanthi, G., Karthikeyan, K., Dave, S., Bhargava, P., Soni, S. R. and Bagatharia, S. B. *Cladosporium tenuissimum* isolate 7123. GenBank accession number - MG430269.
- Jayanthi, G., Karthikeyan, K., Dave, S., Bhargava, P., Soni, S. R. and Bagatharia, S. B. *Memnoniella echinata* isolate 7125, GenBank accession number - MG430270.

BOARD OF GOVERNORS

Sr. No.	Name	Designation
1	Sh. S. G. Mankad, IAS (Retd.), Former Chief Secretary of Gujarat State	Chairman
2	Ms. Vijaylaxmi Sheth, IPS (Retd.), Former Chief Post Master General of Gujarat State	Vice Chairman
3	Shri. P. K. Taneja, IAS (Retd.), Director General, GIDM, Gandhinagar, Gujarat	Member
4	Dr. Dinesh Misra IFS (Retd.), Former PCCF (HoFF)	Member
5	The District Development Officer, Kachchh District, Gujarat	Member
6	Prof. R. Parthasarathy, Director, GIDR Ahmedabad, Gujarat	Member
7	The Vice Chancellor, KSKV Kachchh University, Bhuj, Gujarat	Member
8	Prof. Geeta Padate, M. S. University, Vadodara, Gujarat	Member
9	The Member Secretary, GPCB. Gandhinagar, Gujarat	Member
10	Prof. V. C. Soni, Former Prof. Saurashtra University, Rajkot, Gujarat	Member
11	The Member Secretary, GEC, Gandhinagar. Gujarat	Invitee
12	Dr. G. A. Thivakaran, Chief Principal Scientist, GUIDE, Bhuj, Gujarat	Invitee
13	Dr. V. Vijay Kumar, Director, GUIDE, Bhuj, Gujarat, India.	Member Secretary

THE GUIDE SOCIETY

Sr. No.	Name
1.	Sh. S. G. Mankad, IAS (Retd.), Former Chief Secretary of Gujarat State
2.	Ms. Vijaylaxmi Sheth, IPS (Retd.) Former Chief Post Master General of Gujarat State
3	Shri. P. K. Taneja, IAS (Retd), Director General, GIDM, Gandhinagar, Gujarat
4	Dr. Dinesh Misra IFS (Retd) Former PCCF (HoFF)
5	The Member Secretary, GEC, Gandhinagar. Gujarat
6	The District Development Officer, Kachchh District, Gujarat
7	Prof. Geeta Padate, The M. S University of Baroda, Vadodara, Gujarat
8	The Member Secretary, Gujarat Pollution Control Board (GBCP), Gandhinagar, Gujarat
9	The Vice Chancellor, KSKV Kachchh University, Bhuj. Gujarat
10	Head, Regional Station, Central Arid Zone Research Institute (CAZRI), Kukma, Kachchh. Gujarat
11	Director, Indian Grassland and Fodder Research Institute, Jhansi, Uttar Pradesh
12	The Principal Chief Conservator of Forest (PCCF), GSFD, Gandhinagar, Gujarat
13	Prof. V. C. Soni, Former Prof. Saurashtra University, Rajkot. Gujarat
14	Prof. Pragnesh Dave, Professor, Department of Chemistry, S.P. University, Vallabh Vidyanagar, Gujarat
15	Sh. Kantisen C. Shroff, Chairman, Shrujan, Bhujodi, Bhuj-Kachchh Gujarat
16	Sh. Asim Chakraborty, Director, Welspun Group, Anjar, Kachchh, Gujarat
17	Sh. Dipak Bhimani, Chairman, Navdeep Chemicals Pvt. Ltd, Mumbai, Maharashtra
18	Dr. R. Parthasarathy, Director GIDR, Ahmedabad, Gujarat
19	Dr. G. A. Thivakaran, Chief Principal Scientist, GUIDE, Bhuj, Gujarat
20	Dr. V. Vijay Kumar, Director, GUIDE, Bhuj, Gujarat

HUMAN RESOURCE

S.No.	Name	Designation
	SCIENTIFIC STAFF	
1.	Dr. V. Vijay Kumar	Director
2.	Dr. G. A. Thivakaran	Chief Principal Scientist
3.	Dr. B. Anjan Kumar Prusty	Senior Scientist (till 26th June 2018)
4.	Dr. K. Karthikeyan	Senior Scientist
5.	Dr. Rachna Chandra	Senior Scientist
6.	Dr. Arun Kumar Roy Mahato	Senior Scientist
7.	Dr. Nikunj B. Gajera	Scientist
8.	Dr. Jayesh B. Bhatt	Scientist
9.	Dr. G. Thirumaran	Scientist
10.	Dr. Abhiroop Chowdhury	Project Scientist (till 30th April 2018)
11.	Dr. Aliya Naz	Project Scientist (till 24th August 2018)
12.	Dr. K. Prabhu	Project Scientist
13.	Dr. Durga Prasad Behera	Project Scientist
14.	Dr. V. Selvakumar	Project Scientist
15.	Dr. S. Sivaraj	Project Scientist
16.	Dr. G. Jayanthi	Post-Doctoral Fellow (UGC)
17.	Ms. Dipmala Gajjar	Women Scientist (WOS-A-DST)
	PROJECT STAFF	
18.	Mr. Dayesh Parmar	Project Officer (GIS & RS)
19.	Mr. Mukesh H. Koladiya	Project Fellow
20.	Mr. Ajay Gohel	Senior Research Fellow
21.	Mr. Bhagirath Paradva	Senior Research Fellow
22.	Mr. Soumya Ranjan Mishra	Senior Research Fellow (till 31st May 2018)
23.	Mr. Rakesh Poptani	Senior Research Fellow
24.	Mr. Viral Vadodariya	Senior Research Fellow
25.	Mr. Deba Prasad Das	Senior Research Fellow
26.	Ms. Sonia Benjamin	Senior Research Fellow (till 19th Feb 2019)
27.	Mr. Pratik Sengani	Senior Research Fellow
28.	Ms. Antara Sen Gupta	Junior Research Fellow (till 23rd May 2018)
29.	Mr. Keyur Modi	Junior Research Fellow
30.	Mr. Viral Barot	Junior Research Fellow (till 4th Dec. 2018)

	LABORATORY STAFF	
31.	Mr. Ratansi Chaudhary	Senior Scientific Assistant
32.	Mr. T. Dhananjayan	Scientific Assistant
33.	Ms. Anjali Thomas	Scientific Assistant
34.	Mr. Mahesh. R. Dafda	Scientific Assistant (till 6th March 2019)
35.	Mr. Hirji K. Dangar	Junior Scientific Assistant
36.	Ms. Monika R. Sharma	Junior Scientific Assistant
37.	Mrs. Ami D. Lakhani	Junior Scientific Assistant
38.	Ms. Dipti L. Parmar	Junior Scientific Assistant
39.	Ms. Ravinaba A. Jadeja	Junior Scientific Assistant (till 21st November 2018)
40.	Ms. Bhavanaba A. Jadeja	Junior Scientific Assistant (till 21st November 2018)
41.	Mr. Raj A. Joshi	Field Assistant / Lab Assistant
42.	Mr. Jayanti P. Barot	Field Assistant / Lab Assistant
43.	Mr. Hiren Chavda	Field Assistant / Lab Assistant
44.	Mr. Arjan Rabari	Field Assistant / Lab Assistant
45.	Mr. Isharkumar Loncha	Field Assistant / Lab Assistant
	OFFICE STAFF	
46.	Mr. Prakash. M. Patel	Deputy Engineer
47.	Mr. Manish Vyas	Administrative Officer
48.	Ms. Geeta Goswami	Accounts Officer
49.	Mr. Arvind Lakum	Driver / Peon
50.	Mr. Altaf. A. Memon	Driver / Peon
51.	Mr. Hameed. H. Maniyar	Peon / Chowkidar
52.	Mr. Dansing Bist	Cook / caretaker
	WATERSHED STAFF	
53.	Mr. Jayrajsinh Mori	Senior Research Fellow
54.	Mr. Amit Ghodasara	Data Entry Operator
	SUPPORTIVE STAFF	
55.	Mr Bhura Bhai	Day Watchman / Gardener
56.	Mrs. Ushaben	Sweeper
57-58.	Others	2 Nos

DOCTORAL AND DISSERTATION STUDENTS

Name of the Supervisor	Name of the Student	Degree Perusing (UG/PG/PhD)	University / College	Title
Dr. V. Vijay Kumar	Mr. Raghvendra M. Ramanuj	Ph.D.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Evaluation of Physico - Chemical Characteristics of selected Ground Water sources of Kachchh District, Gujarat with special emphasis on Nitrate and Fluoride contamination.
B. Anjan Kumar Prusty (Guide) Rachna Chandra (Co-Guide)	Mr. Soumya Ranjan Mishra	Ph.D.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Removal of metals from contaminated soil through phytoextraction: impact of amendments. metal concentrations and soil fraction
Dr. K. Karthikeyan	Mr. T. Dhananjayan	Ph.D.	Bharathiar University, Coimbatore, Tamilnadu	Studies on marine pollution with special reference to heavy metals and petroleum hydrocarbons in the vicinity of industrial cluster, Vadinar, Jamnagar
	Mr. K. P. Nithul Lal	Ph.D.	Bharathiar University, Coimbatore, Tamilnadu	Development of low cost technology for production of water soluble pigments from halotolerant microbial strains
	Ms. Monika. R. Sharma	Ph.D.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Application of amendments to promote the growth of selected crops in saline soils of Kachchh, Gujarat: An Environment friendly sustainable approach
Dr. Arun Kumar Roy Mahato	Mr. Harish Prajapati	Ph.D.	Rai University, Ahmedabad, Gujarat	Status, Ecology and Conservation of Aquatic Avian fauna of Thol Sanctuary, Mehsana district, Gujarat
	Mrs. Dipmala Gajjar	Ph.D.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Phyto-sociology, Diversity and Distribution of Climbers in dryland ecosystems of Kachchh, Gujarat
POST GRADUATE				
Dr. K. Karthikeyan	Ms. Aashka Bhatt	M. Sc.	The I. I. S. University, Jaipur, Rajasthan	Antimicrobial susceptibility pattern and MAR index of bacterial isolates from different drinking water sources of Bhuj-Kachchh, Gujarat: Special reference to heavy metal resistance and plasmid DNA extraction
	Mr. Axay Solanki	M. Sc.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Optimization experiment for DO, BOD and COD in different water types: Effect of seeding material and aeration time
Dr. K. Karthikeyan	Mr. Nikhil Dhamani	M. Sc.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Assessment of ambient air quality around municipal solid waste dumping site Nagor road, Bhuj

Name of the Supervisor	Name of the Student	Degree Perusing (UG/PG/PhD)	University / College	Title
Dr. K. Karthikeyan	Mr. Rajesh Kahor	M. Sc.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Comparative assessment of Hypersaline terrestrial sediment and mangrove sediment from Kachchh, Gujarat with special reference to physico–chemical constituents
	Mr. Haresh Kachhad	M. Sc.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Studies on select physical and chemical constituents of hypersaline sediment samples from Rann of Kachchh, Gujarat
	Ms. Urmila Patel	M. Sc.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Studies On Hypersaline Sediments From Athalassohaline Environment Of Rann Of Kachchh, Western India
	Ms. Dipti Parmar	M. Sc.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Environmental monitoring and Management plan for a Steel Plant with special reference to Ambient Air, Stack and Noise environment
Dr. Rachna Chandra	Ms. Pujara. P. Moxa	M. Sc.	KSKV Kachchh University, Bhuj, Gujarat	Physico-chemical characterization of soils collected from agriculture land.
	Ms. Taraben. R. Asari	M. Sc.	KSKV Kachchh University, Bhuj, Gujarat	Heavy metals in the air samples collected from industrial region
	Ms. Bhavanaba. A. Jadija	M. Sc.	KSKV Kachchh University, Bhuj, Gujarat	Study of soil quality and potential sources of contamination in an industrial area of Kachchh, Gujarat
Dr. Arun Kumar Roy Mahato	Ms. Joshna Maheswari	M. Sc.	KSKV Kachchh University, Bhuj, Gujarat	Phytochemical analysis of some selected Medicinal plant of Mandvi, Kachchh
Dr. G. Thirumaran	Mr. Udayraj D. Titosa	M. Sc.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Water Quality Parameters in Shrimp Cage Culture, At Kharo Creek, Abdasa, Kachchh, Gujarat-India
Dr. K. Prabhu	Mr. Bhavik D. Sarvaiya	M. Sc.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Studies on soil nutrients and carbon sequestration of the mangrove sediment from Kandla, gulf of Kachchh, Gujarat
Dr. G. Jayanthi	Mr.Sanjay O. Khatri	M. Sc.	Gujarat Univeristy, Ahmedabad, Gujarat	Isolation and characterization of a biopolymer, Polyhydroxyalkanoate(PHA)
	Ms. Richa K. Thakker	M. Sc.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Comparative evaluation of phytochemical constituents of different parts of Commiphora wightii effect of crude extract

Name of the Supervisor	Name of the Student	Degree Perusing (UG/PG/PhD)	University / College	Title
Dr. G. Jayanthi	Ms. Divya Y. Joshi	M. Sc.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Estimation of antioxidant activity of different plant parts and endophytic actinomycetes isolated from the plant parts of a critically endangered plant, Commiphora wightii from Kachchh, Gujarat
	Mr. Vijay K. Bhavanani	M. Sc.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Appraisal of antibacterial activity of the extracts and endophytes of Commiphora wightii from Kachchh western India
	Mr. Meetkumar Jayantilal vaishnav	M. Sc.	K.S.K.V. Kachchh University, Bhuj, Gujarat	Estimation of phytochemical content in some medicinal plants with special reference to antioxidant activity
UNDER GRADUATE				
Dr. K. Karthikeyan	Mr. Pankaj Vaghamshi Mr. Swapnil Vasaiya	B.Sc.	Government Science College (Affiliated to K.S.K.V. Kachchh University)	Studies on biological characteristics of marine water and sediment samples from Vadinar coast, Gujarat
	Mr. Vishesh Matta	B.Sc.	Amity Institute of Marine Science and Technology, Uttar Pradesh	Petroleum hyderocarbon, phenolic compounds, oil and grease concentrarion in water and sediment matrices near an industrial cluster in Vadinar, Gulf of Kachchh : A short term study
Dr. Rachna Chandra	Mr. Mitesh P. Trivedi Mr. Swapnil Bhayani Mr. Shrikant M. Nagu	B.Sc.	Mandvi College	Mangrove nursery preparation methodology in Kachchh: a case study at Luni.
Dr. G. Thirumaran	Mr. Shubham Mr. B. Vaishnav	B.Sc.	Government Science College - Mandvi	Cage culture of Milkfish (Chanos chanos) along the coastal waters of Juna Bandar, Gujarat
Dr. K. Prabhu	Mr. Vishram Gadhvi Mr. Mayurdhvajsinh S. Jadeja	B.Sc.	Marine Science, Government Science College, Mandvi	Studies on Intertidal Faunal Diversity in Kathda Coast, Mandvi-Gujarat
	Mr. Shivam Marwah	B.Sc.	Amity Institute of Marine Science and Technology Uttar Pradesh Campus	Intertidal macrofaunal diversity of Mandvi coast, Kachchh, Gujarat
	Mr. Anirban Ganguly	B.Sc.	Amity Institute of Marine Science and Technology Uttar Pradesh Campus	A comparative study on the intertidal macrofauna of Mundra and Jamnagar coast, Gujarat
Dr. Durga Prasad Behera	Mr. Prahladsinh D. Zala Mr. Bhimshi D. Gadhavi	B.Sc	Mandvi college of Arts and Science	Shore wash molluscan shell Diversity along selected sites of North Gulf of kachchh

Name of the Supervisor	Name of the Student	Degree Perusing (UG/PG/PhD)	University / College	Title
Dr. G. Jayanthi	Ms. Manisha Desai Mr. Mrugesh Desai Ms. Shyama R Langnecha, Ms. Falguni Maheshwari, Ms. Hemangi Oza	B. E	Government Engineering College, Bhuj	Vermicomposting of spent mushroom substrate and paper waste
	Ms. Bharti K Ninjar Ms. Neelam S Dhemani	B.Sc	Government Science College, Mandvi	Evaluation of select parameters of Industrial effluents with special reference to oil and grease and phenolic compounds
Dr. S. Sivaraj	Mr. Samay Khankhala Mr. Kalpesh R. Pokar	B.Sc.	K.S.K.V. Kachchh University	Diversity and distribution of Macrobenthic fauna in Mangalore coastal waters

TRAINING / INTERNSHIP

Name of the Supervisor	Name of the Student	Internship / Training	University/College	Title
Dr. K. Karthikeyan	Mr. S. Gokulnath Mr. D. Manikandan Ms. V. Aishwarya Ms. R. Saranya Ms. S. Gokula Priya	Training	M.Sc. Environmental Sciences, P.S.G. College of Arts and Sciences, Coimbatore, Tamilnadu	Instrumentation and Environmental Analysis techniques in Marine Biology
	Ms. Sonal Tosawara Ms. Maitri Zala	Training	B.E. Environmental Engineering, Government Engineering College, Bhuj, Gujarat	Instrumentation and Environmental Analysis techniques in Marine Biology
	Ms. Gayatri Gadhvi	Training	Ph.D Research Scholar, Gujarat University	Soil analysis with special reference to agriculture
	Mr. Nikhil. R. Gusai	Training	ETP In-Charge, Anchor Health & Beauty Care Pvt. Ltd., Padhhar	Wastewater analysis with reference to ETP
	Ms. Ananya Guchait	Training	Senior Executive, Innovation and Knowledge Centre, Ashapura Minechem Ltd., Bhuj	Basic techniques in Microbiology

Name of the Supervisor	Name of the Student	Internship / Training	University/College	Title
Dr. K. Karthikeyan	Mr. V. Anbu Ganesan Mr. N. Deepak Mr. R. Vishnu Pradeep	Training	M.Sc. Environmental Sciences, Bharathiar University	Instrumentation and Analytical techniques related to Environmental monitoring and Assessment
	Ms. Charmy Vyas Ms. Hetvi Pansara Ms. Acharya Pooja Ms. Dhruti Parmar Ms. Payal Vamja	Internship	M.Sc., Biotechnology, Shree M & N Virani Science College, Rajkot, Gujarat	Evaluation of enzyme profiling and salt tolerance of bacterial strains from drinking water sources of Kachchh, Gujarat: Special reference to Antibiotic susceptibility and MAR indexing
	Mr. B. Vinoth	Internship	M.Sc. Biochemistry, Bharathiar University	Bioaccumulation of heavy metals in fishes.
Dr. Arun Kumar Roy Mahato	Ms. Neha Khan	Training	Msc., Biodiversity and Conservation, Guru Govind Singh Indraprastha University, Delhi	Study on the Diversity of Terrestrial Vertebrates in selected Habitats of Kachchh, Gujarat
	Ms. Kritshree Kaushik	Training	Msc., Biodiversity and Conservation, Guru Govind Singh Indraprastha University, Delhi	Assessment of diversity and conservation status of mammals in dryland district of Kachchh
Dr. G. Jayanthi	Ms. Shradha Modha, Ms. Jenika Parmar, Mr. Mitesh K Parmar, Mr. Pravin M.Ramanuj, Mr. Bipin K Makwana, Mr. Asip S. Ghoniya, Mr. Kishan B.Chhayani, Mr. Jay I. Vachhani	Training	Communities from Kachchh	Hands on Training on mushroom cultivation Techniques.
	Ms. Komal Pahal Ms. Preeti Reddy Ms. Geeta Kadachha Ms. Dhwira Thacker Ms. Binal Ramani	Internship	B.Sc., Biotechnology, Shree M & N Virani Science College, Rajkot	Phytochemical screening of plants in GUIDE campus, Bhuj

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