

Annasaheb Kulkarni
Department of **BIODIVERSITY**



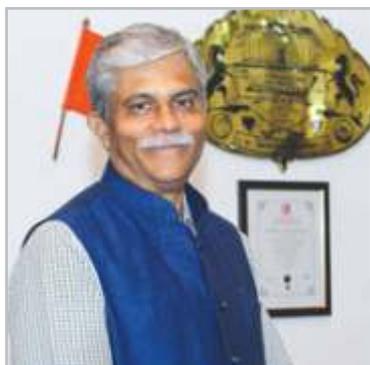
Vision 2030

MES Abasaheb Garware College
Annasaheb Kulkarni Department of Biodiversity



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From the Vice Chancellor's Desk

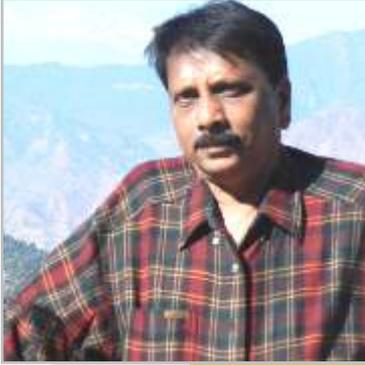
Prof. Nitin R. Karmalkar
Vice Chancellor
Savitribai Phule Pune University

Biological resources are often referred to as the 'Resource Capital' of a nation. Among the 36 global biodiversity hot-spots, Western Ghats of India occupies the fifth position according to the economic potential of its biological resources. Biodiversity is the largest source of potential wealth for the country, which remains grossly under explored. One of the reasons for the under utilization is the dearth of trained manpower. The current generation of biologists is largely divided into field-oriented taxonomists and ecologists on the one hand and the lab oriented functional and molecular biologists on the other. This divide has become a limiting factor in the study of Biodiversity. **Programmes such as Masters in Biodiversity** that bridge this gap by inculcating excellence in field and laboratory biology simultaneously will not only help in capacity building exercise but also will help generating wealth through a prudent and sustainable use of the country's bioresources.

Though biodiversity and human wellbeing are intricately linked, there are several challenges for protection of biodiversity. Edward Wilson a renowned biologist has identified factors for biodiversity loss, described by the acronym- HIPPO standing for Habitat destruction, Invasive species, Pollution, Population and Over-harvesting. These compounded with Climate Change has severely affected seasonal cycles in plants and animals. Rampant urbanization, loss of forest cover and habitat fragmentation are other key issues that trigger biodiversity loss. Even if one element of an ecosystem breaks down, the whole system's balance is threatened. For effective biodiversity protection, we need a participatory approach, from all sectors such as local community people, urban citizens, policy makers, academicians and industries. India is a signatory to CBD and also the first country to enact **The Biological Diversity Act** in 2002. Provisions such as **People's Biodiversity Register (PBR)** and **Biodiversity Management Committees (BMC)** also encompass natural resources. Effective implementation of this will make India a Smart Country with Smart Cities and Smart villages.

A handwritten signature in black ink, appearing to read 'N. Karmalkar'.

Signature



From the Chairman's Desk

Dr. Vilas Bardekar

Chairman

Maharashtra State Biodiversity Board

After rapacious destruction of the environment and elimination of innumerable varieties of life forms over a long period of time in the name of development, the world suddenly woke up to the ills this had caused and embarked upon an aggressive drive of reclaiming the environment through afforestation. But in the haste of achieving something over the short term this drive has led to monoculture that in turn led to lopsided correction.

It was then realised that the huge diversity of life forms on this planet is essential for its, and in turn, our own survival. Thus was born the concept of Biodiversity and the realisation that conservation of as many varieties of plants and animals as possible is essential to our survival.

To ensure that this movement is systematically taken forward, the world under the auspices of the United Nations Organisation convened the **Convention on Biodiversity (CBD)** in Rio de Janeiro (Brazil) in 1992 wherein extensive discussions were undertaken and some 21 major aspects of Biodiversity conservation identified. Major among these were a country's exclusive ownership of bioresources within its geographical boundaries and its responsibility towards their conservation and sustainable utilisation. It was decided that all the signatory nations would enact Laws towards fulfilling this aim.

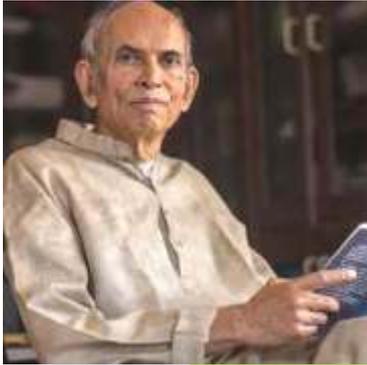
Consequently, India enacted **The Biological Diversity Act** that was promulgated in the country in **2002**. This Act provided the framework for adoption of all means needed to ensure that conservation of biodiversity is achieved systematically. In addition it also provides for sharing of benefits among its generators.

These conservation measures can only work when awareness is built up among the common people. This can be achieved through regular awareness drives and, teaching of Biodiversity as a stand-alone subject is a major step in this direction. **I am pleased to learn that the Abasaheb Garware College, Pune has started this course in Biodiversity and established a special Department for this purpose.** I am sure the reputation of this college and its dedicated staff will go a long way towards achieving this objective.

I wish the College and the department all the best in this endeavour.



Signature



Foreword

Padmabhushan Prof. Madhav Gadgil
Renowned Ecologist

For thousands of years we have protected our diversity with help of traditional practices and knowledge. Sacred riverines and sacred groves have ensured that the diversity will remain undisturbed. Due to erosion of resources which started in colonial period we have shifted from sustenance to more commercialization and state or private ownership of our natural resources. Our new generations are more oriented towards modernization and derecognition of traditional/folk knowledge. **I firmly believe that in order to save our natural resources we need to involve our younger generations in inventorying and monitoring biodiversity.** Initiatives such as Western Ghat Biodiversity Network (WGBN) and People's Biodiversity register (PBR) are two such examples where students are directly involved in conservation efforts.

India's conservation efforts started with conversion of hunters to elite photographers. We have to convert this elitist bias to true conservation efforts. These efforts should not restrict to certain species like tigers or to certain areas such as Corbett National Parks. Real diversity lies in unexplored places where people are still connected with nature. For long term preservation of diversity it is essential to prevent the situations where the ecosystem people pay cost of conservation and the urban elites use the forest for leisure purposes. We need genuine involvement of younger generations. **Masters in Biodiversity is one such effort where new age custodians are trained in not only in classical subjects such as taxonomy but also environment laws and policies.**

Biodiversity is currently disappearing at up to 1,000 times the natural background rate of extinction, 60% of ecosystems worldwide are in an advanced state of degradation, around 80% of global fish stocks are fully exploited or over exploited, which could lead to the collapse of global fisheries by 2050. Seventy-five per cent of the food crop varieties we once grew have disappeared from our fields in the last 100 year. The estimated global annual cost of biodiversity loss is close to 3 trillion USD. 1.6 billion people worldwide rely on forests for their livelihood, but an estimated 41% of the country & 39 forest cover has been degraded to some degree. The rich diversity of medicinal plants (over 6,500 species) in the country needs conservation and sustainable utilisation, as their habitats are either degraded or the species are being over-exploited. Thus, the constraints and challenges to biodiversity conservation relate to biodiversity information base, safeguarding traditional knowledge, economic valuation and natural resource accounting, policy, legal and administrative measures and institutional support the threat to biodiversity. If we are able to train our youth to appreciate the rich diversity we have we will be one step closer to save at least a few species from complete extinction. For this we need genuine involvement of younger generation. Masters in biodiversity is one such effort where new age custodians are educated through exposure to field work to understand diversity and also environmental laws and policies. Initiatives such as biodiversity Internships are a welcome step in this regard, as it enables students to work with research institutions, experts, NGOs, and government organizations, and gain insights into vast field of biodiversity.



Signature

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Annasaheb Kulkarni
Department of **BIODIVERSITY**



About Us

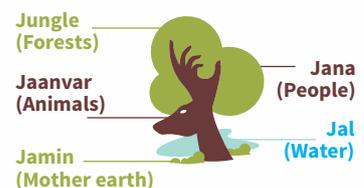
Maharashtra Education Society (MES) established in the year 1860 has been one of the premier education institutes in the Maharashtra State. MES's Abasaheb Garware College, affiliated to Savitribai Phule Pune University (SPPU) is a bi-faculty college in Science and Arts established in 1945. College has Graduate and Postgraduate courses in Physical Sciences, Life Sciences, Languages and Humanities. The college also has seven recognised research centres offering PhD degree in different disciplines. Our college was the pioneer in introducing Masters Course in Biodiversity in India, sanctioned under **Innovative Programme of University Grants Commission (UGC)** in 2003.

The department is named after Late Shri Annasaheb Kulkarni of Kolkata in 2017. We are grateful to the Kulkarni family for its generous donation of Corporate Social Responsibility (CSR) funds in the memory of their late father.



About the department logo :

The logo of the department exemplifies five basic elements that are constituents of biodiversity. It is made up of 5 J's. Jal (Water), Jungle (Forests), Jamin (Mother Earth), Jaanvar (Animals) and Jana (People).

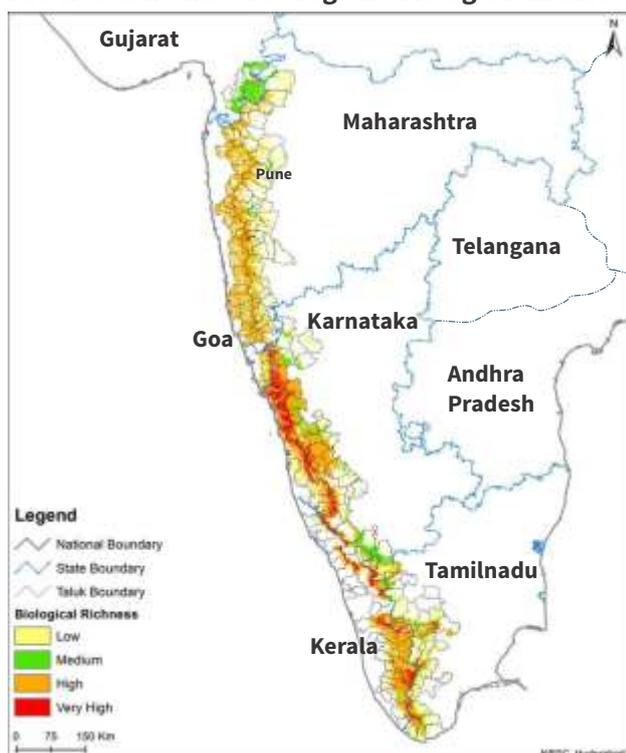


Biodiversity And Ecosystem Well Being !!

Biodiversity is essential for maintaining ecosystem balance and resilience. It plays a vital role in maintaining various ecosystem services such as pollination, carbon sequestration, food, medicine etc. Human Quality of Life is dependent on natural resources. The Uncultivated Foods (Wild Edible Plants), Non Timber Forest Produce (honey, medicine), Timber (Construction material) and Fuel wood that the forests provide or fish stocks we get from aquatic ecosystems are extremely critical for human sustenance. The bioresources including microorganisms have been identified as sources of novel molecules and secondary metabolites that are important in fields such as bioprospecting and drug discovery.

India is one of the mega diversity rich countries. It is endowed with 12 distinct biogeographic zones and has 4 out of 36 biodiversity hot-spots. It contains over 7 per cent of the world's biodiversity concentrated in 2.5 per cent of the Earth's surface. These hot-spots have extraordinarily high levels of species richness which are endemic and threatened. India have origins of various traditional varieties of food grains (e.g. rice, pulses) and indigenous livestock. The diversity is due to the different land forms and ecosystems ranging from tropical to temperate and from mountains to deserts.

The Western Ghats Eco-region : Biological Richness



Floral diversity of India is estimated to be more than 47,000 species representing almost 11.4% of world's flora, of which many are endemic. Along with floral diversity, India is also rich in faunal diversity with more than 91,000 animal species. There are about 2,546 species of fish (about 11% of the world species), 197 species of amphibians (4.4% of the world total) and more than 408 reptile species (6% of the world total), about 1,250 species of birds about 410 species of mammals and more than 1500 species of butterflies.

India's four biodiversity hot-spots include Western Ghats which are older than the Himalaya mountains. The site's high montane forest ecosystems influence the Indian monsoon pattern. The Western Ghats are internationally recognized as a region of immense global importance for the conservation of biological diversity, besides containing areas of high geological, cultural and aesthetic values. It is a chain of mountains running parallel to India's western coast and traverse through the States of Gujarat, Maharashtra, Goa, Karnataka, Tamil Nadu and Kerala from North to South . These mountains cover an area of around 140,000 km² in a 1,600 km long stretch that is interrupted only by the 30 km Palghat Gap at around 11°N. The forests are home to at least 325 globally threatened flora, fauna, bird, amphibian, reptile, fish and butterfly species. The Western Ghats are the water towers of peninsular India. Around 58 major rivers originate in the forests of Western Ghats.

Understanding biodiversity is an important step in conservation and management of floral & faunal wealth of any country. Questions such as How to stem biodiversity loss, What to conserve and Where to conserve, can be effectively addressed only through systematic studies pertaining to species and ecosystems. Ensuring effective people participation in conservation is a challenge and can be addressed through generating awareness and capacity building related to various biodiversity and livelihood issues. India has enacted The Biological Diversity Act (2002) and its effective implementation will happen only when the younger generation is trained and educated about it. Our Masters' course in Biodiversity is a prudent step in scientifically orientating young nature enthusiasts for conservation of biodiversity.

Vision

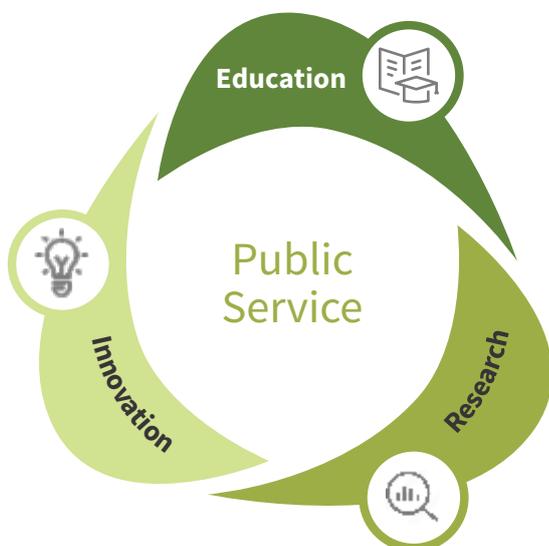
Ensuring biodiversity for sustainable future and ecosystem well being

Mission

- Educate new age custodians of biodiversity
- Conduct field and laboratory research for biodiversity monitoring, conservation and policy input
- Enhance awareness and help address societal challenges in biodiversity

Values

- Passion for mission
- Ethical conduct
- Entrepreneurship/Leadership
- Highest professional and academic standards



Tracking wild life @ Dandeli Wild Life Sanctuary



Monitoring Forest Plots



Understanding taxonomy



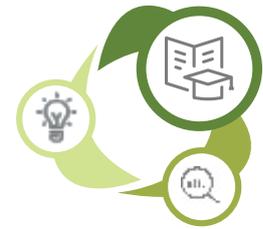
Dr. Bradley, University of Birmingham, UK, interacting with students



Seed Bank



EDUCATION



Programmes at the Department

Department believes in and imparts 'borderless education' to the students by the way of 'experiential learning' process. It has a strong research focus with grass-root linkages. Promotion of out of the box thinking has helped students reach higher echelons in their life as evident by Antarctic Expedition, Darwin Scholarship, Harvard Field Course at Borneo, Asian Geographic Photography prize etc.

The department offers following courses

✂ **M. Sc. Biodiversity - Monitoring and Utilization (since 2003)**

- The only course of its kind in Savitribai Phule Pune University (SPPU) bridging the gap between excellence in Field and Lab Biology

✂ **Ph. D. in Environmental Sciences (since 2011)**

- Recognized research centre of SPPU

✂ **Certificate course in Applied Nature Photography (since 2012)**

M. Sc. Biodiversity - Monitoring and Utilization

MSc Biodiversity is a 2-year postgraduate course of 4 semesters. The first year comprising of two semesters is extensively field oriented and the second year is lab intensive. The curriculum gives holistic coverage to various aspects of field of biodiversity.

The course consists of 4 semesters

1. The first year is devoted to understanding diversity of various life forms and insights into techniques for exploration of diversity.
2. It focuses on ecology and natural history and is supplemented adequately with quantitative

techniques in biology and biogeography, which forms key component in shaping up of natural systems.

3. The second year will expose students to various facets of environment, conservation and utilization of bioresources.
4. Learnings in first and second year emphasize conceptual as well as empirical knowledge of the ways in which natural systems work and various dimensions of diversity such as socio-economic aspects links with policies and laws for protection

In order to support teaching & research activities we have following Infrastructure facilities –

Facilities for field and lab subjects such as Botany, Molecular Biology, Zoology, Ecology, Microbiology and Tissue Culture. Students also get exposure to various analytical facilities such as Gas Chromatography (GC), High Pressure Liquid Chromatography (HPLC) and X-ray powder diffraction (XRD).



Interaction with Dr. Aparna Watve (Renowned Ecologist) during research project presentation



Prof K. C. Melhotra, a renowned anthropologist explaining man-nature relationship to students

FACULTY



Ankur Patwardhan,
M. Sc. PhD (Environmental Sciences)

Associate Professor and Head, Biodiversity Department
Chairperson, Board of Studies for Biodiversity, SPPU

Area of expertise: Forest ecology, recovery prospecting of medicinal plants, ecosystem services assessment and community interactions

He is chairing a High Level Monitoring Committee (HLMC) constituted by the Ministry of Environment, Forests & Climate Change (MoEFCC, GOI) for Eco Sensitive Zone of Mahabaleshwar-Pachgani. He is a Member of Maharashtra State Biodiversity Board, a policy level body of the state. Besides teaching assignments, he is involved in research activities. His main research contribution focuses on recovery,

including *ex-situ* and bioprospecting of threatened plant taxa from Western Ghats of India, one of the 36 global biodiversity hot-spots. He is also associated with grass root level NGOs and CBOs and initiated formation of Biodiversity Management Committees (BMCs) under the aegis of The Biological Diversity Act (2002). He has conducted Environmental Impact Assessments (EIA) projects and Biodiversity Management Plans for industries and developmental projects. He is also Honorary Secretary of 'RANWA', an NGO active in the field of environmental education and awareness.



Sonali Shinde
M.Sc. (Microbiology)
SET (Life Sciences)

Assistant Professor

Area of expertise: Microbiology, molecular modelling and simulation of membrane associated proteins, stress response in plants and microbes, drug/inhibitor designing

Sonali Shinde completed her Masters in microbiology. She was associated with several research projects in IBB, NCCS and URDIP. She has sound knowledge of basic microbiology, molecular tools, research methodologies and procedures of patenting an invention. She has her expertise in Molecular Modeling, Docking, Molecular Simulation and metabolic network construction to find the drug target. Results obtained by her are presented in various national and international conferences and are also published in international scientific journals of repute. Her research interests are natural product chemistry and exploring the microbial diversity. She is a member of Jaivik Shastram blog which explores day-to-day research in an around world and several opportunities important for a life science student.



Medhavi Rajwade
M.Sc. (Biodiversity)
SET (Environmental Sciences)

Assistant Professor

Area of expertise: Plant ecology, Animal-Plant interactions.

Her research interests include understanding impact of climatic factors on phenological changes in plants. Plant animal interactions especially dispersal of plants in northern western ghats is another focal area she is working on. She also has working knowledge of mapping and quantification of plant resources. She has worked as a Research Fellow on DBT funded project involving Mapping and Distribution of Plant Resources of Western Ghats. She is associated with the Biodiversity assessment studies for Forest department, Industrial houses and Private land owners. She has also worked as a volunteer in Snake park Pune, since 2002.

ALUMNI



Tejaswini Pachpor
M.Sc. (Zoology)
PhD, NET, SET (Life Sciences)
Assistant Professor

Area of expertise: Metal Microbe interactions, Plant microbe interactions, Yeast Molecular Biology.

She holds a doctorate in Microbiology with 2 yrs of postdoctoral experience. She has hands on experience in yeast molecular biology, protein purification and characterization techniques, scale-up /process optimization for metal enriched yeast production. She has taught Masters and Bachelor students from multiple disciplines Microbiology, Biotechnology, and Biodiversity topics associated with Basic Microbiology, Molecular Biology, Biochemistry and Immunology.



Dhanashree Paranjpe
M.Sc. (Microbiology)
PhD, NET (Life Sciences)

Area of expertise: Animal behaviour, ecology, evolutionary biology

She holds a doctoral degree in Animal behavior and Evolution. She recently finished her postdoctoral research at University of California, Santa Cruz, CA. She has received Ramalingaswami Re-entry Fellowship from Dept. of Biotechnology, Govt. of India. Broad area of her research is Animal Behaviour, Ecology and Evolution. Currently she is studying the impact of human vicinity on Indian Peafowl (*Pavo cristatus*) populations in terms of feeding habits, reproductive behaviour, communication and demographics and the impact of peafowl on local economies in different localities across India.



Krystal Phillip (West Indies)

Present work

PhD, Visiting Lecturer at University of Bedfordshire, United Kingdom.

Also an Assistant Chief Examiner for the Caribbean Examinations Council - setting the Caribbean Advanced Proficiency Examination (A level) Biology for 16 Caribbean countries.

How biodiversity training helped me

I appreciate the training and experience I had while doing MSc in Biodiversity under Dr Ankur and Dr Watve. The variety of topics I did really broaden my interest and also helped me to develop ideas as well for my own students.

RESEARCH

Sustainable Development Goals



Sustainable development is the guiding principle for our research.

Focal Areas of Research

- Biodiversity and ecosystem service assessment
- Medicinal plant cultivation
- Conservation of rare plant species
- Molecular diversity studies
- Metabolite profiling in plants and microbes
- Applications of natural products
- Plant phenology in relation to climate change
- Seed biology of wild species
- Addressing climate change
- Animal behaviour studies

The Sustainable Development Goals (SDGs) were adopted by all **United Nations** Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. **The Convention on Biological Diversity (CBD)** adopted **AICHI** (Prefecture in Japan) **Targets** to ensure biodiversity protection and ecosystem well being. The SDGs and the AICHI targets are integrated that is, they recognize that action in one area will affect outcomes in others and that development must balance social, economic and environmental sustainability.

Our department is promoting research in some of the topical issues identified by UNSDG and AICHI target. This is achieved by involving students in various research projects conducted by the faculty and other collaborators.



Source : www.stockholmresilience.org

ALUMNI



Shantanu Shukla

Max Planck Institute for Chemical Ecology (Jena, Germany).

Present work

My research interests include ecology, evolutionary biology, physiology, and behavior, with a special interest in insects and microorganisms. I study symbiotic interactions between insects and microbes.

How biodiversity training helped me

The field exposure I got during my Masters' helped me broaden my vistas.



Jahnavi Joshi

Scientist (CSIR-CCMB, Hyderabad)

Present work

Molecular diversity studies

How biodiversity training helped me

The course generated curiosity to explore the amazing animal and plant diversity in the tropical forests.

Moving Towards Sustainability

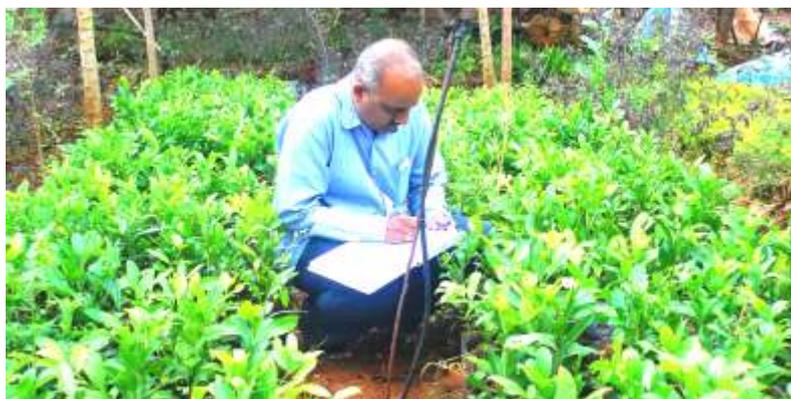


Plants from the Western Ghats mountains are becoming globally important due to newfound curative properties. Over 4000 medicinally important plant species serve as a source of primary health care of various communities. Species such as *Mappia foetida* (that yield the chemical Camptothecin, used against cancer cure), *Salacia chinensis* (that yields Salacinol used against diabetes), *Saraca asoca* are some such species whose demand exceeds > 100 MT per year. Over exploitation of such resources is leading to over harvests, threatening global health care and local livelihoods. Reducing harvest pressure on wild population and promoting viable commercial cultivation with the community and government participation is a huge challenge.

Salacia chinensis (*Saptarangi*) roots are mainly employed in the treatment of diabetes and *Saraca asoca* (*Sita ashok*) bark finds its use in various gynaecological ailments. However traditional methods of uprooting *Saptarangi* and harvesting bark by chopping off the *Sita ashok* tree, inherently, are fatal and hence unsustainable. With rapid increase in demand of herbal medicine, the danger to these plant species is eminent and imminent.

One way to address such unscientific harvesting is to check whether optional plant parts have the same desired effect. We first established that the aerial plant parts of *Saptarangi* – stems, leaves and seeds also contain anti-diabetic activity comparable with the roots. For *Sita ashok*, the role of season of harvest and use of various treatments to the bark wound for its rapid recovery have been worked upon.

Future directions : Development of mass multiplication protocols and package of practices for cultivation of high value threatened species.



Cultivating Rare Plants

Understanding Forests : A Tale of a Seed

Understanding seed biology becomes a pre-requisite for studying regeneration and growth of a forest. Various factors such as seed to pulp ratio, colour of the fruit, nature of seeds and their size play a critical role in their dispersal and also determine the range of the seed predators. Studies related to seed biology of wild species have thus become significant in understanding forest dynamics. We initiated the studies on seed morphology of wild woody plant species in northern Western Ghats. Parameters such as seed size, seed number, seedling survival in 'ex-situ' and 'in-situ' condition (forest floor) are being explored. A database on various parameters of seeds of more than 100 wild woody species has been generated. Insights gained through seed studies will help understanding various aspects of development of mass multiplication protocols and address issues of protection and promotion of indigenous flora.

Future directions : Use of indigenous plants for restoration of degraded areas, wastelands and in landscaping



Seed characterization and germination

Tracking Climate Change : The Phenological Way !!



Climate change has been identified as one of the most important factors that affect various natural processes in an ecosystem. It has resulted in erratic rainfall patterns, increased temperatures and prolonged seasons affecting regions and forests alike. Climate change is also known to affect the interaction between plant and animal communities. Understanding its impact on plants and animals has thus become a key and needs long term observations. Phenology is the study of the timing of the biological events in plants and animals such as flowering, leafing, hibernation, reproduction, migration etc. In tropical countries like India, where establishing network of monitoring of phenology over an ecoregion level has become an absolute necessity, we initiated the studies in northern Western Ghats. Over past 3 years, our team has been collecting the data at regular intervals on timing and duration of flowering, fruiting and leaf phenology of wild plant species in forested landscapes of *Amboli*, Northern Western Ghats. This data is being complimented with the records of temperature, rainfall, precipitation and soil moisture. Flowering and fruiting at community level is known to attract a lot of faunal visitors which visit flowers for nectar and pollen rewards and fruits for feeding and dispersal. A database on floral visitors is also being generated through our studies.

Future direction : Use of phenological records in understanding response of plants and faunal visitors to the climate change.



Monitoring Pheno-phases and Floral Visitors

ALUMNI



Damoder Salekar

Present work

Assistant Conservator of Forest in Goa Forest Department.

How biodiversity training helped me

The exposure to wildlife ecology and biodiversity gave a strong background during working in forest department. exposure to microbiology, molecular tools and working with eminent scientists like Dr. M.G. Watve gave new insight in answering complex problems.



Amruta Joglekar

Biodiversity Consultant

Present work

Working in the field of natural resources management and sustainable development. Research Consultant to NGOs working in tribal belt of Central India. Involved in developing education programme related to local natural resource management for tribes.

How biodiversity training helped me

Extensive field experience and interaction with local communities developed my understanding of the subject.

Sacred Groves : Forest & Tradition in Sync



Sacred Groves popularly known as '*Devrai*' or '*Devrahati*' represent a unique linkage between people and their environment. These are the relic forest patches protected through religious customs and taboos in the name of the deity. These forest patches not only conserve the local biodiversity but also provide insights into cultural and religious associations of local communities who have protected them traditionally. Fear of being cursed by the local deity ensured sacred groves remained untouched and thus protected for centuries. They are represented either by cluster of trees or few hectares of land. These unique forest ecosystems have been sources of medicinal plants, wild fruits and non timber forest produce such as honey. Many a times a stream or a river originates in these patches. Sacred Groves have been managed by village communities, temple trusts, family or forest department. They are also home to rare and endemic plants and animals, diverse micro-organisms and possess nutrient rich soil. Species that are seldomly

seen elsewhere in the Northern Western Ghats such as *Canarium strictum* (*Dhoop*), *Myristica dactyloides* (*Wild Nutmeg*), *Giant Squirrel*, *Southern Birdwing*, *Malabar Pied Hornbill* find a refuge here. These groves are breeding areas of many rare birds, insects and bats that play a vital role in maintaining the ecosystem balance. We at the department have identified these critical ecosystems as one of the focal areas and have been exploring various Ecosystem Services provided by these unique forest ecosystems. Sacred Groves are being inventoried for presence of unique flora and fauna, their distribution in a landscape and socio-cultural linkages with the communities. Development of such a factual database on sacred groves would help evolve a strategy for conservation, sustainability and protection of these unique ecosystems.

Future direction : Generating awareness about these biodiversity hot-specs



Great Pied Hornbill



A sacred grove in Konkan

A Tale of Two Species: Humans and Indian Peafowl Influence Each Other's Behaviour



Natural habitats for animals are shrinking at an increasing rate all across the world and particularly in India. Animals are increasingly finding themselves near human habitation thereby increasing human-animal interactions and conflicts. We are studying the impact of human vicinity on Indian Peafowl populations across India in terms of feeding habits, reproductive behaviours, vocal communication and the impact of peafowl on local economies in different localities across India.

Our study takes us to various places in India- from remote villages in Rajasthan to urban areas like Nashik city. Through interviews of farmers who regularly come in contact with peafowl, resort owners, visitors flocking to watch the majestic beauty of our national bird, our study has explored various interactions among humans and Indian peafowl. In many parts of India, humans not only

provide them nutritious food in the form of grains but also take pride in their presence around us and protect them. Direct field observations and documentation of various behaviours of peafowl allows us to understand how direct and indirect interactions with humans may change their food habits, diet, time budget, their vocal communication as well as where they choose to “dance”. The lessons we learn from these complex interactions will be useful to appreciate that just frequent contact with wild life can change our outlook towards them and can impact the animals' lives in multiple ways. It will help us understand how to “behave” around other wild life which we commonly encounter around us.

Future direction : Formulating guidelines for interactions with wild life and conservation with community participation.



Community Participation and Awareness Generation

Research Output

Marathe et al. *Annals of Clinical Microbiology and Antimicrobials* 2013, 12:26
<http://www.ann-clinmicrob.com/content/12/1/26>



ANNALS OF CLINICAL
 MICROBIOLOGY AND
 ANTIMICROBIALS

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RESEARCH

In vitro antibacterial activity of *Tabernaemontana alternifolia* (Roxb) stem bark aqueous extracts against clinical isolates of methicillin resistant *Staphylococcus aureus*



Contents lists available at ScienceDirect

Industrial Crops and Products

journal homepage: www.elsevier.com/locate/indcrop



Extraction, quantification and antioxidant activities of flavonoids, polyphenols and pinitol from wild and cultivated *Saraca asoca* bark using RP-HPLC-PDA-RI method

Rashi Tewari^{a,b}, Madhuri Gupta^{a,b}, Furkan Akbulut^{a,b},
 Laxminarain Misra^{a,b}, Ankur Patwardhan^{a,b}

Journal of Threatened Taxa | www.threatenedtaxa.org | 26 September 2014 | 6(10): 6293-6312

INDIRANA CHIRAVASI, A NEW SPECIES OF LEAPING FROG (ANURA: RANIXALIDAE) FROM WESTERN GHATS OF INDIA

Pratik Modak² & Neelesh Dahanukar³

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SPATIAL DISTRIBUTION AND HABITAT CORRELATES OF NILGIRI WOOD-PIGEON (*Columba elphinstonii*) IN NORTH WESTERN GHATS, INDIA

Section Editor: Varadharajan Gokula

Submitted: 12 May 2012

Tropical Ecology 53(1): 53-67, 2012
 © International Society for Tropical Ecology
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Dispersal modes of woody species from the northern Western Ghats, India

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Current science

RESEARCH COMMUNICATIONS

Tree species composition in Koyna Wildlife Sanctuary, Northern Western Ghats of India

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M. E. S. Abasaheb Garware College, Karve Road, Pune, India

INNOVATION



Butterfly Attractant for Pollination and Ecosystem Health



Plant-pollinator interactions play a vital role in maintaining ecosystem health and stability. It is prerequisite for successful reproduction and in establishing the ecosystem resilience. Climate change is known to affect pollinators' interactions with flowering plants. This coupled with excessive use of insecticides has adversely affected beneficial pollinator community there by decreasing their visits to the flowers. Many agricultural crops and wild plants whose yield relies on pollination thus have experienced decreased yields. It has been observed that Butterflies are next to Honey

Bees as pollinators. Re-establishing pollinator-plant relationship has thus become an urgent need for maintaining ecosystem balance. One way to address this is to develop natural attractants to enhance floral visits of the pollinators. We intend to take insights from nature by observing plant species that are frequently visited by butterflies, understand their nectar composition and develop natural attractant formulations for butterflies. Such formulations can increase efficiency of pollination and are environment friendly.



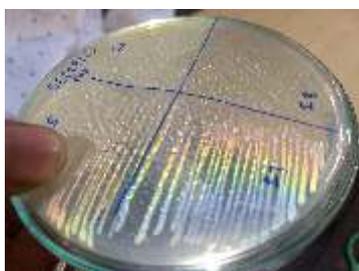
Common Lime on *Lantana camara*



Elsevier Foundation Green & Sustainable Chemistry Award Function, Germany

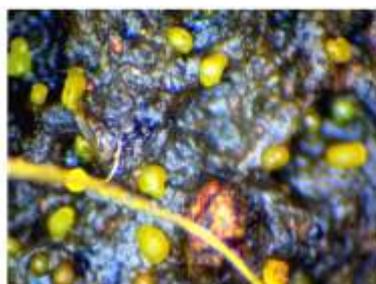
Exploring the Microbial Diversity and Potential Activity Pattern

Microbial diversity represents largely underexplored field and is highly dependent on technological development. Advances in the microscopic techniques, environmental micro array and metagenomic techniques have made it possible to visualize and understand the microbial taxa. A large number of interesting microbial communities can be probed with such techniques. However one should be more fundamental with the observations. As rightly said by Louis Pasteur that 'In the field of observation chances favors prepared mind.' In biodiversity, we integrate enquiry based teaching. One such investigation was when studying with organisms isolated from soil sample. An interesting phenomenon was observed in the microbes termed as iridescence. This may be the first report from India about microbes showing iridescent behavior. We are hypothesizing if the property is associated with the cell wall composition. This study may find application in designing sensing devices like that used in a gas sensor to bioinspired nano structures and imaging systems for better image resolution.



Curious case of Myxobacteria

Myxobacterial diversity is one such under explored and yet fascinating areas of microbial diversity that has captured interest of researchers due to their characteristic life cycle i.e. fruiting body formation. Myxobacteria represent a group of heterotrophic, aerobic, Gram negative bacteria, delta-proteobacteria which thrive in soils of diverse habitats and live on complex organic molecules by producing extra cellular enzymes. They produce multicellular fruiting bodies under starvation conditions, social interactions mediated through various contact mediated signals. They are distributed in a wide range of habitats including soil, bark of trees, decaying plant materials, and freshwater and marine environment. We are targeting these from point of exploring their Bacteriolytic (predatory activity) and Cellulolytic (cellulose degraders) activity. Besides, their potential as antibiotic producers as well as anti-cancer metabolite producers is being explored.



Ashok Surwade

Present Work

“An Antarcican is crafting a passion for producing natural wines at farm winery in Nashik.”

How biodiversity training helped me

Multi disciplinary and holistic approach helped me in decision making as I got exposed to actual field level applications. I found evaluation of students on field most exciting and fruitful.



Nilesh Rokade

Present Work

NPLANTS Nursery and Landscaping Services

How biodiversity training helped me

The course helped me building my confidence. It also exposed me to entrepreneurial aspects of biodiversity that helped me setting my own nursery and landscaping unit.



PUBLIC SERVICE



The department is contributing in addressing UNSDG's & AICHI targets in form of following initiatives:

- Reaching out to farmers via the booklets about propagation protocols and cultivation practices of high value medicinal plants
- Offering consultancies to developmental projects, Industrial houses and Forest department of Maharashtra for Biodiversity Audit of their establishments
- Reaching out to private land owners and farm house owners for the management and enhancement of biodiversity in their respective areas



Plant Ecology and Ecophysiology Workshop
- An initiative of India - UK consortium



Biodiversity Assessment Surveys

| A. Address the causes of biodiversity loss | B. Reduce the direct pressure on biodiversity and promote sustainable use | C. Safeguard ecosystems, species and genetic diversity | D. Biodiversity benefits to all | E. Participatory planning, capacity building |
|--|--|--|--|--|
| <p>Educating new generation about the values of biodiversity</p> <p>Awareness generation through public talks, articles and reports</p> <p>Citizen Science Initiatives</p> | <p>Development of sustainable harvest strategies</p> <p>Development of package of practices for cultivation of threatened medicinal plants</p> | <p>Recovery prospecting and reintroduction of threatened plant species in the wild</p> <p>Seed biology studies</p> | <p>Assessment of Ecosystem services</p> <p>Understanding human-nature relationships</p> <p>Enhancing plant-pollinator interactions</p> | <p>Training to Farmers, Women self help groups, Forest department staff on various issues pertaining to biodiversity</p> <p>Local community participation in documenting Peoples Biodiversity Register (PBR)</p> |
| | | | | |

CITIZEN SCIENCE INITIATIVE

“WILD REFLECTIONS”: An Innovative Participatory Approach to Science Documentation and Environmental Protection

"A good photograph is one that communicates a fact, touches the heart, and leaves the viewer a changed person for having seen it; it is in one word, effective" — *Irving Penn.*

Concept: We at the Department initiated “WILD REFLECTIONS - Nature Photography Competition and Exhibition” as a **Citizens’ Science** activity in 2012. Our idea was to make biological science enjoyable and to draw meaningful insights from activities such as photography, a hobby that cuts across age and profession. Most of the times environmental protection has to stand low due to unavailability of data with respect to particular sites, species etc. Collection of information remains a challenge. Efforts taken by researchers to collate and analyze such information are no doubt important and required but by and large remain confined to scientific community. Real benefits will be gained only when it

percolates to masses. Art of Photography is being appreciated and aspired by more people due to increasing exposure to new developments in still and movie shooting. People are visiting and exploring wilderness areas and new terrains. Week-end tourism has become a popular activity. Therefore, we in form of “WILD REFLECTIONS” made an attempt to provide amateur naturalists a platform. Photo entries were invited under various themes such as 'Rare Species / Plant patterns / Beautiful landscapes / Disturbances in nature / Microscopic photos and Actions & behaviour in wild life'. Information collected about species occurrence, critical habitats, unique landscapes etc can turn invaluable later to ensure better environmental protection especially of those places, species where data are scanty or not available. This way, biological science can become most useful, interesting and productive when coupled with hobby and mass participation.

Concept developed by : Dr. Ankur Patwardhan



STAKEHOLDERS & SPONSORS

Research at the department is supported by various agencies of repute at National & International Level such as -

1. Mapping and Quantitative Assessment of Geographic Distribution and the Population Status of Plant Resources of Western Ghats.

Supported by



Department of Biotechnology
(DBT, GoI)

2. Identification of critical areas of conservation concern using RS-GIS technique from northern Western Ghats of India.

Supported by



ISRO-UoP

3. Sacred Grove Ecosystem Service Assessment from Northern Western Ghats of Maharashtra.

Supported by



Ministry of Environment, Forests
& Climate Change (MoEF&CC, GoI)

4. Ecological Assessment and Determination of Endophytic Diversity of Marine Macroalgae (Seaweeds) and Camptothecin Prospecting from Medicinal Plants of Western Ghats.

Supported by



Savitribai Phule Pune University

5. Butterfly Attractant for Pollination and Ecosystem Health.

Supported by



The Elsevier Foundation, Netherlands

6. Inventorization of provisional ecosystem services of selected Sacred Natural Sites (SNS) through community participation from northern Western Ghats of Maharashtra - a biodiversity hotspot.

Supported by



Department of Science
& Technology (DST, GoI)

7. Population Status of butterflies from northern Western Ghats.

Supported by



State Forest Department

8. Identification of biodiversity rich sacred natural sites with specific reference to protection of RET plants species.

Supported by



Maharashtra State Biodiversity Board
महाराष्ट्र राज्य जैवविविधता मंडळ

Services offered by the department

- Authentication of flora and fauna essential for Environmental Impact Assessment and Sustainability Audit
- Biodiversity Audit and Management Plans
- Ecological surveys and Impact assessments
- Rare species gardens
- Carbon sequestration studies
- Medico-scaping (integration of medicinal plants in landscape)
- Design of Nakshtravan and Herbal gardens
- Eco-friendly farmhouse development



Afterword

Prof. P. B. Buchade

Principal, Abasaheb Garware College

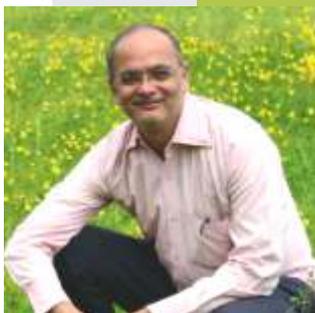
Annasaheb Kulkarni Department of Biodiversity is a unique department of our institute. Looking at the need of generating awareness in masses and decision makers alike about the vital issues of biodiversity, climate change and ecosystem services, we are visualizing the growth of the department on following lines.

Departmental goals :

- Generating human resources for the protection of environment
- To build a network of intra-collegiate and inter-collegiate units working in the field of biodiversity (short term)
- To initiate short term courses in the area of biodiversity monitoring (mid-term)
- Design student / faculty exchange programme with renowned institutes Nationally & Internationally (mid-term)

Scientific goals :

- To establish the department as a nodal point for government and non-governmental research institutes/organizations, universities and colleges conducting research in the field of biodiversity (long term)
- Ethnobotanical based bioprospecting for product development (mid / long term)



Dr. Ankur Patwardhan

Head, Annasaheb Kulkarni Department of Biodiversity

Protection of natural resource base and biodiversity have become vital issues when one talks about issues such as livelihood generation, food security etc. Protecting wild life and managing wilderness areas amidst increasing human-wild life conflict is emerging as a new challenge. Sustainable utilization of our bioresources for human well being is another area where intervention is required. On this back drop the department is envisaging future growth in phase wise manner as follows;

(a) Biodiversity Assessment & Conservation Cell with focus on ecosystem services - establishment of long term ecological monitoring station - forestry, phenology monitoring & documenting wild life (short term)

(b) Bioprospecting Cell - (i) Involving basic research and be product development oriented (mid term)

(c) Biodiversity Education & Training Cell - (i) Development of biology related learning resources for students, local community (ii) Capacity building for preparing Peoples Biodiversity Registers (PBR) (mid term)

(d) RS-GIS Cell - Application of RS-GIS in biodiversity mapping and identification of critical areas of conservation (mid term)

(e) Digital Database Centre related to Biodiversity (mid term)

(f) Agriculture / Fodder and Livestock Cell (long term)

(g) Biodiversity policy & Environmental Law Cell (long term)

(h) Biodiversity Outreach Cell (long term)





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यावत् भूमण्डलम् धत्ते सशैलवनकाननम् ।
तावत् तिष्ठति मेदिन्याम् संततिः पुत्रपौत्रिकी ॥

As long as, the Earth bears the mountains, rivers, jungles and forests, only till then, Mother Earth will be able to sustain the nourishment of human beings with future generations !!



Annasaheb Kulkarni
Department of **BIODIVERSITY**

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