

Report on **Sustainable Development**





Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss





We are not separate from nature. We are nature defending itself. Every tree cut, every species lost, is not a loss to the wilderness—it is a wound to the human soul.

— *Nnimmo Bassey*, Nigerian environmental activist, poet, and winner of the Right Livelihood Award

SDG 15, Life on land, is an earnest call to protect, restore, and sustainably manage the Earth's vital terrestrial ecosystems - forests, grasslands, wetlands, and mountains. The UN has called for the restoration of 1.5 billion hectares of degraded land by 2030 to meet land degradation neutrality. However, some of the latest statistics offer less encouraging figures, with over 12 million hectares of forest lost yearly, primarily to agricultural expansion; land degradation affecting one-third of Earth's land, undermines food security, health, and livelihoods for over 3 billion people. Only 15% of global land is under protection, and more than 1 million species are at risk of extinction, giving a sense of the urgent action required to address the prevailing trend.

The Shiv Nadar University community is closely involved in advancing SDG 15. Built on a 286-acre area, the university's sprawling campus is a biodiversity hotspot—home to around 10,000 trees, 700 plant species (including rare fossils like Horsetail from the Jurassic era), and over 125 bird species. Approximately 95% of the plant species have medicinal value. This 'living lab' for biodiversity is a research site and a demonstration model for sustainability and conservation.

This report provides a glimpse of our work to advance SDG 15 through our teaching, research, institutional practices, and partnerships on this exciting living lab for faculty, researchers, and students to study, research, and document diverse flora and fauna.

TEACHING AND LEARNING

The Common Core curriculum at Shiv Nadar loE has an Ecology and Environmental Sciences component: All undergraduate students must mandatorily take a core group of common subjects designated as the Core Common Curriculum.

Almost every department offers courses on sustainability and has faculty members researching these topics. Two of the priority research areas for the University are the environment and energy.

Courses such as Environmental Studies (CCC 704), Biodiversity: Assessment & Conservation (CCC 706), Environmental Impact Assessment (CCC 406), and Ecology and Environmental Science (BIO104) inspire students to study biodiversity at the global level and practice it in their local environment.

Student Stories

Field Internships of Students of the Master's Program in Rural Management - Forty Students, Eighteen States, and a Thousand Questions

As a significant part of their coursework, 40 students from the first MA in Rural Management program batch at Shiv Nadar University travelled across 18 states. They partnered with eminent grassroots organizations, from Kutch to Kalahandi, Melghat to Bundelkhand, Telangana to Dantewada. Living and working in tribal hamlets, NGO field offices, remote villages, and towns, every internship project was a site of learning, challenges, and transformations. Students worked on themes around:

- Tribal land and forest rights,
- Participatory groundwater management,
- Regenerative agriculture,
- Women's leadership in SHGs and FPOs,
- Seed biodiversity and agroecology, to name a few

Dr. Bhumika Dubay, an alumnus of the class of 2016 in Bioinformatics and Cheminformatics, is currently a Postdoctoral Fellow at United Arab Emirates University. Her work focuses on forest genomics to understand and enhance biodiversity by studying climate-resilient plants, contributing to environmental sustainability. With a strong foundation in bioinformatics and cheminformatics, Bhumika uses advanced techniques like Next Generation Sequencing to drive her research. From

ALUMNI SPOTLIGHT

From Shiv Nadar University to Advancing Research in Environmental Sustainability

Dr. Bhumika Dubay Postdoctoral Fellow United Arab Emirates University

Master of Science (M.S.) in Bioinformatics Class of 2017

her academic journey at Shiv Nadar University to her impactful work in environmental research, Bhumika is making strides in improving biodiversity and promoting climate resilience.

RESEARCH

Ecohydrological and hydrogeological dynamics of groundwater springs in Eastern Himalaya, India

Groundwater springs are critical to achieving Sustainable Development Goals (SDG 6, access to clean water) in the Himalaya and remain highly vulnerable to climate change and land-use and land cover change. In a first from Eastern Himalaya, the research used high-frequency discharge monitoring to analyze the relative controls of land-use, precipitation, soil properties, and hydrogeology on the diel and seasonal variability in three representative springs. The study provides an integrated analytical framework for understanding Himalayan springs, which are critical for achieving SDG 6 (access to clean water) and a baseline for developing appropriate springshed models for effective management of freshwater ecosystems (SDG 15) against future climate change impacts (SDG 13), as well as informing the water security assessment in the Himalaya.

Kumar, Manish, Sumit Sen, Himanshu Kulkarni, Shrinivas Badiger, Girish R. Varma, and Jagdish Krishnaswamy. "Ecohydrological and hydrogeological dynamics of groundwater springs in Eastern Himalaya, India." *Groundwater for Sustainable* Development 27 (2024): 101311.

Forest Management and conservation regime

Forest conservation involves ensuring sustainability in use-priority areas, preservation in biodiversity-priority areas, and regulation of converting forests to non-forests. However, forests provide multiple benefits to stakeholders at various scales; hence, trade-offs between these benefits result in trade-offs between stakeholders. The chapter describes how these questions were resolved under the statist forest governance regime that prevailed during the colonial and post-colonial epoch, until the Forest Rights Act, 2006 passage.

Lele, Sharachchandra, 'Forest Management and Conservation Regime', in Philippe Cullet, Lovleen Bhullar, and Sujith Koonan (eds), *The Oxford Handbook of Environmental and Natural Resources Law in India* (2024; online edn, Oxford Academic, 18 July 2024).

Academic Programs on Sustainability and Public Policy

Dr. Rajeswari Raina, Professor, Department of International Relations and Governance, Shiv Nadar University, has been awarded a grant of INR 11 Crores by Rainmatter Foundation to conduct academic sustainability and public policy programs.

The grant will help towards creating a set of programs focused on addressing the critical need for:

- Knowledge production (research), sharing and propagation (education) for sustainability transitions,
- Knowledge and policy decisions in the intertwined social and biophysical dimensions of the wicked problem of unsustainability,
- Knowledge that co-evolves with multiple ways of knowing and reinforces socio-environmental ethics.
- Knowledge invested in and building public engagement in the choices and decisions we make.

Balancing greenwashing risks and forest carbon sequestration benefits: A simulation model linking formal and voluntary carbon markets

Voluntary carbon markets (VCMs) offer energyintensive firms a cost-effective way to reduce carbon mitigation expenses by promoting forest conservation. However, concerns about greenwashing may deter firms from using these options, which are susceptible to illegal forest harvesting. This study examines whether firms purchasing carbon credits from forestrybased communities can help strengthen forest conservation, mitigate project risks, improve environmental outcomes, and reduce abatement costs.

Ranjan, Ram. "Balancing greenwashing risks and forest carbon sequestration benefits: A simulation

model linking formal and voluntary carbon markets." Forest Policy and Economics 168 (2024): 103317.

Pectin biopolymer to develop composite thin films for biodegradable vegetable and fruit wraps.

Dr. Yamini Sudha, Associate Professor, Department of Chemical Engineering, has used pectin biopolymer to develop composite thin films for bio-degradable vegetable and fruit wraps. Her research aims to significantly boost the shelf life of produce and reduce hazards to the human body and nature.

The biodegradable wraps are made by extracting pectin from bananas, oranges, and sweet lime. They are a natural, edible coating that can replace synthetic wax, which gives fruits gloss and longevity.

She and her research group have successfully produced small films with improved properties compared to pure pectin films. "We are now working on process-related improvements to scale up the film production with the required physical, chemical, and mechanical properties," she says.

Dr. Sudha's research is linked to SDG 3 (good health and well-being), SDG 11 (sustainable cities and communities), SDG 12 (responsible consumption and production), and SDG 13, 14, and 15 (climate action, life below water, and life on land).







Developed biodegradable film wraps by extracting pectin, a propsective biopolymer, from fruits.

Incentivizing endemic biodiversity conservation under a warming climate through market-based instruments

This study investigates the potential of utilising payment for ecosystem services (PES) led incentives to support the conservation of endemic biodiversity and the development of alternative livelihood opportunities, specifically through ecotourism, in regions facing water scarcity. It highlights the ability of PES programmes to not only generate additional income for communities and encourage land use practices that safeguard biodiversity and enhance water recharge.

Ranjan, Ram. "Incentivizing endemic biodiversity conservation under a warming climate through market-based instruments." *Journal of Environmental Economics and Policy* 13, no. 3 (2024): 322-345.

Wetlands' contribution and linkage to support SDGs, their indicators and targets- A critical review

This study is one of the pioneering efforts to compile comprehensive information on global Ramsar sites. It delves into the significance of wetlands and the designation of Ramsar sites across various countries, incorporating a concise exploration of utilizing Unmanned Aerial Vehicles (UAVs) for wetland monitoring and assessment. The study conducts a comparative evaluation of Ramsar sites, analyzing their percentage area and overall coverage worldwide. Incorporating a Scientometric analysis utilizing the Scopus database, the study features a co-occurrence map, thematic map, thematic evolution trend, and country collaboration map. Emphasizing the interconnection between wetlands and Sustainable Development Goals (SDGs), particularly SDG6 (Clean Water & Sanitation), SDG12 (Responsible Consumption & Production), SDG13 (Climate-Action), SDG14 (Life Below Water), and SDG15 (Life on Land), the study delves into associated targets and indicators. The study provides valuable insights for future researchers and policymakers, underlining the indispensable contribution of wetlands to the direct and indirect fulfillment of SDGs 6,12,13,14,15, and 17.

Mohanty, Smrutisikha, Prem Chandra Pandey, Manish Pandey, Prashant K. Srivastava, and Chandra Shekhar Dwivedi. "Wetlands contribution and linkage to support SDGs, its indicators and targets-A critical review." *Sustainable Development* (2024).

Promoting agroforestry on sand dunes for desertification control in arid regions

This research focuses on tackling the issue of fertile land turning into a desert in arid regions. It proposes a solution involving financial incentives based on payment for ecosystem services (PES) to encourage the transformation of privately owned dunes into agroforestry systems. Under the proposed mechanism, farmers plant Acacia nilotica trees and pearl millet on dunes, providing resilient economic returns in regions with harsh climatic conditions. In addition, acacia trees help to prevent crop damage on neighboring farms through stabilizing sand dunes and serving as shelterbelts. A dynamic optimization model of land-use decisions between open millet farming and acacia-based agroforestry derives optimal afforestation of dunes under varying PES payments, crop incomes, and farm size endowments. Results suggest that such agroforestry systems can effectively prevent the spread of desertification in arid regions. Further, PES incentives can improve agroforestry uptake and augment farmers' livelihoods.

Ranjan, Ram. "Promoting agroforestry on sand dunes for desertification control in arid regions." *Journal of Environmental Planning and Management* 67, no. 14 (2024): 3600-3625.

Coral Reefs Threat Assessment and Comparative Analysis of Neil and Agatti Island, India, Using Multispectral Approach

Coral reefs stand out as highly diverse, productive, and environmentally sensitive ecosystems within the global spectrum of ecological systems. Andaman-Nicobar and Lakshadweep islands exhibit many coral reef species, most of which are under threat. The application of optical remote sensing has been extensively employed for monitoring coral reefs. The

present study involves the mapping of coral reefs at select islands of Andaman-Nicobar (Neil Island) and Lakshadweep (Agatti Island) using Landsat 7 (ETM+) and Landsat 8 (OLI/TIRS) satellite data for the years 2002 and 2020.

Wasim, Md, Smrutisikha Mohanty, Prem C. Pandey, Ahammed Kk Basheer, and Arvind Chandra Pandey. "Coral Reefs Threat Assessment and Comparative Analysis of Neil and Agatti Island, India, Using Multispectral Approach." In Aquatic Ecosystems Monitoring, pp. 252-278. CRC Press, 2025.

Conversations on Campus

The Shiv Nadar University campus is filled with some incredible biodiversity. The bird life is especially rich, and over 150 species have been recorded in the immediate surroundings. To explore the species of birds on campus, we organize workshops and nature walks to spot and observe the feathered friends of Shiv Nadar University and contribute to the campus bird count.





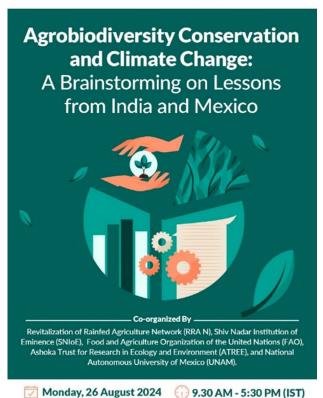


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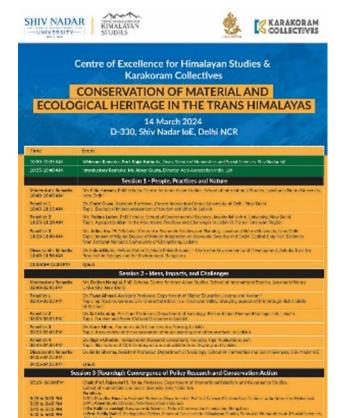




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Click on the **Registration Link** to register for this event





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February

9-11th, 2024



UNIVERSITY OPERATIONS

Celebrating and reaffirming our commitment to Earth Day every year

Every year, on Earth Day, we reaffirm our commitment to shaping a sustainable future, not just in words, but through action. At Shiv Nadar University, sustainability is woven into research,







AIRPORT/WILDERNESS

Airport/Wilderness is a slideshow with a documentary-style narrative that describes a camping trip to the hinterland of a major international airport, London (leasthrow, UK, Against the beskdrop of, on the one hand, an exer-expanding global network of sirports and, on the other, radial carth system transformation induced by our industrial way of life, Ferguson uses the trip to investigate a much-publicised environmental heritage initiative by the airport authority's interest in bodiversity. No exist: What executly is the airport authority's interest in bodiversity? To what extent can its claims of excellence in biodiversity be upheld? And, if they can, what are the implications for the future of coexistence human, natural, technological?

VISITING FELLOW

DR NICHOLAS FERGUSON

SHIV NADAR

DEPARTMENT OF ART, MEDIA AND PERFORMANCE



education, and daily practice. From our 286-acre biodiverse campus, a home to over 10,000 trees and 700+ plant species, to solar energy expansion, waste treatment, and biowaste composting, we're creating lasting solutions.



Biodiversity Conservation

At Shiv Nadar University, we have an opportunity to learn on and nurture 10.4 acres of land. Conceptualized as a unique concept, first of its kind in northern India, this land has been eco-

restored to a thematic botanical garden on campus. Providing students, visitors, and researchers with an opportunity to explore some rare, uncommon, and economically significant plants has increased interest and awareness about many plants and herbs in daily lives. We have also conserved their germplasm for education and research purposes.

With over 2000 plants belonging to more than 700 species, eleven themed gardens with 555 plant species, Medicinal Plant Gardens, RET Plant Gardens, Palm Gardens, Gymnosperms Garden, Ficus Garden, Hydrophytes Garden, Butterfly Garden, Bamboo Garden, Fruit Plant Garden, Species and Condiments Garden, Xerophytes Garden

The campus is rich in faunal diversity, characterized by wetlands and terrestrial species, mammals, aves, reptiles, amphibians, fishes, molluscs, annelids, and insects, including 53 butterflies. These findings and discoveries are published in books for posterity to facilitate research.

The wetland side of the botanical garden provides a conservatory for the oldest known living genera of vascular plants. These are two species of Equisetum (also known as horsetail), i.e., Equisetum ramossissimum ramossissimum and Equisetum ramossissimum devil, living fossils from the Jurassic period.

All species in and around the garden are indigenous or endemic, except for a few. The main thrust is to introduce as many rare, endangered, and threatened plant species from the point of view of conservation.

Geo-tagging of the Campus's rich plant life is in progress.

In a drive to geo-tag trees on campus, we have carried out an inventory of and affixed QR codes on 13500 trees with 44 individual species present within the boundary of Shiv Nadar University using the census method. More than 20 primary and secondary attributes have been recorded for each of these trees, including Latitude and Longitude, Local Name, Girth, Height, Condition, and Canopy Diameter, to name a few. The trees have been assigned a specific QR code, which, when scanned, gives detailed information about the tree.

Importance of Tree Data at Shiv Nadar University

Geo-tagging activity offers,

- Access to the tree data, including the mapping feature.
- Students can access information about each tree on their mobile device by scanning the OR code.
- In improving tree identification skills, including awareness, information, and conservation of trees, which is also used for research
- We can identify gaps using a GIS map layer and maintain data of cut /collapsed/ illegal cut trees, etc.
- Most significantly, it is helpful in the carbon sequestration of the campus.

Sustainable Food Options on Campus and Local Sourcing

The University supports the local community with significant economic opportunities by obtaining fresh and sustainable food choices from local sources.

We have partnered with a local organic farm, Jaivik,

where the university sources organic food. The farm is situated within 15 miles of the campus. The produce is procured every week to prepare meals served on campus.



Landscaping the Campus

The university has beautifully landscaped gardens, tree avenues, and sprawling grassy areas developed and planned by a horticulture architect. The University takes pride in the extensive horticultural work and tree plantation drive carried out during the past few years, increasing the tree cover and overall greenery on campus.

With a green cover of 35.5 hectares, we have created a sequestration potential of 5412.8 MTCO2e. Please highlight this.

To date, we have the following ground cover:

S.NO	PARTICULARS	TOTAL QUANTITY
1	Trees/Palms	18,117
2	Shrubs	1,70,127
3	Ground Covers	3,03,624
4	Grass	3,44,123 sqm.

To conserve the wild native species present on campus, maintain the healthy ecosystem of the campus, and prevent the growth of invasive species, the biodiversity core team on campus, comprising faculty and trained local farmers, makes every effort to enhance knowledge of and preserve the area's biodiversity.

During every development process on campus, every aspect of biodiversity is considered. So, every measure is taken not to remove old or native trees planted previously

Date Palm Grove

One of the distinctive sights on the Shiv Nadar University campus is the date palm trees, found standing alone and in clusters. The largest date palm grove, the Sacred Grove, is a sprawling plantation of over 900 date palms. Spanning 0.75 hectares, it lies on the eastern side of the campus, close to the Dargah, along the road leading from the indoor sports complex.

As per the village elders¹ Chithera's trees are believed to be 300–400 years old. The area has relics from Mughal invaders; some say nomads from the West camped here in the wetlands. The date palm seeds they left along their camping trail later grew into date palm trees spread across North India, including the University campus and the surrounding areas. Forming a unique ecosystem, the date palm grove is an essential keystone species, providing shelter, habitat, and food to several wild plants and animals. Some plant species found in the sacred grove include Vasaca, Ratti, and Sandpaper plants that are no longer found outside in western UP.

The Campus Lake

The campus lake is part of the Dadri wetlands, also called the Bil Akbarpur wildlife habitat. The lake was almost dried up when the University was founded. Its immediate revival has allowed many fish and aquatic plants to thrive, such as Nitella, Chara, and other phytoplanktons, which provide food for winged visitors. Alternanthera philoxeroides grows gregariously throughout the year on the lakes' fringes, encroaching on the water body and offering a good insect population to feed the birds.

The lake is home to many species of birds, which are endangered, near threatened, or vulnerable in the IUCN category, including the common Pochard, Sarus Crane, Woolly-necked Stork, Ferruginous Duck, Painted Stork, Black-headed Ibis, Black-necked Stork, Oriental Darter, Alexandrine Parakeet, and Egyptian Vulture. All efforts are being taken to preserve the lake and its natural ecosystem. During the summer, the lake is supported by external water to preserve life underwater, and the water is conserved and rejuvenated through rainwater harvesting. Efforts are being made to focus on migratory avifauna that visit the lake.

True to its existence on the campus, the University named its first newsletter after one of the prominent resident birds, the Whistling Teal.

PARTNERSHIPS

The School of Humanities and Social Sciences (SHSS), in collaboration with The Habitat Trust (THT), has undertaken two exciting projects.

1. Conservation of Alluvial Grasslands in the Dudhwa-Pilibhit Landscape

The alluvial grasslands of India are one of India's most threatened ecosystems. Besides wild spaces and forests, a large portion of the Indian subcontinent is covered by grassland ecosystems. The Terai alluvial grasslands are one of the country's most biodiverse regions. Other than Assam, Uttar Pradesh has one of the largest belts of Terai grasslands. Unfortunately, because Uttar Pradesh state has the highest human population in India, land pressure has taken away most of these amazing grasslands in the form of agriculture. With

¹A village elder is person having authority because of age and experience

the severe loss of grasslands throughout the state, most of these grasslands now exist only in the Protected Areas (PA) of the Dudhwa and Pilibhit Tiger Reserves and the river banks that flow around these areas. The communities living around this area depend heavily on these grasslands. Shiv Nadar University has collaborated with THT to look at the impact of communities on these habitats and develop economic interventions to help reduce the dependence of these communities on the forests and nudge a positive mindset toward the forests and their denizens for long-term conservation.

2. Conservation of Rocky Outcrops

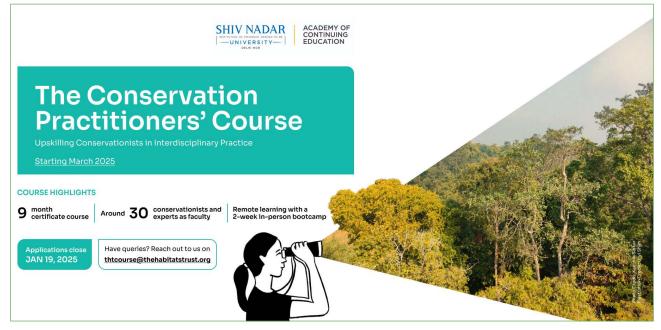
The Konkan region of Maharashtra has mid-elevation lateritic plateaus between the Sahyadris and the coastal plain. Apart from India, such lateritic plateaus are highly restricted ecosystems found only in Brazil and Australia. These rocky outcrops are home to a wide range of endemic plants, amphibians, and a multitude of other taxa, and historical petroglyphs². Being under threat due to private ownership, outcrops face significant challenges due to laterite mining, mango and cashew plantations, and the sale of these properties for various purposes. Researchers from the School of Humanities and Social Sciences have partnered with the team THT to conduct a pilot study to assess the prospects of developing economic opportunities for the communities, which will help them retain the rocky outcrops and contribute to their conservation.

Academy of Continuing Education (ACE)

At Shiv Nadar, the Academy of Continuing Education (ACE) recognizes that learning is a lifelong endeavor that also involves some unlearning. To facilitate best-in-class knowledge, practices, and skill development offerings to the growing ecosystem of lifetime learners and leaders within and outside the University, the academy has a strong foundation in a student-centric, multidisciplinary, and research-focused pedagogy, along with uniquely crafted programs and innovative delivery models that offer students the best of the University's rich intellectual resources.

The students at ACE are encouraged to evolve into meta-learners, which brings forth the ability to learn new skills and quickly adapt to new environments. Learning opportunities are provided through short-term programs and experiences, the blended deployment of in-class and experiential learning using the latest instructional technologies, such as interactive e-learning and tutoring, gamification, simulations, and learning apps.

One example is the 'Conservation Practitioners' course jointly launched with THT and ACE, Shiv Nadar University. The nine-month certificate course is taught by some of India's leading experts to support conservationists in upskilling, through a curriculum that blends various skill sets and



²Petroglyphs are images of animals and people, as well as structures, formed by picking or removing the upper surface of a rock.

promotes interdisciplinary learning, grounded in theory and real-world application, that can be imparted to any practitioner. Designed so that practitioners can continue to work and learn, the course empowers practitioners with the tools needed to safeguard India's rich biodiversity and natural ecosystems.

Community Connect Program partners with Lending Hands Foundation

In partnership with the Lending Hands Foundation, the Community Connect Program of Shiv Nadar University hosted a Solid Waste Management session at a senior secondary school and a primary government school in Datawali, a village near the university.

Over 160 students participated, gaining insights into waste issues and sustainable practices. Through engaging discussions and hands-on activities, they explored the impact of daily choices on planetary health, learned about waste's long-term effects, the idea of conservation, and source segregation.



Shiv Nadar Institution of Eminence is fully committed to the UN Sustainable Development Goals (SDGs). We have embraced a four-pronged strategy for SDGs through **teaching**, **research**, **our core institutional practices**, **and partnerships**.



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