SDG 11: Sustainable Cities and Communities

MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE, SAFE, RESILIENT AND SUSTAINABLE

The institute has undertaken numerous activities and initiatives to promote sustainable development in each of the three major domains: economic, environmental and social). IIT Gandhinagar has implemented several campus development projects that demonstrate sustainability in the site and building designs. Activities corresponding to each of the four broad components of research, education, outreach and operations in the theme of sustainable cities and communities are summarised below.

RESEARCH

Extensive research activities are conducted at the institute to address challenges of urbanisation, including air quality and distribution of reactive traces, wastewater reclamation and treatment technologies, solid waste management, sewer network, urban water management strategies, urban green spaces, flood evacuation during pandemic, clean energy and resource recovery, energy effective smart city applications among others.availability, among others. More than 20 researchers at the institute work in these areas. Some of the ongoing research projects in this sphere are mentioned below.

- Development of low-cost, efficient and scalable materials for CO2 capture using naturally available non-toxic stable materials and industrial solid waste; Department of Science and Technology (DST), Government of India
- Development of a sliding bearing for earthquake protection of structures; DST
- Development of environmentally and economically sustainable composite solution for municipal solid waste management; Ministry of Education
- Drives for electric vehicle applications; SERB
- ECO-WET - Efficient Coupling Of Water and Energy Technologies for smart sustainable cities; Indo-German Science and Technology Centre
- Gandhipedia: A one-stop AI-enabled portal for browsing Gandhian literature, life events and social network; National Council of Science Museum, Ministry of Culture
- Geosynthetic-reinforced soil walls and abutments for high-speed railway systems; High Speed Railways Innovation Centre

- High sensitive detection of atmospheric pollutant gases to monitor the effects of industrial emissions on urban air quality; Gujarat Council of Science and Technology
- Impact of air pollution on Covid-related secondary exacerbations; Google
- Impact of sea-level fluctuations, climate change or tectonic activity on the decline of the Harappan settlement of Dholavira, Kutch, India; DST
- Indigenous cultural heritage as a facilitator for SDGs; Flinders University
- Multi-sensor drone survey of Dholavira, Gujarat, Archaeological Survey of India
- Synthesis of magnetic catalyst-coated microbubbles for removal of trace pollutants; DST
- UAV-based laser spectroscopic monitoring of greenhouse gas emissions in urban and rural India;
- Vulnerability assessment and sustainable solutions for water quality management in the urban environment; DST
- Water for change: Integrative and fit-for-purpose water sensitive design framework for fast-growing livable cities; DST
- Cultural heritage preservation and restoration using digital 3D models; SERB

MICOB is a start-up incubated by IIEC that provides products related to the construction industry. It develops 3D concrete printing blocks that use the least energy and material and minimises waste reduction, thus leading to a substantial decrease in the carbon footprint and emissions. It was among the teams shortlisted under Global Housing Technology Challenge 2019.

Nearly 30 articles related to sustainable cities and communities were published, covering topics including wastewater surveillance, urban water management strategies, resource recovery, urban green spaces, air pollution, urban stormwater management, reactive trace gases, etc.

IITGN and Durham University, UK have entered into a Memorandum of Understanding (MoU) on November 17, 2021, for cultural, educational and scientific cooperation. The MoU was signed by Prof Claire O'Malley, Pro-Vice-Chancellor (Global), the University of Durham and Prof S P Mehrotra, Professor-in-Charge (External Relations), IITGN, during a virtual ceremony. This new agreement will facilitate students, faculty, and knowledge exchange between both institutions. Immediately after the signing of the MoU, the two institutions hosted a joint seminar on "Understanding the challenges of world heritage sites and the role of Archaeology in the global context".

Several projects ongoing at the Institute, majorly led by faculty at Humanities and Social Sciences discipline, strive to record and/or preserve intangible cultural heritage such as local folklore, traditions, language, and knowledge:
- Mobility and multilingualism in the Indian Ocean: Impacts of global ecological change on local society
- Mangroves stories in Gujarat
- History, Science & Technology of Wildlife Hunting and Trapping in Arunachal Pradesh
- Multi-sensor drone survey of Vadnagar, Gujarat
- Field Assistants in Wildlife Research and Conservation: Case studies from Arunachal Pradesh

OPERATIONS

The institute encourages public access to its buildings. However, at present, as a relatively new institution (established in 2008), we do not have spaces such as museums, exhibition spaces/ galleries and/or works of arts and artefacts or natural heritage landscapes of cultural significance.

Library

The university as a body provides public access to the library. There are no charges for using the library and on-site. However, there are nominal charges for lending books and delivering articles to external (academic institutions and individual - researchers and academicians) members.

Pedestrian-friendly campus

The institute has been designed to be pedestrian and cycle-friendly and offers public transportation community members both on campus and outside (covering areas up to a distance of approximately 20 km toward the nearest city of Gandhinagar).

Possession and use of personal motor vehicles by the students is not permitted. Regular emails are sent to the students regarding no vehicle use on campus. Any student needing to park a personal vehicle for unforeseeable situations must place a request to the Dean (Student Affairs) with the reasons detailing the need behind the same.

Affordable housing for employees and students

IITGN has a residential campus with approximately 65% of its employees (including faculty and staff) staying inside. Hence, it reduces the need for a longer commute and gives flexibility to the employees for work. The institute provides state-of-the-art residential facilities to all its students at an affordable fee. No student is denied hostel accommodation on account of non-availability.

Sustainable campus

The master plan had accounted for "environment and energy response" as one of its major components. It attempted to make the campus an exemplary project for sustainable development and the buildings were built to Green Rating for Integrated Habitat Assessment (GRIHA) and Energy Conservation Building Code (ECBC) standards. The master plan complied with the National Building Code 2009 of India, including the 'Approach to Sustainability'. The guiding principles included the following: a) complete and absolute respect for the environment at both micro and macro levels, and b) respect, conserve and, wherever possible, recycle resources. IITGN became the first campus in India to be awarded a five-star rating by Green Rating for Integrated Habitat Assessment for Large Developments (GRIHA LD) in 2016.

To further enhance the campus experience, add to its beauty, and encourage academic development, IITGN has embarked upon an ambitious "Art on Campus" project, which focuses on art installations around the campus. The Institute has engaged an external consultant to develop a dynamic long-term master plan for this project that is aimed at establishing a connection between buildings, social settings and their surrounding environments.

IITGN bagged the second position in the category of 'Best Institution / Resident Welfare Association / Religious Organisation for Campus Usage' during the 3rd National Water Awards ceremony organised by the Ministry of Jal Shakti at Vigyan Bhawan, New Delhi, on March 29, 2022. Shri Gajendra Singh Shekhawat, Union Cabinet Minister of Jal Shakti; Shri Prahlad Singh Patel, Minister of State for Food Processing Industries; and Shri Bishweswar Tudu, Minister of State for Tribal Affairs and Jal Shakti were present on the occasion and bestowed the award to IITGN in recognition of the Institute's efforts to promote water conservation and water management.

IITGN has entered into a Memorandum of Understanding (MoU) with the Climate Change Department, Government of Gujarat, on February 21, 2022, to forge a strategic partnership for the development of climate change policy and a roadmap for net-zero by 2070 for Gujarat.

Leh-Ladakh and Kargil delegation

A 13-member delegation from Leh-Ladakh and Kargil visited IITGN on October 13, 2021, to understand wastewater management at the Institute, learn about the processes, and examine various eco-friendly and sustainable technologies which can be adopted to the extremely cold climate of their region. The group also visited the Water Treatment Plant and Sewage Treatment Plant of the Institute. Prof Sudhir Kumar Arora hosted the delegation along with other faculty members and officials from the Institute.

MoU with GPCB

A tripartite MoU has been signed among the Gujarat Pollution Control Board (GPCB), the Rajkot Municipal Corporation, and the Indian Institute of Technology Gandhinagar (IITGN) in October 2021, to tackle the ubiquitous problem of air pollution collaboratively. IITGN will act as the technical partner for the City of Rajkot. In conjunction with the Rajkot Municipal Corporation and the GPCB, IITGN will formulate and assist in implementing city- specific action plans and interventions that will help mitigate air pollution in Rajkot. In its role as the technical partner, the Institute will extend knowledge-based support, undertake research to monitor air quality, gather and analyse data to assess the on-ground situation and more. The three signatories will work together to fulfil the ambit of the National Clean Air Programme (NCAP), launched by the Ministry of Environment, Forest and Climate Change, Government of India.

EDUCATION

IITGN has signed Memorandum of Understandings with NIT Sikkim (NITS) and NIT Hamirpur (NITH) to facilitate student exchange, academic cooperation, and research collaboration among faculty members of both the institutes. Selected meritorious students of both the NITs can now be a part of the IITGN-SRIP, study a semester at IITGN, and apply for the Start Early PhD Programme at IITGN. Academic and research collaboration between faculty members will also be facilitated

IITGN and the University of Durham have entered into a Memorandum of Understanding (MoU) on November 17, 2021, for cultural, educational and scientific cooperation. The MoU was signed by Prof Claire O'Malley, Pro-Vice-Chancellor (Global), University and Prof S P Mehrotra, Professor-in-Charge

(External Relations), IITGN, during a virtual ceremony. This new agreement will facilitate students, faculty, and knowledge exchange between both institutions. Immediately after the signing of the MoU, the two institutions hosted a joint seminar on "Understanding the challenges of world heritage sites and the role of Archaeology in the global context.

Courses related to cities and environment offered at the institute are:

CE 202: Sustainability and environment
CE 306: Civil Engineering Materials Lab
CE 403: Construction Technology and Management

CE 404: Transportation Engineering
CE 605: Remote Sensing of Land and Water Resources CE 613: Analysis and Design of Masonry Buildings
CE 629: Geosynthetics
CE 633: Water Resource Systems: Planning and Management

CE 692-I: Special Topics in Civil Engineering: Risk based seismic evaluation of existing buildings
EE 426: Electric Vehicle Technology
EH 605: Modelling of Earth System and Sustainability EH 610: Engineering Seismology and Seismic Hazard Analysis
ES 403: Introduction to Fire Engineering
ES 635: Water Quality Engineering

HS 104 (R): Foundational Sanskrit
HS 111: Urdu script and poetry
HS 112: Urdu poetry interpretation
HS 201: World Civilisations and Cultures
HS 211 (N): Exploring India's cultural, scientific and technological heritage
HS 223: Sanskrit Literature

HS 326: Harappan Civilisation

HS 391: Special Topics in HSS: Music Traditions of India
HS 425: Introduction to Archaeology
HS 508: Introduction to Indian Knowledge Systems
HS 510: Perspectives on Indian Civilisation
HS 519: Linguistic Anthropology
HS 642: Structures and Hydrology in Ancient India
IN 304: Ancient Indian Technology
IN 402: Human Evolution
SC 264: Active Tectonics & Earthquake Geology: A tool for Seismic Hazard Assessment

The Humanities and Social Sciences discipline at the institute offers several courses for learning languages such as French, Sanskrit, Chinese, Urdu, Japanese, and Gujarati, and the students are encouraged to take these courses. Moreover, the institute has established four endowed chairs in Sanskrit,

Urdu, Classical Indian Music and Indian Performing Arts to promote Indian cultural traditions in its curriculum.

COMMUNITY OUTREACH

Swachhata Pakhwada

IITGN observed 'Swachhata Pakhwada' during September 1-15, 2021, with several events and activities, including a Swachhata pledge, cleanest hostel competition, e-waste collection drive, plogging drives, swachhata awareness in neighbouring village and labour colonies, painting and essay writing competitions for children and students, among others. The events were coordinated by the Green Office team, IITGN.

IITGN hosts seminar on campus development

IIT Gandhinagar, known for its commitment to sustainability, organised a 'Seminar on Campus Development: Reflection and Future Direction.' This event celebrated the successful completion and operationalization of phase 1 projects, bringing together stakeholders to reflect on the institute's future development.

IITGN-IITK Joint Symposium

Faculty members of IITGN and IIT Kanpur came together for a Joint Symposium on Energy Technologies on April 15 and 16, 2022, to discuss research areas of mutual interest in the domain of energy technologies. The event provided a platform to identify potential joint research proposals and projects. Prof Atul Bhargav coordinated the event.

Cultural Council

The Cultural Council organised 'Inspireclipse', a short video-making competition on the theme "Vaccine Awareness" from July 12 to 30, 2021; 'Drawasaurus', an online scribble tournament by Palette Club on July 26 and 27; 'Battle of Quizzards', an entertainment-based quiz by the Cinematheque Club on July 25; and a 'Matki Phod competition' on August 30, on the occasion of Janmashtami.

The Cultural Council organised an interesting line-up of activities during this quarter, including 'Fin-e-Quiz', a quiz competition on finance, on October 8, 2021; 'TechnoWiz' (in collaboration with the Technical Council) on October 24, 2021; and 'Another Lie', a horror video-making competition by Abhinaya - the drama club. Besides, the council also organised 'IITGN's Got Talent' (IGT) from October 28 to November 14, 2021, which featured various competitions for creative expressions.

In an eclectic line-up of events, the Cultural Council organised an online Republic Day quiz on January 26, 2022; a virtual dance reel-making competition by the Step Up Club from February 5 to 16; a photo composition workshop and exhibition by 16 pixels Club on February 27 and 28; a talk on the journey of India's first transman pilot Adam Harry by Orenda Club on March 12; a Jamming night by Sargam Club

on March 19 during Blithchron '22, which also included a wide range of singing, dancing, beatboxing performances by students.

IKS 2022: IITGN conducted the sixth edition of its unique elective course, Introduction to Indian Knowledge Systems (IKS), in hybrid mode, from January to April 2022. About 12 distinguished scholars from India and abroad delivered lectures during this season which was themed on 'Precolonial India's Treasure House of Literatures'. The programme is being coordinated by Prof Michel Danino and Ms Mana Shah.

AESA Award: Adding one more feather in its cap, IITGN has won 'AESA Award 2022' in the non-residential institutional category for the 'Central Arcade' building on June 03, 2022.

Students' activities: The Design and Innovation Centre organised two exhibitions to celebrate and showcase the work of students who had opted for two design courses - 'Playing with Possibilities: Gaming New World' and 'Creativity, Design and Doing' during the third week of April. Additionally, Palette, the art club of IITGN, organised Exhibit 2.0 on April 19, 2022, to showcase more than 60 paintings and sketches made by the IITGN community. The Quizzing Society at IITGN, in collaboration with IIT Hyderabad's Quiz Club, conducted a pan-India quiz competition on the theme 'Anime Quiz'.

Faculty members of IITGN and IIT Kanpur came together for a Joint Symposium on Energy Technologies on April 15 and 16, 2022, to discuss research areas of mutual interest in the domain of energy technologies. The event provided a platform to identify potential joint research proposals and projects. Prof Atul Bhargav coordinated the event.

The Humanities and Social Sciences discipline and the Archaeological Sciences Centre jointly organised a two-day virtual workshop on 'GIS Applications in Social Sciences' during May 13-14, 2022. The workshop received nearly 90 applications from around the globe, out of which 20 applicants were selected to participate. Apart from lectures and hands-on training, the workshop included two keynote sessions and flash presentations by participants. PhD Scholars Camellia Biswas and Ekta Gupta, and Profs Sharada C V and V N Prabhakar organised the workshop.

Prof Manish Kumar, Assistant Professor, Civil Engineering, IITGN, has been honoured with the Commendation Card by Lieutenant General Jai Singh Nain, AVSM, SM, General Officer Commanding-in-Chief (GOC-in-C) of the Southern Command, Indian Army, for providing overall leadership and guidance in developing 3D printed defence structures for the Indian Army. This work was a part of his student Shashank Shekhar's PhD thesis. Dr Kumar also joined the Earthquake Engineering Research Institute's World Housing Encyclopedia committee. His role will be to review the reports on housing types from different parts of the world with a focus on earthquake performance.