



SDG6: CLEAN WATER AND SANITATION

ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL

The Indian Institute of Technology, Gandhinagar (IITGN) is designed as a living laboratory on sustainability, which is integrated into its master plan. The conceptual process emphasised consideration of sustainability factors, which in turn informed the development of the master plan and campus development. The institute operates and maintains buildings following a sustainable management programme and a green building rating system. IITGN is 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.

IITGN campus has been designed with key sustainability features, such as water conservation, purification and recycling, solar energy generation, comprehensive waste management, and compost production. Moreover, the campus infrastructure supports passive cooling and energy conservation in all aspects of construction, operations and management.

The IITGN community is actively engaged in promoting sustainability in all its operations. For instance, we are developing a system for real-time monitoring (day-to-day basis) of the carbon and water footprints of the campus. This initiative will have a considerable impact on reducing energy usage and making the entire campus more energy efficient.

The Master Plan emphasised sustainability in campus water management and several features that make the campus water system innovative were incorporated. Different initiatives and activities have been taken at the institute to promote water conservation, raise awareness of the community on the campus and in the neighbourhood, thus contributing to achieving Sustainable Development Goal 6.

Research

Extensive research activity is underway at the institute on a wide range of areas related to water and the institute as a body cooperates and coordinates with the local, regional and national governments on water security. The institute facilitates access to research through its library, state of the art laboratories and a conducive learning environment. The institute advocates for public policies through several research activities, thus contributing to the achievement of SDG 6. At least 10 researchers at the institute research areas related to water such as emerging contaminants, urban water crisis management, water resilience strategies in the context of climate change, sustainable management of river systems, etc. Several water-related projects were undergoing at the institute during the year 2019-20. Examples of a few such research projects along with the names of the funding agencies are as follows:

- Brine splitting for energy-efficient textile dyeing effluent reuse; Department of Science and Technology
- Developing of bio-inspired transition metal complex for efficient degradation of industrial dyes in wastewater under environment-friendly conditions; Department of Science and Technology
- Electrochemical fabrication of sub-nm pores on mica and Si-nitride sheets for desalination applications; Ministry of Human Resource Development
- Low-cost and non-electric water filter for Point-of-Use (POU) water disinfection; WIN Foundation
- Multi-effect membrane distillation for modular desalination and brine concentration; Science Engineering and Research Board
- Water for Change: Integrative and fit-for-purpose water sensitive design framework for fast-growing livable cities; Department of Science and Technology
- Weekly surveillance of wastewater for SARS-CoV-2 gene detection in Ahmedabad for pandemic curve monitoring; UNICEF



IITGN faculty and researchers have published nearly 30 articles related to water during the year 2019-20. The research publications comprise topics such as water budget, data management, river health, water quality, desalination, water distribution systems, urban water crisis, water resource management, groundwater treatment among others.

IITGN faculty and researchers have applied for the following patents that relate to water.

A Filter for Water Purification and a Process for its Manufacture:

Inventors include Chinmay Ghoroi, Deepa Dixit

The present disclosure envisages a filter for water purification and process for its manufacture. The filter is manufactured by a simple, economical process and is effective in purifying contaminated water by the removal of bacterial cells or microorganisms present therein. In one aspect, the present disclosure provides a filter for water purification. The filter is made up of etched particles, disposed within a housing, wherein the etched particles have a plurality of deformations on their outer surface. The etched particles can be in the form of pellets, granules, spherical particles, or combinations thereof. The etched solid material can be made of but is not limited to, silica glass. Other suitable materials can also be used.

A System and a Process for Wastewater Purification:

Inventors include Arnab Dutta, Chinmay Ghoroi, and Afsar Ali

The existing technologies for water purification have disadvantages such as they are unable to provide environment-friendly, user-friendly, cost-effective measures for the proper disposal of hazardous materials

from industrial wastewater and release of hazardous by-products during the purification process. The present disclosure envisages a wastewater treatment process comprising the following steps: i) treating an influent wastewater stream (106) with a transition metal complex stream (108) (MC), containing a redox-active ligand framework in a degradation unit (102); ii) adding a stoichiometric amount of Hydrogen Peroxide (H_2O_2) which activates the MC to initiate the oxidation of the organic dye chemicals to reduce the chemical oxygen demand (COD) and to some extent total dissolved solids (TDS) of the solution by 80-98 per cent and 30-50 per cent, respectively. The focus of research laboratories related to water at IITGN includes Desalination, Safe Drinking Water Production, Water Resources, Climate Change and water availability, Water Networks and Distribution among others. Details of laboratories related to water and allied areas are mentioned below.

Water and Climate Lab

The Water and Climate lab focuses on Hydrologic modelling, Remote Sensing, Climate Change, Drought, Floods, and Heat Waves Methods and techniques: Modelling, Statistical analysis, Data analysis. The current research work is on drought and water availability in India under current and future climates.

Water and Environment Technology Lab

Water Environment Technology (WET) Lab deals with hydrogeochemistry, contaminant transport and bioremediation experiments. The overarching objective of my research is to ascertain, broaden, comprehend, & develop (abcd) various dimensions of the fate, transport and remediation of geogenic, micro, microbial, and emerging contaminants.



Water Energetics Lab

The Water Energetics Lab focuses on modelling and experimental testing of energy-efficient desalination and water treatment technologies towards drinking water production and industrial effluent recycling.

Water Resources Engineering Lab

The Water Resources Engineering laboratory has the following equipment for teaching purposes: a hydraulic bench, pitot tube, Reynold's apparatus, sharp-crested weir (notch), Bernoulli's apparatus, venturimeter and orificemeter, nozzle meter, hydraulic tilting flume, basic hydrology apparatus, free and forced vortex flow apparatus. In addition to the above, a river tray having a levee breach facility, an automated hydraulic tilting flume and a piping system to study transients are being used for research purposes. A 3D velocity measurement device, Acoustic Doppler Velocimeter, is used in the flume experiments.

Machine Intelligence and Resilience Lab

The Machine Intelligence and Resilience Laboratory is an interdisciplinary lab working on the various aspects of climate change and variability, climate extremes, and resilience of built and natural systems. Key projects that are being undertaken by the lab include 1. Developing physics guided super-resolution approach and evaluation strategies for downscaling earth system model outputs 2. Physics guided data science approach for predictive understanding of hydrological processes 3. Evaluating resilience of critical infrastructures under evolving threats 4. Modelling the spread of Covid-19 in congested cities.

Earth Science Lab

The lab is equipped with basic and sophisticated research facilities /equipment to conduct elementary and advanced levels of water and soil chemistry. It aims to address the environmental maladies and provide a scientific sustainable solution to society at the grassroots level. This laboratory has several experimental setups to assist research from macromolecular level to ultra-trace level with the help of different instruments such as ion chromatography (IC), Hanna (HI7698194) multiparameter pH/EC/DO probe, etc. The lab is a true example for multidisciplinary studies, as the Masters and PhD research work is extended to different areas like nanomaterials, sustainable construction materials.

State Climate Change Centre

This project is funded by the Department of Science and Technology, Ministry of Science and Technology, Government of India and aims to build research networks and foster research activities in the areas of climate change impacts on socio-economic sectors like agriculture, health, natural ecosystem, biodiversity, coastal zones, etc. As a part of the National Mission on Strategic Knowledge for Climate Change (NMSKCC), an interdisciplinary team of researchers is working toward developing knowledge related to the expected impact of climate change in Gujarat. Detailed climate models are used to project future temperatures under various scenarios, and the corresponding impact is assessed in areas such as water, agriculture, forests and biodiversity, sea-level rise and coastal infrastructure, energy efficiency and renewable energy, urban development, and health. Across all these sectors, vulnerability assessment is also being carried out.

Dry Process Technology (DryProTech) Lab

The state-of-the-art DryProTech Lab has several sophisticated instruments such as a surface energy analyser (inverted gas chromatography), simultaneous TG-DSC from Netzsch, FT4 powder rheometer (Freeman Technology), laser diffraction particle size analyser (CILAS) for characterisation in dry and wet mode. In addition, the lab is equipped with a V-blender and cone-mill (Prism Pharma), humidity-controlled glove box and Faraday cup with electrostatic charge measurement facility, planetary ball mills, furnace chamber, tube furnaces, catalytic reactor to study the performance of catalyst powders, etc.

DSIR-IITGN-CRTDH (Common Research & Technology Development Hub, CRDTH)

The DSIR-IITGN-CRTDH is equipped with ICP Analysis Suite (Perkin Elmer), fluorescence spectrometer, multimode microplate, mass spectrometer (Spectrum Automation and Control) UV-Vis spectrometer (Analytic Jena AG), Model - MAX300- CAT (M/s Extrel CMS, LLC, USA), multi-purpose online gas chromatography, TOC analyser (Analytik Jena AG), HPTLC (CAMAG, Switzerland), basket centrifuge, and refrigerator circulator.

The *Central Instrumentation Facility (CIF)* has been established to provide sophisticated characterisation services to the researchers within and outside IITGN. It houses several high-end analytical instruments such as SEM, XRD, AFM, NMR, LC-MS, MALDI-TOF, ICP-MS & ICP-OES, Confocal Microscope and Single Crystal XRD. We have recently added new instruments such as Transmission Electron Microscope (TEM) and Multipurpose XRD with various modules like Powder analysis, Thin Film, SAXS and in-plane scattering for Material Science and Research. The CIF aims to provide a central facility consisting of the latest and advanced analytical Instruments to facilitate multidisciplinary research and to cater to the needs of academic research institutes, universities, and industries for high-end material characterisation. IITGN regularly conducts the Technical Education Quality Improvement Programme (TEQIP) training programme, where CIF facility staff and students are involved in giving short lectures towards the technical and application aspects of CIF Instrumentation. IITGN CIF is on the National I-STEM Portal to avail the usage of the facility by users around the country and internationally. CIF has been catering to the needs of industries at various levels. Many pharmaceutical industries like Sun Pharma, Piramal Pharma, Zydus Research Centre, Cadila Healthcare, Torrent Pharma, Sud-Chemie are the regular users of our facility. Nearly 30 major industries are users of the CIF IITGN. CIF has also been constantly providing services to the universities, institutes and R&D departments. The major goal has been to build an

environment that would lead to major collaborations between academic institutes.

Operations

The carrying capacity of a site can be defined in different ways and the sustainable quantity of water available is an important factor in a water-scarce area. Developing a sustainable water supply has been an important component of building the IITGN campus. An environmentally responsible water collection and distribution system has been developed, that includes piping in and using fresh water and capturing rooftop rainwater and once used, recycling all this water for irrigation purposes.

The ravine landscape of the site was integrated into the master plan through soil conservation and using the topography for water recovery and root zone treatment. A separate pipeline was installed from the Narmada Canal, to bring freshwater across the Sabarmati River. A flow meter is installed at the campus, which measures the total volume of water extracted from the Narmada canal.

The water quality parameters are checked daily by the Institute Works Department as a measure to prevent polluted water from entering the water system, including pollution caused by accidents and incidents at the university. The reuse of water across the university is measured and the institute implements water reuse. The institute provides free drinking water for students, staff and visitors; water fountains and dispensers have been installed in the academic and hostel blocks.

The housing for campus residents and hostels have the following features to minimise water use: low-flow faucet and showerheads, dual flush in toilets, waterless urinals, efficient taps. Throughout the campus water-saving aerators are used in all the washbasins, sink taps and faucets. These dispense water at a controlled rate by mixing air with the stream of water. This results in lesser water consumption compared to the taps and faucets that do not have such regulators installed.

The landscaping plan of the campus has emphasised using native species of trees and plants to minimise water usage. The institute has also established strategies to safely dispose of hazardous chemical waste on campus; and implements a programme to recycle electronic waste.

The filling of overhead water tanks is automated, with 24x7 monitoring of water levels and pumps on/ off to prevent overflow of water. All the overhead tanks are provided with float valves which shut automatically once the tank is filled to a predefined level. Any overflow (eg. due to a temporarily dysfunctional valve) is collected in Jalmandap. Surfaces such as open grid pavements and planting beds (shrubs) have been used throughout the

campus to reduce the imperviousness factor.

Various sustainable interventions at the IITGN campus are explained through placards and posters, which are installed at suitable locations on the campus, to generate a better understanding and awareness of these measures amongst community members and visitors. During ongoing construction activities, the contractors are responsible for providing clean drinking water and a minimum level of safety and sanitation facilities for all the workers.

The Masterplan specified three qualities of water to be distributed on campus:

- 1) **Fresh Water:** Water that is taken from sources such as the Narmada River, a lake, tube wells, storage reservoirs and rainwater harvesting systems. Water from sources free from pollution and toxic chemicals and treated to make it fit for human consumption is called freshwater. This water is essential for drinking, cooking, bathing, washing and ablution.
- 2) **Irrigation Water:** Water required for landscape irrigation need not be freshwater. Once used by human beings, it can be used for irrigation after treatment. In the final design of the campus water system, irrigation water is sourced from treated sewage water.
- 3) **Recycled Water for Flushing:** The Masterplan specified that the sewage treatment system for IIT Gandhinagar would be based on the following principles:
 - a) Low energy consumption
 - b) Minimum use of chemicals
 - c) Ease of operation and maintenance
 - d) Ability to withstand variations in flows (vacation-time flows are less)

Thus, a system was developed to treat domestic sewage primarily through a biological process (natural wastewater system). The campus is a zero-discharge campus and supports full harvesting-recycling-reuse of water and wastewater, which also contributes to reducing the carbon and water footprints. It treats all its sewage in an environmentally friendly sewage treatment plant that uses anaerobic reactors to digest sewage solids and a root zone treatment system, which treats the effluent to be later used for horticultural operations. The rooftop rainwater is captured in four underground Jal Mandaps of 50 lakh litres storage capacity, placed strategically across the campus. These large water storage structures also allow the campus to adapt to short-term disruptions in water supply, due to changes in rainfall and water availability.

All the rooftops, which are approximately 2,21,000 sq. m of the built-up area of Phase IA campus buildings (both housing and academic buildings) are connected to a

rooftop rainwater collection pipe network. The four current Jal Mandaps are connected to approximately 42,000 sq m of rooftop area of the buildings on campus. The rooftop network can currently collect approximately 26,075 cubic metres of rainwater in the monsoon season. Assuming an average consumption of water from the Water Treatment Plant of 640 cubic metres/day during the rainy season, there is enough rainwater to supply the campus for approximately 40 days.

In summary, freshwater is piped from the Narmada Canal directly to the Water Treatment Plant (WTP) on campus, where it is treated and then distributed to Water Service Centres (WSC) for further chlorination. It is held in these WSCs and then distributed directly to buildings on campus for drinking, cleaning, etc. Rooftop rainwater is collected and stored throughout the campus in large tanks the landscape architect designated as Jal Mandaps (water pavilions). This water is piped to the WTP where it is treated and mixed with the Narmada Canal water. Once the water is used, it is piped to the Sewage Treatment Plant (STP) where it is treated and then sent back in a separate distribution system to be used for irrigation. Surface runoff of rainwater is captured through a series of drainage pipes and sent to the seasonal ponds through intake wells. Overflow of the ponds goes to the Sabarmati River.



The water cycle at IITGN

The basic water quality parameters, including pH, turbidity, TDS and Chlorine are monitored and documented regularly by the Institute Works Department. Samples of water are collected and sent to laboratories for analysis to ensure compliance with the state and national level pollution control regulatory framework. This exercise helps in assessing and preventing any polluted water from entering the water distribution system.

The Institute Works Department carries out periodic

maintenance to prevent water loss or leakages in the water system. Performance monitoring and validation is conducted through the implementation of operation and maintenance protocol.

Education

The institute offers several graduate and undergraduate courses on sustainability and also specifically on water-related subjects. It offers sustainability-focused immersive educational courses that provide students with the knowledge and skills to contribute to the achievement of SDG 6. The institute aims to undertake curriculum development by implementing modules on sustainability in existing courses and advancing education on sustainability nationally and globally. It promotes student, academic and research exchanges on sustainability with institutions across the country and abroad. The institute conducted several workshops and short courses focused on the water during 2019-20. These were designed to provide a knowledge-sharing platform to initiate and strengthen research networking as well as explore the possibility of joint research projects and training in the area to help society with sustainable solutions. The following graduate and undergraduate courses related to water were offered in 2019-20.

CE 201 Earth Materials and Processes

CE 202: Sustainability and Environment

CE 308: Water Resource Engineering

CE 605: Remote Sensing of Land and Water Resources

CE 611: Advanced Engineering Hydrology

CE 624: River Engineering

CE 631: Irrigation Engineering and Hydraulic Structures

CE 633: Water Resource Systems: Planning and Management

EH 302: Elements of Earth System Science

EH 601: Earth Surface Processes in the Anthropocene

EH 602: River Morphology and Ecology

EH 604: Quantitative Geomorphology

EH 606: Critical Zone System Science

ES 635: Water Quality Engineering

ES 652: Introduction to Electrical Systems

ME 642: Energy-efficient design of separation processes

EH 602: River Morphology and Ecology

EH 302: Elements of Earth System Science

Details of workshops conducted at the institute that linked to water are as follows:

Workshop on ‘River styles’

Instructors: Prof Gary Brierley, University of Auckland & Prof Kirstie Fryirs, Macquarie University, Sydney

The Earth Sciences discipline of IITGN organised a short course on ‘River Styles Framework for sustainable stream management’ and a workshop on ‘Introduction to Fluvial

Geomorphology’ from 29 October to 2 November, 2019 under the MHRD-SPARC initiative. The primary instructors during the course were Professor Gary Brierley from The University of Auckland, New Zealand, and Professor Kirstie Fryirs from Macquarie University, Australia. One of the main objectives of the course was to provide the participants with hands-on experience on the River Styles tool and help them to think about river futures while considering different scenarios.

Workshop on ‘On-site microbial water quality surveying with a portable sequencing device’

Instructor: Dr Kishor Acharya, Research Associate, Newcastle University, UK

The workshop held from 9 to 12 September, 2019, discussed the comprehensive assessment of microbial water quality through portable sequencing equipment as a versatile technology. Embedding of this molecular microbiological method with other field-deployable methods for assessing water quality, including inexpensive screening methods, to derive cost-effective and reliable surveying strategies was also explored.

Following lectures and short courses related to water were organised:

- The Food-water Quality Nexus in Periurban Aquacultures Downstream of Bangkok, Thailand by Prof David Werner, Newcastle University on 17 September, 2019
- Fit-for-Purpose Driven Innovation & Engineering for Wastewater Treatment and Reuse by Dr Vijay Sai, Suez Water on 10 January, 2020
- Exploring the Potential of Iron-bearing Minerals for Sustainable Contaminant Remediation and Water Treatment Systems by Dr Anke Neumann, Newcastle University on 13 September, 2019
- Water in Earth: Storage, Origin and Role in Volcanism by Prof Jibamitra Ganguly, University of Arizona, USA on 20 November, 2019

Community outreach

The institute organised several programmes to promote engagement with industry, policymakers and grassroots organisations in the area of water, such as the Sustainability Fair, Sustainability Seminar Series, Climate Action Now (CAN) workshop series, and CSD-WIN Foundation Roundtable. A broad range of stakeholders including professionals in the industry, NGOs, academicians and public officials, in addition to IITGN faculty and students, participated in the various events. The programmes facilitate networking among researchers and professionals engaged in the sphere of water and sanitation. The institute also organises activities and takes initiatives to promote water conservation, raise awareness on conscious water usage among the community members



on the campus and in the neighbourhood.

1. *WIN-CSD-ACT Roundtable 2019*

The roundtable held on 9 July, 2019 discussed the vision and activities of KPCSD and ACT (Arid Communities and Technologies), an NGO working in water conservation in Kutch, Gujarat, which was designed to identify areas of potential collaboration. The major points of discussion at the roundtable were as follows: 1. Desalination for coastal areas using technology with very low power consumption. 2. For places with TDS in ranges like 3000 to 5000, IITGN will explore the potential of electrolytic technology developed by CSMCRI, Bhavnagar. 3. Intelligent crop watering system with precise control based on crop, soil condition, rainfall, etc. 4. Technical training inputs for Bhujal Jankar to make them more capable. 5. Setting up an Aquifer Research Unit in Kutch to serve as a field research centre with strong data gathering and analytical capabilities. 6. Engagement of humanities faculty in various empowerment action plans. 7. The data collected by Bhujal Jankar and the lab now generate substantial data. This, together with the hydrogeological data can provide a good dynamic data set for data analytics applications, which can add substantial value for local agriculture and other water-related issues.

2. *Sustainability Seminar Series*

Exploring the Potential of Iron-bearing Minerals for Sustainable Contaminant Remediation and Water Treatment Systems

Facilitator: Dr Anke Neumann, School of Engineering, Newcastle University, UK | Seminar held on 13

September, 2019

The presentation reviewed the applicability of low cost, Fe-(II)-bearing clay minerals to design sustainable advanced oxidation processes for (waste) water treatment and contaminant remediation through selected recent and current studies. Dr Anke Neumann is an environmental chemist with a focus on redox processes at the mineral-water interface and how these processes affect the fate of organic and inorganic compounds in the environment. Working at the intersection of environmental engineering, mineralogy and biogeochemistry, she explores emerging and transdisciplinary questions related to water sustainability.

3. *CSD-WIN Foundation Roundtable*

The objective of the CSD-WIN Foundation Roundtable held on 10 January, 2020 was to bring together WIN and KPCSD-IITGN partners and other organisations/experts in (i) Water and Sanitation (WATSAN) and (ii) Maternal and Child Health (MCH), for a roundtable discussion. Prof Jaichander Swaminathan, Kanchan and Harilal Doshi Chair and Co-Coordinator at KPCSD, served as moderator for the roundtable session on Water and Sanitation. Nearly 70 participants participated in the roundtable to drive social change in the two focused domains. Projects/products and other initiatives with common objectives to drive community change were presented. The discussion highlighted the major challenges in WATSAN & MCH toward achieving SDG 2 (zero hunger), SDG 3 (good health and well-being) and SDG 6 (clean water and sanitation). Implementation, sustainability and

scalability of the projects after the completion of the project period were explored. The discussions also explored ways to take research projects to market/ implementation level through startups or technology transfer programmes. Products and solutions by startups to create a social impact amongst target markets/ communities and significant initiatives by others in these domains were introduced. The roundtable concluded with recommendations for:

- Creating a supportive ecosystem and partnerships by improving focus on information flow regarding technology and technology solutions through established media among diverse stakeholders for knowledge sharing.
- Establishing an intermediary organisation to facilitate communication with government services and ordinary citizens to solicit advocacy in research to implement pilot scale setups on the field.

4. Sustainability Fair 2020

Dr Kiran C Patel Centre for Sustainable Development at IITGN hosted its second annual Sustainability Fair on 28 February, 2020, attended by 150 participants. The Sustainability Fair is aimed at fostering collaborations between IITGN faculty and organisations and industries in the area of sustainable development. The Fair serves as a platform for government bodies, NGOs, and other organisations working in the area of sustainable development to share ideas and practices on water, pollution & waste management, energy, climate change, wildlife & ecosystems. Nearly 30 exhibitors, including

government agencies, NGOs, welfare organisations, and industry leaders showcased a wide range of sustainable development practices, projects, products and services. Some of the prominent exhibitors included Climate Change Department, Government of Gujarat; Centre for Environment Education; Foundation for Ecological Security; GEER Foundation; Geological Survey of India; Arvind Envisol Ltd; Gujarat Biotechnology Research Centre; International Water Association; Savy Electric Vehicles Private Limited; Sundarvan Nature Discovery Centre; UNICEF; Wildlife Trust of India; among others. Vhali, a life-sized model of the whale shark was also on display at the exhibition by the Wildlife Trust of India to spread awareness about whale sharks and their conservation. The event featured three keynote speakers: Kartikeya Sarabhai, Founder and Director, Centre for Environment Education; Dr Ratan Chand Jain, Ex-Chairman, Central Groundwater Board; and Sarbjit Singh Sahota, Emergency Specialist, Disaster Risk Reduction Section, UNICEF India. The Sustainability Fair concluded with a networking session to explore knowledge sharing and academia-Industry partnerships around a wide range of sustainable development themes including water. Students, faculty, research scholars, representatives of government, advocacy agencies and industries attended the event.

5. CAN2020

IITGN collaborated with the Gujarat Ecological and Education Research (GEER) Foundation on a Mega Workshop Series CAN 2020, Climate Action Now, A



Gujarat State Initiative. The workshop series was structured around three themes: Climate Change Policy and Governance, Climate Action and Industry, and Climate Change Science and Research. Each segment comprised three workshops, a total of 9 workshops under the CAN 2020 workshop series, held over three months. The workshops covered seminal issues of energy, water, health, ecosystem and biodiversity, agriculture & food security, climate science, climate technology and solutions, climate policy, the economics of climate change, climate disaster, vulnerable communities, socio-cultural issues of climate change and other allied subjects, focusing on the state (Gujarat) and national level priorities.

The first segment of Climate Action Now (CAN) 2020 Workshop Series was held from 11 to 28 February, 2020 on “Climate Change Policy and Governance”. This workshop series included talks on different sectors that are directly linked to climate change, including climate policy, environment, water, agriculture, power, energy, sustainable urban and rural development, industry and mining, climate risks and vulnerability, sustainable transport, forests, biodiversity and wildlife and climate finance and economics. 12 theme-based technical sessions included talks by 44 expert speakers who were invited from different parts of the country. The speakers represented organisations ranging from the Forest Survey of India, Indian Council of Forestry Research and Education, Ministry of Environment, Forest and Climate Change, Bankers Institute of Rural Development, Small Industries Development Bank of India, The Energy and Resources Institute, Centre for Environmental Planning and Technology, Indian Institute of Management, Gujarat International Finance Tec-City, Gujarat Mineral Development Corporation, Gujarat Institute of Disaster Management, Deendayal Port Trust, Sardar Patel Renewable Energy Research Institute, Gujarat Energy Development Agency, etc. More than 300 people participated in CAN 2020 and shared thoughts, experiences and knowledge. The workshop facilitated networking amongst participating individuals and organisations.

Community outreach

IITGN constituted a dedicated Green Office, which has a pivotal role in monitoring and implementing various efforts related to the green campus. The Green Office comprises a team of faculty, staff and students who work for creating better awareness and implement various activities that contribute to eco-friendly and sustainable practices on the campus and neighbourhood villages. It is

one of the major bodies participating in sustainability efforts actively promoting awareness among the campus residents and in the wider community; focusing more particularly on waste management, compost production, and awareness programmes (on campus as well as in neighbouring villages). It aids in steering sustainable development practices, inculcating behavioural changes and contributing to increased awareness amongst the community members of IITGN and nearby villages. The Kiran C Patel Centre for Sustainable Development (KPCSD), established in 2019, addresses major sustainability challenges and promotes collaboration among faculty and students on developing practical solutions through integration of advanced research, traditional knowledge and field understanding. Its principal focus areas are water, pollution and waste management, energy, climate change and natural resources, wildlife and ecosystems. It aims towards developing a strong outreach programme of training, education, awareness and community engagement on sustainable development and promoting networking and collaboration among scholars, policymakers, industry, non-profit organisations and other stakeholders. The Centre conducts an annual Sustainability Fair and a regular Sustainability Seminar Series to encourage active collaboration and networking amongst a broad range of stakeholders.

KPCSD has established several fellowships, grants and awards over the past year to support research, projects and thesis work aligned with the major objectives of the Centre. The Centre also launched several initiatives to promote impactful work on Covid-19 research projects and publications with the aim:

1. To enable the implementation/ testing/ validation of laboratory research in the field (to help alleviate the last-mile problem)
2. To strengthen and complement sustainability-related research and development activities already being undertaken by various IITGN faculty and students
3. To positively impact the campus and immediate neighbourhood and community in sustainable living and development

Examples of some of the major initiatives by the Centre include financial support for sustainability-related projects/ theses, IITGN-CSD Young Alumni Fellowship, Student Sustainability Grant and KPCSD Covid-19 Research Award.

The Green Office and KPCSD play a vital role in promoting policies and practices and supporting research related to sustainability. The Green Office majorly plays a key role in promoting sustainability in campus operations. The Kiran C Patel Centre for Sustainable Development is an umbrella for academic programmes and research in the areas of sustainability and climate change.

The institute implements projects and carries out responsibilities as the Regional Coordinating Institute of the flagship programme of the Ministry of Education, Government of India, 'Unnat Bharat Abhiyan' which focuses on village development including economic development, infrastructure development and other aspects of human development i.e., education, health, drinking water supply, etc.

