Implementation of Environment Friendly Strategies for Energy Conservation and Mitigation of Climate Change – A Holistic Approach in Mangalagangotri Campus

Prof. P. Subrahmanya Yadapadithaya[1],
Dr. Prashantha Naik[2], Prof. Kishori Nayak K.[3*]
Mangalore University, Mangalagangotri, Karnataka, India.

Introduction:

- **Conservation of nature with a focus on saving energy and mitigation of climate change is the need of the hour.**

- **For the last few decades, United Nations - Environment Program (UN-EP) has been encouraging a multi-dimensional approach towards mitigation of climate change by promoting climate-resilient and low emissions strategies (UNO, 2020).**

- **As a popular proverb, '*Little drops of water make a mighty ocean*', goes, decentralized and individual-level efforts contribute a lot to mitigate climate change, on a global scale.**

- **In this context, Mangalore University on its Mangalagangotri Campus, for the last five years has been trying its best to implement various environment-friendly strategies.**

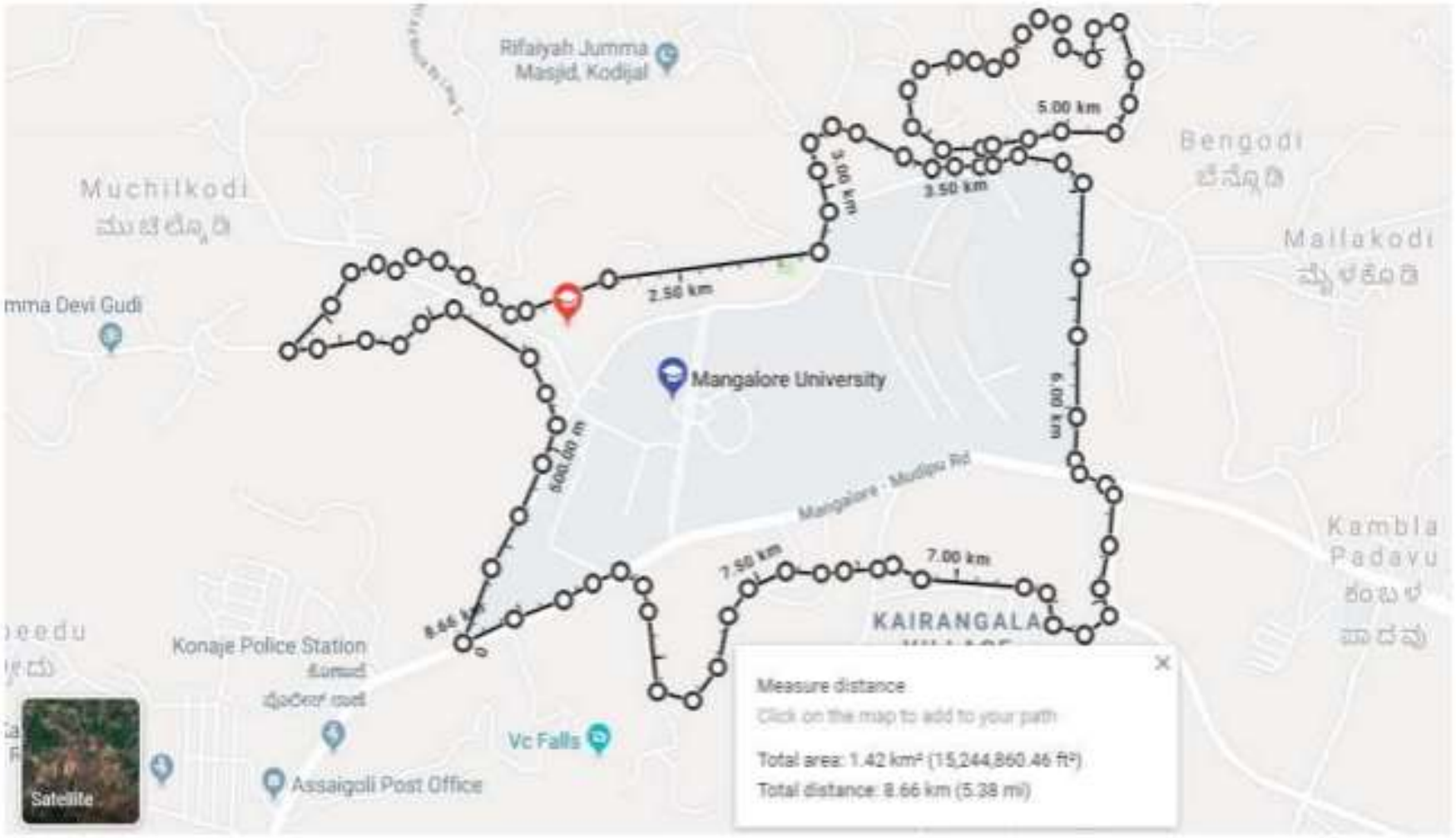
- **In this context, Mangalore University on its headquarters Mangalagangotri campus, adopted and implemented many eco-friendly activities, technologies, and policies for sustainable development.**

The University campus at Mangalagangotri is located at a distance of about 20 Km to the southeast of the historic coastal town of Mangalore and is spread over an area of 353 acres, with state-of-the-art buildings. Overlooking the confluence of the river Nethravathi with the Arabian Sea on the one side and the cloud-capped Western Ghats on the other, the impressive architecture of the various buildings matched with the green cover creates an amazing physical platform of the magnificent academic environment.

Currently, a total of 2,812 students and 812 employees, including teaching and non-teaching staff, are on the campus. All our staff and students have joined hands to develop an eco-friendly sustainable campus.

The COVID-19 pandemic has affected many of our regular activities, including conducting various events. However, the University has maintained its vibrancy by keeping pace with various activities, setting up infrastructure to enhance the sustainable campus, organization of environment-related events, deciphering knowledge through awareness programs, and publishing popular articles.

All these activities were performed by strictly following COVID-19 safety guidelines of the Government of India, Govt of Karnataka, and the World Health Organization.



Total Campus area

Total area: 1.42 km² (0.53 mi²) = 1428540 m²

Total distance/circumference: 8.66 km (5.38 mi) = 8660 m

The ratio of open space to total area = 96.19 %

Total Area on the Campus Covered in Forest Vegetation 4,63,192.05 m^2

Total Distance: 14.76 km

An aerial view of Mangalagangotri campus:

https://mangaloreuniversity.ac.in/aerial-view-and-photography-mangalore-university-0

Gardening in the available space not only enhances the beauty of the campus but also provides a good academic ambience for students and teachers

Total area on the campus covered with planted vegetation : 4,39,669.9 m^2

Total area on the campus for water absorption besides the forest and plantation : 4,65,547.99 m^2

Usage of Energy Efficient Appliances

Appliance	Total Number	Total number energy Efficient appliances	Percentage
LED Lamp	9,093	3,530	38.82%
Fan	3,056	330	10.80%
AC with inverter technology	298	141	47.63%
Refrigerator	83	52	62.65%
		Average Percentage	**39.97%**

No.	Name	Place	automation		safety				energy		water		Indoor environment				lighting				Building Area (m^2)
			B1	B2	S1	S2	S3	S4	E1	E2	A1	A2	I1	I2	I3	I4	L1	L2	L3	L4	
1	Science Block	Mangalore, India	x	x		x	x			x		x					x			x	8,591.07
2	Management Block	Mangalore, India		x		x	x			x							x			x	6,515.87
3	Humanities Block	Mangalore, India		x		x	x			x										x	5,117.00
4	Kannada Block	Mangalore, India		x		x	x			x							x			x	2,263.26
5	Botany Block	Mangalore, India		x		x	x			x							x			x	2,287.38
6	Electronics Block	Mangalore, India		x		x	x			x							x			x	1,295.35
7	Bio-Science Block	Mangalore, India		x		x	x			x							x			x	4,754.68
8	Class Room Complex	Mangalore, India		x		x	x			x										x	3,120.00
9	Physical Education Block	Mangalore, India		x		x	x			x							x			x	1,221.67
10	Administrative Block	Mangalore, India		x		x	x			x		x					x			x	4,604.27
11	Library Block	Mangalore, India		x		x	x			x		x					x			x	5,784.72
12	Hostel Block	Mangalore, India				x	x			x		x					x			x	9,852.88
13	Auditorium Block	Mangalore, India				x	x			x		x					x				3,431.06
14	Guest House Block	Mangalore, India				x	x			x							x			x	3,545.1
15	Indoor Block	Mangalore, India				x	x			x			x				x				1,651.69
	Total																				64,036 m^2

Smart Building Implementation

$$\frac{Total\ smart\ building\ area}{total\ building\ area} \times 100\%$$

$$\frac{64,036\ m^2}{1,14,305.35\ m^2} \times 100\% = 56.02\%$$

Harnessing of Renewable Energy on the Campus

Solar Panel System

The university has a solar energy source generating 361290 kWh of power every year.

Solar lights:

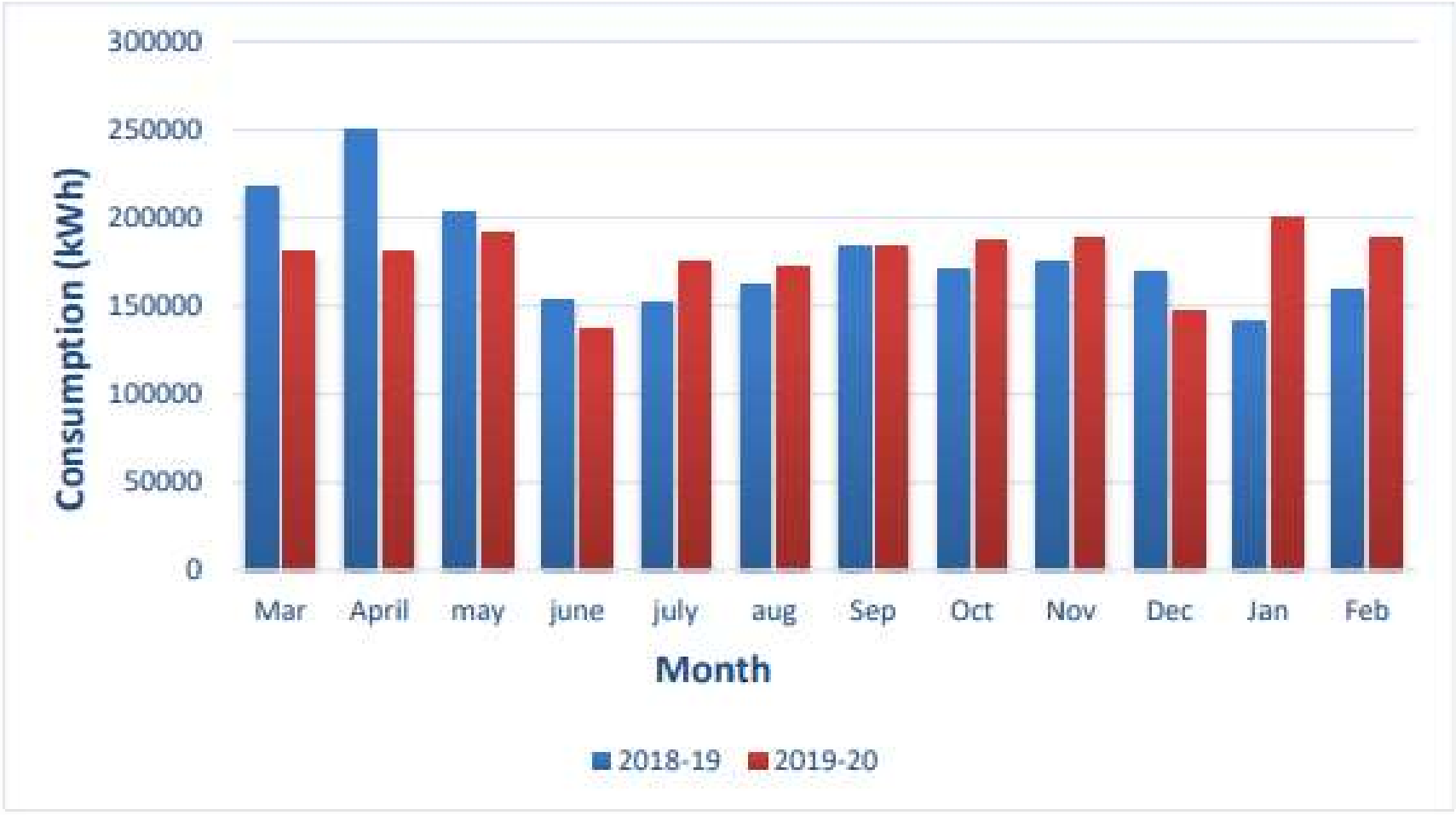
There are 210 numbers of 24 watt solar street lights, 222 numbers of solar corridor lights and 100 nos. of 20 watt designer street lights that save electricity 60.48 kWh, 13.32 kWh and 24 kWh, respectively per year.

A biogas plant in the hostel generates a power of 12778 kW per year.

Organic Waste Management

Vermicomposting:

- **A part of the kitchen wastes generated from working women's hostel, men's hostel, and canteen are recycled through vermicomposting to produce organic manure.**
- **The manure is used for gardening on the campus.**



Electricity Consumption (kWh)

Elements of Green Building Implementation






- All the buildings are constructed in such a way that there is scope for natural ventilation and illumination.
- Classrooms/laboratories are painted with white color to increase the illumination.
- The campus is already covered to the extent of about 50% by vegetation and a regular tree planting program is one of the best practices of the University.

CO_2 (electricity)

$$= \frac{2133152\ (kWh)}{1000} \times 0.84 \qquad = 1791.84 \text{ metric tons}$$

CO_2 (bus)

$$= \frac{2 \times 2 \times 2 \times 220}{100} \times 0.01 \qquad = 0.176 \text{ metric tons}$$

CO_2 (cars)

$$= \frac{80 \times 2 \times 2 \times 220}{100} \times 0.02 \qquad = 14.08 \text{ metric tons}$$

CO_2 (motorcycle)

$$= \frac{180 \times 2 \times 2 \times 220}{100} \times 0.01 \qquad = 15.84 \text{ metric tons}$$

CO_2 (total)

$$= 1791.84 + 0.176 + 14.08 + 15.84$$
$$= 1821.93 \text{ metric tons}$$

Carbon footprint in 2019-20 = 1821.93 metric tons

The Total Carbon Footprint on the Campus

- **For the last 5 years, the carbon footprint has been significantly reduced by adopting and implementing eco-friendly practices and technologies.**

Setting up of Infrastructure for Water Conservation

- Two check dams; one is in progress.
- A reservoir with a capacity of 2000 liters to store the rainwater.
- Water storage tanks.
- The gardens/lawns are being maintained by drip irrigation and water saving sprinkler system.
- A provision has been made to store the harvested rainwater in purpose-built underground tanks.
- Domestic wastewater is stored in infiltration ponds to increase the rate of water percolation.
- Two vented dams, bore wells have been constructed.

Water Efficient Appliances Usage






Appliance	Total Number	Total number water Efficient appliances	Percentage
Toilet	840	210	25%
Wastafel	662	350	52.87%
Drip Irrigation/Sprinkler	140	140	100%
Urinals with flush	120	85	70.83%
Low flow taps	840	840	100%
		Average Percentage	**69.74%**

Water Recycling Program Implementation

- Treated water is used for watering lawns, indoor and outdoor gardens, hand washing taps, and toilet flush.
- It is also being used for bath and toilets in all the hostels.

Transportation

Total number of vehicles (cars and motorcycles) divided by total campus population

$$= \frac{260}{5444} = 0.047$$

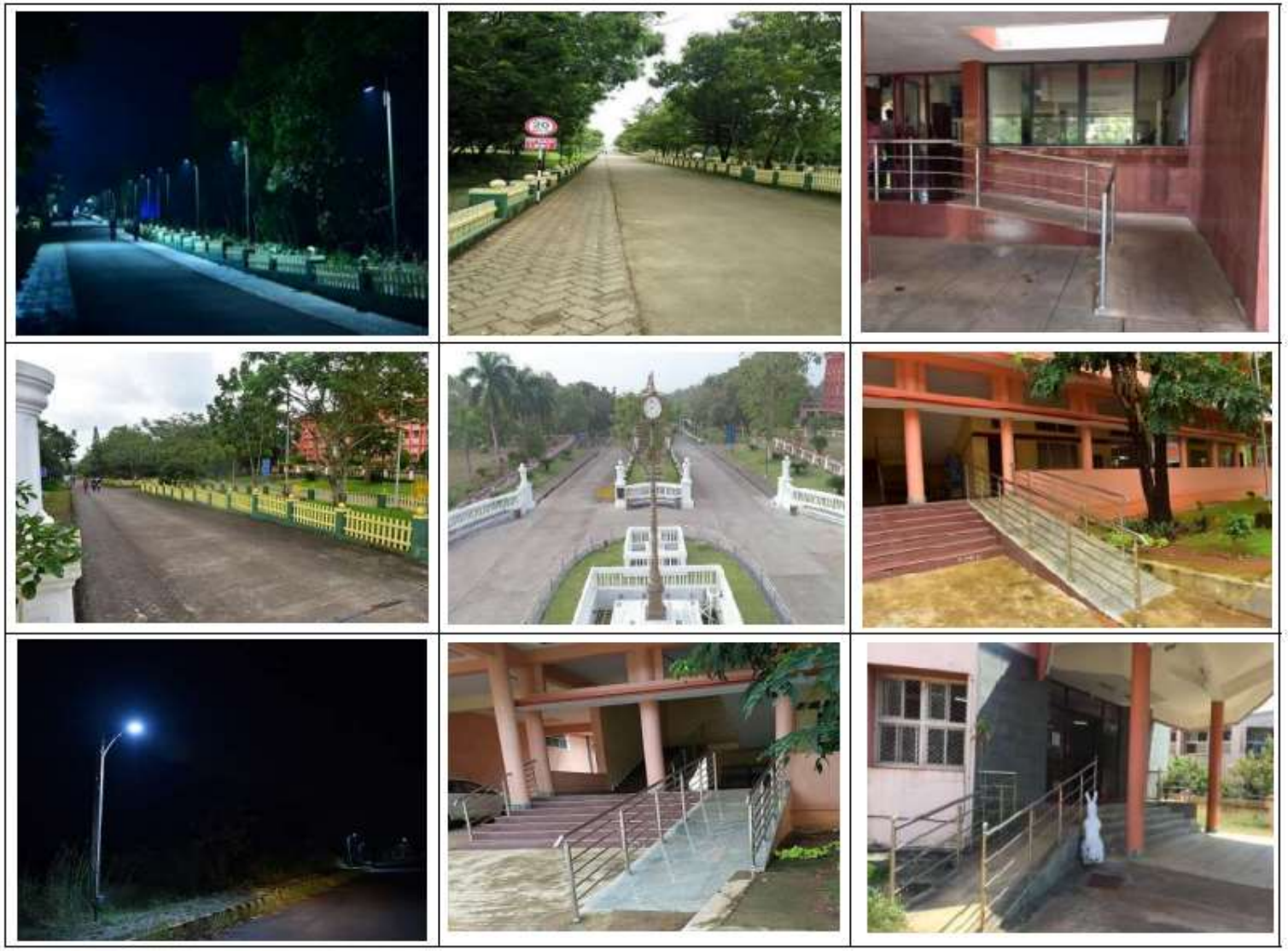
- **The University bus service at fixed timing help the mobility of the students with in the campus**

Zero Emission Vehicles Policy on the Campus

Battery operated vehicles and bicycles are encouraged

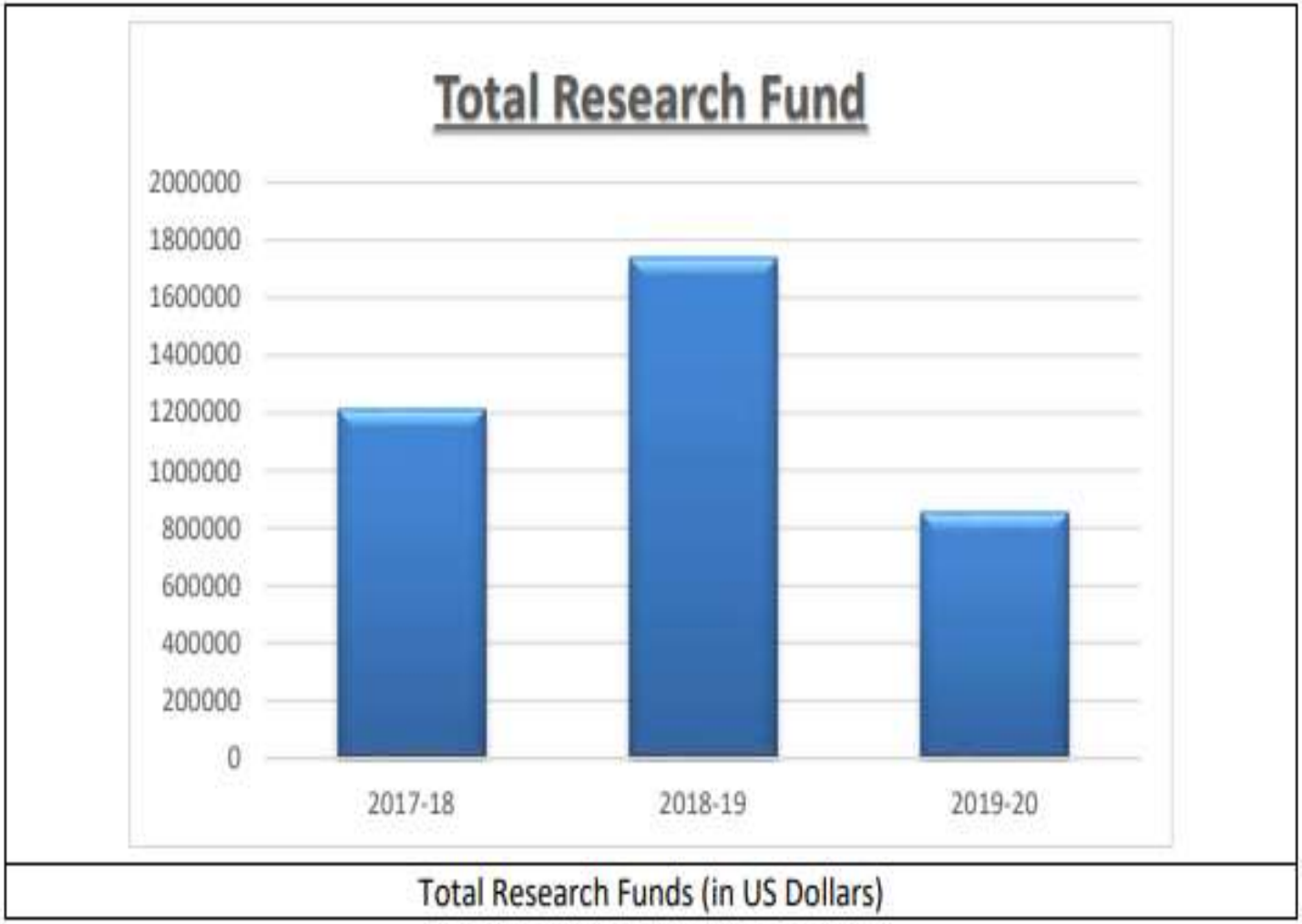
Program to limit or decrease the parking area on campus

Pedestrian Path Policy on Campus



- Separators on roads between vehicle lane and pedestrians paths.
- Ramps and guiding blocks which have suitable design for pedestrian having physical disabilities.
- Street lamp for pedestrians at night.

Funds Dedicated to Sustainability Research



Research fund received in:

- **2017-18 = 1,213,190 USD**
- **2018-19 = 1,735,868 USD**
- **2019-20 = 852,549 USD**

Organization of environment and sustainability events:

2017-18: 54
2018-19: 67
2019-20: 66
2020-21: 23*

A total average per annum over the last 3 years of 62 events

** **Due to COVID-19 pandemic, the number of events got reduced.***

Programmes Related to Sustainability

Environment Sustainable Activities During the COVID-19 Pandemic

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DEPARTMENT OF GEOGRAPHY

All are cordially Invited

National Webinar on

Climate change, Agriculture and Disaster Management – Geospatial Remedy

On 25th and 26th February 2021

Day 1
25th February 2021

10:00 AM

Inauguration

Chief Patron

Prof. P. Subrahmanya Yadapadithaya
Hon'ble Vice Chancellor
Mangalore University.

Day 2
26th February 2021

10:00 AM

Special Lecture

Dr. Sreekumar Chattopadhyay
Retd. Scientist G and Head,
Resources Analysis Division CESS,
Thiruvananthpuram.

VALEDICTORY PROGRAMME

Convener
Dr. Dasharatha P. Angadi
Co-Ordinator
Department of Geography
Mangalore University.

Patron
Sri. K. Raju Mogaveera K. A. S
Registrar
Mangalore University.

Day 1 Webex link

https://mangaloreuniversity.webex.com/mangaloreuniversity/j.php?MTID=mda4ed23817da2ebd958e9fdb94f0a257

Day 2 Webex link

https://mangaloreuniversity.webex.com/mangaloreuniversity/j.php?MTID=m88fb717b460f6c19508252d59a555a76

Workshop on Pot-composting

World Water Day Celebration

Govt. Dakshina Kannada Zilla Panchayath High School, Pavur : 22nd March 2021.

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Under UGC- SAP Level II Programme

TWO DAYS NATIONAL WEBINAR

ON

ANIMAL DIVERSITY AND CONSERVATION

CELEBRATION OF NATIONAL WILDLIFE WEEK - 2020




https://bit.ly/34jqjZ7

Day 1 - https://youtu.be/gkVrEBp0Y3M

Day 2 - https://youtu.be/CaJqOLq_yeA

Date: 7-8, October 2020

All are Cordially Invited

Mr. Narasimhaiah. N
Assist. Professor & Webinar Convener

Prof. Bhasker Shenoy
Co-ordinator UGC-SAP Level II

Prof. Sreepada. K. S
Chairman

Shri. K.Raju Mogaveera, K.A.S
Registrar

Webinar on 'Sustainable Engineering'

in association with

Bamboo Society of India

3rd Aug. 2021

Celebration of World Environment Day: 2021

Gmail Prashantha Naik <pn.bioscience.research@gmail.com>

Welcome to #GenerationRestoration!
3 messages

World Environment Day <worldenvironmentday@un.org> 3 June 2021 at 23:52
Reply-To: World Environment Day <worldenvironmentday@un.org>
To: pn.bioscience.research@gmail.com

REIMAGINE RECREATE RESTORE
#GenerationRestoration

WORLD ENVIRONMENT DAY

WEEKLY UPDATE

YOUR EVENT HAS BEEN REGISTERED!

World Environment Day thanks you for registering your event and becoming part of #GenerationRestoration.

Don't forget to share photos and screenshots of your event and use #GenerationRestoration and #WorldEnvironmentDay. We will be sharing the best of them on our social pages!

If you arrived here after completing LEVEL 2 through the WED #GenerationRestoration experience, congratulations, you are in the big league!

Are you ready to PLAY LEVEL 3?

Do you have a restoration initiative you are working on? Follow the link and enter your details here to complete LEVEL 3.

- **Registered in UNO for a mission to restore 1 billion hectares of the Earth to ecologically fertile ecosystems in 10 years.**
- **Accordingly, we continued with plantation drives with the involvement of students, faculty, and non-teaching staff.**
- **In 2020-21, over 1000 saplings were planted.**

Sustainability Report

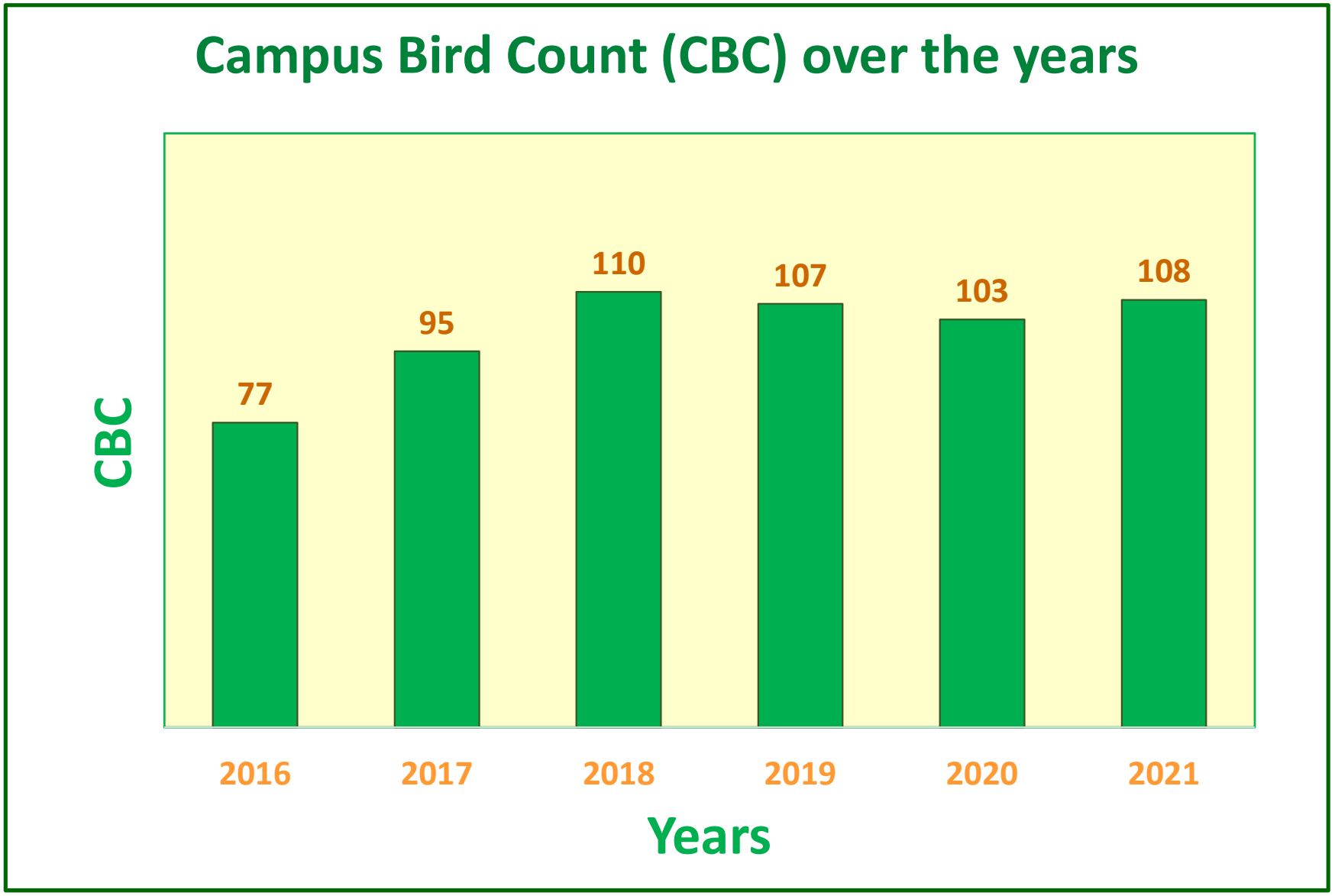
Reports on Biodiversity: https://mangaloreuniversity.ac.in/sites/default/files/BioDiversity%20Complete.pd

Campus Bird Count:2021

- **The University has been participating in the Campus bird count (CBC) a sub-event of 'Great Backyard Bird Count' (GBBC) organized by Bird Count India, for the past 6 years.**

- **Sighted 108 species of birds from various locations across the campus spread on 353 acres, in 2021.**

- **Some of the birds recorded include, Black Drongo, Black Kite, Brahminy Kite, Common Iora, Green Wabler, Purple-rumped Sunbird, Red-whiskered Bulbul, White-cheeked Barbet, Jungle Babbler and Plum headed parakeets.**


Campus Bird Count (CBC) over the years
CBC
77
95
110
107
103
108
2016
2017
2018
2019
2020
2021
Years

Inauguration of Wall of Kindness
‘ Vatsalaya Nidhi ’

MANGALORE UNIVERSITY

MANGALAGANGOTHRI – 574 199

Opening Ceremony of New Welfare Schemes

‘VATSALYANIDHI’ (Wall of Kindness)
Inauguration by: Sri U. T. Khader
MLA, Mangalore Constituency

PUBLIC TOILET (Bank of Baroda under C.S.R Fund)
Inauguration by: Sri Sunil K. Pai
Regional Manager, Bank of Baroda, M’lore City Region, Mangalore

MID-DAY-MEAL SCHEME
(For Poor Students of the Campus)

NATIONAL SERVICE SCHEME
(2021-22 NSS Unit of Mangalagangothri)

Inauguration by: Sri D. Vedavyasa Kamath, MLA, Mangalore City South Constituency

Presided by: Prof. P. Subrahmanya Yadapadithaya, Hon’ble Vice Chancellor, Mangalore University

Guests of Honour: Sri Laxmikanth Nayak, Senior Manager, Bank of Baroda, Konaje
Dr. Sushmitha Rao K., Administrative Officer, Konaje Grama Panchayath
Smt. Savitha, Panchayath Development Officer, Konaje Grama Panchaya

Date: 6 February 2021 Time: 3:00 PM; Venue: Mangalore University Indoor Sports Complex, Mangalagangothri

All are Cordially Invited

Prof. Prashantha Naik
Convenor

Prof. B.K. Sarojini
Committee Chairperson

Dr. Govindaraju B.M.
NSS Coordinator

Sri Umesh Bhat Y.
Executive Engineer

Sri K. Raju Mogaveera, K.A.S.
Registrar

Azaadi Ka Amrith Mahotsav

75th Independence Day Celebration by

Plantation of Fruit Yielding Plants - a Tribute to Freedom Fighters

Summary and Conclusion:

- **Infrastructure was set up to harness a renewable source energy by installing solar power panels of the electricity generation, 361290 kWh; replacement of incandescent light bulbs with LED bulbs with an energy saving of around 62% and procurement of most energy-efficient electronic & electrical appliances (47%).**

- **Many strategies have been implemented to reduce the carbon footprint (CO_2 emission for the last 12 months was 1821 metric tons; the total carbon footprint divided by total campus population is currently in the range of 0.42 - 0.10 metric tons).**

- **These strategies include effective implementation of eGovernance by adopting eOffice of Govt of Karnataka, and campus management system, social media, and email-based official communications that significantly reduced the usage of papers (>70%); a complete ban on single-use plastics; recycling of organic wastes through vermicomposting, pot-composting, biogas production; encouraging electric vehicles.**

- **Altogether these have significantly reduced the release of greenhouse gases in and around the campus in our efforts to join with global efforts to drop carbon footprint below 2 tons by 2050.**

- **The rainwater harvesting through rooftop catchments and check-dams contributed to ≈ 50% water conservation on the campus.**

- **The campus is comprised of 32.4% of its total area with natural vegetation (463192m^2) and currently with 30.8% planted vegetation (439670 m^2) of the total area (1428540 m^2).**

- **The campus biodiversity has been further enriched by periodical tree plantation drives with special reference to the planting of fruit-yielding saplings.**

- **It has not only helped to enhance the green ambience with the continuous release of fresh oxygen but also helped in increasing the biodiversity with special reference to birds, including migratory ones as witnessed by regular conduct of the campus bird count.**

- **'One-Student-One-Plant' a new initiative of our University was effective in making our students more sensitized about nature. Through this initiative, every student is shouldered with the responsibility of taking care of a minimum of one sapling on the campus during the period of their stay on the campus from day one to completion of their studies; they have been motivated for this by awarding an appreciation certificate.**
- **Registered in UNO for a mission to restore 1 billion hectares of the Earth to ecologically fertile ecosystems in 10 years, and continued with plantation drives with the involvement of students, faculty, and non-teaching staff. In 2020-21, over 1000 saplings were planted and our effort is continued.**
- **As an Institutional Social Responsibility (ISR), the university has been making efforts to disseminate the knowledge of eco-friendly practices, by conducting public awareness programs (street play, processions, book publications, handbill distribution, etc.), workshops, training, seminars, and conferences.**
- **Organized a special plantation drive as a part of the Independence Day celebration on August 15th, 2021 by planting edible fruit-yielding trees. The planted saplings were tagged with a label composed of names of freedom fighters and information such as taxonomic names, common names, and economic importance of the plant in quick response (QR) code.**

- **Smart buildings with special reference to energy and resource savings in terms of ventilation, lighting, greenery, sensor, rooftop rainwater catchment, and energy-efficient appliances. have been successfully implemented, for existing and newly constructed ones.**

- ***Vatsalaya Nidhi'*** **- Wall of Kindness is not only helping the general public but also contributed to nature conservation in terms of Freecycle, thereby, 4 R's (reduce, reuse, recycle and recover) of waste management are effectively practiced on the campus.**

- **Overall, our holistic approaches of various eco-friendly strategies, in terms of the utility of advanced technologies, eGovernance, solar energy, rainwater harvesting, organic wastes management, recycling of solid wastes, and many others, have been implemented for the last 5 years significantly helped in saving energy and reduction in the emission of greenhouse gases.**

- **Our enthusiasm to contribute to the mitigation of climate change by the implementation of eco-friendly strategies and programs on the campus will continue with still more collective efforts.**

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