

GREEN AUDIT REPORT

(2017-2022)



KAKATIYA UNIVERSITY
Warangal

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Name of the Institution	: Kakatiya University, Vidyaranyapuri, Warangal, Telangana-506 009, India
Nature of the activities in the Institution	: Education, Research and Extension Activities
Initiatives taken by University	: (i) Water Harvesting (ii) Solar Energy Trapping (iii) Green Credits (iv) Biomass Carbon Estimation (v) Miyawaki method of afforestation
Year of Establishment	: 1976 (19 th August, Formation Day)
Year of last Green Audit	: 2016-2017

Amenities and Infrastructure of the University

The institution began as Post Graduate Centre in Osmania University in 1968 at Warangal with four departments such as Chemistry, English, Mathematics, and Telugu. The departments of Botany, Commerce, Physics, Public Administration, and Zoology were added later. The Department of Economics and B. Pharmacy were started in 1974. This Centre was accorded autonomy in Administrative and Academic affairs by Osmania University, Hyderabad on April 30, 1976. Eventually, the PG Centre was upgraded into Kakatiya University on August 19, 1976. The main campus spreads over 650 acres, is named Vidyaranyapuri, and is located in Hanamkonda on the Hanamkonda-Karimnagar National Highway (NH 563). The university has a satellite campus of 30.25 acres at Subedari, Hanamkonda, where four constituent colleges are now located. The jurisdiction of Kakatiya University extends to the erstwhile districts of Adilabad, Khammam, and Warangal.

The University offers a total of 95 programmes through its 28 departments which include 39 PG, One PG Diploma programmes, Two 5-Year integrated courses, 10 M.Phil., and Ph.D. programme in 33 subjects. 25 programmes are offered by the SDLCE.

(i) Water Harvesting

Rainwater is the primary resource and its judicious use and conservation are vital for university greenery and carbon stocks. Kakatiya University has visualized and scientifically planned for building up the water resource in its Building Division under the Development Officer. In recent years, its Engineering Department, with the able guidance of the Department of Geology, went for the construction of 9 check dams and one farm pond and dug 69 rooftop rainwater harvesting pits, 100 contour trenches, and built one Gabion. As a result, there was no scarcity of water during the summer as the groundwater level improved.

(ii) Solar Energy Trapping System

Solar energy tapping is one wiser way of reducing the consumption of coal and resources and indirectly helping the carbon and green credits measurements. Kakatiya University has a huge solar panel built as the roof of the Administrative building for power needs. It has to lead to the lesser or no use of diesel generators.

(iii) Green and Carbon Credits

The phenomenal build-up of carbon dioxide around the globe in the atmosphere due to anthropogenic activities has to lead to the present global warming and melting of ice issues. Consequently, under the Kyoto Protocol, reducing carbon emissions into the atmosphere is the goal of global nations, including India. It is to mitigate the adverse effects of global climate change. In this regard, the concepts of carbon and green credits are developed as a measure of the audit. A carbon credit is a generic term for any tradable certificate or permits representing the right to emit one tonne of carbon dioxide or the mass of another greenhouse gas with a carbon dioxide equivalent (tCO₂e) equivalent to one tonne of carbon dioxide (Climate Change Glossary) for carbon reduction schemes between trading partners and around the world. This provides a framework for rewarding people, institutions, or companies who plant trees or otherwise meet standards exclusively recognized as "green". Addressing the G-20 nations in Turkey (2017), Prime Minister Sri Narendra Modi wanted a shift from carbon credits towards 'green credits', which involves more of indirect methods of reducing the use of nonrenewable fossil fuels by discouraging through heavy taxation on the one hand and going for renewable solar or wind energy on the other.

The Kakatiya University has made its since efforts to make the campus green right from its inception by growing more of trees as carbon stalk. The campus is located in Vidyananyapuri, Hanamkonda, which lies between 18⁰ 01 '1 5" to 18⁰ 02'09" N latitudes and 79⁰32'34" to 79⁰33'47" E longitudes. It is bounded on the north by Palivelpula, east by Pegadapalli and Mucherla road, south by NH-163 (Premnagar colony), and west by Karimnagar road (Bheemaram). It spreads over an area of 263 ha. In its layout, there is the main road transecting the campus connecting Mulugu bypass road (Gate I) and Karimnagar highway (Gate II) with several internal approach roads connecting the departments on the campus (Figure I B).

Nursing the existing greenery, developing and maintaining the landscaping and individual gardens around the administrative building, and almost all the departments are being cared for by Incharge, Avenue Plantations. Over time, it was headed by Professors Vidyavati, S.M. Reddy, Vatsavaya S. Raju, B. Digamber Rao, and Dr. Md. Mustafa, Dr. P. Venkataiah is the Officer-in-Charge of Avenue Plantations since 2022. Besides, the university has a Medicinal Plants Garden and Green House on the campus under the aegis of the Department of Botany which conserves several rare and endemic medicinal plant species of indigenous biodiversity of the nation and provides the avenue for imparting scientific education to the students, classroom work for post-graduate and pharmacy students and research material for scholars.

The campus lands, when acquired, were predominantly agricultural fields with scanty vegetation near base camps and around wells. Now it is a green hub receiving higher rainfall and less temperature than the surroundings. The campus harbours a total of 376 plant taxa representing 314 genera 84 flowering and non-flowering families. The family Fabaceae is the most predominant, with 64 species, followed by Apocynaceae (29 spp.), Euphorbiaceae (24 spp.), Asteraceae (18 spp.), Lamiaceae (12 spp.), Malvaceae (11 spp.) and Rubiaceae (11 spp.)

Table – 1 - Medicinal, rare plants and major weeds on Kakatiya University Campus

<i>Rare</i>	<i>Medicinal</i>	<i>Weeds</i>
<i>Isoetes coromandeliana</i>	<i>Paederia foetida</i>	<i>Hyptis suaveolens</i>
<i>Litsea glutinosa</i>	<i>Dregea volubilis</i>	<i>Lantana camara</i>
<i>Paederia foetida</i>	<i>Gymnema sylvestre</i>	<i>Chromolaena odorata</i>
<i>Ledebourea hyderabadensis</i>	<i>Hybanthus enneaspermus</i>	<i>Cyanthillium cinereum</i>
<i>Striga angustifolia</i>	<i>Justicia adhatoda</i>	<i>Oxalis corniculata</i>
<i>Utricularia scandens</i>	<i>Leptadenia reticulata</i>	<i>Senna uniflora</i>
	<i>Ocimum tenuiflorum</i>	<i>Synedrella nodiflora</i>
	<i>Oxalis corniculata</i>	<i>Tridax procumbens</i>
	<i>Phyllanthus amarus</i>	<i>Turnera subulata</i>
	<i>Rauwolfia serpentina</i>	<i>Waltheria indica</i>
	<i>Tinosporavcordifolia</i>	<i>Sida cordifolia</i>
	<i>Tylophora indica</i>	<i>Sida acuta</i>
	<i>Vitex negundo</i>	<i>Revinia spp.</i>
	<i>Withania somnifera</i>	
	<i>Plumbago zeylanica</i>	
	<i>Plumbago indica</i>	
	<i>Pterocarpus santalinus</i>	
	<i>Pterocarpus marsupium</i>	
	<i>Madhuka indica</i>	
	<i>Centella asiatica</i>	
	<i>Andrographis paniculata</i>	
	<i>Hemidesmus indicus</i>	
	<i>Cocculus spp.</i>	
	<i>Costus speciosa</i>	

*Wild/Introduced (*ex situ* conservation)

(iv) Phytomass and Carbon Estimation

The vegetation of the Kakatiya Campus is obviously secondary, with planted trees of choice from time to time. Of course, there was natural regeneration of about 10% from the past through soil seed banks. Forest species are growing, such as *Balanites roxburghii* Planch., *Ficus* spp., *Helicteres isora* L., *Holoptelea integrifolia* Planch., *Morinda pubescens* J.E.Smith, *Streblus asper* Lour., etc. However, biomass is important regardless of naturalness for the phytomass and carbon stock estimation under the context. All the

vegetation was taken on par since the tree volume and specific gravity used were species-specific. As per the area under the plant cover on the campus, 13 plots were laid for the baseline data gathering. The sites were selected based on the plant cover type. These plots were used for clustered sampling of 0.1 ha for trees (31.62 x 31.62 m), two sub-plots of 5 x 5 m for shrubs, and 1 x 1 m for five herbaceous subplots within the 0.1 ha. The size of the sample and plots is based on the earlier studies by FRI, FSI, IIRS, and the Plant Systematics Laboratory, Department of Botany, Kakatiya University.

A total of 24 quadrats were laid to enumerate the trees (13) and TOFs (11)

Table 2: Site location co-ordinates of work done

Latitude		Longitude		Latitude		Longitude	
For trees incl. shrubs, herbs				For TOFs			
	hh:mm:ss	hh:mm:ss		hh:mm:ss	hh:mm:ss		hh:mm:ss
P1	18 01 46.2	79 33 20.0	T1	18 01 50.7	79 33 08.8		
P2	18 01 51.4	79 33 03.5	T2	18 01 48.5	79 32 54.4		
P3	18 01 50.6	79 32 59.2	T3	18 01 29.3	79 32 55.9		
P4	18 01 45.6	79 32 47.0	T4	18 01 26.7	79 33 25.3		
P5	18 01 38.6	79 32 44.0	T5	18 01 39.6	79 33 19.6		
P6	18 01 31.7	79 32 51.2	T6	18 01 40.5	79 32 52.5		
P7	18 01 32.9	79 33 05.6	T7	18 01 31.5	79 33 02.8		
P8	18 01 40.1	79 33 05.0	T8	18 01 57.2	79 33 21.4		
P9	18 01 44.0	79 33 14.7	T9	18 01 38.7	79 33 34.7		
P10	18 01 34.7	79 33 14.6	T10	18 01 47.8	79 33 40.8		
P11	18 01 29.4	79 33 29.3	T11	18 01 56.1	79 33 09.2		
P12	18 01 17.6	79 33 33.8					
P13	18 01 27.8	79 33 13.0					

Tree biomass = Volume x Specific gravity

Biomass t/ha = Tree biomass x 10

To get carbon t/ha, the biomass t/ha is multiplied with the standard value, 47.5, and divided with one hundred, i.e. Carbon t/ha = Biomass t/ha x 47.5/100

Table 3: Predicted phytomass and carbon content in the study area.

01	Total geographical area — 263.05 ha (650 acres)		
02	Total plant cover —74.87 ha (185 acres)		
03	Biomass range per a site (Observed) —4.1 17 to 12.557 t/0.1 ha		
04	Carbon range per a site observed-1.956 to 5.965 t/0.1 ha		
KU Campus		Biomass (in tons)	Carbon (in tons)
05	Minimum	41.17	19.56
06	Maximum	125.5	759.65
07	Total (sum)	46,543.25	22,106.04

The observed phytomass per site ranged from 4.117 to 12.557 t/0.1 ha, and the observed carbon per site varied from 1.956 to 5.965 t/0.1 ha. The predicted carbon was 22,106.04 tons against the total biomass of 46,543.25 tons (Table 3). Table 2 summarizes the baseline data on biomass and the carbon storage of Kakatiya University Campus. It is the first of its kind information made available at a landscape scale on the campus on any university campus in Telangana. These data help to formulate initiatives to plant more saplings for green cover in 'Harithahaaram' or by National Service Scheme.

(iv) Miyawaki model of Afforestation

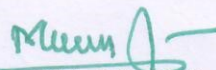
Kakatiya University has proposed raising a mini-forest on the campus by the Miyawaki model of afforestation with collaborative efforts of the Kakatiya Urban Development Authority (KUDA). The plantation was completed in October 2022. Several plant saplings like Bahuhinia, Sterculia, Bignonia, Spathodia, *Tabubia argentina*, *Pithecellobium*, and other plant species in the area of 5 acres of land in Survey No. 370. This programme has been initiated as part of KCR'S massive programme of Green Garland for Telangana.

Recommendations:

1. The utilization of groundwater is to be minimized.
2. More water traps are in the form of water harvesting pits (Inkudu guntalu).
3. A sewage treatment plant has to be constructed and maintained by routing wastewater from all the blocks.
4. Monitoring and surveillance of invasive plant species are sought.
5. The assessment of phytomass and carbon should be taken up biannually; and
6. Clearing weeds such as *Hyptis suaveolens*, *Lantana camara*, *Chromolaena odorata*, *Senna uniflora*, etc., should be initiated in the monsoon period before flowering.



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