

**Dr.BRR Government Degree College Jadcherla
Mahabubnagar (DIST), Telanagana State, India-509301**

(Accredited by NAAC with "B⁺⁺" Grade,
An ISO 9001-2015 Institution
Affiliated to Palamuru University)

Department of Political Science



STUDENT STUDY PROJECT

ON

**“Descriptive analysis of implementation of Telanganaku
Haritaharam in Telangana botanical garden in Dr. BRR
Government Degree College, Jadcherla”**

VI Semester

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CERTIFICATE

This is to certify that the project work entitled “Descriptive analysis of implementation of Telanganaku Haritaharam in Telangana botanical garden in Dr. BRR Government Degree College, Jadcherla” is a bonafide work done by G. Harika, G. Akhila, E. Sunil, K. Srishailam, V. Rajesh Kumar, R. Mallesh the students of VI semester B.A (HEP) T/M, under my supervision during academic year 2022-23 and the work has not been submitted in any other college or University either part or full for the award of any degree.

Place: *Jadcherla*

Date: *23-05-2023*

P.V.
Vijay Kumar PVS

Assistant Professor of Political Science

[Signature]
Signature of External examiner

PV
Signature of Internal examiner

DECLARATION

We hereby declare that the project work entitled with "Descriptive analysis of implementation of Telanganaku Haritaharam in Telangana botanical garden in Dr. BRR Government Degree College, Jadcherla" is a genuine work done by us under the supervision of Sri. Vijay Kumar PVS, Assistant Professor, Department of Political Science, Dr. BRR Govt. Degree College and it has not been under the submission to any other Institute University either in part or in full for the award of any degree.

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Descriptive analysis of implementation of Telanganaku Haritaharam in Telangana botanical garden in Dr. BRR Government Degree College, Jadcherla

Chapter – I INTRODUCTION

Our planet is facing environmental challenges, which is creating problem not only to human kind, but also creating the problems for our bio diversity. It is the high time to reduce the damage and to protect our environment. India is also taking so many initiatives to contribute to make our environment sustainable. Haritaharam for Telangana is the afforestation program undertaken by the Telangana government. Haritaharam 2015 was officially inaugurated by Telangana State Chief Minister Kalvakuntla Chandrasekhar Rao on 3rd July 2015 at Chilukur Balaji Temple. The Telangana Government has designed this program with the objective of planting trees and greening the whole of Telangana (33% of Telangana land area). Before analyze the program it is important to know about the Telangana and its forests. Telangana is situated on the Deccan Plateau, in the central stretch of the eastern seaboard of the Indian Peninsula. It covers 112,077 square kilometres (43,273 sq mi). The region is drained by two major rivers, with about 79% of the Godavari River catchment area and about 69% of the Krishna River catchment area, but most of the land is arid. Telangana is also drained by several minor rivers such as the Bhima, the Maner, the Manjira, the Musi, and the Tungabhadra

The annual rainfall is between 900 and 1500mm in northern Telangana and 700 to 900mm in southern Telangana, from the southwest monsoons. Telangana contains various soil types, some of which are red sandy loams (Chalaka), Red loamy sands (Dubba), lateritic soils, salt-affected soils, alluvial soils, shallow to medium black soils and very deep black cotton soils. These soil types allow the planting of a variety of fruits and vegetable crops such as mangoes, oranges, coconut, sugarcane, paddy, banana and flower crops.

Climate

Telangana is a semi-arid area and has a predominantly hot and dry climate. Summers start in March, and peak in May with average high temperatures in the 46 °C (115 °F) range. The monsoon arrives in June and lasts until September with about 755 mm (29.7 inches) of precipitation. A dry, mild winter starts in late November and lasts until early February with little humidity and average temperatures[58] in the 22–23 °C (72–73 °F) range.

Ecology

The Central Deccan Plateau dry deciduous forests ecoregion covers much of the state, including Hyderabad. The characteristic vegetation is woodlands of *Hardwickia* and *Albizia amara*. Over 80% of the original forest cover has been cleared for agriculture, timber harvesting, or cattle grazing, but large blocks of forest can be found in Nagarjunsagar-Srisailem Tiger Reserve and elsewhere.[59] The more humid Eastern Highlands moist deciduous forests cover the Eastern Ghats in the eastern part of the state.

National parks and sanctuaries

Telangana has three National Parks: KasuBrahmananda Reddy National Park in Hyderabad district, and Mahavir HarinaVanasthali National Park and Mrugavani National Park in Ranga Reddy district.

Wildlife Sanctuaries in Telangana include Eturunagaram Wildlife Sanctuary and Pakhal Wildlife Sanctuary in Warangal District, Kawal Tiger Reserve and Pranahita Wildlife Sanctuary in Adilabad district, Kinnerasani Wildlife Sanctuary in Khammam district, Manjira Wildlife Sanctuary in Medak district, Nagarjunsagar-Srisailem Tiger Reserve in Nalgonda and Mahbubnagar districts, Pocharam Wildlife Sanctuary in Medak and Nizamabad districts, Shivaram Wildlife Sanctuary in Karimnagar district.

Sacred groves are small areas of forest preserved by local people. Sacred groves provide sanctuary to the local flora and fauna. Some are included within other protected areas, like Kadalivanam in Nagarjunsagar-Srisailem Tiger Reserve, but most stand alone. There are 65 sacred groves in Telangana—two in Adilabad district, thirteen in Hyderabad district, four in Karimnagar district, four in Khammam district, nine in Mahbubnagar district, four in Medak district, nine in Nalgonda district, ten in Ranga Reddy district, and three in Warangal district. The Geographical area of Telangana State is 112077 km² and the notified forest area of the State is 26903.70 km², which is 24% of geographical area. According to Champion and Seth's classification, the Forests of the Telangana State fall under Dry Teak Forest, Southern

Dry Mixed Deciduous Forest, Dry Deciduous Scrub, Dry Savannah Forest, Hardwickia Forest, Dry Bamboo Brakes, and Southern Thorn Forest. 18294.52 Km² (68%) is reserved, 7802.07 Km² (29%) is Protected and Un-classed forests occupies 807.11 Km² (3%) of the forest area. The erstwhile Districts- Adilabad has the highest notified forest area of 7101.30 Km² and the Ranga Reddy has the lowest of 758.87 Km², in the State.

Protected Areas-About 21.77% (5856.04 Km²) of total notified forest area is included in protected area network. 12 Protected Areas, consisting of 9 Wildlife Sanctuaries & 3 National Parks are in the State. Amrabad Tiger Reserve and the Kawal Tiger Reserve are notified as two Tiger reserves in the state.

As there is an increase in population, deforestation is being done to meet the human needs. This leads to rise in natural calamities such as floods, landslides and soil erosion. Telangana State is known for its rich heritage in biological diversity distributed in 9 agro climatic regions. Among the flora, the state harbours a total of 2,800 taxa belonging to 1,051 genera under 185 families. This accounts for 16% of the Angiosperms known from India. Of these, 2,071 species belonging to 150 families and 796 genera are Dicotyledons and 729 species belonging to 255 genera and 35 families are Monocotyledons. Among the fauna, Telangana State is rich with 108 species of mammals that include Tiger, Leopard, Sloth Bear, Giant Squirrel, Hyena, Fox, Wild Dog, Wild Boar, Indian Bison(Gaur), Spotted Deer, Barking Deer, Black Buck, Four-horned Antelope, Blue Bull, Sambar, Mouse Deer, Honey Badger, Civets, Jungle Cats, Otter, Pangolin, Bats, Tree Shrew, Common Languor, etc.

EFFECTS OF CLIMATE CHANGE ON FOREST SECTOR

ISSUES

- Deforestation, degradation of forests and excess of soil erosion in degraded forests
- Disturbance in the timing of flowering and appearance of pollinators and excessive use of pesticides/insecticides, loss of forests, air pollution etc have also decreased the appearance of pollinators.

Interventions

- Soil and Water Conservation in forest lands
- Afforestation and eco development through community based programmes (like Joint Forest Management)

- Creation of forests in degraded/public lands, including such lands in and around cities and towns
- Documentation of biodiversity, including genetic fingerprinting Preservation of rare/threatened germplasm.

History

The program was launched by the Chief Minister of Telangana, Mr K. Chandrashekar Rao on 3 July 2015. It is one of the Telangana Flagship programmes to rejuvenate degraded forests, protecting these forests from threats such as smuggling, encroachment, fire and grazing. It adopted intensive soil and moisture conservation measures based on a watershed approach.

In the areas outside the existing forest, massive planting activities were to be taken up in areas such as; road-side avenues, river and canal banks, barren hills and foreshore areas, institutional premises, religious places, housing colonies, community lands, municipalities and industrial parks. The National Forest Policy of India envisages a minimum of 33% of the total geographical area under forest cover to maintain environmental stability and ecological balance

Planning and implementation

Specific duties and responsibilities are assigned to different committees to ensure the implementation of the programme in a well designed way. These committees do regular field inspections and monitor the ongoing plantation and nursery works. The committees are the State Level Steering Committee and the District Level Monitoring and Co-ordination Committee.

At the village level, Haritha Rakshana Committees were formed to monitor the program under the Chairmanship of Gram Sarpanch.

The seedlings are monitored through geo-tagging. The Forest Department posts survival percentage details on the Department.

Planting models

The program uses multiple planting models:

Avenue Plantation - Plants will be planted along National Highway roads, State Highway roads and streets of villages and towns. Species include silver oak, kanuga, yapaa(neem), raavi, marri, neredu, rain tree, gulmohar, and spathodia.

Block Plantation - Planting will be attempted in wastelands, common lands and panchayat lands. These plantations will be raised in the vicinity of villages to meet the fuel, fodder and MFP[clarification needed] needs. Species include albizia, acacia, sisso, neredu, sundra, chinduga, river tamarind (*Leucaena leucocephala*) and gliricidia. Planting will be performed by the concerned departments. After planting the plantations will be handed over to the gram panchayat for maintenance.

Institutional Plantation - Planting will be done at schools, colleges, government institutions, hospitals, graveyards and private institutions and industries. Species include neem, kanuga, neredu, maredu, rela, gulmohar, raintree, badam and peltophorum. Planting will be performed by the concerned departments. Protection and watering will be the responsibility of the best institute.

Tank Fore Shore Plantation - Planting will be at Tank Fore Shores. Species include nalla thumma, kanuga, neredu and arjuna. Planting will be taken up by the departments in charge of the mandal. After planting the plantations will be handed over to the gram panchayat for maintenance.

Homestead Plantation - Planting will be around the houses and colonies to meet household needs. Species include Neredu, Seethaphal, Usiri, Pappaya, Guva, Neem, Maredu, Soapnut, Badam, Munaga and medicinal plants. Planting and maintenance will be performed by the residents.

Agro Forestry Plantation - Planting will be on farmland. Species include teak, red sanders, tamarind, munaga, bombax, eucalyptus, bamboo and subabool. Farmers will do the planting and maintenance.

Barren hill - Planting will be on barren hillocks. Species include hardy plants such as sissoo, acacia, nemalinara and kanuga. Planting will be by the concerned departments. Maintenance will be performed by gram panchayats.

Achievements of Forest Department

In this programme, it is proposed to plant and rejuvenate 230 crore seedlings as follows:

Outside Forests areas – 130 crores (including 10.00 Crs. in HMDA and GHMC areas)

100 crores within Forest areas (20.00 Crs through plantations and 80.00) Crs through rejuvenation.

Block plantations are taken up in the forest areas where old eucalyptus plantations are harvested, in the retrieved encroached areas and in the open areas. These block plantations are taken up in a semi-mechanical method (SMM) and labour intensive method (LI). Total achievements as of 2016-17 are 18920 Ha.

Planting achievements:

2015-16: 15.86 crores plants

2016-17: 31.67 crores plants

2017-18: 15.10 crores plants

Urban lung spaces

Forest blocks adjacent to major cities and towns are under development as urban parks, acting as urban "lung" spaces. The vegetation in urban open spaces act as a sink for carbon dioxide. They reduce pollution and produce oxygen. They allow rain water percolation and ground water recharge in addition to facilitating storm water drainage and flood attenuation. Other advantages provided by them to human societies include social and psychological benefits, recreation, better health, reduced stress levels and reduced depression. The air we breathe and the water we drink are the two primary elements which decide the quality of our life. Thus when the open spaces shrink the quality of life of the people also degrade. There are studies proving that people who use public open spaces enhance their physical activity and gain better physical and mental health benefits. As of 2016, 24 urban blocks had been developed.

Recognition

To encourage competition and to recognize successful implementation, the Government established the "Telangana Haritha Mithra Awards" to award stakeholders including individuals, public representatives, NGOs, Government organizations, Corporate, Rural and Urban bodies. The first awards were distributed on 15 August 2016. The Government established the "Telangana State Excellence Award (T-Ex Awards)" to recognize exemplary

public service rendered by civil servants. The state Government proposed "Telangana Haritha Mitra Award" for the following categories:

Individuals- General, People's representatives, Forest Department, Rural Development Department, other Government departments

Institutions / organizations- Best District, Best Gram Panchayats, Best Municipality, Best Corporation, Best Mandal, Best Elementary School, Best High School, Best Junior College, Best Degree College, Best Technical College, Best University, Best Corporate Body, GHMC -1st, 2nd and 3rd Best Wards, Best Govt. Department

The awards are given at state and district levels every year in each category.

As a part of this program, Dr. BRR Government Degree College also implemented the program from 2015 to till date. This program has been linked with Telangana botanical garden in the college. under the guidance of Dr. Sada Sivaiah, Assistant Professor in Botany every year this program is being implemented successfully. This project aims to examine the implementation of the program in the college.

Objectives:

To examine the impact of Telanganaku Haritha Haram program on Telangana botanical garden in Dr. BRR Government Degree College, Jadcherla

To examine the impact Telanganaku Haritha Haram program on bio diversity in the Telangana botanical garden in Dr. BRR Government Degree College, Jadcherla.

Chapter - II

Review of literature

According to the latest Forest Survey of India (FSI) report, Haritha Haram in Telangana has helped increase the forest cover and green cover in the State. According to the report, the Recorded Forest Area (RFA) in the State is 26,904 square kilometers of Forest land of which, 20,353 square kilometers is Reserved Forest, 5,939 square kilometers is Protected Forest and 612 square kilometers is Unclassed Forests.

The report says that, three national parks and nine wildlife sanctuaries constitute the protected area network of the State covering 5.08% of its geographical area. In terms of forest canopy density classes, the State has 1,608.24 square kilometers under Very Dense Forest (VDF), 8,787.13 square kilometers under Moderately Dense Forest (MDF) and 10,186.94 square kilometers under Open Forest (OF). Main reasons for the increase in forest cover in the State is due to Telangana ku Haritha Haram.

As a practical example of the Sanskrit adage Krushito Naasti Durbhiksham, Chief Minister K Chandrashekhara Rao has himself thrown up challenge in the form of an innovative programme, 'Telangana ku Haritha Haram'. The one and only objective of this unprecedented successful programme is to increase the green and forest cover from 24% to 33% in the Telangana State with people's participation or in other words, the active support of all sections of people.

There are umpteen valid reasons for taking up this ambitious programme on a grand scale. The Forest land in Telangana State is spread over 26,903.70 square kilometers of the total geographical area of 1,12,101 square kilometers, which accounts for 24% of the total geographical area in the State. To increase the green cover, the Telangana government has launched the flagship programme 'Telangana ku Haritha Haram' during 2015-16.

The agenda was to plant 120 crore seedlings outside the forest area and 10 crore seedlings in the Greater Hyderabad Municipal Corporation (GHMC) and Hyderabad Metropolitan Development Authority (HMDA) areas in four years from 2015-16 to 2018-19 and planting and developing of 100 crore saplings inside the notified forests in four years from 2015-16 to 2018-19.

The aim is also to achieve 20 crore seedlings through taking plantations in the degraded forests through Artificial Regeneration Method (AR method). Remaining 80 crores seedlings targets are to be achieved through Rejuvenation of Degraded Forest through Assisted Natural Regeneration (ANR).

As against a target of 20 crores seedlings under the category of inside Forests Planting, the actual achievement year wise since 2015-16 till the current year, respectively has been: 2.933, 3.933, 3.939, 2.898, 3.537 and 2.039 crores, with a cumulative total of 19.339 crore seedlings.

As against a target of 80 crores seedlings under the category of Inside Forests Planting and Rejuvenation, the actual achievement year wise since 2017-18 till 2019-20, respectively has been: 25.970, 4.570 and 4.727 crores, with a cumulative total of 35.267 crore seedlings.

As against a target of 120 crores seedlings under the category of Out-side Forests Planting, the actual achievement year wise since 2015-16 till the current year, respectively has been: 12.667, 25.862, 28.469, 27.777, 33.043 and 13.472 crores, with a cumulative total of 141.290 crore seedlings.

As against a target of 3 crores seedlings under the category of GHMC Planting, the actual achievement year wise since 2015-16 till the current year, respectively has been: 0.001, 0.849, 0.768, 0.431, 0.717 and 1.957 crores, with a cumulative total of 4.723 crore seedlings.

As against a target of 7 crores seedlings under the category of HMDA Planting, the actual achievement year wise since 2015-16 till the current year, respectively has been: 0.260, 0.970, 0.903, 0.876, 0.881 and 2.339 crores, with a cumulative total of 6.229 crore seedlings.

Cumulatively, as against a target of 230 crores seedlings under all categories, the actual year-wise achievement has been since 2015-16 till the current year, respectively, 15.861, 31.674, 60.049, 36.552, 42.905 and 26.242 crores, with a cumulative total of 213.283 crores seedlings.

The other achievements included, avenue plantations raised about 10,000 kms, 76 forest urban parks created, 59 Forest urban parks being developed in HMDA limits, 6837 Palle Prakriti Vanalu were set up in each Gram Panchayat till date, Pattana Pragathi Vanalu or Yadadri model plantation done in each ULBs nurseries established in all 12751 Gram Panchayats and 143 Urban Local Bodies.

Totally 13,721 number of nurseries are established. Monkey food courts are raised about in 4,500 acres in Peddapally, Jangaon, Mulugu, Nirmal, Wanaparthy, Vikarabad, Kamareddy and Jagtial districts. The seedlings planted outside forests areas include the planting in roadside avenues, barren hills, river and canal banks, tank bunds and foreshore areas, institutional premises, religious places, housing colonies, farm bunds, community lands, municipalities, industrial parks etc. by various departments viz., Forest, Panchayat Raj and Rural Development, Excise, Education, Municipal Administration, GHMC, HMDA etc.

A lot of emphasis is given to plantation of fruit bearing plants, flowering plants etc., in and around house premises duly involving the households in the villages. The high-quality fruit bearing grafted plants raised by Horticulture Department are being supplied by Forest Department to the household owners/beneficiaries on free of cost. Apart from the fruit bearing plants, the household owners are also being supplied ornamental plants. The planted seedlings are being maintained by providing tree guards, watering and protection etc., wherever required.

Latest technology is being used to monitor the seedling planted through geotagging. Green Brigades and Haritha Rakshana Committee have been constituted at various levels to ensure participation of the citizens in the programme and to make it a big public movement. So, far 30,902 Green Brigade teams have been formed to protect the plants.

In order to involve the maximum population and stakeholders in the programme, publicity campaigns are being taken up through various media like print media, TV and radio channels, pasting posters on RTC buses plying through the State of Telangana and at prominent places.

On the occasion of World Environment Day, Rajya Sabha member Joginapally Santosh Kumar planted a sapling in Shameerpet in Medchel Mandal in Malkajgiri district.

Santosh's Green India Challenge concept had evoked an unprecedented response from across the world including the Chief Ministers, Union Ministers, MPs, MLAs, film and sports and other eminent personalities as well as common citizens. Santosh's Green Challenge became viral on the social media and it became a movement all over the country and in some parts of the world. Santosh's should be congratulated for kicking up the awareness on greenery overnight and his challenge had attained the cult status.

derabad: Elaborate plans are being made for the forthcoming Haritha Haram this year with a special focus on planting saplings near irrigation projects and canal bunds across the State.

This comes in the wake of Chief Minister K Chandrashekhar Rao's instructions to the officials to explore the possibilities of planting saplings in the untapped areas.

Accordingly, this year, authorities are drawing plans to plant at least 19.51 crore saplings. Among these, nearly six crore are likely to be planted near irrigation projects and canal bunds. For effective implementation of these plans, special teams involving Forest and Irrigation Departments officials will be constituted across the State. Telangana government had launched the Haritha Haram programme with the sole objective of increasing the green cover to 33 per cent in the State.

Telangana's Haritha Haram is considered the third-largest afforestation programme in human history. In the last eight years, 243 crore saplings were planted with an expenditure of over Rs 8,511 crore. This aided in the rejuvenation of 9.65 lakh acres of forest areas in the State.

The initiatives taken up as part of Haritha Haram are yielding green results with the State being ranked second in the country in terms of increase in forest cover by 632 square km. In addition to this, Hyderabad tops among the megacities, which gained maximum green cover with 48.66 square km in a decade in the country.

All these facts are shared in the India State of Forest Report 2021. The biennial assessment of forest cover of the country is prepared by the Forest Survey of India (FSI), which has been mandated to assess the forest and tree resources of the country.

Green Budget, Fund

Not confining to plantations, the State government is focusing on the survival of the saplings. Under this initiative, the State government introduced Green Budget and Green Fund. Accordingly, it is now mandatory for the local bodies — both urban and rural to spend 10 per cent of their Budget on the plantation drive. This apart, the task to ensure a minimum of 80 per cent survival of saplings is entrusted to the elected representatives, failing which, they are liable for removal from office.

Telangana government had issued orders for deduction of Telangana Green Fund contribution from the State government employees' salaries, All India Service officers, State Government Undertakings, including corporations, and other institutions employees. This apart, the fund is also being deducted from the salaries or honorarium or remuneration paid to public representatives every year in April, payable in May. These deductions are being made

from the financial year 2022-23 and over Rs 64.80 lakh being collected so far as Haritha Nidhi.

Others taking cue from State

Many teams from different States across the country had visited Telangana to study the impact of Haritha Haram. On Saturday, Keerthi, IFS and Mohd Shabab, IFS from Kerala visited the State. They studied implementation programmes such as urban forest parks and forest rejuvenation under Haritha Haram. The officers visited Mulugu Forest Research Centre Nursery, Narsampally Reserve Forest Block, forest rejuvenation works and Yadadri model plantation in Singaipally, Avenue plantations in Gajwel town, Palle Prakriti vanam and GP nursery at Tuniki Khalsa and Sangapur Forest urban park in Gajwel range. The Kerala officers appreciated the greenery works, particularly urban greening activities such as urban parks, Outer Ring Road greenery and avenue plantation. Later, they visited Forest College & Research Institute, Mulugu and met Dean Priyanka Varghese.

It is becoming a world wide phenomenon that rapid urbanization (Concrete Jungle) and industrialization, vegetation cover is contributing to the rapid deterioration of vegetation cover. Time has come to recognise the importance of the trees in maintenance of ecological sustenance in particular ecosystems. Keeping in view of the importance of the vegetation cover particularly tree cover, National Forest Policy of India underscores a minimum 33% of the total geographical area under forest or tree cover to maintain environmental stability and ecological balance that are vital for sustenance of all life-forms, human, animal and plants

even outside the notified forest areas. Recognizing the importance of the tree cover Government of Telangana launched the massive plantation programme as its flagship programme titled as "Telangana Ku Haritha Haaram (means green garland to Telangana) (here after abbreviated as (TKHH)" to increase the existing 24 % tree cover to 33% of the total geographical area of the state (Anonymous 2021). Trees play vital role in ecological restoration, retaining surface moisture, checking top soil erosion, enhancing ground water table, ground soil health, hosting soil microorganisms etc. The main aim is not only achieve stipulated forest cover but also conserve the degraded forest ecosystems to protect watershed with integrated social forest methods by involving institutional initiation of various government and non governmental organizations. Areas are identified in disturbed and fragmented forest areas, gap areas formed after harvesting of Eucalyptus plantations, Over burden cites of Open-cast coal mining, outside forested areas and barren hills for block and

massive plantation including road side areas, canal banks, tank bunds, rural and urban parks, religious places, housing board colonies, schools, universities, river banks, bunds of reservoirs, dam sites of Kaleswaram lift irrigation project, premises of educational and government institutions for avenue plantation (Figure 1). A multistrategic approach is adopted to rejuvenate the degraded forest ecosystems affected under mining sites etc. It is the need of the

hour to ensure the protection of existing forests from anthropogenic activities like smuggling, illegal logging, encroachments, forest fires etc. to improve the forest cover upto desired level. Various government departments like, Unlabeled graphic796 Indigenous tree species suitable for "Telanganaku Haritha Haram" : A massive plantation programme in India

Panchayat Raj, Municipal Corporations, Forest Department, Horticulture, Sericulture, Hyderabad Urban Development Authority (HUDA) are actively involved to take part in the massive plantation programme. People from all spheres viz., Government agencies, officers, prominent citizens, and public representatives will participate in the programme. The field functionaries of various line Departments have undertaken identification of sites for planting and prepared village Action Plans. The Village Action Plans will be consolidated at Mandal level and finally at the District level to form District Action Plan. At State level, two committees; the State Level Coordination and Monitoring Committee, and the State Level Steering Committee oversee the progress of the TKHH programme (Anonymous 2021). In recent times, government has initiated the rural parks named Palle Prakrithi Vanams and urban parks named Pattana Prakrithi Vanams in addition to these, nurseries to raise the tree saplings at every village and town levels are maintained to long term continuation of this massive plantation programme. In order to achieve the targets set under this programme, government and non government agencies take part in the massive plantation programme of "Telangana Ku Haritha Haaram (TKHH)" are actively involved in plantation of saplings belonging to various tree species irrespective their nativity like indigenous or exotic. Targets are set to achieve desired number of saplings to plant including indigenous and exotic tree species based on the availability in the public and private nurseries. Organizations are eager to achieve the plantation-targets by planting fastgrowing, ornamental and other exotic tree species without knowing the damage to the ecosystem caused by them. Long term impact of the exotic tree species is not taken into consideration. Invasive exotic plant species (IEPS) threaten the environment, reduce biodiversity, replace economically important plant species

and increase the investment in agriculture and silviculture practices, prevail vegetation dynamics and alter nutrient cycling. They can promote hazards like forest fires. Plant invasions dramatically affect the distribution, abundance and reproduction of many native species (Aarif Ali Gattoo, 2013; Almeilla and Freitas, 2001; Kumari and Choudhary 2016, Lovich Jeff. 2003, Richardson and Higgins 1999, Muhammad et al., 2004, Sala et al., 1999; Sonia Panigrahi, 2020, United States Environmental Protection Agency, 2003) Keeping in view of this background an effort was made to explore the suitable indigenous tree species for TKHH programme. Traditional and conventional planting methods existed in the ancient Indian culture are also discussed in detail. Review and retrospection of methodology, procedures and targets achieved in TKHH programme was not discussed here. Main aim of this paper is to suggest suitable indigenous tree species for TKHH programme and other traditional ways to promote tree cover.

Chapter – III

Data Collection and Analysis

MATERIAL AND METHODS

A detail exploration was made by referring state and local floras available. Random field surveys were conducted at field level to observe the observations on status of the plantations. A detailed list of indigenous tree species was prepared by referring the botanical literature and floristic reports of India in general and Telangana in particular. Tree species are presented in a tabulated form envisaging their botanical name, family name along with their local telugu name. In addition, traditional plantation patterns like Nakshatra vanam and Raasivanam are encouraged with their botanical components. Importance of other plantation strategies like urban parks, rejuvenation of natural forest vegetation, trees for biofencing, shade giving trees, flowering trees, fruit yielding trees, wind resistant trees, trees for avenue plantation and Tamarind groves are also discussed in detail. Detailed field works were conducted along with the detailed literature survey was takenup (Anonymous, 1992; Brandis, 1906; Khan, 1953; Patridge, 1911; Prasanna et al., 2012; Pullaiah, 1999; Rao 1986; Rao, 2012; Reddy et al., 2000; Reddy, 2008; Reddy & Reddy 2016; Shrikant & Sharvari 2010; Sayeeduddin, 1935-36, 1938, 1941, 1954) to find out the important indigenous tree species suitable for Telnganaku Haritha Haram.

RESULTS

A total 104 indigenous tree species suitable for plantation in Telangana ku Haritha Haram programme were enumerated. All the tree species were presented in a tabulated form. Table includes the Botanical name of each tree species including their families with their native telugu names along with their importance to plant for block plantation, avenue plantation, flowering, fruiting and medicinal importance. Unlabeled graphic797 E.N. Murthy et al.

Table 1 : Indigenous tree species suitable for “Telanganaku Haritha Haram”

S. No.	Botanical name	Family	Vernacular name	Significance
1	Acacia catechu (Roxb.) Willd.	Mimosaceae	Kachu	B, M
2	Acacia nilotica (L.) Willd. ex Del.	Mimosaceae	Nallathumma	S, B

3	<i>Aegle marmelos</i> (L.) Correa	Rutaceae	Maaredu	S,B,M
4	<i>Ailanthus excelsa</i> Roxb.	Ailanthaceae	Peddamaanu	S,B,M
5	<i>Alangium salvifolium</i> (L.f.) Wang.	Alangiaceae	Ooduga	B, M
6	<i>Albizia amara</i> (Roxb.) Boiv.	Mimosaceae	Naarlingi, Chigara	S, A
7	<i>Albizia odoratissima</i> (L.f.) Benth	Mimosaceae	Chinduga	S, A
8	<i>Albizia procera</i> (Roxb.) Benth.	Mimosaceae	Tellachinduga	S, A
9	<i>Albizia lebeck</i> (L.) Benth.	Mimosaceae	Diresana	S, A
10	<i>Alstonia macrophylla</i> G. Don	Apocynaceae	Pedda adakulapaala	S, A
11	<i>Alstonia scholaris</i> (L.) R. Br.	Apocynaceae	Edakulapaala	S,A, M
12	<i>Annona muricata</i> L.	Annonaceae	Seethaphalamu	FR, B
13	<i>Annona reticulata</i> L.	Annonaceae	Laxamanaphalamu	FR,B
14	<i>Annona squamosa</i> L.	Annonaceae	Ramaphalamu	FR, B
15	<i>Anogeissus latifolia</i> Bedd.	Combretaceae	Chirumaanu	B, M
16	<i>Atalantia racemosa</i> Wight & Arn.	Rutaceae	Adavinimma	FR, B
17	<i>Azadirachta indica</i> A.Juss	Meliaceae	Vepa	S, M
18	<i>Balanites roxburghii</i> Planch	Balanitaceae	Gaara	B, M
19	<i>Barringtonia acutangula</i> (L.) Gaertn	Barringtoniaceae	Kanapa/Ganapa	B, M
20	<i>Bauhinia purpuria</i> L.	Fabaceae	Devakaanchanamu	A, FL
21	<i>Bauhinia racemosa</i> Lam.	Fabaceae	Aari	A, FL
22	<i>Bauhinia variegata</i> L.	Fabaceae	Devakanchanamu	A, FL
23	<i>Bombax ceiba</i> L.	Bombacaceae	Booruga	A, FL
24	<i>Boswallia serrata</i> Roxb. ex Colebr.	Burseraceae	Andugu	B, M

25 <i>Bridelia retusa</i> (L.) Spreng. Euphorbiaceae Koramaddi B, M
26 <i>Buchnanian axillaries</i> (Desr.) Ramam. Anacardiaceae Pedda morli B, M
27 <i>Buchnanian lanzan</i> Spreng. Anacardiaceae Chinna morli B, M
28 <i>Butea monosperma</i> (Lam.) Taub. Fabaceae Moduga B, M
29 <i>Calophyllum inophyllum</i> L. Guttiferae Ponna A, FL
30 <i>Careya arborea</i> Roxb. Lecythidaceae Buda dharmi A, FL
31 <i>Cassia fistula</i> L. Caesalpiniaceae Rela A, FL
32 <i>Ceiba pentandra</i> (L.) Gaert. Bombacaceae Tellaburooga A, FL
33 <i>Chloroxylon swirtenia</i> DC. Flindersiaceae Billudu, Billa B, M
34 <i>Chukrasia tabularis</i> A. Juss. Meliaceae Errapongadi A, F
35 <i>Cochlospermum religiosum</i> (L.) Alston Cochlospermaceae Konda gogu A, F
36 <i>Cordia dichotoma</i> Forst. & Forst. f. Cordiaceae Iriki, Nakkeru B, M
37 <i>Cordia wallichii</i> Don. Cordiaceae Pedda nakkeru, A, FL
38 <i>Crateva magna</i> (Lour.) DC. Cappariaceae Ulimidi, Usikamaanu A, FL
39 <i>Dalbergia latifolia</i> Roxb. Fabaceae Jitregu, Pachairugudu B, M
40 <i>Dalbergia paniculata</i> Roxb. Fabaceae Pachari, Jettigu B, M
41 <i>Delonix elata</i> (L.) Gamble Caesalpiniaceae Tellaturayi A, FL
42 <i>Desmodium oojainense</i> (Roxb.) Ohashi Fabaceae Vandanamu, Darugu B, M
43 <i>Diospyros melanoxylon</i> Roxb. Ebenaceae Thuniki, Tendu B, M
44 <i>Dolichandrone falcata</i> (Wall. ex. DC.) Seem. Bignoniaceae Neetivoddi A, FL
45 <i>Eriolaena hookeriana</i> Wight & Arn. Sterculiaceae Naarabothuki B, M
46 <i>Erythrina variegata</i> L. Fabaceae Baaditha A, FL

47	<i>Ficus amplissima</i> Sm. Moraceae	Konda juvvi	B, M
48	<i>Ficus arnottiana</i> Miq. Moraceae	Konda raavi	B, M
49	<i>Ficus benghalensis</i> L. Moraceae	Marri	B, M
50	<i>Ficus mollis</i> Vahl. Moraceae	Kaalijuvvi	B, M
51	<i>Ficus racemosa</i> L. Moraceae	Medi	A, FL
52	<i>Ficus religiosa</i> L. Moraceae	Raavi	A, FL 798 Indigenous tree species suitable for "Telangana ku Haritha Haram" : A massive plantation programme in India
53	<i>Ficus virens</i> Aiton Moraceae	Juvvi	B, M
54	<i>Firmianacolorata</i> (Roxb.) R.Br. Sterculiaceae	Karaka	B, M
55	<i>Garuga pinnata</i> Roxb. Burseraceae	Garugu	B, M
56	<i>Givotiamoluccana</i> (L.) Sreem. Euphorbiaceae	Poliki, Konda poliki	B, M
57	<i>Gmelina arborea</i> Roxb. Verbenaceae	Gummaditeku	B, M
58	<i>Grewia tiliifolia</i> Vahl. Tiliaceae	Thada	A, FL
59	<i>Gyrocarpus americanus</i> Jacq. Hernandiaceae	Kommaripoliki	B, M
60	<i>Haldinia cordifolia</i> (J.D.Jacks.) Ridsdale Rutaceae	Pasupuganapa, bandari	B, M
61	<i>Hardwickiabinata</i> Roxb. Caesalpiniaceae	Narayepi, Ippa	A, FL
62	<i>Hibiscus tiliaceus</i> L. Malvaceae	Neeru patti	A, FL
63			
	<i>Holarrhenapubescens</i> (Buch.-Ham.) Wall. ex		
	G.Don Apocynaceae	Kodise, Ankudu	A, FL
64	<i>Holoptelea integrifolia</i> (Roxb.) Planch. Ulmaceae	Nemalinaara	A, FL
65	<i>Hymenodictyon rixense</i> (Roxb.) Mabb. Rubiaceae	Chedippa	B, M
66	<i>Ixora pavetta</i> Andrews Rubiaceae	Palaponna	B, M

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66	<i>Ixora pavetta</i> Andrews Rubiaceae	Palaponna	B, M

67 Lagerstroemia parviflora Roxb. LythraceaeChennangi A, FL
68 Lanneacoromandelica (Houtt.) Merr. AnacardiaceaeVoddi B, M
69 Limoniaacidissima L. RutaceaeVelaga A, FL
70 Madhuca latifolia Macbr. SapotaceaeChinnakuvippa B, M
71 Madhuca longifolia (f.Koeng.)MacbrideSapotaceaeVippa B, M
72 Manilkara hexandra (Roxb.) DubardSapotaceaePaala B, M
73 Melia azediarch L. MeliaceaeThurakavepa A, FL
74 Melia dubia Cav. MeliaceaeMalabaaruvepa A, FL
75 Mitragyna parviflora (Roxb.) Korth. Rubiaceae Batta ganapa B, M
76 Morindacitrifolia L. RubiaceaeThogaru B, M
77 Morindapubescens Sm. RubiaceaeThogarumaddi B, M
78 Nyctanthes arbor-tristis L. NyctanthaceaePaarijatham A, FL
79 Phyllanthus emblica L. EuphorbiaceaeUsiri A, FL
80 Pithecelobium dulce (Roxb.) Benth. Euphorbiaceae Seema chintha A, FL
81 Pongamia pinnata (L.) Pierre. Fabaceae Kaanuga A, FL
82 Premnamollissima Roth LamiaceaeNellikura A, FL
83 Prosopis cineraria (L.) Druce Mimosaceae Jammi chettu B, M
84 Pterocarpus marsupium Roxb. Fabaceae Vegisa B, M
85 Putranjivaroxburghii Wall. PutranjivaceaeTellapoliki A, FL
86 Radermacheraxylocarpa (Roxb.) Schum. Bignoniaceae Naaguru, A, FL
87 Rhus mysorensis Don. AnacardiaceaeSeehasundari B, M
88 Sapindustrifoliatus L. SapindaceaeKunkudu B, M

89	<i>Semecarpus anacardium</i> L.f. Anacardiaceae	Nalla Icedi	B, M
90	<i>Soymida febrifuga</i> (Roxb.) Juss. Meliaceae	Somida	B, M
91	<i>Sterculia foetida</i> L. Sterculiaceae	Jangli Baadam	A, FL
92	<i>Sterculia urens</i> Roxb. Sterculiaceae	Tapsi	B, M
93	<i>Streblus asper</i> Lour. Moraceae	Barrekka	B, M
94	<i>Strychnos nux-vomica</i> L. Loganiaceae	Vishamushti	B, M
95	<i>Strychnos potatorum</i> L.f. Loganiaceae	Chillaginja	B, M
96	<i>Tamarindus indica</i> L. Rubiaceae	Chintha	A, FL
97	<i>Tectona grandis</i> L.f. Verbenaceae	Teku	B, M
98	<i>Terminalia tomentosa</i> (Roxb. ex DC.) Wight & Arn. Combretaceae	Nalla maddi	A, FL
99	<i>Terminalia arjuna</i> Roxb. ex DC. Combretaceae	Thella maddi	A, FL
100	<i>Terminalia bellirica</i> (Gaertn.) Roxb. Combretaceae	Thaani	A, FL
101	<i>Thespesia populnea</i> (L.) Soland ex. Correa. Malvaceae	Ganga raavi	A, FL
102	<i>Trema orientalis</i> (L.) Blume Ulmaceae	Bogguchettu	A, FL
103	<i>Walsura trifoliata</i> (Juss.) Harms Meliaceae	Vaalsuri	A, FL
104	<i>Wrightia tinctoria</i> (Roxb.) R.Br. Apocynaceae	Paalakodisa	B, M

A=Avenue; B=Block plantation; FL=Flowering; FR=Fructing; M=Medicinal; S=Shade
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Fig. 2 : Indigenous tree species; a. *Lannea coromandelica*; b. *Madhuca longifolia*; c. *Holarrhenapubescens*; d. *Givotia moluccana*; e. *Morinda pubescens*; f. *Albizia amara*.

Shade giving trees

Alstonia scholaris, *Artocarpus heterophyllus*, *Barringtonia acutangula*, *Dalbergia sissoo*, *Ficus benghalensis*, *Ficus elastica*, *Ficus microcarpa*, *Ficus virens*, *Madhuca longifolia*, *Mangifera indica*, *Manilkara hexandra*, *Sapindus emarginatus*, *Schleichera oleosa*, *Sterculia foetida*,

Swietenia mahogany, *Syzygiumcumuni*

Wind resistant tree

Acacia nilotica, *Azardichta indica*, *Casuarina equisetifolia*, *Polyalthia longifolia*, *Tamarindus indica*, *Terminalia catappa*, *Ziziphsmauritiana*.

Colourful Trees

Albizia lebeck, *Bauhinia purpurea*, *Bombax ceiba*, *Butea monosperma*, *Cassia fistula*, *Cochlospermumreligiousm*, *Erythrina variegata*, *Nycanthus arbor-trisits*, *Senna surattensis*

Bird attracting trees

Bauhinia purpurea, *Bombax ceiba*, *Butea monosperma*, *Erythrina variegata*, *Ficus benghalensis*, *Schrebera swietenoides* Unlabeled graphicUnlabeled graphic800 Indigenous tree species suitable for "Telangana ku Haritha Haram" : A massive plantation programme in India

Fragrant trees

Alangiumsalvifolium, *Albizia lebeck*, *Alstoniascholaris*, *Barringtonia acutangula*, *Bauhinia purpurea*, *Calophyllum inophyllum*, *Cananga odorata*, *Crateva magna*, *Dolichandron falcata*, *Gardenia latifolia*, *Gardenia resinifera*, *Madhuca indica*, *Magnolia champaca*,

Millingtonia hortensis, *Mimusopselengi*, *Morinda pubescens*, *Murrayapaniculata*, *Nycanthus arbor-trisits*, *Plumeria rubra*, *Saracaasoca*, *Schreberaswietenoides*

Biofencing trees

Vitex trifolia, *Tectona grandis*, *Gmelina aroborea*, *Morindatinctorea*, *Acacia catechu*, *Acacia nilotica*, *Balanites roxburghii*, *Caesalpinia pulcherrima*, *Catunaregam spinosa*, *Ziziphus mauritiana*

Wild ornamental trees

Anthocephalus chinensis, *Bauhinia variegata*, *Butea monosperma*, *Cochlospermumreligiousum*, *Careya arborea*, *Dillenia indica*, *Gardenia latifolia*, *Gmelia arborea*, *Helicteresisora*, *Holarrhenapubescens*, *Mallotusphilippensis*, *Memecylon umbellatum*, *Naringicrenulata*, *Ochna obtusata*, *Tamilnadiauliginosa*, *Wrightea tinctoria*.

Avenue Plantation

To enhance the aesthetic beauty and to improve the greenery in the area large scale avenue plantations are taken up along national highways, state highways, roads which are maintained under the Department of Road and Buildings and Panchayat Raj and Municipal roads in one to three rows on either side of the road depending on the availability of the road margin. So many indigenous tree species are recommended for avenue plantation i.e., *Alstoniascholaris*, *Dalbergia sissoo*, *Ficus benghalensis*, *Ficus religiosa*, *Manilkara hexandra*, *Melia azedirach*, *Mimusopselengi*, *Pongamia pinnata*, *Sapindusemarginatus*, *Schleicheraoleosa*, *Sterculia foetida*, *Swietenia mahogani*, *Syzygium cumuni* etc.

Urban Parks

Existing Forest blocks adjacent to major cities and towns are being developed into urban parks which are acting as urban lung spaces for the local people. Urban parks act as green lungs of the neighboring cities and towns in order to improve the air quality by puming the oxygen into air. Native plants along with limited use of exotic tree species are suggested without altering the existing terrestrialforest ecosystem.

Seed Balls

During this year the concept of seed bombing has been introduced under Telangana ku Haritha Haram to take up greenery on slopes, hillocks and remote areas. Seed balls are prepared with earth, manure and other nutrients. Seeds belong to trees of Legumincaeous group are very suitable for preparation of seed balls i.e., *Albizia amara*, *Butea monosperma*, *Bauhinia purpurea*, *Bauhinia racemosa*, *Cassia fistula*, *Pongamia pinnata*, *Tamarindus indica* etc.

DISCUSSION

Though exotic trees can reduce pressure on native forests by providing timber (*Eucalyptus* spp.), fodder (*Leucaena leucocephala*), firewood (*Prosopis juliflora*) etc., thier impact on natural ecosystems are detrimental. Exotic trees are preferred in plantation programmes for their attributing characters like fast growing ness, adaptability etc. The impact of invasive species on native species, communities and ecosystems have been recognised for decades and invasive species are now viewd as a significant component of global change (Elton 1958, Lodge, 1993a, b, Simberloff 1996 and Vitousek et al 1996). Exotic plants have been introduced deliberately as forage, fiber, medicines and ornamentals for erosion centres and

for timber plantations (Baker 1974, 1986). Ecological interactions between native and invasive species may be direct like predation, herbivory, parasitism, competition, mutualism or indirect like habitat alteration, apparent predation, cascading trophic interactions and result in changes in the population biology (births, deaths, migration) of the native species. As a consequence, rapid evolutionary changes also may occur in the native species in response to the invading species. In the long run exotic species may replace the natives and ultimately result in extinction of the native species (Levin et al., 1996; Rhymer and Simberloff 1996; Lonsdale, 1999). Invasive plant reports from mostly from herbaceous plants, further research is prioritized on naturalized, exotic, introduced tree species (Murthy 2007; Murthy, 2017; Sateesh et al., 2016). Various studies reported the impacts of invasive species on native species and community structure (Gordon, 1988; Parker et al., 1999; Sala et al., 2000; Stein et al., 2000; Williamson, 1996; Wilcove et al., 1998).

The Indigenous species does not harm local flora and fauna thus facilitates conservation measures. The wild animals are adapted well to the vegetation, so that the habitat destruction is reduced. Some tree species have peculiar habits that make them unsuitable if planted in specific locations. Afforestation of forest by using indigenous species is ideal practice in forestry. Mostly the indigenous species are favourable to the natural condition where they are growing for a longer period of time. These are less susceptible to pest and diseases in the local climate. These indigenous species are more valuable for its timber value and firewood production. As the origin of species are well known, the cultivation and cultural practices of trees are also known by the local people. Thus it helps the people to manage the forest stand which enhance the forest produce (Dhanya et al., 2014).

Besides failing to monitor or nurture the large numbers planted exotics, such tree planting can cause more harm than good. Across India, tree planting efforts suffer from five main problems like planting trees in the wrong places, planting the wrong species an species mix, planting too few species, failing to consider seed provenance, and planting without considering the rights of local people and without consulting the experts in Botany, Forestry, Ecology and Agriculture (Shankar Raman 2021a). For example, Seeds of most Ficus species get propagated and germinated through bird droppings. Ficus species are therefore not suitable for planting in the vicinity of buildings. Such trees hence should not be planted close

to busy roads. It is necessary to understand the primary botanical data of a tree before going to plantation viz. a specific style of growth for its roots, trunks, canopy and nativity etc.. It was an attempt of first of its kind to find out important indigenous trees where they can use to fill the fragmented forest gaps for protecting remaining forests as a priority. Ecological restoration of respective ecosystems like grassland, desert, savanna, or rainforest is preferable to invite their own native species only. Ignoring of these facts, Urban Local Bodies are busy involved in massive planting of exotic trees which is eventually becoming death knell to urban ecosystems. Miyawaki forests are now becoming a trend in urban areas which hosts full of exotic trees. These forests are mainly located in urban areas purely developed based on methods improved by Japanese Botanist Akira Miyawaki with densely packed planted trees which are renamed as Pattana Prakrithi Vanams in urban areas and Palle Prakrithi Vanams in rural areas in Telugu by the authorities of Telangana where indigenous species are recommended on exotics. Restoration of existing forests Ecological restoration of existing natural forests involves the planting of the native plant species by following proper scientific methodology. In most of the cases, plantation programmes are tend to prefer the attractive exotic tree species owing to its fast growing character and adaptations. When observed, a good number exotic tree species are planted in Telangana's Haritha Haram without proper study of their impact on natural vegetation and ecosystems. Telangana has a diverse range of natural ecosystem including grasslands, tree savannas, dry thorn forests and deciduous forests, with hundreds of native plant species, from grasses and shrubs to trees. Several exotic tree species such as *Tecoma stans*, *Marchamia platycalyx*, *Spathodea campanulata*, *Casuarina equisetifolia*, *Conocarpus erectus*, *Delonix regia*, *Peltoporum pterocarpum*, *Parkia biglandulosa*, *Tabebuia argentea*, *Tabebuia rosea* etc. are rigorously planted. Though they are very attractive and fast growing species, but their negative impacts on ecosystem is very enormous. It is observed that these exotic trees are not suitable to Telangana.

Numerous studies have summarised the impacts of invasive species on native species and community structure (Gordon 1988, Parker et al 1999, Sala et al 2000, Stein et al 2000, Williamson 1996, Wilcove et al 1998). Few of these species are not only inappropriate to Telangana, some are downright harmful as observed in *Conocarpus erectus* (Shamukh 2020).

Yet, millions of saplings are being planted and millions of seed balls tossed around of whether the right species are being planted or even whether trees should be planted in that ecosystem at all. Tree planting in open natural ecosystems can also affect local hydrology and reduce water availability. One study estimates that about 6,452 sq. km or half the open natural ecosystems in Telangana could suffer from inappropriate tree planting. Across India, 51% of open natural ecosystems are similarly threatened (Shankar Raman 2021b).

Information to put use in screening of potential plant introduction is highly required (Richardson and Hamilton 1997, Richardson et al 2000). A proper scientific strategy is need of the hour where indigenous trees are prioritized to restore and enhance the natural forest cover of the state. Importance of Indian traditional/ religious plantations/

Vanams Since ancient times, in India, There is an existing practice of planting and maintenance of native tree species with traditional and religious importance to offer rituals in the name of respective deities in sacred places and temple compounds, hill shrines, pilgrimages etc. Each and every planted tree species are assigned a deity to offer rituals in order to please the respective god. So that Indians have an in-built traditional practices to protect the religious indigenous tree species (Anonymous, 1992). There are various names attributed based on the composition of the tree species like, RaasiVanam, Nakshatra Vanam, Shiva PanchayataVanam, Ashoka Vanam, SaptharshiVanam, Nava grahaVanam, Nandana Vanam, SanthanaVanam etc. Hence, It is advised to the respective government organisations to encourage the traditional/ religious plantations in order to encourage awareness on tree

protection.

Aided Natural Regeneration (ANR) Predominantly, Most of the forested areas in Telangana state are in degraded conditions. So that, it is planned to improve quality and density of the forest, treatment to degraded forests under Aided Natural Regeneration. Soil and Moisture Conservation works are taken up to improve the moisture in the forest area which will help in rejuvenation of the viable root stock. To take up ANR indigenous tree species are highly preferred to improve the natural vegetation cover.

Importance of Tamarind grooves

There is prevailing negligence in maintenance of Tamarind groves which are surviving since many years in court yards, tankbunds, temple compounds etc. Rigorous felling of Tamarind trees is found in rural areas attributing to various reasons which leads to unavailability of Tamarind pods in villages, contributing to soaring prices in the open markets of both urban and rural areas (Murthy, 2017). Keeping in view of situation, planting new saplings and management of existing Tamarind groves should be encouraged not only to meet the needs of rural market but also to maintain the rural ecosystem as well.

Limited and wise use of exotics Exotic trees have the potential to take intensive pressure and can mitigate the timber demand of huge population. From various studies it is concluded that the exotic trees can give more outcomes per unit area as compared to the indigenous species as the rate of growth is faster in exotic trees. But the indigenous species has better resistance to disease and pest as compared to the exotic. The exotic tree species have various advantages in agroforestry and commercial plantation, apart from these advantages, there are various negative impacts of exotic trees viz., allelopathy, liable to attack by pests and disease, not provide shelter to birds, use of excess water and effect on soil and invasive nature (Sonia Panigrahi, 2020). These risks can be reduced by taking some precautions before introduction of an exotic species. Introducing material through proper evaluation before mass plantation, keeping wide genetic base, etc must be taken into consideration at the time of selection. (Almeilla and Freitas, 2001; Kumari and Choudhary, 2016; Lovich Jeff, 2003; Richardson and Higgins 1998). Limited use of

exotic tree species are recommended because they may not suitable in a new ecosystem which may cause lesser or more damage to the existing infrastructure. A study proved that exotic *Conocarpus erectus* has damaged the infrastructure facilities in Iraq (Shamukh et al., 2020). Keeping in mind the damage done by exotic tree species, wise and limited use is advised particularly in urban ecosystems. *Conocarpus erectus* trees are replaced with the suitable indigenous tree species like *Mimusops elengi* etc (Figure 1). If desired, exotic tree species are meticulously planted after careful guidance taken from the Botanists, Agriculture and Forestry experts. 802 Indigenous tree species suitable for "Telangana ku Haritha Haram" : A massive plantation programme in India

Otherwise It will have long lasting impact on the ecosystem.

Fig. 1. a) *Conocarpus erectus* b) *Mimusopselengi* (*Conocarpus* can be substituted with native tree species like *Mimusopselengi* at median of the roads in urban areas.

Hypothesis

There will be positive impact of TelanganakuHaritaharam on Telangana Botanical Garden in Dr. BRR Government Degree College, Jadcherla.

Methodology

In this study The data was collected from two sources. The primary data was obtained by collecting information by using self designed interview schedule. The secondary data was collected from journals, books and from websites.

A detailed account of methodology that was applied in this study is given as follows:

As a part of interview, the researchers prepared the questionair containing the questions related to the implementation of the TelanganakuHaritaharam in the college garden, its impact on the garden, about bio diversity in the garden. the researchers interviewed Dr. SadaSivaiah, Assistant professor in Botany, Dr. BRR Government College, Jadcherla. the researchers also interviewed the research scholars working in the Telangana botanical garden. the researchers examined the garden to different planets and the bio diversity in the garden.

Chapter – IV

Conclusion

Findings of the studies

Within the span of one year, the garden was rapidly developed with 170 species and 1000 individuals. In the ornamental-vegetable section a total of 76 species of ornamentals and 20 species of vegetables and 10 species of leafy vegetables were grown. In this section, 6 varieties belonging to 3 species of *Passiflora*, 4 varieties belonging to 2 species of *Hibiscus*, 3 species of *Allamanda*, 2 species of *Ipomoea*, 10 color variants of roses and other ornamental species are grown with beautiful flowers. Brinjal, Tomato, Bottle gourd, Bitter gourd, Cluster beans, Green Chilli, Carrot, Ladies finger, Beet root, Cabbage, Cauliflower, Radish, Ridge gourd, Drumstick and other vegetables were grown.

In medicinal plant section, a total of 28 medicinal plants were grown, of which, *Adenantherapavonia*, *Caralluma* spp., *Curcuma longa*, *Decalepishamiltonii*, *Elaeocarpus ganitrus*, *Phyllanthus emblica*, *Terminalia bellirica* and others are the major species.

In endemic and threatened section *Boswellia ovalifoliolata*, *Caralluma indica*, *C. diffusa*, *C. stalagmifera*, *C. umbellata*, *Cycas beddomei*, *Decalepishamiltonii*, *Drimianagarjunae*, *Hildegardiapopulifolia*, *Pterocarpus santalinus* were grown.

In the fruit section a total of 25 species of fruits are maintained in the garden. The local and hybrid varieties of Papaya, Guava, and Green apple bear, Water apple, Pomegranate, Pine apple, Indian Gooseberry and Banana etc. In the Xerophytic section, very few xerophytes like Agave, Cactus, Euphorbias were maintained.

A total of 416 tree individuals grown in 16 rows with 26 individuals for each species in 200 square yards and it was named as the Forest Section. A unique methodology was adopted for the forest section where the saplings were planted with a 2ft distance. Within a year, these plants were grown up to 12-15ft in height.

In March 2020, with the help of 150 NSS volunteers of Unit- II, III of the College and Unit-V of Palamuru University, Mahabubnagar have planned and designed the Telangana Botanical Garden with the geographical shape of Telangana in 5 acres adjacent to the earlier Botanical Garden. Finally, on 17th March 2020, the layout of Telangana Botanical Garden was completed with the efforts of NSS volunteers and the Research Team headed by Dr. B. Dr

Sadasivaiah. With the help of local donors the layout was completed with bricks in a single line.

In July 2020, this small Botanical Garden existed in the College premises was enlightened and brought to the notice of the Hon'ble Chief Minister of Telangana State by the Commissioner, Collegiate Education, TS Hyderabad. Knowing the tremendous work done by the college, Hon'ble Chief Minister of Telangana State sanctioned an amount of Rs. 50,000,00/- (Rupees Fifty lakhs) for the development of Telangana Botanical Garden issuing the G.O vide number No.116 dated 21-07-2020.

The garden is structured into 33 geographical district areas, each with its unique flora. A half-kilometer long walking track with a 15-foot-wide path surrounding the garden. Each district is bordered with a 2-foot-wide corridor that allows for close observation of plants. Students of the college involved in shaping the garden during their leisure time. Staff, students and the local people planted the saplings on their special days. Whenever guests visit the college, they are pleased to plant a sapling in the garden. The garden presently comprises 6400 plants from 527 species. The students from the local schools and colleges from Jadcherla and adjacent towns and trainees from Telangana Forest Academy, Hyderabad regularly visit the garden.

A well-maintained Green Net House which is first in kind in all Government Degree Colleges in the state was established and named after Sri Kotha Kesavulu who donated land for the college. A percolation tank with a 12 lakh liter capacity is created in the TBG and the college campus which serves as the catchment region for this tank.

A constructed plateau occurs in the garden where the then Prime Minister Smt. Indira Gandhi and Sri Rajiv Gandhi, addressed the people, has been transformed into a viewpoint from which one can see the entire Telangana Botanical Garden and it was named after Padma Shri Vanajeevi Ramaiah, a well known environmentalist of Telangana as Vanajeevi Viewpoint.

Various scientific activities conducted by botanical gardens are conservation, propagation, horticulture, seed science, taxonomy, genetics, biotechnology, restoration ecology, public education and many more.

The plantation was completed in 25 districts with different plant communities/association namely Raasi Vanam (Jogulamba Gadwal-12 species), Sacred Forest

(Wanaparthy-15 species), Ficutorium (Mahabubnagar-23 species), Butterfly Park (Narayanapeta-25 species), Ornamentals (Vikarabad-15 species), KartheekaVanam (Sanga Reddy-1 species), Nakshatra Vanam (Medak- 27 species), Rose Garden (Siddipet), Gymnosperm (Rajanna Sirisilla-10 species), Palmaram (Peddapalli-10 species), Redsandorum (Jangaov), Sandorum (Warangal Urban), Fruit Arboretum (Adilabad-20 species with 42 varieties), Wild trees (Nagarkurnool, Nalgonda- 78 species) and 5 districts were partially completed with different plant species.

Another unique feature of the garden is each and every species of plants has a QR code which possesses the details of its own. Presently, Telangana Botanical Garden harbors 527 species and 6400 individuals. Still, many more species are awaiting for plantation.

Telangana Botanical Garden has a MoU with Association for Biodiversity Conservation & Development (ABCD), Wanaparthy and Lead Botanical Garden, Yogi Vemana University, Kadapa, Andhra Pradesh for exchange of plants and distribution of plants.

Apart from the plants, this garden has 5 kinds of snakes, 58 types of birds, 52 kinds of Butterflies, 75 kinds of insects.

Limitations of the study:

1. this study is limited to Telangana botanical garden in Dr. BRR Government Degree College, Jadcherla.
2. lack of funds, time constrain is also a limitation of the study.

Chapter – V

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Questionnaire:

1. How many saplings planted under the Telanganaku Haritaharam program?
2. Which types of saplings planted under the Telanganaku Haritaharam program?
3. Do you think this program made an impact on bio diversity in the college?
4. What are the measures beeing taken to protect the plants in the garden?
5. What are the measures taken to protect the bio diversity in the garden?
6. Who are involved to help the growth of the garden?
7. What are the funds sufficient to maintaine the garden?
8. Describe the fanaa in the garden?
9. Any suggestions to improve the Telanganaku Harita Haram Program?



