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Rejuvenation of Reserve Forest by Forest Interventions (Species and Different Plantations)

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Abstract: ***Eco-restoration is a technique for rejuvenation of degraded ecosystem to their near original state. It also helps to control soil erosion, develop microbial ecology, enhance biomass production and socio-economic development. The present study was focused on a new approach called Rejuvenation Technology for less forest area. India is bestowed with the rich diversity of flora and fauna due to diverse environment. Global warming and consequent impending danger of climate changes has necessitated to arrest deforestation. The species diversity has also helped in the selection of appropriate native species to enhance the ecological functions of urbanizing landscapes. Adoption of monoculture plantations though the region appears green, but fulfilling the vital ecosystem functions such as groundwater recharge, food and fodder to dependent biota, etc. Forest Rejuvenation Action Plan was prepared for each Reserve Forest Block with forestry activities like Reserve Forest boundary deep trench, fencing, Plantations of Gacchakaya on trench mounds along the periphery of the Reserve Forest boundary having interface with Revenue Land to protect the forest from biotic interference. Further Soil & Moisture Conservation works were proposed to improve moisture regime. Silvicultural operations like Cultural operations & removal of invasive species were proposed for better natural regeneration & growth of existing root stock. It was further supplemented with plantations like Block plantations, fruit bearing plantations, Yadadri Model plantations, Grassland development in 0.0 - 0.10 canopy density forest area. Further plantation activities like Gap planting, Medicinal herbs & Shurbs, plantation inside and on the mounds of SCT, Bamboo plantations along nalas/Streams were proposed to improve three tier canopy in the Reserve Forest in 0.1 - 0.40. These Forestry Interventions help to improve the forest cover, biodiversity, Carbon sequestration, Water Argumentation etc to meet the required results as per National & Global Commitments. To demonstrate this technology, plantation of seedlings of 5 different canopy density. Block plantation. Yadadri Model Plantations, Grass lands, Forest Fruit bearing Plantations was carried out in a village community degraded land located in Medhal district in Telangana State. This study developed spatial definitions of the Rejuvenation of reserve forest.***

Keywords: Rejuvenation, Reserve forest, Plantation models, canopy, Soil & Moisture Conservation

I. INTRODUCTION

Forest regeneration is the very foundation of sustainable forestry. While many forests are regenerated using natural techniques, increasing annual wood harvests will depend upon plantation forestry. Moreover, planting is necessary for afforestation on degraded lands, abandoned agricultural lands, or anywhere that trees are to be reintroduced without a natural seed source. According to the most recent Food and Agricultural Organization (FAO) Forest Resource Assessment, there are close to 4.5 million ha planted each year. If one assumes that planting area is also a reflection of nursery production and using an estimated average spacing of 3×2 m (1666 trees ha−1), this is an annual nursery production of 7.5 billion seedlings. Asia has the largest planting area with 62% of the world total, followed by Europe with 17%. Pines occupy 20% of all plantations worldwide, other conifers 11%, and eucalyptus 10%. The stock used for planting these areas almost invariably come from forest tree nurseries. Nursery managers are responsible for producing a seedling of suitable quality in a reasonable amount of time at a reasonable cost, which can withstand the rigors of processing, storage, transportation, planting, and what is more likely as not, harsh environmental conditions. If the stock does not survive, more is lost than just the cost of the planting stock. Also forfeited may be the cost of preparing the site, growth forfeited until the next planting date, and the expenses incurred if additional weed control, fertilization, or other cultural practices must be conducted. These costs may be, and usually are, substantially greater than the cost of planting stock. It is no wonder that organizations dependent upon successful plantation management consider nursery operations to be the heart of their regeneration program. As a general rule, there are two types of planting stock – bareroot and container. The decision to rely on bareroot or container technology depends upon many factors. Certainly the physiological requirements of the species is tantamount in importance. Certain genera, such as Eucalyptus, are invariably grown in containers and survive poorly when planted bareroot. Other genera, such as the pines, are commonly produced bareroot.

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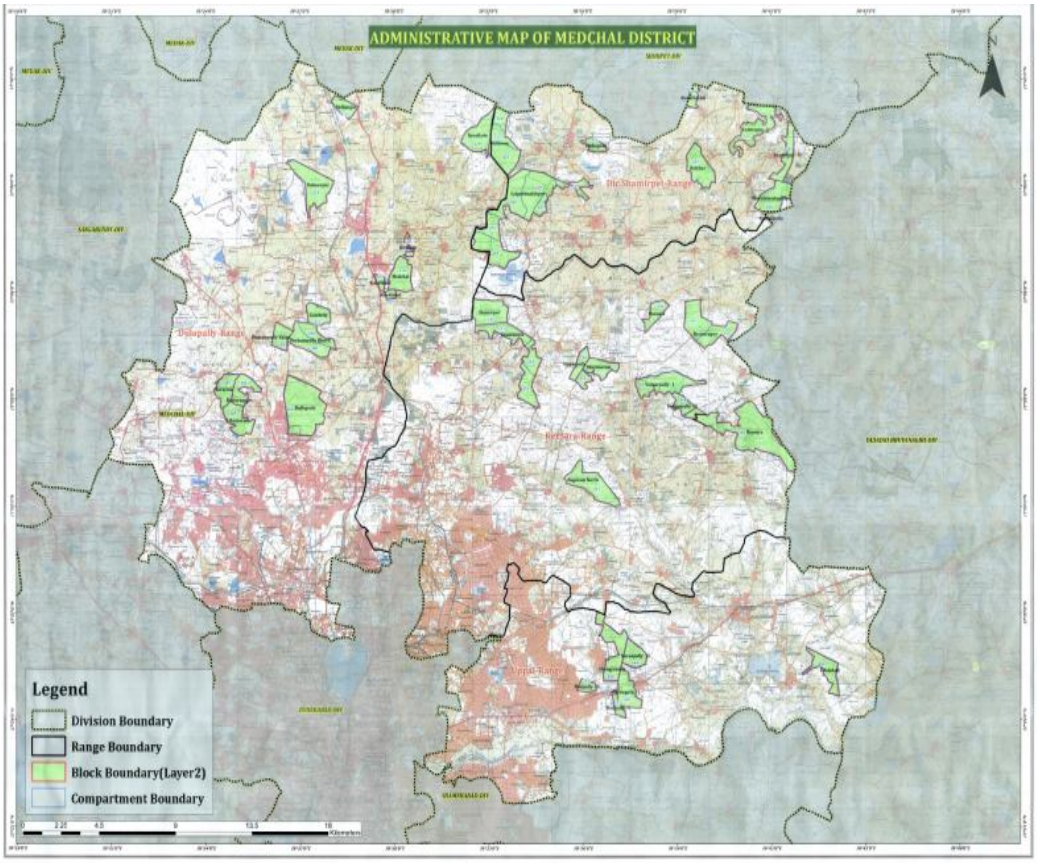
Even so, certain pine species, particularly those in the tropics (e.g., Pinus caribaea) require containerization. Boreal species may be containerized to shorten their time in the nursery. Whereas producing plantable bareroot stock may take 2–3 years for some boreal species, the environment of container production can produce smaller planting stock in far less time. The ability to control the growing environment is also important when producing vegetatively propagated material which is high in value and/or may require more exacting conditions to root and/or develop. Finally, planting adverse (droughty) sites may require the use of containerized stock. A possible disadvantage to containerization is a substantial increase in cost. In the southeastern United States, for example, the price of container grown stock is generally four to five times higher than the same species grown bareroot. Container stock is also more expensive to transport.

II. MATERIALS AND METHODS

A. Experimental Location and Climate

The experimental area is Chengicherla Range Forest and Rachakonda Commssionarate Range Forest Located in Medchal District(17°37’48 ”N 78°29’3.17402”E) of Telangana state This area gets a yearly normal precipitation of 500-600 mm and mean yearly temperature of 33.4 °C (least of 28 °C and limit of 37 °C). The soil type of the trial area is red sandy earth with the pH and EC of 7.26-7.41and 0.34 dS m-1, respectively.



B. Experimental Map

Interventions across all Forest Canopy Density classes,Protection: RF Boundary Trench/ Fencing - Mound stabilization,Soil & Moisture Conservation,Water Harvesting (PA + non-PA),Fire lines,Areas between 0 to 0.1 Canopy density (Artificial Plantation Zone).

Block plantation,Yadadri Model Plantations,Grass lands,Forest Fruit bearing Plantations,Area Between 0.1 to 0.4 Canopy Density (Assisted Natural Regeneration Zone),Gap Plantations,Plantation inside and on mounds of SCTs,Bamboo Plantation along streams, nalas, water bodies,Medicinal Plantation, Herbs & shrubs inside and on the mounds of SCT.

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C. Species distribution In Chengicherla Reserv forest

Table 1

Species
Teak (Tectona grandis)
Red sanders (Pterocarpus santalinus)
Bmboo Bambusa vulgaris)
Buruga (Bombax ceiba)
Kanuga (Pongamia pinnata)
Peltophorum (Peltophorum pterocarpum)
Gulmohar (Delonix regia)
Eetha (Phoenix sylvestris)
Rela (Cassia fistula)
Silveroak (Grevillea robusta)
Usiri (Phyllanthus emblica)
Kanuga (Pongamia pinnata)
Gulmohar (Delonix regia)
Tecoma (Tecoma stans)
Bahumia (Bauhinia acuminata)
Danimma (Punica granatum
Velaga (Limonia acidissima)
Gadichadia (Tecoma stans)
Tulasi (Ocimum tenuiflorum)
Acalypa (Acalypha hispida)
Gorintaku (Lawsonia Inermis)
Caesalpinia (Caesalpinia pulcherrima)
Mandaram (Bauhinia variegata)
Karivepaku (Murraya koenigii)
Bouganvillea (Bougainvillea glabra)

Tabe 2

Forest Block area treated till now										
Division	No. of Blocks	Forest Area (Ha)	Silvicultural operation (Ha)	Root stocks regenerated (Nos)	AR (Planting) Ha	SMC/WHS (cmt)	Trench /Fencing (km)	FireLines (km)	%	Area (Ha)
Medchal	40	8148.81	827	240000	1244.3	38640	146.84	86.78	69.4	5699.14

Table 3

Canopy Density	Area in Ha.	% to Forest Area
Very Dense	0	0
Moderately Dense	2887.96	35.44
Open	3807.87	46.73
Scrub	554.98	6.81
Water Body	64.78	0.79
Encroachment, Diverted land and less on ground	833.22	10.23
Total	8148.81	100

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Figure 1

Figure 2

III. RESULTS AND DISCUSSION

Many conservationists expressed the concern that the forest is not just the trees or shrubs, but it is a complex ecosystem. The forest should be a place for balanced eco system with fauna and flora. Keeping in mind, a new technique called rejuvenation was formulated. With this technique, a rejuvenation plantation could be formed in a shorter span of time with space for the post cultural operations and recreation utilities (Figure 1 & Figure 2). in table 3 showing very dense initially nil, moderately dense was 2887.96 % of cover area was 35.44 covered along with open and scrub 3807.87 and 554.98 treated as 46.73 and scrub was 6.81 respectively.This new technique also serves as economical returns in due course of time. The higher space utilization and cost reduction over the normal monoculture technique. Trees were grown up to a height of 5 to 6 mts (Figure 3). About 90 percent of the planted area was covered by green canopy (Figure 3). It is evident from the study that, mutual shading resulted in temperature reduction in the canopy area as well inviting natural dwelling place for insects, honeybees and animals, (Table 1 & Figure 2). The trees planted with equal spacing could be used for recreation and aesthetic values and generate economic returns.

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The tree species with highest growth height and basal diameter and canopy was observed in . showed the lowest growth and basal diameter and canopy was observed in..

In table 1 showing treated species trees namely *Tectona grandis, Pterocarpus santalinus, Bambusa vulgaris, Bombax ceiba, Peltophorum pterocar, Delonix regiapum and medium canopy pecies are Grevillea robusta, Phyllanthus emblica, Pongamia pinnata, Delonix regia, Tecoma stans ,Bauhinia acuminata , Punica granatum, Limonia acidissima and Low* canopy Species..*Ocimum tenuiflorum , Acalypha hispida, Lawsonia Inermi, Caesalpinia pulcherrima, Bauhinia variegata, Murraya koenigii, Bougainvillea glabra, Gliricidia sepium respectively*..are highly suitable for afforestation in wastelands and also for urban forest in Mayawaki method of planting. highest stomatal conductance and eco-physiological activities but lowest biometric traits, resulted in their nonsuitability for Miyawaki afforestation.

In table 2, 3 showing Forest Block area treated area till now Climate change and influences on reserve forest High susceptibility to anthropogenic interventions and climate change impacts (Primavera, 2005, Duke et al., 2007, Lovelock et al., 2015, Ward et al., 2016) have resulted in the decline of the extent, structure, and function of coastal ecosystems (Alongi, 2002, Polidoro et al., 2010, Giri et al., 2011, Murdiyarso et al., 2015, Kauffman et al., 2018). Globally, 20%–35% of mangrove habitats were lost during the period 1980 to 2000 (Millennium Ecosystem Assessment, 2005, Polidoro et al., 2010). Further, the rate of mangrove decline in Southeast Asia during 2000–2012 was 0.18% per year (Richards and Friess, 2016). It was estimated that, 1.67% of all mangroves were deforested globally in the last two decades (Sanderman et al., 2018).

IV. CONCLUSIONS

Reserve forests, strictly considered as evolutionary hotspots, are facing drastic degradation in the Anthropocene. The key issue in Medchal is not just destruction but the degradation of shrub habitats, through pollution, loss of biodiversity, and unsustainable selective cutting. Further, the deterioration of Reserve habitats due to human intervention has led to the extinction of several valuable species like Teak. Even though several policies and conservation strategies have been developed by the regional and national governments, environmental law enforcement continues as a challenge. Community-Based forest Management through ecotourism is a viable alternative for sustainably managing forest ecosystems in Telangana, which are depleting at an alarming rate. Furthermore, the Government of Telangana has decided to develop the green belt (Harithaharam) following the recent years as a cost-effective means of increasing green area against the impacts of hazard events. In this context, effective governance, adaptation and mitigation options for climate change, better planning for rehabilitation of degraded forest and creation of awareness to local communities are need of the hour to conserve, protect and restore the valuable forest species.

V. ACKNOWLEDGMENTS

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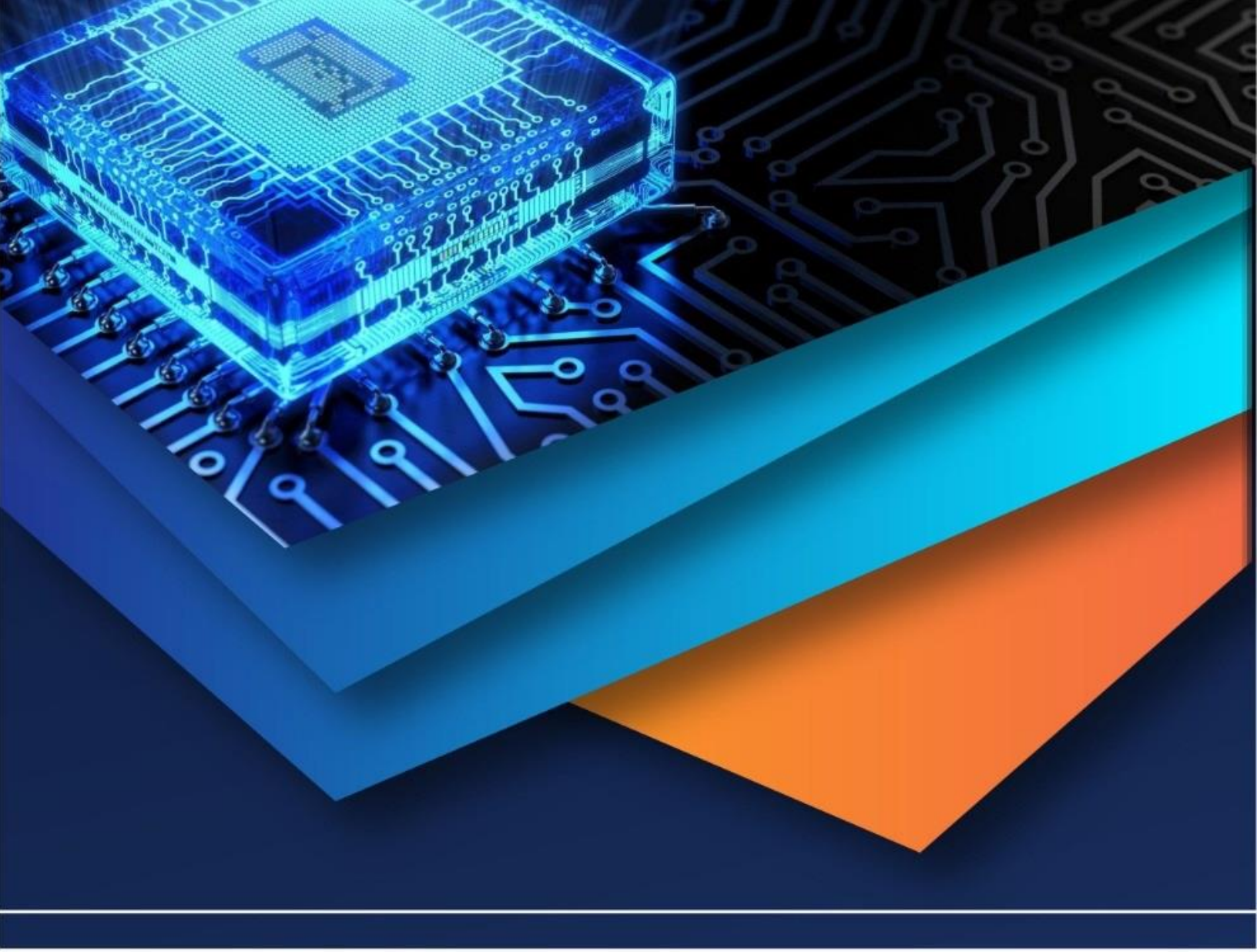

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