GREEN

AURANGABAD MISSION

Documenting and Sharing the Partnerships and Interventions Undertaken for Impacting the Green Cover of a Region in an Ecologically Sound Manner

CARPE
CENTRE FOR APPLIED RESEARCH AND PEOPLE'S ENGAGEMENT

The Civic Response Team and CARPE are sister concerns working under a hybrid model since 2015. The vision of the organization is to achieve inclusive and sustainable cities, towns and villages; Through designing and implementing evidence driven solutions to civic and environmental challenges and implementing them with multi-dimensional partnerships for impact and scale.

EcoSattva

EcoSattva Environmental Solutions Pvt. Ltd. is a company that provides eco-sensible solutions for green cover management and waste water treatment. EcoSattva is also a Maharashtra Start-up Week 2018 awardee. At EcoSattva, we believe that nature has the most efficient and robust systems and designs. Our role is to understand and incorporate them in human habitats. EcoSattva has been a strong implementation partner for the Green Aurangabad Mission.

GRIND MASTER

Grind Master is a company that is committed to operate and grow its business in a socially and environmentally responsible manner. Ensuring sustainable and inclusive growth is in the company's DNA. GM's CSR approach reflects their core values of Innovation, Expertise, Passion and Trustworthiness towards society and the environment. GM is committed to forging innovative and meaningful impact through its CSR efforts and beyond.

GREEN AURANG

VISION

To transform Aurangabad's degraded landscapes

through afforestation, tree-plantation, water management and environmental restoration; supported by research into its ecological needs, documenting best practices and establishing and inspiring partnerships to create impact at scale.

GABAD MISSION

Chiranjeevi Prasad
Hon. Commissioner of Police, Aurangabad, Maharashtra

The repercussions of a degraded ecology and landscape on human well-being have been established both through research and experience. In the Marathwada region the pressing issue of water has brought the problem of ecological degradation into sharper focus. In response to these challenges, several solutions have also emerged. The broad range of contributors - media, youth groups, educational institutions, corporates, NGOs etc - has been heartening.

The Green Aurangabad Mission is one of the most thoroughly researched and strategically developed responses that I have come across in the past couple of years. I have witnessed their projects in multiple locations and have also partnered with them for a plantation at the Police Commissioners' Office, Aurangabad city. I congratulate Grind Master Machines Pvt. Ltd. and its partners - EcoSattva and CARPE - for this much needed initiative. The partnerships and collaborations developed under this Mission and the investment in making them sustainable by ensuring a win-win solution for all, is what makes it truly unique. I am particularly pleased by the positive examples of government-corporate-civil society projects.

I hope this report will encourage other companies and organisations to partner with the police and other government bodies in a sustainable manner and will help address the problems of our region.

Congratulations to the Green Aurangabad Mission team and my best wishes for the future.

Milind Kelkar

Chairperson and Managing Director, Grind Master Machines Pvt. Ltd.

The Green Aurangabad Mission (GAM) is a flagship program under the Corporate Social Responsibility Policy of Grind Master Machines Pvt. Ltd. And I am grateful for the opportunity to play a small role in taking this movement forward.

While Grind Master Machines Pvt. Ltd. has been investing CSR funds into efforts for greening the Aurangabad district for over six years now, we launched the Green Aurangabad Mission in 2018. The focus of this mission is to implement innovative, region-appropriate methods and forge innovative partnerships to impact the environment sector positively.

This Green Aurangabad Mission Report provides insights from our projects that can help other stakeholders interested in developing their CSR/ execution strategies in this sector. Our aim has always been to ensure optimum use of resources for the largest impact possible and our experience shows us that research and strategic partnerships are essential to this.

There are many government schemes and campaigns in this sector, promoting diverse greening techniques and companies undertaking tree plantation activities[1] in the region and the country. Strategic partnerships would help to achieve global, national and local standards of green cover and its management.

Together with our partners CARPE and EcoSattva, we have tried to document our efforts with the intention to share insights with all those who want to come together for a greener and ecologically balanced future.

1 https://www.livemint.com/Companies/2B44FTN85SRehyrFp6OfJO/Companies-step-up-publicprivate-partnerships-to-widen-green.html

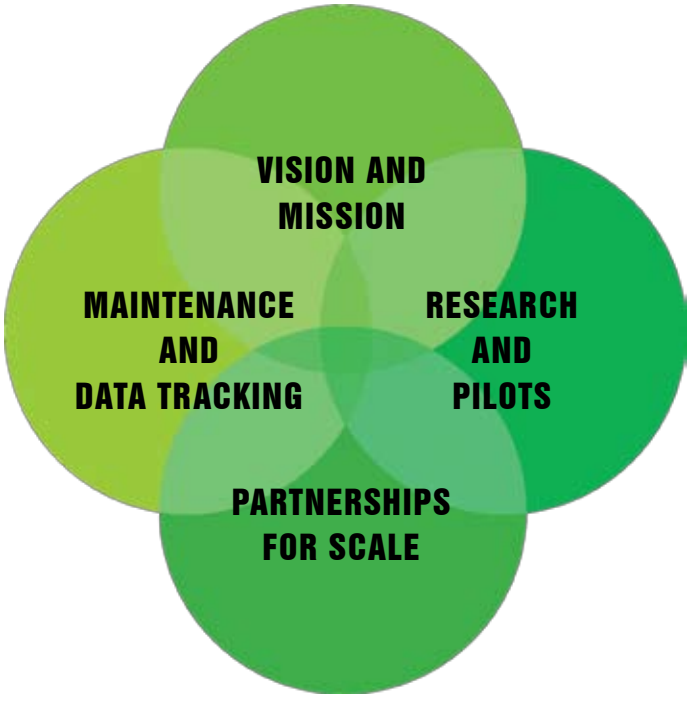
Note from CARPE

CARPE is an Aurangabad-based social enterprise dedicated to designing and implementing research-driven solutions to civic and environmental challenges in collaboration with multiple partners including government, industry and civil society. We have dedicated the past three years to studying and understanding sectors such as solid waste management, education, menstrual health management in the context of Aurangabad and then devising the right partnerships or interventions to address the various issues.

Afforestation, ecological restoration and green cover management emerged as an area of research due to corporate and government interest. A section of our research on urban governance showed that 'tree plantation' was the second most popular activity (after clean up drive) among corporators to engage with their constituency. Our survey of Aurangabad-based companies and their CSR interests showed that 63% of the respondents had "tree plantation/ greening" as a CSR mandate. Despite this interest from city leadership and industry, Aurangabad and Marathwada fare poorly in this sector.

It was clear that the city needed a planned and strategic approach. And to build a strategy requires data. This strategy document is our effort to document and share the efforts taken under this mission by all parties concerned, and to invite others involved in the sector to contribute to a pooled knowledge bank.

Natasha Zarine,
Managing Director
Center for Applied Research and People's Engagement



The CARPE CSR Research & Application methodology

Acknowledgement

This report is the culmination of efforts taken place over multiple months, and with multiple partners. While words fall short, it is imperative that we express our gratitude to the key persons who have played a role in making this mission a success. The acknowledgement of Grind Master Machines Pvt Ltd (GM), the CSR Funder of this mission goes without saying, especially since GM has invested not only its CSR funds, but also been a partner in a true sense, in their vision, adaptability, flexibility and inspiration.

We would also like to thank, Mr. Sunil Kendrekar, (IAS), Hon'ble Divisional Commissioner, Aurangabad Division for encouraging Grind Master Machines Pvt Ltd and CARPE to take up 'green cover management' in this region as an area of research and impact. His commitment to the upliftment of this region is a driving force for many.

We would like to thank Mr. Chiranjeevi Prasad, (IPS) Hon'ble Commissioner of Police, Aurangabad, for his vision and interest in leading this mission by example. His focus on improving the social and environmental fabric of this region through many positive interventions that go beyond policing and law & order are commendable.

We thank Mr. Nipun Vinayak, Hon'ble Municipal Commissioner, AMC, and Mr. Uday Chaudhari Hon'ble Collector, Aurangabad District, Mr. Nandkumar Ghodhele, Hon'ble Mayor of Aurangabad, for their encouragement and support. A specil thanks to Mr. Pramod Rathod, Hon'ble Corporator, Aurangabad and Ms. Madhuri Adwant, Hon'ble Corporator, Aurangabad for their active involvement in the execution of the tree-census pilot, and for their time in mentoring the student volunteers. We extend our thanks to all 50 corporators who participated in the Corporator's CSR survey.

We thank Ms. Pavneet Kaur, (IAS) Hon'ble CEO, Zilla Parishad, Aurangabad for her collaborative leadership, her far-sighted approach and her can-do & will-do attitude that has given an impetus to this mission. Her vision to integrate greening efforts with educational initiatives, thus spreading knowledge and inspiration across the populace though the 100 schools program, ensures that the message of planting and nurturing trees is etched in the minds and hearts of generations to come.....

.....We thank, Mr. Prakash Mahajan, Hon'ble Chief Conservator of Forests, Mr. Wadaskar Deputy Conservator of Forests, Mr. from the Forest Department for the Daulatabad Hill Side Plantation. Their vast knowledge and support means a lot to us.

We would also like to thank Mr. Virendra Tiwari, Hon'ble Additional Principal Chief Conservator of Forests, Mantralaya and Mr. Vasudevan, Hon'ble Chief Conservator of Forests, Mangrove Cell, for their kind guidance and support.

We thank MIDC & MECC for the swift paperwork for the permission to develop the EcoScape in Waluj MIDC. We thank CANPACK and MIT for having the foresight to take up the pilots of Miyawaki Forests on their premises when the concept wasn't known to most people in the city. We thank Mr. Ashish Garde and the trustees of Astha Foundation, as well as Mr. Milind Bapat and Mr. Rahul Mishrikotkar for reaching out, and partnering on this program.

We thank Ashoka University, Vijyendra Kabra College, for their partnership on the research project into native forest species seedbank. Our native species survey would have been incomplete without the enthusiasm and guidance of Professor Dr. Pardeshi, thus we express our sincere thanks to him. A shout out to Sijo, Dev and Harry from the Maharashtra State Innovation Society for their immense support and guidance.

We want to thank the dedicated and determined team at EcoSattva who work diligently and with love and dedication to make all these pilots succeed, Siddharth, Prakash, Prem, Samir and Atul.

Finally, we are deeply grateful to each and every person who has been part of this mission, especially our friends in the media, who have directly or indirectly assisted in spreading information about the various methods, partnerships and data available towards achieving the goal of Green Aurangabad and greener cities at large.

Contents

The ‘Jarul’ plant also known as ‘Pride of India’ is the State Flower of Maharashtra

How to read this report

Designed as a practical illustration for stakeholders within the afforestation and ecological restoration sector in the Aurangabad region, this document serves as a collection of interventions – both implementation and research – in the sector.

The first segment consists of case studies of projects that have been completed and serves to provide readers a perspective on processes, partnerships and impact that can be expected from similar interventions in the future. It will allow funders to pick the strategies that most closely align with their CSR mandate/ philosophy.

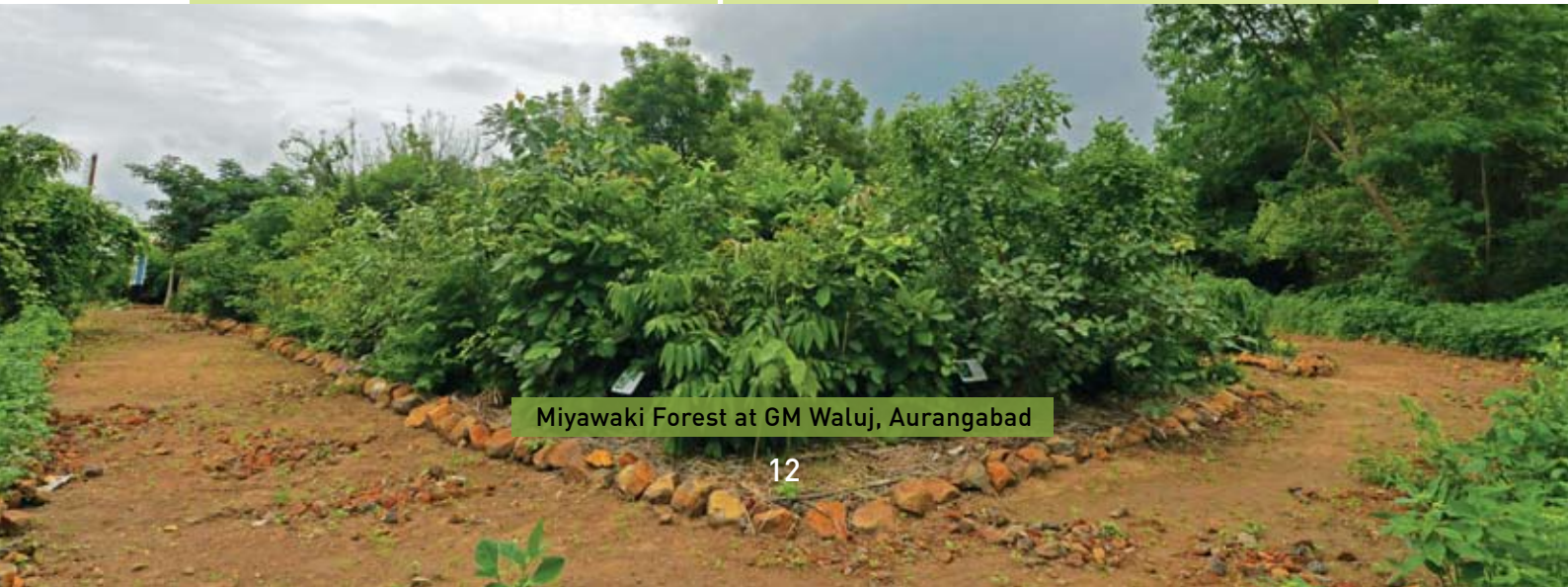
The next segment provides details of the research needed to strengthen the sector in this region and efforts taken for waste-water treatment and reuse, that goes hand-in-hand with any major greening effort.

The way forward section mentions the next target of the mission as well as methods in which people can partner in this effort. The report is meant to demonstrate the immense possibilities for creating impact in this sector, and inspire multi-stakeholder partnerships for achieving ecological balance and furthering state, national goals and global Sustainable Development Goals.

1. Snapshot

The table below summarizes the key interventions undertaken under the GAM and the rationale behind choosing them. You can read more about each of the interventions in detail later in the document.

Initiatives	Advantages
A. Miyawaki Native Dense Forest	
A. Miyawaki Native Dense Forest on Private land 1. Satara, Aurangabad 2. Grind Master Machines Pvt. Ltd., Waluj 3. Can Pack India Pvt. Ltd., Waluj 4. MIT College, Aurangabad 5. Sai Mandir, Aurangabad 6. Astha Foundation Senior's Home, Jadgaon B. Miyawaki Native Dense Forest on Government land 1. Public Health Centre, Verul 2. Office of Commissioner of Police, Aurangabad 3. Aurangabad Green School Mission - 100 forests	Efficient and economical use of land and water resources in urban areas
	Conservation of native botanical species and biodiversity
	30 times denser compared to conventional plantations and 30 times more carbon sequestration
	Fast growing, quick results in lowered dust/noise pollution. Better buy-in from stakeholders
	Self sustainable after 3 years, thus lower maintenance costs and better sustainability
	To be used only on fallow urban land, or land where forests once stood
	Not to be used to replace grasslands or other native ecology



Miyawaki Forest at GM Waluj, Aurangabad

B. Ecoscaping & Ecological Restoration for Green Cover Management

1. Green Belt Grind Master Machines Pvt. Ltd., Waluj MIDC & MECC 2. Gol Tekdi Biodiversity Park with CIDCO Waluj 3. Daulatabad Hillside Ecological Restoration with Forest Department 4. Green Traffic Islands in Aurangabad Municipal Corporation	Government Partnerships enable Scale and Sustainability
	Conservation and display of local flora, creation of micro habitats and conservation of bio-diversity
	Effective for private plots that cannot support forests/ tall trees due to over-head wires, underground plumbing, or to use for recreational purpose
	Facilitates a human – nature connect
	Ecological Restoration most economical and environmentally appropriate for large tracts of land

GM EcoScape, MIDC, Waluj

C. Research

1. Prakriti Research Fellowship 2. CARPE Campus Club 3. Native Seed Bank 4. Tree Translocation 5. Tree Census Pilot for Aurangabad City 6. Survey: Elected Representative's priorities 7. Survey: Corporate CSR priorities 8. Survey: Open spaces in AMC	Generation of urgently needed data and research for enabling ecological conservation
	Involvement of youth – and community for environment conservation by providing knowledge, skills and opportunity to create real time impact
	Generation of data that can inform CSR investments in the space

Sorting and Labeling Seeds for the Native Forest Species Seedbank

D. Waste Water Treatment

A. Eco-STP (Sewage Treatment Plant)

1. Grind Master Machines Pvt. Ltd. Railway Station MIDC, Aurangabad
2. Grind Master Waluj MIDC, Aurangabad
3. Osborn Lippert India Pvt.Ltd. Waluj MIDC, Aurangabad

B. Nala restoration

1. MIT Collage, Beed Bypass, Aurangabad
2. BAIF, Uruli Kanchhan

Works on ecological principles with minimal carbon footprint

Economically viable – skilled operator not required

Ecologically sustainable

Saves water bodies from contamination

Requires no mechanical parts or electrical consumption or chemicals - low maintenance cost

Provides treated water for reuse in greening efforts

GM Waluj EcoSTP

The Aurangabad Division, also known as Marathwada

2. Introduction

"Marathwada has barely 6% of forest area, while 94% of the land area is without any green cover[2]. This poses a serious challenge to sustainable development. Let everybody in Marathwada come together to pledge to turn green areas in their neighbourhoods and contribute to the global cause of environment conservation. This effort can prevent natural disasters like drought, floods and landslides. We must remember that the little drops of water, the little grains of sand make a mighty ocean and the massive land."

Praveen Srivastava, CCF & Dy. DG of
Social Forestry dept (Marathwada region)[3]

Aurangabad Division (also known as the Marathwada Region) is spread over about 65000 sq km and has a population of over 1.88 crore. The landscape of Aurangabad's urban region is increasingly devoid of ecological elements and the region does not meet any global/ national standards for green cover. For an already dry region that is prone to droughts[4] and adversely dry climatic conditions, a focus on enhancing green cover on fallow urban land can help combat multiple problems like air quality, water retention, temperature control and as research is increasingly showing, mental health as well[5]. However, we must also caution against replacing the original local ecology with an alien one in the pursuit for a greener environment[6]. Thus, through our multiple consultations with experts and desk reviews of relevant research publications, we have taken an approach to greening that does not destroy the local grassland and thorny scrub ecology while still addressing contemporary challenges and meeting standards of green cover.

2 https://timesofindia.indiatimes.com/home/environment/global-warming/Depleting-green-cover-poses-threat-to-Marathwada-Experts/articleshow/20433942.cms
3 https://timesofindia.indiatimes.com/home/environment/global-warming/Depleting-green-cover-poses-threat-to-Marathwada-Experts/articleshow/20433942.cms
4 https://www.downtoearth.org.in/news/why-marathwada-is-becoming-a-graveyard-for-farmers-49832
5 https://www.pnas.org/content/116/11/5188
https://www.smithsonianmag.com/smart-news/does-exposure-green-spaces-childhood-lead-better-mental-health-180971590/
https://www.researchgate.net/publication/282331597_Green_Space_and_Mental_Health_Pathways_Impacts_and_Gaps
https://www.who.int/sustainable-development/cities/health-risks/urban-green-space/en/
6 https://www.thehindu.com/news/national/kerala/exotic-trees-eating-up-western-ghats-grasslands/article25892844.ece
https://www.livemint.com/Opinion/nlPPJt40XbbNbjH98D9LeJ/The-right-way-to-save-Indias-forests.html

Standards for Green Cover

Sr. No.	Source	Standard
1.	World Health Organization	The WHO recommends that every person should have access to green open space within a walking distance of 15 minutes
2.	National Forest Policy	The National Forest Policy aims and emphasizes at maintaining 33% of the country's geographical area under forest and green cover
3.	Urban Development Plans Formulation and Implementation (UDPFI)	As per the 1996 UDPFI guidelines of the Urban Development Ministry, recreational areas should comprise 20-25% of the total developed area in metropolitan (million plus population) cities, 18-20% in medium towns/large cities, and 12-14% in small towns. Areas under parks, playgrounds, botanical gardens, open spaces etc are classified under land for recreational use/open spaces in the Master Plans of Indian cities

Planting and maintaining trees, forests and and ecological restoration have costs associated with them and various factors such as land availability and allocation and complementary/ competing land-use potential, species used, water requirement and availability, funding, intended impact and intended beneficiaries etc. need to be considered at the planning stage itself. It is especially challenging to grow and sustain green cover in urban environments that have more competing claims on land. Hence, a strategic approach that optimizes current resources, sets appropriate targets and takes into account the roles and responsibilities of various stakeholders, and the impact on the natural ecology of the region is necessary.

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Thus, through the planning and implementation phase of the Green Aurangabad Mission, the following

1. Identify, document and maintain the existing green cover.
2. Increase green cover in an ecologically sound manner to achieve environmental standards.
3. Generate research and Data that is relevant to the Aurangabad Ecological Context.
4. Engage relevant stakeholders through effective partnerships for maximizing impact.
5. Pilot & develop waste water recovery and reuse methodologies to support plantation efforts.

Sustainable Development Goals and the Green Aurangabad Mission

In the year 2015, all member nations of United Nations General Assembly adopted a collection of 17 Sustainable Development Goals also known as SDGs to achieve by 2030. Emphasizing on social, economical and environmental sustainability for all, these goals are closely integrated with each other and progress in one area will also affect outcome in others.

The Green Aurangabad Mission serves to further our country's progress towards 4 of the 17 goals, as described below.

SDG 11 – Sustainable Cities and Communities: Making cities sustainable means... building resilient societies and economies. It involves investment in public transport, creating green public spaces, and improving urban planning and management in participatory and inclusive ways[1].

The aim of the GAM is to create paths towards a sustainable region, with the participation of the community. Whether it be planting forests on fallow urban land, or generating research into best practices for ecological restoration, the GAM pulls towards this goal.

SDG 13 – Climate Action: Climate action means stepped-up efforts to reduce greenhouse gas emissions and strengthen resilience and adaptive capacity to climate-induced impacts, including: climate-related hazards in all countries; integrating climate change measures into national policies, strategies and planning; and improving education, awareness-raising and human and institutional capacity with respect to climate change mitigation, adaptation, impact reduction and early warning[2].

Climate change is finally being acknowledged as a reality. One of the ways in which the Green Aurangabad Mission impacts this goal is through on-ground action and building channels for reforestation, ecological restoration and afforestation on barren land[3] and building institutional capacity to do so.

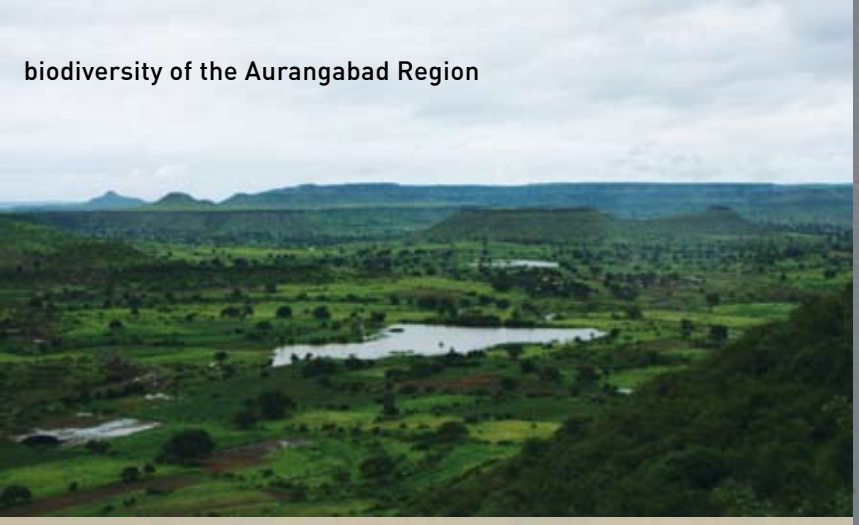
SDG 15 – Life on Land: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

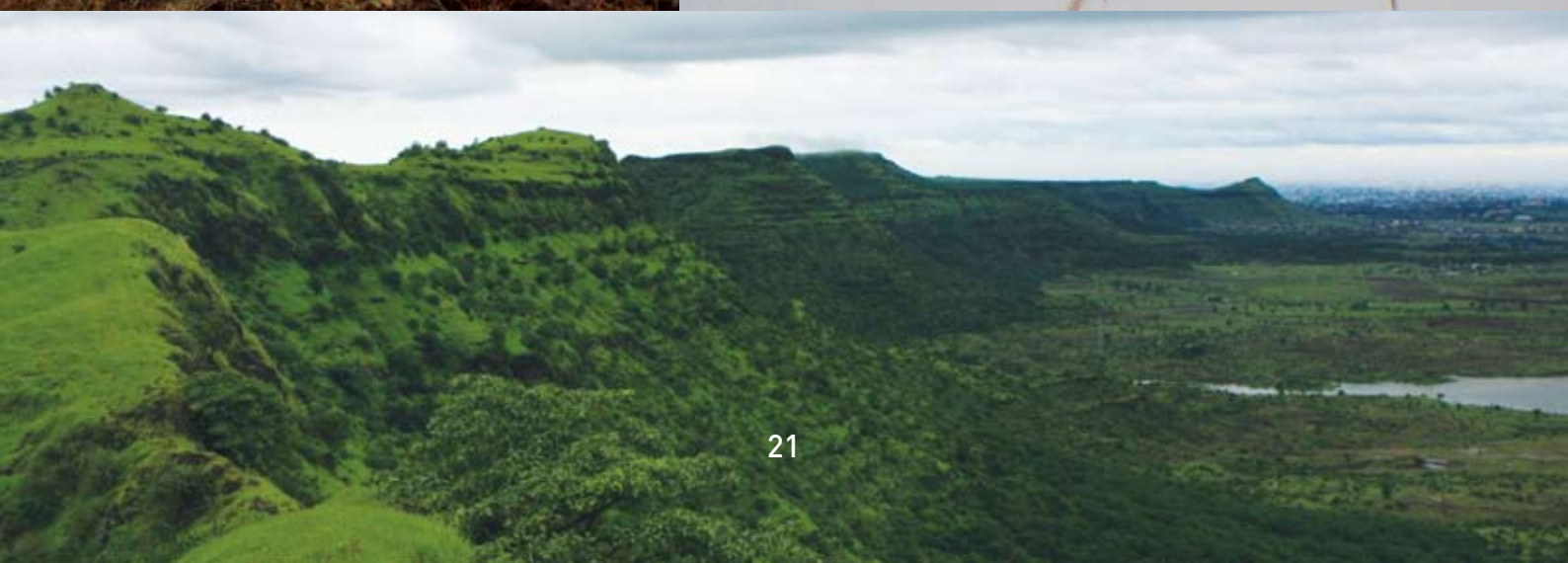
According to studies, the Earth is currently experiencing a spate of species die-offs since the loss of the dinosaurs 65 million years ago, which is being termed as the 6th Mass Extinction[4]. The Green Aurangabad Mission strives to bring attention towards this through pilots.

SDG 17 – Partnerships for the Goals: A successful sustainable development agenda requires partnerships between governments, the private sector and civil society. These inclusive partnerships built upon principles and values, a shared vision, and shared goals that place people and the planet at the centre, are needed at the global, regional, national and local level[5].

The Green Aurangabad Mission has been instrumental in building multi-stakeholder partnerships for climate action. These partnerships, many of which have been the first of their kind in the country, harness the strengths and resources of each stakeholder to create sustainable impact at scale. Thus furthering the vision of this program.

1 https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-11-sustainable-cities-and-communities.html
2 https://www.sdfinance.undp.org/content/sdfinance/en/home/sdg/goal-13--climate-action.html
3 The Global Tree Restoration Potential
4 The Sixth Extinction: An Unnatural History Kindle Edition by Elizabeth Kolbert (Author)
5 https://www.undp.org/content/undp/en/home/partners.html



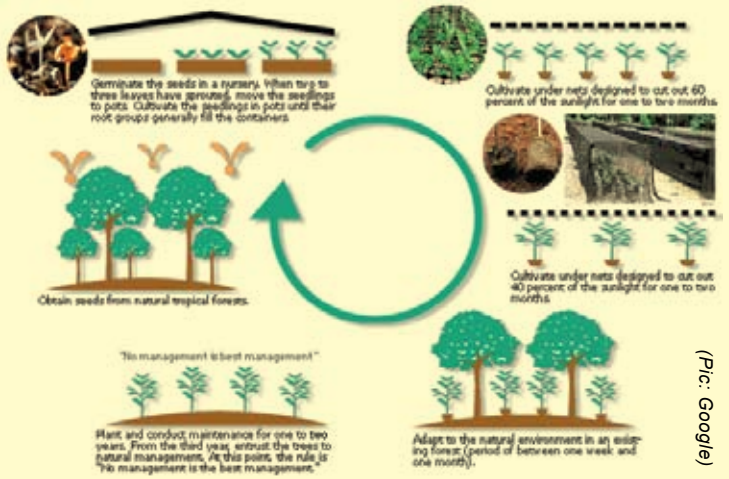


Projects Executed Under the Green Aurangabad Mission

A number of pilot projects with multiple partnerships were executed under Green Aurangabad Mission. This section introduces the readers to the basic techniques and acquaints the reader with resource requirements for implementation and partnerships required to achieve scale.

A. MIYAWAKI NATIVE DENSE FOREST

1. Selection of area



(Pic: Google)

2. Multilayer plantation species selection

3. Soil preparation

4. Tree plantation

5. Mulching and watering

6. Growth of forest

The Miyawaki Method Native Dense Forest- a modern plantation method used for afforestation- was developed by Japanese ecologist Dr. Akira Miyawaki[7]. It is aimed at creating an accelerated forest equivalent to a 100 year indigenous forest within 10 years. In practice, the soil is amended for optimal growth outcomes, seedlings are spaced very close to induce competition and mulch is used to conserve soil moisture and suppress weed growth. The Miyawaki technique is based on natural principles for faster growth and self-sustainable native forest cover.

Mimicking a dense forest in which trees crowd together to form a thick canopy that shelters vegetation beneath it, this technique involves planting of a number of different types of trees (top canopy, mid canopy, shrubbery and ground cover) to create and sustain a healthy co-existence. This methodology has showed positive results in various geographies and temperatures. The land required is much lesser than in traditional plantations. Such a forest can be created in a private backyard, public open spaces, educational campuses, public parks, and any other type of open space that was previously forested[8].

The Miyawaki Method has gained a lot of interest in recent times, with the government publishing a GR to the effect as well. However, ecologists suggest to tread with caution, to ensure that grassland ecosystems and other important local ecosystems are not replaced with tree/ forest ecosystems in an over enthusiasm to plant trees.

The following features make Dense foresting an excellent option for increasing the green cover of urban regions in Marathwada:

- Gautala Wildlife Sanctuary and local publications serves as a reference for forest species in the region.
- Minimal land requirement, efficient use of even small plots of high-value land (minimum area 100 sq mt) in urban and rural areas.
- Preserves the biodiversity of the region, including a mix of at least 50 to 100 different species thus improving species diversity in urban areas.
- Every element needed to make a forest is available around the site as the technique is adaptable. In addition the forest becomes self-sustaining in ~3 years. This is suitable for the water scarce situation of Marathwada.

7 https://en.wikipedia.org/wiki/Akira_Miyawaki
8 https://www.afforestt.com/methodology

Compared to a conventional plantation, the trees in Native Dense Forest grow 10 times faster and 30 times denser, and the forest is multi fold more biodiverse than conventional plantations. This results in a strong buy-in to protect the forest by stakeholders.

- Can serve as a sound and dust barrier in congested urban spaces in the region.
- Also serves as a natural sink to conserve water and soil that would otherwise get eroded with the run off.
- Creates micro-sanctuaries for birds and other fauna that survive in urban areas.
- Helps in conservation of native species of flora and fauna, allowing for easy harvesting and storage of seeds of medicinal and other importance in the area.
- Easy and low cost maintenance, less labour and water resource requirement per sapling and Self sustainable forest after ~ 3 years.
- Helps with ground water percolation.

Location	Date of Plantation	Area (sq. ft.)	No. of Species	No. of Saplings
Dense Forests on Private Land				
1. Satara	29th Dec. 2016	2400	43	740
2. Grind Master Machines Pvt. Ltd., Waluj	29th Dec. 2017	7000	68	2600
3. Grind Master Machines Pvt. Ltd., Waluj	29th July 2018	4000	80	1200
4. CanPack Cans Division	Sept. 2018	4000	72	1200
5. MIT College Boys Hostel	Feb. 2019	1250	48	400
6. Astha Foundation	Aug. 2019	5000	52	1500
7. Sai Mandir	Oct. 2019	2000	52	700

Dense Forests on Public Land				
8. Public Health Center, Verul	29th March 2019	7265	80	1700
9. Office of the Commissioner of Police, Aurangabad	7th June 2019	7030	64	1750
10. Aurangabad Green School Mission covering 100 Zilla Parishad Schools	on-going	200000	54	70000

Innovative Partnerships for Impact

A. Educational Institutions' Engagement in Green Cover Management

The special feature of the plantation at MIT College is the involvement of the CARPE Campus Club - a student group from MIT college in planting and maintaining the dense forest. It adds an element of education and capacity building to the dense forest plantation. The vision of the CARPE Campus Club program is to harness the power of youth to generate knowledge driven solutions to civic and environmental challenges of Aurangabad and beyond, through experiential learning that translates academic pursuit into impact in the real world. Students receive training in research design and evidence driven decision-making, systems thinking and problem solving, thus equipping them to become competent professionals/ entrepreneurs as well as engaged citizens. At MIT College, students completed the classroom sessions of CARPE Campus Club, received training in the Miyawaki methodology, executed the plantation and are also responsible for maintaining it.

B. State Government's boost to innovation through the MSIS

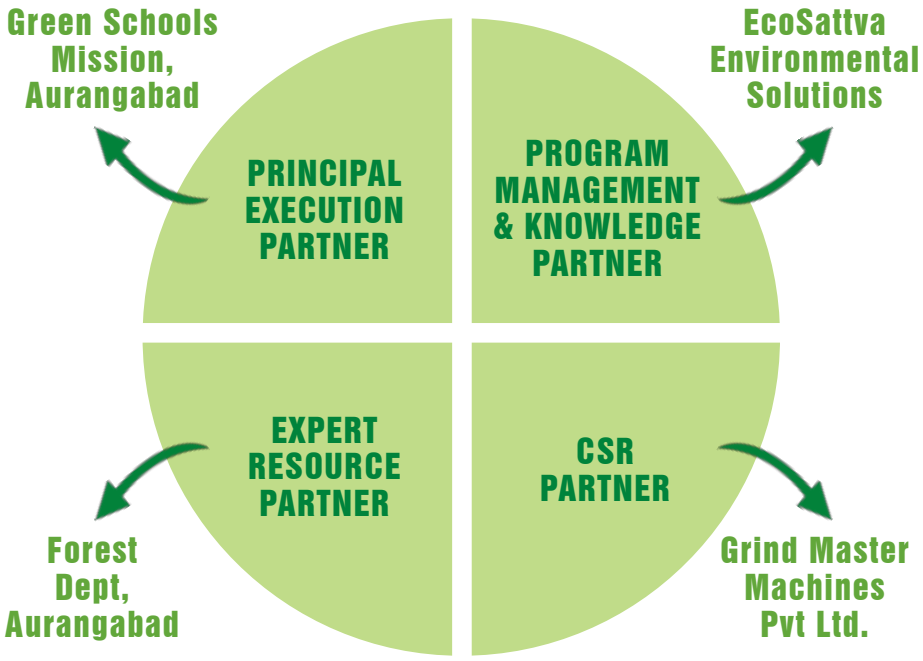
WINNER OF MAHARASHTRA STARTUP week

Ecosattva Environmental Solutions Pvt. Ltd. was awarded as one of the top Startups in the country by Maharashtra State Innovation Society during the Maharashtra Startup week, 2018 for the services of Ecoscaping, Wastewater treatment and Miyawaki Dense Forest. The prize money was spent on planting the dense forest on Public Health Centre in Verul. Grind Master Machines Pvt. Ltd. came on board to provide fencing to this plantation. This is a great example of a partnership that harnesses the capacities of each partner, resulting in effective and efficient use of resources.

"We experimented with the Miyawaki Method of Afforestation thanks to the MSIS and EcoSattva award, by planting the first one at the PHC in Verul. The results have been very promising. Thus, I have decided to take the conservation of native species, the planting and nurturing of forests to our villages and schools. I want our coming generation to have real world knowledge about their natural heritage, with a practical understanding about conservation and climate action. Thus, the Green Schools Mission was born."

Pavneet Kaur (IAS), CEO, Zilla Parishad, Aurangabad

C. Partnerships to achieve scale, Green Schools Mission, Aurangabad



Public-Private-Partnership for optimal use of resources to meet development goals

The Green Schools Mission is born out of a need to scale the positive impacts of the Miyawaki Method through effective, equitable and efficient use of resources. The expertise and strength of each partner is utilized symbiotically to build maximum impact through collaboration, partnerships, knowledge and credit sharing, and putting proportionate skin in the game.

The mission aims to create Miyawaki Method Native Dense Forests across 100 sites in schools and institutions in Aurangabad (rural) to build green-lungs for the schools and villages, as well as to comply with Green Maharashtra Mission – Harit Maharashtra Abhiyan. However, the uniqueness of this program comes from the democratisation of the knowledge behind the Miyawaki Method. This is done through training a team of Zilla Parishad and Forest officials called the

Zilla Parishad and EcoSattva Team after the GSF training


Pavneet Kaur (IAS), ZP CEO, addressing her 120 HMs

Miyawaki Core Team who will oversee the implementation of these forests, as well as training a team from each school to implement the Miyawaki Method effectively. This program also focuses on spreading awareness about the need for native species conservation to schools. The program is designed in a way to instil ownership of the forests and the impact that the school will make through nurturing it to maturity.

1. Thus, this program consists of 4 components:
   Training & Awareness: Of a Miyawaki Core Team and a team from each of the hundred schools consisting of 1 teacher + 1 headmaster + 2 students.
2. Plantation and Nurturing of 100 Miyawaki Forests (one per school).
3. A Green Schools Premier League (GSPL): To encourage schools to focus their attention towards the growth of the forest + students' and community engagement in the forest.
4. A scaling plan for covering more schools and areas in an efficient, sustainable and effective manner through partnerships such as this one.

The Miyawaki Core Team has been formed and has received an exciting classroom training filled with activities and learning, as well as on-ground practical training in the method. They are also trained in methods of digital documentation, growth tracking and reporting.

The Headmasters of over 120 schools attended the orientation program, where they were explained the process, the goals, and the expectations from each stakeholder. The Headmasters were most excited, and the work on-ground has begun in October itself. From 100 expected schools, the number has gone up to 120 already.

The in-depth training of one teacher and 4 students per school was also conducted. This team is called the Green School Force that is in charge of the plantation at each school. The first plantation was kicked off in October, 2019.

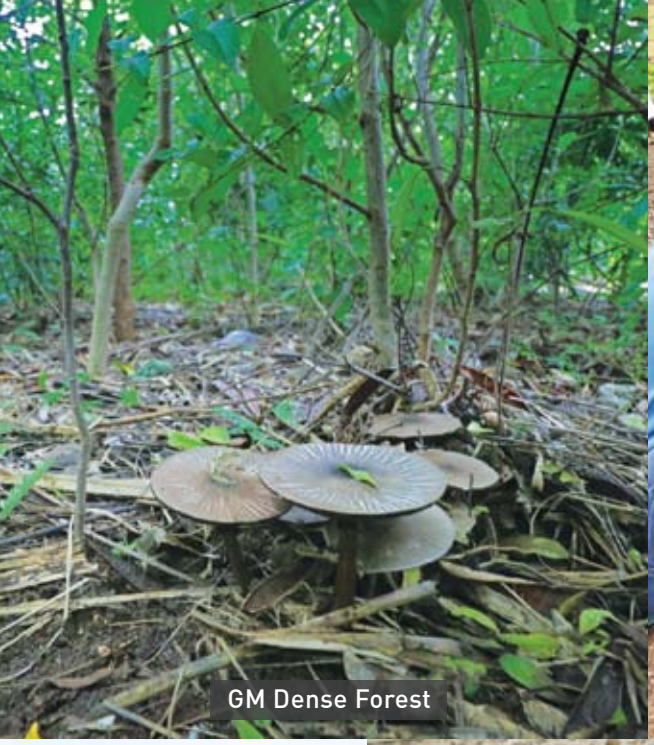
CP Office Dense Forest

CP Office Dense Forest

Satara Dense Forest

MIT plantation

Verul Dense Forest -



GM Dense Forest

Aastha Foundation - Plantation Site

Canpack Plantation

Plantation Day

Verul Dense Forest

B. ECOSCAPING FOR GREEN COVER MANAGEMENT

Dense forests, while great for urban greening, creating green lungs within the city are not suitable for all locations. Flora of Marathwada region is characterized by dry deciduous forests, open scrub and thorn forest and grasslands (Flora of Maharashtra). These ecosystems support rich biodiversity ranging from large mammals such as leopards, wolves, foxes, deer; smaller animals such as hare, porcupines, and many different species of birds, butterflies, and reptiles. Therefore, it is also important to create ecoscapes that reflect the uniqueness of this region, and it is essential to make sure that inappropriate plantation efforts don't undermine or destroy the natural ecology of this region. The projects listed below harness and build upon the existing biodiversity of the Marathwada region.

Location	Date of Plantation	Area
Ecoscapes on Public Land		
1. Green Belt - GM, Waluj	Sept. 2019	9800 sq. ft.
2. Hillside Plantation Abdimandi, Khultabad	April 2018 onwards	2 hectares
3. Green Traffic Islands, Aurangabad city	May 2016	3 islands
4. GolTekdi Assessment - for Development of a Biodiversity Park	April 2017	10 acres

GM Green Belt

1. The Grind Master green-belt eco-scape is a unique plantation that mimics the ecological landscape of the region in a controlled environment, and reflects the local topography, flora, thorny shrub forests and grasslands that are native to the Aurangabad region. The dry-river bed along with natural sit-out areas provide a unique opportunity for humans to interact with the natural landscape - promoting appreciation for plantation that is not typically "lush green" but is closer to the natural ecology of the area.

   The land belongs to the MIDC and has been adopted by Grind Master under a scheme to green the area as floated by the MIDC, Waluj and the Marathwada Environment Care Cluster.

2. Grind Master is the first company in the region to sign a tripartite agreement for environmental conservation on Forest Land. The tripartite agreement was made at Aurangabad on 31st March 2018 between Government of Maharashtra, Grindmaster Machines Pvt. Ltd and Centre for Applied Research & Peoples Engagement (CARPE). This partnership, while complex to establish, provides the project sustainability and acknowledgement that is often lacking in other tree plantation projects. Since this was the first agreement to be signed with no precedence/ templates available, it took over nine months to establish the partnership. The State Government is positive about similar associations in the future.Till now 1800 saplings of 38 species have beenplanted and maintained in this area in between 2014 to 2018.

3. In 2016, the Aurangabad Municipal Corporation announced a scheme to 'adopt a traffic island' that was dilapidated, broken or missing, to spruce up the city roads. Grind Master used the opportunity to create small green-spaces within the city. Grind Master has adopted 3 traffic islands for 5 years in Aurangabad under this initiative which are as follows:

A. Traffic island, Near Vits Hotel, railway station road, Aurangabad.
B. Sanvidhan Chowk, Next to SSC board, Aurangabad.
C. Traffic island, Near Gopal tea centre, railway station road, Aurangabad.

Proposed Site for Golwadi Tekadi Biodiversity Park

Goltekadi Biodiversity Park Plan

4. Gol Tekdi (750 16'25" E and 190 50'57"N) is a small hill near Aurangabad city. Though currently it's a barren land, it has elements of both an open scrub forest and grasslands.

The range of microhabitats present at this site- rock surface, grassland patches, rock crevices, soil covered areas and deep soil areas, make it suitable for restoring trees and shrubs native to each of these microhabitats. In addition, closeness of the site to Aurangabad city makes it ideal to develop it as a nature education reserve. Thus, we present here a proposal focused on developing GolTekdi as a Biodiversity Education Park.

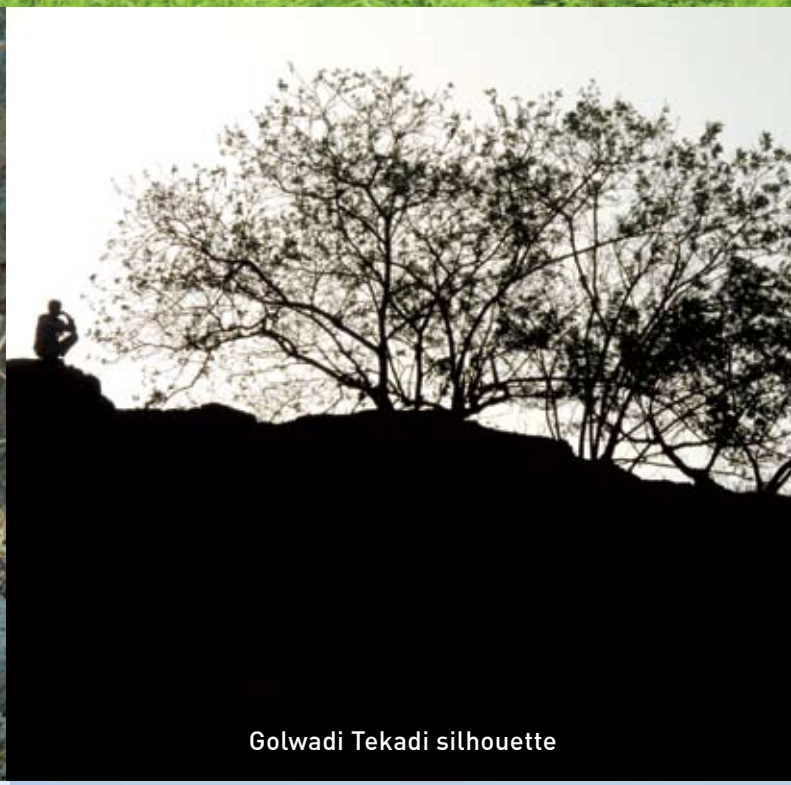
A biodiversity survey was conducted on 18th-19th April '17 by a team of biodiversity experts.

Based on the biodiversity assessment and site visits, we propose developing the entire GolTekdi region into 5 different zones as described below:

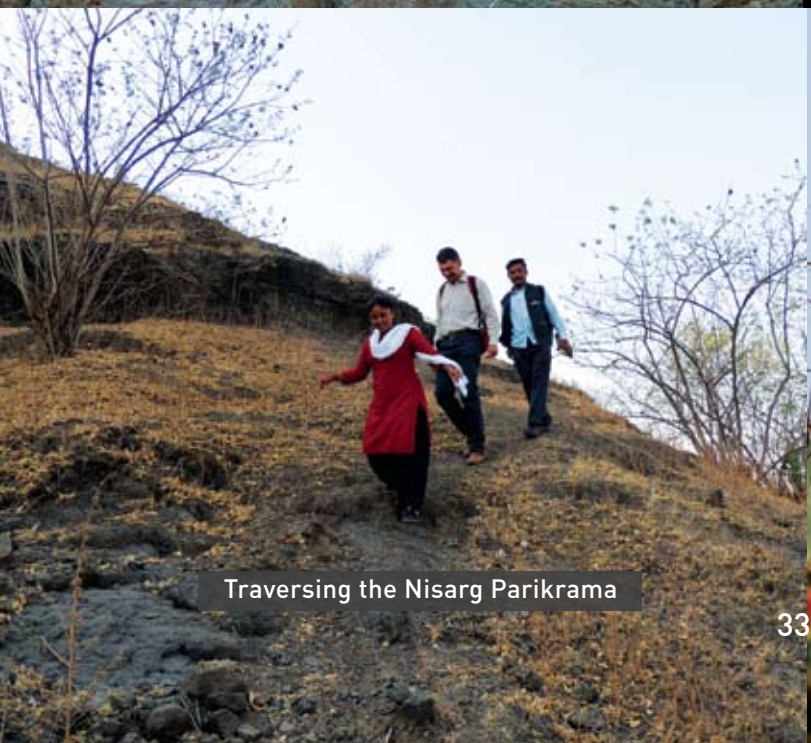
A. Nisarg Parikrama- A 1 km long walking route for visitors along the circumference of Gol-Tekdi. Native trees will be planted along this trail wherever the soil is deep.
B. Bird oasis- The steps leading to the Chatri with a buffer of 10 meters of either side of the steps will be developed as an oasis for birds. This will be a dense plantation with species suitable for birds, and shade giving trees. Trees will be planted after every 10 ft along the path.
C. Chatri- Few native trees of aesthetic value will be planted around the Chatri region.
D. Rocky habitat- Maximum area of the GolTekdi region is rocky habitat. Around 30-50 native trees suitable for rocky habitat will be planted in this zone wherever possible.
E. Urban forest- A dense plantation of native trees and butterfly friendly herbaceous and shrub species belonging will be planted in this zone. This area will be developed like a biodiversity park, where visitors can relax and rejuvenate under the shade of native trees. The depression between the deep soil and the Tekdi slope will be filled with gravel to create a groundwater recharge zone, which will benefit the plantation immensely in the summer months.

Daulatabad Hillside Ecological Restoration - Forest Dept - GM - CARPE Partnership

Caralluma fimbriata- native medicinal herb



Golwadi Tekadi silhouette



Traversing the Nisarg Parikrama

Opuntia species- fruit is edible

Campus Club on Field

C. RESEARCH AND DATA GENERATION

"Despite the enormous benefits that green spaces provide there is a serious lack of information on quantity and quality of green spaces available in Indian cities and towns."

Urban Greening Guidelines 2014

"A comparative study of green cover in major Indian cities would be extremely difficult toconclude, given that there is hardly any norm of tracking and monitoring. With the exception of one-time, isolated studies conducted by different organisations following disparate methodologies, there is not much to go by."

Citizen Matters

Research has been the cornerstone of all of CARPE's work across sectors. The sector of ecological restoration is especially data-poor not just in terms of availability of updated information, but also in terms of expertise in research design and methodology. Any serious progress is only possible when we begin to plug the data gaps one piece at a time. This section of the strategy document elaborates on the research initiatives and proposals under the Green Aurangabad Mission.

Translocated Banyan Tree Trunk After 2 months

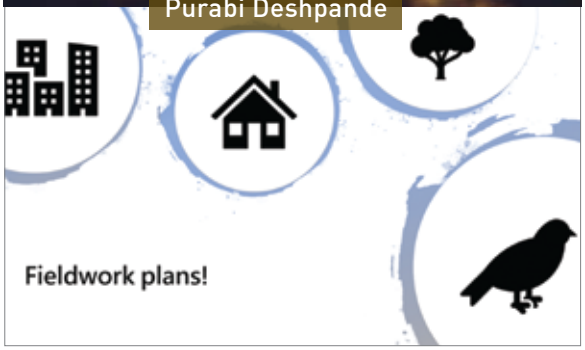
Seed Germination at Native Species Nursery

Project	Project Partners
1. Prakriti Research Fellowship	GM, CARPE, CANPACK
2. Pilot: Tree Census	GM, CARPE, CANPACK, Vijendra Kabra College of Social Work
3. Pilot: Native Seed Bank	EcoSattva, Ashoka University, GM
4. Pilot: Tree Translocation	EcoSattva, GM
5. Survey: Parks, Gardens and Open Spaces	CARPE, CANPACK, Vijendra Kabra College of Social Work
6. Survey: Corporator Perspectives on Green Cover Management	CARPE, CANPACK, Vijendra Kabra College of Social Work
7. Survey: Corporate CSR Perspectives on Green Cover Management	CARPE, CANPACK, Vijendra Kabra College of Social Work

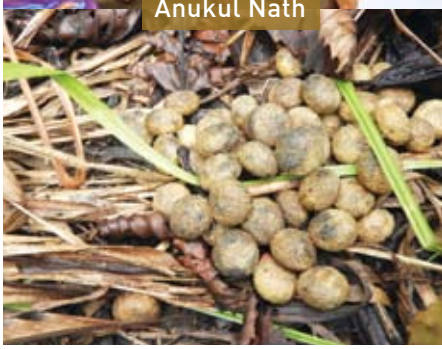
Year	No. Applicants	Fellows	Project Titles
2018	40	1. Ms. Radhika Kothari	Creating a Bio-cultural portfolio to inform long- term conservation action in eastern Ladakh
2019	88	1. Mr. Tushar Pawar	To assess status and distribution and prepare a community based conservation plan for conservation of Indian pangolin (Manis crassicaudata) in Bhimashankar Wildlife Sanctuary
		2. Ms. Purabi Deshpande	Making a case for urban biodiversity by quantifying urban bird-tree interactions
		3. Mr. Pankaj Korparde	Conservation of city wetlands through crowd studying Odonates (dragonflies & damselflies) in Marathwada region
		4. Mr. Anukul Nath	Strengthening the conservation needs of endangered Hispid Hare in Manas World Heritage Site
		5. Mrs. Jui Pethe	Community based conservation in Anjaneri hills, Western Ghats

Tushar Pawar

Purabi Deshpande



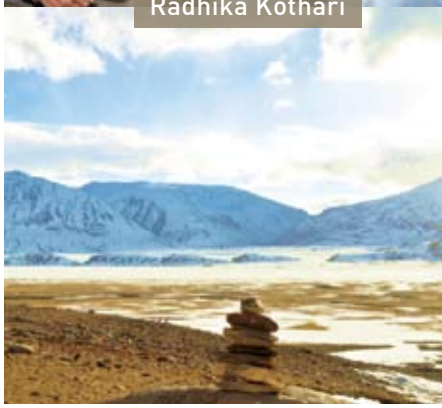
Anukul Nath



Jui Pethe

Pankaj Koparde

Radhika Kothari



1. Prakriti Research Fellowship

Prakriti Fellowship is a small grants programme initiated to support nature conservation research and action with a focus to create a direct tangible long-term impact on nature conservation in Aurangabad and beyond. The fellowship aims to provide seed money for strong on-ground work done by individuals, teams, and small NGOs in this field from various Industry partners. Each research project under the fellowship is awarded a sum of up to two lakh rupees.

While applications from across the country are accepted, Marathwada is special a category in itself and proposals from Marathwada are judged separately to ensure that research from this region is funded.

" The Prakriti Research Fellowship has been a great support to me and my partner. Not only have we been able to conduct our research and follow our passion, we have also been able to establish our organization. We need more funding in the ecology space in India, I am very grateful to my sponsor GrindMaster"

Radhika Kothari

"It is really depressing to see that in our country, we lack data with regards ecology, and there is a complete lack of funding for independent researchers. You have to either be associated with a university and survive on shoe-string grants, or work with international agencies that have their own agendas. It is about time that the country decides to fund this sector seriously, and CSR funds might just provide the shot in the arm that is needed."

Prerna Agrawal

The tremendous response that the Prakriti Research Fellowship received in its first two years of existence, is a clear sign of the need for funding in this sector. Through just word of mouth, we received over 128 complete proposals, from across the country. While the PRF raised funds for 6 fellows, there were many more deserving applicants. Thus, establishing that CSR funding in the sector is essential. In September, 2019 the Hon'ble Finance Minister Ms. Nirmala Sitaraman issued a circular stating that "Corporate bodies can deploy CSR funds for research", thus creating the right circumstances for funding for programs such as the Prakriti Research Fellowship.

CARPE CAMPUS CLUB:

CCC is our response to the triple challenges of:

1. Need for solutionists and social entrepreneurs to address growing social and environmental problems.
2. Rising numbers of graduates with few relevant employable skills.
3. Lack of data regarding several development issues in Aurangabad city.

The vision of the CARPE Campus Club is "To harness the power of youth to generate knowledge driven solutions to civic and environmental challenges of Aurangabad and the world, through experiential learning that translates academic pursuit into impact in the real world."

CCC is an experiential learning program that provides an ideal blend of classroom sessions, field experience and discourses on contemporary socio-environmental issues. The program aims to inculcate rational decision-making aptitude, research, leadership & communication among college students. In its inaugural edition (2018-19) more than 180 students across the disciplines of pharmacy, social work and engineering participated in it. They produced excellent research work in the sectors of Solid Waste Management, menstrual hygiene management and green cover management and presented it in front of a qualified audiences comprising of industrialists, corporators, media

Data Collection and tree profiling by CC students for Tree Census

persons etc. The research projects in the sector of Green Cover Management included a tree census and a survey of parks and garden spaces in Aurangabad city. A brief overview of both projects is provided below. Two other surveys - Corporators survey and Corporate CSR survey - with results relevant to the Green Aurangabad Mission are also discussed below.

2. Tree Census in Aurangabad

According to Maharashtra (Urban Areas) Protection & Preservation Of Trees Act 1975 chapter four section 7 (b) carrying out a tree census once in every five years in its jurisdiction is mandatory for a Municipal corporation. During our research we found a mention of a tree-census in Aurangabad conducted 29 years ago, the details of which were not accessible. Thus, it became clear that there was a need for a tree-census.

CARPE piloted a tree census with college students in N4 area of Aurangabad city under its Campus Club program with CSR support from CANPACK India Pvt. Ltd.

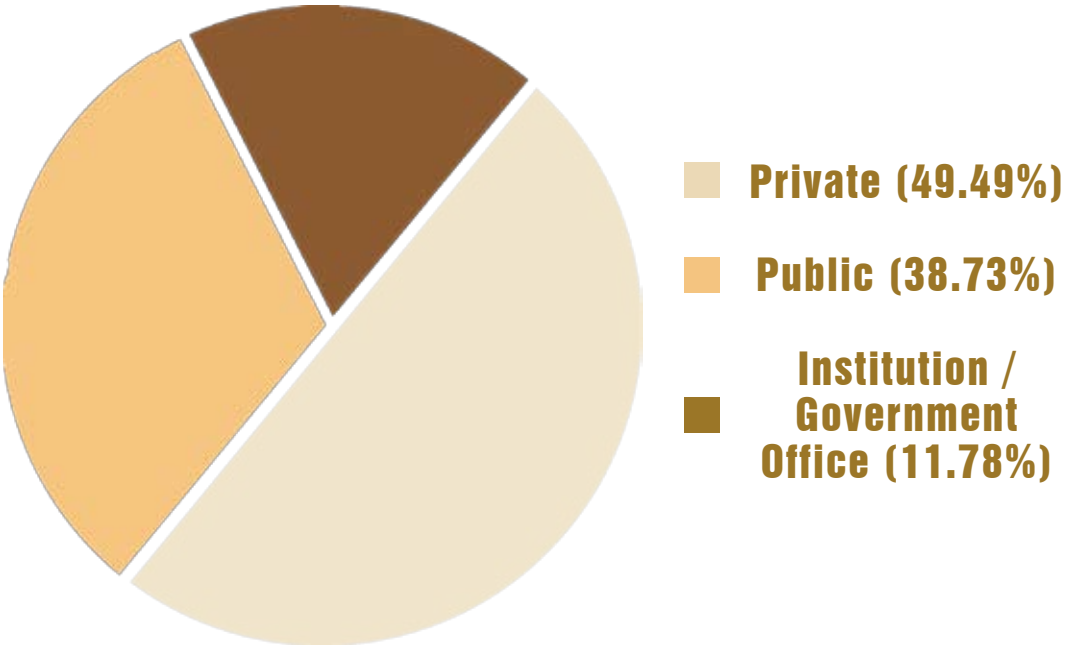
Objectives of this project were:

- To quantify, map and create an inventory of trees in the given area
- To set up a role model for future such studies in other parts of the town
- To study, tree species diversity, population and distribution
- To record health status and importance of individual trees
- Help management and monitoring of green cover in the city
- Sensitize students and citizens about environment conservation

The study provided detailed account of species diversity, health status, density, distribution and locations of the trees in the study area. A total of 2724 trees of 59 species belonging to 31 families were identified, mapped and measured. The survey was spread over an area of 2.88 Lakh sq.mt. A list of all the trees along with their Longitude and Latitude positions, girth, height, health status etc. is attached with this report. Students from Vijendra Kabra College of Social work were given basic training of scientific identification and measurement of trees and communication skills to conduct the survey.

Major findings of the study:

- 40 (67.8%) were native whereas 19 (32.2%) were non-native tree species.
- 49.49% trees recorded on private land, 38.73% on public land and 11.78% on land belonging to institutions/ govt. offices.
- Siraca asoca (Ashoka), with the highest number of trees i.e. 535 (19.7%) was recorded to be the most dominant species.
- Most of the trees (95.93%) in the study area were healthy while 3.05% were diseased and only 1.03% were in dangerous condition.



HIGHEST COUNT (535) | SIRACA ASOCA (ASHOKA)

The per-capita distribution of the trees in this area, can only be estimated. The registered population of the entire ward of N3, N4 is estimated at 12000 individuals. We have considered the population of N4 as 40% (4800) of the total population of the ward 80. Thus, the per capita count of this area is 0.56 trees. This is double that of the National Capital. It will be imperative to note that the tree-cover observed in the N3, N4 wards seems higher as compared to other wards. N4 was developed under the City and Industry Development Corporation's town-planning scheme, with land earmarked for green-spaces. N4 is also an economically forward area. However, only a tree-census can provide a clear comparative picture.

Resources Developed through Pilot Project:

1. Pictorial guide for tree identification
2. Survey form and data collection technique that can be scaled to cover the whole city
3. Understanding of volunteer hours required to complete a tree census exercise

A garden developed around a polishing pond, for recreational purposes

3. Survey of open spaces in Aurangabad:

A survey of open spaces in specific zones of Aurangabad city was also conducted under the CARPE Campus Club in 2018. The objectives of this study were:

- To create a detailed account of open spaces in the city
- Studying current status and potential of open spaces

Major findings of the study:

- 94 parks and gardens were surveyed. 72 parks, gardens & 16 open spaces were maintained by Aurangabad Municipal Corporation. 3 parks and 1 open space had care- takers appointed by private bodies/ organizations.
- 17% of the spaces were under complete disuse.
- Parking of cars and dumping of garbage in these spaces were common complaints.
- Presence of unused vehicles, large pieces of scrap, construction and demolition waste, broken play equipment etc were observed in 36 spaces.

Of the open spaces surveyed, 17 have been mapped as potential sites for creating green lungs or recreational spaces. Some of these are presently used to dump garbage. A collaborative initiative involving the AMC, corporates and NGOs can help device an effective strategy for developing these spaces as well as improving the status and use of all other open/ park/ garden spaces. This has been done in Pune city very successfully and such partnerships could enable the protection and development of green spaces for the public in Aurangabad as well.

We have mapped 17 open spaces under this survey, which are owned by Aurangabad Municipal Corporation and can be developed as a green lung for the city. Some of these are presently used to dump garbage. A collaborative initiative involving the AMC, corporates and NGOs can help device an effective strategy for developing these spaces as well as improving the status and use of all other open/ park/ garden spaces.

4. Key Stakeholders Survey: Corporators and Corporate CSR in Aurangabad

Companies implementing CSR projects and local elected representatives (corporators) are two major stakeholders driving the social and environmental development of Aurangabad. CARPE conducted a survey of 50 corporators of Aurangabad city to explore the potential for partnership between these two stakeholders for a greener Aurangabad.

Corporator Survey: Highlights

24% Corporators have worked in partnership with private companies for development in their area

88% believe that partnerships with private companies could be effective tool for development of the city

58% need a team and 52% need implementing partners to address the challenges they have identified

76% believed that CSR funds could be extremely effective for the development of their ward, only 10% said it wouldn't make a difference

Resident associations and Youth groups are key partners of corporators have engaged with in the past | Lack of support from administration, unavailability of solutions and data are the biggest hurdles
Tree plantation was the second most popular activity (after clean up drives) used by corporations

Corporate CSR Survey: Highlights

76% of the respondents have indicated tree plantation/ afforestation as a CSR mandate

45% of the respondents have indicated tree plantation/ afforestation as a CSR mandate

50% of the respondents indicated that they are in need of CSR partners who can deliver impact in a professional manner

30% respondents reported that frequent changes in city leadership and constant follow-up required for government partnerships was a major challenge


Previously chopped and dumped banyan tree


Lifted and transported to the relocation site


Treatment at relocated site

It is clear from the above surveys that there is keen interest from both stakeholders in green cover management. To bring them together effectively will require a shared vision, clarity of roles/ responsibilities, well-designed timelines and building of trust over time through impactful initiatives.

5. Tree Translocation

In August 2017 Paithan Road (Aurangabad) was widened leading to the cutting down of several trees, some of them heritage trees. In the absence of a translocation policy/ process, expertise and equipment to translocate these, Grind Master Machines Pvt Ltd (GM) under their CSR supported the translocation of four large banyan trees with the help of Ecosattva Environmental Solutions Pvt. Ltd. It was a pilot project to establish processes and costs for translocation. Three out of the four trees have survived. With better planning and more timely interventions, better results can be expected. Since then, an attempt was also made with the translocation of other 18 trees within the Grind Master campus and the results are unclear.

Translocation is an expensive project and there is a severe lack of expertise and appropriate equipment in the Aurangabad region. Therefore, translocation is recommended only for heritage trees. As more construction activities are undertaken in cities in Marathwada, expertise in translocation will be essential to preserve old trees whose ecological value cannot be easily substituted by new plantations.

Integrating existing green cover into construction and development activities is also being promoted as a good practice in several parts of the world - acknowledging the crucial role that trees and green cover play in improving human well-being in urban habitats.

6. Native Seed Bank Project

In partnership with Ashoka University EcoSattva has initiated a project to create a native species seed bank with the following objectives:

1. Collection of seeds of native species from locations (like hills and forests) in and around Aurangabad for afforestation.
2. Understanding various processes and methods of seed preservation.
3. Creation of a seed bank for seeds especially of native species.
4. Documentation and publication of open-access materials on the benefits of various species.
5. Promoting use of native species in private and government plantations.

Seed Collection & Profiling

Native Seeds Labeling and Storage

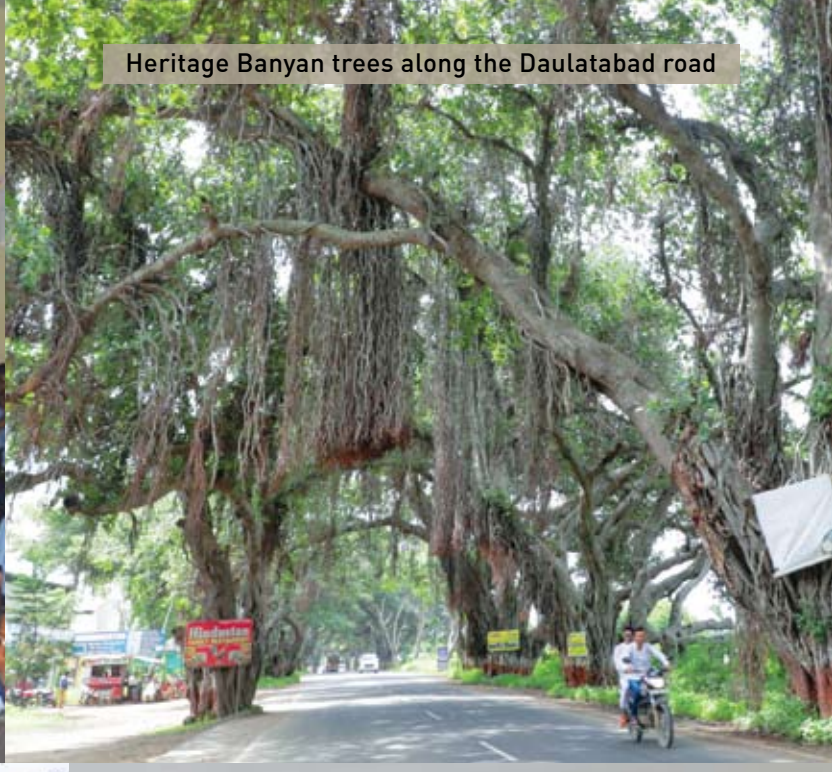
The first step in the research for creation of seed bank involves making a comprehensive list of dominant plant species in Marathwada region. About 83 species of dominant plants were listed and the major characteristics of these species was documented. These characteristics included basic information like canopy height, flowering period, major medicinal and aesthetic uses, etc. This list is crucial in targeting the most suitable species for making a dense forest in the native region.

The research work also included visits to Aravalli Biodiversity Park and Asola Bhatti Wildlife Sanctuary. Information regarding setting up of seed bank and the challenges that could come up were collected and compiled with secondary research from journals and articles on seed bank. Based on the research the team reached on the following conclusions:

- Seeds must be collected in bulk amounts from all sides of the canopy.
- Seeds collected can be stored in hard plastic boxes.
- Stored seeds however, have a shelf life from 6 months up to 3 years depending on the hardness of the seed cover. Seeds are very prone to fungal and bacterial attacks.
- The shelf life of seeds can be determined and predicted through experimentation and observation.
- Some measures that can help in extending the shelf life of seeds include storing seeds with neem leaves or soaked in kerosene oil, which may extend the preservation time to some extent.
- Despite these measures, seeds are bound to become fodder due to fungal or rodent attack- best way of preserving seeds is to sow them as soon as possible and preserve them as saplings.
- Germination of seeds requires patience and constant experimentation with various methods and techniques.
- Depending upon the hardness, softness or inherent properties of species, a seed may require external interference in order to germinate. Some seeds such as palash require no assistance at all. They germinate wherever they fall on the ground.
- Hard seeds usually need to be soaked in normal water (for 24 hours) or boiled in hot water (for 15 minutes) before germination.
- Also, while germinating a seed, one must be careful to pack the soil tightly on top of the seed to avoid any air coming in contact with it. The seed might die due to this interaction with air.

Students learning about native species

Heritage Banyan trees along the Daulatabad road



Digital Documentation of Growth-rate

Seed bank

Seed collection exercise

Student documenting bio-diversity

D. WASTE WATER TREATMENT

During the initial planning phase of this mission, it became clear that 'water' is going to be a major factor in any green-cover management program. Thus, with our execution partner EcoSattva Environmental Solutions Pvt Ltd, two methods of waste-water treatment/ reuse were pilotted in Aurangabad: Ecological Sewage Treatment Plants (EcoSTP) and ecological nala restoration (NalaRestore.) Below is a brief note about the same:

Ecological Sewage Treatment Plant

Sewage contains 99% of water and rest of 1% has suspended solids, bacteria etc. If we treat this 1%, we can use this treated water for gardening and other purposes.

The EcoSTP builds an ecosystem to accelerate the natural process of wastewater treatment. Sustainability is at the core of this technology which is environment friendly and economical with almost no maintenance costs.

Osborne EcoSTP


EcoSTP water after treatment and before

Location	Date of Commissioning	Type of Sewage	Capacity	Project Partners
1. Grind Master Machines Pvt. Ltd., MIDC Railway Station	Aug. 2015	Toilet, bathroom kitchen	5 KLD	GM and EcoSattva
2. Grind Master Machines Pvt. Ltd., MIDC, Waluj	July 2017	Toilet, bathroom kitchen	10 KLD	GM and EcoSattva
3. Osborn Lippert India Pvt. Ltd., MIDC Waluj	Nov. 2018	Toilet, bathroom kitchen	8 KLD	Osborn Lippert and EcoSattva

Uruali Kanchan Nala - Before (above) and After (below)

Ecological Nala Restoration

Understanding Nalas

Nalas are a part of the natural geography of a landscape. Nalas are formed as a result of the inherent unevenness of the land. As rainwater starts flowing from higher elevation to lower elevation by gravity, the channel carved out by this flowing water becomes a Nala. Nalas function as natural drainage channels whose primary function is to carry surface run-off during the monsoon. Generally, several Nalas join to form a Stream (Odha), several streams join to form a small river, and several small rivers join to form a big river, which eventually drains out into the sea.

Over the past 100 years or so, as the density of human settlements kept on increasing and mechanically irrigated agriculture began, the sewage from human settlements and irrigation runoff from the agricultural fields started entering the Nalas. Until the volume and pollution load of the sewage and fertilizer run-off entering the Nalas is within their 'carrying capacity', the Nalas are able to 'deal with' or 'treat' the pollution. This pollution is treated mainly by certain types of aquatic and semi-aquatic plants as well as by microorganisms found in the Nalas. However, once the volume and pollution load of the sewage exceeds the 'carrying capacity' of Nala, groundwater, surface water bodies


MIT Nala Restore Pilot

such as ponds and lakes, as well as the soil is contaminated. When humans drink this polluted water, diseases such as diarrhoea and dysentery become common. On the other hand, when polluted water from the Nalas is used (without any treatment) for irrigating crops, the salinity of the soil increases over time, and the soil can become unproductive, apart from the health hazards that consumption of such food may pose.

How can Nalas be 'restored'?

Nalas can be restored by using ecological methods and watershed management techniques, as piloted by Ecosattva for MIT, Aurangabad and BAIF, Uruli Kanchan, Pune.

1. A plastic trap is installed in the upstream of the Nala for trapping plastic waste and large objects.
2. Specialized Dry Rubble Masonry Bunds (DRMBs) are constructed at strategic locations in the upstream, mid-stream, and down-stream sections of Nala. These structures reduce the velocity of flowing water, allowing solids to settle down, increase retention time: thereby increasing the contact time with aquatic plants, semi-aquatic plants and microorganisms (especially aerobic bacteria).
3. Aerobic Bacteria oxidize the organic matter load in the sewage during respiration, the byproducts being CO2 and water. The oxygen needed by these bacteria is supplied by aquatic and semi-aquatic plants and can also be supplemented by using phyto-enzymes.
4. Planted Gravel Filter does the work of filtering out some of the suspended solids and provides an ideal substrate to semi-aquatic plants which promote the growth of aerobic bacteria on their roots.
5. Stone pitching is done on the banks in order to stabilize the slopes.
6. Existing wetland ecosystem is enhanced and additional wetland areas are created by planting specific aquatic and semi-aquatic plants which are most efficient in sewage treatment through direct absorption of pollution and/or efficient in supporting aerobic bacteria.
7. Sump well(s) are constructed in the downstream section of the Nala where treated water can be utilized for forestry and gardening.

The Way Forward

This report is a summary of the efforts taken by a group of organizations towards achieving an ambitious greening mission. Grind Master had set a target of 1 lakh saplings to be planted and nurtured, 300 trees/ employee. This number will be reached by mid 2020. The effort does not end here, it does not end upon reaching the 1 lakh trees planted + nurtured target either. In fact, this is just the beginning, just a pathway created to share insights with others who are starting off along this route, who want to start contributing to this cause, who want to want to impact their ecology and surrounding positively, and try to mitigate the detrimental impact of human activity on the environment and the climate.

The next goal of this mission is to achieve a target of 1 million saplings planted and nurtured in the urban areas of this region. One tree per resident of the city, as per 2011 census.

The Green Aurangabad Mission in just its first years has begun impacting 4 of 17 the Sustainable Development Goals. Through efforts of multiple organizations who have been working in this space, as well as those who want to join going forward, the methods, themes, and channels described in this document, may lead to a greener, healthier, more equitable and sustainable future.

Thus, for those who are already doing their bit, we take this moment to congratulate you and offer our support, and invite you to contribute your learnings to a shared knowledge pool. And for those who want to contribute, below are three channels through which you can be part of this cause:

1. Volunteer: To plant trees or become a Miyawaki Forest Plantation Expert.
2. A Land Bank: Sign up to pledge space for a Miyawaki Native Forest in perpetuity on your land.
3. Fund: Become a funding partner, and help grow forests or ecoscapes on land pledged for increasing green cover.

The Green Aurangabad Mission does not belong to any one corporate body. Indeed, it is the efforts of multiple partners who have made this mission take-off. It is also the responsibility of multiple stakeholders to continue this mission to achieve an ecological balance in the region.

Our Partners

Established in 1962 and headed by the dynamic, Ms. Pavneet Kaur (IAS), Chief Executive Officer, the Zilla Parishad Aurangabad, has been implementing pioneering programs in the space of Education, Afforestation, SWM, among others. The Zilla Parishad has been a partner in the true spirit for innovation in scaling the impact of the Green Aurangabad Mission.

Headed by Mr. Prakash Mahajan (IFS), Chief Conservator of Forests the Forest Dept is the first in this region to establish a tri-partite agreement for greening Daulatabad hillside. Thus establishing pioneering channels and partnerships for more participation with corporate bodies and NGOs for climate action.

Maharashtra State Innovation Society

Transforming Maharashtra by catalyzing the growth of an innovation-driven entrepreneurial ecosystem in the state. The MSIS has been a pioneering state government intervention that has impacted the space of Climate Action by awarding the top start-ups with channels to partner with the government for achieving scale, such as in Verul, Aurangabad.

CARPE CENTRE FOR APPLIED RESEARCH AND PEOPLE'S ENGAGEMENT

CRT CIVIC RESPONSE TEAM

EcoSattva ENVIRONMENTAL SOLUTIONS

CANPACK Care • Sustain • Renew

Maharashtra Startup Week

Affores Native. Wild. Forever.

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By
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