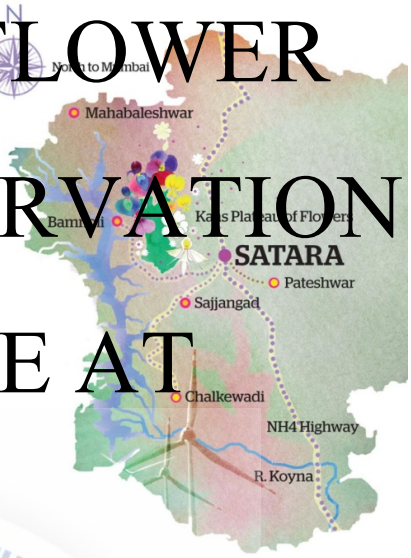
WILD FLOWER CONSERVATION CENTRE AT KAAS



TO CREATE A GROUND FOR CONSERVATION OF RARE AND ENDEMIC FLORA OF KAAS PLATEAU, SATARA

NAVREEN SAYYED

TABLE OF CONTENT

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- **ACKNOWLEDGEMENT**

I would like to express my gratitude to my parents who have always been supporting me through 4years of my course. Special thanks to my best friend **AKHTAR PAHELWAN**. I am deeply indebted to my mentor **PROF.MINAL MODAK** for his valuable guidance, assistance and moral support throughout the Project. I am honored and grateful to him for his advice and explanations during the research which I have gained plenty of valuable knowledge hope that will not be the end of it.

My special thanks also goes to the forest officer, **MR. AJANGKAR** for providing required information and documents on time. I would like to express my gratitude to all those who gave me the possibility to complete this project.

Finally yet importantly, I would like my uncle **MR. SHAGIR** who have stood with me every time when I need him. My relatives and their prayers for me were the main source of inspiration, motivation and encouragement to accomplish this research work. Again To father This work is dedicated to you.

- ABSTRACT

Biodiversity is essential for maintaining the ecologicalfunctions, including stabilizing of the water cycle, maintenance and replenishmentof soil fertility, pollination and cross-fertilization of crops and other vegetation,protection against soil erosion and stability of food producing and other ecosystems. Conservation of biological diversity leads to conservation of essentialecological diversity to preserve the continuity of food chains.Biodiversity provides the base for the livelihoods.

Had William Wordsworth visited Kaas, the words would still be the same…

I wandered lonely as a cloud That floats on high o'er vales and hills, When all at once I saw a crowd, A host, of golden daffodils; Beside the lake, beneath the trees, Fluttering and dancing in the breeze.

There exists an extremely pristine ecosystem around 25 kms from Satara. Nestled in the Sahayadri Mountains, this place is known as the Kaas plateau. It is home to a few life forms– found no where else in the world- they are endemic to Kaas. Till very recently, they had all peacefully habited the surrounding hills and plateaus. But suddenly, the scientific community observed that every year during the Indian Monsoons, the land became covered with innumerable tiny flowering plants.Kaas plateau has its endemic value through years. Kaas is ground for more than 250 flowering species which has its botanical impotance. This flowers proves very new and essential for Botanical studies, therefore it is important to conserve and research on such species. About all the flowering plants on kaas 6% are added to red data book and the site is registered under UNESCO World heritage site. . It was only in June 2012 when the UNESCO declared Kaas as a world heritage site that it got recognition and tourists started pouring in. With tourism came problems of overcrowding which eventually led to destruction of its flora. Though the government of Maharashtra is taking preventive measures to preserve the endangered species, the lack of knowledge among the people creates problems.

An architectural intervention, in the form of a conservation and visitors centre can prove to be of great help in solving the existing problems. The conservation centre will help in preserving the biodiversity in its natural habitat. Also, it will help in educating the masses about the lesser known facts of the flora in Kaas. The visitors centre will not only boost the tourism, which is seasonal, but also help eradicate the common problems caused by the tourist. It will also help in maintaining strict and vigilant watch over the miscreants. A Research centre will

provide the Researchers and Botanist a Platform for studying the Endemic Flora of Kaas Plateau Which has its medicinal importance.

Villagers of Kaas plateau face the problem of unemployment and hence restrict the growth of the village. Kaas is surrounded by three villages, Kaas, Kasani and Yekiv. The architectural intervention will prove helpful for the villagers by providing them with Employment Aim is establish the conservation and research centre on kaas which will prove helpful to reduce the negative impacts of tourists on kaas. This centre will also prove helpful for the villagers to because the flowering season is seasonal so villagers are employed only during the onl during the time of flowering season.

Conservation center will provide employment to the villagers and ground for the botanist and researchers for study of unknown flora and fauna of kaas.

- **LIST OF TERMINOLOGIES**

- RED DATA SPECIES -
- ENDEMIC – Native to particular area or culture, originating where it occurs
- INVASIVE – a plant or animal that grows in environment which donot harbor natural enemies
- ENTOMOLOGY - the scientific study of insects
- HERBARIUM - a collection of dried plants or parts of plants
- PLATEAU – a largely level expanse of land at a high elevation ,table land
- HORTICULTURE – A art and science of cultivating gardens, gardening
- VALLEY – An elongated depression between hills or mountains
- TROPICAL - Form or similar to hot and humid climate
- MEDITERRENEAN – Of or pertaining to the mediterranean sea and the region around it.
- THERMAL STRATISFACTION – A column of rising air in the lower atmosphere created by uneven heating. of earths surface

  HUMIDIFICATION – The process of increasing the water vapour content of the gas.
- EPIPHYTE – A plant that grows on another, using it for physical support.
- Laterite – A red hard gravel like soil or subsoil formed in the tropics.

- LIST OF CHAPTERS

- **CHAPTER 1: INTRODUCTION**

.1. TOPIC INTRODUCTION:

- Natural resources prove to be the base for the genesis of numerous ecosystems.
- 'Kaas' Plateau popularly known as the 'Kaas Pathar' regionally, is situated 25 km west from Satara city in Maharashtra
- The UNESCO declared the 'Kaas Plateau' a world heritage site in the year 2012, following which it began to appear in the regional newspapers and finally the world map.
- Currently the tourism in 'Kaas' is just a secondary source that contributes little to the economy, the primary being cattle rearing and animal husbandry. Promoting tourism will prove to be beneficial for this dwindling economy by creating adequate job opportunities.
- The flowers on the plateau bloom annually only during the monsoons i.e from August to early October, which is observed to be the only time of the year when tourism can be observed. Besides, only botanical researchers and environment specialist form a major part of these.
- Conservation of the depleting flower plateau is the need of the hour!
- Also, providing an adequate source of income year round is essential.
- Therefore, the basic idea is to provide a ground for conservation of wild flowers on the 'Kaas' Plateau and help prevent the harm caused to the endemic flower species.
- This platform will not only enhance the preservation of the endangered species but will also create numerous job opportunities for the locals year round, which will solve the prolonged problem of unemployment
- Providing a commercial flower centre with auction centre were local villagers can grow the commercial flowers like Rose Marigold and Gerbera flowers which is famous through Satara , Wai and karad.

- **WHY THIS PROJECT?**

Kaas plateau is a small plateau situated near the Kaas village in the Satara district of Maharashtra. The high hill plateau and grassland turns into a 'valley of flowers' during the monsoon, in the month of August and has more than 850 types of flowers, shrubs and grasses, the orchids blooming for a period of 3–4 weeks during this season. Until recently, the Kaas plateau was considered ordinary. It was only in June 2012 when the UNESCO declared Kaas as a world heritage site that it got recognition and tourists started pouring in. With tourism came problems of overcrowding which eventually led to destruction of its flora. Though the government of Maharashtra is taking preventive measures to preserve the endangered species, the lack of knowledge among the people creates problems.

An architectural intervention, in the form of a conservation and visitors centre can prove to be of great help in solving the existing problems. The conservation centre will help in preserving the biodiversity in its natural habitat. Also, it will help in educating the masses about the lesser known facts of the flora in Kaas. The visitors centre will not only boost the tourism, which is seasonal, but also help eradicate the common problems caused by the tourist. It will also help in maintaining strict and vigilant watch over the miscreants. A Research centre will provide the Researchers and Botanist a Platform for studying the Endemic Flora of Kaas Plateau Which has its medicinal importance.

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WILD FLOWER CONSERVATION CENTRE

.2. KAAS PLATEAU

LOCATION OF KAAS PLATEAU

The Kaas Plateau, also known as the Kaas Pathar or Kas Sadas, is a plateau situated 25 kilometers west from Satara city in Maharashtra, India.[1][2] It falls under the Sahyadri Sub Cluster of the Western Ghats, and it became a part of a UNESCO World Natural Heritage Site in 2012

Kaas plateau is a plateau located around 25 km from Satara. There are two ways to reach Kaas. one the more direct way from Satara and another from Tapola via the link road connecting Mahabaleshwar and Panchgani to Kas Pathar. Kas plateau is 20 km away from Northern part of Koyana Sanctuary. The major portion of the plateau is reserve Forest.
The various distances of Kas plateau are as follows:

From Satara - 25 km
From Pune - 125 km
From Mumbai - 280 km

It is a biodiversity hotspot known for various types of seasonal wild flowers bloom and numerous species of endemic butterflies annually in the months of August and September. The plateau is situated at an altitude of 1200 metres and is approximately 10 square kilometers in area

Kaas lake (over 100 years ago) is a perennial source of Water supply for western part of Satara city by gravity.

Other attractions

Kaas lake is on the south of the Kaas Plateau and is surrounded by dense forest. It lies between Sajjangad fort and the Kanher Dam. Koyna project is around 30 km towards the south of Kaas Lake. Vajrai Waterfall is also near from Kaas which is India's highest waterfall

CONDITION OF THE PLATEAU THROUGHOUT THE YEAR

.2.1. KAAS PLATEAU

Natural resources provide numerous ecosystem services, which are critical to human survival and the economy. Biodiversity is part of these natural resources. This biological diversity exists as a part of various ecosystems & life-forms. On the Earth there are different types of ecosystems like forests, grasslands, deserts, mountains etc. as well as aquatic ecosystems like rivers, lakes and sea. India hosts a niche-treasure of biodiversity in its various states. The State of Maharashtra is known for its unique biodiversity & hill ranges such as Western Ghats. One such unique biodiverse ecosystem in Maharashtra is 'Kaas Plateau'.

.2.2. PLATEAU – AN EARTH LANDFORM:

Many movements like erosion, natural forces, plate movement, faulting and volcanic activity took place during the formation of earth 4 billion years ago. Earth`s topographic records show that it is made up of many different types of landforms which include mountains, hill ranges, plateaus and plains. Out of total land in India 30% area is
Covered by mountains, about 43% by plains and 27% by plateaus.

Northern western Ghats in Maharashtra is gifted with plateaus, grasslands and characteristics herbaceous vegetation's. Kaas plateau, which is also known as a "Kaas Pathar" is also part of this region. It is situated in Sahyadri, 25 KM away from Satara district. Kaas is also known as a Maharashtra`s valley of flowers.

There are few stories behind why the plateau is named as "Kaas"? Like, as the Kaasa tree

(Elaeocarpus glandulosus) is found in thick forests around the Kaas, the plateau is known as Kaas. In the local community, Kaasa means a lake, there is a lake here, & this could be the one reason for the place being named "Kaas". Kaas lake (built 100 years ago) is a perennial source of Water supply for western part of Satara city & is origin of the river Urmodi.

Plateau of Kaas is classified under Volcanic Plateaus which is produced by volcanic activities. These plateaus are mainly formed of two rocks namely basalt rock which is predominant rock & porous lateritic rock (Jambha) which is red colored stone rich in iron and aluminum allowing most of the water to seep through or drain off.

There is only a thin layer of soil which supports no vegetation except for the rainy season which makes Kaas a unique ecosystem. Kaas is one of the hotspots of biodiversity

The geographical details of the Kaas plateau are as follows:

Latitude	17^0 42' to 17^0 45' N
Longitude	73^0 47' to 73^0 56' E
Height	1200 to 1240 meters
Area	1792 ha (includes1142 ha of forest land)
Average Annual Rainfall	2000 to 2500 mm

Ecological Features of Kaas

- Globally, Kaas has been recognized as one of the hotspots of biodiversity due to its unique ecosystem and high degree of endemism.

- The lateritic nature of Kaas Plateau has given rise to unique ecosystem, hence the flora and the fauna of the region is unique and endemic to the region.

- In Kaas evergreen plants as well as thorny bushes are found at the same time and all the diversity within these two extremes.
- There are many herbs found here which have high medicinal value and hence need to be protected.

- Kaas plateau is an outstanding example representing significant Ongoing ecological and biological processes in the evolution and development of terrestrial and fresh water ecosystem and communities of plants and animals.

- The plateau contains most important and significant natural habitats for conservation and biological diversity including those endemic and threatened species of outstanding universal value from the point of science and conservation.

- Though an ecological succession has been observed in this ecosystem, an estimated climax cannot be anticipated. Various forms of algae and lichen inhabit the rocks as pioneer species. Mosses and ferns combat the climatic extremes by remaining dormant till the rains bring back the moisture.

- Crevices in rocks holding meager amounts of soil provide for variety of grasses and herbs during the months of monsoon.
- Since the flora of Kaas plateau is specialized, so are the insects and pollinators around them. Each flower has evolved to attract its specific pollinator forming a delicate and intricate network of interdependence and food linkage.

Ecological Services provided by plateaus are immense.

The biodiversity of Kaas plateau provides pollination services, being laterite it acts as a sponge and provides water resources to the agriculture.

WILD FLOWER CONSERVATION CENTRE

Kaas Plateau in Maharashtra is no ordinary place. The mass flowering in the monsoon is simply magical, an adventure waiting to happen

By Anuradha Arjunwadkar & Sujatha Padmanabhan

Herbs and grasses

Kaas Lake perennial source of water

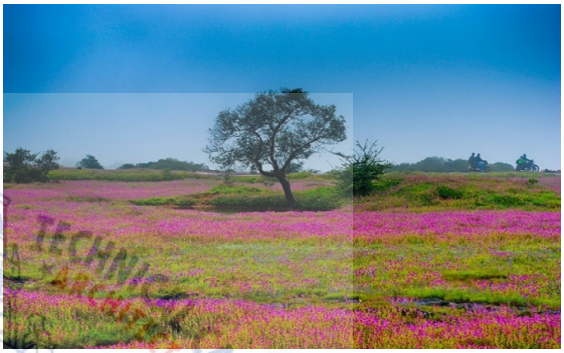
Herbs and Grasses Many of these herbs and grasses are endemic to plateau due to presesnce of Laterite soil which is peculiar to geographical feature of Kaas

.2.3. Nature of Flora

The Flora or the Vegetation on the Kaas plateau constitutes primarily of numerous species of flowering plants and other related plants. They are typically indigenous to the plateau and are found nowhere else.The reason being, the geology of the plateau which is largely formed of basalt and is directly exposed to the atmosphere. The plateau thus formed is covered by a thin cover of soil particularly accumulated due to erosion in a layer of about only an inch. This soil is neither laterite nor black. The uneven surfaces formed due to weathering has resulted into accumulation of water to form small puddles which have harbored a typical marshy flora. Because of these peculiar geological conditions of the plateau, the plants growing are typically of herbaceous nature commonly known as grasses. Botanically these are labeled to be known as 'herbaceous'. The Plateau almost entirely seems to change colours every 15- 20 days during the blooming season, due to the cycle of these flowering plants that progresses with the progress in monsoon from the month of June to October every year. Other small shrubs and trees are usually seen at the periphery of the plateau. It is locally known as the 'Kaas Pathar' or 'Plateau of Flowers' and a major portion of the plateau is now reserved. The Kaas Lake is a perennial source of water supply for the western part of Satara city and is an important landmark for the Satara forest division

The plateau is rich in Bio-diversity which is of outstanding universal value and is beneficial for botanical studies and research work. A number of species found on the plateau are still new to the Botanical Science. This includes many endemic and

endangered plants as well. The Kaas plateau is a potential site for future breakthroughs in botanical studies. More than 850 species of flowering plants have been reported out of which, 624 species have been registered in the Red Data Book. These entries also include 39 species that are found on the Kaas plateau. These constitute 6% of the Red data species approximately. It has therefore become necessary to undertake effective measures that will enable to protect and conserve the diverse, rare and endangered Bio-diversity of the plateau



It Approximates 6% of the Red data species It has become very urgent to take effective measures to protect this whole area in order to conserve the diverse, rare and endangered flora of Kas plateau. Plateau seems to change the colours after every 15- 20 days as the cycle of flowering plants progresses with the monsoon progress since June to October.

.2.4. Flora and Fauna of Kaas:

Among all distinguishing features Kaas has a unique flora and fauna. More than 450 species of wild flowers bloom in and after monsoon season,

most of them are endemic herbs. At certain places on Kaas, water gets accumulated because of uneven surface; such places appear like small puddles which harbour a typical **marshy flora**. Because of this particular situation of soil, the plants growing on Kaas plateau are typically of **herbaceous nature** which means plants without woody parts.

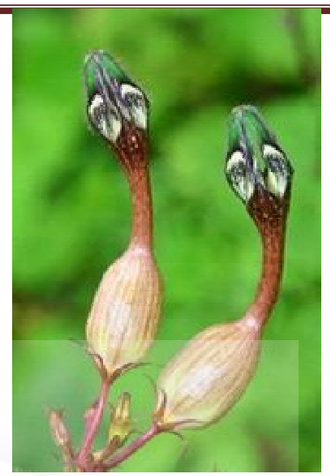
Many species which are still new to the botanical science are observed on plateau. Fauna of Kaas includes varieties of micro & macro organisms, mammals, amphibians, reptiles, arachnids and insects. The small shrubs and trees are located at the periphery of the plateau.

Kaas and the nearby Koyna area is home to about 1,500 types of plants – 156 botanical families, 680 genera, 1452 species, 400 medicinal plants, and about 33 endangered varieties. More than 450 species of wild flowers bloom in and after monsoon season and most of them are endemic herbs. More than 850 species of flowering plants are reported from Kaas plateau, out of theseplants 624 species have entered in the Red Data Book & most importantly 39 species from these Red Data Book species are found in Kaas Region only. The endemic species approximates 6% of the Red data species. It has become very urgent to take effective measures to protect this whole area in order to conserve the diverse, rare and endangered flora of Kaas plateau.

Out of 624 red data species, following 33 species are reported in and around Kaas Plateau , which is approximately 6% of the total red data species.

1. Abutilon ranadei (Wasota forest)
2. Aponogeton satarensis (Kaas Plateau)
3. Barleria gibsonioides (Koyana valley)
4. Begonia phrixophylla (Mahabaleshwar)
5. Begonia trichocarpa (Mahabaleshwar)
6. Brachystelma nawaroji (Maharahstra)

7. Campanula alphonsii (Mahabaleshwar)
8. Ceropegia huberi (Chalkewadi)
9. Ceropegia jainii (Kaas)
10. Ceropegia lawii (Wasota forest)
11. Ceropegia mahabalei (Mahabaleshwar)
12. Ceropegia noorjahaniae (Ambheri,Janai,Satara)
13. Ceropegia oculata (Kaas, Panchgani)
14. Ceropegia panchganiensis (Panchgani)
15. Ceropegia sahyadrica (Wasota)
16. Ceropegia santapaui (Mahabaleshwar)
17. Ceropegia vincaefolia (Kaas)
18. Crinum eleonorae (Mahabaleshwar)
19. Crortolaria filipesvar trichocarpa (Kaas)
20. Decaschitia trilobata (Kaas)
21. Dicanthium panchganesis (Panchgani)
22. Dipkadi maharashtrensis (Kaas)
23. Erinocarpus nimmonii (Bamnoli)
24. Euphorbia panchganesis (Mahabaleshwar)
25. Frerea indica (Sajjangadh)
26. Habenaria panchganesis (Panchgani)
27. Iphigenia magnifica (Mahabaleshwar)
28. Iphigenia stellata (Kaas)
29. Kalanchoe olivacea (Wasota)
30. Murdania lanuginose (Kaas)
31. Sashagiria sahyadrica (Wasota)
32. Smithia agharkarii (Kaas)



CEROPEGIA JAINII

Local name – Kharchudi

It is very rare and threatened species of Sahyadri ranges. Its flowering season is from August toOctober

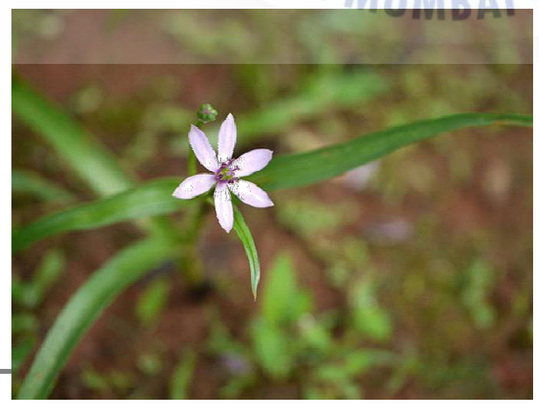
MURDANIA

Murdania are the species of tropical region across the world. These species are found in open area in marshy land

ENDEMIC FLOWERS OF KAAS

IPHIGENIA STELLATA

It is harvested for pharmaceutical use as it has its medicinal uses.
Endemic to Plateau region of Maharashtra.
This species provide Colchicine.
It has Etnobotanical use



THE TIMES OF INDIA

Rare Karvi wildflowers bloom after 8 years

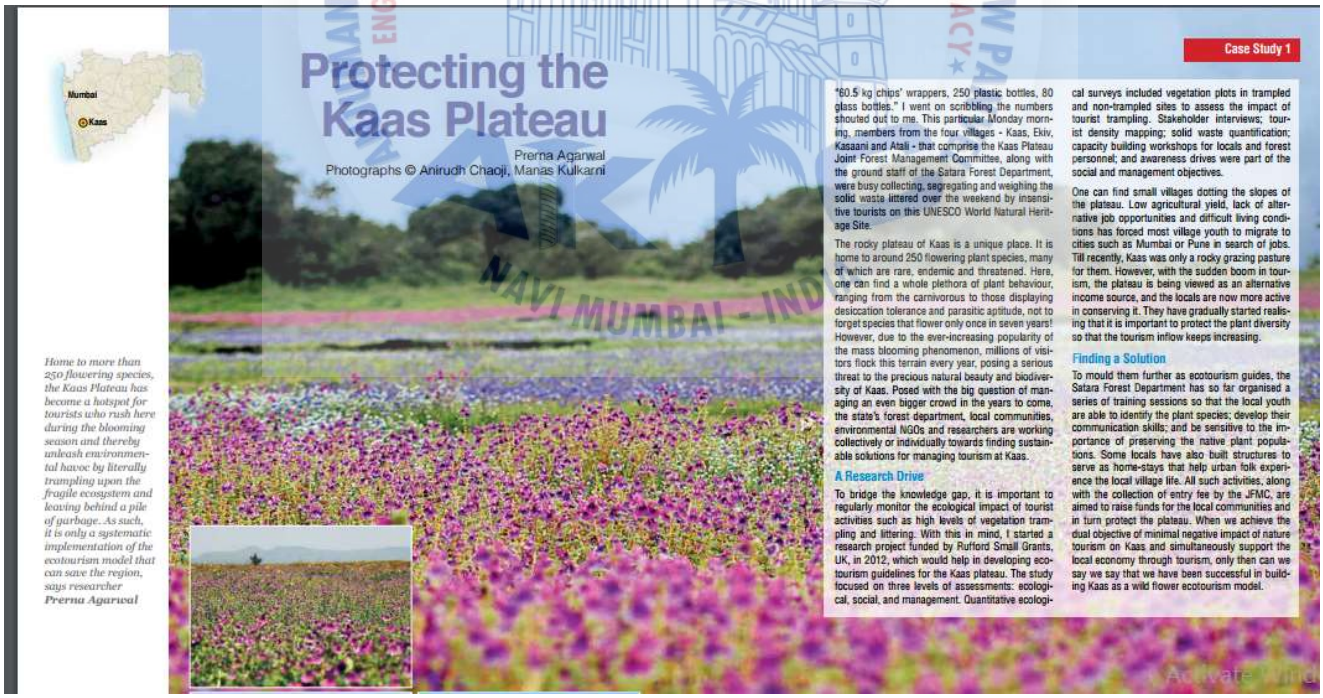
TNN | Aug 26, 2016, 08.38 AM IST

MUMBAI: Young nature enthusiasts are rejoicing on discovering the rare purple-blue Karvi wildlife flowers in bloom after a period of eight years at Goregaon, close to Sanjay Gandhi National Park. We had gone on a nature trail earlier this week at Goregaon, outside the Film City; it was an unbelievable sight to see so many Karvi flowers in bloom. We had last seen these same species flowers in 2008, when we had gone in around the same site along with children for a trek," said the founder of Young Environmentalists Programme Trust, Elsie Gabriel.

Considering this rare botanical phenomenon of Karvi, which is sometimes also referred to as the nature's miracle", YEPT is planning to undertake several more trails in these parts so that a maximum number of citizens can witness and enjoy this vibrant purplish blue sight amid greenery.

The Karvi flowers bloom for barely 20 days in various parts of the state, especially along the slopes of Sahyadri, western ghats. Nature has a lot of priceless, mysterious treasures which we must appreciate," she added.

It's scientific name is Strobilanthes callosa, shrub found mostly in the lower slopes of western India. It typically takes seven years for this wild plant to grow and in the eighth year it bursts into bloom. It's bright lavender colours attracts a host of butterflies, insects and birds during this time.



Case Study 1

Protecting the Kaas Plateau

Prerna Agarwal

Photographs © Anirudh Chaoji, Manas Kulkarni

Home to more than 250 flowering species, the Kaas Plateau has become a hotspot for tourists who rush here during the blooming season and thereby unleash environmental havoc by literally trampling upon the fragile ecosystem and leaving behind a pile of garbage. As such, it is only a systematic implementation of the ecotourism model that can save the region, says researcher ***Prerna Agarwal***

"60.5 kg chips' wrappers, 250 plastic bottles, 80 glass bottles." I went on scribbling the numbers shouted out to me. This particular Monday morning, members from the four villages - Kaas, Ekiv, Kasaani and Atali - that comprise the Kaas Plateau Joint Forest Management Committee, along with the ground staff of the Satara Forest Department, were busy collecting, segregating and weighing the solid waste littered over the weekend by insensitive tourists on this UNESCO World Natural Heritage Site.

The rocky plateau of Kaas is a unique place. It is home to around 250 flowering plant species, many of which are rare, endemic and threatened. Here, one can find a whole plethora of plant behaviour, ranging from the carnivorous to those displaying desiccation tolerance and parasitic aptitude, not to forget species that flower only once in seven years! However, due to the ever-increasing popularity of the mass blooming phenomenon, millions of visitors flock this terrain every year, posing a serious threat to the precious natural beauty and biodiversity of Kaas. Posed with the big question of managing an even bigger crowd in the years to come, the state's forest department, local communities, environmental NGOs and researchers are working collectively or individually towards finding sustainable solutions for managing tourism at Kaas.

A Research Drive

To bridge the knowledge gap, it is important to regularly monitor the ecological impact of tourist activities such as high levels of vegetation trampling and littering. With this in mind, I started a research project funded by Rufford Small Grants, UK, in 2012, which would help in developing ecotourism guidelines for the Kaas plateau. The study focused on three levels of assessments: ecological, social, and management. Quantitative ecological surveys included vegetation plots in trampled and non-trampled sites to assess the impact of tourist trampling. Stakeholder interviews; tourist density mapping; solid waste quantification; capacity building workshops for locals and forest personnel; and awareness drives were part of the social and management objectives.

One can find small villages dotting the slopes of the plateau. Low agricultural yield, lack of alternative job opportunities and difficult living conditions has forced most village youth to migrate to cities such as Mumbai or Pune in search of jobs. Till recently, Kaas was only a rocky grazing pasture for them. However, with the sudden boom in tourism, the plateau is being viewed as an alternative income source, and the locals are now more active in conserving it. They have gradually started realising that it is important to protect the plant diversity so that the tourism inflow keeps increasing.

Finding a Solution

To mould them further as ecotourism guides, the Satara Forest Department has so far organised a series of training sessions so that the local youth are able to identify the plant species; develop their communication skills; and be sensitive to the importance of preserving the native plant populations. Some locals have also built structures to serve as home-stays that help urban folk experience the local village life. All such activities, along with the collection of entry fee by the JFMC, are aimed to raise funds for the local communities and in turn protect the plateau. When we achieve the dual objective of minimal negative impact of nature tourism on Kaas and simultaneously support the local economy through tourism, only then can we say we say that we have been successful in building Kaas as a wild flower ecotourism model.

.2.5. Threats and Issues

In recent years the popularity of Kaas Plateau, Satara has increased many folds and the increase in numbers of tourists have resulted in a direct or indirect impact on its bio-diversity. According to keen observation and analysis of experts, there are number of threats affecting to the biodiversity of Kaas. Among which tourism is the biggest threats to Kaas which brings lakhs of tourists and thousands of vehicles every year. Due to the increase in numbers of vehicles; the tranquility and peace of Kaas is highly disturbed result ng in breakdown of flora & fauna of ecosystem.

In the absence of forest or woody vegetable on, these lands get easily mistaken for being barren and are categorized as wastelands. And hence it is not being protected from the rampant developing

Activities.

1. **Pollution &Waste Management**

   According to one of the proposals by UNESCO, only2,000 tourists should allowed to visit Kaas per day. But during the peak season between August and October, on holidays, the number touches nearly 50,000 per day. Tourism is becoming one of the biggest threats to the biodiversity of Kaas.



2. **Mining**

   These Plateau is rich in mineral like Bauxite, thus villagers practice mining activities on site thus making changes to the geological features of the plateau

3. **Installation of wind mills**

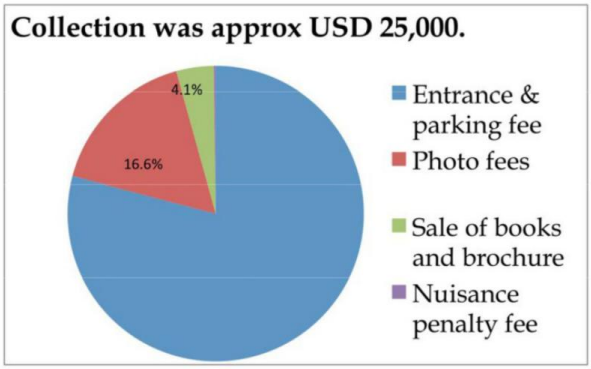
   Though windmills are a source of 'green energy', their excessive installation at one place and at places like such plateaus is causing disturbance to the surrounding ecosystem

Installation of windmills in ecologically sensitive area can cause a slow degradation of vegetation by invasion of weeds, changes in the drainage pattern and fragmentation by roads and fencing.

Green activists to give Kaas flowers breathing space to bloom

Sakal times Monday, July 09, 2012

- PUNE: City environmentalists and the organizations they represent have decided to keep away from the Kaas Plateau for the next few years to protect the world heritage site from the ill effects of over-crowding.
- Ecologist *Aparna Watwe*, through her presentation, highlighted the existence of rich flora and fauna on Kaas, which happens to be one of the 39 sites that the United Nations Education, Scientific and Cultural Organization (UNESCO) has declared as World Heritage Sites.
- *Sachin Punekarm,* a botanist from Agharkar Research Institute, said the over-crowding oftourists, grazing of cattle, trampling of rare floral species, deposits of plastic and glass, increase in exotic weeds, collection of specimen by researchers, wild fire and change in drainage pattern are some of the major problems the Kaas Plateau faces.
- *Praveen* brought the fact to light that, on an average, around3,000 plastic bottles are thrown away by the tourists every day in the Kaas Plateau



- **PROBLEMS FACED BY VILLAGERS OF ADJACENT VILLAGE TO KAAS PLATEAU**

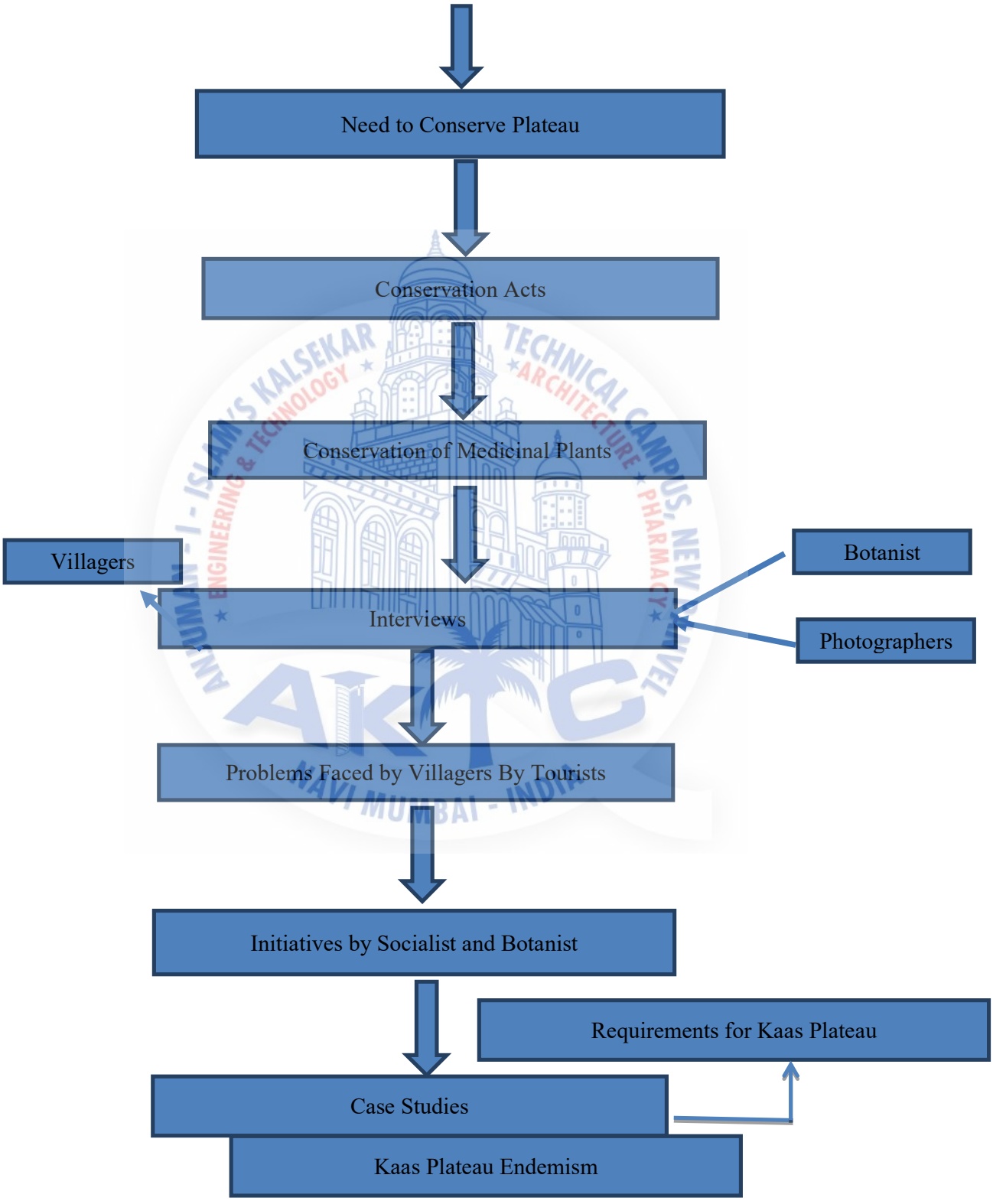
Solar Street lights for the security of the protected areaKaas village has connections of electricity but due to their financial conditions they could not effort to pay the bill of electricity. Kaas Roads from flower valley do not have lamppost hence after evening the roads appear to be black out. This affects the security of Kaas people due to presence of forest adjacent to their village.

To get over this situation and because it is tourist place government provided them with solar lamps which was just 11 in numbers. The villages decided to help the other villages in the Satara district that were suffering from the shortage of water and famine. The villagers from Kaas, through voluntary efforts have cut the grass and kept ready to provide the fodder (grass) from the Kaas Plateau to the cattle in the region facing shortage of water. The state government is running a camp for the cattle that are not getting sufficient fodder. The villagers with the permission of the District authority would supply the fodder of nearly two truckloads to these camps. This action demonstrated the brotherhood gesture from those who have (Kaas as World Heritage) to other villages that were going through difficult time.

Cooking gas to poor families to prevent cutting of trees:

All the families in the Kaas village used to cut the trees and stack the logs in their house for cooking. Now all families have started getting LPG cylinders for cooking purposes so that cutting of trees and valuable shrubs is avoided. It also helped to save time taken by women and children to fetch the biomass from forest. This has freed their time so that they can now focus on education and more productive activities like farming and craft making. 25% of the cost of the LPG cylinders is born by the families.

- **CHAPTER 2: RESEARCH METHODOLOGY**



2.1. AIM

- To design architectural ground for the conservation of wild flowers and a research centre on Kaas for Botanist and researchers visiting Kaas and educate visitors about its significance and ecological value of the site.

2.2. OBJECTIVES

- Providing a ground for conservation of wild flowers on the plateau through architecture by designing a conservation and visitors Centre.
- A conservation Centre will provide an opportunity for the people to know more about the flora of Kaas which is otherwise seasonal, throughout the year.
- Providing a visitors Centre with a space to exhibit the wildflowers that will boast tourism.
- Enhancing tourism that will provide a platform for job opportunities for the villagers of kaas, with minimal negative impact on nature. Currently only cattle rearing is the main source of income and tourist visit only during the blooming season thus contributing very little to the annual income for the villagers.

2.3. CONSERVATION

The study of DNA has revealed that even the commonest plants that we see around us carry some of the oldest evolutionary success stories of the Earth. Some can be traced back millions of years, even before the formation of present day geology and climate of our region. Certain native plants have adapted to thrive in specific conditions and exist nowhere else on Earth. Whether rare or common, these native plants have evolved in synchronization with the other organisms and have adapted to the unique ways that ensure their mutual survival. These plants and flowers become the unique identification mark and represent a native town or country.

The depletion of these native wild flowers and plants is a matter of primary concern, which is where conservation plays a very significant role. Conservation of not only the plants but also biodiversity as a whole becomes essential to maintain balance of various ecological functions like water cycle, soil fertility, cross pollination and

ecosystems. The most concerning factor is maintaining appropriate balance in the food chain that forms the basis for survival of life on earth.

Additionally, biodiversity forms the base for varied livelihoods, cultures and economies of millions of people that include farmers, fishermen, forest dwellers and artisans to name a few. The rapid depletion of biodiversity in the last few decades has affected land, water bodies and humans negatively.

- **STRATEGIES ADOPTED FOR CONSERVATION OF BIODIVERSITY:**

- **LEGISLATION :**

  Formal acts and programs for conservation and sustainable utilization of biodiversity. For e.g Wildlife (Protection) Act 1972 and Wildlife (Protection) Amendment Act 1991

- **IN-SITU CONSERVATION:**

  Conservation of wildlife and plants in their natural habitats is known as In-situ conservation. Biosphere reserves come in the category of protected areas where wildlife is protected and the local communities continue to live and pursue traditional activities within.

- **EX-SITU CONSERVATION:**

  This is basically, conservation of wildlife away from their natural habitat generally botanical gardens and zoological parks. It also includes reintroduction of plant or animal into the habitat where it has become extinct.

- **RECORDING INDIGENOUS KNOWLEDGE:**

  The lives of local communities are closely woven with their environment. These communities have vast knowledge of the local flora and fauna. Much of this traditional knowledge is passed on from generations to generations and needs to be recorded and preserved before it is lost.

- **CONSERVATION OF MEDICINAL PLANTS:**

In India, there are around 70,000 plant species in various ecosystems that have medicinal significance. Plants have been used for treating various ailments since time immemorial. The traditional Indian system of medicine dates back to the age of Rigveda which forms a base of 'Ayurveda' which has been recognised worldwide. The World Health Organisation (WHO) also mentioned 240 absolutely essential medicines that can be only obtained from plants. In the Indian household, women are aware of medicinal properties of certain plants which form a part of the daily lives. Earlier, people used to collect important medicinal plants from the forest. Depletion of essential herbs can prove to be a loss and hence conservation of these medicinal plants in nurseries, laboratories and gardens is the need of the hour.

- **GOVERNMENT INITIATIVES:**

BSI: The Botanical Survey of India (BSI) was established in 1890 with the main objective to explore the plant resources of India and to identify the plant species with economic virtues. The basic functions included monitoring of changes in floristic components, multiplication and maintenance of germplasm of plant generic resources, conservation and identifying the endemic and endangered plant species among others.

- **OBJECTIVES OF BSI:**

- Identification of species with traditional and economic use and preparation of protocol for their conservation and sustainable utilization.
- Qualitative and quantitative analysis of the diversity of economically useful plant species.
- Develop and maintain Botanical gardens, Museums and Herbia.

2.4. INTERVIEWS

- **VILLAGE**

	QUESTIONS	ANSWERS
1.	What they think about flowers of Kaas?	First they were not aware of its importance but now-a-days they consider flowers as their source of income.
2.	How they are related to site and surrounding?	Kaas plateau is owned maximum by villagers of Kaas and some part is owned by villagers of Ekiw, Kasani village.
3.	Income generations by tourists? -Annually -During seasonal time (flower blooming time)	Anually -50,000 approx During season time – more than 80,000.
4.	Villages and proximity to Kaas.	Village is approximately 1km from Kaas plateau so they hardly visit it otherwise they are more into hotels and guests house. Some villagers are the hired security guards by the Kanwata- society.
5.	They provide their homes for tourists Who wish to stay in village.	Botanists and researchers wills to stay in stay in village for one or more months.
6.	How they accommodate them in their homes?	Villagers provide their front living rooms for the tourists.
7.	How is their relations with Botanists and researchers?	
8.	Did they know about importance of flowers or their conservations?	Yes, they know about the importance of flowers due to maximum tourists and researchers increasing every year.
9.	What are their programs for the visitors? -Which help them to generate income and not harm the biodiversity.	They provide hotels, homes for tourists also there are books edition on Kaas which they sell for income generations.
10.	Their idea of government planning to conserve flowers or they are not aware of it.	They knew about government planning as many of conferences and seminars happens on the plateau for its conservation by social workers, forests departments and wild life conservation societies.

- **TOURIST VISITORS:**

1.	Type of tourists. Number of tourists per year during flowering season.	
2.	How they knew about Kaas and what make them visist such a place?	Newspapers and news channels. The beauty and science features of Kaas make them visit such a place.
3.	Their idea about flowers.	They are just attracted towards the beauty and colours of flowers.
4.	What they think about conserving the plateau?	

- **PHOTOGRAPHERS**

1.	What makes flower which are wild species to be clicked?	The shape and color of the flower make them to be captured.
2.	There was Kaas photography competition. Did they knew about it?	There was just once photography competition.
3.	What are their views about conservation and importance?	They think these flowers are very delicate and are important to nature so they don't destroy it or stamped it.
4.	What they think is more special to the site other than flowers?	Animals, insects, fungi.

WILD FLOWER CONSERVATION CENTRE

- **BOTANISTS AND RESEARCHERS -** Dr. Prerna Agarwal – Botanists, Pune

1.	Botanists views about conserving and what they think can be done to conserve the flowers – though their research and analysis.	Very important and its need of the hour to conserve their rare and endemic species of flowers which are wild but has its great medicinal uses. The medicinal uses of these flowers are not yet identified therefore Kaas plateau is very important from researcher point of view.
2.	What kind of spaces or ideas are required to conserve and research on this flowers?	Some wild flowers which are endemic to Kaas plateau require a great care for conservation, providing such conservation centre does not prove helpful but else it should to multiplied or seeds of these flowers should be conserved for year. For e.g. International Achieve for world seeds does the same thing.
3.	No. of Botanists. -Every year -During season time.	-Every year – 5 to 10 -During season time – 20 to 25
4.	Is there any research project going on which can be helpful in conserving of flowers other than study of flowers?	Prerna Agarwal is doing her research thesis for Ph.D. in Botany for tourist tramping the wildflower and its effects.
5.	How can Architecture helps in conserving their views?	-Providing conservation centre seed bank. -Regulating the path of tourist through roads. -Proper parking management so that cars does not interfere in bloomed area of flowers. -Research centre -Some accommodation for them.
6.	Should these flowers be grown the whole year? i.e. developing artificial setup to develop flowers entire year.	No, these flowers has its own unique seasonal character, which attract tourist.
7.	What are the future scope to the site?	Scope to site which respect to botanical study and research.
8.	Tourist's accommodation should be near to Kaas – Restrictions.	No, Tourist should not accommodate near the plateau.
9.	Commercial importance – or not in future. -medicinal importance-pharmaceutical	Some flowers has its commercial importance and some are yet to be find out.
10.	Scope to the site.	Yes, there is.

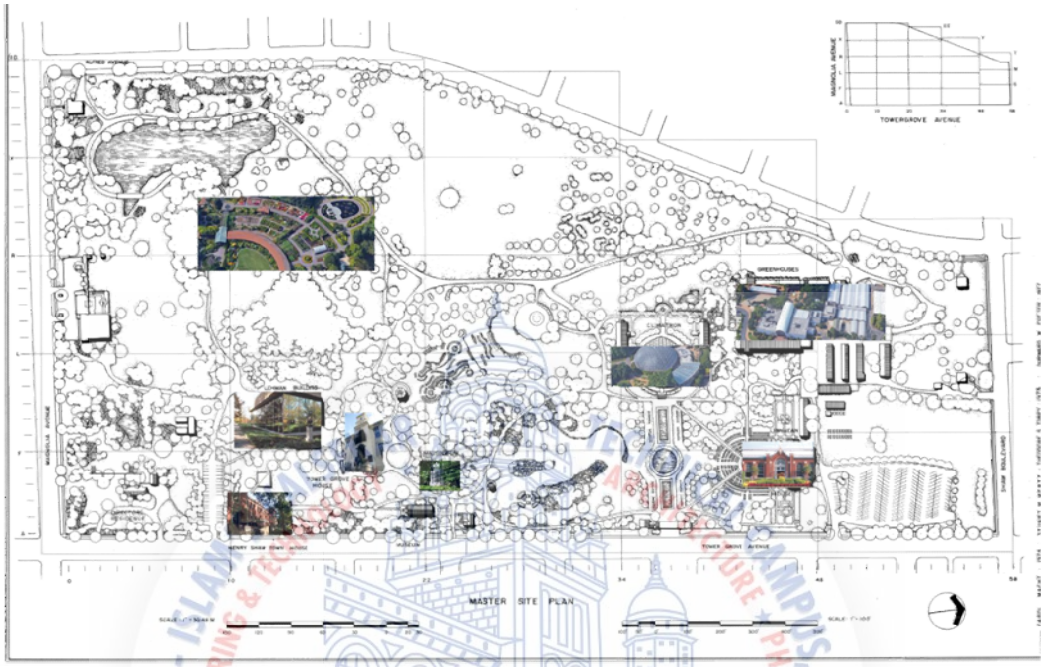
2.5. NO. OF VISITORS

Sr. No	PLACE	YEAR	TOURIST POPULATION
1	KAAS PLATEAU	2008-2009	8,972
2	KAAS PLATEAU	2009-2010	41,347
3	KAAS PLATEAU	2010-2011	1,20,950
4	KAAS PLATEAU	2011-2012	3,33,619
5	KAAS PLATEAU	2012-2013	61,137
6	KAAS PLATEAU	2013-2014	1,27,414
7	KAAS PLATEAU	2014-2015	99,280
		AVERAGE	1,20,107

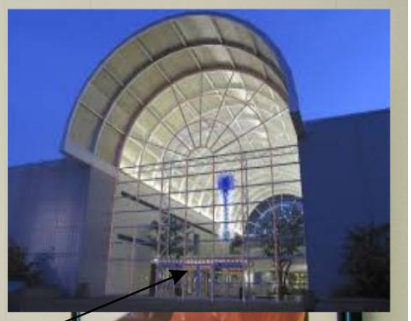
CHAPTER 3: CASE STUDY

- NET

A. MISSOURI BOTANICAL GARDEN



The Ridgeway Center, main entrance of theMissouri Botanical Garden and Parking Area.



The Ridgeway Center is the main entrance of the Gardens. An extensive gift shop and restaurant with patio dining are located in this building, along with a **theater, floral hall and educationwing**. A table near the garden entrance holds fresh cut samplesof flowers that are in bloom in the Gardens at the time.

From the entry building, visitors emerge into Spoehrer Plaza, a courtyard with the spectacular Latzer Fountain, surrounded by small sawtooth oak trees

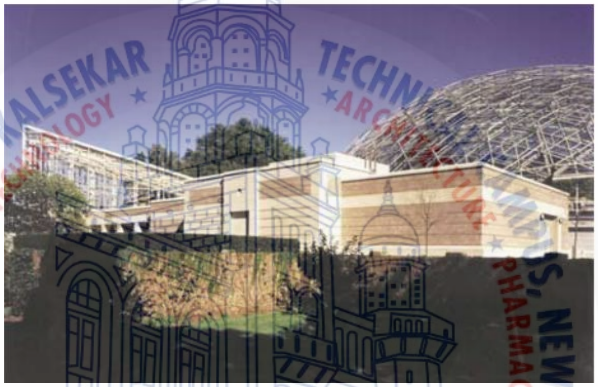
A free parking lot with over 475 spaces is adjacent to the Ridgway Visitor centre

CLIMATRON AND TEMPERATE GARDEN

- **The Schoenberg Temperate House** is glazed with thesame low-emissivity, energy-efficient glass used in the Climatron, and its southward roof slope allows maximum penetration of solar rays. A computerized climate control system aims to maintain the Temperate House at temperatures between 40 and 90 degrees.
- **The term "Climatron" was coined to emphasize the climate-control technology of the greenhouse dome.**

- The Climatron, named for its climate-control technology, stands 70 feet high and 175 feet in diameter.
- It encompasses a volume of 1.3 million cubic feet, and a ground surface of about 24,000 square feet (more than half an acre).
- The form of the building was chosen to fit the specific demands of a greenhouse.
- The Climatron has no interior support and no columns from floor to ceiling, allowing more light and space for plants. Instead, the weight of the dome is carried to the ground on five piers around the perimeter of the circle.
- The interlocking triangle design helps to distribute weight throughout the dome, allowing it to be lightweight but strong.

- **TEMPERATE HOUSE**



The shape of the greenhouse was derived after studying the sun angles it would receive. The cast stone and masonry details complement the existing architecture at the Garden.

The automated HVAC system and strategically positioned glass panes create a highly sophisticated yet seamless environment for plant growth.

The water from the roof runs down this curtain wall and into the wall below

PARKING AREA OF MISSOURI BOTANICAL GARDEN

- The main parking lots for the Botanical Gardens are located outside the Ridgway Center
- Due to the Botanical Gardens being a public facility, they are ADA compliant and paths throughout the gardens are wheelchair accessible.
- The Rock Garden, Milles Sculpture Garden, Dwarf Conifer Garden, Azalea Rhododendron Garden, Magnolia Walk, Rose Garden, and Dry Stream Bed Garden all surround the Climatron, so there is ample room for later growth and expansion.

WILD FLOWER CONSERVATION CENTRE

- MISSOURI BOTANICAL GARDEN
- SIZE: 78,000
- ARCHITEC: LOUIS R.KHAN
- The Monsanto Center houses a world-class

THE MONSANTO CENTER HOUSES A WORLD-CLASS

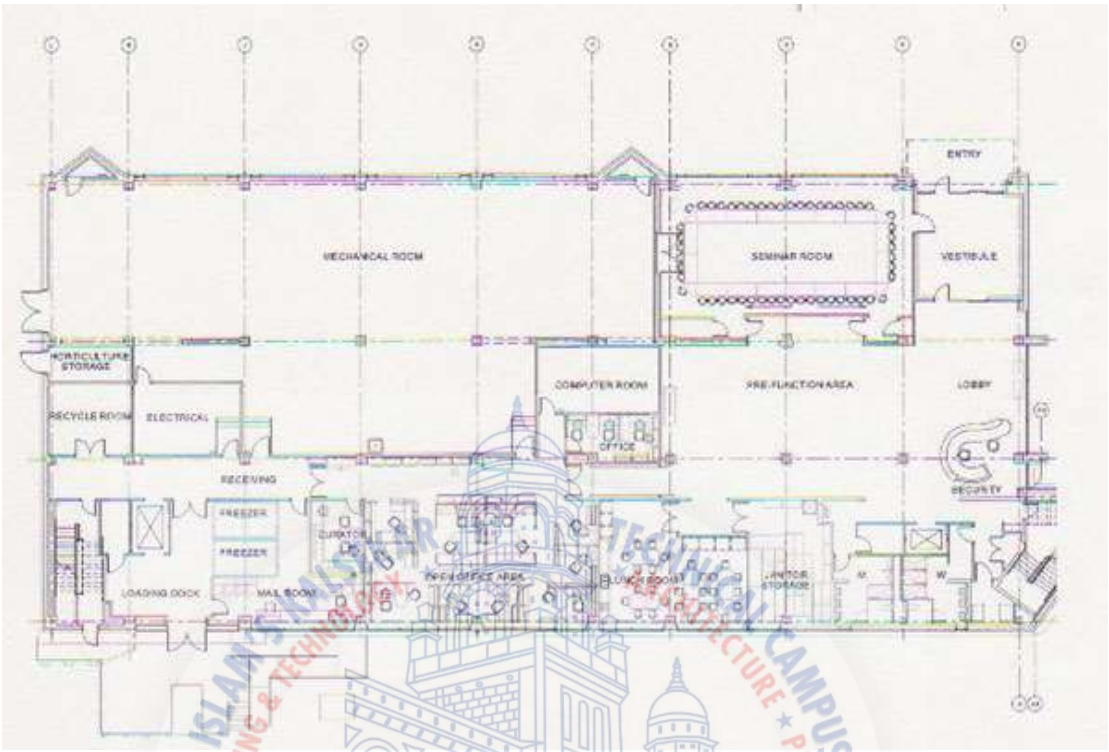
1. Herbarium collection (containing 5 million plant specimens)
2. Library
3. Offices
4. Laboratories.

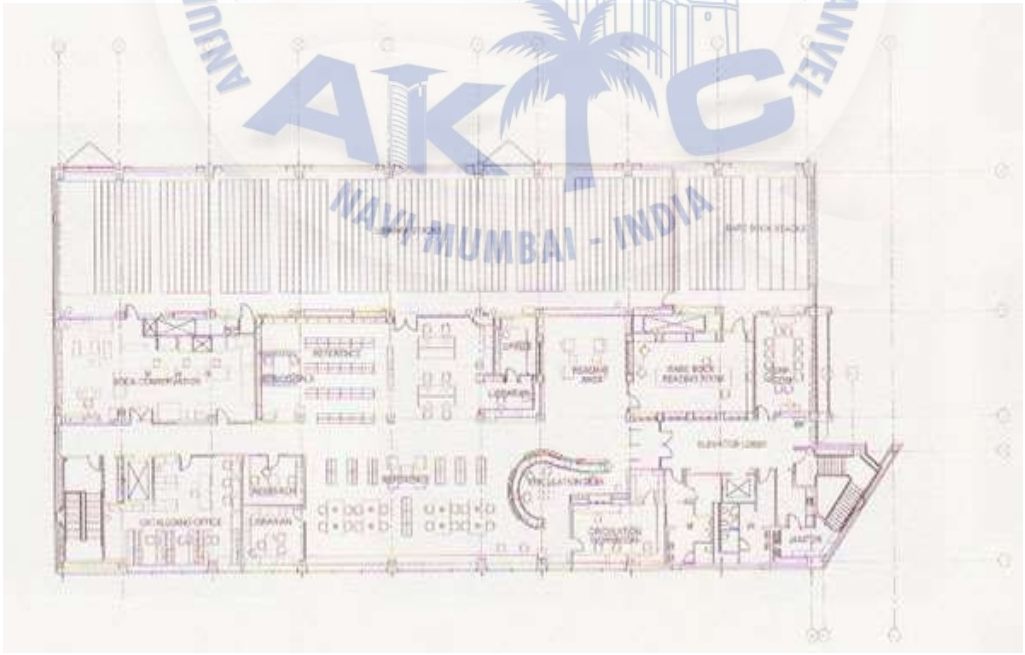
Given the dual needs for research and preservation of the collections, Christener designed the building in two distinct vertical zones, with separate thermal and environmental controls.

Research and office areas are on the south. Large windows admit light that is then reflected off the angled ceiling to reduce electric light use.

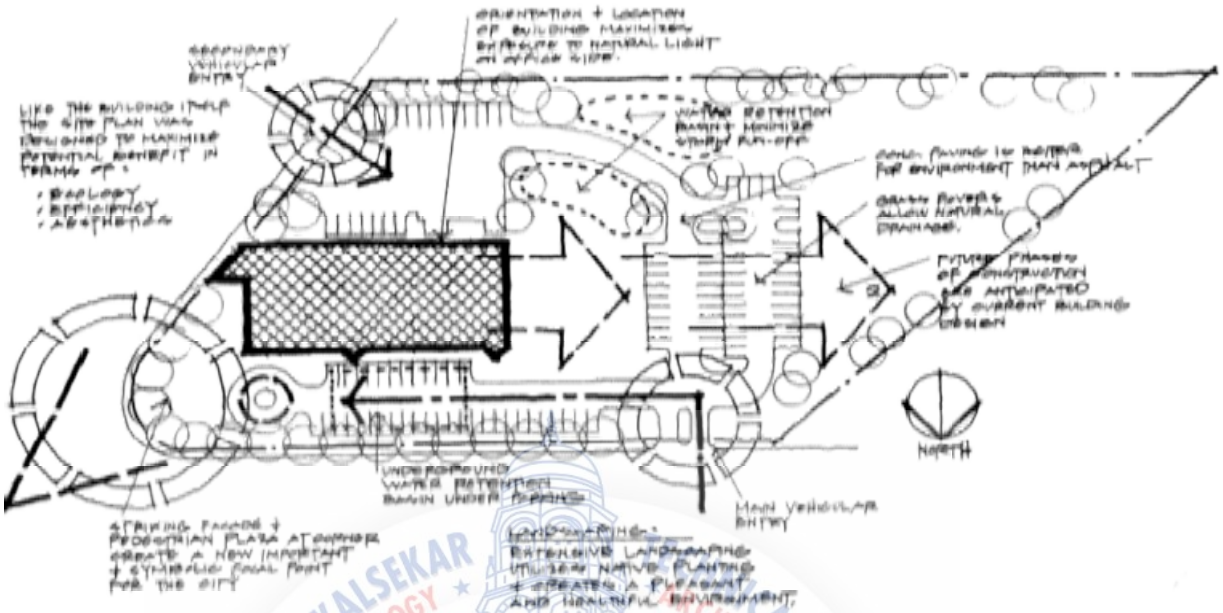
The collections area (heavily insulated and without windows) is on the north. Rigorous environmental demands require storage at 62 to 65 degrees and relative humidity at 45 percent. Vestibules buffer heat and moisture migration from adjoining office space.

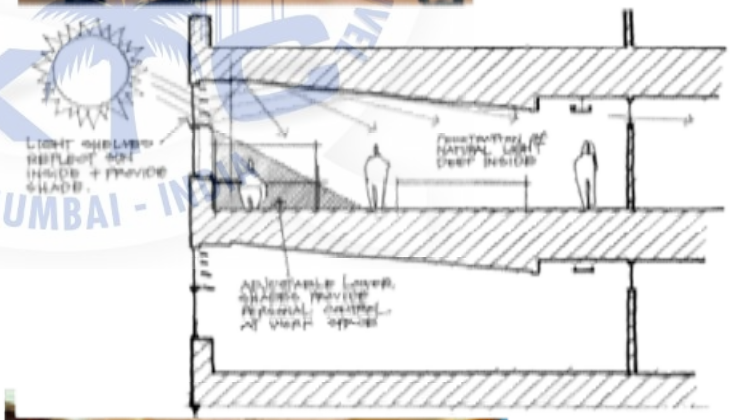
WILD FLOWER CONSERVATION CENTRE

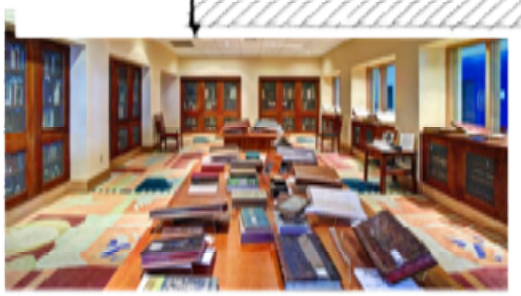




WILD FLOWER CONSERVATION CENTRE



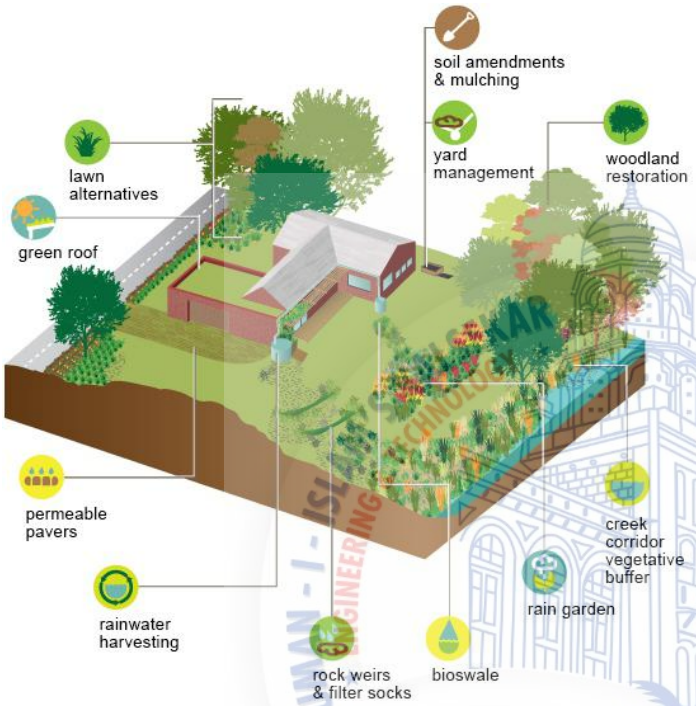




Why Rainscape?

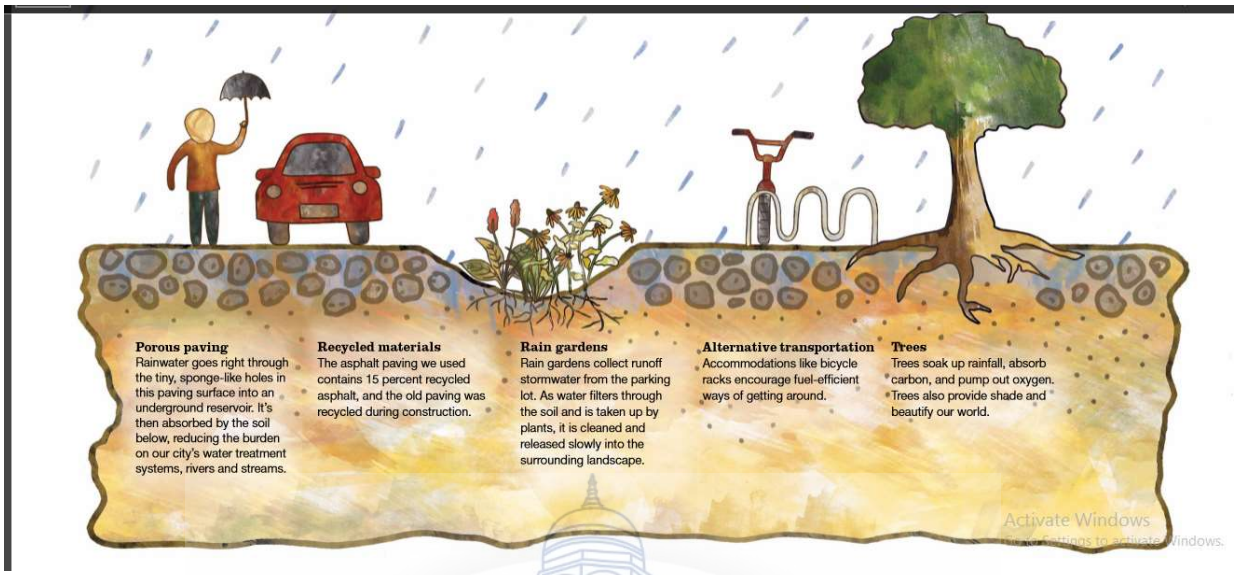
Impervious surfaces such as rooftops and driveways have replaced healthy soils and natural plant communities that once readily absorbed rainwater.

Rain Scaping Flowchart



What Is Rainscaping?

Rainscaping is conservation of water through parking, catchment areas and other functions that help to conserve water as it falls on it. This activities should be used where the flow of water is maximum. Other than this activities one can plant trees, shrubs and porous soil that allows water to penetrate in the ground to increase the water table. Plant native plants in the rainfall area as the native plants are capable of retaining more of rainwater and utilize less for their growth.



- **INFERENCE:**

Missouri botanical garden provides a place for the conservation of different flower species which attract many of the tourist from around locations.

It has visitors Centre which is the part of garden but the research Centre is located away from the garden as it should have the excluded space for research.

The species which are on verge of extinction are saved in herbarium library which is also the part of research Centre.

The garden has its history which is been saved from time through development of new spaces.

The species which requires control climate are placed in the climatron and temperate area

B. NATIONAL WILDFLOWER CONSERVATION CENTRE

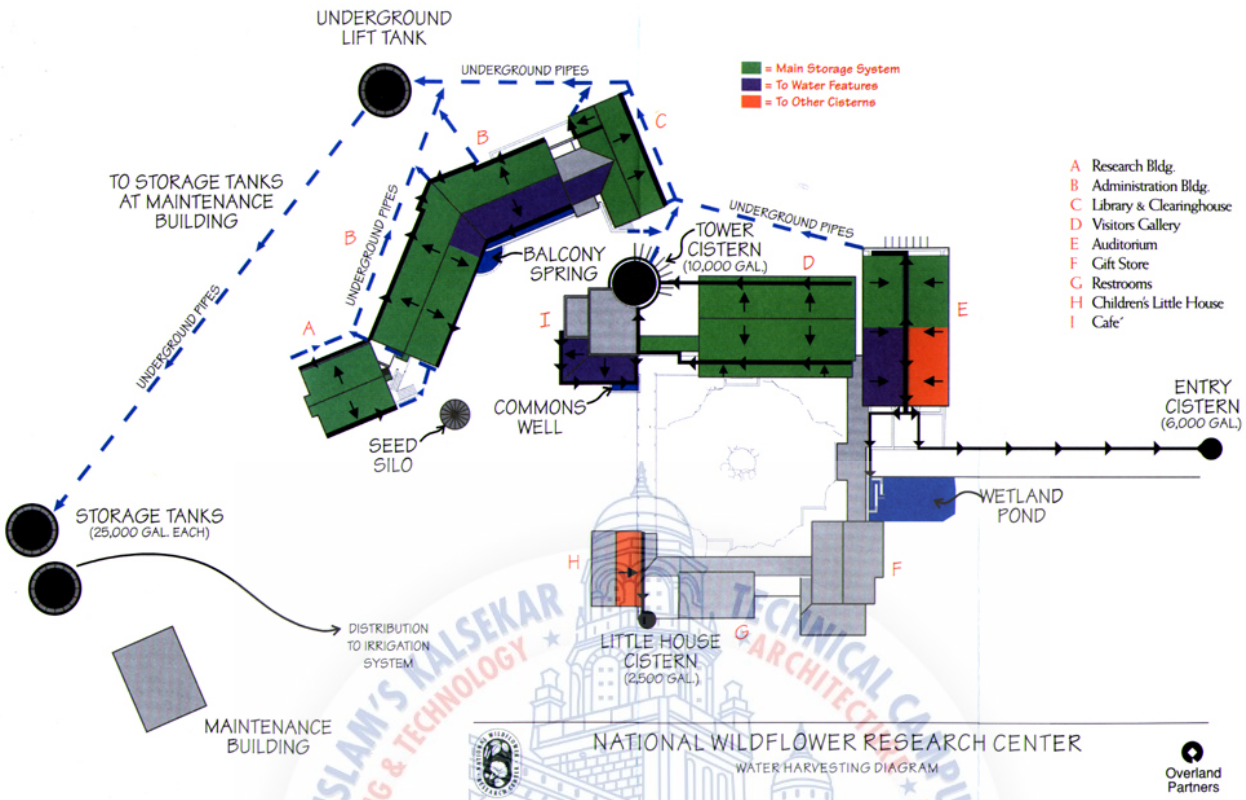
SCOPE OF PROJECT:

The Wildflower Center takes a multi-pronged approach to address specific plant conservation threats such as the harm caused by invasive species and the need to protect plants of conservation concern. Through partnerships, information sharing, seed collection and banking, rare plant monitoring and research, botanical expertise and novel citizen science-based approaches, the Wildflower Center has become a recognized leader in plant conservation in the state of Texas.

The Wildflower Center's conservation staff works with partners and stakeholders to address the most pressing plant conservation needs in Texas. These needs include:

1. Leadership and coordination,
2. Rare plant and invasive species monitoring and research,
3. Collecting and banking seeds for conservation and restoration,
4. Comprehensive documentation and mapping of the state's flora,
5. Dissemination of information,
6. Developing a network of citizen scientists to monitor invasive species and rare plants and, most importantly, Educating landowners and the public about the importance of conserving Texas' natural heritage and biodiversity Seed collection and banking.

WILD FLOWER CONSERVATION CENTRE



AUDITORIUM

Auditorium is perfect for large group presentations and has hosted internationally known scientists, authors, photographers, horticulturists, and story-tellers.

The Auditorium has 232 padded seats tiered for maximum visibility and comfort. Entrances located in all corners allow easy access to many of our natural areas, (including the tranquil Wetland Pond just outside the entrance

WILD FLOWER CONSERVATION CENTRE

VISITORS' GALLERY

Begin your explorations of the Wildflower Center and the world of native plants in the stunning Visitors' Gallery.

The Visitors' Gallery, Courtyard, and classrooms are available, like most of the Wildflower Center's facilities, for weddings, meetings, parties and other special occasions.

An impressive edifice of stone, glass and wood, the Gallery faces the busy Courtyard on one side and looks over the bucolic Wildflower Meadow on the other. The size and design of the Gallery make it an ideal spot for parties and receptions. Downstairs, you'll find several classrooms and an excellent "worm's-eye view" of the restored Meadow.

The Courtyard serves as a visual centerpiece and hub of activity at the Wildflower Center. After entering the Center via the lush promenade that runs along the Aqueduct, you'll step through the Courtyard's northern arch and into a wide, warm, natural space centrally anchored by a deep, cool, sparkling spring. Designed to resemble the natural springs of the Texas Hill Country, we occasionally hear a bullfrog croaking among the grasses of the spring in the early morning or evening. Just off the Courtyard's expansive breezeways lie the Visitors Gallery, the Auditorium, the Wildflower Cafe and The Store. Looming to the west is the Wildflower Center's famous Tower. As you pass from the Courtyard through its southern arch, you'll enter the first of many display gardens that are the Wildflower Center's raison deter.

Wildflower Center Store

OBSERVATION TOWER

Representative of watch towers of the Spanish missions, the San Antonio Observation Tower is also a 10,000 gallon cistern and was used as a vertical landfill for debris generated during the Wildflower Center's construction.

WILD FLOWER CONSERVATION CENTRE

LIBRARY

The Lady Bird Johnson Wildflower Center Library collects and organizes information to support the programs of the Wildflower Center.

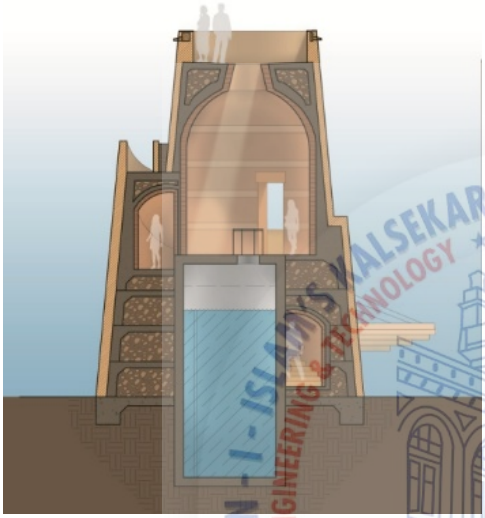
The Lady Bird Johnson Wildflower Center's Library assembles and disseminates information that will encourage the cultivation, conservation, and preservation of wildflowers and other native flora throughout North America

RESEARCH BUILDING

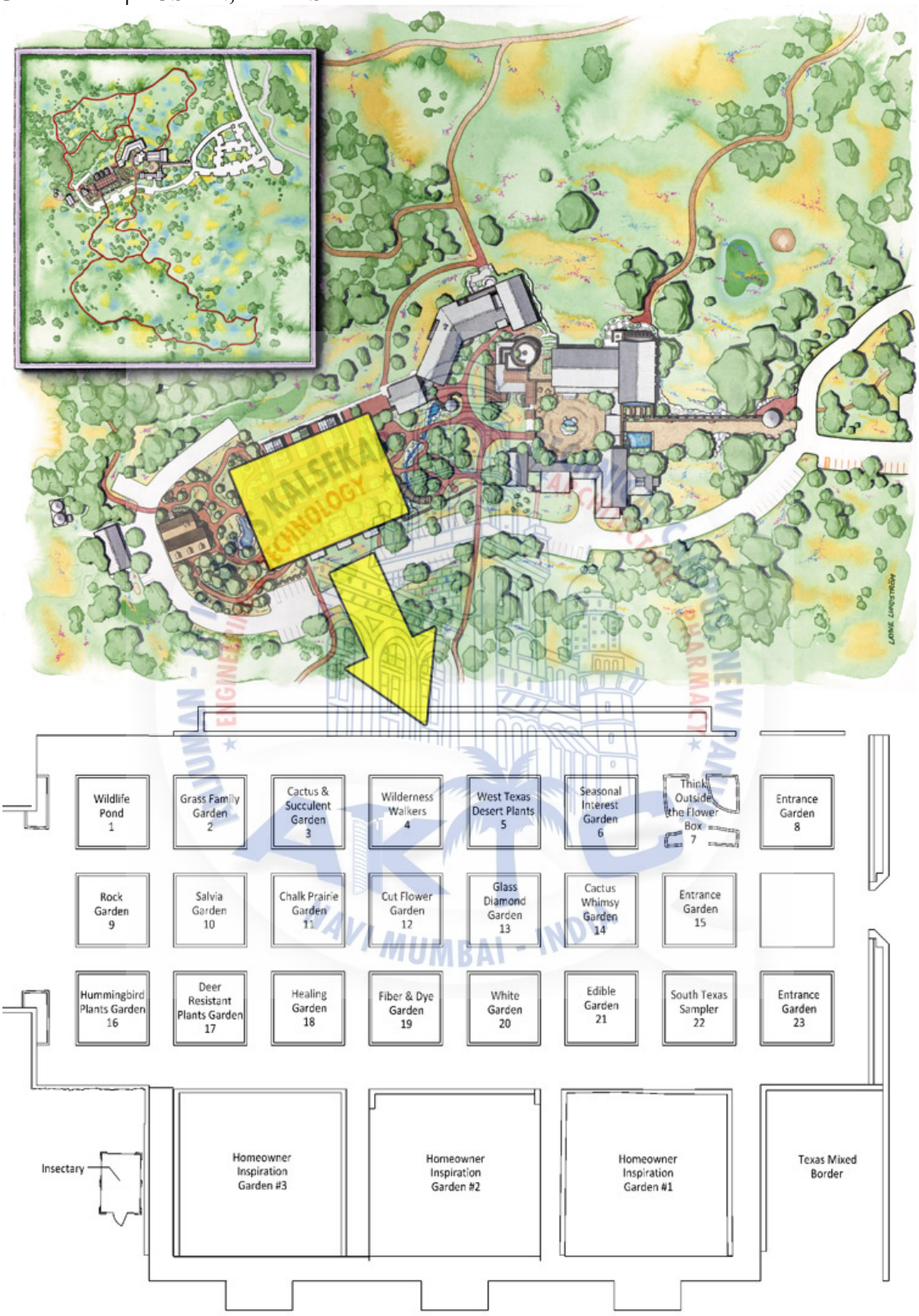
The Research Building houses the Seed Lab, Seed Bank and Herbarium and is the home of the Wildflower Center's Plant Conservation Program.

Learning Center

Lady Bird Johnson Wildflower is designed as a series of outdoor spaces and facilities, including visitors' galleries, a 200-seat auditorium, classrooms, a gift shop, tea room, conference facilities, administrative offices, a botanical library and research labs. Demonstrating an ecologically sensitive approach to the development of a site with fragile environmental conditions, the buildings and the programs model "total resource conservation" while showing the beauty and benefit of native landscape.



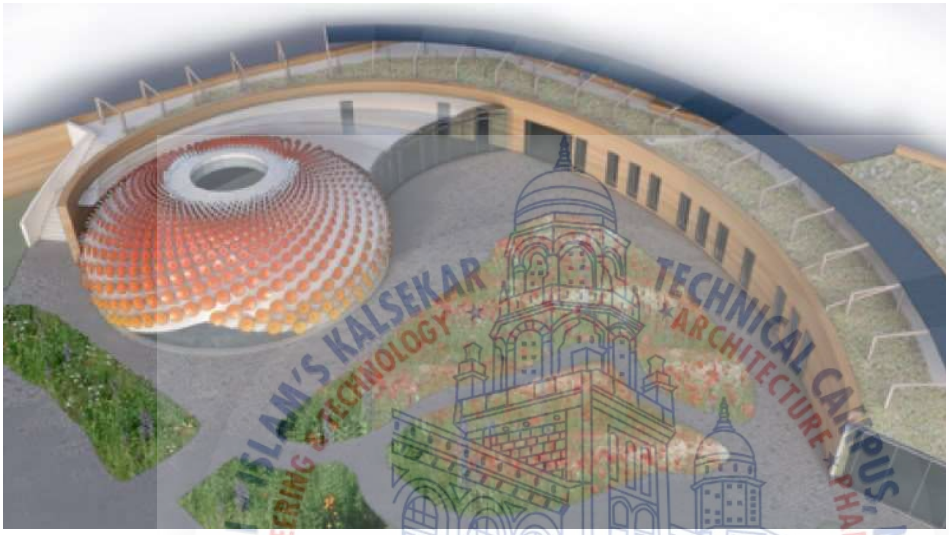
LADY BIRD JOHNSON WILDFLOWER CENER | INTERACTIVE VISITORS GALLERY | AUSTIN, TEXAS



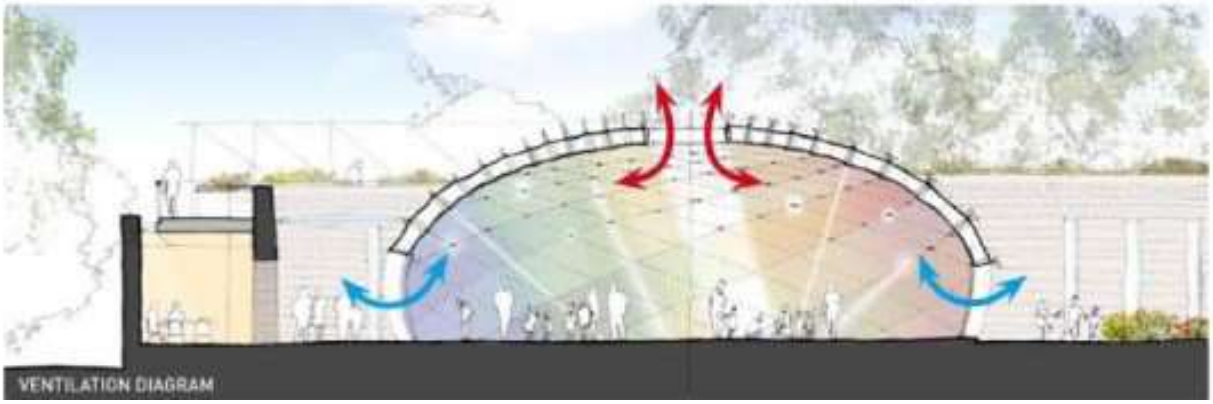
WILDFLOWER CONSERVATION CENTRE

- **CONCEPT-**

The close interrelationship of these spaces allows extreme flexibility.The main flexible space sits alongside the established wildflower beds as a distinctive new element,inspired by flower head.



- **SPACES:**
  - Operational areas
  - Reception space
  - Boiler room
  - Storage areas
  - Visitors
  - The proposals aim to embrace and improve the setting of the established
  - wildflower beds at the visitors centre while creating the striking entrance to new building.
  - A curving ramped earth laid out on spiral embraces the wildflower beds,leads to entrance to conference and delineates the public and operational area. The roof of operational area will contain the pot plant storage area,shaded by simple screened trellis system.



- **CONSTRUCTION-**
  - For the flower head ,developed the design to the point at which it can be constructed from a series of repetative elements.the structure is formed as a series of segments of which there are only two variations. These are. fabricated off site as a structural glu-laminated timber units,with the cross members follows the lines and bolted together on site These timber structure will be expressed internally. Between the structural units ,at the intersection there are steel light tubes which will receive the reflective panels.

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- A curving ramped earth laid out on spiral embraces the wildflower beds,leads to entrance to conference and delineates the public and operational area. The roof of operational area will contain the pot plant storage area,shaded by simple screened trellis system.

INFERENCE

- The idea for the conservation of wildflower in national wildflower is they create the artificial layer of soil which is suitable for the growth of such species.
- It creates the striking large opening which is the main entrance of the Centre.
- It has water Harvesting which serves as purpose of water throughout the making it sustainable.
- The main purpose of the centre is to create awareness which is served by the visitors centre.
- The exhibition area and gallery with interactive feature make people understand the use and its importance for conservation.

C. GARDENS BY THE BAY, SINGAPORE

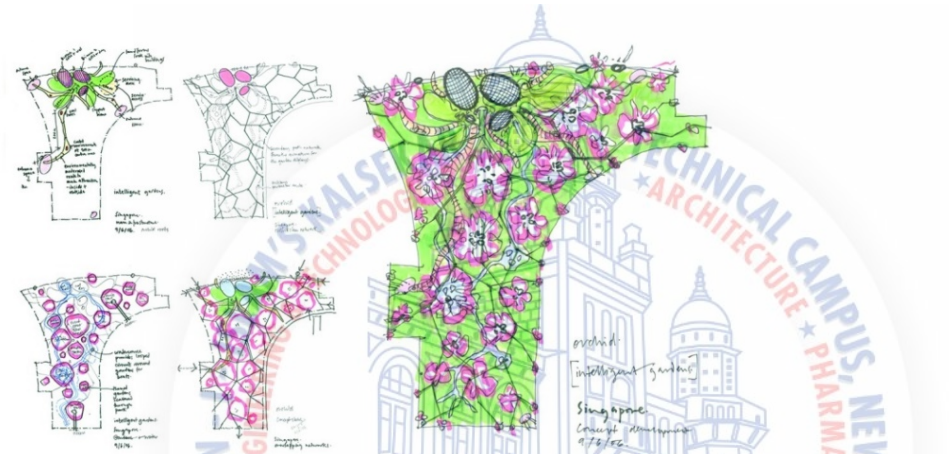
- Architects
- Grant associates
- Location
- Bay Shore rd., Singapore

- Created a city in a garden
- Garden by the bay is the project that brings human life close to the environment. It is one of the largest botanical garden which serves as conservation Centre for most of endemic herbs and plants from tropical and mediterrean climate. This garden is the perfect atmosphere for the flora and fauna of Singapore

.

A CONCEPT OF NATIONAL FLOWER OF SINGAPORE WHICH IS THE INSPIRATION TO THE CENTRE.

A fusion of nature and technology Taking inspiration from the form of the orchid, grant associates' master plan is a rich fusion of nature, technology and environment management. The structure is the combination of nature fusing with technology are combined with a wide various horticultural displays. The whole idea of project is conserving the endemic species of Singapore



DESIGN DETAILS:

- 18 super trees (25-50m high) to act as iconic vertical gardens
- Aerial walkway and treetop bar offers unique views of the gardens
- 2 giant cooled conservatories housing plants from Mediterranean and tropical montane regions of the world
- Indoor mountain offering tropical rainforest experience
- Spectacular nightly light and sound shows
- 4 heritage gardens reflecting Singapore's cultural links with plants
- 6 world of plants gardens showcasing the biodiversity of plant life on our planet
- Dragonfly lake and dragonfly bridge
- Numerous sculptures and architectural structures.

WILD FLOWER CONSERVATION CENTRE

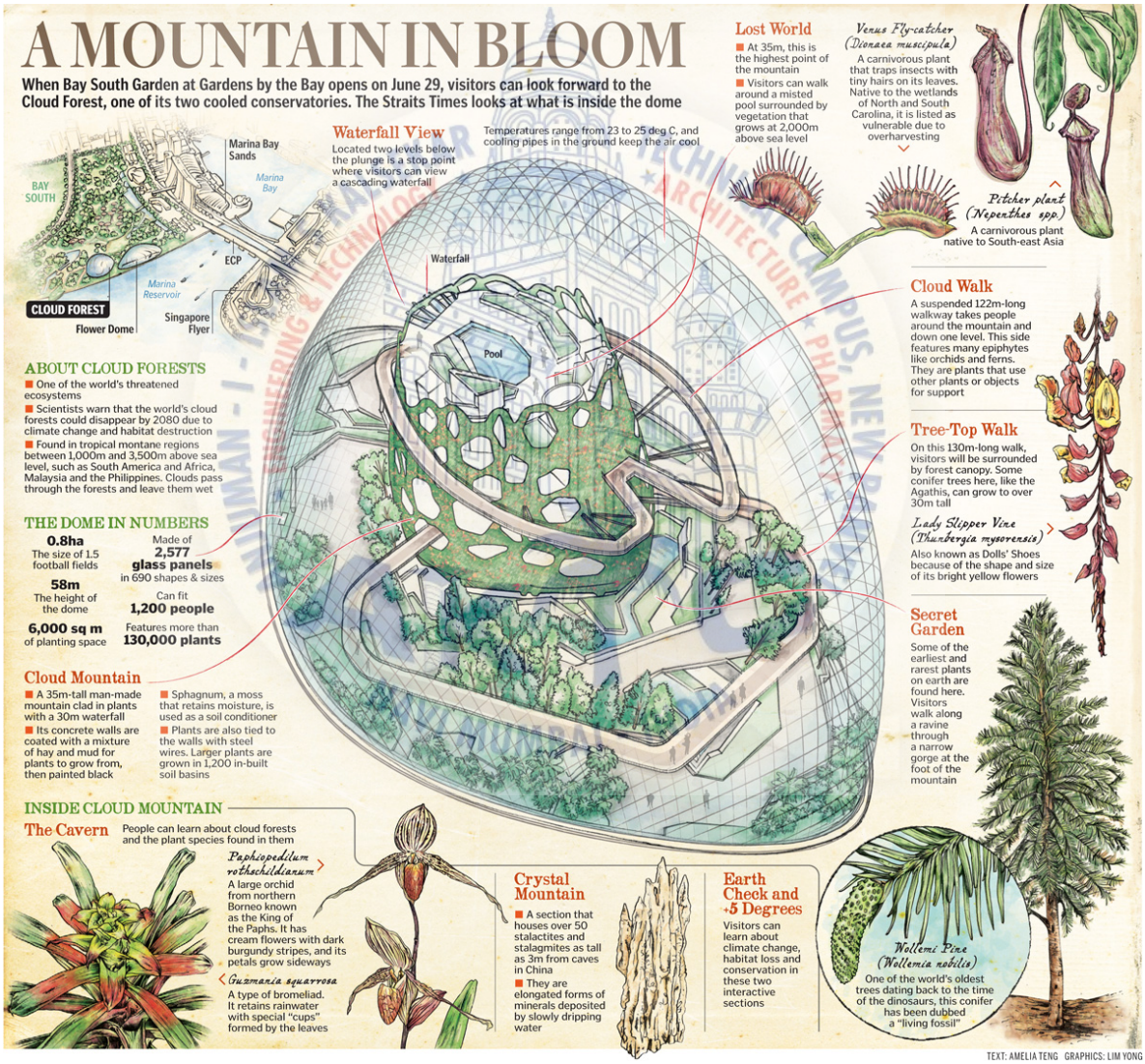
- **INTELLIGENT ENVIRONMENTAL INFRASTRUCTURE.**

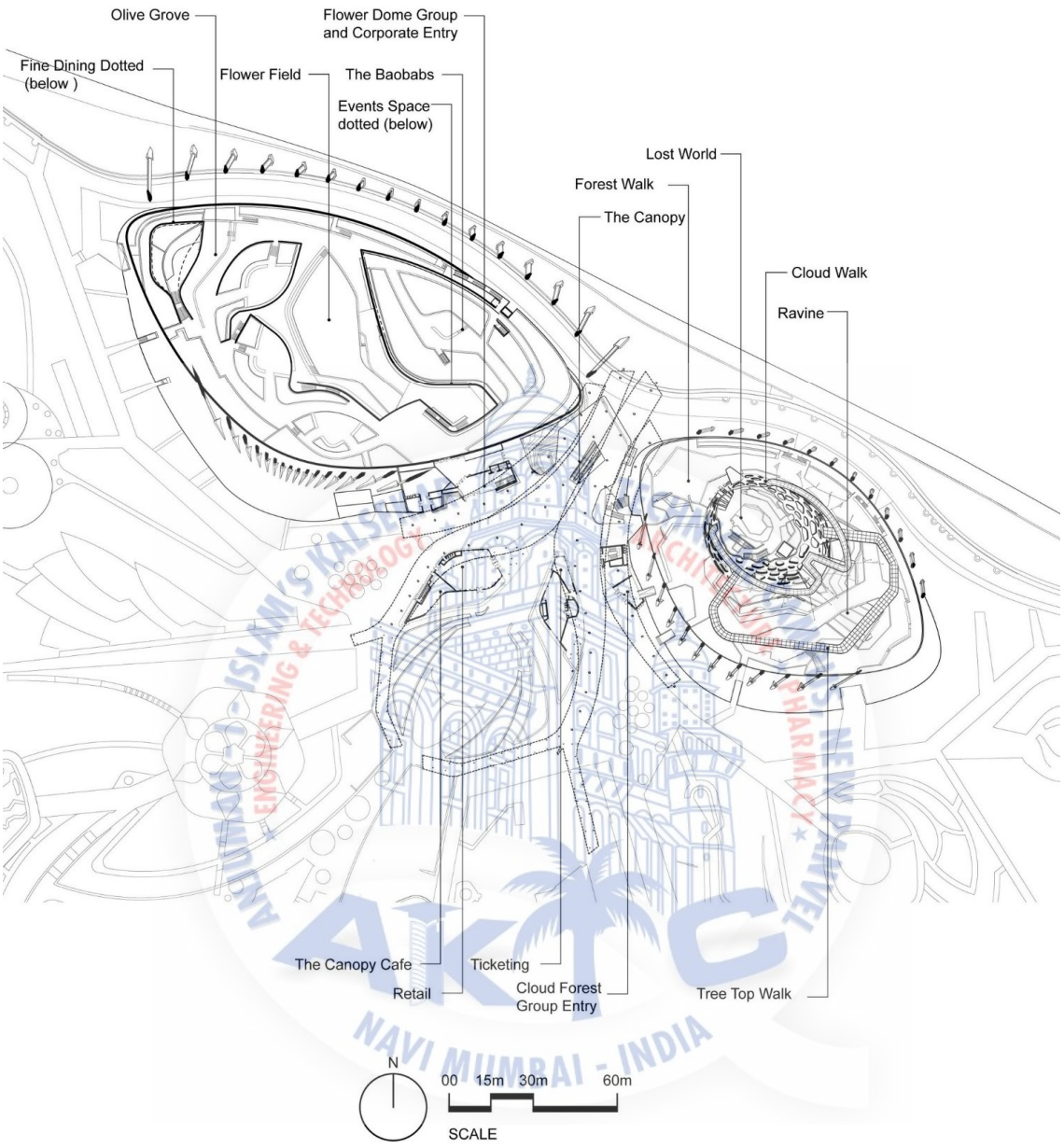
The 4 heritage gardens reflect Singapore's 4 main ethnic groups as well as the city-state's colonial heritage. Each garden explores the rich cultural significance of different plant species:

- Malay garden – the story of life in a traditional village
- Indian garden – inspired by a traditional lotus flower motif
- Chinese garden – inspirational places for writers, poets and artists
- Colonial garden – the story of crops, spices and plants as 'engines of empire'.

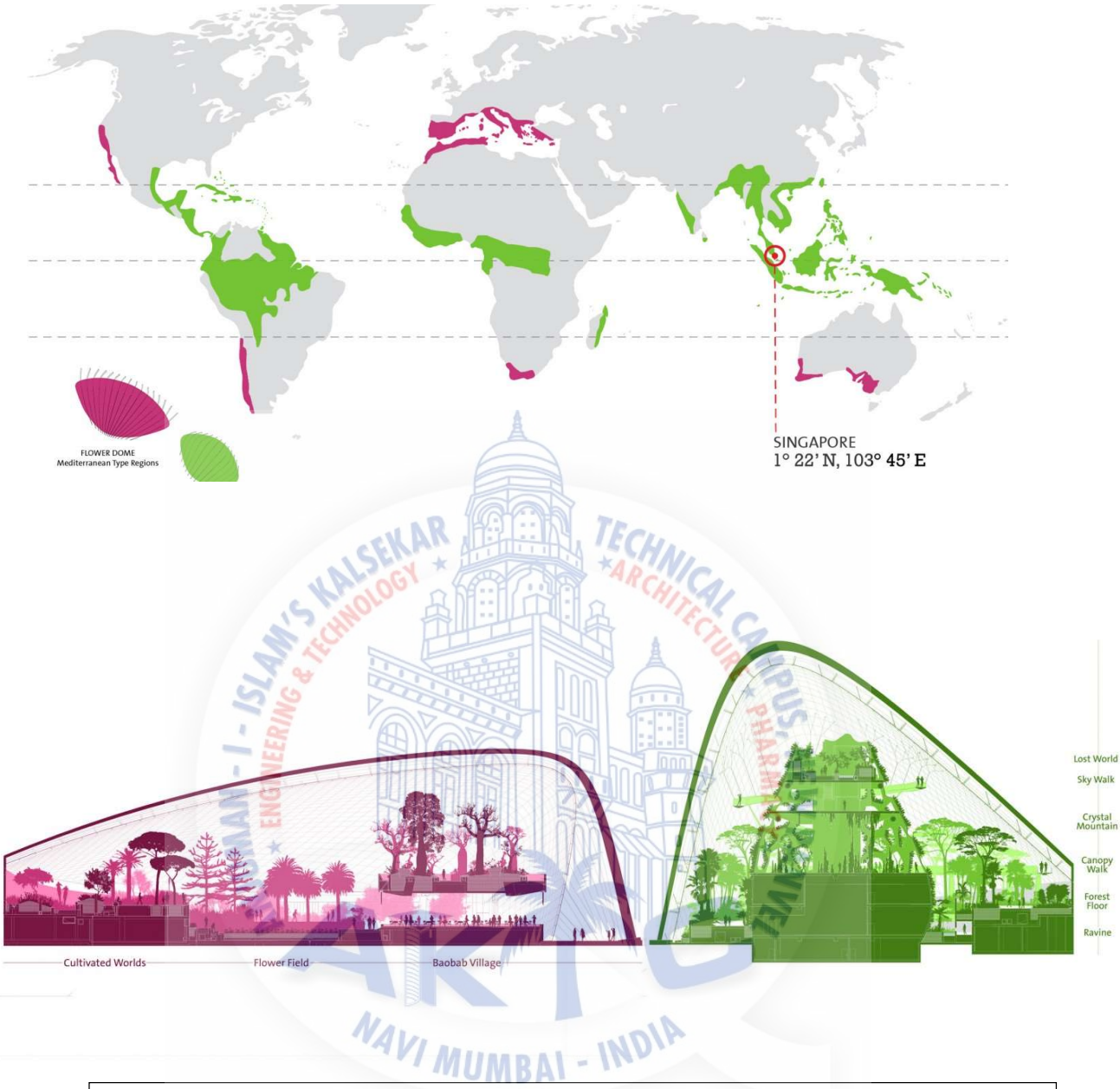
COOLED CONSERVATORIES

Two giant biomes designed by Wilkinson Eyre architects – The first dome is the flower dome dome (1.2 hectare) and the second is cloud forest and the cloud forest dome (0.8 hectare) – display plants and flowers from the Mediterranean-type climatic regions and tropical mountain (cloud forest) environments and provide an all-weather space within the gardens.





PLAN OF CONSERVATORIES



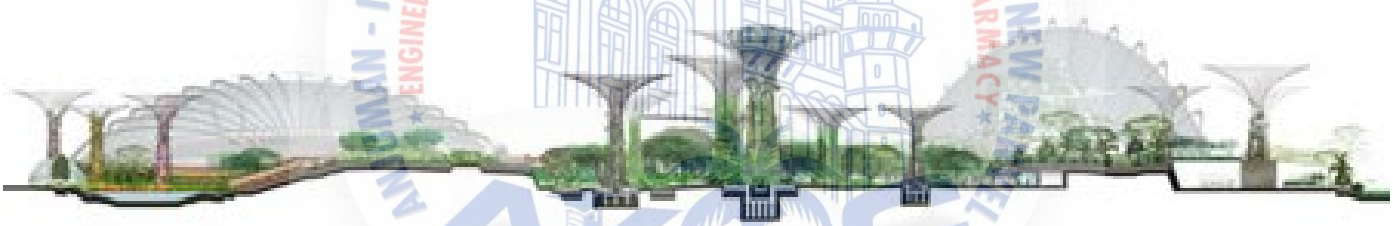
TROPICAL AND MEDITERRAEAN TYPE OF CLIMATE INSIDE THE CONSERVATORIES

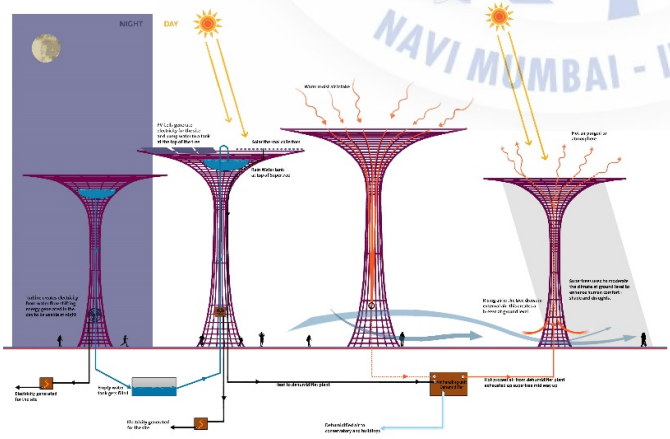
SUPER TREES

- **The supertrees are embedded with sustainable energy and water technologies integral to the cooling of the cooled conservatories**

DESIGN DETAILS:

- 18 supertrees are home to 162,900 plants and over 200 species
- beautiful displays of tropical flowering climbers, epiphytes and ferns by the gardens by the bay horticulturalists
- Daytime shades are provided by the overhangs of these trees
- Due to lighting and projected media this trees comes alive at night
- Panoramic view from the top of the supertree is the best feature of this structure.
- the ocbc skyway offers a unique 22m high perspective over the gardens and dragonfly lake
- Solar energy conservation is done by solar panels which is laid at the conservatory.





HORTICULTURAL GARDENS

- Two collections the heritage gardens and the world of plants centre on ‘plants and people’ and ‘plants and planet’. Together with mass flowering and coloured foliage landscape, they form a spectacle of colour and texture and fragrance within the gardens, providing a mesmerizing experience for visitors.
- The theme gardens showcase the best of tropical horticulture and garden artistry. Together with mass flowering and colored foliage landscape, they form a spectacle of colour, texture and fragrance, providing a mesmerizing experience for visitors.
- The themed gardens feature two spectacular collections, one focused on ‘plants and people’, the other on ‘plants and planet’.

HERITAGE GARDENS – ‘PLANTS AND PEOPLE’

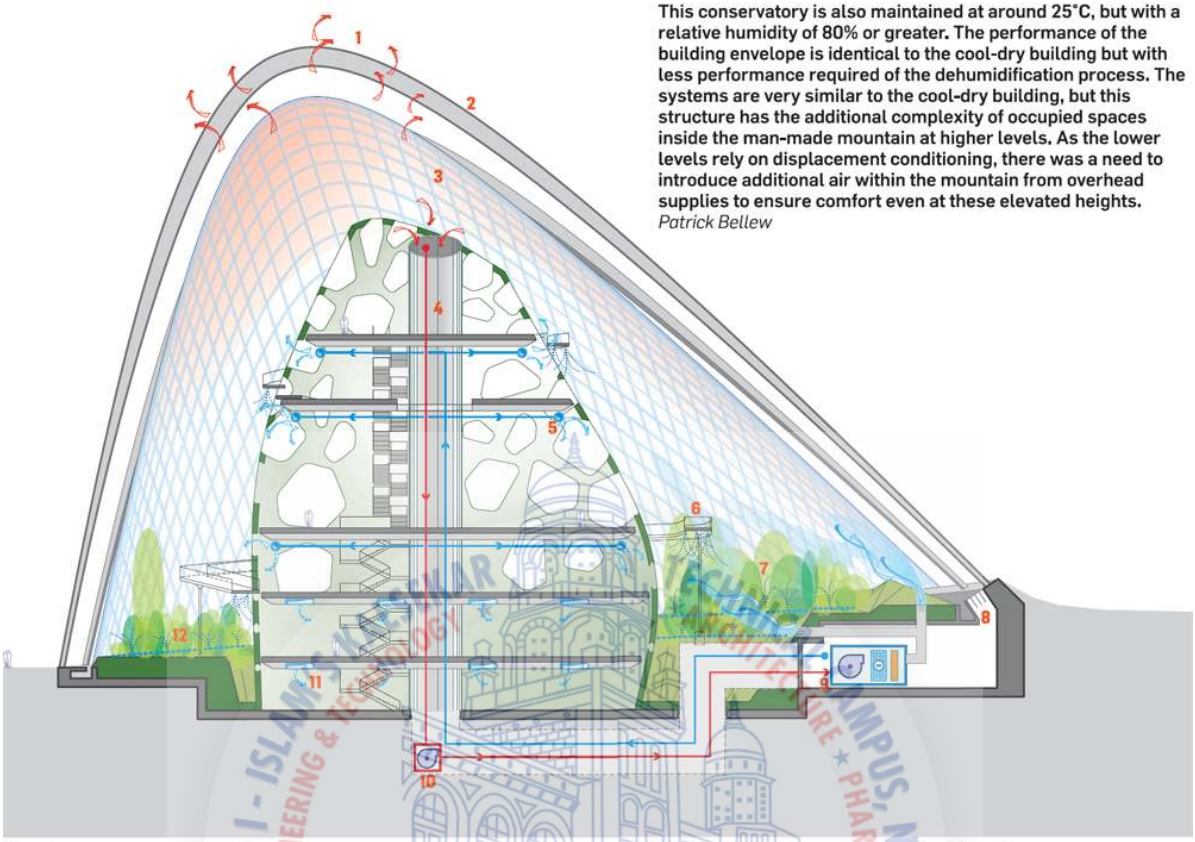
Children garden The far east organization children's garden at gardens by the bay is inspired by the natural instincts of children. Providing children with an innovative facility that gives them the opportunity to play with nature in nature, hide, climb, explore, paint, cook, dig and in ways that contribute to their full growth potential.

DESIGN DETAILS:

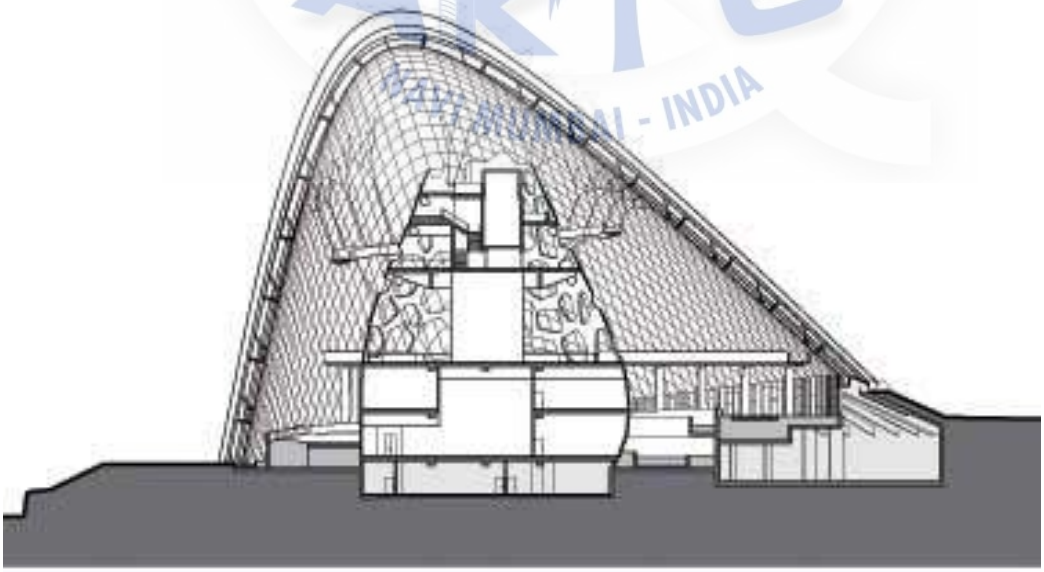
- Water play is the centerpiece of the garden using modern water play technology, including hydro vaults, water splines and orchid-shaped splash buckets.
- Two treehouses set within a thicket of rainforest trees to bring a sense of adventure and close contact with trees.
- An adventure trail follows the edge of the children's garden with a series of topiary pergola arches that shade a linked series of balancing, clambering, swinging and climbing elements to allow children the opportunity to enjoy a different type of forest trail.

COOL-MOIST BIOME

This conservatory is also maintained at around 25°C, but with a relative humidity of 80% or greater. The performance of the building envelope is identical to the cool-dry building but with less performance required of the dehumidification process. The systems are very similar to the cool-dry building, but this structure has the additional complexity of occupied spaces inside the man-made mountain at higher levels. As the lower levels rely on displacement conditioning, there was a need to introduce additional air within the mountain from overhead supplies to ensure comfort even at these elevated heights.
Patrick Bellew

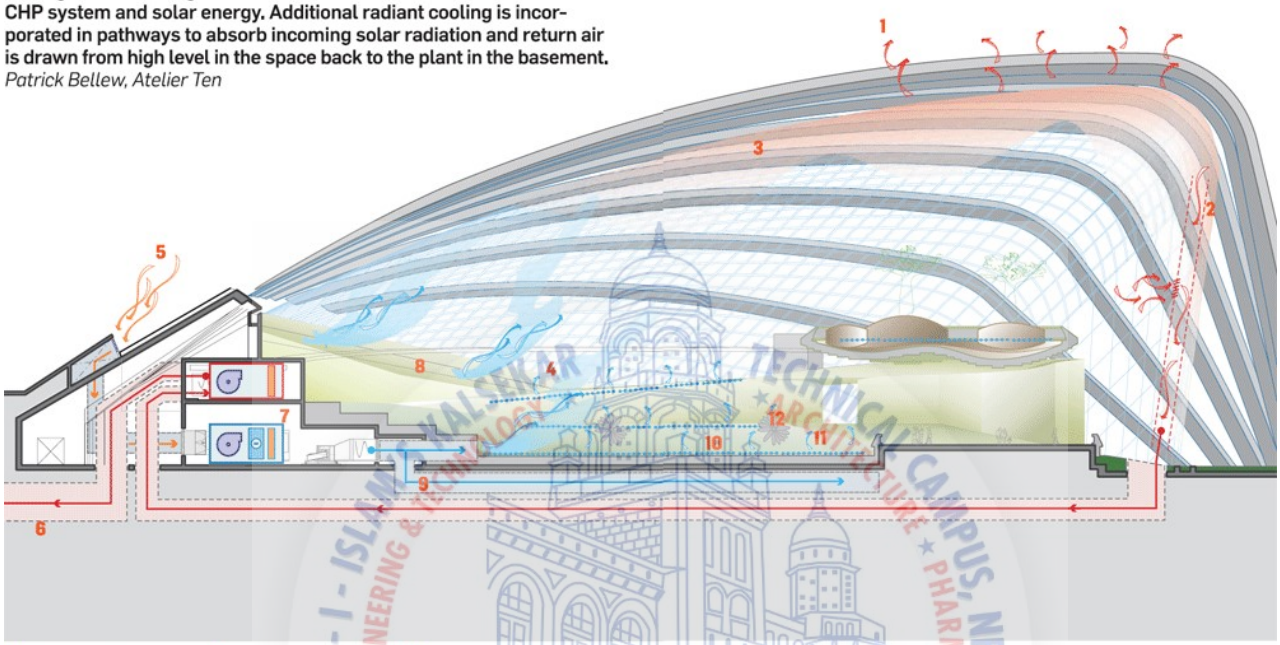


1 Hot air purged to outside via openings in facade. Space is always positively pressurised
2 Active shading on exterior of facade. Options 1: Tension blinds. Option 2: Movable opaque panels
3 Air volume equivalent to fresh air rate purged through facade at high level
4 Return air duct integrated to mountain
5 Air distribution via ring ducts at each level to set diffusers pointing inwards and pointing outwards
6 No conditioning to walkways. Misters are on underside of walkway. Internal misters can be used to shade on bright days
7 Misting nozzles distributed throughout surface of space
8 Air intake
9 Ground air handling plant room. Supply air handling unit contains cooling coil and dehumidification unit
10 Mountain air handling plant rooms
11 Block box internal spaces conditioned with fancoils
12 Air distribution and fabric cooling integrated to planter and walkway areas

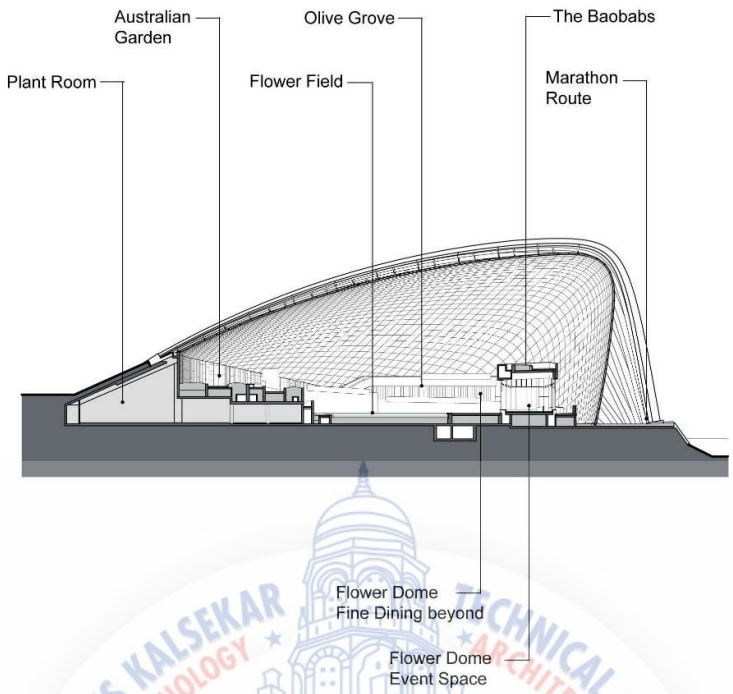


COOL-DRY BIOME

This conservatory is maintained at a temperature and humidity suitable for growing European plants (25°C and 65%RH max). Air is introduced for cooling at ground level through integrated slots in the internal structures. Liquid desiccants are used to remove moisture from the air prior to cooling by chilled water. The desiccants are regenerated using a combination of waste heat from a biomass CHP system and solar energy. Additional radiant cooling is incorporated in pathways to absorb incoming solar radiation and return air is drawn from high level in the space back to the plant in the basement.
Patrick Bellew, Atelier Ten



1 Return air duct integrated to facade
2 Hot air purged to outside via openings in facade
3 Active shading on exterior of facade. Options 1: Tension blinds. Option 2: Movable opaque panels
4 Cooled air and fabric cooling integrated to planting areas.
5 Air intake
6 To energy centre / supertrees
7 Plant rooms contain supply & extract air handling unit (AHU)
8 Air supply bulkheads
9 Underfloor supply duct
10 Fabric cooling
11 Displacement grilles at regular intervals
12 Motorised mounted impulse fans to ensure air velocity is 0.5 - 1m/s



SECTION OF SPACES IN THE CONSERVATORIES

DESIGN DETAILS:

- Cooled conservatories house 226,000 plants from every continent except Antarctica
- 1.2 hectare flower dome replicates a cool-dry Mediterranean climate
- Giant flower field with changing seasonal displays
- Raised walkways to explore exotic planting
- 0.8 hectare cloud forest recreates cool-moist climates of tropical montane regions
- 35 meter high epiphyte clad mountain with waterfall
- The mountain houses galleries and a black box media exhibition themed around climate change and habitat loss
- Powered sustainably via horticultural waste, efficient de-humification and thermal stratification

D. MAHATMA PHULE KRISHI VIDHYA PETH AT RAHURI.

- LIVE CASE STUDY (INDIA)

CRITERIA OF SELECTION CASE STUDY

Reason of taken this university for case study to understand my topic of agricultural research and training institute, how it manage all activity relate to teaching ,research good crop cultivation programs. How they divided land for farm, structurally how it can be look like to farmer's come for education they fell comfortable. Architectural features which used in planning of university or institute. Use of modern technology for farmer for good crop. What kind of marketing is to use for sealing of crop ,bio-fertilizers, arrangement of exhibition space for farmer's about new research products.

This university is known a day's one of successful university in teaching, research and imparting extension education to the farmers of the State. it having well organization setup which is divided keeping mind of farmer's behavior it structurally different part

Huge land is well divided for different crops for different regions and research on those crops is to be done, before use of farmer's seeds, crops, fertilizers presentation conducted on the site teach them how to use it.

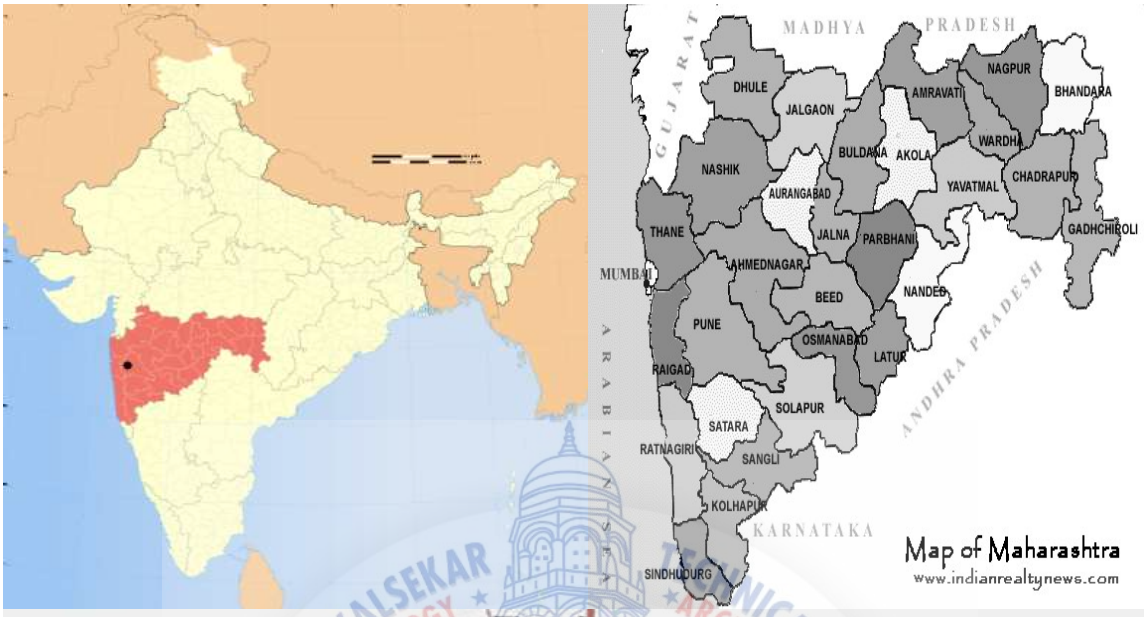
Land is divided like, Horticulture, floriculture, seed production area etc.

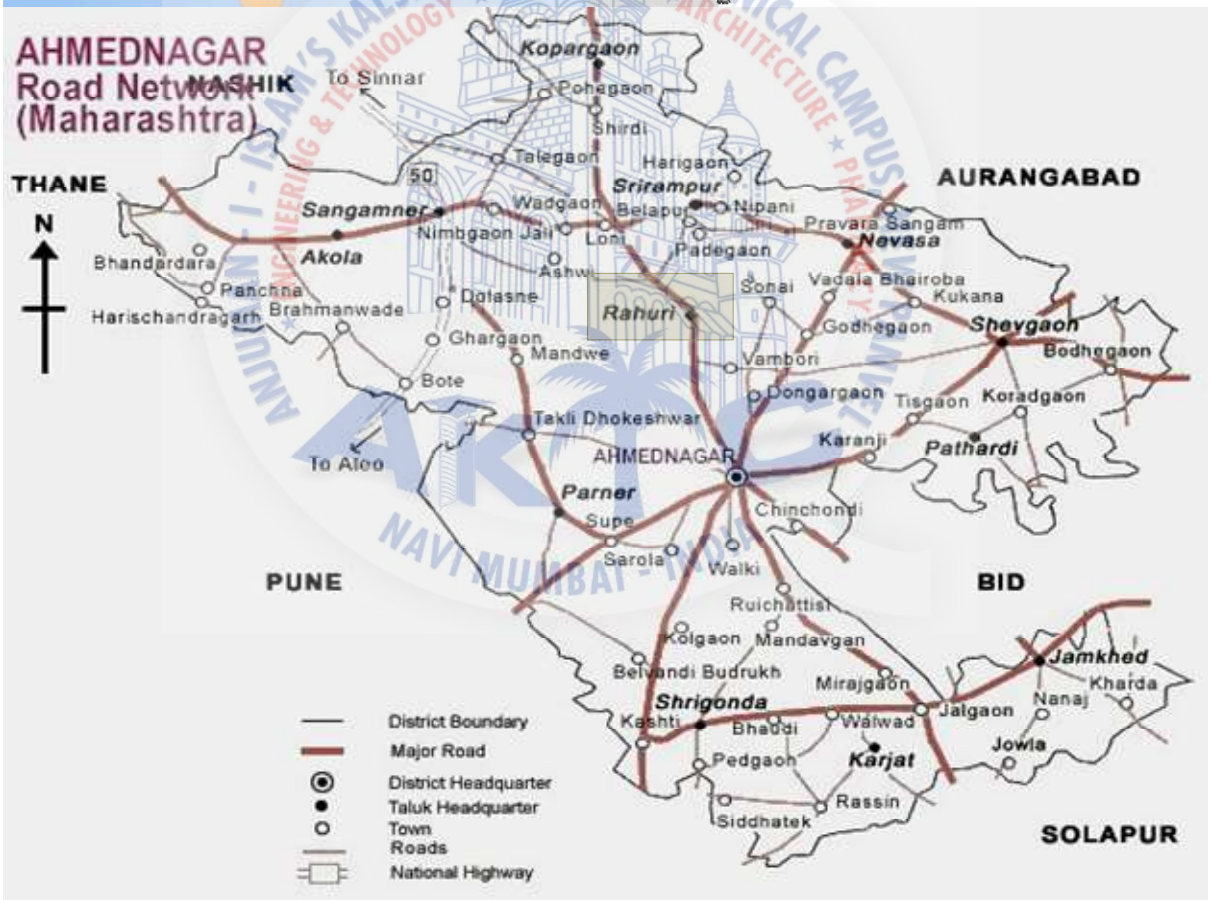
The university offers well teaching and research facility for student of agriculture and former's B Sc / B Tech / M Sc / M Tech in Agriculture, Horticulture, Forestry and Agricultural Engineering.

For student, farmers, scientist hostel facility also provided which is constructed in R.C.C. . . . Library, Gymkhana Hall and University playground at central campus are regularly maintained.

WILD FLOWER CONSERVATION CENTRE

LOCATION:



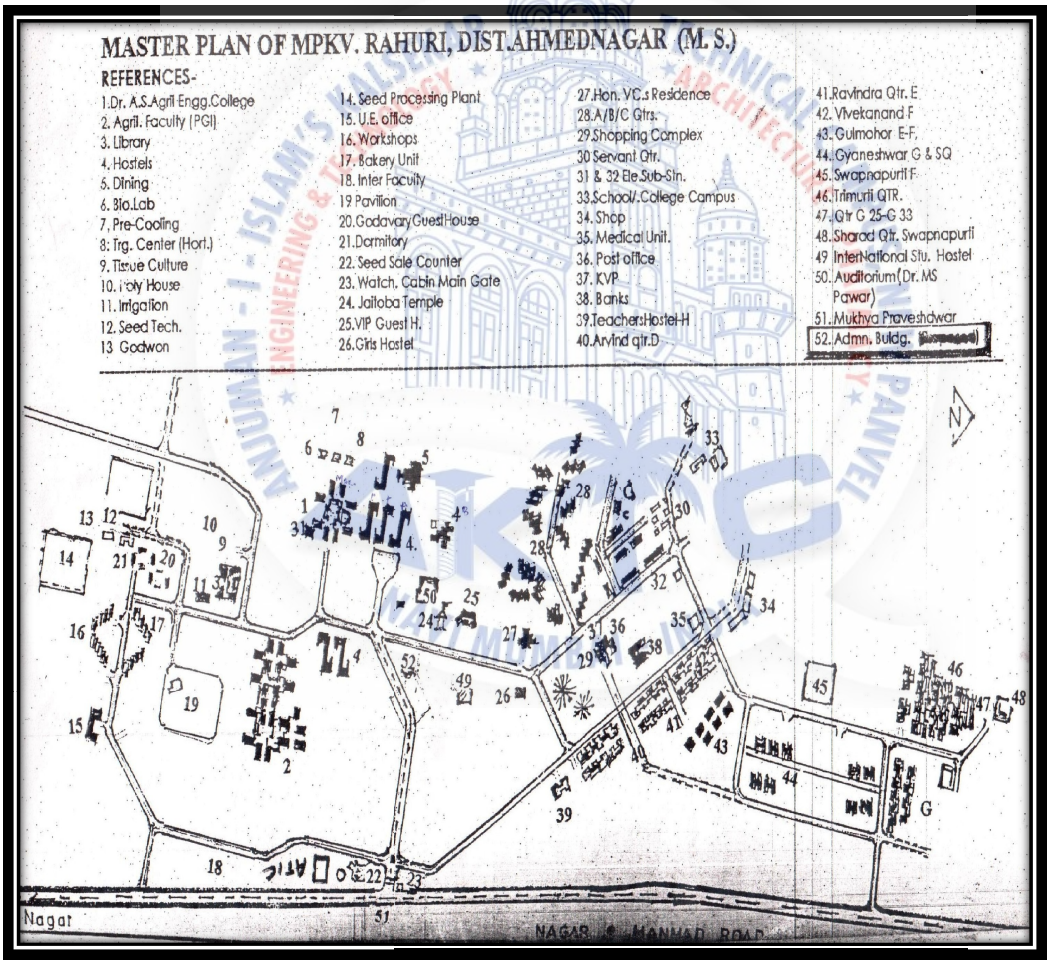


WILD FLOWER CONSERVATION CENTRE

AIM:

The aim of the project is to study the Horticulture research center which would be helpful for designing the wildflower research center.

- **SITE AREA:** 8500 acres
- **BUILT UP AREA:** 20-30% of the total area.
- **JURISDICTION:** Western Maharashtra consisting of 10 districts.
- **3 HOLD FUNCTIONS:**
  1. Education
  2. Research
  3. Extension



SITE PLAN OF MPKV AT RAHURI

Dr. A.S. College of Agricultural Engineering, Rahuri

The College is named after late Dr. Annasaheb Shinde, former Union Minister of State for Agriculture. Dr. Shinde was one of the architects of Green Revolution in India and White Revolution in Maharashtra especially in Ahmednagar district.

INTAK:

B.Tech 50, M.Tech 8

AGRICULTURAL ENGINEERING:

Stone Construction Open planning Small Courtyards kept for plantations

G+2 Structure

- PARELLAL PLANING WITH PROJECTING ELEMENTS CREAT ONE VISION POINT

- 2 BLOCKS OF BUILDING CONNECTED BY BRIDGE WHICH ALLOWS LIGTH VENTILATION IN MID PART OF THE BUILDING
- SHURABS AND SMAL PLANTATION USED IN THE LINER FORM TO WHOL BLOK AT GROUND LEVEL WHICH ALLOWS TO DIRECTION OF THE WAY

DISCIPLINES FOR M.TECH:

- Farm Machinery ,
- Soil and water Conservation,
- Irrigation and Drainage Egg,
- Agriculture Process Engg.
- Bothe the buildings (PGI and Agri engg) are designed by Ar. Kanvinde.
- They follow the same character, while the other buildings built later are quite different and do not follow same character

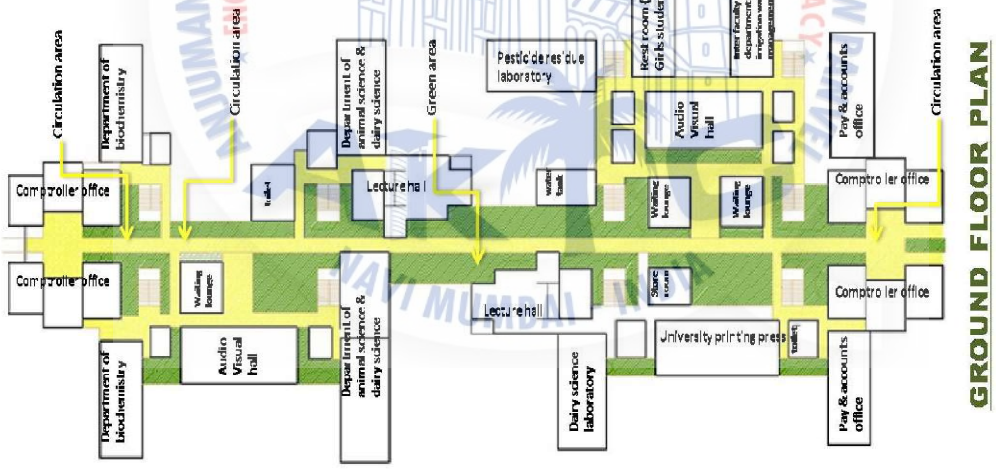
THE POST GRADUATE INSTITUTE (PGI)

Established at Mahatma Phule Krishi Vidyapeeth, Rahuri in 1972 by transferring Postgraduate research programme from College of Agriculture, Pune.

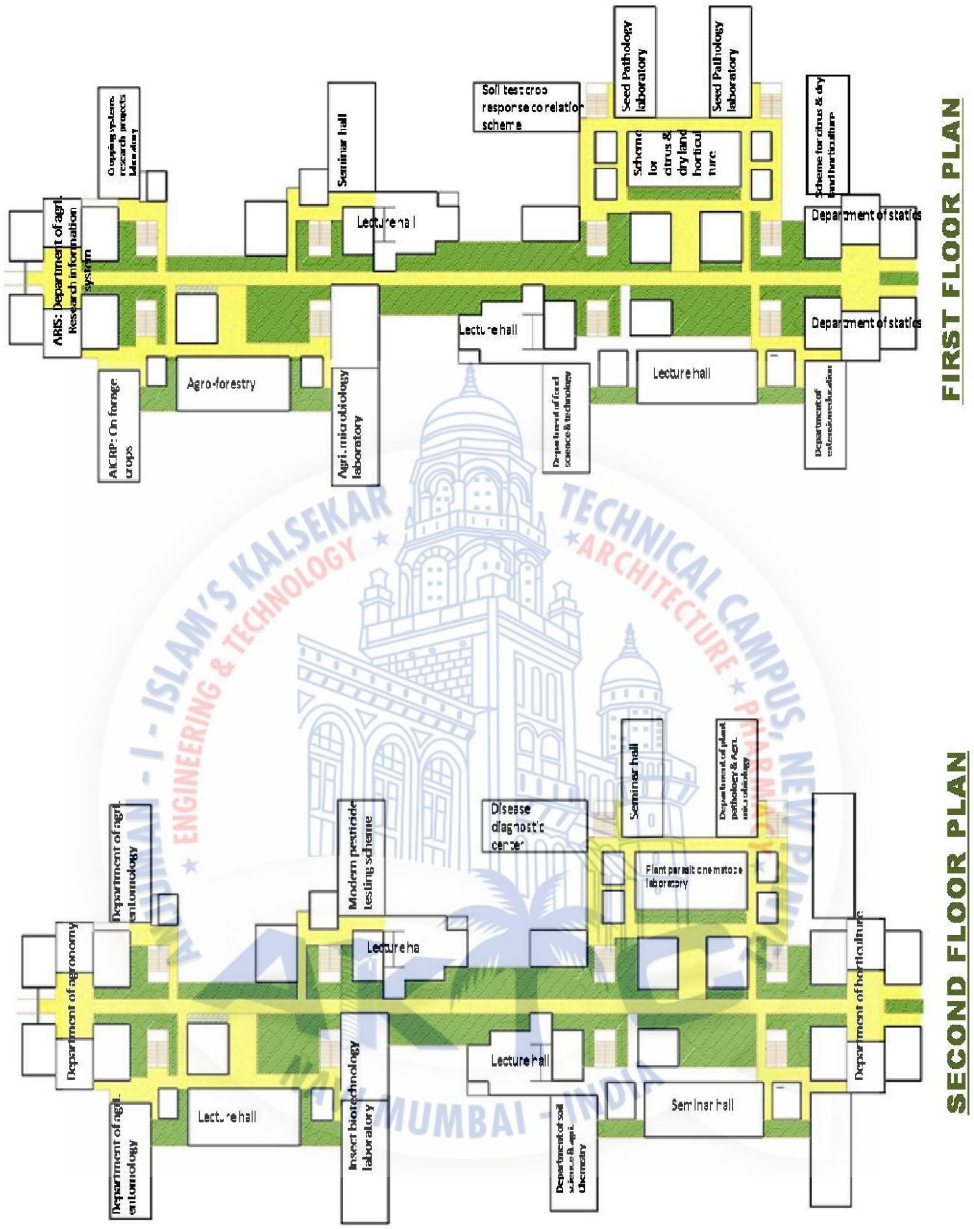
M.SC. AGRICULTURE: DISCIPLINES:

- Agronomy
- Plant physiology
- Agronomy entomology
- Agricultural extension
- Plant pathology
- Agricultural micro biology
- Horticulture
- Seed technology
- Food science and technology
- Bio-chemistry
- Animal Science and Diary science.

WILD FLOWER CONSERVATION CENTRE



WILD FLOWER CONSERVATION CENTRE



LIBRARY:

The University Library has been shifted to its new building in December 1980.

The four-storied building is having length of 117 feet and width of 130 feet.

The carpet area of all four floors is about 35,640 sq.ft

The building has a capacity of stacking five lakh volumes and can accommodate 250 readers at a time.

Lighting: Indirect natural Light.

Structure: G+4

INFORMATION CENTRE:

WILD FLOWER CONSERVATION CENTRE

HOSTEL FACILITIES:

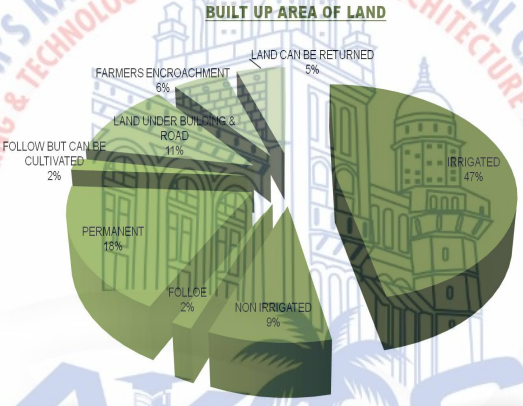
There is a common Balcony between every two rooms. Courtyards enhance interactions between the students. G+2 structure.

- International Students
- Girls Hostel
- Boys Hostel
- Teachers' Hostel
- Hostel
- Farmers' hostel
- Guest House
- VIP Guest House

WATER TANK FOR COLLEGE:

- Mullah dam water used for agriculture.

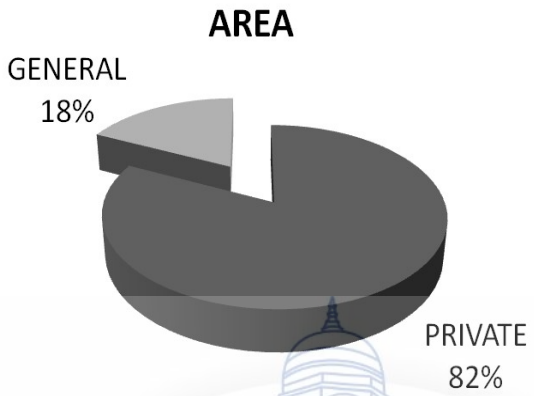
LAND USE:



CROP	AREA (HA)
mango	**121**
Sapota	**15**
Ber	**26**
Tamarind	**58**
Jamun	**1**
Custard Apple	**6**
Guava	**7**
Forest Trees	**95**

AREA UNDER PLANTATION:

333 HA/ 822 Acres



Farm Land HAVING Green Houses, The Land Is Used For Seed Processing Unit.

ORGANIZATIONAL SETUP:

Vice-Chancellor (Appointed by the Hon. Chancellor of the State)

↓

Pro chancellor (Minister for Agriculture)

↓

Director of Instructions and Dean, Director of Research, Director of Extension Education and Dean Faculty of Agricultural Engineering.

↓

Associate Dean (UG & PG)

↓

Associate Dean (Lower Agricultural Education) looks after the working of Agricultural Schools and Training Centers.

↓

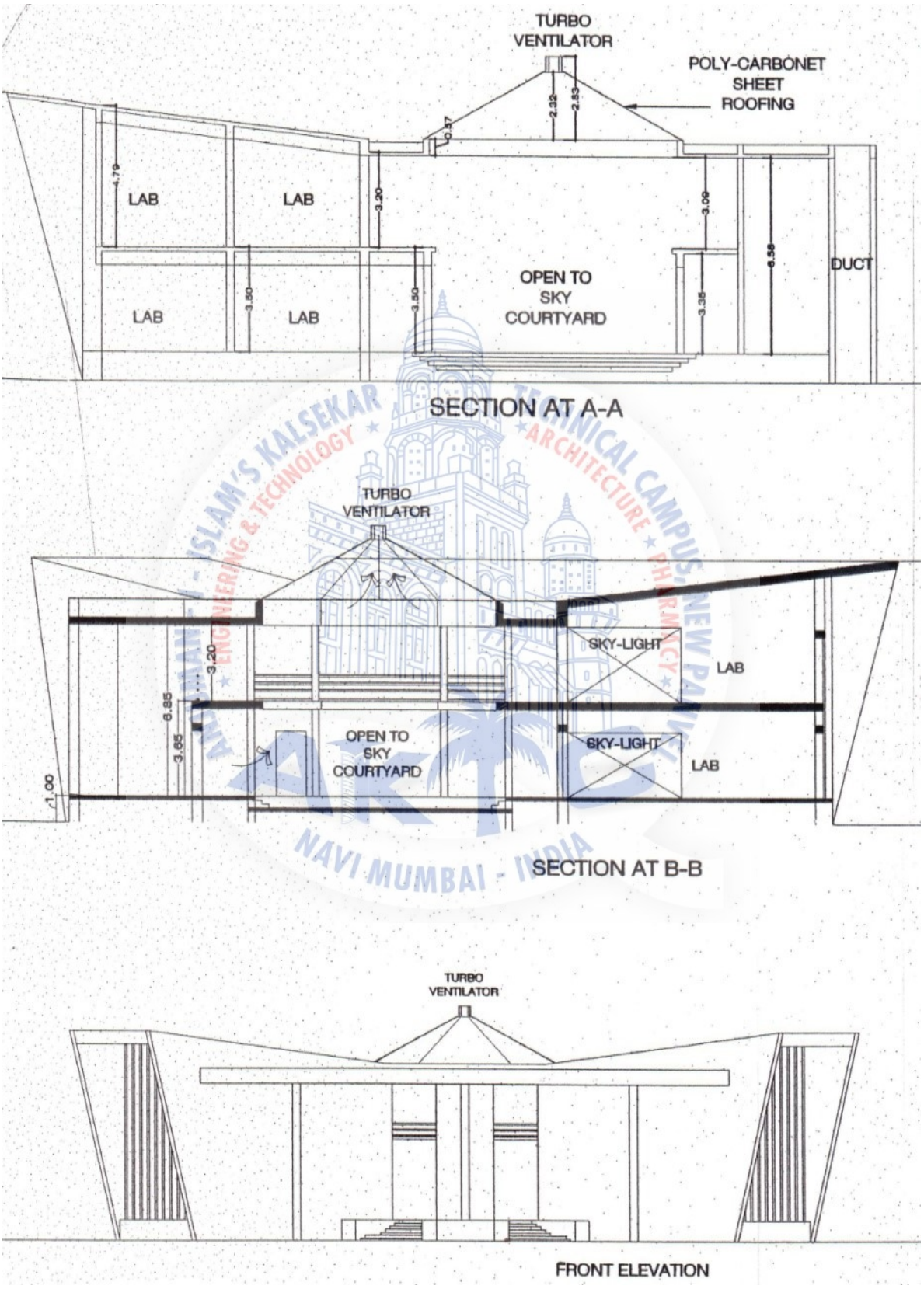
Registrar for academic and administrative matters, the **Financial Officer** for accounts and finance matters and the

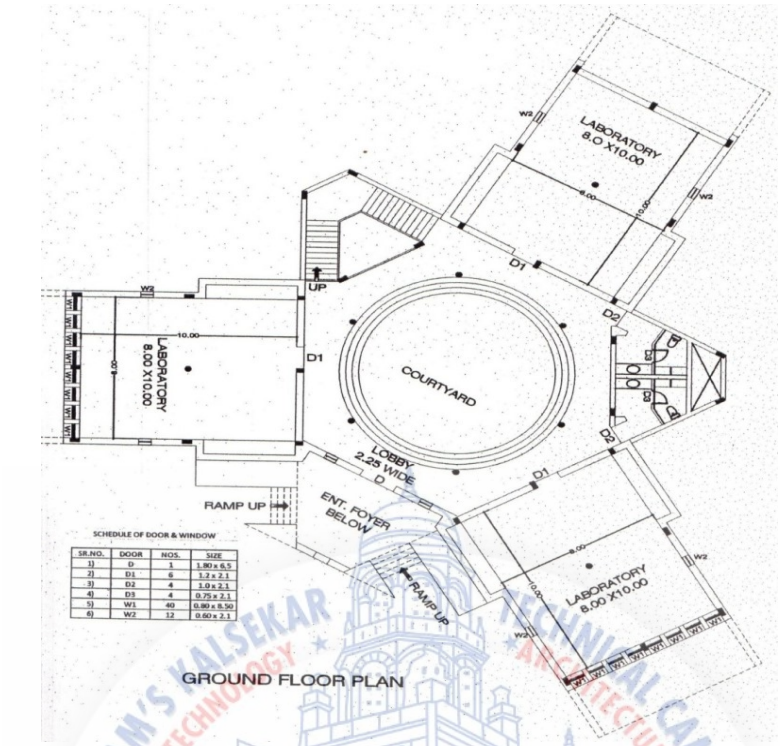
University Engineer for works are the other supporting authorities of the University

BIOCONTROL LABORATORY

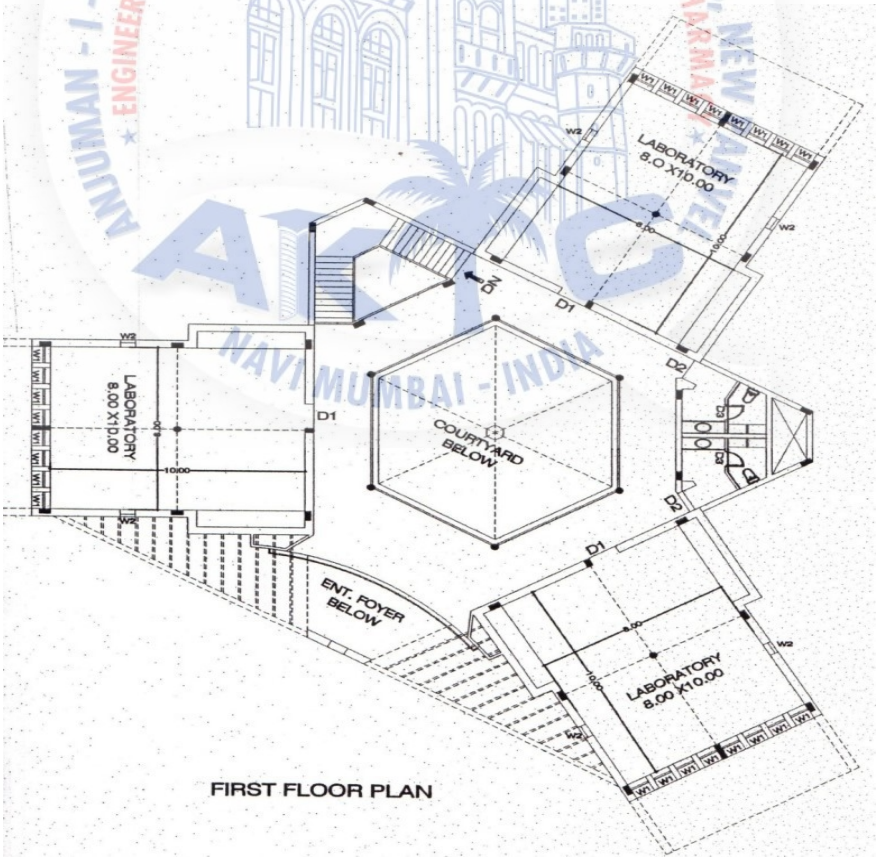
(DEPARTMENT OF ENTOMOLOGY):

SECTION


TURBO VENTILATOR
POLY-CARBONET SHEET ROOFING
LAB
LAB
LAB
LAB
OPEN TO SKY COURTYARD
DUCT
SECTION AT A-A
TURBO VENTILATOR
SKY-LIGHT
LAB
OPEN TO SKY COURTYARD
SKY-LIGHT
LAB
SECTION AT B-B
TURBO VENTILATOR
FRONT ELEVATION

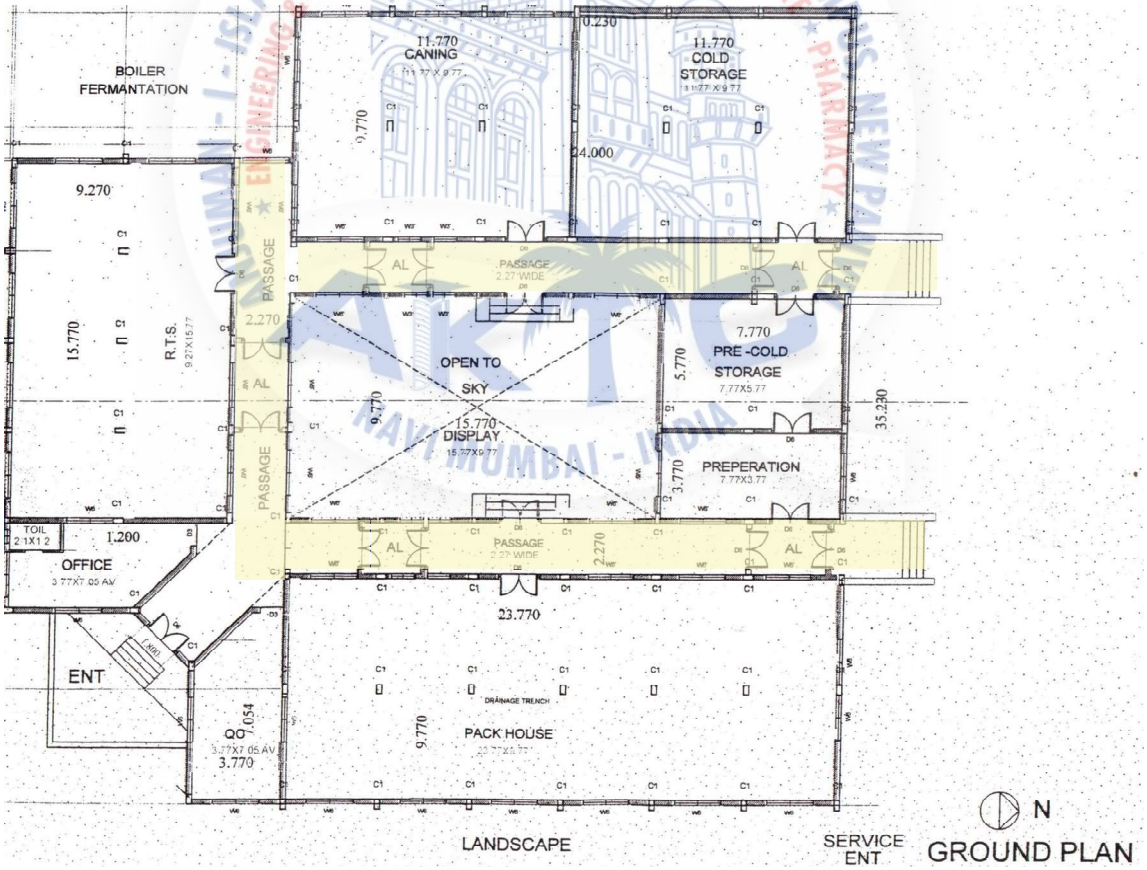


GROUND FLOOR PLAN



FIRST FLOOR PLAN

POST HARVEST TECHNOLOGY CENTRE:



k

PLANT TISSUE CULTURE LABORATORY:

Exhibition space different types of product

CONCLUSION

- In Campus Very Beautiful Garden And Landscape Is Designed.
- The Campus Is Well Designed As All Buildings Are Suitably Connected With Pathways.
- The Site Is On Main Highway Of Ahmednagar So It Is Suitable For Transportation.
- The Main Building Is Too Far From Main Entrance Gate And It Is Surrounded By Different Sections Of College
- Green houses
- In That Campus Different Types Of Crop Used As Experimental Purpose
- Very Huge Land Area Serves As Farming Purpose
- During Last Decade More That 400 Hectares Of Land Have Been Brought Under Cultivation At The Central Campus Farm And The Massive Tree Planting Programme Was Launched.
- This Has Served As A Model For Utilization Of Not Productive Lands.

E. LIVE CASE STUDY: NIPHT HORTICULTURE CENTRE, PUNENIPHT HORTICULTURE RESEARCH INSTITUTE

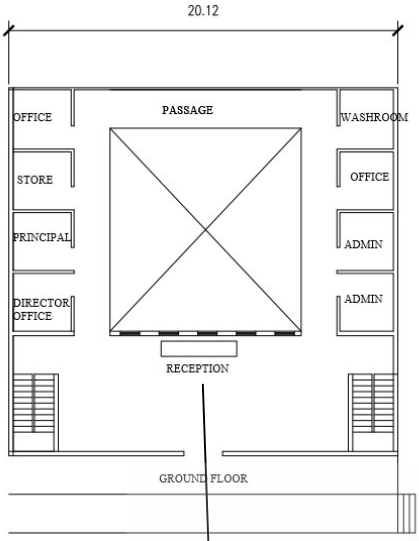
Green house for vegetables Plant tissue culture laboratory class rooms block

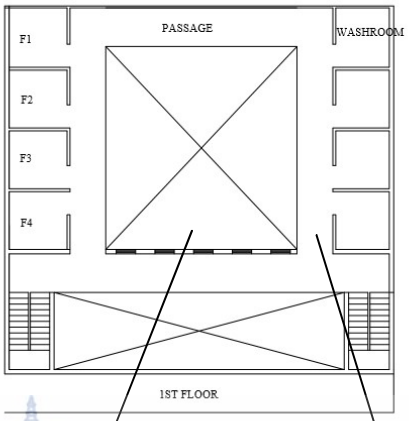
boys hostel Girls hostel canteen Mechanical Room Amphitheatre

The key aim of the Institute is to take relevant agricultural research from lab to land. The chief object is to develop core competence in 'Lab to Land' activities in agriculture in general and in agricultural marketing in particular. To achieve these goals the organization is committed

WILD FLOWER CONSERVATION CENTRE

WILD FLOWER CONSERVATION CENTRE

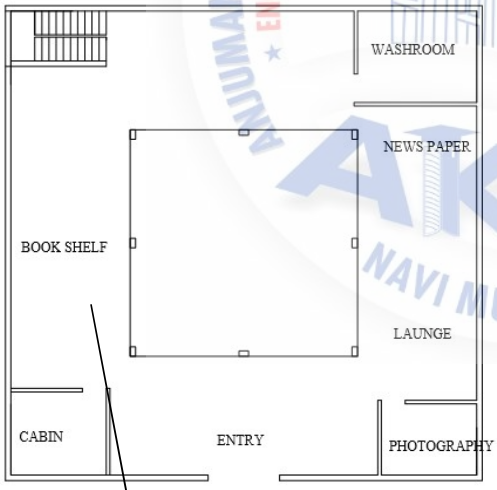


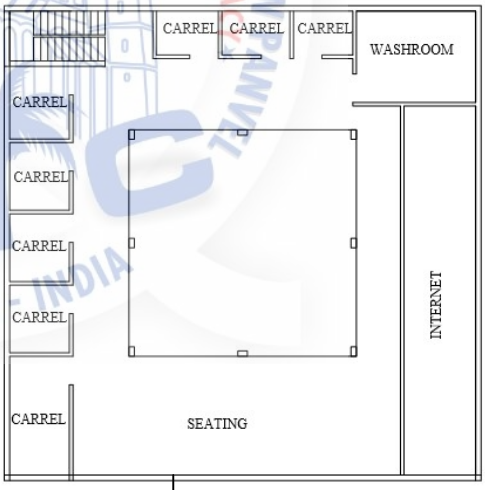


RECEPTION AREA

COURTYARD WITH SKYLIGHT

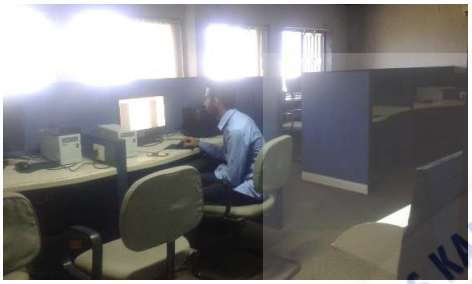
CORRIDORS





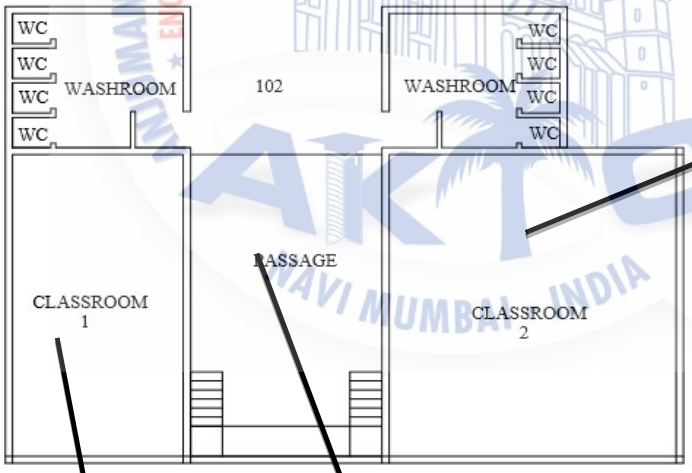
Carrels for study

Seating area



LIBARAY BLOCK

CLASSROOM BLOCK

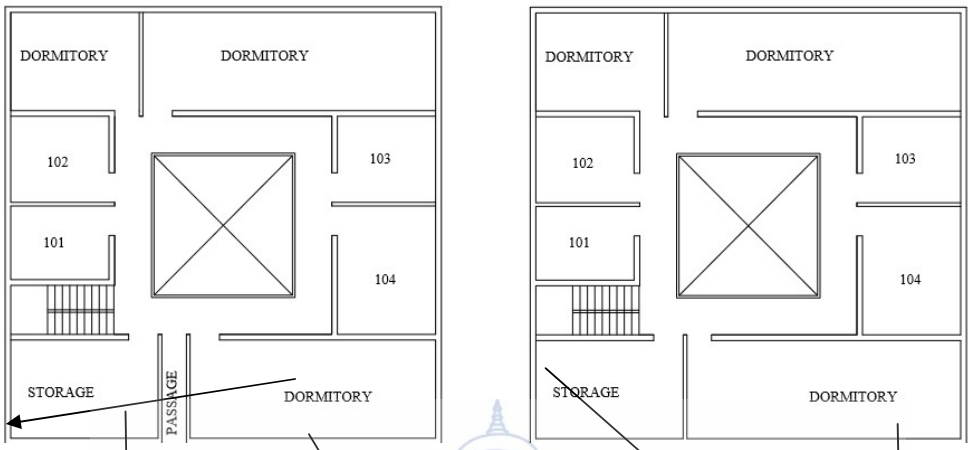


Lobby space between classrooms

- Classrooms

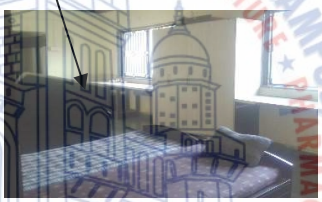
- Staircase outside the classroom towards amphitheatre

HOSTEL BLOCK



G+2 Structure with 2m corridors

Courtyard

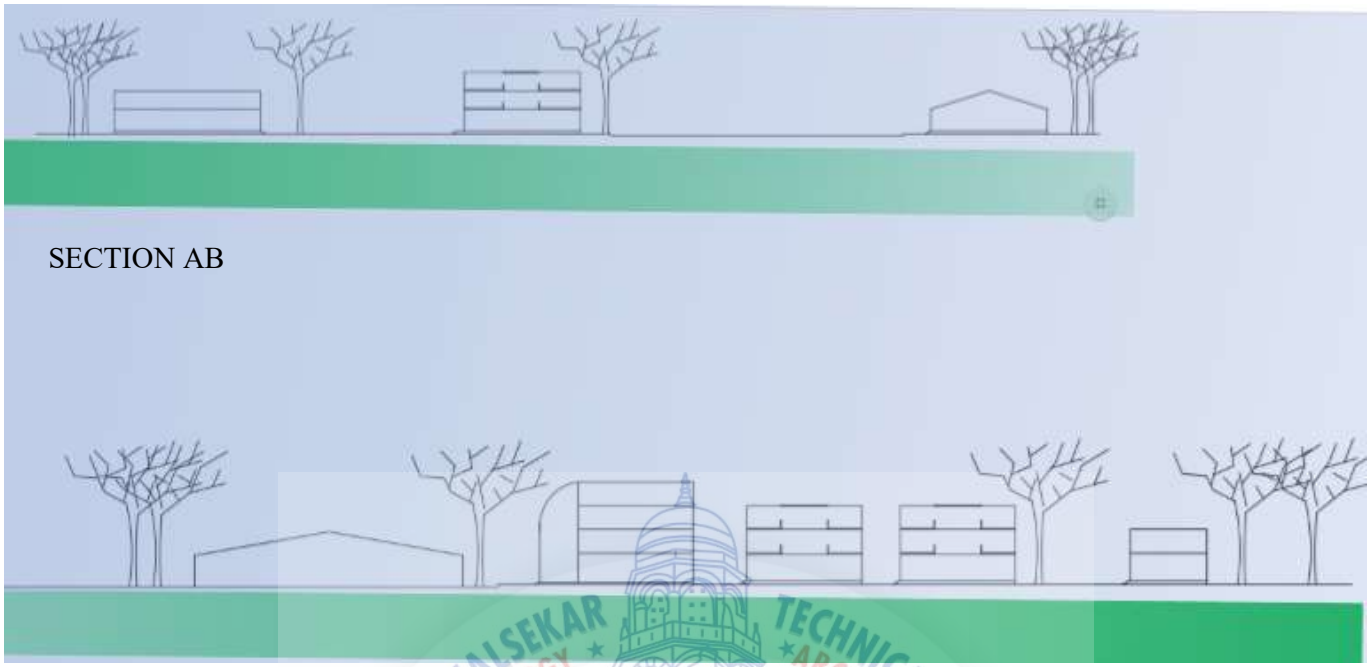


Dormitory

courtyard with skylight

NIPHT ,TALEGAON

FACILITIES IN EDUCATION	50000SQ.M	
NO OF STUDENTS	HOTICULTURE	
	EXPERIMENTAL LAND , LBRARY , LABS , HOSTEL , MESS ,PLYHOUSE , GREENHOUSE , TEACHING SPACE , RECREATIONAL SPACE ,TOOL ROOM, ADMIN , RAINWATER HARVESTIG TANK , GLASS HOUSE	
	120 STUDENTS	
TYPES OF LABS	1. AGRONOMY	70SQ.M
	2. HOTICULTURE	70SQ.M
	3. PLANT PATHOLOGY	70SQ.M
	4. ENTOMOLOGY	70SQ.M
	5. ANIMAL SCIENCE	70SQ.M
	6. SOIL SCIENCE	70SQ.M
	7. BOTANY	70SQ.M
	8. AGRICULTURE ENGINEERING	70SQ.M
SPACES FOR EXTRA CIRCULAR ACTIVITIES	AMPHITHEATER	RECREATIONAL AREA-30000SQ.M
ACCOMODATION	HOSTEL-40 STUDENTS	
STRUCTURAL STYLE	MODERN STRUCTURE (G=1)	
LAND TYPOLOGY	CONTOUR	



SECTION AB

SECTION BC

CHAPTER 4: SITE ANALYSIS

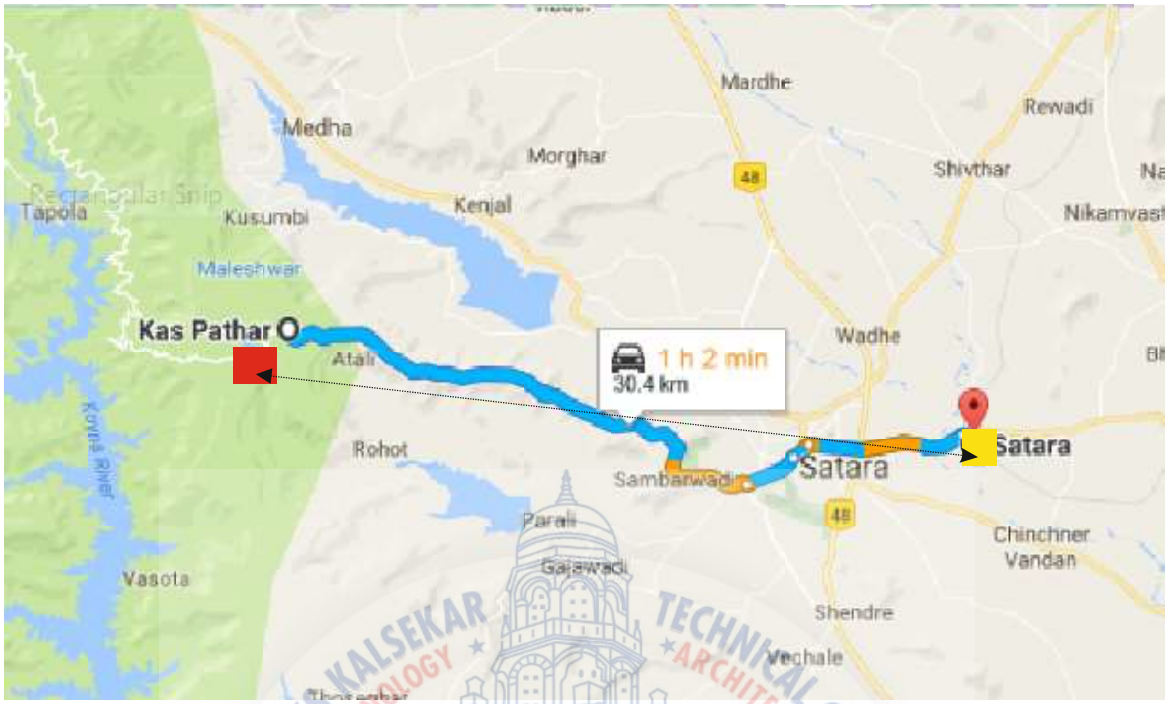
SITE DATA

Location – Kaas plateau ,satara
The Geographical Details Of Kaas
Hieght above the mean sea level 1200 to 1240 metres
Biogeographical province 5B Western Ghats. Jungle ty pe 3B / c-2
Moderate moist mixed deciduous variety
Villages falling in surrounding – Kaas, Ekiv and Atali
Annual Rainfall 2000 to 2500 mm

TOTAL AREA OF SITE – 40437Sq.m

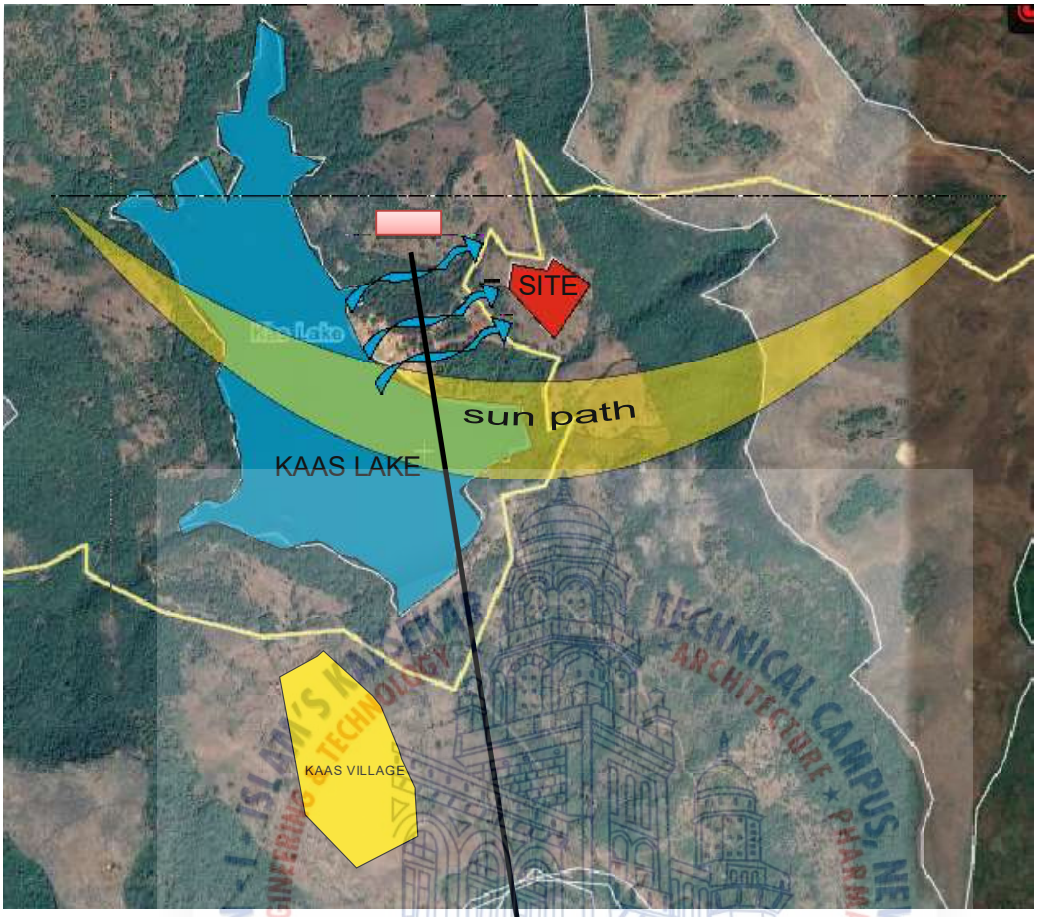
Climate data for Satara

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	29.0 (84.2)	30.8 (87.4)	34.6 (94.3)	36.3 (97.3)	34.8 (94.6)	29.4 (84.9)	25.4 (77.7)	25.7 (78.3)	27.2 (81)	30.2 (86.4)	28.6 (83.5)	28.4 (83.1)	30.03 (86.06)
Average low °C (°F)	11.0 (51.8)	12.6 (54.7)	17.3 (63.1)	20.1 (68.2)	22.4 (72.3)	21.6 (70.9)	21.0 (69.8)	20.4 (68.7)	20.1 (68.2)	18.6 (65.5)	14.7 (58.5)	11.2 (52.2)	17.58 (63.66)
Average precipitation mm (inches)	3.1 (0.122)	1.3 (0.051)	3.3 (0.13)	18.3 (0.72)	34.8 (1.37)	134.4 (5.291)	370.3 (14.579)	296.9 (11.689)	125.0 (4.921)	81.5 (3.209)	49.3 (1.941)	6.9 (0.272)	1,125.1 (44.295)



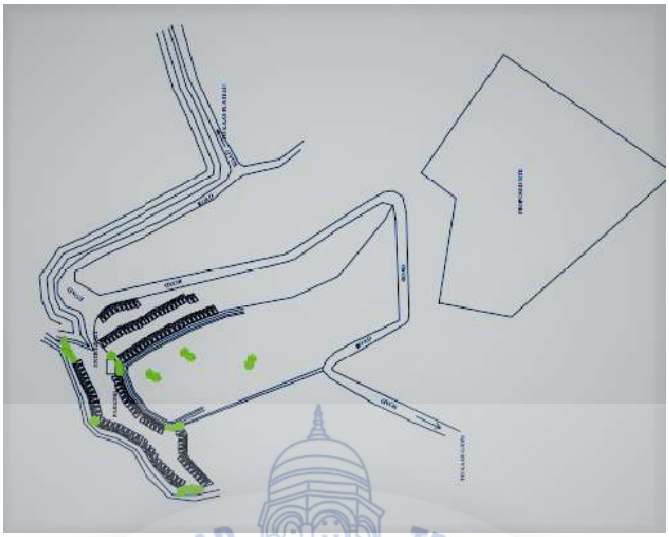
SITE FROM SATARA RAILWAY STATION

VILLAGE AROUND KAAS

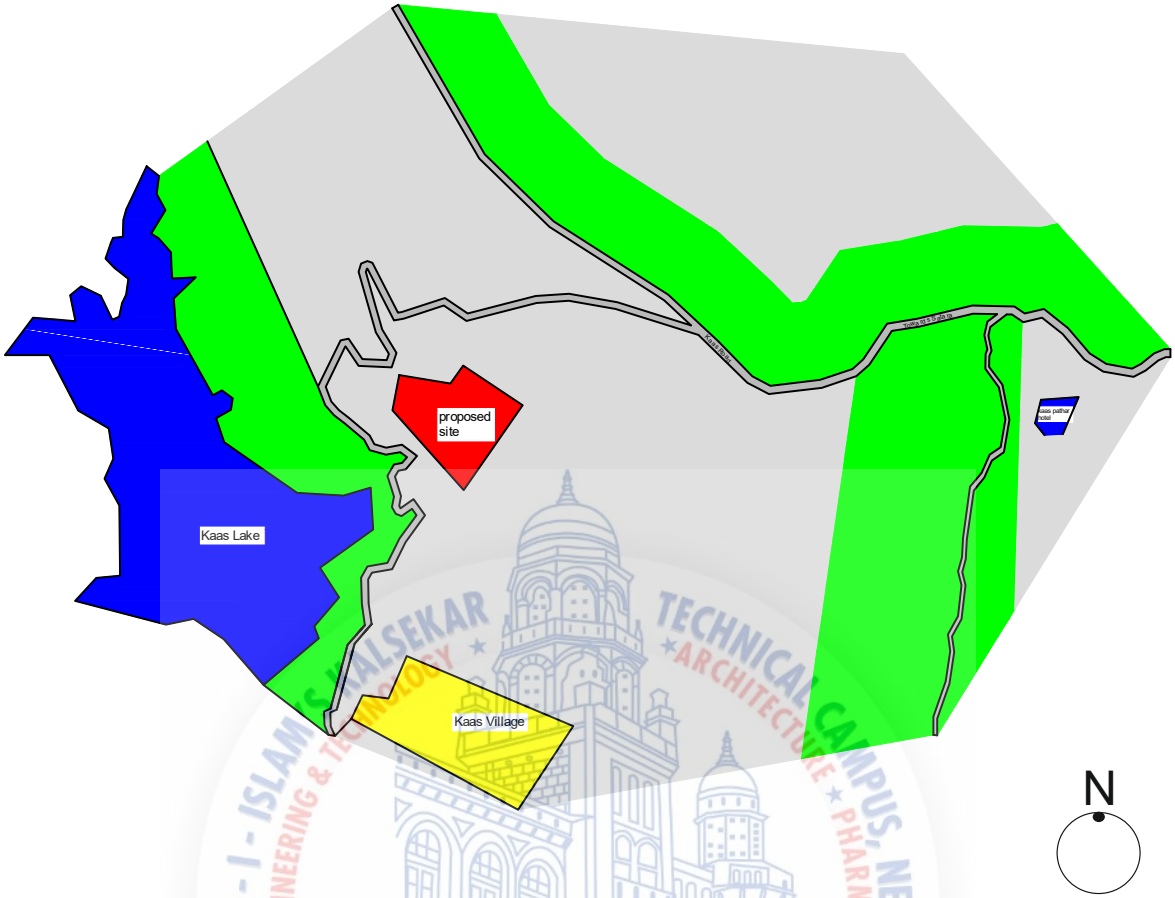


SITE MICRO CLIMATE

EXISTING PARKING



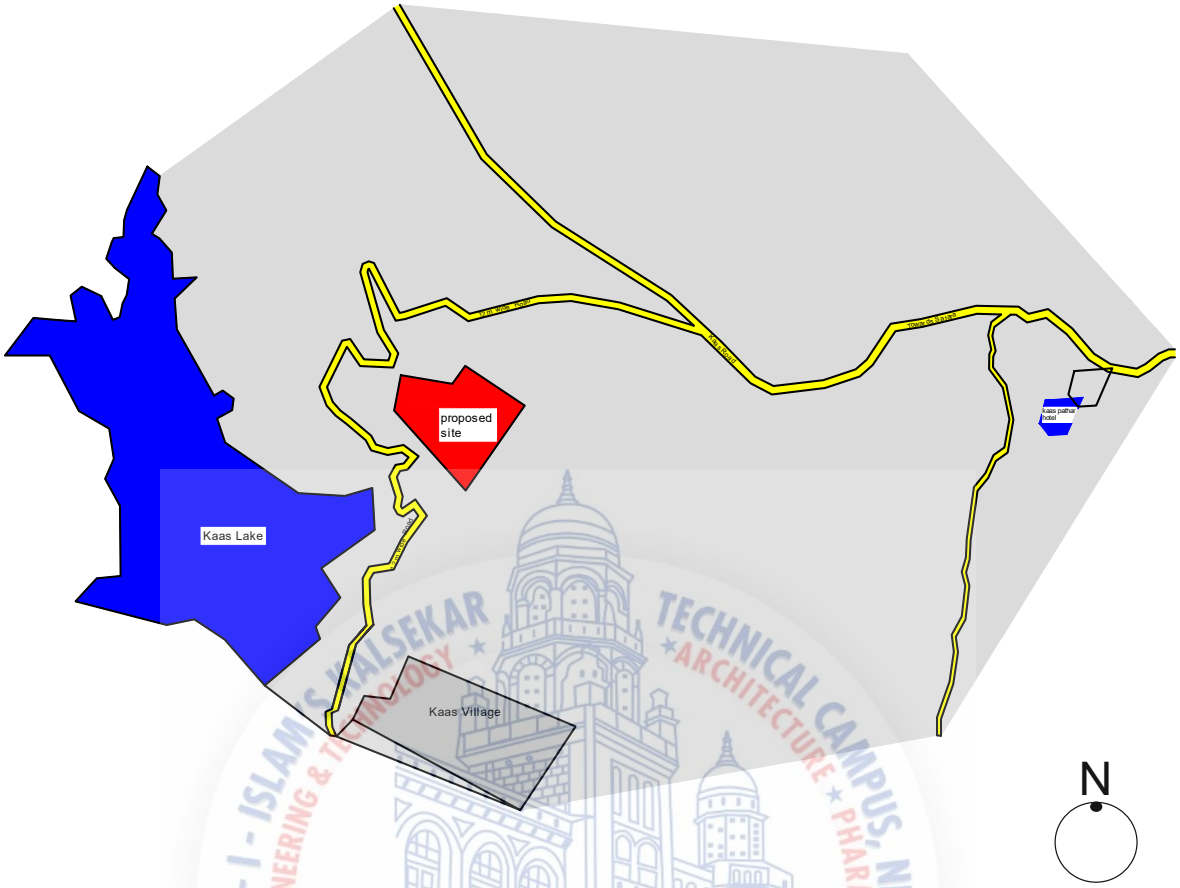
WILD FLOWER CONSERVATION CENTRE



LAND USED

- KAAS VILLAGE
- HOTEL
- SITE

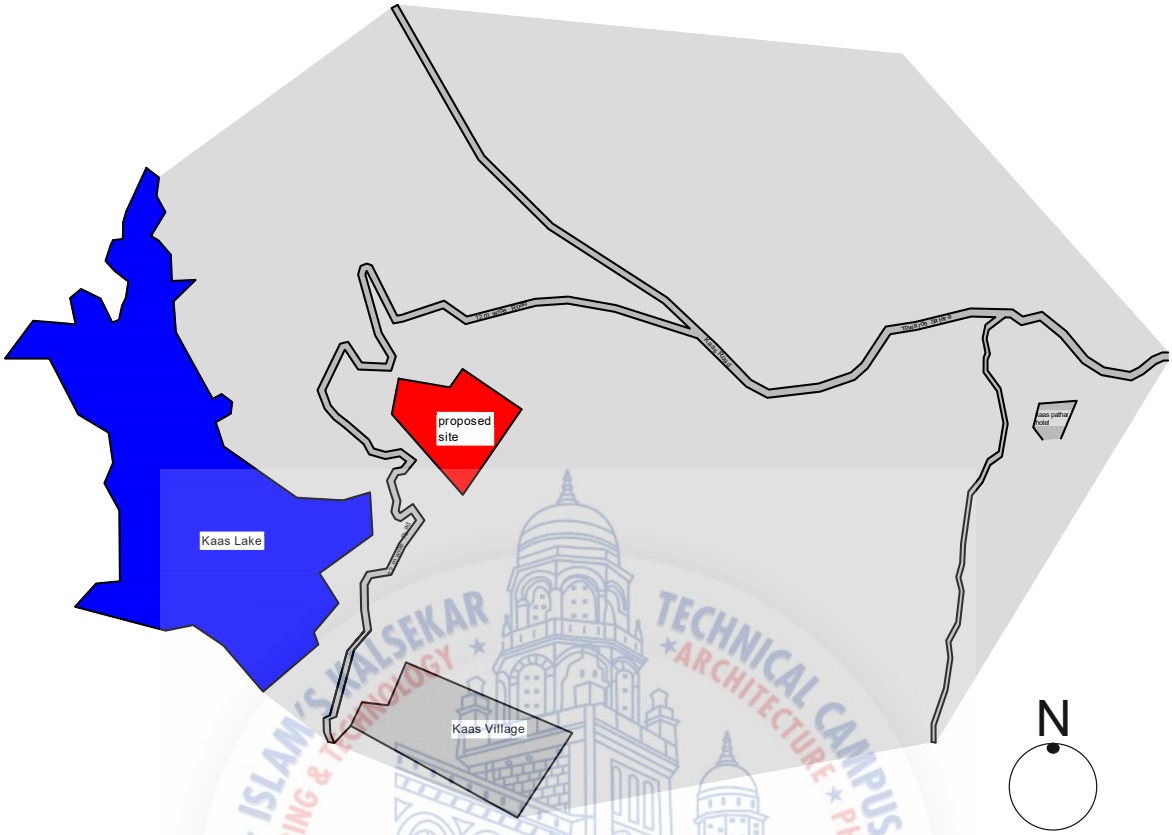
WILD FLOWER CONSERVATION CENTRE



ROAD NETWORK

ROAD TOWARDS SITE

WILD FLOWER CONSERVATION CENTRE



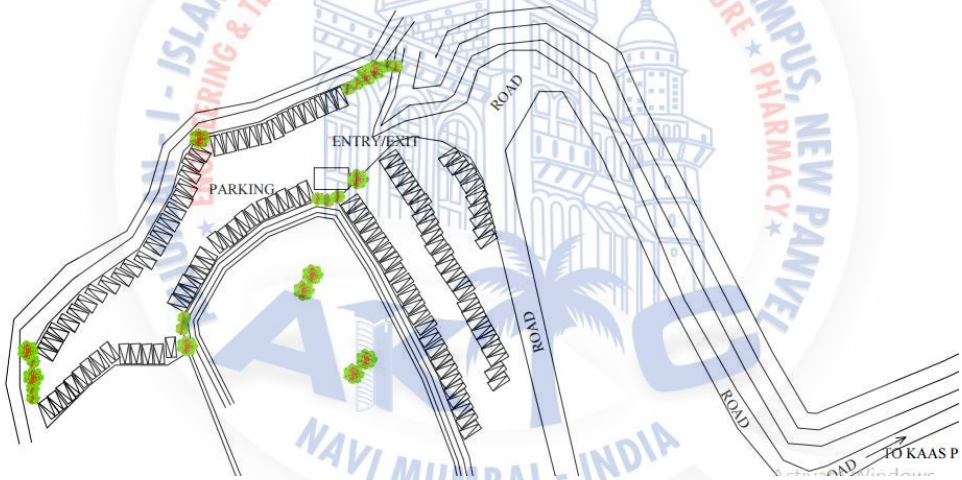
BUILT &UNBUILT AREA

VILLAGE

SITE

EXISTING PARKING

- About 300 Number of parking was alloted by the government of kaas for the tourist
- During the flowering season this parking area dosenot cater to the need of the tourist.



SWOT ANALYSIS

STRENGTH

- Adjacent to Kaas Lake Which is source of water for satara city.
- Site is located near to flower blooming area.
- Exixting parking is adjacent to the site which host almost 400 parking for tourist.

- Surrounded by large trees which will provide privacy to the research centre. As research centre should not have the public interference.
- Many Botanists.

WEAKNESS

- Site falls in earth quake prone area.
- Presence of lake attracts tourists hence disturbing the privacy of Research Centre.

Opportunities

- Due to presence of large spaces the structure can help conserving most of the flowers.
- Redesigning of parking space as visitors centre and parking.
- A research centre at the site would get privacy.
- Due to presence of site on plateau the visitors centre or viewing point can be provided on the cliff.

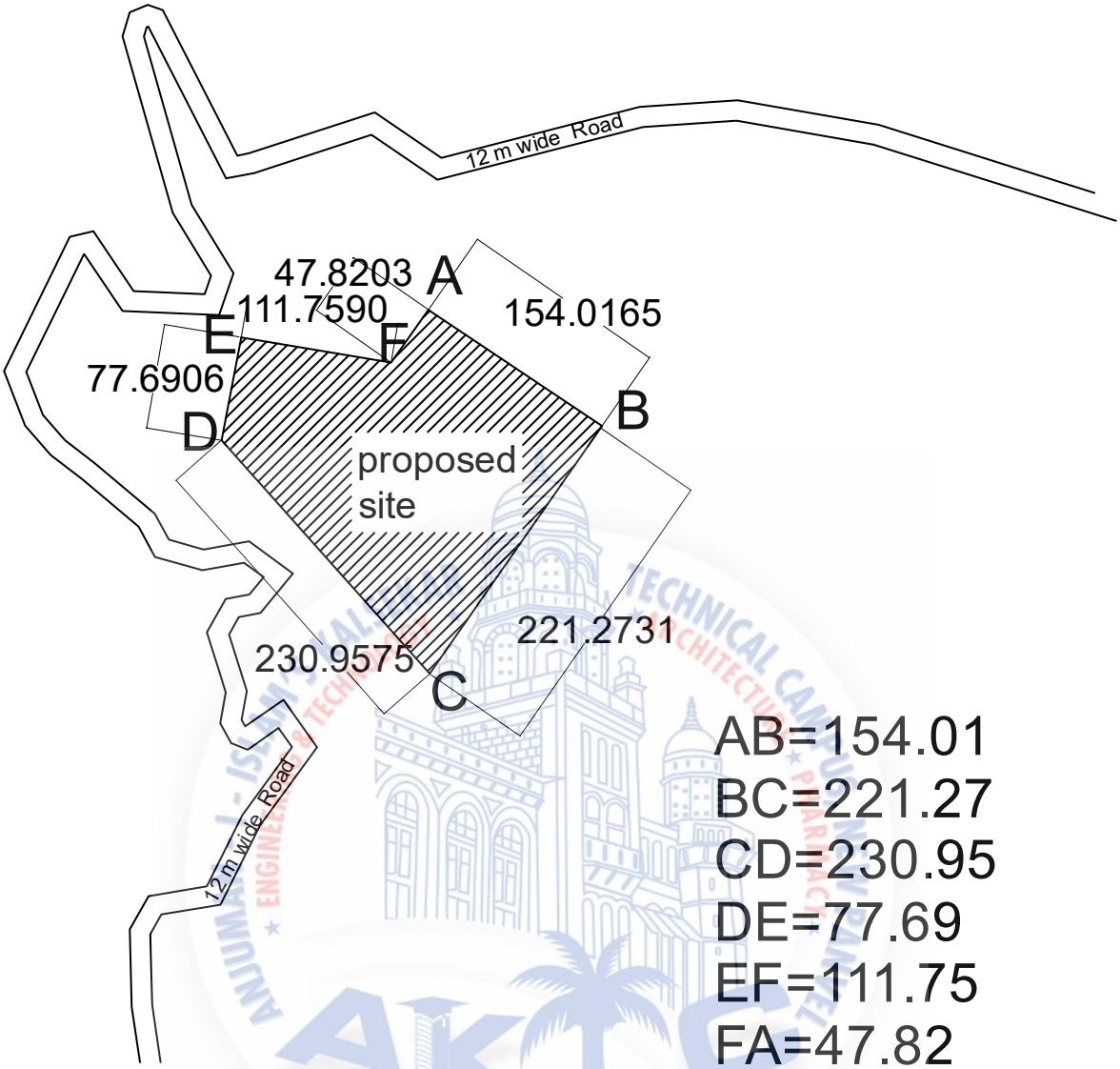
Threat

- Noise created by the visitors at the roads which is function point of Kaas lake.
- Site and road connecting to Flower Valley.

SITE JUSTIFICATION

- Due to Endemic character of kaas plateau , the wildflowers of Kaas has gained some Medicinal values so it is important that the site selected should be near to the area which has maximum variety of flora and fauna of the plateau
- Site is selected in the middle of the plateau as it is very easily accessible to the Tourists and the local villagers.

- The existing parking is located near to site selected which becomes easy for the people to park and visit the Centre
- Location of the site is near to the lake which is also the natural feature which houses many endemic aquatic flora and fauna of the kaas
- Due to presence of lake on the other side of the site it could also can be included in part of the conservation.
- There is lack of electric and water supply near the site. Centre will prove helpful for providing lights through the street which leads to Kaas village.


12 m wide Road
47.8203
A
111.7590
154.0165
E
F
77.6906
D
B
proposed
site
221.2731
230.9575
C
12 m wide Road
AB=154.01
BC=221.27
CD=230.95
DE=77.69
EF=111.75
FA=47.82
TOTAL= 40437 SQM

CHAPTER 6: AREA REQUIREMENTS

1.ADMINISTRATIONBLOCK			
Sr.no	SPACE	No. of	AREA in
1.	Reception/ Waiting	1	30
2.	Director's room	1	15
3.	Assitant Director's room	1	15
4.	Program coordinator's room	1	15
5.	General office	1	30
6.	Information/ Library	1	50
7.	Accounting room	1	15
8.	Conference room	1	50
9.	Pantry	1	10
10.	Store	1	10
11.	Toilet	4	10
	TOTAL		**250**

2.RESEARCH CENTRE

Sr. no.	SPACE	No. of UNIT	AREA in sq.m
1.	Lobby		25
2.	Admin	1	25
3.	Classrooms	6	120
4.	Rainwater Harvesting Tank	1	
5.	Amphitheater	1	120
6.	Glass House	2	140
7.	Library for herbarium	1	75
8.	Plant Tissue Culture Lab	1	70
9.	Experimental area	1	70
10.	Plant Pathology	1	70
11.	Staff Room	1	50
12.	Space tool room	1	25
13.	Scientist incharge room	3	27
14.	Botanist Incharge	3	27
15.	Store	8	80
16.	Pantry	1	10
TOTAL AREA			949

4. **.LIBRARY**

sr.no.	SPACE	No. of UNIT	AREA in.m
1	Lobby	1	20
2	Reading area	1	75
3	carrel	6	54
4	Librarian room	1	20
5.	Photocopy room	1	20
6	A.V room	1	20
7.	Storage	1	20
	Total area		209

4.. VISITORS CENTRE

A. GALLERY AND EXHIBITION AREA

SR.NO.	SPACE	No. of UNIT	AREA in sq. m
1.	Foyer		50
2.	seating area for 200		120
3.	stage area		40
4.	green room	2	40
5.	technical room	1	18
6.	control	1	9
7.	gallery for 200		150
8.	Store	2	30
9.	toilet	1	15
10	Restaurant	1	150
TOTAL AREA			582

5.CONSERVATION CENTRE

SR.NO	SPACE	NO. OF UNITS	AREA (sq.mts)
1.	environment for plant growth a. Natural b. Artificial	1	200
2.	Water features		Lake
3.	Café	1	150
4.	Herb display area	1	70
5.	Ayurvedic center		
	a. Lab.	3	75
	b. Auction center	1	70
6.	Seed bank	1	70
7.	Storage	1	75
8.	Wash room	1	50
9.	Total area		625

BIBLOGRAPHY AND REFRENCES

1. https://en.wikipedia.org/wiki/Lady_Bird_Johnson_Wildflower_Center
2. explorersgroup.in/web/package/kaas-plateau
3. www.kaspathar.com
4. http://kas.ind.in
5. http://www.naturelyrics.com/pages/articles/kaas_plateau_of_flowers.html
6. http://www.kas.ind.in/index.php/kas-news
7. http://timesofindia.indiatimes.com/life-style/Kaas-Plateau-Western-Indias-very-own-Switzerland/articleshow/23450131.cms
8. http://nwc.org.uk/
9. http://natureindiapolicies.blogspot.in/2012/08/naturte-india-policies-for-Kaas-plateau.html http://anujnawrites.wordpress.com/2012/10/09/Kaas-plateau-conservation-a-report-on-public-consultation/ http://whc.unesco.org/en/criteria/ http://www.indfy.com/maharashtra/geography.html http://www.conservationindia.org/gallery/tourist-vehicles-at-Kaas-satara-maharashtra
10. http://biodiverstiyconservationgroup.blogspot.in/
11. http://www.sakaaltimes.com/20120709/4790757904325811394.htm
12. http://www.livesangli.com/
13. http://www.dainikaikya.com/20130930/5302265467161419037.htm

BOOK:

- ZILLA PARISHAD SATARA
- FLOWER OF KAAS (- SANDEEP SHOTRI)