smart
ecosystem restoration

TATA

ECOSYSTEM RESTORATION
COMPENDIUM

Inspiring ER stories from Tata Universe

I N D E X

The Challenge

Birds add life, sound and colour to our lives. They play a vital role in ecosystem services such as pollination, seed dispersal, biomass recycling, biological pest control, and act as sensitive indicators of environmental changes. Rapid urbanisation is causing degradation and loss of urban ecosystems, making it difficult for the birds to survive. It becomes imperative to restore the urban ecological landscape to conserve urban bird fauna.

The Solution

The Bird Habitat Enhancement Program is an integral part of the site-specific Biodiversity Action Plan of TCS campuses. Before implementing the program, biodiversity mapping exercises were undertaken at various campuses with respect to the flora and fauna to understand which species are most important, and which are the ones that require special management and further protection elsewhere within their ranges.

The program was implemented with an integrated approach to create bird habitats through protection and transplantation of native trees during construction stage, plantation of native ornamental and flowering fruits, shade trees, etc. It also focussed on creating aquatic habitats for birds as an integral part of Green Buildings through rainwater harvested lakes, reflecting pools, water tank/pond with fountains, etc. Water baths, feeders and nest boxes were also installed. Additionally, a bird care program was introduced to rescue and release injured birds in their natural habitat.

Collaboration Among Entities

Administration Team for overall ownership	Facility Management Team for maintenance	Landscape Planner/Gardening Team for various aspects of native tree plantations and maintenance of landscape
Centre Head & Finance Team for required approvals, etc.	Environmental Sustainability, Health & Safety Team involved in fulfilling the needs and expectations of various internal stakeholders and also for monitoring	

The Result

Improving the green spaces in TCS campuses through the Bird Habitat Enhancement Program not only resulted in restoration of habitats in urban ecosystems, but also led to remarkable increase in bird species - from 43 in 2016-17 to 75 in 2020-21. **The campuses are also supporting a large number of aquatic, native and migratory birds as well as IUCN listed bird species.**

Presence of dense vegetation, variability of fruit trees, flowering trees for feeding and less human interference resulted in occurrence of large number of nests of different species within the campus. **The 1,500 nest boxes which were installed showed 100% occupancy by different bird species during their breeding season** and various activities pertaining to feeding chicks and first flight of chicks from nest boxes were recorded.

Similarly, 100% utilisation of grain feeders and water baths by different species of birds were noticed. Increase in Sparrow population was recorded in all campuses. Some migratory birds also visited the aquatic habitats created as part of this program.

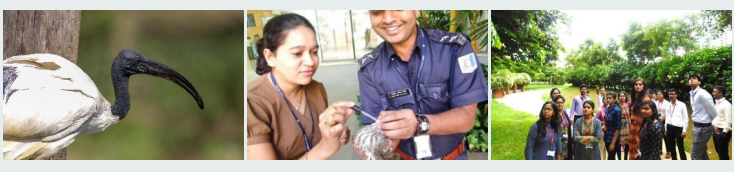
Some threatened species as per the IUCN list were observed within the TCS campus such as:

Anhinga rufa (Snake Bird/Darter) recorded at Rainwater Harvesting lake, Synergy Park, Hyderabad

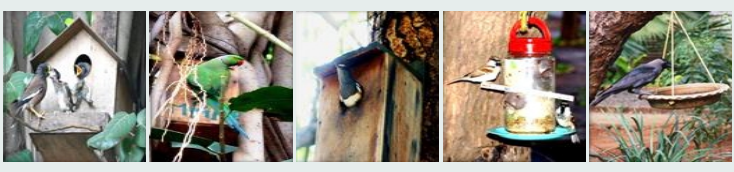
Threskiornis melanocephalus (Blackheaded Ibis) recorded at Garima Park, Gandhinagar

Antigone (Sarus Crane) which is Vulnerable as per IUCN Status, was recorded at the Indore campus

Glimpses of some of the water bodies created at the TCS campuses



Getting up close and personal with rare bird species including the Ibis



An array of species take advantage of the nest boxes, feeders and bird baths

The program has received many accolades such as:

TCS - Yantra Park Thane received ICC-Environment Excellence Award 2020 by Indian Chamber of Commerce, Kolkata

TCS Biodiversity case studies of conservation of Butterflies @ TCS & Sacred Groves @ TCS-Kochi received Innovative Environment Project & Most Useful Environment Project Award 2020 by CII -GBC Environmental Best Practices Award 2020

TCS Garima Park, Gandhinagar received 3rd prize under service sector of CII (WR) SHE Excellence & Innovation Award 2020

New Campus - Kochi received special recognition for "Eco-friendly Campus & Biodiversity Initiatives" at the Bombay Chamber Civic Award 2019 by Bombay Chamber of Commerce & Industries, Kolkata

TCS research paper "Integrated Approach for Developing Biologically Diversified Urban Landscapes @ TCS: A Success" published in "Biodiversity & Livelihood: Lessons from Community Research In India 2020" (pp 137-143) by Bentham Science Publisher Pte. Ltd Singapore 2020

TCS case studies on Biodiversity Conservations are published in CII -IBBI India Business & Biodiversity Initiative 2014 in proceedings of Conference of the Parties (COP) to the Convention on Biological Diversity (CBD) in PyeongChang, Republic of Korea

TCS Deccan Park & Synergy Park, Hyderabad, received Special Jury Award for Biodiversity Conservation by Green IT Award 2012 by Govt. of Andhra Pradesh

The Challenge

JLR's Advanced Propulsion Creation Centre is spread over 4 million m², equivalent to almost 480 football pitches. It is designed to encourage collaboration throughout the entire vehicle development process. **More than 50,000m² of new built space for 3,500 staff accommodates the Jaguar Design Studio,** offices, a site-wide restaurant, a 400-seat multipurpose hall, visitor building and other amenities.

Jaguar Land Rover has integrated sustainability into this innovative centre. JLR has taken several initiatives to make the space green. The timber roof, Europe's largest, reduces embodied carbon whilst use of natural light through façade glazing and extensive roof lights contributes to wellbeing and productivity. **Naturally ventilated "streets", solar PV and LED lighting enhance energy efficiency and performance with workplace design standards supporting wellbeing and access to nature.**

The Solution

As part of enabling works, an extensive protected species translocation and mitigation strategy was prepared, moving animals from the construction area to a receptor site within the adjacent Proving Ground test track.

The construction of the **Gaydon Nature Area reused 80,000m³ of soil excavated from the development site** and now supports important pollinator species, such as bees and butterflies, as well as providing a natural screen between the neighbouring village and the JLR site.

The Gaydon Proving Ground 4x4 track already supports national priority butterfly species, such as the Small Blue, Grizzled Skipper and Dingy Skipper. Habitat management is conducted in accordance with a long-term management plan to increase the amount of its sole foodplant, Kidney Vetch.

The new lake, whilst principally to help manage water run-off, provides additional benefits or "ecosystem services" such as biodiversity and recreation. These contributions together have been recognised by the national regulators, DEFRA and Natural England.

The building's sustainability credentials also support in reducing the impact on the climate. Materials used to construct the building such as the Gulam wooden beams and other timber in the roof supports have been responsibly sourced and reduce embodied carbon. All of the building's electricity comes from renewable sources, one-fifth of which is generated onsite through roof-mounted PV solar panels. Façade glazing, solar shading and natural ventilation in "street" areas further reduces energy demand and overall operational carbon footprint.

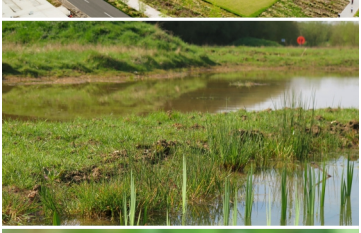
Low-use fittings have been specified throughout the building to reduce water use. "The Lake" provides a huge rainwater attenuation system, reducing water run-off rates to the surrounding countryside to less than pre-development levels.

JLR's Health and Wellbeing principles are supported through the provision of cafes, franchises and staff welfare areas. "Hub" spaces form part of the working environment where people can meet to discuss ideas away from their desks. A central courtyard brings light deep into the building and provides a view of the nature outside.

The Result

On track to achieve the BREEAM "Excellent" rating, putting it in the top 10% of UK's new non-domestic buildings showing environmental best practice

Over 5 hectare of new landscaping and over 700 new trees planted. The scheme has created "The Park" and "The Lake" enhancing the wellbeing and experience for visitors and employees alike



25% biodiversity net gain – creation of new habitat and green space

Over 850 great crested newts, 2,000 other amphibians and several grass snakes translocated onsite

80,000m³ of soil reused to create the Gaydon Nature Area and avoided costly transportation movements and waste disposal

All timber and timber-based products used on the project are sourced from 'legally harvested and traded timber' and certified in accordance with the Forest Stewardship Council (FSC) or Program for the Endorsement of Forest Certification (PEFC)

The Challenge

Whether it is improving green cover in the area or better water management, Tata Steel has always worked towards upholding environment sustainability and biodiversity conservation around its operations.

The CRM Bara Pond was once a large waterbody, but over the years industrial activities in the vicinity had severely impacted the pond. It was slowly drying up and along with the vanishing pond, the local flora and fauna too were impacted drastically.

The XLRI Municipal Solid Waste Dumpsite was not just an eyesore at Jamshedpur, but the air quality too was a concern. Water pollution began to affect the surrounding areas and drove away several local and migratory birds. As a part of its conservation efforts, Tata Steel stepped in with their Wasteland Reclamation project and developed the Dumpsite into a thriving green park of ecological importance.

The Solution

The initial phase included the collection of available data on rainfall, temperature, wind conditions, maximum storage levels as well as Tata Steel and user agencies' information on number of fillings and overflows, water utilisation by the local community and more. The team also charted a map for the rejuvenation and reclamation projects by involving the local community.

A comprehensive plan was devised based on the information collected:

- **Calculation of Water Potential for the Lake** based on the type and areal extent of the catchment, gradient of the terrain, feeder system and runoff water from the adjoining factories
- **Interpretation of Google Earth Maps** in conjunction with historical maps to understand the past history, areal extent of the water bodies, restriction of surface area due to silting and other factors, natural landforms, drainage pattern, surface retention of the lake, catchment area of the lake, source water, diversion arrangement of runoff water, overflow arrangement and more
- **Contour Survey** to understand the level variations, fix the inlet and overflow arrangements and diversion arrangement of runoff water from upper catchment area
- **Geomorphological Study** to understand the local variations in topography, gradient of the terrain, drainage pattern and movement of runoff water
- **Well Inventory Survey** of open wells and bore wells to study the seasonal variation in water levels and infer ground water conditions
- **Hydrogeological Study** to assess the local groundwater conditions, local geology, weathering pattern, intensity and interconnectivity of fracture system
- **Soil Profile** was studied to understand the nature and texture of soil
- **Conventional Water Divining** using copper wire to find out the groundwater flow lines, direction of groundwater flow and potential zones of groundwater recharge
- **Resistivity Survey** to understand the immediate sub surface formations, depth of weathered portion, depth and nature of jointed and fractured formations

Through the interpretation of collected data, the team could provide a suitable engineering design for the reservoir and enhanced its aesthetic appeal with meandering walkways, an exquisite greenbelt that included lawns, plants and trees, seating and landscaping.

The technical and science backed actions taken by the team included:

Providing slope stability through the provision of proper slopes depending on local soil conditions

Lake side walls pitched with precast PCC slabs to avoid erosion of banks and provided weep holes with porous blocks

Desilting/Filtering arrangement to minimise the flow of silt into the pond

Study of water quality from various sources and segregation of contaminated areas to divert only water within the acceptable limits of Pollution Control Board (PCB) norms

Introduction of innovative aerators like imploders and attractive fountains to improve aeration and quality of stored water.

The Result

Tata Steel's efforts in the last two years have led to the creation of a beautifully designed waterbody as well as a lush park on what was previously a wasteland. It serves both humans and local wildlife today.

Through the initiative at CRM Bara, the disappearing and degraded ponds have been rejuvenated and are cumulatively a

scientifically designed reservoir as well as a beautiful pond of 5.6 hectare, that supports and enhances local biodiversity. The rainwater harvested at this site is 82,300 kl.

Adding to this, the flow of contaminated water is being treated and has reduced to NIL. The groundwater level has stabilised and the alarming depletion of water levels has been stemmed. The planting of over 5,000 plants and trees has enhanced the green cover and attracts a host of butterflies. The thriving fish population in the pond has begun attracting migratory birds again.

The Reclamation of Wasteland on the XLRI Municipal Solid Waste Dump site at Jamshedpur led to the development of 12 hectare space into a green park of ecological importance called the Dalma View Point. By layering the dumpsite with good soil, and planting indigenous flora that help control soil erosion, the site and its surrounding areas have been converted into a green zone with over 1,000 plants, 28,000 creepers, 5,000 shrubs and 13,000 sq. mts. of grass. It is now a gorgeous park and picnic spot that plays host to several species of butterflies, birds and insects. A pond has been developed inside the picnic area and works as a catchment for run-off water while enhancing the serene surrounding.

Tata Power Ltd.

PARTICIPATORY BIODIVERSITY

Conservation and Management in Kutch

The Challenge

Kutch district, spread over an area of 45,652 sq. km., is the largest district in India. Kutch is more an island as it is bound by the Arabian Sea to the south and west and the unique large Rann (meaning 'salt marsh') to the north and east.

The challenges of biodiversity loss are large in and around the landscape, affecting its various ecosystems. These challenges include the spread of invasive species of flora and fauna, illegal hunting practices and unethical logging, loss of habitat due to deforestation, agriculture and cattle grazing, and over exploitation of medicinal plants.

The Solution

To address the challenges that are degrading Kutch's ecosystems, a range of action plans were carried out. These included:

- **Developing and drafting ethical guidelines** (including imposing charges) for research and extraction of natural resources by outsiders
- **Identifying relict patches** (that which has survived from an earlier period or in a primitive form) endowed with natural vegetation and taking conspicuous steps for its sustainable conservation
- **Eradication of invasive species,** to be replaced with plantation of indigenous species that benefit the region and the communities that live there
- **Raising awareness on the issue of road-kills of animals** by putting up signs, signboards, hoardings and/or speed breakers at specific locations that witness their regular occurrence
- **Hiring locals to keep a consistent watch on illegal hunting** practices and unethical logging in and around villages, who are also aided by eco-green efforts by the **Forest Department**
- **Conducting discussions and public awareness sessions** among indigenous people to get rid of beliefs, myths, taboos, and motifs that drive them to hunt certain wildlife, especially endangered ones

The Result

The series of interventions have greatly increased awareness on the local biodiversity and its importance among 3,000 locals and 1,500 students

More than 12 sites have been demarcated for participatory conservation of biodiversity and ecologically sensitive areas, with over 100 acre of land being restored for local species

A few of the sites of implementation have successfully recorded the sighting of threatened species including the Chinkara and White-naped Tit. Also, the increasing awareness on the threatened status of the White-naped Tit has reduced cutting and lopping pressures up to a whopping 80%

For the long-term conservation and maintaining of feeding and resting sites of the Grey Hypocolius, over 700 saplings of Salvadora were distributed to communities to increase habitat potentiality for sustaining the species

The MSU University of Baroda's work in the field of tissue culture collection for certain plant species (i.e. Commiphora stocksiana and Olax nana) has paved the way to provide BMCs (Biodiversity Management Committee) with saplings for the restoration of these indigenous wild species. With these provisions, the BMCs and pastoral communities of Kutch have mutually agreed on the conservation efforts and to protect the local ecosystems of their land

The Challenge

Ecosystems around us are fast deteriorating and it has been realised that in order to restore them, a more focussed approach is necessary.

An important percentage of the population in Okhamandal region where the Tata Chemicals Mithapur site is located, is directly or indirectly dependent on agriculture for their livelihood with several farmers growing cash crops that need pollinators. It is therefore an important component of the restoration efforts that we ensure a healthy pollinator population, so we can ensure the security of farm-based livelihoods.

It is in this context that Tata Chemicals has taken up the restoration project of a 150 acre (60 hectare) open scrub forest ecosystem at Mithapur, with the aim to develop a thriving sanctuary for indigenous flora and fauna, as well as a seed bank for the local flora. Through this process, the company aims to create a model for the open scrub forest ecosystem restoration initiative that can be replicable in other parts of the region.

It is increasingly becoming clearer that pollinator conservation is of prime importance if we are to ensure our survival - whether on a global scale, or locally.

The Solution

Prior to commencement of restoration efforts,

the entire 150 acre area was a fallow land with dense growth of the alien invasive species, Prosopis juliflora.

An aggressive invader, it does not offer sustenance to the local wildlife, save for the grazing domestic cattle that consume and spread the seeds far and wide, across the region, leading to its rampant spread.

Taking the issue head on, the project was planned and implemented in a phased manner, with 15 acre of the invasive species being cleared every year. The growth was so dense, that they could be uprooted only with the use of heavy machinery like bulldozers and excavators. This was followed by land development activities and the plantation of native forest flora species during the monsoon season. Initially, the indigenous saplings were sourced from the Forest Department's plant nurseries, but today we have an in-house flora nursery that was developed for raising select species.

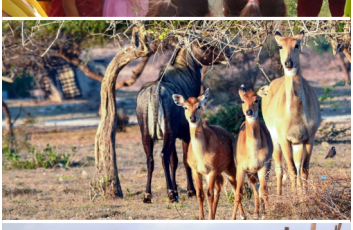
The project opened up a new avenue for employee volunteers and family members' participation in the scrub forest development and maintenance activities. They also participated in seed collection drives from the surrounding wilderness areas and helped in the raising of saplings to strengthen them for a year before plantation.

The team worked on developing micro habitats with flora species that were raised from genetic material of wild stocks, making them ideally suited to the different plots and pockets of land with varied physical characteristics. The region is home to gently undulating coastal sand dunes as well as grassland patches in between. Protective barbed wire fences were gradually replaced by hedges which now provide shelter to a diverse wild fauna. Work on flora diversity enrichment continues and a 40 acre exclusive plantation of the endangered Gugal tree has also been developed.

The Result

The spectacular revival of the ecosystem in this region saw 150 acre of non-agricultural fallow land being developed into an open scrub forest which also serves as a botanical reserve for conservation of local strains of indigenous flora of Mithapur region

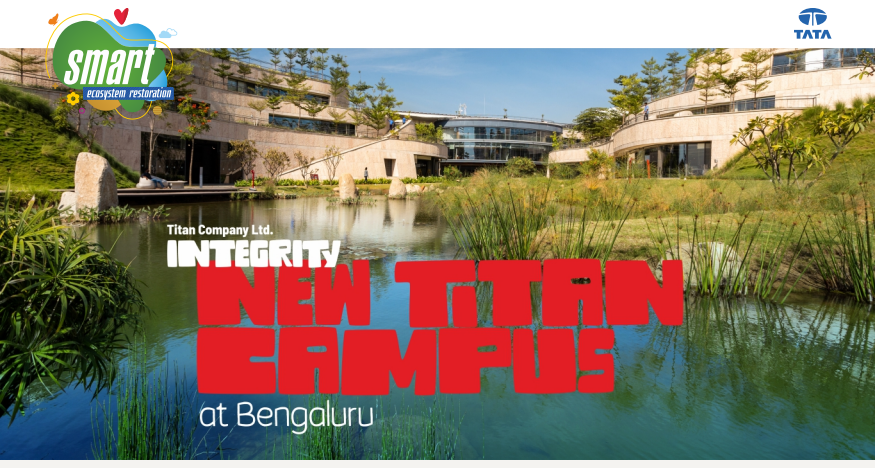
The exclusive 40 acre set aside for the endangered Gugal (Commiphora wightii) species is thriving and incredibly beneficial as the resin of this plant is highly sought after for its medicinal properties



A total of over 145 flora species have been recorded on site

The bird species recorded here has more than doubled (40 at the time of initiation of the project in 2004, to 105 now) and 20 wild animal species including 9 species of reptiles have been recorded here. The returning wildlife include 11 species of raptors, some of which are endangered, reptiles including monitor lizards, cobras and saw-scaled vipers, a host of insects drawn by the flourishing grasses as well as hares, hedgehogs, mongooses, civets, jackals and hyenas. A herd of Nilgai have taken up permanent residence in the area and several endangered fauna species too have made it their home, including the Star Backed Tortoise, Eurasian Marsh Harrier, Indian Pangolin and Macqueen's Bustard. Rare sightings of the elusive leopard has been recorded and the Barn Owl and Spotted Owlet have made a comeback after 30 years!

Such a thriving community of wildlife, including top predators such as raptors and leopards, is a welcome sign signifying the good health of the ecosystem and the continued success of the restoration project at Mithapur.

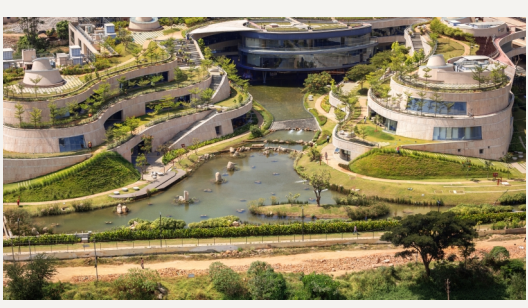


The Challenge

Titan, in keeping with its vision of creating elevating experiences for the people it touches and significantly impact the world it works in, wanted to create a safe and sustainable campus for its workforce in the urban agglomeration of Bengaluru. The aim was to build a campus which retains the natural beauty and focusses on energy and resource conservation, while enhancing the quality of life of their employees.

The Solution

Nature became the pivotal inspiration in the campus' design and the resulting structure both celebrates and preserves it.



The construction of the **Titan Integrity Campus was developed on a 6.5 ACRE SITE which has a lake on the eastern side. The idea was to take advantage of every angle possible of the lakeside, providing the user innumerable views of this serene setting.**

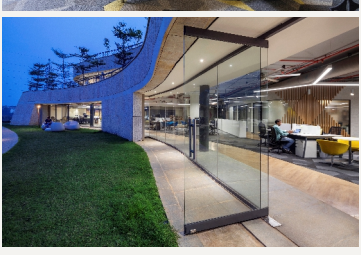
A few salient features of the construction, design and architecture worth mentioning are:

Minimising negative impact during construction: While clearing the land for construction, soil erosion was kept at a minimum by preserving the topsoil and re-laying it once construction was complete. Carbon emission levels were painstakingly measured and balanced by planting trees. 95% of the construction debris was reused instead of being wasted in landfills. Most of the material was locally sourced, thereby reducing the need for long-haul transportation. The foundations were laid on non-fertile soil. The combination of soft and hard landscaping, reduced the lawn areas, thereby lowering the water consumption and minimising pesticide and fertiliser use.

Creation of a bio-lake: A bio-lake was conceived towards the eastern side of the campus which responds to the existing lake and would seem like an extension of it. The campus is built around this bio-lake.

Porosity of form: Porosity in form allows continuous movement of air with wind tunnels creating a venturi effect. The campus is designed in such a way that each department has its own zone but is connected to the other departments through voluminous atria which brings in light and allows hot air to escape.

Use of natural light: The depth of office space is conceived in such a way that the entire area is enveloped with daylight as long as there is light outside, thus minimising the use of artificial light. A green wall on the western side of the building shields the usable spaces from the harsh western sun.



Use of natural air flows and green terraces: Common areas are open and non-air conditioned. The three-floor structure has a terrace garden at every level. Cascading green terraces are connected through external staircases and provide insulation to office spaces below, thus, reducing heating and cooling loads. This enables the use of the unconventional comfort air cooling system (Evaporating Cooling System) for 99% of the office space instead of conventional HVAC. It is for the first time in India that this innovation has been deployed at such a large scale. The green terraces not only allow one to work outdoors, but also stimulate interaction with the flora and fauna.

The campus has rainwater harvesting systems and a wastewater treatment plant, with the treated water being used in toilet flushes and for landscape irrigation, ensuring zero discharge from the campus. The design is in compliance to green building norms which includes special glazing to reduce heat load, roof gardens, stone cladding, renewable energy sources like solar energy, waste management, integrated systems to manage the facility and EV charging points.

The Result

60% SAVINGS ON ENERGY COST

Energy performance index of Integrity is **45%** LOWER THAN THE BENCHMARK FOR COMMERCIAL BUILDINGS

Awards & Recognition

LEED (Leadership in Energy and Environmental Design) Platinum Rating

Five Star GRIHA Rating

Global recognition at

RTF Awards (Rethinking the Future)

City Scape Awards for Excellence in Architecture and Landscaping