Report on Study Trip to Agra

[10-13 October 2017]

A TRIP TO AGRA

The trip to Agra has been planned for three days (10th - 13th October 2017). The main purpose of the visit is to understand various issues related to sustainable development practices and to sensitize the students on various issues related to sustainability challenges. For this, an official visit has been scheduled to Dayalbagh technical college. The main purpose of the visit is to get a glimpse and hands on experience of Renewable energy technology (especially solar power) and also to get an exposure how the university is self-reliant in terms electricity consumption in the campus itself. A visit to Taj Mahal has also been scheduled. Besides the understanding of sustainable tourism practices, the students also got an exposure on the Pollution related issues from Archaeological Survey of India (ASI) officials. Finally, in the Sur Sarovar Bear Rescue Centre, the students learnt about bear rescue projects. Moreover, the Wildlife SOS officers also talked about various community development projects especially the resettlement and rehabilitation of Kalandhar Community in UP, Rajasthan, MP etc., who largely practice bear dancing by captivating wild bear in their house. The study team was comprised of 27 students across the disciplines and departments along with two faculty members viz. Dr Swarup Dutta and Dr Udit Soni. The team is largely indebted to Mr Sandeep Arora and Ms Preeti Dogra for their time to time help on various issues. Following is the itenary of the study trip to Agra.

Study Tour: Agra (October 4-7, 2016)				
Locations/Date	**10-Oct**	**11-Oct**	**12-Oct**	**13-Oct**
Departure (TERI University, Delhi)	7am			
Arrival in Agra	12noon			
Sikandara (Akbar Tomb)	3-6pm			
Dayalbagh Technical College		10 am-1pm		
Taj Mahal		3-6 pm		
Fatehpur Sikri/ Exposure Trip to local area			9am to 12 pm	
Agra Fort			3-6pm	
Departure from Agra				8:00 AM
Sur Saravor Bear Rescue Centre				10:00 AM
Arrival (TERI University)				3pm

A VISIT TO DAYALBAGH TECHNICAL COLLEGE

The Technical College in Dayalbagh under Dalayalbagh Educational Institution (DEI) is one of the premier technical institutes of the country. Founded as a Technical School in the year 1927 it was later upgraded into a College in 1930. It was founded by Sir Anand Sarup, H.H. Sahabji Maharaj. The college has been contributing to the pool of technically trained manpower of our country since its inception and thereby steering India's march towards becoming a technologically advanced nation.

From the academic session 1986-87, it has been brought under the administrative and academic control of the Dayalbagh Educational Institute (Deemed University), Dayalbagh, Agra. The college provides low cost, comprehensive, value based, and quality education to its students in regular as well as in distance mode. Its outreach programme in remote areas of the country, including tribal areas, caters to the under privileged and economically backward class of society, especially women and school dropouts.

The college has modern state-of-the-art laboratories and workshops which cater to the practice component of the curriculum. The college has 12 regular Diploma, 2 Vocational Diploma and 15 Certificate programmes in the main campus and in its Distance Education Programme. A total of 1280 students, coming from all parts of the country, are enrolled in the various programmes of the college.

The college has a vibrant industry-institute partnership having signed MoUs with leading automobile companies like Maruti Suzuki India Ltd, Gurgaon; TVS Motor Company Ltd, Hosur; India Yamaha Motor Pvt Ltd, Surajpur; Honda Motorcycle and Scooter India Pvt Ltd, Manesar; and, Radhasoami Satsang Sabha Agriculture Farm, Dayalbagh.

The college is a pioneer in implementing the National Vocational Education Qualification Framework of the AICTE and MHRD w.e.f. the session 2012-13. Under this programme, Diploma Vocational in Automobile Sector, specialization - Engine Testing and IT sector, specialization - Software Development have been started.

The Dayalbagh Educational Institute (DEI) has received recognition from the Uttar Pradesh Electricity Regulatory Commission for its work in harnessing solar power and spreading awareness among students about saving energy. The university has been successful in meeting a major portion of its own electricity demand and distributes its surplus energy to local colonies in Dayalbagh.

We met the principal Dr BB Rao and Professor Bhagwan Das. Around six years ago, a solar power plant was set up in the campus. With constant upgradation of the system, the university now has the capacity to produce 558 kilowatts of energy. By 2018, the university aims to increase its capacity to two megawatts. The DEI produces up to 2,500 to 2,800 units of electricity on a regular basis. The institute has a grid tie-up with Dakshinanchal Vidyut Vitran Nigam to whom it sells its surplus energy. Let us have a look at some of the major initiatives on renewable technology taken by the University.

RENEWABLE INITIATIVES

1. Among first five green campus declare by MNRE.
2. Self sufficient in electricity.
    - Photovoltaic
    - Solar thermal cooking
    - Solar vehicle
    - Biogas plant
    - Solar and wind hybrid system

Few Major highlights on SOLAR PV

- Installed capacity of university is 558 KW.
- 7 department are having 7 PV plants (decentralized).
- 3 plants of 40 KW each and 2 of 150 KW each.
- The project is installed with the help of BHEL.

The solar power plant at the DEI is a 520 kWp photovoltaic unit that is being largely used for the institute. The project was initiated in 2010 under the National Solar Mission for off-grid and solar photovoltaic applications. The project finished in February 2012. It costed about Rs 11 crores for the entire project and continues to depend on the institute's funding for maintenance. "*However, only about 15% has been received so far*, says Prof. D. Bhagwan Das. Prof. Das and Prof. Saxena were instrumental in setting up the project.

"We were involved in every step of the project cycle and we decided the kind of technology we preferred for inverters, and batteries," says Prof. Das.

The university is actively using solar thermal power for cooking. For this, five scheffler dishes each of 16 sq mt has been installed in the campus. Solar power is used to cook food for the students staying in hostel by igniting 16 kg of LPG per day for hostel. In lean time that is between 10 am and 2 pm it helps in boiling of *amla* and 8 kg of coal for ayurvedic pharmacy in the campus itself.

Each plant is associated with battery room which is having autonomy of 4 hours. Low maintenance **lead acid batteries** are used which is having average voltage of 2V. The Grid supported inverter of 150 KVA is associated which is mediator between battery, module, grid, load.

To overcome challenges that is efficiency, reliability, economy viability following projects are initiated.

- Remote monitoring and control of solar inverters.
- Remote monitoring and control of switch gear.
- Remote metering and protection.
- Optimal sun tracking of solar panels.
- Strong monitoring and diagnosis.
- Smart battery and storage system.
- Remote monitoring and control of water pumping.
- Decision in support system for optimal operation.

The institution is connected to the grid, and therefore there is a mix of grid connected and solar based electricity being utilized. Usually, there is enough electricity being produced by the power plant to meet the load of the institution. However, in summer months when temperatures are high the output is reduced, as solar photovoltaic (PV) technology is not very efficient beyond 25 degrees Celsius. This is also when the demand for power is high and hence, more grid based electricity is needed. However, just after the rainy season, the temperature is ideal for the PV panel and the atmosphere is clear of dust particles. The output from the power plant is now at its peak. During winters, power demand also decreases as the fan and cooling requirements drop. "*We are completely dependent on the solar power plant during this period*," says Prof. Das. The power plant electrifies the hostels in the evenings which houses about 300 students.

The institute also supply excess electricity to the government. The surplus power is not exported to the distribution company (Torrent Power, in this case) because there is no Power Purchase Agreement (PPA) between the two parties. This is because there are no government regulations on small scale power producers. Instead, the surplus power is fed into the houses in Dayalbagh colony. The DEI and the colony buy electricity in bulk from Torrent Power discom at 33kV. The voltage is stepped down at a transformer from where a line goes into the colony and another goes into the institute at 11 kV. "*The excess that comes from the solar power plant is automatically fed into the colony because there is constant load demand from the households*," says Prof. Das. "The households receive the electricity for free," he adds.

The technical arrangement is simple. There 520 kWp system is divided by 7 power plants of varying capacities depending on the size of the roofs they are on. In each power plant, the solar panels are directly connected to a Maximum Power Point Tracking (MPPT) charge controller. They are in turn connected to low-maintenance lead acid batteries which can provide a backup of four hours. The batteries need to be

refilled once every 8 months. "*Just to be safer we have been refilling it every 6 months*," adds Prof. Das. The batteries are connected to a switch gear which helps in adjusting the incoming grid based electricity according to the load demand and the solar power available. The switch gear has been developed by the institution as part of their research.
Rooftop generation at the colonies

The households in the residential colony have also invested in solar power for reducing their energy bills. So far, 27 households have fitted rooftop solar power plants with a small capacity of 1-2 kWp according to their capabilities. "Sometimes, when they have surplus generation the electricity is fed into the other houses of the colony," says Professor Das. The households are fitted with net meters. "The Renewable Energy Authorities at the Radhasaomi Satsang bill individual houses in the residential colonies for electricity. Torrent Power has no business beyond bulk purchase. We charge the households according to their meter," says Gupta. If the houses have drawn power from the main grid beyond their solar power generation, they are charged for that. In case they have sold off power more than what they used from the main grid, the surplus is carried forward to the next month when it can be adjusted. "We don't pay off in cash," says Gupta.

There is no compensation for excess generation into the local grid. The credits are just rolled into the succeeding billing periods. The advantage of roof-top grid interactive generation is that the batteries have longer lives compared to the islanded mini-grid system. This is because, the batteries are not discharging all the time as there is conventional power. The number of discharge cycles is lower as compared to the mini grid or individual home systems.

Title: Prof Bhagwan Das explaining renewable technology in Dayalbagh to the students

AMBIENT AIR QUALITY MONITORING STATION, TAJ MAHAL

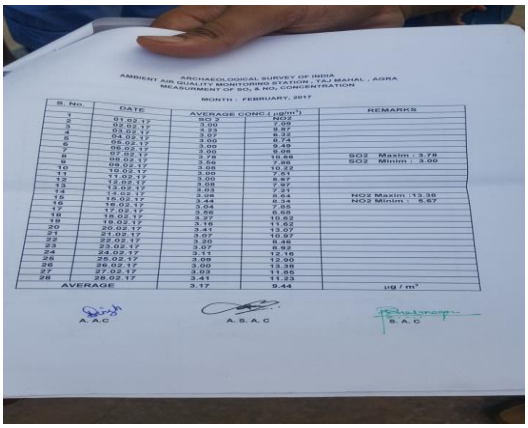
Archaeological Survey of India (ASI) has lab in Taj Mahal area that checks pollution level in City of Agra on daily bases and makes report on it. That had been seen that there is significantly rise in industry, traffic and population where Taj Mahal is located. Air contamination had been suspected as the main party in discolorations of Taj Mahal. To discover what are cause of shading change, specialists of ASI are using air inspecting hardware to notice effect all around Taj Mahal complex. The filtered air-sampling equipment analyze both fine particles issues that are little than 2.5 micro in diameter and add up to suspended particles issue.

(Taj Mahal Pollution Control Office)

They have placed small specimen of pristine marble on the Taj Mahal at different places near the main dome. That specimen of marbel get reacted with other particles of NO2 and SO2 over a three-month period, the samples were tested by using an electron microscope to measure the size and the number of particles deposited on their surfaces.

By this test they find particles of dust, brown organic carbon and black carbon in the filters which tell the pollution level around the Taj Mahal.

In the end they make a final report on monthly bases and forward it to the Supreme Court for final decision regarding pollution control.



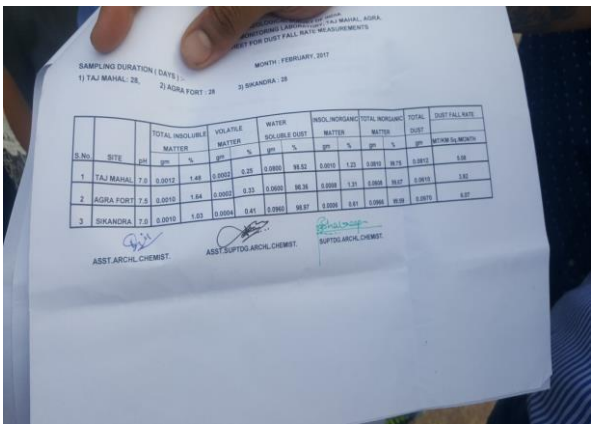
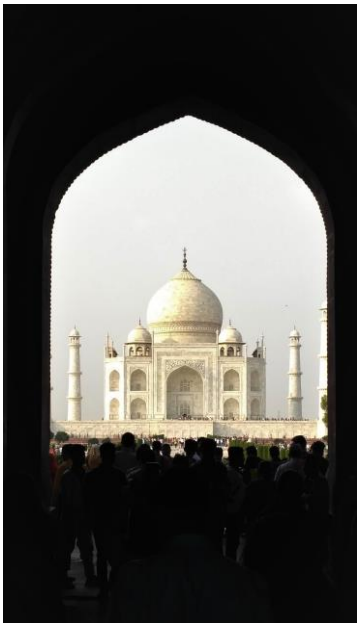


Photo: report of Pollution level in Taj Mahal provided by ASI



VISIT TO BEAR RESCUE CENTRE, AGRA

The Sur Sarovar sanctuary lies about 20 km from Agra and spread across 403 hectares and about 27 km form the famed mausoleum, which was built during the reign of one Mughal emperor. Keetham Lake sits within the sanctuary, comprising half of the entire preserve. The shallow 245-hectare manmade lake is the signature centerpiece of Sur Sarovar. The reservoir was built to provides fresh water resources to the region, but the abundance of wetland bird species that have since colonized the sanctuary, have added a whole new dimension to the already scenic area.

In total, Keetham Lake and its man-made islands are what attracts as many as 165 species of birds, as reported over wet and dry seasons in one year. Herons, egrets and flocks of bar headed geese, flamingos, pelicans and 106 other species of avifauna to the region are year-round residents or seasonal visitors.

The Soor Sarovar is also home to the Agra Bear Rescue Center a captive facility home to the largest population of sloth bears in the world. Run by Wildlife SOS under the auspices of the Uttar Pradesh Forest Department, the rescue center is home to more than 245 former dancing bears. These dancing bears also known as tame bears were confiscated over a period of several years with the help of police, Wildlife SOS and the Forest Department. And down the street Wildlife SOS manages a new rescue center for injured, and orphaned Asian elephants.

Wildlife SOS, founded in 1995 aimed at making long-lasting changes to protect and conserve India's natural heritage, forest and wildlife. Today, the organization has taken on various other activities that work towards protecting the Indian wildlife, combatting illegal trade, conserving their natural habitats (restoration and protection), studying biodiversity, conservation awareness, conducting research (In-situ and Ex- situ), rescue and release of wildlife creatures that are attained with the help of the round the clock

hotline services and creating alternative and sustainable livelihoods for communities that are dependent on the wildlife for their livelihood. They have sanctuaries for snakes, leopards, elephants and other primates. They have many rescue centers such as 4 centers for sloth bears (Agra, Bengaluru, Bhopal and Purulia), 2 for Asian black bears (Dachigam and Pahalgam –J & K), Leopard Rescue Center (Maharashtra), 2 elephant care centers (UP & Haryana) to mention a few. They also have a round the clock helpline service where they help rescue and release of animals in distress.

Kartick Satyanarayan and Geeta Seshamani dedicated themselves to eradicating the practice of 'dancing bears' in India completely through Wildlife SOS, today the organization has grown to more than rescuing just the 'dancing bears'. It takes responsibility in taking action against animal cruelty, rescuing wildlife in distress, working to put an end to man and animal conflicts by promoting and educating the public about the need for protection of natural habitat for the wildlife.

For over 400 years, the sloth bears have been used as 'dancing bears'. This began when the nomadic tribe, Kalandars began using the bears for entertainment purposes for the emperors during the Mughal Era. Over the years, the kingdoms have gone and yet the tradition remained. It became means of livelihood for the Kalandars. Mother bears were killed so that poachers could take and sell their cubs to the Kalandars for their benefit. With no anesthesia, a red-hot rod would be driven through the muzzle of the baby bear, a rope would then be strung through the painful piercing, and tugged to induce 'dancing' performances on demand. A research conducted in 1996 showed that there were more than 1200 dancing bears scattered throughout the country. Over the years with help from government officials and various organizations International Animal Rescue, One Voice, Free the Bears, and others, Wildlife SOS rescued over 620 dancing bears. They now live peacefully in 4 natural sanctuaries across India (Agra, Bengaluru, Bhopal and Purulia) where the bears are taken care off.

The bear rescue at Agra is a home to around 192 sloth bears rescued from horrific lives as 'dancing bears', or from poaching and situations of man- animal conflict.

The organization in Agra is especially working on rescuing sloth bear. The Indian Sloth Bear (*Melursus ursinus*) can easily be recognized by his shaggy black coat, long muzzle, protruding lip and by a white V-shaped patch on the chest. His diet consists of fruits, berries, grasses, flowers, honey, insect larvae and other insects. He has a proclivity to "vacuum" up termites and ants using his long snout.

The sloth bear has been exploited by human since hundreds of years. A nomadic tribe known as the Kalandars (one of the denotified and semi-nomadic tribes in India) began 'dancing' sloth bears for the emperors during the Mughal era. Mother bears were killed so that poachers could take and sell their cubs in perpetuation of this brutal practice. With no anesthesia, a red-hot poker rod would be driven through the muzzle of the baby bear, often at the tender age of six months. A rope would then be strung through the painful piercing, and tugged to induce 'dancing' performances on demand; for many bears a life at the end of a rope would be all they would ever know. According to research, it can be concluded that there were 1200 dancing bears out of which 620 has been rescued Despite of this the anti-poaching activities are continued for Chinese medicines and south-east cuisine.

Wildlife SOS has in the last decade successfully carried out many rescue operations in the states of Madhya Pradesh and Karnataka, where these bears are often found injured in snare traps or with bullet shots by poachers.

The Wildlife SOS use to take several measures after rescuing the bear from captivity and these are as follows -

- Each rescued bear undergoes a 90-day quarantine period during which he or she is given a complete health checkup and treated for any diseases, wounds and parasites.
- The bear is vaccinated against Rabies, Leptospirosis and infectious canine hepatitis. After the quarantine period, the bears have access to large socialization enclosures where the behavior & personality of each bear is closely monitored by the Wildlife SOS vets & staff. The enclosures ensure bears interact with each other.
- Based on each bear's personality, he/she is matched to a group and then moved to a larger free-range area. Wildlife SOS has full-time wildlife veterinary doctors and a dedicated team of bear keepers to care for the rescued bears. The bear hospital is equipped with a laboratory in addition to essential equipment like X-ray, Ultrasound, Dental suite, Operation Theater and other equipment needed to meet any bear care need that may arise.
- A special cub weaning area of the bear sanctuary is dedicated to foster baby bears rescued from poachers as the cubs require a lot of careful attention during the early months.
- Bear rescue centre has certain enrichment activities for the bears like 'Ball' and 'Bell'

where the ball has holes in it which is filled with honey in order the bear due to great smelling sense will get attracted towards it and will stand and feed on it. Certain bears are blind due to certain infection caused thus bell is meant for their recreational purpose.

At present, The Sur Sarovar Bear Rescue Center in Agra has over 192 rescued dancing bears and 4 illegally poached bears. The most recently saved cub was Mowgli whose mother died from electrocution. The bears were taken from the Kalandar villagers in accordance to the 1998 agreement which allots them a compensation of fifty thousand rupees in return of the bears and signing the agreement of never using wildlife again as means of livelihood. With this money, they get a chance to develop a new means of livelihood.

The rescued bears are taken to the sanctuaries and taken care of, they are first let into an adaptation cage that faces the enclosures of the other bears so that the new rescued bears may see that the bears are taken care off and can live peacefully in their natural habitat. After they have adjusted to their new environments and care takers, the bears are then treated medically for the injuries they may have sustained through their years in captive. The bears sustain various injuries like blindness, tuberculosis, jaundice, iron deficiency and cancer to mention a few.

The blindness is mostly resulting from the damage done to the optic nerves during the piercing of the muzzles of the bears. The canines of the bears are broken off so that the bears don't harm anyone, due to this the bears cannot be let back into the forests as they are not fit to tend for themselves in the wild. The bears are thus taken care off in the sanctuary. Their meals are mostly laced porridge, carrots and other vegetables that are flavored using banana and honey. There are 2 keepers for each enclosure and 3 vets on site at all times for taking care of the bears. The bears have been made cooling rooms made of mud so that they can remain cool during the hot weather. They also have winter management, where straw beds are made to keep the bears warm. Various precautionary measures are taken so that no infections are spread across one of them being potassium permanganate foot baths. It has been observed that even though the bears have been rescued it has been seen that the bears show stereotypic behavior that had developed within them to cope up during the years of captive, it takes them years to overcome this behavior. The most common stereotypic behavior being the swinging motion they adopt on seeing humans. They have a veterinary hospital of international standards for taking care of the bears and other animals within the sanctuary. The first bear they have rescued was Rani, who still lives in the Agra sanctuary. The bears are rehabilitated among other bears where they find new families among other bears and humans.

Besides rescuing the bears, the organization is actively engaged in community economic rehabilitation in which the organization is actively working on education, empowerment and livelihood of the community. The organization believes that the impoverished communities do not often have the luxury of informed choice in how they earn the living that feeds their family. Keeping this in mind, the organization funds the education of children from Kalandar communities. This enables the people to break cyclical poverty and ignorance. Education empowers future generations to live and thrive in mainstream society. The Wildlife SOS supports education of over 1,360 Kalandar children. They assist the children in school admissions, paying fees and providing books, stationary, uniforms and schoolbags etc.

Besides education, Wildlife SOS has designed and carried out initiatives to empower women belonging to Kalandar communities in the states of Rajasthan, Madhya Pradesh, Uttar Pradesh and Karnataka. Women empowerment initiatives help provide additional financial security by making women secondary income earners for their families. At present, over 1,500 Kalandar women have been given vocational training or seed funding to start businesses. The organization carries out capacity building and skills' training of women as well as generating awareness and providing support to discourage child marriages. It also provides women with seed funds, extensive technical support services, including training and extension assistance, to create micro enterprises. Where necessary, it provides marketing assistance and linkages with suppliers and buyers. Consulting is provided to help the women in choosing appropriate entrepreneurial ventures suited to their capabilities. Training in the elected skill (e.g. training in embroidery, stitching, jewelry making, bag making, stone polishing, powdering and packaging of spices, and in other forms of "business" that could be run from the house) is then accordingly provided.

Few years back, the organization conducted a need assessment study of the Kalandar community to understand their preferences for alternative employment. Based on the assessment the organization is now offering various means of livelihood to the community. Till date, over 600 Kalandar men have surrendered their bears voluntarily to the organization and claimed the rehabilitation package form them.

The families receive rehabilitation packages based on submitted applications. The application is based on individual's entrepreneurship skills and personal vision. So far, the organization assisted to purchase handcart, a small "khoka" or wooden stall / shop; or bicycle for selling goods in the rural areas. They also helped in purchasing cycle rickshaw, auto rickshaw or with providing seed funds for initial stocks etc.

The organization also help in providing training in carpet weaving, powdering and packaging of spices, training on welding machines, training on cup-making machines in tool rooms and as assistants in motor mechanic shops. Helping a man learn to drive in order to become employable (drivers with proper license documents); small scale poultry farming; rearing of goats; metal work, training in gem-cutting and polishing of low value semi-precious stones for costume jewelry are further examples of trade possibilities. The organization put significant efforts to bring the community into the mainstream.

Annexure

List of Students

Group 5 - Agra		
Sr. No	**Reg. No.**	**Name**
1	1700018MSG	Jyoti Rathour
2	1700229MSP	Afshan Afroz
3	1700164MSP	Vishakha Bhardwaj
4	1700212MSO	Anmol Sehgal
5	1700055MSO	Garima Jasuja
6	1700162MSO	Radhika Arora
7	1700239MSO	Shreya Bedia
8	1700161MSE	Abhishek Pattanaik
9	1700007MSE	Ardra Sam
10	1700118MSE	Lalrempuii Hrahsel
11	1700219MSE	Priyam Saxena
12	1700102MSE	Sidharth Borah
13	1700121MSE	Vaishali Vatsa
14	1700285MBB	Sanjana Das
15	1700188MBB	Vanisha Kakwani
16	1700053MAS	Annanya Bhuyan
17	1700267MAS	Neelakshi Sharma
18	1700086MAS	Shirish Bhatt
19	1700120MTR	Abhinav Agrawal
20	1700045MTR	Drimson Fernandes
21	1700192MTR	Karan Bhandari
22	1700131MTR	Richa Singh
23	1700025MTR	Shravani Itkelwar
24	1700165MTR	Trishita Bhattacharjee
25	1700028MTU	Aviral Dubey
26	1700081MTU	Tarun Sharma
27	1700054MTU	Ashamary Alexander
	Faculty	**Dr. Swarup Dutta**
		Dr. Udit Soni

Thank you