



Amrita's Green Campuses Initiative

Dr Maya Mahajan, Program Coordinator  
Dr Anju Bist, Community Outreach Coordinator  
Green Campuses Initiative  
Amrita Vishwa Vidyapeetham





Green Campuses

## GREEN CAMPUSES INITIATIVE

- ❑ Launched in July 2013
- ❑ To sensitize student community on Environment Protection and Sustainability.
- ❑ Looking beyond our Campuses
- ❑ Reaching out to larger audiences
- ❑ Providing a platform for collaboration to Indian universities and colleges
- ❑ Powered by A-VIEW (Amrita Virtual Interactive E-Learning World)- our own e-learning platform



[www.greencampuses.in](http://www.greencampuses.in)



## OUR MAIN GOALS

- ✓ Promote sustainability by creating awareness
- ✓ Sharing knowledge & expertise- Expert talks about environmental problems and possible solutions
- ✓ Deploy eco-friendly technologies for greening and cleaning our campuses
- ✓ Encourage active research in these technologies



[www.greencampuses.in](http://www.greencampuses.in)



## EXPERT TALKS HOSTED SO FAR

### Dr. R. K. Pachauri



**Director General, The Energy Resource Institute (TERI),** believes

- ✓ **renewable energy , energy security**
- ✓ it is with the students that the future hopes of the country rests upon, the growth of our country relies on.

### Keya Acharya



**Founder Trustee and President, Forum of Environmental Journalists in India (FEJI),**

- ✓ Good practical ideas in **waste segregation** by various educational institutions were publicized across India
- ✓ Waste segregation in to biodegradable and non-biodegradable at source and composting or recycling it locally

[www.greencampuses.in](http://www.greencampuses.in)



### Padmashree G. Shankar



#### **The Green Architect, Cost-effective, sustainable and eco-friendly building technologies**

- ✓ sustainable construction materials: Mud, Bamboo, Lime, etc.
- ✓ willing to collaborate with us in implementing green architectures.

### Dr. Ligy Philip



#### **Professor, IIT Madras, emphasizes**

- ✓ **water management**
- ✓ rain water harvesting, prevention of water wastage and pollution of aquifers, recycling of water, low cost waste water treatment etc.

[www.greencampuses.in](http://www.greencampuses.in)



### Dr. Prasad Modak



#### **Executive President, Environmental Management Centre LLP, has worked with**

- ✓ many key UN development institutions in the world
  - ✓ various Governments on environmental policy and management
- Sustainability as Profession**

### Dr. Lokendra Singh



#### **Director, Directorate of Life Sciences, DRDO,**

- ✓ won Defence Technology Spin-off Award 2007 for **development of bio-digester (Bio-toilets)** for onboard treatment of human waste
- ✓ has 20 patents to his name, authored more than 130 research papers and articles in national and international journals

[www.greencampuses.in](http://www.greencampuses.in)



### Mr. Peter Ash



**Environmental Educator & Permaculture Designer,**  
advocates that,

- ✓ everything that comes into natural system should go back into it, or everything should get cycled
- ✓ importance of top soil, food web, biodiversity, concept of food forest etc.

[www.greencampuses.in](http://www.greencampuses.in)



## UNIVERSITY PARTICIPANTS



### Northern Zone

- ✓ TERI University

### Western Zone

- ✓ IIT, Bombay
- ✓ IIT, Ropar
- ✓ Visvesvarayya NIT, Nagpur
- ✓ Gandhigram Rural Institute Deemed University

### Southern Zone

- ✓ IIT, Madras
- ✓ IIT, Hyderabad
- ✓ IGNOU
- ✓ IBS, Hyderabad
- ✓ Visvesvaraya Technological University

[www.greencampuses.in](http://www.greencampuses.in)



#### Northern Zone

- ✓ Punjabi University, Patiala
- ✓ Jan Shikshan Sansthan, Unnao

#### Central Zone

- ✓ National Institute of Technical Teachers Training and Research, Bhopal
- ✓ NIOS Regional Centre, Ranchi
- ✓ Directorate of Technical Education

#### Western Zone

- ✓ DST Connectone Forum
- ✓ Gujarat Ayurved University, Gujarat
- ✓ Sobhasaria Group of Institutions, Rajasthan
- ✓ Government Polytechnic, Bhuj

#### Southern Zone

- ✓ Bharathiar University
- ✓ Pondicherry University
- ✓ Avinashilingam University for Women
- ✓ JNTU College OF Engineering, Hyderabad
- ✓ Goa University
- ✓ Osmania University, Hyderabad
- ✓ Forum of Environmental Journalists in India (FEJI), Bengaluru

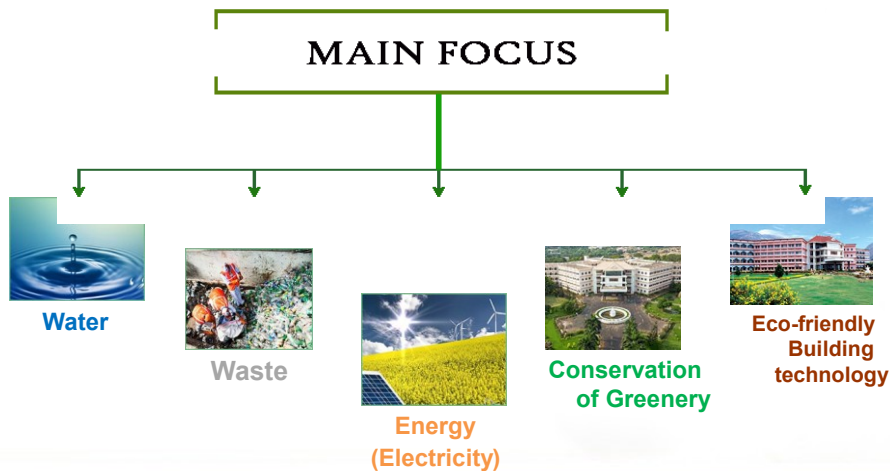
#### Eastern Zone

- ✓ Nilachal Polytechnic, Bhubaneswar
- ✓ Mizoram University
- ✓ Tezpur University
- ✓ Assam University
- ✓ Nagaland University
- ✓ Dibrugarh University, Assam

[www.greencampuses.in](http://www.greencampuses.in)



## OUR FOCUS AREAS



[www.greencampuses.in](http://www.greencampuses.in)





# Water Management



## GREEN CAMPUS IN THE ARID REGION

- ✓ Ettimadai campus- spread over 400 acres in an arid area.
- ✓ Has five sewage treatment plants to treat over 12 lakh liters of waste water per day and recovers 11.6 lakh liters.
- ✓ Bioremediation aided by Effective Microbes (EM) technology.





- ✓ Treated water currently used for
  - ✓ Irrigating campus lawns and gardens
  - ✓ Flushing the toilets



- ✓ *Costly in terms of electricity consumption*
  - ✓ *The electricity charges to run the five sewage treatment plants on campus comes to Rs. 3.5 lakhs per month*



## BIO TOILETS - A RECENT SUCCESS STORY

- The septic tank at one of our hostels, Kaveri, was converted to a bio-digester and populated with a consortium of anaerobic bacteria-psychrophile- that consumes human waste.
- The effluent water from the bio-digesters is released through a reed bed for further purification.
- Our recent water quality test results have confirmed the suitability of technology
- Resulted in to huge electricity cost savings at the waste water treatment plants





# Waste management



## RECYCLING

### Amrita Recycling Centre

- ✓ Every bit of the waste in the campus is collected, segregated and recycled.
- ✓ Our Ettimadai campus has developed the most extensive recycling system by effectively engaging with unorganized sector
- ✓ Their **annual turnover is several lakhs of rupees**, and more than pays for the salaries of the staff at the waste management department
  - ✓ The waste management department at Ettimadai is completely self sustaining







## PLASTIC TO FUEL

- ✓ One of our Ph. D. students, Sriram, at the School of Business owns a Pyrolysis Plant in Chennai
- ✓ They have agreed to buy our plastic waste and process it to generate fuel.



## COMPOSTING

- ✓ On several Amrita campuses, almost all bio-degradable waste generated is composted.
- ✓ At AIMS, composting was used along with other techniques for eco-restoration of a former landfill site
  - ✓ Significant restoration was achieved in ~1.5 years.





## WET WASTE FOR BIOGAS PRODUCTION

- ✓ We have a **small Biogas generation plant setup at Amritapuri campus** which is used by the Oriya workers kitchen and the Biotech canteen.
- ✓ We have plans to setup Biogas generation plant at AIMS.



## Energy

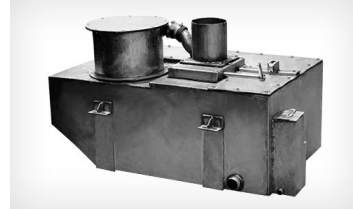




## ENERGY (ELECTRICITY)

### Biggest Electricity consumers –

- ✓ Waste water treatment plant at Ettimadai consumes 10% of the campus electricity
- ✓ A/Cs, especially at AIMS.



## GREEN ENERGY OPTIONS

- ✓ AIMS and Ettimadai campus –plans to have **solar PV panels** to meet some part of their electricity needs.
- ✓ Switching to LED Lamps, which have lifespan and electrical efficiency that is significantly better than most CFLs and tubes.





## BIO TOILETS - A RECENT SUCCESS STORY

- ✓ **Biotoilet technology** has been implemented on an experimental basis at our Amritapuri campus.
- ✓ The original septic tank at one of our new hostel was converted to a biodigester and was populated with a consortium of anaerobic bacteria which consume human waste.
- ✓ The effluent water from the biodigestors goes through a reed bed for further purification.
- ✓ The water output from the reed bed doesn't need any further waste water treatment and is good enough for reuse or to be released in the environment
  - ✓ Results in huge electricity cost savings at the waste water treatment plants.
- ✓ Our recent water quality test results have confirmed the technology.



## Landscaping and Trees





## LANDSCAPING AND TREES

- ✓ Landscaping and tree planting has helped transform our Ettimadai campus into a lush green campus.
- ✓ 1 lakh trees were planted at this campus during the last 10 years
  - ✓ Have the largest collection of trees in South India
- ✓ Trees have helped reduce the ambient temperature by ~5 degrees in the campus
- ✓ Cultivation of organic vegetables, fruits, medicinal plants
- ✓ Permaculture



## Rich Biodiversity in the Campus

- 112 species of Birds
- 86 species of butterflies
- 19 species of mammals
- 12 species of reptiles







# Building Technologies



## BUILDING TECHNOLOGIES

- ✓ The goal is to reduce future energy costs in heating/cooling/ventilating our buildings by using appropriate construction techniques and materials.
  - ✓ For ex., the main canteen at Ettimadai Campus with no fans
  - ✓ Open courtyards
- ✓ Padmashree G.Shankar shared with us some of his experiences with cost-effective, sustainable and eco-friendly building technologies.
  - ✓ Sustainable construction materials: Mud, Bamboo, Lime.
  - ✓ Willing to collaborate with us in implementing green architectures.
- ✓ Recent visit to Barefoot College in Rajasthan showed that lime construction can be considerably cooler.
- ✓ Development Alternatives firm in - has a model office building that aims at zero emissions





## CLASSROOM ACTIVITES



- ✓ Education and Curriculum



- ✓ Student Projects



- ✓ Research Projects

www.greencampuses.in



## EDUCATION AND CURRICULUM

- ✓ Environmental Sciences (EVS) is a mandatory course for undergraduate study of all branches of higher education.
  - ✓ Our Engineering and Business schools have adopted EVS in letter and spirit and high credits are given. ....Responsible citizens  
<https://sites.google.com/site/amritaevs/>
  - ✓ Tools-PPTs, Games, Role plays, Group discussions, Documentary Films etc
- ✓ Developed extensive E-learning material and videos for this course
  - ✓ <http://aview.in/evsmodules/>
- ✓ Development of Flip classroom based basic course on EVS for small private online classes (SPOC)
- ✓ MOOC (Massive Open Online Course) in this subject in future.

www.greencampuses.in



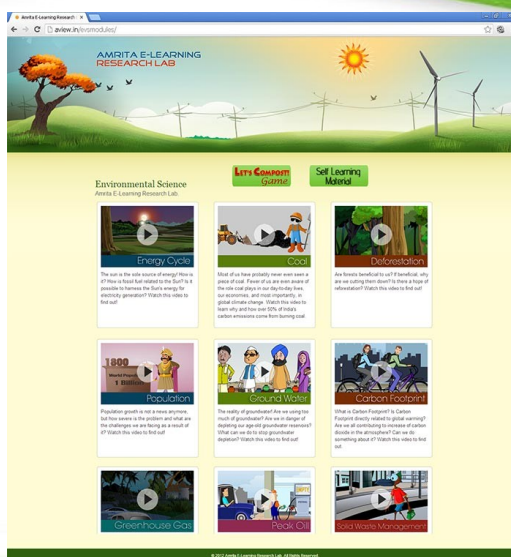
## Curriculum-EVS

- Overview of the Global Environmental Crisis.
- Biogeochemical Cycles
- Climate Change
- Ozone depletion
- Overpopulation
- Energy Crisis
- Water Crisis,
- Ecology, Biodiversity
- Deforestation and Land Degradation
- Food Crisis
- Water Pollution.
- Air Pollution.
- Other Pollution (Land, Thermal, Noise).
- Solid Waste Management
- Environmental Management: Green Businesses, Green buildings, Environmental ethics, Environmental Impact Assessment
- Environmental Legislation.
- Sustainable Development.

www.greencampuses.in



## A-VIEW EVS MODULE



www.greencampuses.in



## STUDENT PROJECTS

Project work forms a major part of the EVS course

Multi-disciplinary in nature.

Integrating with their core subject

- ✓ Water, energy audits, waste management projects
- ✓ Food waste audits and awareness projects
- ✓ Solar based UPS, Solar vehicles, Solar street lighting, LED
- ✓ Rain water harvesting structure with cost estimation
- ✓ Water quality monitoring
- ✓ Developing organic gardens, herbal/medicinal plant garden
- ✓ Awareness projects, biodiversity surveys
- ✓ Carbon sequestration by trees in the campus
- ✓ Impact of cell phone radiation
- ✓ Health impacts of pollution
- ✓ Man-animal Conflict
- ✓ Development of modules, education material, posters, films



[www.greencampuses.in](http://www.greencampuses.in)



Currently, we have 5 Ph. D. students at Amritapuri campus working in the area of Water.

### Career options

- ✓ During the past decade, many Indian companies have also started adopting the path of sustainability and appointing suitable personnel for this purpose.
- ✓ This has created a demand for professionals trained in environmental issues and sustainable practices.

[www.greencampuses.in](http://www.greencampuses.in)



## CONCLUSION

- ❑ We strongly feel that, Sustainability should be integrated in every course, every discipline and every subject offering. We are working towards the same in our campuses
- ❑ We are planning to expand our network and reach out to the larger student community to generate awareness on Environment Protection & Sustainability
- ❑ We are striving to achieve excellence in not only making our own campuses green by adopting best practices; but also collaborating with other campuses to exchange ideas and expertise which would be mutually beneficial and lead us towards a Sustainable future.

[www.greencampuses.in](http://www.greencampuses.in)



## Amma says...



“There is an inseparable bond between man and nature. For man, there cannot be an existence removed from nature. However, because of man’s thoughtless actions, equilibrium in nature is getting disturbed and the pulse of human life is becoming erratic. Air and water are polluted. Rivers have dried up. Seasons arrive unseasonably. New diseases are spreading. If things continue in this way, the human race is in for a monumental catastrophe...”

[www.greencampuses.in](http://www.greencampuses.in)





**Together we can make a big difference**