A critical review of campus sustainability in India- a road map for the future

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Introduction/rationale

• The breadth and depth of environmental issues/problems/concerns have prompted greater international interest/commitment in the need for campus sustainability

• India is the seventh largest & the second most populated country as well as the second fastest growing economy- in terms of HEIs – next to China & USA

• As on 2011- 504 universities and university level institutions -285 state universities, 53 state private universities, 40 central universities, 130 deemed universities ; technical education institutions-1346 with a student intake capacity of 4.4 lakhs.

• The present GER in higher education in India is around 13.8 % (world average 23.2%) and the Government of India wants to increase the GER to 21% by 2017, and set 30% GER by 2020 (merely 1% in early 1950s). The higher education in the country has experienced significant growth over the last two decades. Universities & colleges in India have grown at a CAGR of over 5% and 6% respectively, since independence (MHRD, 2011).

Thus, HEIs are required to manage more students than they afford, exerting more pressure on the campus ecosystems/resources. Impacts on NRs/ESS ?
What are the alternatives?

• Our ancestors worshipped the 5 elements of nature → the “pancha pudhas” - earth ‘prithvi’, water “jal’, agni ‘energy’, air ‘vayu’, and sky ‘akash’ → merely rediscovering the Indian ethos through the concepts of green buildings/ infrastructure → a blend of both eastern & western spiritual philosophies with the modern advances in material science /earth based architecture. These developments are also known as “organic," "evolutionary," "ecological", “low Impact” etc.

• Vaasthu Shastra
Introduction/rationale

• However, campus sustainability is either rarely taught or researched in India, though very few universities/colleges have implemented green energy demonstration projects such as solar street lighting, solar hot water for hostels, solar thermal cooking, institutional biogas plants, electrical mobility, etc.

• Out of about 450 institutional signatories of Talloires declaration across the world, only 10 are from India as of June 2012. Out of 30 institutional members of the ISCN, only one is from India (IIT-M). Out of the 1115 HEIs registered globally on the Association for the Advancement of Sustainability in Higher Education (AASHE), only one is from India (IISE, Bangalore).

• Though, the higher education policy of India is embedded with several principles of SD, the implementation of the same is faced with challenges due to lack of motivation/commitment for inter-disciplinary transformative learning opportunities, action research, and community outreach.
TALLOIRES DECLARATION INSTITUTIONAL SIGNATORY LIST
as of May 15, 2012

Total Signatory Institutions: 440
No of countries: 53

Australia (20), Ghana, Portugal, Bangladesh, Greece, Puerto Rico, Belize, Hong Kong, Romania, Brazil (52), Hungary, Russia, Bulgaria, India (10), South Africa, Canada (37), Italy, South Korea, Chile, Japan, Spain, China (2), Kenya, Switzerland, Colombia (30), Lebanon, Taiwan, Costa Rica (5), Malawi, Thailand, Croatia, Malaysia, Tunisia, Cyprus, Mexico, Turkey, Czech Republic, Nigeria, Ukraine, Ecuador, Paraguay, UK (12), Finland, Peru, USA (168), France (2), Germany (1) Philippines, Vietnam
India - List of signatories- TD

1. BIMT, Gautam Budha Nagar, UP
2. Devi Ahilya University, Indore, MP
3. Guru Nanak Dev University, Amritsar, Punjab
4. Indian Statistical Institute, West Bengal
5. Indira Gandhi National Open University, New Delhi
6. Jawaharlal Nehru University, New Delhi
7. Delhi University, New Delhi
8. Manipur University, Manipur, Imphal
9. North Maharashtra University, Jalgaon
10. Osmania University, Hyderabad, AP
Some specific advantages of SC

- Recyclable/reusable solid wastes generated from buildings (plastics, paper, glass); using recycled building materials saves 12 - 40 % of the total energy used during materials production.

- Supply / value chain management - Designing durable & adaptable buildings to reduce the energy costs of demolition/new construction.

- Biomimicry - Closed loops, no wastes, nature as model/mentor

- D4S – Eco-design /Design for the Envir.

- All this comes at an incremental cost of about 2-8 %, with a pay-back period of 3-7 years time.
Green Infrastructure (GI)

- GI consists of an integrated/inter-connected network of multi-functional, high-quality, open green spaces, provided across all spatial planning levels (regional, sub-regional & local) that support native species, maintain natural ecological processes, facilitate nature conservation/eco-restoration & protect habitat/ ecosystem/ BD/LSS, besides ensuring local climate control & noise reduction, sustainable drainage & flood mitigation as well as sustainable livelihoods.
A few notable examples..

- Some institutions, such as IITs (Kanpur, Madras, and Delhi), IIMs (Calcutta, and Ahmedabad), and universities (Madras, Jadavpur, Hyderabad, Pune, Jammu, Pondicherry University) - established sustainable development education programmes/courses/activities to promote campus sustainability in India.
- Christ University Bangalore has started an experiment on integrated solid waste management both in the campus and its neighborhoods, generating employment for the women SHG too in composting.
- TERI University in Delhi model green campus in terms of building, energy conservation including promoting RE in the campus, water conservation and waste-water recycling etc., embeds the sustainability concepts in most of its courses offered in the campus.
- Periyar Maniammai College of Engineering Vallam, Tanjore has initiated pioneering attempts even 2 decades back on campus sustainability initiatives.
- PU- green campus initiative started with MSc/PhD students in 2005/2009; solar street lights, installation of solar water heaters, solar street lamps; free bi-cycles - first Solar campus project....
The spacious, green and ecofriendly campus of the Banaras Hindu University—marching towards sustainability
BHU Policy on Environment Sustainable Development

- Released by Hon’ble Chancellor, Dr. Karan Singh on 25th December, 2009 (Malaviya Jayanti).

- Policy sets out the principles, priority areas and procedures for implementation, management and evaluation of the environment plan for the university.

- Priority areas:
  - Energy
  - Water
  - Waste Management- segregation at source
  - Building & Estate
  - Transport
  - Sustainable Resource Acquisition
  - University Environment Management System
  - Environmental Education, Training, Awareness
IITM Sustainability Initiatives

IITM has set up a Centre for Sustainability with the following objective:
   – foster inter-disciplinary research, training and policy advocacy in the broad area of sustainable development.

Four thematic areas:
   – Water/waste Management (SHGs), Building retrofits Energy & Land-Use

Activities
   – R& D :
     • Sustainable Development of Chennai River Basin
     • Set up a Centre of Excellence for Sustainable Energy Research
   – Campus Sustainability Initiative
   – Continuing Education & Degree Program on Sustainability
   – Set up a Data Centre & Clearinghouse on Sustainability
   – Network with other Institutions working on Sustainability
   – Support Policy & Planning towards sustainability
Initial constraints

Of GEOGRAPHY: Barren, hot desert

Of WATER: Low ground water table, low monsoon

Of ENERGY: Poor grid supply

Solutions

Landscaping, enhanced bio-diversity

Rainwater harvesting, watersheds, recycling

Renewables based, smart grids

Goals

Green, regenerative campus, sustainable buildings, 24/7 working environment

Smart water networks with minimal waste

Smart meters and self-healing power network with embedded renewables

1st Batch Graduation from IIT Jodhpur Campus in March 2012!
Nirlon Knowledge Park, LEED, Goregaon(E), Mumbai
Periyar Maniammai College of Engineering www.pmu.edu/mech
Vallam Tanjore

• PM women’s Engg college -Periyar PURA (Provision of Urban Amenities to Rural Areas).- cluster of 65 villages near Vallam 2000 students - village population of over one lakh empowered with all the 3 connectivities - physical, electronic and knowledge - leading to economic connectivity- 5 villages with Wi-MAX connectivity. Periyar PURA has health care centres, primary to PG level education and vocational training centres-large-scale employment generation and creation of a number of entrepreneurs with the active support of 1500 SHGs. 200 acres of waste land has been developed into cultivable land with innovative water management schemes. All the villagers are busy in cultivation planting Jatropha, herbal and medicinal plants, power generation using biomass, food processing and above all running market centers.

• “one village one product scheme” Japan External Trade Organization (JETRO) of Japan. proto types for 123 products such as bed sheets, table runner, cushion cover, brass drum, curtains, bread basket etc

• MSW segregation at source , solar PV panels, SWHs, Curved concentrator solar cookers/dryers bio-gas plants (kitchen wastes, sanitary napkins) in hostels , Solar still, solar cloth drier, Wind gear pumps, solar Campus Rider, Paper Reprocessing Unit , biopesticides…
Barriers

• The trinity of education, research and service with sometimes competing orientations /priorities,
• The typical hierarchical structure and rigidity of over-crowded university curricula – hindering a sweeping change, and transformative learning that are often required for the paradigm shift towards campus sustainability
• Lack of motivation among some faculty /researchers - not “hard core” science! academic credibility?
• Time intensive bureaucratic and consultative phases of advocating desirable sustainable changes within an institution due to red tapism, lack of communication channels and collaboration between faculty and operations staff
• Funding constraints & administrative support

However, such barriers have to be perceived as guiding stones so that we can try to avoid or reduce these bottle necks by analyzing the root causes for the same for facilitating campus sustainability.
A road map to campus Sustainability in India

- Legacy - vision/mission
- Leadership
- Commitment
- Planning /Auditing –E/E
- Implementation
  - Land Use/BD
  - Recycling
  - Facilities
  - Transportation
  - Energy/Solar/other RE
  - Revamping Curriculum-CN & S integrated
- Student/NT involvement
- Action research/outreach-innovations ? Serv learning
- Institutionalisation- OS
SC - Essential elements

- Carbon Sequestration/offsets – re-vegetation & renewable energy technologies
- CSCs /CSSCs for day time cooking in hostels/canteens
- SWH for kitchen /bathrooms
- Biogas generation from food waste of hostel mess & fallen leaves for cooking and slurry for horticulture
- Reuse of treated grey water of hostel bathrooms for irrigation of lawns and horticultural plants
- Organically grown edible plants /products; restoration cultivated BD
- Bee keeping
- Energy efficient lighting systems – SPV, LED…
- Green buildings & retrofitting old buildings
- Green Purchasing
- Ecosan toilets in all hostels & buildings
- EESD – greening the curriculum
- ISO 14000 compliant University - EMS
Top tips for engaging students

Ask students what they want:

• Set up opportunities for face-to-face communication
• Use surveys and questionnaires
• Involve students in decision making
• Encourage student representatives to sit on steering groups
• Involve students in developing policies

Give students ownership of projects:

• Give students roles and responsibilities e.g. volunteers could even have job descriptions/volunteer agreement
• Have open meetings/opportunities for student to input on the development of the projects

Reach more than the usual suspects:

• Integrate projects into the curriculum
• Hold events which attract and bring together different groups of students
Environmental management and sustainability in educational campuses

EMS in educational campus

- Green campus to showcase students where they learn and implement those ideas when they go out of campus
- Environmental management system and sustainability cell in educational institutions

Sustainability aspects in research and teaching

- Conferences, seminars, workshops related to sustainable development, energy efficiency etc.
- Sustainability aspects should be included in course curriculum
- Research and development on climate change, energy efficiency, sustainable development etc.

Students and faculty participation projects and social equity

- Students and faculty participation in environmental management
- Involvement of students and community for awareness and participation in different projects
- Social justice: chance to get education to students (poor/handicap) who are not able to get education

Source: Alshuwaikhat and Abubakar (2008)
Campus Sustainability metrics

How do we quantify progress in greening the campus?

- Measurement of green cover?
- Measurement of enhanced biodiversity?
- Change in soil profile/quality?
- Estimation of ecological /water/carbon foot prints?
- Life cycle analysis?
- Measurement of water table levels/water quality?
- % solid wastes recycled; Energy/cost savings
- Change in atmospheric composition? GHG emission
- scenario modelling & policy analysis ?
- Sustainability analysis of the campus & neighborhoods – Sustainability Tracking, Rating, and Assessment (STARS)
We sometimes fixate on our part of the system, and miss the whole!
Education, Research and Public Engagement to advance climate action

**Short Term Goals**

1. **Mini-grants to faculty** to incorporate community-based learning about climate change
2. **University-Community Academic Partnership Assistance** program to fund partnerships which provide learning experiences tied to climate change and sustainability
3. **Seed funds** for faculty/student research focused on climate change and sustainability
4. **Sustainability as a strategic priority of the Community Engagement Steering Comm.**
5. **Interdisciplinary degree programs in sustainability**
6. **student volunteers**
7. **Increase academic collaboration**
8. **Continue organizing public lectures and forums**

**Midterm Goals**

1. Make “climate neutrality and sustainability a part of the curriculum and other educational experiences for all students”
2. Expand academic research relevant to climate change mitigation and adaptation
SC - Three broad approaches

- **Attitude = behaviour**
  - EFS /EESD approach; change mindsets
- **Behaviour = attitude**
  - CBSM approach (selecting behaviors, identifying barriers & benefits, developing strategies, conducting a pilot, and broad scale implementation)- focus on actions
- **Value alignment- transformational learning**
**Vision**

**ENVIRONMENT**
- Low carbon
- Water harvesting/saving
- Reclaimed materials
- Sustainable travel
- Biodiversity enhancement

**ECOVERSITY**
- Inclusive housing for students
- EESD
- Community seed banks & social inclusion
- Improved health & hygiene

**SOCIETY**

**ECONOMY**
- Locally sourced materials and energy etc
- Whole-life costing
- Regeneration of PU
- Attracting students
Govt/private support- policies & programmes

- Solar cities (60 cities during the 11th Plan) & 50 new small townships/campuses- solar campuses – MNRE-a maximum of five solar cities (at least one) in each State will be eligible for support from the MNRE, GOI

- The first solar campus project was granted to PU – March 2012

- Funding for training & capacity building from both central & state Govts - JNNNSM, JNNURM, State REDAs…

- CER & CSR – industry- university partnerships
Future perspectives

• The recently emerging Green campus initiatives in India could create test-beds and incubators for innovative solutions in various fields.

• The suggested road map is neither prohibitively complex nor expensive, but their potential impact on campus sustainability can be highly significant.

• The methodology/strategies for sustainable GC practices can be applied to other built environment settings- communities, peri urban neighborhoods / cities- facilitating univ campuses as living laboratories / outreach.
A caveat – changes are always disruptive!

“The reasonable man (woman) adapts himself (herself) to the world. The unreasonable one persists in trying to adapt the world to himself (herself). Therefore, all progress depends on unreasonable men (and women).”

-George Bernard Shaw
"You must be the change you wish to see in the world."
...Mahatma Gandhi

“The economy of permanence"
- JC Kumarappa
University Leaders for a Sustainable Future (ULSF) assists colleges and universities in making sustainability an integral part of curriculum, research, operations and outreach. ULSF is also the secretariat for signatories of the Tallares Declaration (1990), which has been signed by more than 300 university presidents and chancellors around the world.
Thank you, any questions.....