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Say NO to Lawns, Yes to Butterflies

Samaksh Kapoor The Kitty Party, Wipro Staff

By ***Benedict Paramanand***

In May 2013, hundreds of Wipro staff saw a spectacular sight. They saw thousands of migratory butterflies on their semi-annual journey from Western Ghats to Eastern Ghats rest in their new campus in Electronic City, Bengaluru, for nearly a month, to rest and feed. Why did they go there and not anywhere else?

It happened because Wipro broke the norm. Instead of laying out thousands of square feet of lush green lawns, it adopted a biodiversity policy a few years ago. It planted 2849 trees and several hundreds of small native flowering plants.

That's not all. Wipro staff photographed gorgeously colored Golden Backed Ant, Rhino Beetle, native to Bannerghatta forest range. It is endangered and usually breeds on elephant dung. They found tiny frog with cryptic coloration including 15 bird species and 23 species of butterfly, all in their campus. "Our campus has created a sense of wonder and renewed energy among employees," says P S Narayan, VP and head of Sustainability, Wipro Ltd.

Now, Wipro has taken this to the next level. It is using biodiversity as a platform for employee engagement. It has identified biodiversity champions and conducts expert workshops covering biodiversity principles, forests and communities, urban ecology, among others. It organizes general town hall gatherings on Earth

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Purpose To excite Indian businesses, SMEs, executives and students about the immense business opportunity in not only adopting Sustainability as Strategy in their companies but also inspire them to the possibilities of a big market for innovative sustainability products and services.

Rishabh Media Network
22, 1st A Main, G M Palya,
Bangalore – 560 075. India
Phone – 91 80 41126557/9880602275
benedict@managementnext.com
www.sustainabilitynext.in

Information in this publication is drawn from a variety of sources, including published reports, interviews with practicing managers, academia and consultants. While doing so utmost importance is given to authenticity.

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Day and wildlife week. It has even created a portal for employees to upload images and share experiences.

Wipro is among a few pioneers among IT companies that have taken to campus biodiversity very seriously. This is one of the many ways companies are cutting their carbon footprint and bringing the employees closer to nature.

Chaotic Abundance of Biodiversity

The grass lawns, of late, have become somewhat associated with the moods of people depending how well they are doing financially. A critic of lawns in the United States said: "There is nothing remotely natural about a lawn. It is an industrial landscape disguised as organic plant material."

The lawn has its roots in England. It makes sense there because of regular rainfall and cool climate. But people wonder why in an extremely diverse country like the US more grass is grown in lawns than any other crop, estimated to be more than whopping thirty million acres.

There's been a quiet movement in the US to replace domestic front lawn with an edible landscape. The Edible Estates project, for example, proposes that the food grown in front yards connects people to seasons, the organic cycles of the earth, and neighbors.

"The banal lifeless space of uniform grass in front of the house can be replaced with the chaotic abundance of biodiversity. In becoming gardeners we will reconsider our connection to the land, what we take from it, and what we put in it. Each yard will be a unique expression of its location and of the inhabitant and his or her desires," Freitz Haeg wrote in his post published in AlterNet a few years ago.

Haeg's views resonate closely with most Indian households who still grow fruits, vegetables and flowers in their front and backyards. Why then did the builders of monstrous commercial buildings, office campuses and residential buildings in big Indian cities move away from the Indian way of life to laying out lawns?

The post 2000 India is when Indian companies became big and needed huge campuses. The only way they could ramp up was to emulate western campuses. And the first ones to build such large campuses in India were multinational companies who used to take pride in replicating

their office culture wherever they went. This had a fall out even in residential complexes in cities like Bengaluru, Gurgaon, Pune and Chennai.

The lawn vs. biodiversity debate is ten years old in the West and perhaps two years young in India. The pitfalls of using lawns are well documented – needing exorbitant amounts of scarce water and lavish use of chemical fertilizers for their maintenance. The fertilizer and chemicals get into the water table, tanks and lakes contaminating them as well.

Preetam Bose, Wipro Staff

A spokesperson of Mantri Developers, a prominent builder in Bengaluru, says: "The cost of lawn is cheaper (by ₹50%) when compared to ground cover with local species. However, in the long run, the maintenance (cost) of lawn is more than the ground covers and also the water consumption is also more. The ground cover (plants and trees) require 1/5th of the lawn water. (Yet) The lawn is preferred because of its low installation cost and looks green from the day one of installation and gives a great feeling."

The builders' version of 'great feeling' may be changing with greater awareness about biodiversity among children and the possibility of urban forestry minimizing the damage city's pollution causes. A city's greenbelt need not be outside the city, as it used to be. It can be within and inside our own campuses and homes.

Urban Forest

Fortunately, builders and buyers need not break their heads about how to do this. Shubhendu Sharma's startup Afforest (www.afforestt.com) promises to raise an urban jungle in eight months, literally. His reforestation company uses a revolutionary planting method that enables it to transform a barren area the size of six parking spaces into a 300 tree forest in just eight months. Here the tree grows ten times faster than it would take using traditional methods.

A city's greenbelt need not be outside the city, as it used to be. It can be within and inside our own campuses and homes.

There's another terrific option for companies and residential complexes to raise oxygen levels by planting Assamese bamboo. **Infosys has tried this and is happy it has done so to offset its travel related emissions. Also called Bheema Bamboo, this wonder plant, developed by Hosur-based Growmore Biotech (www.growmorebiotech.com), is capable of absorbing 50 kilograms of carbon dioxide in a year,** which is approximately five times that of most plants. It grows about one foot a day for a month during monsoon and in two years reaches 60 feet.

This plant promises to transform India's renewable energy sector, provide environment-friendly wood for the paper industry and also help reclaim lost forest cover in two years. It also has the potential to become the energy crop of the developing world.

The ratio of lawns to plants is currently 70 and 30 percent. This could be reversed easily in new facilities and gradually in the older ones. The good news is, everyone is a winner in this shift, including the humble blades of grass which certainly would prefer to have their day in the sun. What are we waiting for?

2nd International Conference on ROBUST QUALITY ENGINEERING

For the First time in India, NIQR Bangalore is organizing 2nd Conference On Robust Quality Engineering. This event is Co-organised by, Meiji University (Japan), American Supplier Institute (USA), Quality Engineering Society (Japan), Quality Council of India, Kennametal India Ltd., Premium Transmission Ltd., Capgemini India, Reliance Industries, Universiti Teknologi, (Malaysia) and J K Fenner

The International Conference Schedule

December 11 – 12, 2014
Workshop on Robust Engineering
December 12, 2014
Workshop on Rotbust Parameter Design (RPD/RQE) ISO Standardization Procedure
December 13, 2014
Industrial Visit
December 15 – 17, 2014
Conference

INVITED SPEAKERS

American Supplier Institute (USA)

Prof. Dr. Bo Bergman Chalmers - University of Technology (Sweden)

National Metrology Institute Japan (Japan)

Zenichi Miyagi Meiji University (Japan)

Prof. Dr. Eng. Shuichi Fukuda Stanford University (USA)

Assoc. Prof. Dr. Khairur Rijal Jamaludin Universiti Teknologi, Malaysia

TOPICS

1. Robust Engineering Course by Shin Taguchi

2. Workshop on Robust Parameter Design (RPD/RQE) ISO Standardization procedure by Prof. Dr. Masayoshi Koike on 12 December 2014

LOCATION

The Hotel Citrine,
Subedar Chatram Road,
Seshadripuram,
Bangalore

Shin Taguchi

Shuichi Fukuda

Zenichi Miyagi

Masayoshi Koike

Rajesh Juglum

Khairur Rijal Jamaludin

Contact :

National Institution For Quality & Reliability Bangalore
12 FF City Point, 13 Infantry Road,
Bangalore – 560 001

Ph : +91 80-22862017, +91 9845164031,
+91 9342884233, +91 9900245551
E mail: niqr_blr@yahoo.com
Web: www.niqrblr.com

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Smart Cities India 2015

Exhibition and Conference

20-22 May 2015
Pragati Maidan, New Delhi

Some elements identified for Smart Cities:

- USD 1 trillion to be spent on infrastructure between 2012-17; half of which to come from the private sector
- India to emerge as the world's 3rd largest construction market by 2020
- The Government of India has allocated US$ 6.1 billion to build 8,500 KMs of new roads in FY 2014-15
- India plans to build 200 low-cost airports in the next 20 years to connect tier-II and tier-III cities
- The Ministry of Human Resource Development plans 1,000 private universities for producing trained manpower to meet the services and industry requirements

843 million

people will be living in Indian cities by 2050

100 new cities

will be developed by Government of India, with plans to transform satellite towns and existing cities

USD 1.2 billion

allocated by the government during FY 2014-15 for smart cities to improve the quality of life for Indian citizens

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Bring Plants Inside Office, Up Productivity by 20%

The air quality in most Indian cities and towns is considered harmful on several measures and Delhi's is even hazardous. The air quality inside air conditioned offices can be marginally better. Companies can do little about air quality outside, but can they improve it inside their offices?

That's what Kamal Meattle, India's foremost green building evangelist has been doing since he opened his first commercial office space in South Delhi in 1996. Even today, he claims, his 50,000 sq ft office space is the healthiest in India, if not the world. Hinting that his claims are not all gas, he says his complex adheres to the American Society for Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE) standards, one of the best in the world.

He has figures to show off. He saves Rs.200 per sq ft a year on running cost using green methods like growing indoor plants and painting the building white. What takes the cake is – the productivity of employees working in his building is a phenomenal 20 % higher. And reduction in energy requirements by an outstanding 15%.

How does he do it? It's not rocket science; it's simply belief in the wonders of some plants.

The popular talk show TED called him to share his wisdom, which he did in June 2014. He said: "Seventeen years ago I became allergic to Delhi air, my lung capacity was at 70% and it was killing me. With the help of IIT, TERI and NASA, we discovered three common plants through which we could grow fresh air indoors to keep us healthy. The wonder plants are:

Chrysalidocarpus lutescens (Areca Palm)

- Works well in the day time
- Great for living areas
- Need about 4 shoulder-high plants per person
- Need to be take it outdoors once every 3–4 months

Kamal Meattle

Mr. Meattle said: "With the above plants you can grow all the fresh air you need." PBC tried these plants in its building in Delhi which is 50,000 sqft and 20 years old, its 1200 plants for 300 occupants. "Our studies have found that there is a 42% probability of blood oxygen going up by 1% if one stays indoors in this building for ten hours.

The Government of India has published a study to show that this is the healthiest building in New Delhi. The study shows, compared to other buildings, about reduced occurrence of eye irritation by 52%, respiratory by 34%, headaches by 24%, lung impairment by 12% and asthma by 9%."

PBC is replicating its experience in 1.75 million sq ft. building which will have 60,000 indoor plants.

- The leaves need to be wiped every day in Delhi and once a month in a cleaner city
- The soil used should be vermicompost and/or hydroponic methods

Sansevieria trifasciata (Mother-in- law's tongue)

- Converts CO2 into O2 at night
- Require about 6–8 such waist-high plants per person
- Leaves need to be wiped in the same way as the Areca Palm
- The soil used - vermicompost and/or hydroponics

Epipremnum Aureum (money plant)

- Excellent for removing formaldehyde and other volatile organic compounds
- Best grown using hydroponic method

More Will Live in Cities

Why is this important? The world's energy requirements is expected to grow by 30% in the next decade , 40% of it is taken by buildings currently and 60% of the world's population will be living in buildings in cities with population of over one million in the next 15 years and there is a growing preference for air-conditioned office and living spaces.

While better technology is helping businesses reduce their carbon footprint, the sheer growth that India and emerging markets will see in the coming years can ruin the planet further. Unconventional methods too can contribute significantly to support the current green building drive. There's no better teacher than Nature.

Give Smart Incentives for Green Buildings

Dinesh Wadehra, COO – India, Cushman & Wakefield

In all that we do as a firm, Sustainability is at the core of C&W philosophy. While from 'Corporate sustainability' perspective, the emphasis is on instilling this as a culture in the firm through various initiatives, from 'Client –facing sustainability' perspective, the focus is on advising our clients in their efforts to lease space in LEED rated buildings apart from supporting them in getting LEED rating for their projects, facilities and properties by advising on the process to be followed, materials to use and entire documentation process till receipt of certification.

With a lot of general awareness on this aspect, the emphasis on sustainability has gained completely different dimension in today's scenario.

Over the last 15 years in India, out of 100+ Million sq. ft. of projects managed till date, almost 12 Million sq. ft. has been for LEED rated projects spread across 40+ assignments across the country. Apart from this, we are managing LEED rated properties in excess of 5+ Million sq. ft. out of a total of 130 Million sq. ft. under Facility and Property management. Our endeavor is to create a culture across the organization so that sustainability is driven by everyone and not by a few individuals.

Benefits that accrue from being a green building have to outweigh the premium that clients have to pay

Clients who are looking at being in a premise on lease of 1 – 3 years do not generally give too much emphasis for going into LEED certification or for being in LEED certified property but those looking at long-term leases or owned premises certainly are keen to take sustainability route as they are able to realize the pay off as well as additional benefits over that period of time.

What is the status of the government rules for green buildings?

As of now, while the government has made it mandatory to have energy star rating for white goods but from building perspective, there is no such mandatory rating for energy and sustainability. Significant work is being done in this field by Indian Green Building Council (IGBC) and Green rating for integrated habitat assessment

(GRIHA) to promote this initiative though. There has been active interest in this from the developers and occupiers for the last 5 – 7 years but it will take time for the impact to deepen. It took USGBC about 20 + years to achieve the impact it has made.

Cost of going green

When it comes to the cost of going green, it generally costs about 7 – 15% higher in the initial phase but that increase gets offset over a period of 3 – 5 years, though in certain cases, the payback may be slightly longer.

Are builders taking customers for a ride?

With green wave having just begun over the last decade, everyone is going through a learning phase so it will be unfair to say that builders are taking customers for a ride. While as of now, from a buyer's perspective, it is not difficult for a buyer if he wishes to cross check all the papers if the project in which they are investing is registered with IGBC or USGBC. The builders have to submit several documents to relevant bodies and buyers can ask for copies of such documents.

Pertinent to mention here that sustainability is interlinked with the construction materials and buyer's mind is still in a nascent stage when it comes to accepting alternate construction materials as primary ones. As we evolve on that front, the construction cost would also start coming down and that's when the long term benefits will become multifold.

What smart incentives do you suggest to boost Green buildings?

Incentives will definitely give a boost to the industry for people to take sustainability seriously. It will give a significant impetus to the construction sector.

There have been various suggestions made by real estate industry forums to government bodies on the possible incentives to drive sustainability. Some which can help drive this initiative are:

1. Tax exemptions on the specific equipment or materials used for driving water and energy sustainability in the buildings
2. Lower rate on per unit usage of electricity if the building has been able to keep the energy use below a particular threshold that is normally observed
3. Gain share with the developers by the occupiers for the savings the occupiers would get by leasing space in LEED rated building. This will encourage developers to opt for construction that encompasses sustainability features
4. Discount/incentives on property tax for LEED rated buildings (some of the municipalities do it I believe but not many)
5. With extensive potential available in retrofitting projects, incentives on such projects can play a large role in providing necessary impetus to sustainability initiative.

With extensive potential available in retrofitting projects, incentives on such projects can play a large role in providing necessary impetus to sustainability initiative.

Green Buildings are a Big Hit in India

India has the third highest number of green buildings in the world shows the decade old movement has had its impact. For this movement to have a larger impact it has to involve smaller builders and should move to tier two and tier three towns. Edited excerpts from a report titled 'Corporate Real Estate in India – A Green Initiative' by CoreNet Global 2014.

According to other estimates, 75 percent of the buildings expected to come up in India by 2030 are yet to be built. The United Nations Environment Program says nearly one third of the total greenhouse emissions come from buildings, "green buildings" are essential to any policies addressing climate change and environmental concerns.

In India buildings account for 35 percent of total energy consumption and this percentage is growing at an annual rate of 8 percent. As demand for green buildings increases, the hope is that the energy consumption per building will reduce concurrently.

The green initiative has seen many Indian companies take charge as well. *Newsweek's* 2012 Green Rankings had thirteen Indian companies in their list of top 500 greenest companies in the world, and three were in the top twenty.

The Indian Green Building Council – The Indian Green Building Council (IGBC) was established in 2001 by the Confederation of Indian Industry (CII). The IGBC administers the Leadership in Energy and Environmental Design (LEED) certification in India and this was the first green building certification system in India. With 11.6 million gross square meters of space LEED certified, India currently ranks third in the world. It also has over 1600 LEED certified and registered buildings. Considering that green building certification took off in India only in 2004, there has been tremendous progress. As of July 2014, the Green Building Certification Institute (GBCI) will be taking over the process of LEED certification in India.

According to George McKay, South Asia Director, Office & Integrated Services, Colliers International, "The Indian green building market has evolved. It is no longer only motivated by MNCs looking for LEED certification. A growing number of End Users – both Indian and international – might follow sustainable practices, without necessarily aiming for that certification. Leading developers are increasingly, genuinely more interested in pursuing more

sustainable practices, as they look to benchmark both their products and techniques against the best practices existing in more developed markets."

Voluntary So Far

The Green Rating for Integrated Habitat Assessment, also known as GRIHA was introduced in 2005 by The Energy and Resources Institute (TERI). According to GRIHA's website, there are currently 500 projects registered under the system, while the total footprint registered is about 18 million square meters. TERI uses green practices particularly suited to the Indian market and has partnered with the USGBC to promote these further.

The Energy Conservation Building Code (ECBC), introduced by the Indian government in 2007 is now voluntary. But is likely to be made mandatory by 2017. ECBC compliant buildings could have energy savings of 40-60 percent.

The Bureau of Energy Efficiency – The BEE, a governmental organization, Also promotes reduction of energy consumption in India via self regulation. BEE is specifically charged with creating standardized labels that would apply to appliances, produce building codes for energy efficiency, craft certification and accreditation procedures, among other responsibilities.

Leveraging Technology

In order to meet these criteria, leveraging available technology and knowledge is important. This is already happening in India. Estimates by Gartner put spending on green IT and sustainability in India at three times their 2013 levels, by 2020.

Overall, however, though the cost premium for building a green building used to be higher in India than in the more mature markets, the cost is expected to go down as the green building industry in India develops further.

For example, according to Frost and Sullivan, green buildings can have some of the following benefits:

- 50-70 percent energy cost reduction
- 40 percent reduction in use of potable water
- Higher productivity/improved quality of life
- Significant reduction in emission of greenhouse gases

While estimates for the cost premium for green building construction vary, the chart below shows that platinum LEED buildings in India have a longer payback period than those that are gold or silver. Overall, however, though the cost premium for building a green building used to be higher in India than in the more mature markets, the cost is expected to go down as the green building industry in India develops further.

Table 2: Performance of Green Buildings in India

Name of the Project	Location	Built-up Area (sq ft)	Rating Achieved	Increase in Cost (%)	Payback Period (years)
CII-Sorabji Godrej GBC	Hyderabad	20,000	Platinum	18	7
ITC Green Centre	Gurgaon	170,000	Platinum	15	6
Wipro	Gurgaon	175,000	Platinum	8	5
Technopolis	Kolkata	72,000	Gold	6	3
Spectral Services Consultants Office	Noida	15,000	Platinum	8	4
HITAM	Hyderabad	78,000	Silver	2	3
Grundios Pump	Chennai	40,000	Gold	6	3

Source: CII[30]

McKay adds, “The cost differential is lower than they used to be. Many materials that used to have to be sourced from farther destinations are available more locally, now. This lowers the overall costs as compared to a building solution that relies on a lot of imported products and techniques. It is also beneficial that over the years there has been an increased influx of knowledge of green/sustainability practices into India. Not only are end users being able to leverage the knowledge of their internationally based counter parts, there is also superior data available in the country itself.”

Cisco is the Leader

Cisco office spaces in Bangalore have been consistently awarded the LEED Platinum certification. The B15 building on the Bangalore campus is the highest rated Platinum LEED ID+C project in Asia and the second highest in the world. Some of the features of the building include, 100 percent of the building’s total energy consumption has been offset by green power investments amounting to over 7,000,000 KWh of green power per annum.

The campus is also a zero discharge site and the project has reduced potable water usage by 50 percent. The project has achieved higher HVAC energy savings over that of a conventional building by integrating high performance glazing and efficient HVAC design, amongst other features.

In addition to the obvious energy savings and positive influence on the bottom line the green initiatives is also help in increasing employee productivity and wellbeing.

Next Issue Special - Toilet Economics

Toilet has become the most spoken and written about topic in India in the last one year and it will be so for at least another year. The talk, fortunately, is shifting from the need of a toilet in every Indian household, to the choice they now have among five proven and a dozen unproven technologies, cost and ease of use.

The January 2015 issue of SustainabilityNext is bringing out a special issue to put all the recent developments in perspective. It will list various options, their pros and cons, and possible funding options.

You can support the special issue by sponsoring it/ advertising in it and/or sharing it with your network.

We expect this issue to be read by at least 100,000 people.

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MicroX Labs Wins Tata Social Enterprise Award

MicroX Labs has developped a technology to count the blood cells. The solution is based on upcoming technology of 'Lab on Chip' and MEMS (Micro electro mechanical systems) which miniaturizes the instrument to less than 2Kgs. This brings down the fixed price of the instrument to less than ₹12,000 and operating price of cartridges to less than ₹20.

All the reagents are pre-loaded in the cartridge itself making it easy to use with only 2uL of blood. Such instrument will give 14 parameter reports in under 1 minute. **Owing to ease of use, portability and low cost such device will be a boon to the rural healthcare and can be used at point of care also.**

TATA Social Enterprise Challenge, a joint initiative by the Tata Group and the Indian Institute of Management Calcutta, is a national level challenge to find India's most promising social enterprises.

Having grown up in a family of doctors, Prakhar Jain never felt the need to visit a hospital for consultations. He did not study medicine, but always wanted to contribute to the field. His dream took shape when he met Usama Abbasi and Prabhat Kumar, and founded MicroXlabs in early 2013, under the guidance of professor V. Kumaran from the department of chemical engineering, Indian Institute of Science, Bangalore.

Green Agrevolutions

Agrevolution's business model is based on the gap between growers and consumers of food and agriculture sector. One side they provide support to growers during the production cycle and by doing so they also assure quality production as per the market/ buyers demand. On the other side, they supply quality products directly to the end users without any intermediaries. Hence buyers get competitive price and high quality as well.

Patna-based start-up Green Agrevolution Pvt. Ltd. wants to bridge the gap between farmers and institutional buyers of farm produce, to maximize benefits to the BoP (bottom of the pyramid) segment. The company was set up by three Indian Institute of Technology graduates—Shashank Kumar, Shyam Sundar Singh and Manish Kumar—in 2012 as a marketing arm of their existing start-up venture Farms and Farmers. "There is a link missing between these farmers and large buyers in Bihar and other states. We wanted to fix this problem and make sure farmers' produce reach the right people without shifting too many hands in the process," said Singh. Green Agrevolution has an active network in Bihar, serving more than five dehaats. (Each dehaat is a catchment area of 8km comprising 500-700 farmers and headed by a local entrepreneur, trained by the company

Bodhi Health Education

The solution by Bodhi Health Education uses affordable tablet computer technology to train, monitor and supervise community health workers (CHWs). This e-Learning content has been developed keeping in mind the low literacy levels of health workers. Complex medical topics have been explained using simple, illustrative videos which connect to the bottom of the pyramid segment and their issues. The concepts are explained in regional languages and with minimum content to be read.

Abhinav Girdhar & Shrutika Girdhar
Co-founders

Intel Launches Android App to Spread Digital Literacy

Intel India's digital literacy efforts got a fillip when it recently launched an Android based application of its Learn Easy Steps. As part of the initiatives undertaken under the Digital Literacy Mission, Intel also announced the completion of its 'Follow the Fiber' program conducted in the first three villages to receive connectivity as part of NOFN roll out and released an its impact study.

Intel is among several other Indian and multinational companies who are supporting Indian government's ambitious National Optic Fibre Network (NOFN). It aims to create the right eco-system to provide basic computer operating skills to at least one individual in every family.

Intel, along with IT-ITeS industry body NASSCOM, launched the National Digital Literacy Mission in August 2012 to participate in the government's plan of making at least one e-literate person in every household in India by 2020. Intel's Learn Easy Steps program has so far trained over 1.7 million individuals in the country over the last 18 months.

Karnataka Releases Green Growth Plan

Green Growth Strategy for Karnataka, a result of the first phase of a collaborative research project undertaken by Global Green Growth Institute (GGGI) and a consortium led by the Bangalore Climate Change Initiative-Karnataka (BCCI-K) was released in Bengaluru, early December 2014.

The plan articulates need for policies and measures to combat growing environmental concerns while maintaining, if not accelerating, the pace of social progress and economic growth. The strategy aims at meeting both the short-term economic priorities of job creation, industrialization and poverty reduction, as well as the long-term objectives of economic growth and environmental sustainability.

Some of the unique features of the project are:

- First comprehensive effort at developing a state-level green growth strategy in India, using sophisticated analytical tools and models.
- Presents a detailed sectoral analysis of challenges and solutions for energy, agriculture, forestry and water sectors.
- Builds upon and seeks to support existing policies and programs of the government
- Identifies financial resources and suggests investment opportunities for the government, private sector and multilateral banks to encourage and enable the development of sustainable practices across sectors.

A consortium of institutions led by the Bangalore Climate Change Initiative-Karnataka (BCCI-K) (chaired by Professor B.K. Chandrashekar), in partnership with the Global Green Growth Institute (GGGI) has conducted this study. The intensive research efforts were led by a number of leading researchers from partner institutions, including:

- Dr. N.H. Ravindranath (Indian Institute of Science -IISc, Bangalore)
- Dr. Anshu Bharadwaj (Center for Study of Science, Technology and Policy-CSTEP, Bangalore)
- Dr Ruth Kattumuri (London School of Economics – India Observatory, London)
- Dr R. S. Deshpande (Institute for Social and Economic Change-ISEC, Bangalore)
- Dr M. B. Rajegowda (University of Agricultural Sciences-UAS, Bangalore)
- Dr K. V. Raju (Institute for Social and Economic Change-ISEC, Bangalore)
- Dr. A. K. Gosain (Indian Institute of Technology –IIT, Delhi)
- Dr Sandhya Rao (Integrated Natural Resources Management Consultants –INRM, New Delhi)

iGrow Helps Farmers Turn Yield into Cash

Andreas Senjaya won the first place at Startup Arena Jakarta 2014 held recently. His start-up **iGrow** provides a system where users can plant, monitor, and develop crops in Indonesia as an investment. When the crops begin to produce fruits and veggies, iGrow's team helps users turn the yields into cash.

Senjaya refers to iGrow users as sponsors. "They will get a return of their investment after the plants produce crops," he explains. "However, the speed of this depends on the type of the seed they choose. Peanut plants can produce crops within six months, but durian trees need five years to grow fruit." So far, Senjaya claims iGrow has 207 sponsors and handles nearly 30,000 plants.

After sponsors get a return on their investment, Senjaya says they will then continue to reap 40 percent of all profits brought in by the plant thereafter. The remaining 60 percent of the plant's income will go toward taking care of the plant until the end of its lifecycle. Senjaya says he is more focused on providing value to users at this point, hasn't made a firm decision about monetizing yet.

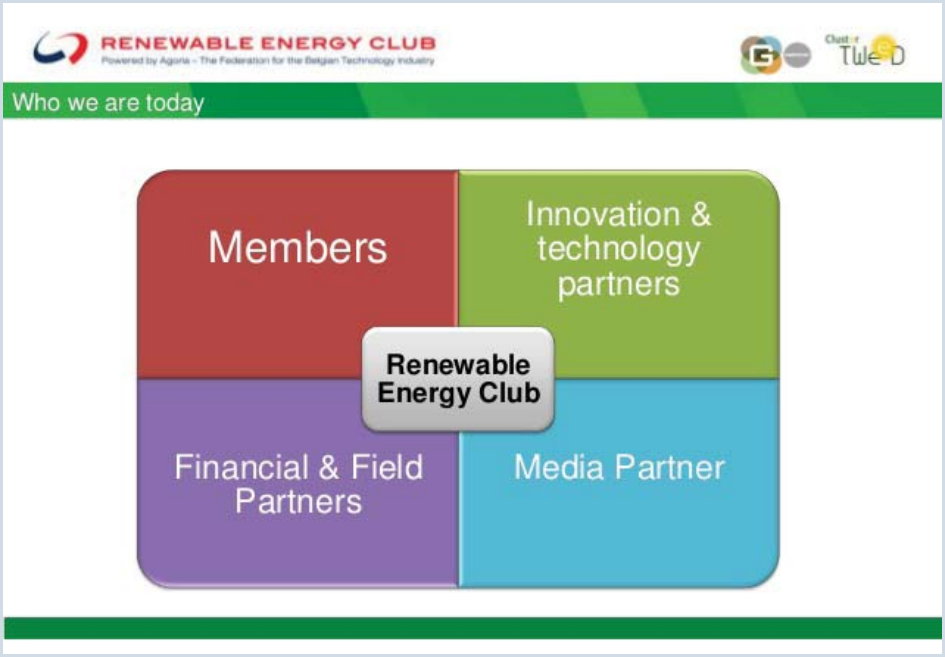
Senjaya says iGrow targets Indonesia's middle class urbanites, which is around 60 million people. Based on that number, he estimates the potential market size for iGrow is somewhere close to US$24 billion. Apart from IT experts and business development representatives, Senjaya says iGrow's founding team also includes a farmer with 610 hectares of land and ten years of agriculture experience. "iGrow also hopes to become the place where farmers and landowners can gather together and create more potential initiatives," says Senjaya. "In three to five years we will sell to the international market."


Andreas Senjaya

https://www.techinasia.com/igrow-startup-arena-jakarta-2014-startup-asia-jakarta/

Amazon Joins Renewable Energy Club

Amazon has become the latest tech giant after Google to join the list of companies seeking renewable energy to offset their carbon footprint. Amazon cloud computing division Amazon Web Services has declared its commitment to achieve 100-percent renewable energy usage for its global infrastructure footprint.



No information currently available to address whether Amazon might be considering similar initiatives for its primary e-commerce business, which includes large warehouses and expansive transportation networks.

"Apple, Facebook and Google, three of Amazon's peers and rivals, all have laid out road maps that explain how they intend to achieve their goals of procuring 100 percent renewable energy," wrote David Pomerantz, who oversees energy advocacy and communication for Greenpeace. Amazon has not offered that kind of road map yet, and it has some work to do to catch up." Other relative newcomers to Silicon Valley's cloud computing craze, like SalesForce and Box, have also made 100 percent renewable energy pledges.

100% Renewable Energy by 2050?

All of the world's energy needs could be provided cleanly, renewably and economically by 2050, according to a new study by WWF. The Energy Report breaks new ground with its global scope and its consideration of total energy needs including transport, and making adequate and safe energy available to all.

The Energy Report shows that in four decades we can have a world of vibrant economies and societies powered entirely by clean, cheap and renewable energy and with a vastly improved quality of life. **The report shows that the aim of meeting most energy needs from renewable sources will be a challenge, especially for countries like India.**

The report shows that by 2050, power, transport, industrial and domestic energy needs could be met with only isolated residual uses of fossil and nuclear fuels – vastly reducing anxieties over energy security, pollution and not least, catastrophic climate change. Energy efficiency in buildings, vehicles and industry would be a key ingredient, along with an increase in the energy needs met through electric power, renewably generated and supplied through smart grids.

United States and Japan Pledge $4.5 Billion to Green Climate Fund

United States and Japan announced $4.5 billion in pledges to the Green Climate Fund (GCF). This includes up to $3 billion from the United States and up to $1.5 billion from Japan, subject to respective domestic procedures and based on strong contributions from other donors. The donors hope to provide momentum to the ongoing climate change negotiations toward a post-2020 agreement that is applicable to all, in which countries make ambitious and transparent commitments to reduce their emissions.

This announcement builds on a history of collective leadership by the United States, Japan, and other countries to support resilient and low-carbon development around the world. The GCF will mobilize investment from the private sector, whose resources and expertise will be essential to meet the climate challenge.

Novelis's Stride in Aluminum Recycling

Novelis' recently released Fiscal Year 2014 sustainability report shows the aluminum rolling and recycling giant making significant investments and strides to advance the circular economy and increase the sustainability of its business, the aluminum industry and its broader value chain.

The company plants to increase its recycling capacity and the recycled content of its products to 80 percent by 2020, which will require less dependence on higher-carbon primary aluminum and more focus on innovation and technology to accelerate the use of recycled aluminum.

Novelis' innovative business model, which is built on closed-loop recycling, comes at a time when aluminum demand is high and the industries that Novelis serves — automotive, beverage can and specialty markets — are increasingly calling for lighter-weight, low-carbon materials.

"We're leading the industry to harness the sustainability potential of aluminum as a lightweight, infinitely recyclable metal," said Phil Martens, Novelis' president and CEO. "We're still early in our journey — and that includes Novelis shifting to more recycled aluminum, which avoids 95 percent of the energy use and greenhouse gas emissions associated with primary production."

At the end of Fiscal Year 2014, Novelis achieved 46 percent recycled content of its aluminum inputs, up 16 percentage points from the baseline years of 2007-2009, and is on track to hit 50 percent by the end of the year.

A key component of Novelis' transformation is a dramatic expansion of its ability to serve the automotive industry - the fastest-growing market for its products - as automakers increasingly turn to lightweight vehicles that are more fuel-efficient and create fewer emissions.

Tetra Pak Turns 100% Green

Tetra Pak, provider of food processing and packaging solutions, announced the launch of the industry's first carton made entirely from plant-based, renewable packaging materials.

The new Tetra Rex® carton will be the first in the market to have bio-based low-density polyethylene (LDPE) films and bio-based high-density polyethylene (HDPE) caps, both derived from sugar cane, in addition to Forest Stewardship Council (FSC ™) certified paperboard.

Developed in partnership with Braskem, one of the world's leading biopolymers producers, the new Tetra Rex package will be commercially available in early 2015. Tetra Pak customers using the standard 1 liter Tetra Rex with TwistCap OSO 34 can easily transfer to the new version without the need for any additional investment or modification to their existing filling machines.

Together with its suppliers, customers and other stakeholders, Tetra Pak is leading the pack towards 100 percent renewable packaging. The company says that increasing the renewable content of its packages is both good for the environment and offers customers a competitive advantage in the overall environmental profile of their products. In 2013, Tetra Pak delivered 1.1 billion packages to customers worldwide featuring bio-based caps (made from plastic derived from sugarcane.

Second Gen Bioethanol, Biochemical Plant to Come up in Malaysia

Sarawak, province in Malaysia, takes the regional lead in the biomass-based industry with the setting up of South East Asia's first commercial scale 2nd generation bioethanol and biochemical plant. Brooke Renewables and its consortium of partners will be investing $1 billion over the next five years to develop the Sarawak Biomass Hub project.

The MOU between Hock Lee Group and Biochemtex Agro is to establish a dedicated biomass plantation that is sustainable, self-sufficient and in compliance with globally-accepted standards. This biomass resource is renewable and provides the bioethanol and biochemical plant secured feedstock to ensure long-term operations of the plant.

The tri-party LOI signed is for the use of Beta Renewables' Biomass Conversion Technology and Novozymes' Exclusive Enzymes Solutions in the 1st 2G Bioethanol and Biochemical plant in Brooke Renewables' proposed Sarawak Biomass Hub project.

The development of the Sarawak Biomass Hub is in line with the Malaysian government's vision underlined in the National Biomass Strategy 2020, which emphasizes on the capitalization of biomass by channeling it into higher value downstream uses. This strategy provides the roadmap for utilizing some of the 100 million tons by 2020 of by-products produced annually by palm oil plantations alone, to create high value new industries.

The Power of Honey

***Chayaa Nanjappa** is a gritty entrepreneur from Coorg. Kodavas, who inhabit Coorg, are known more for their army generals and coffee plantations and doing business doesn't come to them that easily.*

*In her seven-year adventure in honey and other agri-foods business, Chayaa has broken the glass ceiling. By focusing on very high quality and customer service standards backed by determination, she is raring to go. The only factor holding her back from unleashing her animal spirits is Karnataka's bureaucratic apathy and red tape. In a free-flowing chat with **Suchitra Jayaprabhu**, she shares her anguish and dreams:*

In 2007, Chayaa Nanjappa, a first generation entrepreneur from Coorg, left her job in a big hotel to follow her dream of starting her own honey business. Her initial plan was to supply pure honey from her hometown to local markets in Bangalore.

She got herself trained at the Central Bee Research and Training Institute in Pune. With a small loan from her mother and with support of Khadi and Village Industries, she started Nectar Fresh.

Three years later, Chayaa relocated to Mysore. Mr. Rajappa, a well-known businessman with considerable experience in management of plantations and retail sector, joined the company as a partner. Nectar Fresh was initially sourcing honey only from Coorg. Today, it sources raw honey from various honey-rich regions of India.

After serving solely as a supplier to other brands, Nectar Fresh began marketing honey and related products under its own label across India. She launched single-portion packs and 30-gram bottles to hotels perhaps the largest consumer segment. Soon Nectar fresh will be launching retail-portion package of jams and sauces.

Future Plans

Nectar Fresh has emerged as one of the largest suppliers of bulk honey from south India, and today its products are exported to international markets. Recently, it met the stringent standards necessary for approval to export honey to Germany.

The new processing plant of Nectar Fresh has a much larger capacity of 200 tons per month. Another plant for processing fruit jams and tomato sauces

and purées is expected to be operational soon. The company is in the process of introducing Nectar Fresh Coorg Coffee by March 2015. It also plans to market Coorg-grown pepper, cardamom and kokum.

Chayaa is a member of the National Bee Board of India and hopes to influence policy to promote it across India. She is happy with the fast pace of her business and says her fulfillment comes also from being able to provide jobs to rural folk and tribals. "It's not just about our organization, we would like to see the whole environment around us to grow with us."

The biggest kick for an entrepreneur is when her brand gets consumed along with leading international brands or sometimes even replaces them in their home countries like Germany and France. Nectar Fresh is the first brand in India to have launched polypropylene food grade, recyclable sachets and blisters in honey and jams.

Chayaa gets emotional talking about her early days. "ITC was the first to have the trust in me when I started in 2007. I am indebted to them. Because of my quality standards they started packaging their honey in my facility. I am immensely grateful to them."

Chayaa started Nectar Fresh at a very low point in her life. What this means is – you don't need to be on a high and have everything before starting a business. "Determination and belief in oneself are very important to succeed and of course there is no substitute for hard work."

5th Edition

WASTE MANAGEMENT SUMMIT 2014

Resource Management for Sustainable Future

Confederation of Indian Industry

16 & 17 December 2014

Objectives

- Develop common platform for all key stakeholders to discuss issues and challenges of waste management
- Provide opportunities for companies to showcase latest products and technologies
- Envisage pathway for waste management movement in the country through combine efforts of industries, regulatory bodies, policy makers, technology consultants and service providers

Focus Areas

- Approach towards Resource Management
- Promoting "Waste to Wealth" and "Waste to Energy" concepts
- Dedicated session on sector-wise waste generation issues, challenges and it's surmount
- Corporate Initiative and success stories on "Resource Conservation"

Who Should Attend?

- Manufacturing & Service Industry Personnel
- Waste Management Facilities and Environment Consultants
- Hospitals, Hotels, IT Sectors
- Technology and service providers
- Academicians, Educational Institutions, NGOs etc.

Venue

Palladium Hotel
(Imperial Hall)
462, Senapti Bapat Marg
Lower Parel, **Mumbai**-13
Ph: +91 (22) 6162 8000

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Divesh Menon I divesh.menon@cii.in I +91 40 4418 5162

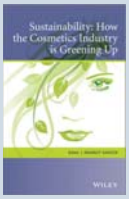
Register online at: www.greenbusinesscentre.com

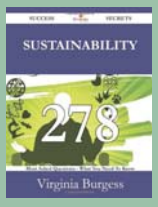
SustainabilityNext Top Books in 2014

National

Thirsty Nation: Priorities for India's Water Sector
By Joseph P. Quinlan, Sumantra Sen, Kiran Nanda, Random House, 2014

Sustainability: How the Cosmetics Industry is Greening Up
By Amarjit Sahota, Wiley, 2014





Sustainability 278 Success Secrets - 278 Most Asked Questions on Sustainability - What You Need to Know
By Virginia Burgess, Emereo, 2014

Good News & Bad News: Clearing the Air in Indian Cities
By Anumita Roychowdhury, Centre for Science and Environment, 2014

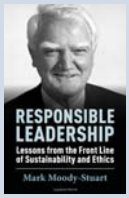
Jungle Trees of Central India
By Pradip Krishen, Penguin Books India, 2014

Mimicking Nature: A Solution for Sustainable Development
By Ashokan Kannarath, Partridge India, January 2014

International

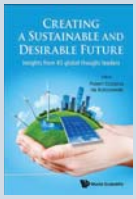
Making Sustainability Stick
By Kevin Wilheim, FT Press, 2014

Economics, Sustainability, and Democracy: Economics in the Era of Climate Change
By Christopher Nobbs, Routledge, 2014



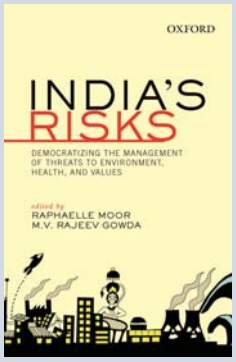
Responsible Leadership: Lessons from the Front Line of Sustainability and Ethics
By Mark Moody Stuart, Greenleaf, 2014

Sustainability with Style
By Lisa Heinze, Lisa Heinze, 2014



Creating a Sustainable and Desirable Future: Insights from 45 Global Thought Leaders
By Robert Costanza, Ida Kubiszewski, World Scientific Publishing Company, 2014

A Better World, Inc.: How Companies Profit by Solving Global Problems... Where Governments Cannot
By Alice Korngold Palgrave, Macmillan, 2014



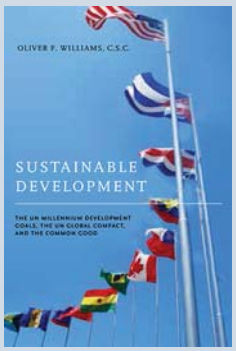
India's Risks: Democratizing the Management of Threats to Environment, Health, and Values

Edited by: Raphaelle Moor & M.V. Rajeev Gowda, Oxford University Press, June, 2014

A prospective superpower, India is still grappling with a host of risks that threaten to hamper its progress. These range from environmental threats caused by GM crops and pollution; dangers to health from HIV/AIDS and maternal mortality; safety concerns about natural hazards, nuclear power, and industrial disasters; and challenges to livelihoods and values.

The field of risk research, which has emerged over the last 40 years in the West, has been relatively unexplored in India. In an effort to bridge this gap, this volume brings together Indian and Western scholars and practitioners across the fields of psychology, anthropology, law, politics, sociology, public health, philosophy, science, and architecture, who offer insights on the theory of risk, lessons from the West, and the realities of risk in India.

This book is a culmination of a study project run jointly by the Centre for Public Policy at the Indian Institute of Management Bangalore and the STEPS centre at the University of Sussex. All Royalities from the sale of this book will go directly to the Environment Support Group, an NGO based in Bangalore.



Sustainable Development: The UN Millennium Development Goals, the UN Global Compact, and the Common Good

By Oliver F. C.S.C. Williams, University of Notre Dame Press, April 2014

For business to flourish, society must flourish. In today's global economy, business serves the common good not only by producing goods and services but also by reaching out to the many who are not even in the market because they lack marketable skills and the resources to acquire them. The book contains twenty-two essays that document the work of Western companies, working through the UN Global Compact and its Principles of Responsible Investment and the Principles for Responsible Management Education, to shape more peaceful and just societies. Seven case studies by leading businesses and private-public partnerships—including Microsoft, Merck, Sumitomo Chemical, Nestlé, Coca-Cola, Novartis, and Levi Strauss—outline their projects, especially those advancing the MDGs (Millennium Development Goals) designed to alleviate dire poverty. Twelve chapters reflect on some of the conceptual issues involved with the MDGs, and the three concluding essays examine the future of the UN Global Compact, of the Millennium Development Goals, and of the role of business enterprise in society.

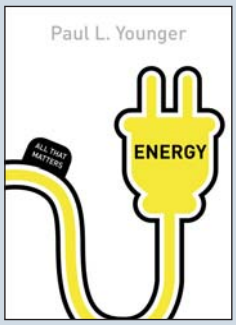
"The United Nations Global Compact is a major initiative in the worldwide effort to ensure the fair distribution of the enormous wealth generated by the globalization of corporate capitalism, an initiative of interest to all nations, corporations public and private, and the present and future citizens of the world. This volume comprises original contributions from the foremost scholars in the field. These papers are the state of the art in the scholarly examination of the international efforts on the part of private enterprise to assist in economic development and forging peace.

Unflooding Asia the Green Cities Way

By Zoran Vojinovic and Jingmin Huang, Intl Water Assn, November, 2014

A continuing increase in disasters triggered by floods occurs almost daily even though our technological capabilities have grown rapidly and global economic growth per capita has doubled. This paradoxical situation proves that our earlier ways of thinking are inadequate and that we must shift our way of thinking and working. It has become obvious that most flood-related disasters, although commonly referred to as natural disasters, are not the result of nature-related processes alone. Some of the early efforts in dealing with floods and flood-related disasters were only concerned with the construction of engineering structures (e.g., levees, floodwalls, dams, embankments, storage basins, diversions, etc.) without significant consideration of aspects which are nowadays regarded as equally important, if not more important. There is a great deal of natural, social and technological interactions that shape the vulnerability to floods.

Realizing that flood risk can hardly ever be completely eliminated, the traditional 'flood defence' culture has been replaced with the culture of learning how to live under flood risk and how to better respond to it. This renders purely engineering solutions inadequate. Can the threats of more flood-related disasters provide an impetus to shift our mind-set towards an approach that favors not only sound technological innovations but one that also addresses the social, cultural, and wider ecological aspects of dealing with floods? In this illustrated book, ADB seeks to introduce a holistic thinking in dealing with urban floods by adopting the green cities development approach. Green cities development is a holistic approach which promotes multipurpose (or multifunctional) solutions that are not only technologically and economically efficient, but which are also ecologically sustainable and socially just.



Energy: All That Matters

By Paul L. Younger, Hodder & Stoughton, November, 2014

Energy is probably the defining topic of our age. Uncertainty over the long-term availability of some hydrocarbons and nuclear fuels are increasingly prompting volatility in energy prices on world markets. Meanwhile, no serious scientist doubts that the unabated atmospheric emissions of carbon dioxide associated with traditional forms of energy use are (at very least) exacerbating natural variations in climate in undesirable ways.

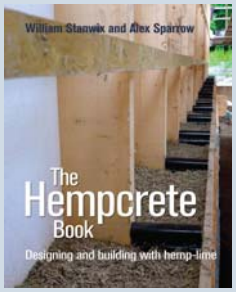
For either reason or both, few commentators of any stature argue that "do nothing" is a credible option in the world of energy management. The technical challenges are legion; yet energy is just as much a socio-economic issue. Surprisingly, there are no authoritative books giving an overall introduction to energy for general readers, students, engineers, geographers or architects, offering adequate coverage of the scientific, engineering, environmental, social and economic dimensions in a single, reasonably-sized and easily-readable volume. The book proposed here seeks to fill that gap.

Books

Adam Werbach on the Strategic Advantage of Sustainability

By Adam Werbach and Dave Summers, American Management Association, November, 2014

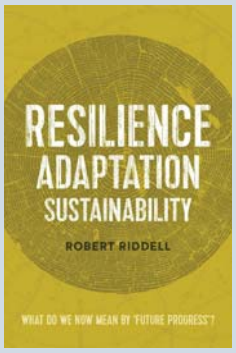
More than ever before, consumers, employees, and investors share a common purpose and a passion for companies that do well by doing good. So any strategy without sustainability at its core is just plain irresponsible - bad for business, bad for shareholders, bad for the environment. In his book Strategy for Sustainability, author Adam Werbach argues that sustainability is now a true competitive strategic advantage, and building it into the core of your business is the only means to ensure that your company - and your world - will survive.



The Hempcrete Book: Designing and Building with Hemp-Lime (Sustainable Building)

By William Stanwix and Alex Sparrow, UIT Cambridge Ltd., November, 2014

Hempcrete is a building material with excellent properties. It's made from lime and hemp shivs (a waste product from hemp fiber growing); it can be used for walls, floors, and for roof insulation; it's breathable, absorbing and emitting moisture to regulate internal humidity and avoid trapped moisture and mold growth; it provides excellent acoustic and thermal insulation and thermal mass; it's lightweight and reduces construction costs; and it's environmentally friendly—it locks up CO2 for the life of the building, and the hemp doesn't require agrochemicals or insecticides in its cultivation. This book is a detailed practical manual for professionals and self-builders, detailing how to source and make hempcrete and other hemp-lime composites, and how to use them in new builds and restoration. *The Hempcrete Book* provides a full explanation of construction techniques, highlighting potential pitfalls and how to avoid them, and includes a comprehensive resources section and examples of completed builds, with design notes.

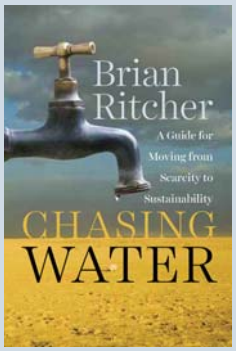


Resilience, Adaption, Sustainability: What do we now mean by 'future progress'?

By Robert Riddell, Robert Riddell, October, 2014

Around 1970 the planet and our occupation of it was pretty much a situation of balance; the biospheric absorptive and recycling capacity coping with resource uptake and waste discard. Since then a doubled human mass and carbon gas overload has spawned the greenhouse effect that has activated ice field melt, savannah extension, rainforest depletion, waste accumulation and species extinction.

Resilience is a prevent-and-adapt advisory. It evokes limits for the growth-on-growth ideology and print money process. It provokes a births-deaths equilibrium, reduced fossil carbon consumption, rainforest restoration and waste recycling. It is about future-proofing the next generation.



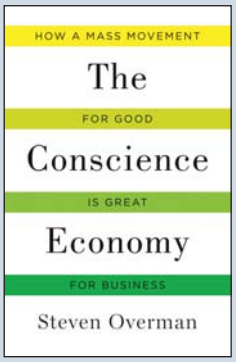
Chasing Water: A Guide for Moving from Scarcity to Sustainability

By Brian Richter, Island Press, June, 2014

Water scarcity is spreading and intensifying in many regions of the world, with dire consequences for local communities, economies, and freshwater ecosystems. Current approaches tend to rely on policies crafted at the state or national level, which on their own have proved insufficient to arrest water scarcity. To be durable and effective, water plans must be informed by the culture, economics, and varied needs of affected community members.

International water expert Brian Richter argues that sustainable water sharing in the twenty-first century can only happen through open, democratic dialogue and local collective action. In *Chasing Water,* Richter tells a cohesive and complete story of water scarcity: where it is happening, what is causing it, and how it can be addressed. Through his engaging and nontechnical style, he strips away the complexities of water management to its bare essentials, providing information and practical examples that will empower community leaders, activists, and students to develop successful and long-lasting water programs.

Chasing Water will provide local stakeholders with the tools and knowledge they need to take an active role in the watershed-based planning and implementation that are essential for water supplies to remain sustainable in perpetuity.



The Conscience Economy: How a Mass Movement for Good is Great for Business

By Steven Overman, Bibliomotion, Inc., May, 2014

A generation of people around the world, from Boston to Bangkok, from New York to New Delhi, is making everyday choices in ways that defy traditional logic. They are judging where and how their clothes were made, not just how they fit. They are thinking global but buying local. They are spending their money and their time, forming loyalties, casting votes and even enjoying entertainment based increasingly upon their desire to make a positive impact on others and the world around them. This new generation believes they can and must make the world better, and they expect business and government to get with the program.

The implications of the Conscience Economy are not “soft.” Ignore it, and your consumer or voter base will rebel, using a host of free tools and cheap connectivity to spread their rejection to peers around the world in real time. Leverage it, and Conscience Culture is a wellspring of financial upside. The Conscience Economy is the must-read guide to this unprecedented shift in human motivation and behavior. Author Steven Overman provides context, inspiration and some basic tools to help readers reframe how they evolve and grow whatever it is they lead—whether it’s a community, a business, a product, or a marketing campaign. From the boardroom to the startup loft, from the State Department to the pulsing marketplaces of the developing world, The Conscience Economy will help international leaders, influencers, investors and decision-makers to manage, innovate and thrive in a new world where “doing good” matters as much as “doing well.”

Courses

Training Programme on Clean Air and Sustainable Transportation Strategies for Livable Cities
November 10 – 12, 2014
http://www.cseindia.org/content/training-prog-clean-air-sustainable-transport-strategies-liveable-cities

Training Programme for Environmental Managers
November 10-14, 2014
http://www.cseindia.org/content/training-programme-environmental-managers

One Week Advanced Training Program on Pollution Monitoring Techniques and Instrumentation
November 17 – 21, 2014
http://www.cseindia.org/content/one-week-advanced-training-program-pollution-monitoring-techniques-and-instrumentation

Training Programme on Urban and Industrial Wastewater Treatment
November 24-28, 2014
http://www.cseindia.org/content/training-programme-urban-and-industrial-wastewater-treatment

CSE's short-term EIA training programme on EIA of road and highway projects
November 10, 2014
http://www.cseindia.org/content/cse%E2%80%99s-short-term-eia-training-programme-eia-road-and-highway-projects

Science and Management for Sustainable Living
www.bhoomicollege.org

Post Graduate Diploma Course in Sustainable Development (PGDM-SD)
http://bimtech.ac.in/

M.Sc. in Sustainable Development - Distance learning Course + information
The Global Open University
http://nagaland.net.in/

Post-Graduate Certificate in Sustainable Enterprise
Indian Institute for Sustainable Enterprise
http://theiise.net/pgcertinse.html

Postgraduate in Sustainability Management
Silver Bright Institute of Management
http://www.htcampus.com/college/silver-bright-institute-management-sbim

Post Graduate Diploma in Sustainability (Distance learning)
Chhattisgarh University
http://www.cguniversity.com/

Post Graduate Diploma
IGNOU- Indira Gandhi National Open University
http://www.ignou.ac.in/

MBA in Environmental Science
School of Management & Infrastructure and Development Studies
http://www.minds-india.org/

Master of Architecture (Sustainable Architecture)
Bharati Vidyapeeth Deemed University
http://www.bharatividyapeeth.edu/Campuses/Pune/default.aspx

MBA and MA in Sustainability Management
TERI University
http://www.teriuniversity.ac.in/

M Tech, MSc Environmental Science
Thapar University
http://www.thapar.edu/

PG Diploma
Entrepreneurship Development Institute of India
http://www.ediindia.org/

M Tech in Environmental Engineering
The National Institute Of Technology, Tiruchirappalli
http://www.nitt.edu/home/

Advanced Diploma in Bio Degradable & Solid Waste
Vellalar College for Women
http://www.vellalar.com/Arts/carrer-oriented-programmes.php

PhD in Environmental Science
Gauhati University
http://www.gauhati.ac.in/

MSc in Environmental Science
Dr Babasaheb Ambedkar Marathawada University
http://www.bamu.net/dept/environment/

Advanced Diploma in Energy
Vidya Prasarak Mandals Polytechnic
http://www.vpmthane.org/polywebnew/courses.html

BSc in Environmental Science
University of Calicut
http://www.universityofcalicut.info/

PhD in Environmental Science
Punjab University
http://puchd.ac.in/

MSc in Environmental Science
Bharathiar University
http://www.b-u.ac.in/

MA in Environmental Economics (Distance Learning Course)
Annamalai University
http://www.annamalaiuniversity.ac.in/

PhD in Environmental Bio-Technology & Solid Waste Management School of Environmental Sciences
Jawaharlal Nehru University
http://www.jnu.ac.in/main.asp?sendval=SchoolOfEnvironmentalSciences

MBA in Energy & Environmental Science
Symbiosis Institute of International Business
http://www.siib.ac.in/programmes.aspx