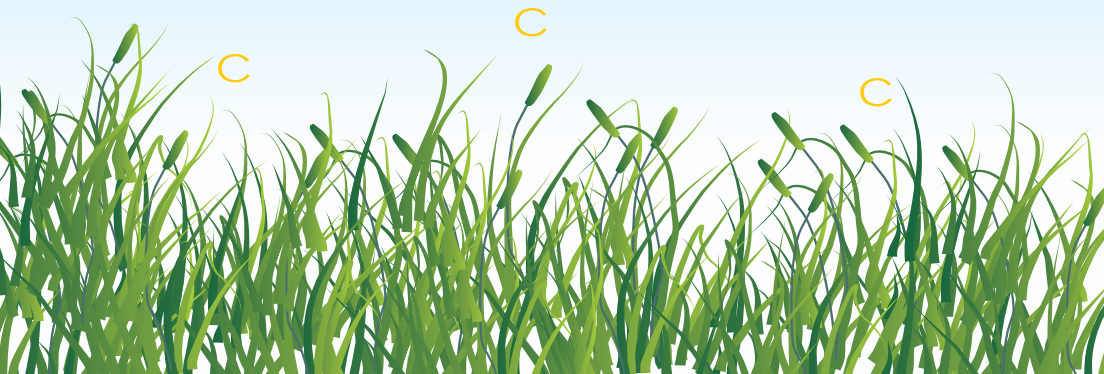




3.0

Ecological Competitiveness for Economic Sustainability
Putting Naturenomics™ into Practice

2009





2009

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Ecological Competitiveness for Economic Sustainability

Ranjit Barthakur, NatureFirst

Since the launch of Naturenomics™ 1.0 we have continuously been trying to create natural paradigms that 'rule' the world by bringing about interdependence between nature and economics. Towards this end we embarked upon 'advocacy' attempting to guide various stakeholders.

This latest collection is centred on a move away from the paradigms of advocacy into the reality of implementation. Practising across the **six forces of ecological competitiveness; land, energy, water, waste, air and carbon** that will lead to the effective management of our biosphere and, we believe, enhancement of ecological competitiveness.

Our work has led to the launch of two implementing organisations; first the Balipara Tract and Frontier Foundation (BTFF), a non profit, NGO, focused on biodiversity and effective enhancement of the environment, and second, NatureFirst - Green Ecologically Managed Services (NF-GEMS), a commercial venture, focused on; country, state and industrial equanimity between nature and economics.

The Balipara Tract and Frontier Foundation (BTFF)

It was our motivation to practice Naturenomics™ proactively that resulted in the creation of the Balipara Tract and Frontier Foundation (BTFF) in 2007. The BTFF has a vision to facilitate the creation of a sustainable and economically viable biodiversity knowledge bank, in Northeast India, resulting in the following areas of experimentation:-

- **Food security** - practising organic agriculture (growing paddy, naga chillies, broccoli, lettuce, and pumpkins) and undertaking animal husbandry (poultry, dairy, duckery and fishery).
- **Land and biodiversity security** - Implementing afforestation and commercial plantations (practising bamboo and teak management, growing medicinal and aromatic plants) and wildlife conservation.
- **Energy security** - using renewable and alternate energy such as biogas, implementing solar cookers, solar water heaters and CFL lighting.
- **Water security** - practising rainwater harvesting, recycling and water management.
- **Cultural security** - through sustainable home stays, ecotourism, 'Ghar-Bari' (home and garden) programmes and also showcasing sustainability through relevant lifestyles such as handlooms and handicrafts.
- **Knowledge security** – developing intellectual property by creating a knowledge bank in the form of a sustainable package of practices taken from the experiments above and history of the villages.

The work of the Balipara Tract and Frontier Foundation has resulted in various memberships and recognitions, and in all humility we share some of these with you:

- **Best NGO engaged** in sustainable tourism - CNBC Awaaz Tourism Award for Wild Mahseer.
- **Organic certification** - BTFF experimental station certified as 'organic' by the American based certifying agency, OneCert Asia.
- **NatureSecure certification** – 'Platinum Leaf for Land.'
- **Observer organisation to UNFCCC** summit - towards COP 15 session at Copenhagen, Denmark.

And then we introduced NatureFirst...

In 2008 we formally launched Naturefirst - Green Ecologically Managed Services (NF-GEMS). Concentrated on delivering ecological competitiveness for economical sustainability. Thus we started to focus on government advocacy and develop practicing partnerships with leading Indian companies - Tata, Vodafone, Bharti and Jindal Group among them - across industry segments such as manufacturing, urban development, hospitality, telecom and finance. The overwhelming support we have received since the launch of Naturefirst has resulted in a strong network and a growing base of Naturenomics practitioners.

Our work is centred on leading to the goals of sustainability, but will also benefit the client financially. In particular by enhancing 2 key income streams; the savings stream, driven by nature compliance and operational efficiencies and the revenue stream, currently driven by carbon credits and in the future by other 'compensatory' mechanisms'.

Through our interventions, we aim to achieve outcomes that will benefit industry and create competitive ecology that can sustain these economies. Resulting in the following gains:

- **Ecological** – reducing environmental burden by implementing sustainable operating processes.
- **Economic** – delivering reduced operating costs and investigating carbon credits potential.
- **Social** – engaging and promoting environmentally conscious stakeholders and enhanced sustainability.
- **Corporate** – creating superior brand value, enhanced (corporate value) competitive positioning and proactively responding to forthcoming regulations.
- **Compliance** – ensuring appropriate adaptation, effective management and monitoring of current and potential regulatory mandates.

NatureFirst-GEMS has a consolidated suite of products that supports a 360 degree diagnostics, implementation and maintenance of select initiatives and further attempts to provide financing options.

In the spirit of Naturenomics™ 3.0

We continue to repeat our belief that ecology and economy are not adversaries, but inter-dependent and intrinsically connected, as reflected in the Naturenomics™ model, so that nurturing the first will benefit the second. Conversely, the neglect of our ecology, whilst pushing for economic gain, will result in the potentially catastrophic degradation of both.

Putting it into perspective, studies have started to reveal that the world is losing more money due to a deteriorating natural capital than has been lost by the current financial crisis. According to a recent EU commissioned study, at today's rate we are losing natural capital worth between \$2 - 5 trillion annually, with forest decline alone costing about 7% of global GDP.

This compilation is made up of case studies, our real-time experiences in delivering Naturenomics™, together with propositions for practical implementation, where case studies do not yet exist. In this way we are able to illustrate what it would mean for all sectors of industry to embrace Naturenomics™ and what they can achieve economically by putting it into practice. A transformation, we believe, that will result in our environmental and economic security and the promotion of a low carbon future.

We hope we will motivate and facilitate industries, corporations, other states and countries to achieve consumption carbon neutrality.

"God forbid that India should ever take to industrialism after the manner of the west... keeping the world in chains. If [our nation] took to similar economic exploitation, it would strip the world bare like locusts."

"What we are doing to the forests of the world is but a mirror reflection of what we are doing to ourselves and to one another."

"Monotony is the law of nature. Look at the monotonous manner in which the sun rises. The monotony of necessary occupations is exhilarating and life-giving."

"To forget how to dig the earth and tend the soil is to forget ourselves"

"The greatness of nations can be judged by the way its animals are treated."

"It is unwise to be too sure of one's own wisdom. It is healthy to be reminded that the strongest might weaken and the wisest might err."

"An ounce of practice is worth more than tons of preaching."

- by Mahatma Gandhi



Assam, India - Accelerating Economic Growth and Poverty Reduction Through Climate Change Strategies (Primarily Mitigation, Supported by Adaptation)

Ranjit Barthakur & Dipak Kripalani, NatureFirst
(Guided by Lord Nickolas Stern)

Objective

To accelerate economic growth, and poverty reduction in Assam. Using community based entrepreneurship from the implementation of climate change mitigation initiatives (supported by adaptation initiatives), building on Assam's unique natural and environmental resources

Context

Globally, climate change is threatening the security of food, water, and eco-systems and under business-as-usual (BAU) is likely to result in risks of abrupt and major irreversible changes. Carbon emissions have already pushed up global temperatures by nearly 1°C relative to the mid-19th century. If no action is taken on emissions there is more than a 75% chance of global temperatures rising between 2°C and 3°C over the next 50 years. There is a 50% chance that average global temperatures could rise by 5°C some time next century under a BAU approach.

Developing countries are earliest and worst hit by climate change. We believe that we could develop a model for developing countries to turn crisis into opportunity – to use climate change mitigation strategies to drive economic growth and reduce poverty in their countries.

India is on a rapid growth path (8-10% GDP growth over the last 2-3 years, with this growth rate broadly expected to continue). However, there is a strong body of opinion in India suggesting that there is a choice between rapid economic growth and climate change mitigation. However, we argue that this is not a choice, but an imperative and that embarking on climate change mitigation strategies can in fact drive economic growth whilst reducing poverty.

Within India, Assam and the rest of the North East is one of the most bio-diverse regions of the world. This bio-diversity naturally lends itself to the development of “nature capital” which can be a powerful driver of economic development in the region. Without strong action to protect and enhance Assam's natural endowments large scale human driven impediments to development will appear. Such as deforestation, land use, loss of soil fertility, disruption to river systems, etc, which will eventually result in the loss of bio-diversity in the region.

Unless the world acts more responsibly, climate change is expected to severely impact food security and water security, thereby impacting the livelihoods of people, particularly those in the poorer sections of society. Assam can contribute to mitigation initiatives whilst also helping to 'securitise' our core natural assets, and improving the livelihoods of the poor.

The Model – Community Climate Change Mitigation Projects (CCCMP)

The model predicates itself on the ability to involve local communities in strategies and initiatives related to addressing both energy emissions (power, transportation, etc) and non energy emissions (agriculture, land use, waste). A graphical representation of the model is shown below:

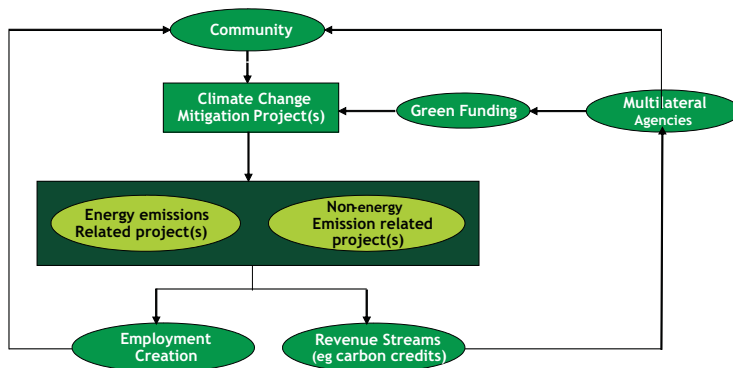


Figure 1. Source: Compiled by NatureFirst-GEMS

The key components of the model are as follows:

- **Community** – this could be an entire village, 'interested clusters' of individuals / families within a village, or rural self-help groups.
- **Community Climate Change Mitigation Project(s)** – CCCMP – community based projects that are aligned to its skills, capabilities, or assets that it has access to. Examples of CCCMPs are:-
 - o Local communities along the Brahmaputra who can develop community based small hydel projects for electrification of their villages.
 - o Groups of farmers having access to land for bio-diverse reforestation.
 - o Rainwater harvesting programmes in villages in Assam (Assam is one of the rainiest regions in the world).
 - o Household cooking using solar cookers.
 - o Bio-gas units.
- **Green investment programmes and financing** – multilateral agencies, individually or in combination, would need to develop investment programmes, and financing structures for this initiative, and will recover the investment through cash flows that are generated from this initiative. These agencies could also facilitate the aggregation and trading of carbon credits for these communities.
- **Eco Banks** - are either; existing banks focusing a part of their investment / lending for green projects or specialised banks who are only focused on investing and lending for green projects.

The climate change mitigation projects are expected to have the following impact

- Employment opportunities, and hence enhance livelihood at the individual level and help reduce poverty.
- Initiative may also provide the community with a deficient resource (eg rural electrification in villages without electricity) which will enable the community to develop different industries, further enhancing livelihood.
- Generate community level revenue streams (eg. carbon credits, power generation, organic agricultural inputs, etc) which can be used by the community to repay lenders, and distribute any surpluses among community participants.

The above community level mitigation strategies need to be supported by adoption strategies, helping us respond to climate change.

Key Stakeholders

- Community Green Entrepreneurs (CGE) – communities taking up CCCMPs in an entrepreneurial framework.
 - An approving authority to define eligibility criteria, and approve the CCCMPs.
 - A consortium of multilateral agencies, possibly led by the World Bank, to provide funding for these projects, and transaction structuring for revenue streams such as carbon credits. One structure is to develop a 'Community Climate Change Mitigation Project Fund' (CCCMPF).
 - Coordinating agency for facilitating, project design, implementation and funding.
 - A monitoring agency to evaluate and monitor implementation and post-implementation parameters.
 - Through both fiscal and non fiscal measures, central and state governments.
 - Private players who would co-participate with CGEs in these initiatives with technology, market linkages, etc.
 - Eco banks and Microfinance institutions.
 - NGOs having access to communities, with experience in working at the grassroots level.
- The implementation of this model would require the development of structures between the above stakeholders.

A CCCMP Programme for Assam

We believe the following CCCMP programme for Assam can be developed:-

Sector	Possible CCCMPs in Assam
Power	<ul style="list-style-type: none">• Small hydel projects in rivers (Bramhaputra, Barak, etc) and streams• Community solar farms• Solar appliances in households (eg solar cookers, solar heaters)• Organic waste to energy (eg bio-gas, agricultural waste, etc)
Transportation	<ul style="list-style-type: none">• Waterways (using rivers to transport people and goods which is more cost effective and environmentally conscious than road or rail)• Surface transportation using alternate fuels
Water	<ul style="list-style-type: none">• Rainwater harvesting• Greywater treatment and recycling• Resource effective irrigation techniques for farming
Agriculture	<ul style="list-style-type: none">• Marginal lands and wastelands for bio-fuels (eg: jethropha)• Vermiculture• Bio-pesticides• Bio-fertilisers
Forestry	<ul style="list-style-type: none">• Planned bio-diverse reforestation• Community afforestation (saving existing forest cover within the community)• Avoided deforestation
Waste management	<ul style="list-style-type: none">• Solid waste management• Waste to energy• Waste to compost

Table 1. Source: Compiled by NatureFirst-GEMS

We would need to support the above with adaptation strategies for Assam such as flood control, GIS mapping, climate information systems, land use planning, community climate change insurance, etc.

Financing the Assam CCCMP Programme

We envisage that the above CCCMP programme for Assam will require an investment of Rs. 8,000 – 12,000 crores (2 – 3 billion USD) over an implementation period of 6 - 8 years in order for it to achieve scale to make an impact on the economy of the state.

The green funding of these initiatives could be through the following routes:-

- Community Climate Change Mitigation Project Fund' (CCCMPF) for Assam promoted by the World Bank with other multilateral agencies (eg ADB) participating in this fund.
- Microfinance institutions (MFI).
- Central and state government funds and incentives.
- Mechanisms set up, or being set up for financial structuring of climate change projects, such as:-
 - o Clean Development Mechanism (CDM)
 - o Forest Carbon Partnership Facility (FCPF)

The overall financial framework could be as follows:

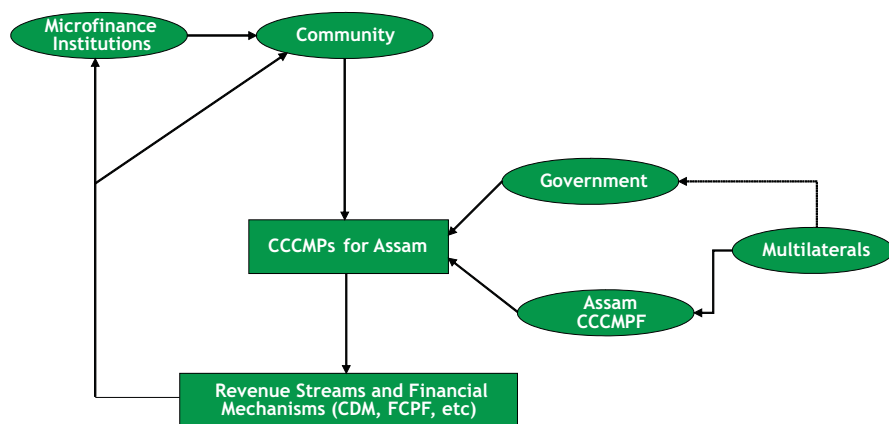


Figure 2. Source: Compiled by NatureFirst-GEMS

Next Steps

To take this concept forward we propose the following next steps:

- Develop a comprehensive CCCMP Assam programme document based on this concept note, including timing and deliverables.
- Discuss concept and programme with representatives from key stakeholders.
- Set up initial structures and systems to commence 'pilot' CCCMPs.

Natural Gist

- A **Natural Capital:** Assam and the North east is one of the most bio-diverse regions of the world, such natural capital can be a powerful driver of economic development. Economic development however must protect and enhance Assam's natural endowments and not deplete or destroy it.
- A **Climate change** is expected to severely impact food and water security and impact the livelihoods of people, particularly the poorer sections of society. Climate change mitigation strategies can be implemented to drive economic growth and reduce local poverty.
- A **Community Climate Change Mitigation Projects (CCCMP)** are community based projects aligned to the skills, capabilities, assets of the community it is based in. Examples of these are; rainwater harvesting programmes, bio-diverse reforestation, community hydel projects such initiatives should be established across all sectors; power, transportation, water, agriculture, forestry and waste management.
- A The CCCMPs **reduce poverty** providing; local employment, enhancing a deficient resource such as electricity in turn facilitating development, generating community level revenue streams.
- A **Key stakeholders** of the model, should be fully engaged in the projects, and include; community based green entrepreneurs, consortium of multilateral agencies, government, private players, eco-banks, microfinance institutions and NGO's.
- A **Green Investment programmes and financing** for these initiatives can be found using; the community climate change mitigation project fund (CCCMPF) for Assam promoted by the World Bank, microfinance institutions (MFI), central and state government funds and incentives, mechanisms set up specifically for climate change project such as a clean development mechanism (CDM) or forest carbon partnership facility (FCPF).

Naturenomics™ in Practice

We are working closely with various state governments including the **Government of Assam** to develop an operational model. This programme can then possibly extended to the rest of the North East, and any other state in India that needs to develop and implement climate change strategies.



Creation of a Biodiversity Knowledge Bank for NorthEast India - Balipara Tract & Frontier Foundation

Prabir Banerjea, Surjit Singh & Robin Eastment, BTFF

Naturenomics™, as explained before, relates to capital formation for a region or an organisation through the creation of ecologically 'compliant' assets in a sustainable manner. The current model of economic development forces us to make a choice between development and sustaining natural resources. Contrary to this belief, Naturenomics™ believes that this needs not be a choice, and in fact we can have economic development through sustaining our natural resources.

The Balipara Tract and Frontier Foundation (BTFF)

The Balipara Tract and Frontier Foundation (BTFF), is a 'Not for Profit' NGO with the mandate of "Facilitating and driving community level involvement and employment/income generation through social entrepreneurship in Naturenomics™ initiatives that are economically self sustaining. Through this, BTFF will nurture interdependence between nature and economics. BTFF was incubated by Globally Managed Services and River Journeys & Bungalows of India and is currently run by a Board of Trustees and onsite professional managers and is also represented through members in an advisory capacity in all North Eastern states.

In addition, BTFF has also entered into national and international collaborations and partnerships with experts across relevant sectors. For example, Morarka Organic for promoting organic cultivation, tea technologies for ancient Indian agricultural practices, Gadhia Solar for alternative energy solutions, centre for wildlife studies for wildlife conservation, Keggs Farms for poultry breeding and Xola consulting Inc for analysing the eco and adventure tourism potential in the region. BTFF is also grateful for the support being received from the government of Assam, Tata Tea, World Wildlife Fund, IIT Guwahati, US India Business Council, Asia Society and Sanctuary Magazine.

BTFF is based in a British Assam Heritage Organic Homestay "Wild Mahseer" located in Balipara Division of Addabarie Tea Estate, Sonitpur district, Assam, India.

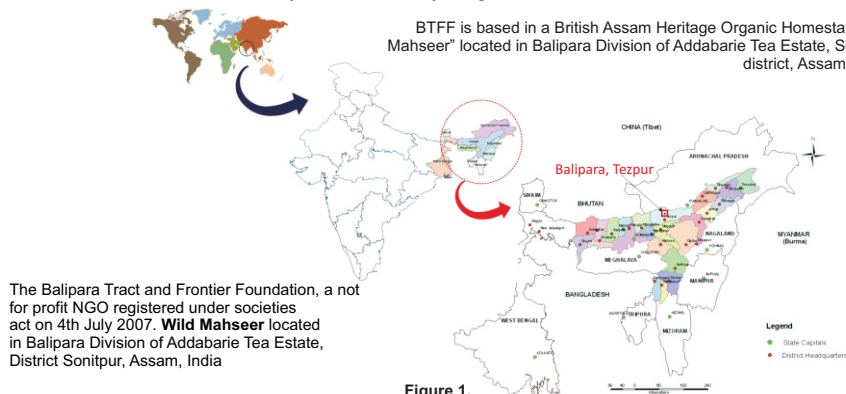


Figure 1.

The BTFF objective

The foundation has the objective of becoming a 'Centre of Excellence' to drive the interdependence between ecology and economy, through the securitisation of assets in the operational areas listed below:

- Food Security.- organic agriculture and animal husbandry.
- Land and Bio-diversity Security. - afforestation, commercial plantations and wildlife conservation.
- Water Security – rainwater harvesting and effective water management.
- Energy Security – renewable and alternate energy.
- Cultural Security - sustainable home stays, handlooms and handicrafts.
- Knowledge Security – intellectual property through a knowledge bank of sustainable package of practices, information sourced from experiments and their tracking and monitoring to form 'Knowledge Bank Capital'.

Through these objectives the BTFF utilises Naturenomics™, maximising the potential of natural resources through the four R's (Reduce, Reuse, Recycle and Recover). Through 'Natural Resource Management' promoting the formation and enhancement of the regions natural capital. Implementing partnering projects and initiatives that follow the Naturenomics principle and in doing this create sustainable livelihoods for the rural poor.

Naturenomics™ activities practiced by BTFF towards the above listed objectives have been further detailed in the following sections. The illustration below explains our differentiated approach to economic development promoting the unlocking of natural capital to stimulate improvements to agriculture, energy provision and water management, amongst others:

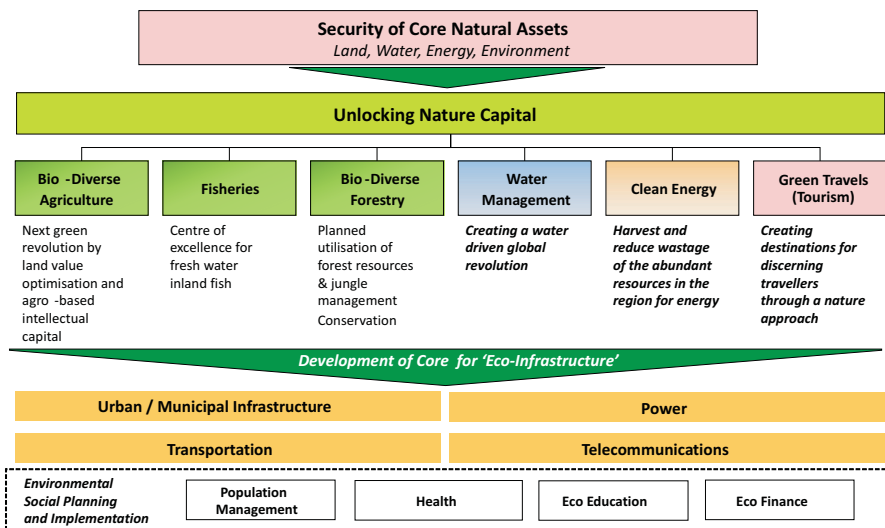


Figure 2 Source: Compiled by BTFF

BTFF trials

To achieve its objectives the Balipara Tract and Frontier Foundation undertakes extensive trials of the emerging practices. All these trials follow the same stages of development, testing first the technology and methods of practice, initially at a small scale and then enlarging the test area to determine its adaptability and final undertaking trials that test and assess commerciality of the practice.

The stages are:

- **Experiments** – Developing a package of practices. Testing the practice on an isolated, small scale. The inputs and resources required, management methods and resulting outputs achieved are all closely monitored and recorded. Enabling practices to be identified that can offer beneficial contribution to the BTFF objectives.
- **Extension** – Testing scalability. Taking successful experiments forward, this stage of practice development increases the scale of the trial to determine how this affects input and outputs.
- **Commercialisation** – Testing commerciality. This stage seeks to develop a successful business model for the practice. The practice is trialled on a commercial scale with business risks and opportunities of delivering this practice identified.

To follow is a summary of the trials at the Balipara Tract and Frontier Foundation, run to date or in progress.

Food security through organic agricultural practices

Organic inputs

Experiments:

- Vermiculture units following the “wind rows” method which began in 2007 was extended to the “tank” method using the *Eisenia foetida* variety of earthworms
- 2 methods of Organic Waste Composting for soil fertility (open and mud composting), initiated for recycling Natural and Kitchen waste into Organic Manure
- Bio- pesticides for (a) integrated pest management (b) foliage growth and (c) soil nutrition developed using combinations of the fundamental ingredients of Cow Urine, Herbs and Spices
- Pre planting seed treatment using combinations of milk, ghee, garlic etc initiated

Extension:

- 4 MT of Vermicompost have been supplied to local farmers.
- 2 Bio-pesticide producing Unit have been set up in partnership with local farmers.

Rice research

Experiments:

- Summer Rice experiments in two phases using 8 Indigenous varieties have been conducted at the BTFF Experimental Station.
- Winter Rice experiment using System of Rice Intensification (SRI) Technology conducted on 2 varieties.

Extension:

- Based on the key learnings derived from the experiments, 'village level' experiments are being conducted with local farmers using 4 shortlisted varieties.

Floriculture

Experiments:

- Cultivation of Gladiolus and Tuberose initiated to test its commercial feasibility.
- 1500 bulbs each of Gladiolus and Tuberose were planted within the BTFF Experimental Station.
- All cultivation aspects followed the Organic Guidelines

Commercialisation:

- Commercialisation of Gladiolus was undertaken through Farm Gate Sales, the retail chain in Tezpur and the Wholesale Market in Guwahati.

Vegetables and spices

Experiments:

- 13 varieties of local vegetables experimented with
- Bean, Naga Chili, Local Chili, Potato, Pumpkin selected as high yielding crop.
- 3 varieties of Exotic Vegetables cultivated (Broccoli, Lettuce and Capsicum)
- Yields of 70 Qntl for Broccoli, 50 Qntl for Lettuce and 47 MT for Capsicum per Ha was achieved.
- Prices between the ranges of Rs 30 to Rs 70 per kg.
- Experiments conducted on Black Pepper, Turmeric and Ginger
- Yields of 11 MT per Ha for Ginger and 21 MT per Ha for Turmeric achieved.
- Harvest of Black Pepper awaited.


Heads Type of Land	BTFF Highland	Assamese Nepali Adivasi Lowland
Land Preparation	First ploughing should take place at least 30 days before transplanting and second ploughing 3 days before to soften and improve soil aeration.	First ploughing 20 days before transplanting and second ploughing 5 to 6 days before to soften and improve soil aeration.
Sowing	Ideally should be 1st week of June but as source of irrigation is mainly rain, this may differ depending on monsoon.	First week of June (depending on monsoon)
Transplanting	30 to 40 days after sowing. Planted in clumps of 4 seedlings at a spacing of 7 cms apart.	After 30 to 40 days the seedling are ready for transplanting. Seedlings placed at a distance 7 cms apart.
Manure	*1000 kgs per Ha. 500 kgs mixed with soil 7 days before transplanting. Rest broadcast in intervals of 15 days.	Cow dung applied during land preparation. Quantity unspecified/subject to availability.
Pest Control	Organic formulation 2 days a week @ 70 ltrs per Ha	None
 Harvesting	130 to 145 days after transplanting, once the straws become dry.	130 to 145 days after transplanting, once the straws become dry.

Table 1. Source: Compiled by BTFF

Overview		Package of Practice	
Varieties	Kali Joha, Kunkuni Joha, Khamti Joha, Bora Joha, Izone etc.	Land Prep	Land for ploughing should be ready atleast 7 days before transplanting
Area to be Planted (Ha)	0.5 ha	Spacing	7 cms
Soil PH	N/A	Organic Formulation	2 days a week @ 70 ltrs per Ha
Quantity to be Planted (Kg)	3 kg	Organic Fertiliser Vermi compost	1000 kgs per Ha. 500 kgs mixed with soil 7 days before transplanting. Rest broadcasted in intervals of 15 days
Source of planting material	3 different districts of Assam	Irrigation	Rainwater
Date of planting	10 th June 2007	Plant Protection	Organic pest repellents 2 days a week
Harvesting Date	December	Harvesting	130 to 145 days after transplanting
Actual Yield	1400 kgs per Ha		
Worker Requirements	N/A		

Table 2 - Phase 1

Phase 1: 8 varieties of indigenous paddy were cultivated in 17 plots, using various dosages of vermicompost and organic fertilisers

Overview		Package of Practice	
Varieties	Kali Juha, Izone	Land Prep	Land for ploughing should be ready at least 7 days before transplanting
Area Planted (Ha)	0.6	Spacing	7 cms
Soil PH	N/A	Organic Formulation	2 days a week @ 70 ltrs per Ha
Quantity to be planted (kg)	3	Inputs	1000 kgs per Ha. 500 kgs mixed with soil. Biofur and boigin solution used as foliar spray
Source of planting material	Local	Irrigation	Rainwater
Date of planting	14 th June	Plant Protection	Organic pest Repellents 2 days a week
Harvesting date	10 th Dec	Harvesting	130 to 140 days after transplanting
Yield per HA	1900 Kgs per HA		

Table 2 - Phase 2

Phase 2: Varieties of indigenous paddy being cultivated in 6 plots, using various dosages of vermicompost and organic fertilisers and foliar sprays

The key learnings we have had from two phases of paddy experiments are:-

Parameters	Phase 1	Phase 2
Land Preparation	First ploughing should take place at least 30 days before transplanting and second ploughing 3 days before transplantation to soften and improve soil aeration.	Adapted
Input Management	Although in some varieties use of vermicompost increased yields to 16%, it is recommended that vermicompost application be restricted during soil preparation. Vrishk Ayurveda formulations were used for the experiments.	Adapted
Transplanting Procedures	Ideally should be 1st week of June or 30 days after sowing but as source of irrigation is mainly rain, this may differ depending on monsoon.	If the cultivated land is highland where water retention is difficult, spacing of 25cms will enable plants to increase water intake.
Intercultural Management	Very little weed management required as seedlings are planted close together. Plots to be partially immersed in water for better plant growth.	If the spacing is increased and plots are not immersed in water then weeding to be done as and when required.
Harvesting	Ideally between 130 to 145 days after transplanting,	Ideally between 130 to 145 days after transplanting
Selling	Though local market.	Branded sales (organic produce) through wholesale and retail channels to maximise revenue.

Table 3. Source: Compiled by BTFF

Overview		Package of Practice	
Varieties	Kalinpong	Planting	8 to 12 inches into the soil.
Area planted (Ha)	0.04	Spacing (cms)	6 to 3 inches
No of Bulbs planted	700 bulbs	Weeding and Forking	Weeding to be done every 10 days. In the first 20 days, forking should be done every 5 days.
Source of planting material	Choudhury Nursery, Assam	Organic Formulation	Cow urine, garlic, chili, Germany bon @ 750 ltrs per Ha every 10 days
Date of planting	13 th Nov, 07	Organic Fertiliser-vermicompost	@ 1000 kgs per Hectar during soil preparation
Harvesting date	15 th Jan, 08 onwards	Irrigation	Manual Watering.
Harvested numbers	432 spikes (YTD)	Harvesting	55 to 65 days after planting
Grade	12 flowers or more- 303 8 to 12 flowers- 129		
Colours	Yellow, Red, White, Purple.		

Table 4 : Phase 1

Experiments on Floriculture- Gladioli: Phase 1

Overview		Package of Practice	
Varieties	Kalingpong	Planting	9 to 12 inches into the soil
Area Planted (Ha)	0.32	Spacing (cms)	6 to 3 inches
No of bulbs planted	5000	Weeding and Forking	Weeding to be done every 10 days. In the first 20 days forking should be done every 5 days
Source of planting material	5000	Organic formulation	Cow urine, garlic chili, Germany Bon @ 750 ltrs per Ha every 10 days
Date of planting	Choudhary Nursery	Organic fertiliser-vermicompost	@ 200 gms per bulb
Harvesting date	November onwards	Seed Treatment	Dipping in 10% Solution of biogin
Harvested numbers to date	1200	Irrigation	Manual watering
Colors	White, Yellow, Red, Purple	Harvesting	55 to 65 days after planting

Table 4 : Phase 2

Experiments on Floriculture- Gladioli: Phase 2

Food security through animal husbandry

Poultry

Experiments:

- Demonstration Breeding Unit for Kuroilers, a high yielding variety of poultry, with a capacity to breed 2000 birds set up.
- Tracking of Growth and Performance parameters undertaken for comparison against the local variety.

Extension:

- Over 6000 birds have been reared and transacted across 50 villages.
- Tracking of Performance under 'Farm Environment' undertaken.

Commercialisation:

- Sale of Kuroiler birds was done through Farm Gate Sales, Local Markets (Huts), and village distribution through self employed vendors.

Dairy

Experiments:

- 4 Female Cows of Exotic variety received as 'gift' from Anand Farm, Gurgoan.
- A demonstration Dairy Unit, with a mix of both Exotic and Local varieties, set up.
- Personalised POP for local conditions under process.

Duckery

Experiments:

- Demonstration Unit set up with three varieties.

Fishery

Extension:

- A BTFF Fishery Club set up involving 16 local fish farmers.
- Process of developing and implementing Package of Practice for these farmers based on successful experiments conducted within the premises on-going.

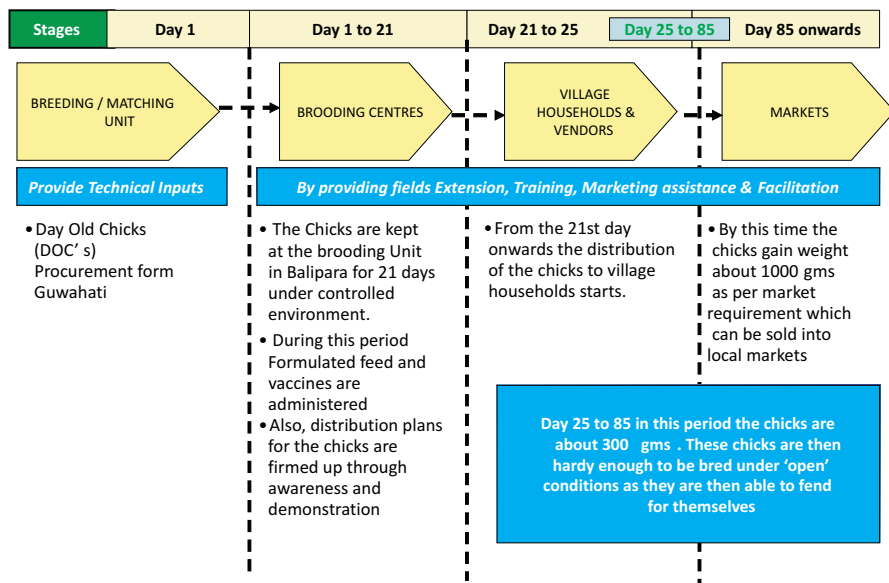


Figure 3. Source: Compiled by BTFF

Production Tracking: In Unit and Farm

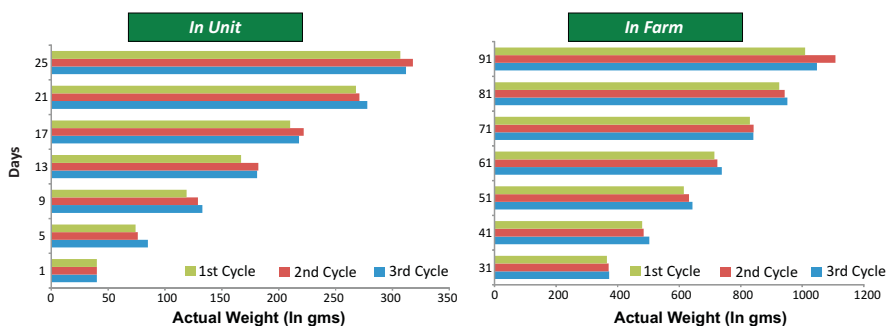


Figure 4. Source: Compiled by BTFF

Biodiversity security

Biodiversity management of the 22 acres Wild Mahseer Campus:

Experiments:

- 3200 Indigenous trees of 39 varieties planted.
- 28 varieties of Indigenous plants planted
- 12 varieties of Ferns and Creepers planted.
- 17 varieties of Exotic trees and Orchids planted

Conservation

Experiments:

- Visit by BTFF Team to the Tata Facility in Lonavla to understand the procedures of Mahseer Breeding.
- Visit by Mr. Ogale, an expert on Mahseer Breeding and Conservation for a scope study on Mahseer Breeding by the Foundation.

Extension:

- BTFF in partnership with the Center of Wild Life Studies has completed the formalities with The State Forest Department for Camera Tracking of large herbivores and carnivores such as tigers, elephants and rhinos in Kaziranga National Park.
- The Balipara Tract and Frontier Foundation along with the Wildlife Conservation Trust and the founders and management of Wild Grass supported by the Assam Forest Department donated 700 sets of winter apparel among the staff of the Kaziranga national Park.

Medicinal and aromatic plants

Experiments:

- 21 varieties experimented with
- Market linkages with the Perfumery Industry established

Bamboo, broom and teak management

Experiments:

- Planted 2500 broom plants of 1 indigenous variety
- 6 indigenous commercial varieties and 1 exotic variety of bamboo planted
- 300 Indian Teak (Sagun) planted
- 500 Chinese Teak (Pawlonia) planted

Commercialisation:

- Sale of brooms (Jarus) was conducted through Farm Gate and the Local Markets

Energy security - alternate and renewable energy

Bio gasifiers

Experiments:

- 2 Cubic Ton Unit set up and cooking experiments conducted over a period of 12 months.
- Cost of Cooking calculated at Rs 1.14 per hour as against Rs 2.83 on LPG.
- Cooking can be done throughout the year

Extension:

- Training programmes conducted for 30 local farmers in partnership with IIT Guwahati.

Solar

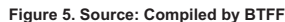
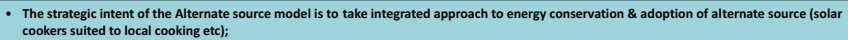
Experiments:









- 3 Cookers, 1 Geyser and 1 Street Light procured and experiments conducted over a period of 8 months
- Cost of Cooking calculated to Rs 0.49 per hour as against Rs 2.83 per hour on LPG
- Can be used for all kinds of food under favorable conditions.
- As clear 'Sun Days' in Assam are only between 120-150 days, usage patterns are very erratic.

- Cooking demonstrations held across 4 villages.



Extension:

- CFL bulbs distributed to identified households in 3 villages to demonstrate its advantages as an Energy Saving investment.
- Tracking and record keeping of Energy used before and after CFL distribution conducted to highlight savings.



Name	Village	Before / After Distribution	Electrical Appliances					Consumption	
			Bulb	CFL	Fan	TV	Fridge	Avg Unit	Avg Amt
Komision Mili	Baligoan		10	4	4	4	1	37	103.6
			4	10	4	4	1	43	120.4
Manipur Payang	Baligoan		10	0	2	2	0	22	61.6
			3	7	2	2	0	28	78.4
Basanta Mili	Baligoan		5	0	0	0	0	54	151
			0	5	0	0	0	17	47
Total								113	316.2
								88	245.8

After replacing Luminary Bulbs with CFL's in three households, an analysis of savings in terms of Unit Consumption and Financial Savings was carried out over a period of 2 months. **Basanta Mili of Baligoan village was the only person of the three whose bulbs were totally replaced by CFL's and over 2 months his savings was Rs. 103 or 70%.**

 Before distribution
  After distribution

Creation of a Biodiversity Knowledge Bank for NorthEast India - Balipara Tract & Frontier Foundation

Water security

Water recycling and harvesting

Experiments:

- 2 Units for recycling water from kitchens started.
- Talks held with IIT Guwahati for technical assistance and first rounds of visits to site made for a Rain Water Harvesting Project

Culture security and alternate livelihoods

Eco tourism

Extension:

- Joint Venture between Balipara Foundation and Xola Consulting Inc, a US based Adventure Tourism Consulting Group on identifying, developing and providing market linkages for adventure tourism (Hot Spots).
- Also launching Assam as a featured adventure tourism destination in the world (one of three, only one in Asia) in the tourism fare in Brazil in September 2008
- Introduction of:
 - Brahmaputra cruise on country boats and Fresh water dolphin viewing
 - River rafting and angling in the Bhorelli River
 - Tea treks, Cycle and Elephant Safaris
 - Guided Jungle walks
 - Guided Temple and Monastery visits
- Discussions are in progress with families of the different communities to set up village home stays activities relating to green travels & nature tourism will not only create economic value, but also promote nature as an asset and drive nature conservation awareness

Ghor Bari programmes

Extension:

- Pilot Project with 10 households initiated with local vegetables and poultry.

Item	Number of Households	Units Distributed	Cost of Distribution	Expected Revenue for the Household
Kuroilers (Poultry)	10	165	6,600	14,850
Vegetable Plants	10	200	1,000	4,000
Indigenous Trees	10	100	1,000	NA




Table 6. Source: Compiled by BTFF

Knowledge security

Engagement in organic and sustainable agriculture

Extension:

- BTFF is nurturing partnerships with a group of 1000 farmers across 50 villages comprising 8 diverse ethnic communities in order to learn and promote through experiments, scientific records and papers, sustainable agriculture and bio-diversity.

- To initiate organic agriculture, twelve hundred farmers have been enlisted for organic certification in the IQCS Programme, covering over fifty villages in the vicinity of Balipara

Training and demonstration through BTFF's "Knowledge Centre"

Extension:

- Two groups from Arunachal Pradesh, one group from various districts of Assam together with 2000 farmers of Balipara have already received training on organic agricultural practices, vermiculture & bio-pesticides through BTFF.
- Solar cooker demonstrations have been held in five centers with a total participation of 214 people. Two groups of farmers covering 22 villages have received training on the technology, operation and maintenance of bio gas. This was training conducted by BTFF personnel under the supervision of the IIT Guwahati.
- 8 farmers have undertaken System of Rice Intensification (SRI) experiments based on training received in BTFF's sustainability park.
- In addition, more than 300 students from local schools, as part of their environment education, have been engaged with solid waste management, Vermiculture techniques with bio- pesticides.
- Students from Tezpur University have been involved in the Eco-tourism Projects.

Creating awareness

Extension:

- Filming of the award winning documentary "An Inconvenient Truth" to more than 500 students.
- Paper published by Lord Nick Stern, Ranjit Barthakur and Dipak Kripalani for "Mitigating Climate Change impacts through Community Involvement",
- Launch of "Plan B 3.0 – Mobilising to Save Civilisation" by Lester R Brown, in English and Hindi in Delhi
- Published and Presented papers on "Naturenomics – The Growth Engine for a Resurgent Assam" for the Chief Minister of Assam in the UK and US

Creating knowledge base

Extension:

- Tracking of Analysis of Temperature and Rainfall Datas
- GIS Mapping of the BTFF Experimental Station.

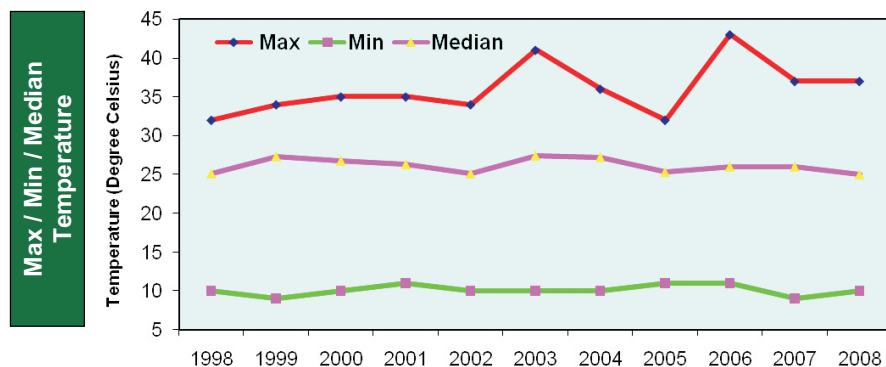


Figure 6. Compiled by BTFF

Annual Rain fall and No of Wet Days

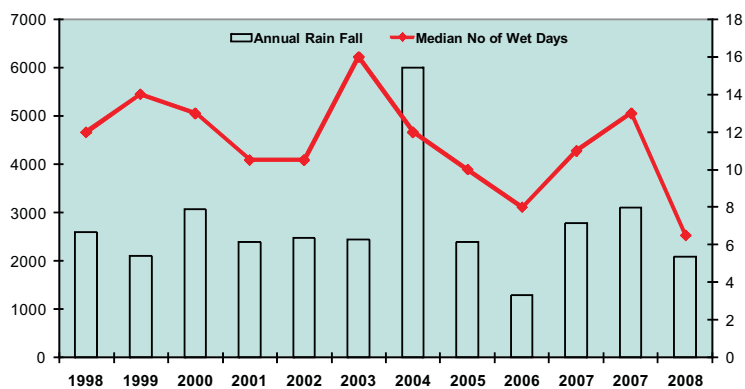


Figure 7. Compiled by BTFF

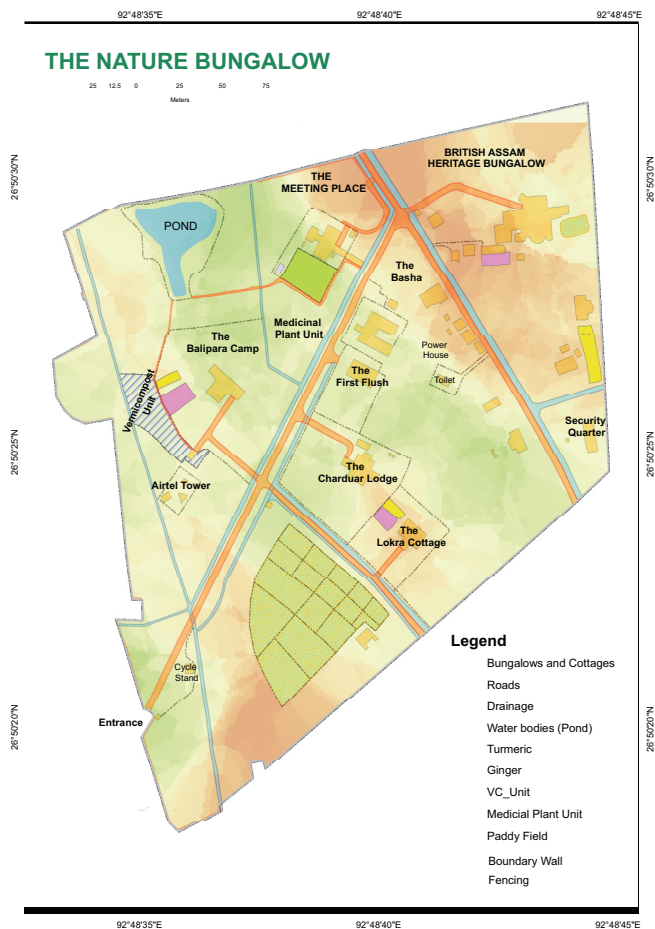


Figure 8. Compiled by BTFF

The organisational structure of BTFF

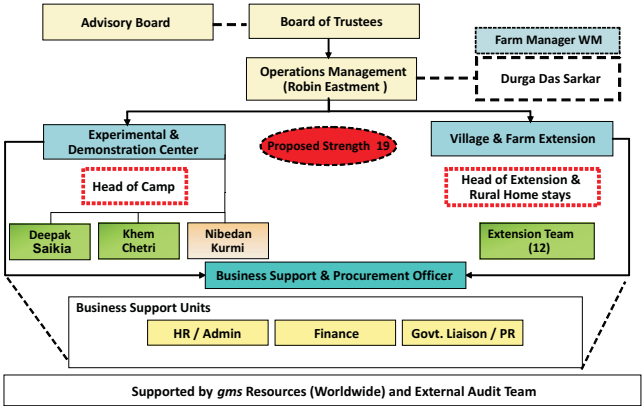


Figure 9. Source: Compiled by BTFF

Governance Structure

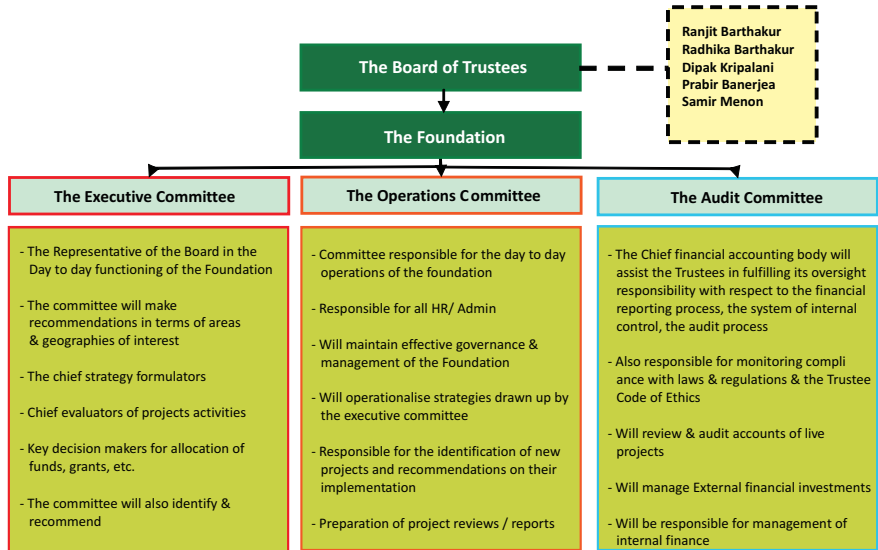


Figure 10. Source: Compiled by BTFF

Challenges and solutions

Going forward, major challenges have been identified in the areas of human resources, farm management, certification process, sourcing and logistics in the BTFF. The various mitigating options achievable in the medium to long term are also identified, illustrated in the table below.



Area	Challenges & Risks	Mitigation Options
HR	<ul style="list-style-type: none"> •Low levels of motivation and ambition •Apprehensive of any activity which is “unusual” or “new” 	Substitute lack of literacy/motivation with intensive training on relevant subject.
Farmer Management	<ul style="list-style-type: none"> •Low levels of literacy. •Limited risk taking ability due to economic conditions •Limited marketable surplus from farm produce based on current practices 	<ul style="list-style-type: none"> •Create and demonstrate “Success Stories” •Organise farmer groups into clusters
Certification Process	Lack of interest among farmers to embrace complicated procedure of maintaining farm documents necessary for certification.	Postpone certification procedure until groups are fully organised
Sourcing and Logistics	Small land holdings coupled with low production makes collection difficult.	Creation of collection centres at strategic locations, through local entrepreneurship

Table 7. Compiled by BTFF

Awards and achievements

Awards and achievements that the Balipara Tract and Frontier Foundation have received to date include:

- The organic homestay 'Wild Mahseer' delivered by BTFF in partnership with the British Assam Heritage, was awarded the 'Best NGO engaged in sustainable tourism' by CNBZ Awaaz, a leading Business News Channel.
- The premises of 'Wild Mahdeer' and the BTFF's 22 acre sustainability park have been certified as 'organic' by OneCert Inc, an international certifying agency headquartered in the US.
- The premises of 'Wild Mahdeer' have been awarded a platinum 'NatureSecure' certification for land security.
- Designated an observer organisation to UNFCCC summit – towards COP 15 session at the Copenhagen Climate Change Conference, Denmark.

It is our hope that we can add to these to demonstrate our achievements in the delivery of the sustainable and economically viable biodiversity knowledge bank and encourage even greater support of the foundation.

In the words of Founding Trustee and Chairman, Mr. Ranjit Barthakur:
“We want to Love, Learn about and Live with Nature”

Natural Gist

- A **Implementing Naturenomics™** promotes the capital formation for a region or of an organisation, developing ecologically 'compliant' assets in a sustainable manner.
- A **The Balipara Tract and Frontier Foundation (BTFF)**, a 'not for profit' NGO, has a mandate to 'facilitate and drive community level involvement, employment and income generation using social entrepreneurship in Naturenomics™ initiatives that are economically self sustaining'.
- A **Key focus areas of the foundation** include the securitisation of key natural assets of; land, water, energy, environment and provision of sustainable eco-livelihoods.
- A BTFF activities are conducted across verticals of; bio-diverse organic agriculture, bio-diverse forestry, organic floriculture, fisheries, animal husbandry, alternate and renewable energy, conservation and eco tourism. By closely monitoring and recording these activities, together with external conditions (temperature and rainfall) we create a **Naturenomics™ Knowledge Bank of Sustainable Practices**.
- A Awards to date: In partnership with Wild Mahseer, the BTFF has been recognised as **"Best NGO engaged in sustainable tourism"** by CNBC Awaaz, a leading business news channel. The 22 acre premises of BTFF are certified organic and have been awarded a platinum "Nature Secure" certification for land sustainability.
- A **Future challenges** have been identified in the areas of human resources, farm management, certification process, sourcing and logistics and need to be addressed through medium to long term mitigation actions.

Naturenomics™ in Practice

The key client of Balipara Tract and Frontier Foundation (BTFF) has been Wild Mahseer(WM), an organic homestay spread over 22 acres. The services offered to Wild Mahseer has been management of all farm activities in adherence to 'organic' principle. WM is an certified organic zone and has been certified by US based OneCert certification agency.

Apart from this the foundation is also responsible for the management of WM biodiversity and tying up with local communities for promoting culture and eco-tourism.



Eco-restoration of Urban Areas through Biodiversity Parks

Vilas Gogate, NatureFirst

Upsetting nature's balance

The achievements of the human race in recent years have no previous parallels, but these achievements have been attained at a cost to our environment. Such human development required unabated interference in the very nature that nurtures life on this planet, this includes human life. Nature fulfills every basic need essential for life by providing various ecological services. The presence of a vast diversity of biotic components and constant interaction among them ensures a healthy balance of nature and this alone ensures nature's capacity to provide the ecological services necessary to help life successfully progress on the planet.

Knowingly or unknowingly we as a human race have disturbed the delicate balance of nature and handicapped nature to the extent that it has lost its capacity to provide ecological services. Extensive urbanisation has demanded large scale interference in our landscape. The urban form encroached upon forested areas eliminating biodiversity components and depriving it from the essential ecological services that the forest previously offered. Urban development altered natural contours affecting drainage patterns and water regimes, brought with it air and water

The impact of development on biodiversity:

- Loss of green cover.
- Depleted natural resources.
- Adverse climatic conditions.
- Changes in land use patterns
- Changed water regimes.
- Polluted air, water and soil.
- Human health problems.
- Loss of biodiversity and extinction of species.
- Concerns about the possible extinction of life on earth.



pollution, accumulated solid and liquid waste. These seem to have become some of the negative, yet seemingly accepted, consequences of urbanisation.

With an increasingly rapid rate of urbanisation, the net result today is an environmental crisis. Realisation of the eminent danger lurking ahead has finally brought about a national concern for the safety and security of nature.

What is biodiversity?

Nature's security lies in the healthy presence of all biotic components and that is why there is special emphasis on biodiversity conservation in recent times.

"Biological diversity" encompasses all species of plants, animals and microorganisms and the ecosystems and ecological processes of which they are part. It is an umbrella term for the extent of nature's variety, including both the number and frequency of ecosystems, species, or genus in a given assemblage.

In a stable bio-diverse ecosystem the diverse biotic components meaningfully interact to ensure a healthy balance of nature enabling it to render complete ecological services. These ecological services include:

- Carbon sequestration.
- Water regulation.
- Regulate; oxygen, nitrogen and carbon cycle.
- Climate amelioration.
- Pollution control.
- Provide habitat for endangered and threatened species.
- Guarantee bioresources and food security.
- Improve aesthetic values.
- Providing a recreational and educational tool.



Eco-restoration & nature protection

Every biotic component within nature irrespective of its size has a distinct role to play and hence needs to be protected. There are several ways in which biodiversity and wildlife can be protected and enhanced within India.

Wildlife Sanctuaries & National Parks:

Wildlife sanctuaries and national parks aim to conserve our special habitats and ecosystems so that the full diversity of organisms has an opportunity to flourish in isolation of human interference. Hardcore conservationists believe true conservation is possible only when the site is totally secure from human intervention, allowing biological repair through the process of natural succession.

Wildlife Protection Act for Biodiversity:

The Wildlife Protection Act for Biodiversity ensures security in the remainder of our forested areas. This act however does not address the vast areas that are under human habitation and where biodiversity components are under tremendous pressure due to large scale human interference. Consequentially in urban areas many important species have become locally extinct and a large number of other species are threatened or vulnerable and now need our urgent attention.

Biodiversity Parks:

The concept of urban landscaped gardens or parks has a long history, but the idea was more a symbolic presence of greens with little concern for biodiversity and vulnerable to urban encroachment due to the high land values. Unlike conventional parks, 'Biodiversity Parks' have the same legal backing as wildlife protected areas and can therefore avoid development as well as benefiting our ecosystems and natural balance. However within the urban environment biodiversity conservation has many constraints:

- Most of the sites available are highly degraded, so cannot follow the 'ideal of true conservation', which allows nature to restore itself through natural succession, free from human intervention. The degraded nature of these site means it would take an age before tangible results can be seen, plus domination by weeds cannot be ruled out, which would defeat the aim of improving biodiversity.
- Urban projects should have scope for community participation. A site located within the urban area yet isolated from human interaction is always counter productive. In our experience communities accept ideas that provide immediate benefits and hence the project must have components that are community friendly.

The concept of Biodiversity Parks has evolved from these concerns.

Implementing biodiversity parks

For urban areas, the concept of biodiversity park is one of the most practical and viable solutions to addressing environment degradation. So this is the solution we shall focus on within this article. The planning of a biodiversity park requires in depth understanding of a site's profile, of the existing and proposed biodiversity, the history of the area and the local communities attitudes and their aspirations. This information is used to develop a long term plan for the park, allowing development in a phased manner. The plan should have special consideration for community participation, accommodating and attracting people to partake in recreational and educational activities.

A successful biodiversity park must create a healthy ecosystem, with the capacity to render full ecological services. To ensure a healthy, complete ecosystem the plant composition needs to be worked out on the basis of distinct plant communities. Providing optimal conditions for the biodiversity components to first rejuvenate and then flourish. This enables the park to continue developing and evolving through natural succession in perpetuity.

A biodiversity park has to consider space for every possible organism, which is found in the ecosystem that the habitat represents. However this cannot be achieved in one go and must be developed in a systematic manner starting with soil micro-organisms and moving up into the higher canopy level species. The plants are the basic building blocks that sustain animal diversity. But healthy plant growth is dependent on a diversity of soil microorganisms that create requisite chemical compositions for plants to absorb. The plants are also dependent on a healthy interaction with diverse animal forms to support; pollination, seed dispersal and on occasions even germination. These organisms in turn have their own needs for healthy growth and hence need to be considered during the planning stage.

As you can see biodiversity is a very dynamic phenomenon therefore when implementing a biodiversity park constant monitoring and adjustments are essential for its successful delivery. In our experience, the success of this type of project is dependent upon the whole hearted support of the scientific community, the local administration, together with strong voluntary support and engagement from the local community.

A case study: Eco-restoration of Delhi through biodiversity parks

The city of Delhi had the distinction of being the greenest capital during the 1960's, but by the year 2000 had transformed into one of India's most polluted cities. Consequentially unique habitats in three areas that had extraordinary diversity of flora and fauna, was subsequently lost or at least highly diminished. The loss of biodiversity in these areas could be exemplified by the following observations:

- Nearly 50% reduction in faunal components.
- Extinction of most herbal and floral components and a significant number of tree species.
- Loss of the majority of wetlands (around 450).
- Depleted water resources.
- Loss in the life sustaining capacity of the River Yamuna.
- Increased pollutant levels in air and water.
- Adverse climatic conditions impacting agricultural production.
- An increase of health problems in the local population.

Such degradation of the environment occurred primarily as a result of intense and rapid urbanisation. Out of concern for biodiversity and the desire to conserve it for posterity, a restoration program in Delhi was pursued and the strategy for biodiversity parks developed. The Lt. Governor, Delhi Mr. Vijay Kapoor was instrumental in conceptualising the idea of a Biodiversity Park development and overseeing its delivery.

Two biodiversity parks were proposed and then developed in Delhi with the following goals identified to reverse the downward environmental trend.

- Restoring green cover and biodiversity.
- Augmenting water resources.
- Reducing energy consumption.
- Controlling pollution at every level.
- Creation of an environmentally conscious society.
- Motivating communities to opt for an eco-friendly life style.
- Creating guidelines for people and institutions to follow.

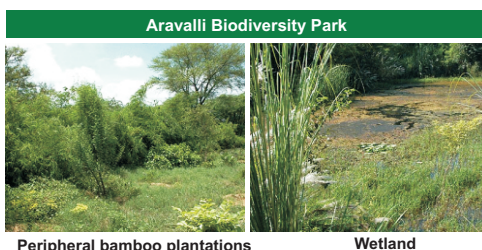
The two biodiversity parks proposed were; the Aravalli biodiversity park located on the south central ridge, spreading over an area of 692 acres and the Yamuna biodiversity park spread over an area of approximately 457 acres near Wazirabad village on the flat alluvial plains of the Yamuna.

The project was a joint collaboration between the Delhi Development Authority, University of Delhi under the chairmanship of Lt. Governor of Delhi and the Ministry of Urban Development as the funding agency. The Delhi Development Authority retained ownership of the land. Planning, designing and development along with day to day management comes under the responsibility of the University of Delhi. The long term future control placed with the Biodiversity Foundation an autonomous organisation, chaired by the Lt. Governor of Delhi.

This project was an ideal opportunity for the scientific community to work free from bureaucratic hassles allowing a show case restoration of highly degraded land in a short time frame. Visualised as a 10 year program (2002 – 2012) it was designed to be delivered in two phases. The project started with 157 acres of highly degraded land in the vicinity of the River Yamuna with the achievements in the first 2 years instrumental for getting an additional 692 acres delivered at Vasant Vihar. Adding to its sustainability value, no chemical were used in the parks together with a ban on the importing of soil or stones.

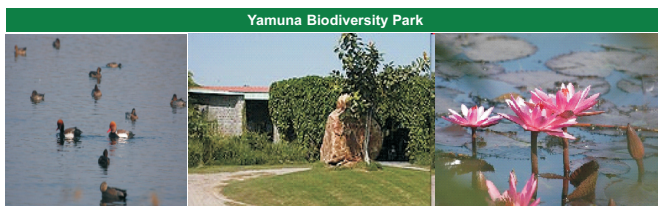
The parks are now the most visited public places in the city and serve as an open air laboratory for the student community. The parks also completely changed the biodiversity scenario of Delhi within five years of their creation, so that today there is:

- 900 Acres of degraded land has green cover.
- 2.5 Million cubic metres of rainwater is harvested annually.
- The majority of herbal species has been brought back, plus most of the faunal components.
- The parks are home for nearly 700 medicinally important species.
- The parks are an important urban carbon sink.
- Ecotourism can be promoted.



Peripheral bamboo plantations

Wetland



Nature Interpretation Centre gives insights into basic concepts

The following is a summary of the ecological enhancements made by the two biodiversity parks.

Ecological Enhancements in Aravalli Park

Spread over 692 acres originally consisting of exposed rocky outcrops, overburdened soils. The total invasion of exotic plants, absence of indigenous flora and non-availability of water was the main hurdle. Aravalli Biodiversity Park aims to conserve all possible biodiversity components known from the Aravalli ranges, contribute towards harvesting surface water runoff over more than 700 hectares of land in the vicinity and enriching city with key ecosystem services.

In more detail its conservation elements include:

Visitor Area

- Medicinal plants or Herbal garden.
- Wetland.
- Sacred grove.
- Butterfly corner.
- Orchidarium.
- Fern garden.
- Cacti garden.
- Natural trails.
- Nature interpretation facility.
- Camping site.

Conservation area

- 10 Biotic communities representing Gujrat Aravalli.
- 15 Biotic communities representing Rajasthan Aravalli.
- 10 Biotic communities representing Haryana and Delhi region.
- Rangeland spread over 100 acres with all grass species known from Aravalli ranges.

Ecological Enhancements in Yamuna Park

The project started with 157 acres of highly degraded land in the vicinity of the River Yamuna with pH ranging from 9 to 9.5, devoid of vegetation except a few Xerophytes. The target was the restoration of all biotic species known to exist in the city, plus within the conservation area biotic communities known to belong to the River Yamuna were promoted. The park is now recognised as a bird watcher's paradise especially for migratory winter visitors.

In more detail its conservation element includes:

Visitor area

- Herbal garden.
- Butterfly corner.
- Sacred grove.
- Ficus grove.
- Bamboo setum.
- Range lands.
- Symbolic presentation of 9 habitats (plant communities).
- Fruit garden.
- Cultivar species from Yamuna basin.
- Shallow and Deep Wetlands.
- Nature Interpretation Facility.
- Amphitheater.

Conservation area

- Sal dominating forest.
- Teak dominating forest.
- Acacia woodlands.
- Grasslands.
- Scrublands.
- Tropical thorn forest.
- Riparian forest.
- Wetlands.
- Marsh.

In the successful delivery of these parks, the following community benefits have achieved:

- An open air laboratory for the community enabling a better understanding of our natural heritage and the need to conserve it.
- Attracting as many tourists as the Bharatpur Bird Sanctuary and hence has the potential to provide a livelihood to a large number of people.
- The expertise now developed can provide guidelines for other areas and parks to be implemented further advancing Delhi's green credentials.

In conclusion

The delivery of biodiversity parks is technically challenging and requires skilled ongoing management, but from our experience the key factor for the success of a biodiversity enhancement initiative comes from there being sufficient motivation to drive it forward. It is this that results in effective ongoing development after initial implementation together with sufficient ongoing monitoring, to ensure that the goals of biodiversity conservation are in fact delivered. Such projects also community programmes which can assist and be part of the parks on ongoing development and improvement. The concept of biodiversity parks is one of the most practical and viable solutions to addressing environmental degradation in urban areas. As a result of the successful implementation of these 2 biodiversity parks Delhi city is now planning to implement 4 more. Following on from the delivery of environmental improvements our case studies have demonstrated that economic benefits can follow, for example allowing the promotion of eco-tourism and recreational opportunities, cost savings achieved through reduced pollution levels and from benefits of rainwater harvesting. In this way we are able to demonstrate that taking an ecologically aware approach can also result in new economic gains and opportunities.

Natural Gist

- △ **Nature's security** lies in the healthy presence of all biotic components, enabling it to render complete ecological services.
- △ **Biodiversity** encompasses all species of plants, animals and microorganisms and the ecosystems and ecological processes of which they are part.
- △ **Handicapped nature**, knowingly or unknowingly we as the human race have disturbed the delicate balance of nature to the extent that it has lost its capacity to provide essential ecological services.
- △ **Wildlife sanctuaries and national parks** conserve our special habitats and ecosystems allowing organisms to flourish in isolation of human interference, in line with 'true conservation' proposed by hardcore conservationists.
- △ **Biodiversity parks** such as those developed in Delhi (the Aravalli Biodiversity Park and the Yamuna Biodiversity Park); promote biodiversity, augment water resources, control pollution, capture carbon, provide amenity and bring about environmental awareness for the city's residents.
- △ **Successful delivery** of biodiversity parks requires skilled ongoing management together with the whole hearted support of the scientific community, local administration and engagement from the local community.

Naturenomics™ in Practice

Working with one of our esteemed consultants, Dr. Vilas Gogate, NatureFirst are able to benefit from the experiences of the Biodiversity Parks implemented in Delhi.



“Green Industry is Smart Industry” – Accelerating Economic Growth through Innovative Mitigation and Adaptation Responses to Climate Change

Samir Menon, Dipak Kripalani & Ranjit Barthakur NatureFirst

Climate Change – Call for Action

Globally, climate change is degrading our bio-diverse eco-systems and hence threatening our water and food security. Under the business-as-usual (BAU) scenario it is likely to result in risks of abrupt and major irreversible changes. We are increasingly and indiscriminately consuming more resources in terms of food, water, energy, materials and at a much faster rate than our planet can replenish naturally. Carbon emissions have already pushed up global temperatures by nearly 1°C relative to the mid-19th century. If no action is taken on emissions, there is more than a 75% chance of global temperatures rising between 2°C and 3°C over the next 50 years. There is a 50% chance that average global temperatures could raise by 5°C some time next century under BAU. The chart below captures the impact of BAU on the Global Emissions.

The Fourth Assessment report of the International Panel on Climate Change (IPCC-AR4) concluded from direct observation of changes in temperature, sea level, and snow cover in the northern hemisphere during 1850 to the present, that the warming of the earth's climate systems is unequivocal.

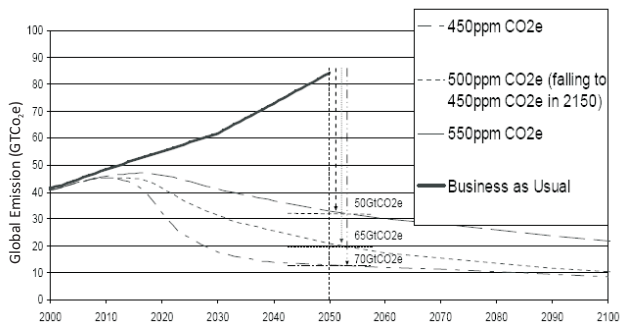


Figure 1. Source: Compiled by NatureFirst-GEMS

The explosion in global population has been the other key trend that has further exacerbated the situation. The world had a population of a billion people in 1804. It took another 123 years to add the next billion by 1927. The third billion achieved by 1961 took only 34 years. However in the last 47 years the population has more than doubled and increased by 3.5 billion people.

Furthermore, most countries are experiencing a direct link between CO₂ emissions and GDP meaning when whilst economic activity rises, emissions also increase. The effect is known as coupling. Historically countries with higher GDP's and per capita income and high emission rates typically had lower population growth rates. However, countries like China, India and Brazil with large populations and significant population growth rates are now exhibiting high GDP and per capita income growth rates resulting in a dramatic increase in emissions. The process of decoupling emissions from economic growth has been slow.

Developing countries are the earliest and worst hit by climate change. China and India are both on a rapid growth path (8-10% GDP growth over the last 2-3 years, with this growth rate expected to continue). However, there is a strong body of opinion suggesting that there is a choice between rapid economic growth and climate change mitigation. However, we argue that this is not a choice, but that action on climate change is actually an imperative. And embarking on climate change mitigation strategies can drive economic growth.

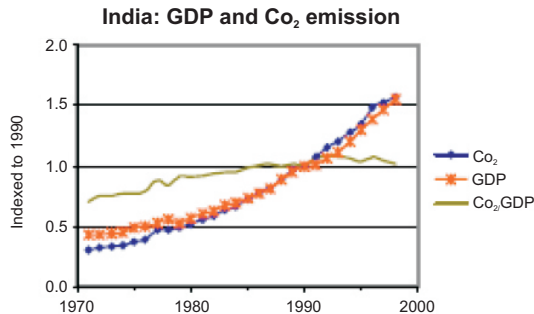


Figure 2. Compiled by NatureFirst-GEMS

We also believe that we need to think beyond just carbon and more in terms of consumption. This leads us to examine all greenhouse gas (GHG) emissions. Lord Stern puts the global importance of local GHG emissions into context with the following statement:

“Greenhouse gas (GHG) emissions are externalities and represent the biggest market failure the world has seen. We all produce emissions, people around the world are already suffering from past emissions, and current emissions will have potentially catastrophic impacts in the future. Thus these emissions are not ordinary, localised externalities. Risk on a global scale is at the core of the issue.” The actions of industry has a significant impact on GHG emissions driven by their utilisation and consumption of resources.

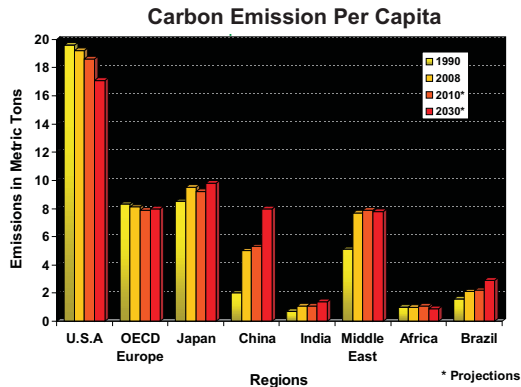


Figure 3. Source: Energy information administration (October 2008)

This can be measured by estimating the consumption footprint of an organisation, which is the impact that its activities are having on the environment i.e. Land, Energy, Water, Waste, Air & Carbon (LEWWAC). This rapidly expanding consumption footprint is causing a sustainability gap which needs to be addressed to help stabilise GHG emissions

As a result, we need to work with industry to help achieve the concept of “Consumption Neutrality”. To lower their footprints with initiatives focused on improving efficiency and enhancing productivity. To avoid or replace processes that are dependent on high-carbon intensive sources and offset or neutralise the impact through a suitable implementation program, including compensatory mechanisms.

It is also imperative to assess the performance of industry on these parameters using the currently available systems of economic rewards or create a new paradigm that helps measure and reward Consumption Neutrality more effectively. We believe this new paradigm is Naturenomics™ - which nurtures the interdependence between nature and economics and provides a compelling alternate approach to sustainable development.

Green House Gases

Greenhouse gases (GHGs) are the gases present in the earth's atmosphere which warm near-surface global temperatures through the greenhouse effect. Greenhouse gases are essential to maintaining the temperature of the Earth; without them the planet would be so cold as to be uninhabitable. However, an excess of greenhouse gases can raise the temperature of a planet to lethal levels, as on Venus where the 90 bar partial pressure of carbon dioxide (CO_2) contributes to a surface temperature of about 467°C (872°F). Greenhouse gases are produced by many natural and industrial processes. Based on ice-core samples and other records the current levels of CO_2 are approximately 100 ppm higher than immediately before industrial times,

when direct human influence was negligible. Today industrial processes, power stations and transportation fuels are large contributors of greenhouse gases globally.

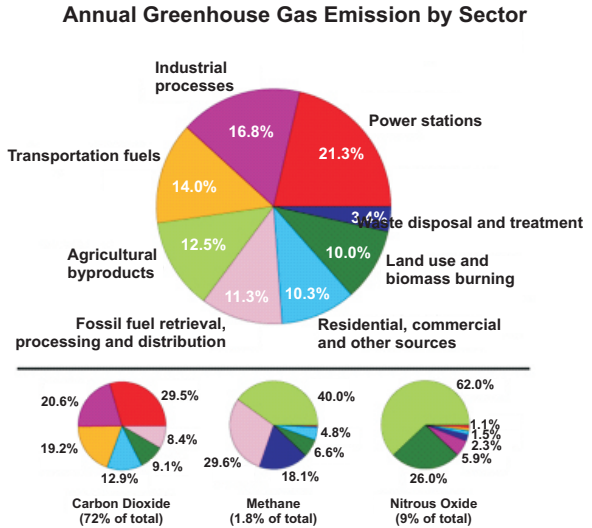


Figure 4. Source: www.nysforum.org

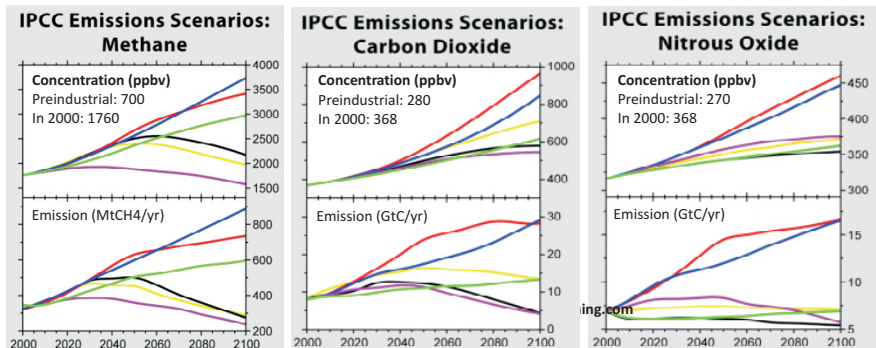


Figure 5. Source: www.nysforum.org

This figure documents the projected man-made emissions and atmospheric concentration of methane according to the six illustrative scenarios developed by the Intergovernmental Panel on Climate Change (IPCC). Methane is the second most significant greenhouse gas in terms of emissions produced in the year 2000. Emissions are expressed in million (10⁹) tonnes of methane per year (MtCH₄/yr) and concentration in parts per billion by volume (ppbv). Each of these scenarios are developed to illustrate one of a range of possible technological, economic and ecological futures that the IPCC Special Report on Emissions Scenarios considered plausible. Every scenario imagines a world in which no explicit action is taken to combat greenhouse gas emissions, but some scenarios (B1 and B2) explore worlds where "increased environmental awareness" lead independently to pollution controls and cleaner technology. In this sense, every scenario considers a possible world that might occur in the absence of concern for global warming, and thus represent the range of possible futures in the absence of explicit regulation. However, some contemplate drastic changes to global energy infrastructure, while others might be considered a more direct continuation of existing trends.

The wide breadth of scenarios considered to be possible is one of the key factors contributing the large uncertainty in estimates of global warming effects during the 21st century (1.4 to 5.8 °C from 1990 to 2100 [IPCC 2001]). The other key factor is disagreement amongst models of the response expected for a given greenhouse gas concentration.

India's Consumption Footprint

Our suggested approach is to look at India's consumption footprint in terms of the 6 forces of ecological competitiveness LEWWAC – Land, Energy, Water, Waste, Air and Carbon.

Land

Land use in India has been largely unplanned and has included, amongst other things, the destruction of forest land, agricultural use of land, industrial use of land, destruction of aquifers and 'urbanisation' of land. The key trends are:

- Forest land is now only between 17% - 20% of our total land use with increasing urbanisation and industrialisation encroaching upon it.
- Poor land use practices and management have contributed to the rapid decline of land quality in the country.
- Excessive use of chemicals and fertiliser has increased the toxic levels in the land as well as the aquifers.
- The productivity of our land has plateaued and even decline in certain areas as a result of the actions above, putting the agriculture sector, which still provides the livelihood for a majority of the population, at grave risk. Growth in the agricultural sector in recent times has been around 1.5 – 2.5%, which is clearly not enough to sustain a large and growing population base like India.

Energy

Energy is a significant contributor to the consumption footprint of the country and the current proposed plans do not envisage a reduction of reliance on high carbon-intensive fuels to generate electricity. While our per capita primary energy consumption remains low compared to the world average, it is growing rapidly.

- Indian industry is the single largest consumer of commercial energy, accounting for about 52% of total energy consumed.
- India is a large consumer of petroleum products. According to estimates made by oil companies the demand for motor gasoline and diesel will touch 13.2 and 77.6 million tonnes respectively by 2006-07.
- India is both a major energy producer and consumer. India currently ranks as the world's 11th largest energy producer, accounting for about 2.4% of the world's total annual energy production, and as the world's 6th largest energy consumer, accounting for about 3.3% of the world's total annual energy consumption. Despite its large annual energy production, India is a net energy importer, mostly due to the large imbalance between oil production and consumption.
- In 2005, India's per capita total primary consumption was 14.8 Million Btu (British Thermal Unit) compared to the World Average of 71.8 Million Btu, China at 51.4 Million Btu and the USA at 340.5 Million Btu

Water

Water utilisation is closely linked to the economy of a country. Our rapid economic progress has resulted in an increase in water withdrawals and utilisation. However the more critical challenge has been the destruction of aquifers due to the rapid degradation of the eco-system and excessive use of fertilisers and pesticides. In addition the melting of the Himalayan glaciers is leading to the loss of one of the larger reservoirs of fresh water in the world.

- Aquifer management is the need of the hour – rebuilding our damaged aquifers and increasing ground water tables is an activity that Indian industry needs to sponsor more actively. There are some examples of companies who are actively involved in these activities.

- Also because water is not effectively priced in India, the water management practices need to be enhanced and disseminated particularly to the agricultural community.
- According to UNDP's World Water Development Report, 2003 (WWDR, 2003), household's account for only 8% of global water consumption.
 - o The agricultural sector is the largest user of water globally and accounts for about 70% of the total freshwater abstraction.
 - o However, it is predicted that both these users will be outdone by industry – in some of the higher income countries with a transition away from agricultural economies, the industrial water use is almost twice the amount used in agriculture.
- In 2003, India's per capita water consumption is 615 cubic metres compared to the World Average of 618 cubic metres, China at 484 cubic metres and the USA at 1,647 cubic metres.

Waste

Effective management of waste and utilisation of waste from one process as the input for another process needs to be a key area of focus for Indian industry. There has been a local system of recycling for a number of years, however the sheer volume and composition of waste has put the system under tremendous pressure.

- Presently in India, about 960 million tonnes of solid waste is being generated annually as by-products during industrial, mining, municipal, agricultural and other processes. The composition of this waste includes:
 - o 350 million tonnes are organic wastes from agricultural sources;
 - o 290 million tonnes are inorganic waste of industrial and mining sectors and
 - o 4.5 million tonnes are hazardous in nature.
- Income levels, economic growth, lifestyle, and location strongly influence composition of waste
 - o Poor households, for example, generate higher fractions of organic waste than wealthy ones.
 - o In high-income countries, however, consumption of processed food and packaged products results in a higher percentage of inorganic materials such as metals, plastics and glass.
- Excessive land and water pollution have resulted in the need for more effective waste management of waste-water. Technology has also advanced to a level where a large percentage of this water can be re-used.
- In 2005 India's annual per capita municipal solid waste was 128 kgs compared to the USA which was 720 kgs.

Air

While India's gross domestic product has increased 2.5 times over the past two decades; vehicular pollution has increased eight times, while pollution from industries has quadrupled.

- Sources of air pollution, India's most severe environmental problem, come in several forms, including vehicular emissions and untreated industrial smoke.
- Apart from rapid industrialisation, urbanisation has resulted in the emergence of industrial centres without a corresponding growth in civic amenities and pollution control mechanisms.
- Table on the commencing page shows the pollution levels at major Indian cities.



City	City Population (in thousands) 2005	Particulate matter (micrograms per cubic meter) 2004	Sulfer dioxide (micrograms per cubic meter) 1995 - 2001 ¹	Nitrogen dioxide (micrograms per cubic meter) 1995 - 2001 ¹
Kolkata	14,277	128	49	34
Madras	6,916	37	15	17
Delhi	15,048	150	24	41
Hyderabad	6,115	41	12	17
Kanpur	3,018	109	15	14
Lucknow	2,566	109	26	25
Mumbai	18,196	63	33	39
Nagpur	2,350	56	6	13
Pune	4,409	47	-	-

Table 1. Compiled by NatureFirst-GEMS

In summary, Indian industry has a significant consumption footprint, as follows:

- **Land** - Indian industry 'consumes' a significant portion of India's land and has a major impact on deforestation.
- **Energy** – over half (52%) of total commercial energy consumed in India is by industry, and this is expected to increase rapidly with the projected economic growth.
- **Water** – Currently a majority of fresh water in India is used by agriculture (70%). However as industrial growth outstrips agricultural growth, it is predicted that fresh water use by Indian industry will expand considerably as has been observed in developed countries where industrial water use is twice that of agricultural use.
- **Waste** – Indian industry generates about half the total waste in India, and even higher if a portion of the organic waste is attributed to industry.
- **Air** – Industrial pollution has grown 4 times in the last 20 years.
- **Carbon** - Contribution of industry to India's carbon footprint.

Green Industry and Roadmap to Eco-Transformation

Green Industry achieves environmental and economic sustainability by focusing on the following six parameters of the consumption footprint i.e.:

- Land
- Energy
- Water
- Waste
- Air
- Carbon

The objective is to ensure efficient utilisation of resources, replenishing the natural reserves and re-using as much as possible hence minimising the environmental impact from its activities. In order to achieve these objectives, industry needs to develop a new paradigm. Ecology needs to be at the centre of the paradigm and the initiatives would support the claim that 'Good Ecology is Good Economy'.

The key business areas that will be impacted in this eco-transformation would include:

- **Green Facilities** – ensuring that the infrastructure is eco-friendly and energy and resource efficient.

- **Green Supply Chain** – Establishing green logistics systems where companies must take more account of the external costs of logistics associated mainly with climate change, air pollution, noise, vibration and accidents. Develop a system that reduces these externalities and achieves a more sustainable balance between economic, environmental and social objectives.
- **Green Human Resource policies** – develop a change management framework that links ecological performance to compensation and reward.
- **Green Financing / Funding** – Eco-banks to create a pool of funds to initially support Green initiatives ensuring that the same fiscal rigor is being applied as would be done with other projects.

Industry would typically need to follow the following path to eco-transformation:-

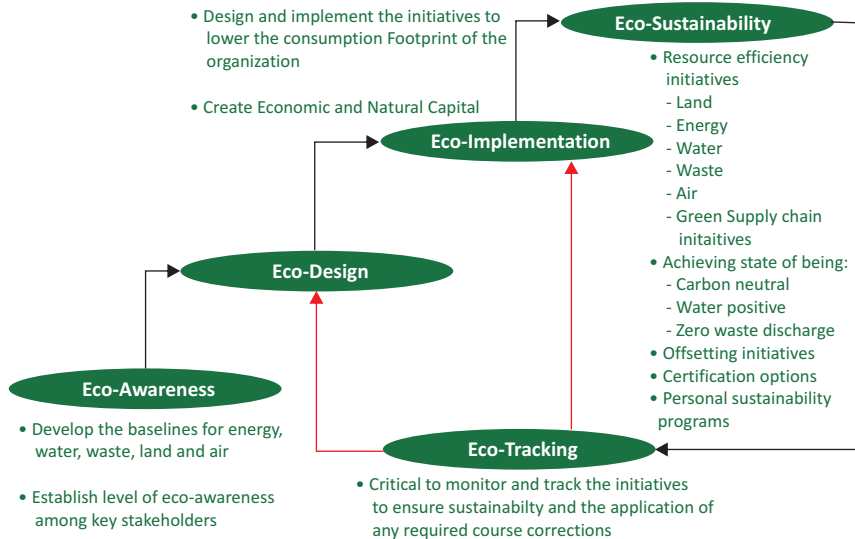


Figure 6. Source: Compiled by NatureFirst-GEMS

Benefits to Industry for Implementing Green Strategies

There are several benefits that accrue to industry as they embark on their green strategies. These areas of benefit are:

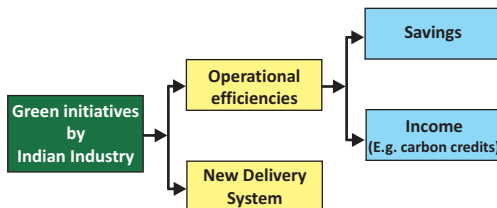


Figure 7. Source: Compiled by NatureFirst-GEMS

Operational Efficiency

- “Green Strategies” particularly in the areas of Energy, Waste and Water are designed to enhance productivity and hence generate bottom line savings.
- Effective Utilisation of Resources (e.g. Energy, water, materials)
- Lower operating costs with increased efficiency programs (driven by technology, systems and products)
- Lower 'Total' Lifecycle Costs (eg. proactive waste management)

- Increased Staff Productivity (eg. Due to lower indoor and outdoor pollution levels)

Financial Benefits

- There are two main streams of revenue
 - Savings stream driven by the operational efficiency initiatives being implemented.
 - Income stream due to carbon credits for applicable projects.
- There is also better utilisation of funds / resources due to the productivity initiatives and enhanced natural capital.
- Opportunity to qualify for the “Green Incentives” program that needs to be instituted to support this initiative.

Establishing a new global delivery system to address the opportunities

- Create a unique position in the industry.
- Developing products and services for the new 'awakening' customer.
- Proactively plan and manage for any business or regulatory impact to the business.

Key Enabling Factors

In order to enable industry to adopt and implement green strategies, the following enabling factors would need to be established:

- Product and service providers – Indian industry would need access to a vibrant pool of product and service providers in each vertical to work with them to design, implement and sustain green initiatives, since capacity and skills would not always be available in-house.
 - Provide incentives for manufacture of “green” products.
 - Place a priority on ensuring wind turbines, solar panels and LED (Light Emitting Diode) are made in India, providing large new markets for existing and emerging industries.
 - Provide advisory and implementation services to Indian industry to help unlock the benefits.
- **Industry and trade associations** - Industry organisations can play a critical role to facilitate the transition of their members towards consumption neutrality. They provide an excellent forum for a dialogue between various constituents (industry, policy makers, etc) to move Indian industry towards the environmental and ecological consciousness, and consequent action. Being 'knowledge chambers', they are well positioned to become the destination for its members for ecological knowledge capital.
- **Government policy** – government policy would need to be configured in order to support Indian industry to embark on the path to green transformation. This would need to include:
 - Incentives (subsidies, low interest loans, lower taxation for implementing green initiatives, etc).
 - Disincentives (higher taxation for lack of action, etc) to encourage corporations to become green.
 - Establishment of a fund to help the re-generation of the eco-systems.
- **Aggressive Target Setting** – it is critical for us to set stretch targets, such as the following for 2020:

- o **Green Supply Chain** – Establishing green logistics systems where companies must take more account of the external costs of logistics associated mainly with climate change, air pollution, noise, vibration and accidents. Develop a system that reduces these externalities and achieves a more sustainable balance between economic, environmental and social objectives.
- o **Green Human Resource policies** – develop a change management framework that links ecological performance to compensation and reward
- o **Green Financing** – creating a pool of funds to initially support Green initiatives ensuring that the same fiscal rigor is being applied as would be done with other projects.

Industry would typically need to follow the following path to eco-transformation:-

Land	30% of total areas planted with bio-diverse endemic species of carbon, dust and noise buffers zero soil toxicity, and ensuring 100% organic inputs in the soil.
Energy	60% of all energy requirements supplied by renewable energy and cogeneration options, of which at least 75% should be from solar and wind 50% savings in energy consumption through energy efficiency initiatives.
Water	100% water neutral – i.e. water consumed replaced by water recharge (cradle to cradle) 80% recycling of water through appropriate treatment mechanisms.
Waste	100% closed loop waste management systems including reuse or recycle of waste – zero waste to landfills.
Air	Establish enforceable clean air act, Indoor and outdoor air quality as per prescribed standards for particulate matter, No_x , So_x , etc
Carbon	Reduction of carbon footprint by 50%, and its monetisation through compensatory mechanisms stabilise CO_2 levels to between 300 – 350 ppm, and then gradually reduce it to 250 ppm by 2050.



Table 2. Compiled by NatureFirst-GEMS

Achieving these targets could create an additional 20 million 'green jobs' by 2020

- **Role of Media** – Media plays a critical role in the success of this initiative. It can help disseminate information, spread awareness, celebrate successes and identify and highlight areas where enhancements are required. The ubiquitous nature of the current media can play a crucial role in the success of these initiatives.
- **Education** – An integrated education framework would need to be designed and implemented across all sectors of education – primary, secondary, degrees and vocational. This would not only create awareness (primary and secondary), but also build skills and capabilities (degree and vocational) to provide a 'green workforce' for Indian industry.
- **Research and Development** – This is a new field and is expanding and growing extremely fast. As a result we need to have academics involved and engaged to help us identify the most appropriate solutions (technology, system or process). All engineering colleges and bio-diversity institutions should be actively involved in these programs to help ensure that the country has access to best technology at the best price.

- o Increase funding for basic research on climate change and low carbon technologies in universities and in research laboratories.
- o Work with universities and the energy industry to increase the number of science and engineering graduates and staff qualified in relevant disciplines.
- o Support international cooperative research.
- **Green financial framework** – This is one of the most critical enabling factors as the costs related to implementation of green strategies by Indian industry would be quite high, new and innovative funding sources and structures would need to be discovered. It is imperative for the government and the financial community to develop a sound and robust financial framework for the initiative. This would include:
 - o Green Incentives
 - o Green Taxation
 - o Green Capital (Capex)
 - o Green Financing Mechanisms (Opex)

Indian Industry - Climate Change Mitigation and Adaptation Strategies

Indian Industry has begun to embrace the concept that Climate Change does represent an opportunity rather than just a threat. They are at different stages of the eco-transformation journey – however most of them are at the early stages of trying to understand their baselines and current status. General awareness is growing and the revenue and positioning potential is attracting more converts.

Climate change strategy for Indian industry is linked to developing mitigation and adaptation strategies in each of the key parameters of the consumption footprint. Samples of some of the initiatives are listed below:

- **Land**
 - o Ecologically conscious use of land that is currently used by Indian industry (eg, plant carbon buffers where land is available and not currently utilised, use of eco-friendly building materials, etc).
 - o Sponsor the restoration of “Green Cover” or Afforestation across the country to achieve set targets.
 - o Ensure that no waste goes to landfills and no toxic waste enters the land.
 - o Reduce fertiliser and pesticide use to lower the toxicity of the land.
- **Energy**
 - o Encourage renewable energy use with a combination of incentives to encourage use and disincentives to discourage use of conventional high-carbon sources.
 - o Develop energy efficiency / usage benchmarks for industry.
 - o Develop standards for energy efficient appliances – continuously raise the bar on enhancing energy efficiency in own products as well.
 - o Help large industrial companies make the transition to sustainability with energy audits paid for by the government.
 - o Assist companies in making sustainable change by using funds collected through the auction of emission credits.
 - o Support and utilise industry associations to ensure that best practices of these industries are shared and promoted. Additionally, introduce tax incentives for large emitters to use today's technology to reduce emissions.
 - o View the industrial sector as a source of energy and invest in cogeneration.
- **Water**
 - o Effective recycling and reuse of water through water treatment initiatives.

- o Prevent extraction of ground water by industrial facilities
- o Restoration of aquifers and enhance the water table
- o Make rainwater harvesting mandatory in all industrial facilities

• **Waste**

- o Develop “closed loop” waste management systems
- o Focus on utilising waste from one process as the input for another process (eg. Waste heat recovery)
- o Develop a zero waste certification programme for Indian industry

• **Air**

- o More stringent measurement and monitoring of indoor and outdoor air quality
- o Development of products and services to help improve and sustain the air quality and measure and monitor pollution cost-effectively.

In addition there are some key horizontals that need to be focused on:

• **Green Transport Strategy**

- o Provide incentives to manufacturers who develop and manufacture cars with lower or zero greenhouse gas.
- o Provide incentives to businesses and corporations to green their transportation fleets by increasing fuel efficiency and reducing greenhouse gas emission.
- o Support pedestrian and cycling infrastructure in communities as part of the commitment to sustainable transport.
- o Increase support for rail transport as a more energy efficient means of moving freight and people.
- o Develop standards and guidelines to create green highways impacting construction, implementation and maintenance.

• **Green Certification**

- o Develop an 'outcomes' based certification programme.
- o Certification to cover all aspects of the consumption footprint – LEWWAC.
- o Sustainability to be a key aspect of the periodic renewing of the certification.

Indian industry stands at a critical cross-roads and holds the future health of our country in their hands. They can choose to treat the tested path set out by the developed economies reaping the benefits of initial rapid growth, but then must be prepared to face the challenges of sustaining the growth with the existing economic model.

The alternate option is to pave a new path of development one that will initially be more challenging. A path, without all the guidelines and systems in place and with a level of uncertainty about the outcome, but this will be the path that holds the promise of being more sustainable relying on a model that puts ecology at the heart of our economic development.

This is the chance for Indian industry to step up to the challenge and prove their worth once again by turning a crisis into an opportunity for the country and the world.

Natural Gist

- A **Global security of food, water and eco-systems** is being threatened by climate change. We are consuming natural resources at a rate faster than our planet can replenish. In the last 47 years the world population has more than doubled, adding 3.5 billion people. Growth that increases our consumption rates and further stresses our global resources.
- A **Developing countries**, like India, are the earliest and worst hit by climate change. Carbon emissions have sped the rise in global temperatures; there is now a 75% chance of global temperatures rising 2-3 degrees Celsius over the next 5 years.
- A **A link between Co₂ emissions and GDP** is experienced by most countries, known as 'coupling'. So when economic activity rises Co₂ emissions also increase. Countries such as India, with large populations and significant growth rates are now exhibiting growing GDP resulting in dramatic increases in their emissions.
- A **Greenhouse gas (CHG) emissions** are significantly impacted by the actions of industry. It is the current CHG emissions that will have a potentially catastrophic impact on our future.
- A **Large corporations** have extremely large ecological and consumption footprints. To achieve consumption neutrality within our businesses, the way companies work must be rethought.
- A **Climate change mitigation strategies** can drive economic growth. Naturenomics™ is the new paradigm, promoting efficient resource utilisation together with minimising environmental impact from the activities. Such an approach can also enhance a company's efficiency and productivity.
- A **Indian industry must pave a new sustainable path.** There is no choice between rapid economic growth and climate change mitigation. We must put ecology at the heart of economic development.

Naturenomics™ in Practice

We have presented these thoughts to various leaders in government, major political parties, economists and environmentalists and the same has been used in very many of the areas influenced by these leaders.



Green Hotels: Responding to the Impact of Climate Change

Rati Bhattacharya & Anshuman Hazarika, NatureFirst

Global Hospitality Industry faces up to Climate Change

Today's modern buildings are no doubt a marvel in terms of architecture and technology, but have also led to an adverse impact on the environment. New age buildings account for 12% of water usage, 30% of green house gas (GHG) emissions, 65% of waste output and 70% of electrical consumption.

The tourism & hospitality Industry are closely interlinked and are both affected by climatic variability and change. Climate defines the length and quality of tourism seasons and plays a major role in choosing destinations as well as the tourists spending.

Climate affects a wide range of the environmental resources that can either work in favour or against tourist attractions. While wildlife productivity, biodiversity, multicultural and multilingual societies all attract tourists, there are several factors that can deter tourists, such as the existence of water borne disease or water borne pests e.g. jellyfish and algae blooms, unhygienic environments a result of inappropriate waste management and other extreme events such as tropical cyclones.

Based on the Travel & Tourism Competitiveness Report of 2008, The World Tourism Organisation (UNWTO) estimates emission from the global tourism and hospitality Industry represented 5 % of the total global green house gas emissions in 2005. Transportation accounting for the highest at 75% (as represented in Table 1) and accommodation accounting for the remaining 25%. These results emphasise the importance of sustainability in the travel, tourism and the hospitality industry.

Emission Source	CO2 Metric Tones	Percentage
Transport Subtotal	985	75
Air Transport	517	40
Other Transport	468	35
Accommodation	274	21
Activities	45	4
Total	1,307	100
Total worldwide	26,400	-
Share Percent	-	4.95
UNWTO et al., 2007		

Table 1: GHG Emissions by Travel & Tourism Industry

A sustainable travel, tourism and hospitality industry is one that optimises the use of national resources with minimum ecological, cultural and social degradation, while maximising benefits to the environment and community.

The need for achieving a sustainable travel & tourism is not a new idea. However, the need for the tourism and hospitality industries to demonstrate leadership by introducing policy instruments that target the achievement of sustainability has only recently become important.

Both developed and developing countries are contributing to this cause and are demonstrating efforts towards redefining systems and processes to achieve optimum efficiencies in their national, legal and international systems and processes. This was recently brought to light, when the T & T Competitiveness Report of 2008, released a list of the Travel & Tourism Competitiveness Index for the year 2008 which compares 130 countries across the globe on the key parameters that directly or indirectly impact the world's Travel and Tourism.

The World Economic Forum (WEF) recognizes 14 "Pillars" as the basis to compare the T&T industry on competitive grounds in different parts of the world. Fortunately enough, Policy Rules & Regulations and Environmental Sustainability forms the first two pillars of the list, highlighting the fact that the hospitality industry ought to place sustainable green hospitality as playing larger and more important roles in both brand enhancing and addressing the issue of climate change.

The table 1. compares 5 key subsets of the first two competing pillars of the T&T competitiveness report of 2008. In summary:

India ranks fairly low in terms of stringency and enforcement of environmental regulations as compared to other listed countries. This talks about the manipulation of the various environmental and pollution acts as per the convenience of the businesses.

India scores a relatively good ranking in terms of low Co₂ emissions from the travel, tourism and the accommodation sector. Though this is due to India having a large population helping it achieve low per capita GHG emissions.

In terms of conserving natural resources through travel and tourism, India ranks better than Ireland and Singapore. This is a result of India embracing the concept of Eco – Tourism, a concept that represents true sustainable green hospitality.

There is also a visible and powerful trend appearing in consumers, who are becoming more concerned about the environment. Many would even argue that this is not a trend at all, but a lifestyle choice by consumers with a permanent sensitivity for the environment. Indeed, the greening of the travel and hospitality industry in the next few decades could be the single most significant driver of marketing, revenue and cost benefits. Consumer awareness and shifts in attitudes are driving green initiatives.

Over the last few years, the leading hotels of the world recognises that consumers were sending a clear message that their environmental commitment was affecting the relationship companies have with them. They are committed to preserving the environment, so much so that many are willing to shift their purchase decisions and brand loyalty to meet this commitment.

What is Green Hospitality?

As much as “Going Green” seems to be the buzz word today among the major corporations and industries of the world, penning down the definition of “Green Sustainable Hospitality” as a term becomes as difficult as being a very rare phenomenon to be witnessed in the market.

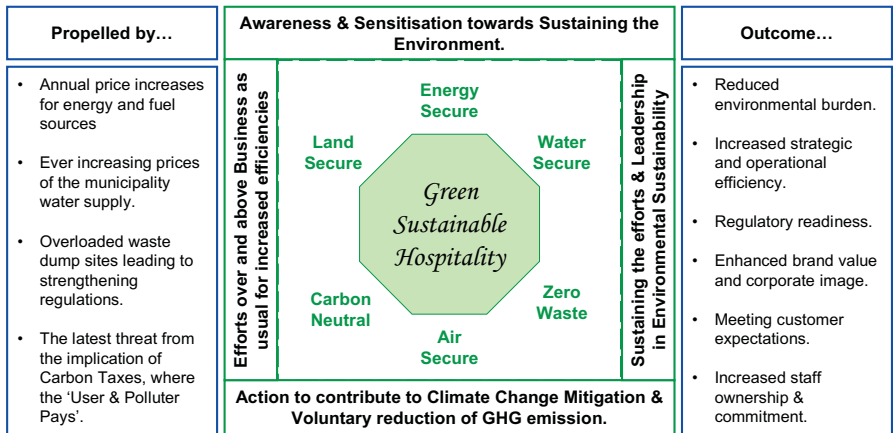


Figure 1. Source: Compiled by NatureFirst-GEMS

Green Hotels as such, can be defined as hotels which demonstrate efforts, which are beyond their business as usual practices towards the following key aspects and parameters:

- Conservation and Optimisation of their key natural resources of Land, Energy, Water, Materials (which over its life cycle get converted to Products & Waste) and Air.
- Incorporation of efforts over and above their Business as Usual (BAU) hospitality services to reduce, mitigate or / and offset their direct or Indirect carbon footprint.
- Benchmark their Environmental Performance Indicators (EPI's) against the best of their national and international competition and constantly show steps towards improvement of their services to benefit their triple bottom line of environment, social and economic.
- Sustain the above efforts to maintain leadership in green hospitality services.

On one side of the coin, being green goes directly to the triple bottom line, enhancing the long-term value of your property, on the flip side, being green goes directly to the front doors which open wide to bring guests back again and again. Green hospitality services thus helps business to increase and sustain profits whilst meeting their Corporate Social Responsibility (CSR) obligations.

The Need for Green Sustainable Hospitality

The need of the hour for the hospitality industry to “Go Green” are driven by various aspects, primarily these factors are;

- Greenhouse gases are at higher levels in the atmosphere than at any time in at least 800,000 years

- Human activities led by burning of fossil fuels, release heat-trapping gases resulting in modern global warming that disrupts water and food supplies with ever more droughts, floods and heat waves.
- Annual price increases for energy and fuel sources now reaching well above the rates of inflation.
- Increasing prices of the municipality water supply combined with fluctuating demand – supply curve of the tanker water supply.
- Overloaded and inappropriate management of waste dump sites due to excessive waste quantities forcing municipal bodies to increase tipping charges and strengthen regulations for appropriate waste disposal.

Finally last but not least

- The application of carbon taxes, where the 'User & Polluter Pays' policy will be the word of the town.

Greening Your Hotel

The Greening of the hospitality industry by implementing environmental management practices has several key benefits for the company, these are:

- Cost savings that make business sense - Hotels that maximise efficiency and reduce waste will be more cost effective than their competitors. Generally a hotel can reduce its energy by 20 to 40 % without adversely affecting performance. Often, the measures that hoteliers can take to improve energy and water efficiency require little, if any capital investments. Yet the savings can run into thousands of dollars a year.
- Legal compliance and regulatory readiness - Increasingly hotels are becoming aware of the need for legal compliance including national and regional legislation, industry specific legislation, voluntary initiatives and the various fines applicable for non – compliance with the environmental laws and regulations. With more than 200 regulations in India covering issues of atmosphere, water and soil pollution, waste management, safety in relation to chemical use and the use of environmental impact assessment, hotels need to be aware of the national and regional regulations, as well as the financial and reputational costs of non – compliance.
- Meeting customer expectations and increasing customer satisfaction – Over the past 20 years, there has been a shift in the expectations and demands of consumers. The typical hotel guest of today is more knowledgeable and more confident about what he or she wants out of the hotel experience. To varying degrees guests today are more likely to be concerned about the environmental and social issues.
- Increasing staff ownership and benefits - Employees, like hotel guests, are increasingly tuned in to environmental thinking in society. As a result, they are far more likely to identify with an employer whose principles and practices are in line with current trends, and many take pride in having a responsible employer. Time and again, environmental programmes have proved to be an effective means of generating enthusiasm and motivating staff to work as a team to achieve a common purpose. Many hotels use environmental programmes as a staff incentive, the financial savings they make are translated into cash or other rewards, such as in house staff events or trips out.

- Improving a company's image – A company's image or corporate reputation is one of the most intangible yet priceless assets a business can have. Without it, a company could lose its “License to Operate”. Governments and stakeholders pressure on businesses to adopt a more proactive and transparent stance on social, ethical and environmental issue has increased dramatically over the last decade.
- Managing risk – Risk minimisation is increasingly viewed as inseparable from corporate social responsibility and corporate governance. The hospitality industry is increasingly rewarding excellence in environment management and performance as an indication of the quality and aptitude of management in general, often imposing standards or minimum levels for quality assurance.

The eco-transformation process

The process of greening the hospitality sector can be termed as the eco-transformation process. The process of eco-transformation consists of ten key steps as highlighted in the figure.

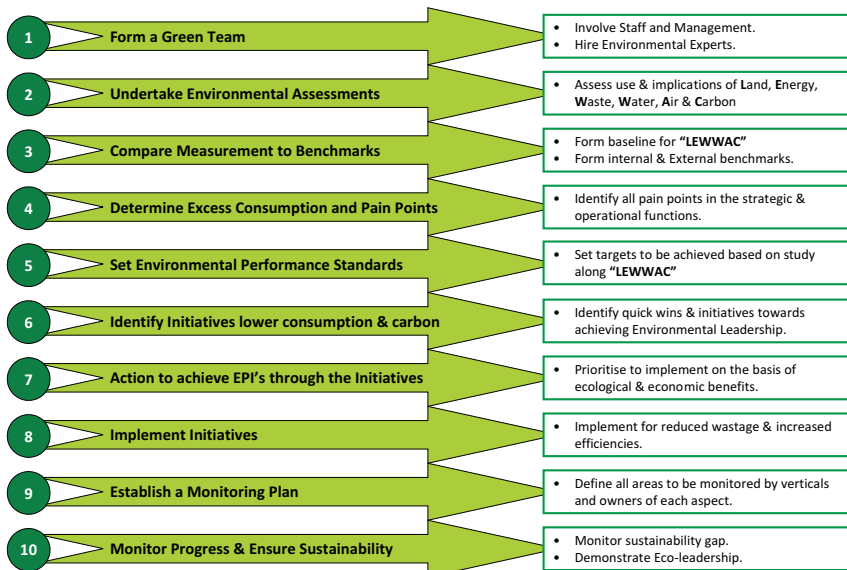


Figure 2. Source: Compiled by NatureFirst-GEMS

a. The Eco-Status of Hotels – The first five steps primarily define the eco-status of the hotel. This phase is the first part of the process and creates a plan for the eco-transformation of the hotel. It requires defining the status of the hotel and its environmental impact from functioning for one base year. This provides the basis to set the right targets for the hotel. This phase can be divided into the following two distinct activities:

- o *Defining the Naturenomics™ Consumption – Carbon Footprint* : Outlines and establishes the consumption baselines for the hotel under the LEWWAC – Land, Energy, Water, Waste, Air and Carbon. Carbon footprint values are measured as the rate at which the hotel building and the running of the business consumes key resources annually (e.g.: energy, water, and other natural resources), here all consumption is identified; including the direct and indirect impacts on the environment. Each of the footprint values is expressed as explicit measurement indices for the hospitality industries. The benefits of creating the

measurement indices are two fold- **First**; it helps in defining and outlining the parameters in the 'business as usual' scenario for the selected base year. **Second**; it helps create a structured format for the benchmarking study.

Managing the carbon consumption footprint of hotels and constantly improving baseline consumption is key to achieving successfully implemented green hospitality services. Good and effective management of resources (Land, Energy, Water, Waste, Air and Carbon) and maintaining maximum efficiency levels through enhanced productivity and greener initiatives is an approach now seen within the top international and national brandnames within the hospitality trade.

- o *Creating Benchmarking Standards* : this acts as the base level to improve each of the Footprint Values thus attaining sustainability in resource consumption and hence bringing process and generating product efficiency as the byproducts. With Benchmarking, a hotel creates a standard by which its resource consumption, processes & functions, efficiency & productivity and hence impacted costs can be measured and compared to its other counterparts to determine what needs to be improved.

b. Eco – Design of Hotels – This is step six in the Eco-transformation process which involves the designing of initiatives which serve the key purpose of lowering the hotel's consumption – carbon footprint (as compared and benchmarked to the base year) and enhanced productivity through improved resource efficiency.

c. Eco – Implementation for Hotels – Step seven and eight aims at launching the on site initiatives as identified in the last two phases. The initiatives take the shape of projects with hotel's technical and management teams. The criticality of this phase lies within a detailed economic vs ecological cost benefit analysis that forms the basis of making the transition for the hotel.

d. Eco – Tracking for Hotels – Step Nine underlines the importance of monitoring and tracking the initiatives to ensure the sustainability, ecological and economic savings are being made and the application of any required course corrections.

e. Eco – Sustainability for Hotels – Step Ten is the last component, closely interlinked with a sound environmental monitoring system. Sustainability ensures the environmental commitment of the hotel towards the preservation of balance between economics and natural resources.

Trend Setters and the Evolving Green Hospitality Trade

Global initiatives being undertaken by the hospitality sector worldwide is a reflection of all the outstanding achievements by this sector so far. It is fighting for a common cause – 'Climate change mitigation and voluntary reduction of GHG emissions', optimising its systems and processes to reduce the adverse impact of the industry and contribute positively to the environment.

The following section highlights trendsetters within the industry and summarises the key essentials to 'Go Green' as demonstrated by top players in the business. The initiatives that have been undertaken have provided evident savings for the hotels and such results reinforces the belief that to 'Go Green' can provide scope for new opportunities, particularly for Indian hotels and resorts.

Key Essentials to Going Green

a. A sustainable policy towards environmental conservation

The first and foremost is the willingness and commitment towards the restoration of the environment in the form of an 'Environmental and Sustainability Policy'.

A prime example illustrating the benefits of adopting an aggressive environmental strategy while tackling new market pressures is the Scandic Hotels. Its policy says; "No company can avoid taking environmental aspects in all parts of their operation. Scandic shall therefore take the lead and constantly improve our contribution to less or non environmental friendly companies in the hotel industry and operate in accordance with the conditions of nature". This stance has enabled Scandic to develop a competitive edge, strengthen its market position and provide greater value to its stakeholders. Scandic has reduced water consumption by 13% and energy consumption by 24%, reduced unsorted waste by 40 % and used 200 million fewer items of disposable packaging in the last seven years.

b. An efficient monitoring and reporting system

Incorporating efficient processes for monitoring & reporting of implemented procedures has been identified as a key component for the successful application and realisation of a hotel's environmental policy.

The Hilton International Group of Hotels has taken a lead in this with their impeccable monitoring systems for the global impact of its operations and energy consumption. The associated Co₂ emissions are also monitored and targeted to reduce their impact.

In 1997, the chain carried out an energy investigation programme in all its European hotels to see how energy was being used. Energy audits identified areas for improvement to plant, equipment and housekeeping methods. A process called 'Monitoring and Targeting' (M&T) was undertaken at the Hilton Strasbourg and required detailed sub – metering of energy usage in the hotel so that each area and department could take responsibility for their own energy consumption. The process reduced Hilton Strasbourg's energy use from 571 kWh / m² to 527 kWh / m². The 6.2% reduction in consumption saved the hotel US\$22,000 (GBP 11,759) in utility costs.

The Hilton UK & Ireland Environmental Sustainability programme aims to position the company as the industry leader in caring for the environment and includes a target to reduce utility consumption across its UK and Ireland estate by 10%. In order to do so, they utilised the global Hilton Environmental Reporting System (HER), launched in February 2004. HER is an advanced internet reporting system that enables each Hilton hotel to report on and compile data to facilitate the monitoring of improvements in environmental performance.

c. Upgrading operations with recent and efficient technologies

Heat recovered from air – conditioning chillers at the Hotel Intercontinental Leipzig is used to preheat hot water. This saves 100,000 kWh heating energy or GBP 2,500 (US\$ 4,677) a month during the three to four months a year when cooling is needed.

The combined heat and power (CHP) plant installed at London's Heathrow Marriott in 2000 reduces Co₂ emissions at source by up to 30%. On average, one kilowatt of electricity generated by CHP is equal to a savings of 1.2 kilograms of Co₂ with annual cost savings of around GBP 50,000 (US\$ 93,545).

The Ihilani Resort and Spa, Hawaii, was designed and built to comply with the latest local and national ordinance controlling water consumption. The hotel uses ultra low flow toilets (that use only 6.0 litres a flush), urinals which uses only 3.8 litres per flush and low shower heads in guests rooms (that reduce water flow to 9.5 litres per minute).

o *Setting national and international benchmarking standards*

When Reiner Boehme, Vice President of Engineering at the InterContinental Hotels and Resorts, first developed benchmarks for his company, it was categorised for three climatic zones. This remarkable benchmarking tool enabled the hotels' consumption profiles to be investigated in depth. The wealth of data also made it possible to fine tune the benchmark for individual departments such as food and beverages, laundry, guestrooms and staff locker rooms, as well as for specific items of consumption systems, indoor pools and irrigation systems. Tracking inefficiencies and waste throughout the hotel premises has so far saved the company US\$ 25 million (GDP 13 million). InterContinental has developed extensive compute spreadsheets to track each department's excess (i.e. their potential for saving) above the benchmarks on a monthly basis. Reiner reported that, over time, the company has also been able to gradually lower the benchmark levels as each hotel's utility efficiency improves. The benchmarks are now a part of the technical services standards for new hotel construction.

The Sheraton Miramar Resort at El Gouna on the Red Sea has received the MENA Travel Award 2004 for the best environmental five star hotel. Annual consumption of fresh water has been reduced by 39,669 cubic meters and electricity use has been reduced by more than 1.85 million kWh.

Radisson SAS is reported to have reduced their energy consumption per square meter by 11 % and CO₂ emissions by 15% between 1999 to 2001, and obtained 25% of its energy from renewable sources in 2003. This process was helped by installing programmable thermostats to control ventilation in approximately 65 % of the hotels.

Whitbread have introduced new low energy light fittings in 85 of their hotels and as a result of the programme, they estimate saving approximately 4.5 GWh a year and 2,000 tonnes in CO₂ emissions.

o *Building sustainably*

A common issue facing the industry is the inappropriate choice of location, or poor design of new hotels, something that has begun to be addressed through responsible building initiatives. Incorporating sustainable building design initiatives at the planning stage of the hotel can lead to increased benefits.

Scandic, like every quality hotel, invests in constant renovation and refurbishment of its hotel rooms. The company recognised this process to be an excellent opportunity to further reduce its environmental impact. Scandic is the first hotel chain in the world to introduce the innovation of a 97 percent recyclable hotel room. The rooms have proven to be very popular with Scandic's customers due to both their aesthetic quality and their contribution to a healthier environment.

With the Scandic Environmental Refurbishment Equipment and Construction Standards (SERECS), In 1995, Scandic introduced the 'Eco – Room' to the Scandinavian market and offered a solution with profitability and environmental benefits in harmony with aesthetics and guest satisfaction. Since then all new rooms have been furnished with both environmental and guest considerations in mind. The floor and furniture is wood, and textiles are wool or cotton, with as few fittings as possible made of chrome, metal or plastic.

SERECs provides a guarantee that:

- All construction and renovation work is on the cutting edge with regard to minimum environmental impact and forward looking material selection.
- Individual aesthetic or short term interests will not jeopardise the company's path towards long term sustainability.

In January 2000, Starwood Hotels and Resorts opened the Sheraton Rittenhouse in Philadelphia, the first 'Eco-Smart' Hotel in the US. During its development, builders and suppliers were challenged to review how their products and services were produced, packaged and delivered in order to create a more environmentally conscious product.

d. Effective energy management

The hospitality industry in the recent years has placed concentrated efforts to optimise their processes and enhance efficiency of the energy systems of the hotel to achieve cost and resource savings.

An excellent example of an eco-friendly air conditioning system is at the InterContinental Thalasso Spa Bora Bora, which opened in May 2006 and is accessible only by waterways. The system is fed by a 2,400-meter pipeline, at a depth of 915 meters, off the Bora Bora reef. The pipe pumps extremely cold deep-sea water through a titanium heat exchanger, transferring it into a fresh water circuit that powers air-conditioning in the hotel. The system saves 90% of the hotel's electricity consumption for air-conditioning, or 2.5 million litres of oil per year.

Lighting is another key area that can be effective in helping hotels reduce their energy & carbon footprint. In Australia, incandescent lights have been banned and hotels have switched to fluorescent lighting, which uses less energy.

The Marriott estimates that its "Re-Lamp" campaign, which replaced 450,000 light bulbs with fluorescent lighting in 2006, saved 65% on a guest rooms' lighting costs. Additionally, replacing 4,500 outdoor signs with LED and fiber optic technology has yielded a 40% reduction in energy used for outdoor advertising. Starwood Hotels & Resorts estimate that changing the type of bulbs will cut energy used for lighting by 75%, which will save the company a considerable sum.

Guests at the Gaia Napa Valley Hotel and Spa are encouraged to stay green by checking real time readings of the hotel's utility and carbon dioxide emissions on display in the lobby. This reminds guests to be environmentally aware, as surveys suggest 60% of travellers leave their green habits behind when they are away from home. The hotel also installed an energy efficient ventilation system at a cost of US \$800,000, this cut costs by 26% and also reduced noise levels which has brought additional guest satisfaction. The Gaia Napa believes the investment was worth it.

e. Closed Loop waste management

Sustaining a closed loop waste management system based on the principals of the 4R's – Reduce, Reuse, Recycle and Recover is particularly relevant within the hospitality sector, given that the average restaurant produces 22,727 kilos of garbage a year. Every night, the average diner produces about 1 kg of waste, mostly composed of beverage and paper products, accounting for 65% of all hotel waste. It is estimated that 95% of this could be recycled or composted, but most is simply thrown away. One of the reasons for this volume of waste is that hotels built some years ago, just like our homes, are not equipped to have multiple garbage collection points restricting the segregation of paper, plastics, and glass.

Starwood Hotels & Resorts and the InterContinental Hotel Group are starting to encourage guests to recycle in the hotel as they would do at home by placing recycling bins in the guest bedrooms.

Fairmont Hotels and Resorts are providing china, cutlery, and linen napkins rather than disposable items and paper napkins, and have placed recycling stations in all its meeting rooms, where whiteboards have also replaced paper flip charts.

The Marriott International has introduced a recycled key card as one of its four new green initiatives. Effective January 2009, the company will begin replacing the 24 million plastic key cards that it purchases annually in the United States with those made of 50% recycled material, thereby saving 66 tonnes of plastic. The new key card is just one of the many advances the company has made to 'Green' its \$10 billion supply chain and reduce its global environmental footprint. Other 'green' initiatives include an eco-smart pillow filled with polyester micro fibre made from 100 % recycled PET bottles and the use of coreless toilet paper. Most paper products at the hotel will be recycled including the key card holders.

f. Water management and conservation

This is another big ticket item for the hospitality industry, as water accounts for up to 15% of the total utility bills in most hotels and up to 95% of the fresh water leaves the hotel as waste water. Considering that:

- o A typical occupied room soaks up 218 gallons (825 litres) of water every day and
- o Most hotels pay for the the water they consume twice – initially to purchase fresh water and then to dispose of it as waste water.

It is evident, that sound water management practices rank high up on the priority lists for hotels towards making considerable savings

There are several ways through which the hotels world wide is demonstrating excellent water management practices. Some of the best practices are highlighted below:-

Fairmont Hotels have cut their average daily water usage by 31% through installation of water efficient fixtures in rooms.

Marriott Hotels has reduced spendings by about 25% by opting for 'Off – Peak' cold wash laundry.

The Hotel InterContinental, Leipzig, through several integrated initiatives like replacement of the cooling tower fill by 'Honeycomb' type; replacement of faulty steam taps; installation of 'Flow Controllers' in all washroom fixtures and centralising of water system for the steward department, has achieved a 65% water reduction from 1993 to 2001.

The ozone washing system installed at the **Forte Grand Jumeira Beach** in 1996 yielded several environmental benefits. First, the ozone in the system is used as detergent, which avoids the need for chemicals to clean the wash and the need to dispose of chemical by-products. Energy requirements are reduced because the system uses cold water that is filtered and recycled, dramatically reducing the volume of waste water produced. The system cost GBP75,000 (US\$140,317) to install but saved the hotel GBP160 (US\$299) a day in operating costs. Sixteen months later, it had paid for itself.

g. Considering product life cycle

By choosing local, seasonal produce hotels cut delivery costs. This makes an especially dramatic impact when in the United States it is estimated that the average calorie travels 1,000 miles from farm to plate.

Fairmont Hotels has introduced an eco-cuisine menu that feature local, seasonal, and organically grown foods wherever possible; and in the United Kingdom, London hotel—One Aldwych—is doing its bit to celebrate locally sourced, seasonal food. Its 'Taste Britain' promotions have proved very popular, and illustrates that organic foods grown without chemicals are a healthy alternative that also helps the environment.

Both the Hilton Hotel Group and Marriott International are being innovative in their choice of products to replace the ubiquitous styrofoam cup. The Hilton Garden Inns is replacing the 6.5 million nonrenewable Styrofoam cups it uses each year with the ecotainer™— an environmentally friendly coffee cup. The cup is the only all-natural, hot-beverage paper cup to be coated with a corn plastic.

It requires less energy and produces less greenhouse gasses, while its corn-based coating means it can be composted rather than sent to landfill. Marriott plans to eliminate the 20 tons of styrofoam and plastic utensils it sends to landfill each year by replacing them with products made of potato (Spudware™), sugarcane, and cornstarch, which are all fully biodegradable within 100 days.

The Staying Power of Sustainability in Green Hotels

As sustainability becomes a critical business issue and also a mandatory requirement for the industry, green hotels must offer a balancing platform to effectively weigh up the opportunity and risk in the hospitality industry. Unlike, certain other issues, sustainability issues are influenced by drivers outside the direct owner's control. Managing consumer behavior and shifting the trend in offering luxurious hospitality, is a major challenge to the sustainability choices in this business. Hence, for this industry, it can be not just about going green but about making the right alternative green choices to sustain their market in a competitive industry.

The following section evaluates some points and provides evidence that in light of the existing debates and dilemmas faced when choosing between eco – friendly options and the business as usual scenario, there are options and ways forward to lower expenses, manage demand and increase profits whilst retaining the pursuit of the greener option in the hospitality sector.

a. Consumer driven behaviour

With Deloitte's recently published survey results for 2008, green hospitality as an alternative option came out to be the preferred choice for business and leisure travellers around the world. A full 95% of the respondents thought that lodging companies should be undertaking greener initiatives.

Out of the 10 initiatives listed in one question, respondents checked off an average of 4.8 green building and operational practices that they felt companies should be taking today, such as recycling and using energy efficient lighting.

These responses are triggered by the realisation that global warming and its related consequences is no longer considered a process to be witnessed years after the current generation's demise. For consumers, numerous groups are providing information on green establishments and other related information. Companies such as Sabre, Orbitz, Travelport, Travelocity and Expedia make available green hotel information with added knowledge about carbon emissions for various travel modes and destinations and options of selling "Carbon Offsets" to passengers. The following websites are utilising the funds contributed by international travelers to offset their carbon footprint in various emissions reductions projects under the UNFCCC. According to answers received by Deloitte, in their 2008 survey, almost 38% of the surveyed travellers have taken steps to determine whether a hotel was green!

- o environmentallyfriendlyhotels.com, greenhotels.com and sustainabletravelinternational.org.

Most business travelers expect hotels to be taking ‘Green Initiatives’

“What are the most important green initiatives that you expect lodging facilities to be taking today?” Top seven responses

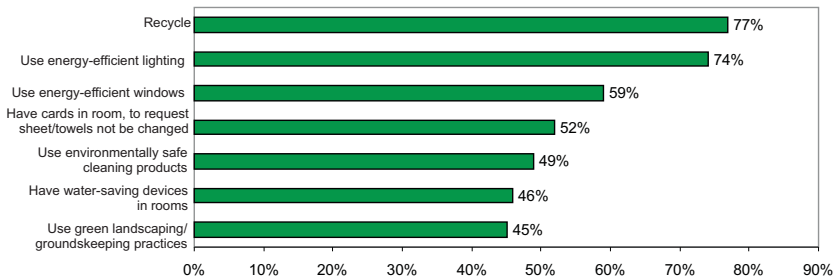


Figure 3. Source: Deloitte Consumer Survey April 2008

As, shown in the chart above, travellers are most often seeking information online, but some do rely on word of mouth. In the current environment, consumer expectations are becoming more important to the performance of a hotel, where information transparency via the internet provides immediate access to corporate behaviour. A company's brand image is a critical aspect for good performance of the business, and this is being directly influenced by how it manages its social and the environmental responsibility.

38% Have Taken various Initiatives to Identify Green Lodging Facilities

“Which of the following have you ever done to identify an environmentally friendly lodging facility? (check all that apply)”

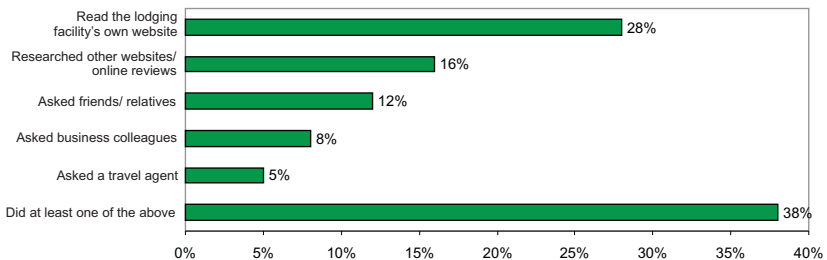


Figure 4. Source: Deloitte Consumer Survey April 2008

b. Market driven behaviour

With heightened attention from the media there is an increased level of awareness and more concerns now about the financial impact of climate change to the businesses, which has forced many business and industrialists to look at the issue.

Today there are financial resources and investments opportunities available only after consideration of a company's environmental and social performance. Such considerations has made “going green” the option in order to access to new markets.

Self monitoring is increasing, partly in response to tightening regulatory scrutiny, but also because companies are realising that, despite short term costs, there can be longer term savings. Along with offering savings, through the incorporation of the green initiatives, hotel owners can also benefit from differentiated market costs that can be charged as a part of the brand image of being “Green”. The recent survey conducted by Deloitte, showed that almost 40% of the respondents are willing to pay more to stay in a green lodging facility. Of these, more than a quarter (28%) said they would be willing to pay 10% more, while 4% would pay a 50% premium.

Lodging companies may also be to obtain savings by requesting that guests assist them in being ecologically responsible. Also advertising these initiatives to the public may improve the branding message around corporate responsibility. For Instance the Marriott International, Inc reported in 2007 that its linen reuse program, a global effort to encourage guests to reuse linen and towels during their hotel stay, has saved an average of 11% to 17.5% of the hot water and sewer costs involved in the operations at each hotel.

Leading hospitality businesses around the world realise that the sustainability model is substantially different to the business as usual scenario. However considering trendsetting observed in the current hospitality market, it is surely unavoidable for the remainder of the global hospitality industry to neglect sustainability issues and further more not seek to incorporate environmental initiatives as a part of their 'business as usual' scenario?

Transforming environmental initiatives for hotels from cost drivers to profitable success stories can be achieved by developing a comprehensive, understandable and well planned sustainable corporate strategy.

40% are Willing to Pay More to Stay at a Green Lodging Facility

“Which statement best describes your feeling about paying extra to stay at a green lodging facility when you, not the company, are paying for the hotel”.

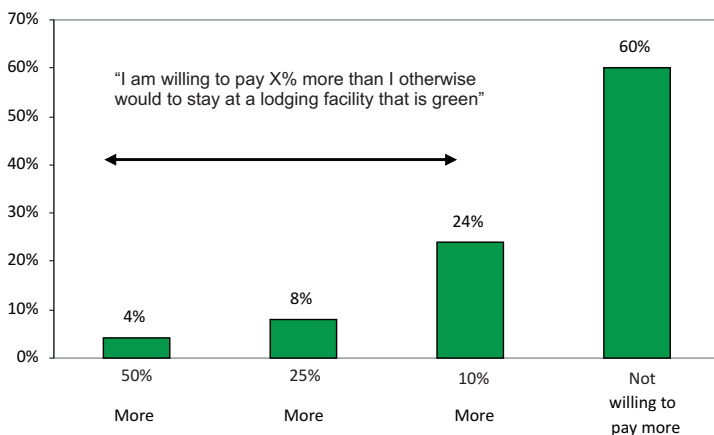



Figure 5. Source: Deloitte Consumer Survey April 2008

In Conclusion

With revenues contributing US\$ 7 Trillion, supposedly rising to US\$ 13 Trillion over the coming decade, the travel, tourism and accommodation sectors of the hospitality industry can play a significant role in addressing climate change.

As long as the innovativeness and resources of this vital global economic sector are fully mobilised and oriented towards the sustainability goal. More recently several governments and business leaders have embraced the idea that long term industry profitability can be achieved only by striking a balance between industry growth and the national “carrying capacity” or “sustainability levels”.

Tapping new revenue streams and cutting costs through environmental initiatives might allow the Indian hospitality sector to become a first mover on the global green hospitality scene, which is fast growing in its pace to achieve a balance between economic vitality and environmental sustainability.



“Glory lies in the attempt to reach one's goal and not in reaching it.”

“The difference between what we do and what we are capable of doing would suffice to solve most of the world's problems.”

“An eye for an eye makes the whole world blind.”

“Prayer is not asking. It is a longing of the soul. It is daily admission of one's weakness. It is better in prayer to have a heart without words than words without a heart.”

“First they ignore you, then they laugh at you, then they fight you, then you win.”

“I object to violence because when it appears to do good, the good is only temporary; the evil it does is permanent.”

“Even if you are a minority of one, the truth is the truth.”

- by Mahatma Gandhi

Natural Gist

- ▲ **Tourism & hospitality are closely interlinked**, both affected by climatic variability and change. Climate affects a wide range of environmental resources that can for and against tourist attractions.
- ▲ **Leadership in sustainable practices** must be demonstrated by the travel, tourism and hospitality introducing policy instruments and business strategies around “Greening”.
- ▲ **Green hotels** demonstrate efforts, beyond their business as usual practice promoting conservation of natural resources and hospitality services to reduce, mitigate or / and offset their direct or indirect carbon footprint and minimising ecological, cultural and social degradation.
- ▲ **Developing countries**, like India need to promote green hospitality, driven by factors such as an increase in energy and water costs, increased threat from carbon taxes (user & polluter pays) and stiff competition from the global hospitality industry.
- ▲ **The benefits of green hotels** includes; operational cost savings, legal compliance, regulatory readiness, increased staff ownership, improved risk management and enhanced company brand value.
- ▲ **Eco-transformation** can be implemented through Naturenomics™ Green Hospitality via a 4 step process striking a balance between industry growth and sustainability levels. The process includes defining the eco-status of hotels, designing of eco-hotels, implementation of eco-hotels and eco-tracking of hotels.
- ▲ **Essentials of the hotel greening process** include the setting of national and international benchmarks, formulating eco-policies, upgrading of operations with recent technologies and implementing efficient monitoring and reporting systems.
- ▲ **The Indian hospitality sector** should strive to emerge as a first mover in the global green hospitality scene, by tapping new revenue streams, cutting costs through environmental initiatives and demonstrating innovation achieving a balance between economic vitality and sustainability.

Naturenomics™ in Practice

We learnt the concept of green hotels by working with our clients some of which include The Taj Group of Hotels and The Park hotel. Additionally we have been advocating the concept of green hotels to the The Oberios, The Marriot and the The Leela Palace Hotels and Resorts as a part of their eco - strategy development.



Scoring the Green Sustainable Hospitality trade

Samir Menon & Rati Bhattacharya, NatureFirst

Naturenomics™ Green Hospitality (NGH) focuses on creating leadership positions in Sustainable Green Hospitality by unlocking natural capital and focusing on the 3E's (Energy, Ecology and Economy) resulting in direct economic and ecological benefits.

Hospitality Value Chain – Converting Cost Centres to Opportunity Centres

The value chain of the hotels is divided into the key Primary and Support centres as represented in the figure below. The revenue centres of a hotel essentially comprise guest services and rooms sold which contributes 70% of the total revenues.

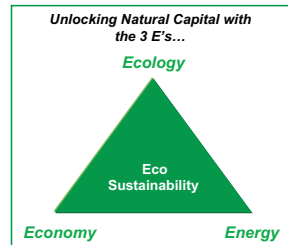


Figure 1. Source: Compiled by NatureFirst-GEMS

Support		Hospitality Value Chain Components			
S U P P O R T		Hotel Infrastructure Technology / Processes (Energy, Water and Waste) Human Resource Management (driving efficient productivity and services) Procurement (driving the best procurement at least price)			
		Inbound Logistics	Operations	Outbound Logistics	Marketing and Sales
P R I M A R Y		•Integrated Supply Chain Management Activities •Concerned with receiving materials from suppliers, sorting these extremely sourced materials and handling within the hotel	•Activities related to the production of products and services •In a hotel, operations are split into various departments like reception, room service, banquets etc.	•Activities concerned with distribution of the final services to the customers / guests and bringing the customers back to the hotel	•Sales, Marketing, Branding to attract and increase clientele for the hotel •Activities involve real – time inside and outside access to customer information, dynamic pricing and product catalogs
					•Activities to support customer feedback based improvements

Table 1. Source: Compiled by NatureFirst with reference to Porter's Model

Green Hospitality Value Chain

NGH impacts the operating costs of the hotel industry – in terms of infrastructure, technology and processes. It also impacts the logistics and the marketing & sales indirectly as demonstrated in the figure on the next page.

It is our goal to convert these cost centres into opportunity centres across the value chain.

Hospitality Value Chain Components		Green Value Addition – Direct Benefits		Direct Profits
S U P P O R T	Hotel Infrastructure	Costs <ul style="list-style-type: none"> •40% costs is composed of Operational Costs •Of the Operational Costs 	Opportunity <ul style="list-style-type: none"> •20 – 30% savings on Total Operational Costs through Greening Initiatives •Total Resource savings by 40 – 50% 	Considering a Luxury Hotel of 400 Rooms and 67000 Sq. m built up space: –Rs. 10 Crores Annual Benfits –Rs. 1250 Crores across 25 Properties in 5 Veras
	Technology / Processes (Energy, Water and Waste)	–Energy Costs forms 25% of total –Water costs forms 15% of total –3 – 5% of total is spent on waste management		
	Human Resource Management			
	Procurement	<ul style="list-style-type: none"> •Goods and services procurement consists of 15% of the total costs 	<ul style="list-style-type: none"> •Resource reduction and greener “Local” supplements leads to costs reduction of 3 – 5% 	
P R I M A R Y	Inbound Logistics - Integrated Transportation & Warehouse Management	Operations - Departments and functions like Room Service, Kitchens, Administration etc	Outbound Logistics - Activities to entail the bringing of customers and business to hotels	Marketing & Sales - Sales, promotions, branding etc to attract customers to the hotel
				After Services - Customer feedback based improvement
Green Value Addition to Primary Activities - Indirect Benefits				
	<ul style="list-style-type: none"> •With Green Supply Chain, reduction in logistics costs and commercials 	<ul style="list-style-type: none"> •With Incorporation of greener services and efficient systems and infrastructure, operations of the hotel are benefited 	<ul style="list-style-type: none"> •Taking benefits from the Green Brand Image •Advertising the Corporate and Environment Social Responsibility would enhance competitive edge •Recent Statistics and Survey suggest: <ul style="list-style-type: none"> – 40% travelers and guest are willing to pay more to stay in a Green Lodging Facility – 38% guests take extra initiatives to identify Greener Hotels through various communication and IT modes 	
Converting Costs Centres to Profit Centres across the Value Chain				

Table 2. Compiled by NatureFirst-GEMS

Cost Centres

Cost centres for the typical Indian hospitality industry listed as following:

- Taxes
- Labour and Staff Costs
- Energy & Fuel
- Utilities
- Contractor services
- Administrative costs
- Insurance costs
- Parts and Supplies
- Replacement / Refurbishment costs

- Energy costs have shown a growth of 20% from the financial year (FY) 2007 – 2008 and these costs are escalating further.
- Cost centres like energy, fuels and utilities management contribute almost 40% of the total operating costs, out of which;
 - 25% of the operating costs is contributed solely by energy sources
 - 5 – 8% of the operating costs is spent in water and trade waste charges a year
 - 3 – 5% cost implications occur due to handling of an average of 2000 – 3000 Tonnes of garbage annually which gets diverted to municipal landfills

Our focus will be to

- Design and implement an efficient Energy Management System (EMS) through efficiency enhancement and introduction of innovative energy solutions.
- Achieve Water Neutrality through water conservation projects focused at the supply end of the business and incorporating maximum reuse and recycling techniques.
- Design and Implement a Closed Loop Waste Management System to ensure efficient waste disposal with added revenue streams for the hotel.

Key Insights

The Energy Profile of Hotels – About 40% of the energy used in a hotel is electricity, 60% comes from natural gas and oil fuels. The breakdown of the typical energy flows is shown in Figure 1.

Percentage Energy Consumption Scenario by a typical Indian Luxury Hotel

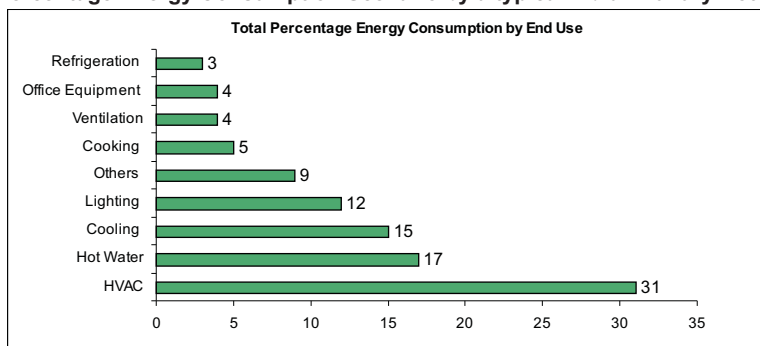


Figure 2. Source: Compiled by NatureFirst-GEMS

As a result, our key focus areas for a typical Indian hotel are hot water generation, lighting and HVAC systems.

Key Insights

- Hotels focus on managing only the utilities in terms of maximising the efficiency (of equipments and key processes), but the **reduction of per capita or per guest night energy values** is not a regular engineering target.
- Incorporating **energy management practices** and correlating these to the hotel's target Environmental Performance Indicators (EPI's), is not an area of focus for facility team
- Having a total system view and setting the appropriate EPI's can help save up to 30% of the costs and resources.

- Hotel renovations typically increase the connected load, thereby negating the impact of other energy efficiency initiatives, hence it is important to set target profile for all renovations projects

The Water Profile of Hotels - Hotels can use Rs. 2 – 3 Crores or more in water and trade waste charges a year. These charges do not include electricity for heating the water or for cooling tower chemicals. Water efficiency audits in the hotel industry have shown it is possible to achieve an average water saving of around 20% without compromising guest comfort levels. Figure 3 represents the typical water consumption break up for a hotel with laundry service.

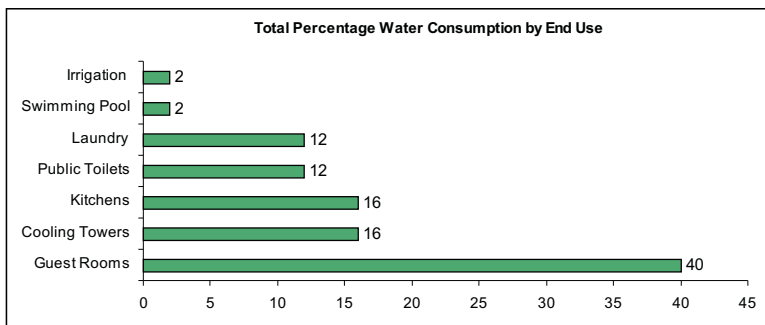


Figure 3. Source: Compiled by NatureFirst-GEMS

Key Insights

- Hotels generally focus on managing the input and the demand to its guest areas through state of the art infrastructure.
- This consumption driven approach misses the critical input – output water balance which has a direct impact on the operating costs.
- Above all, water distribution systems (like water fixtures etc), end use water treatments systems (i.e. ETP / STP's) should be correlated to the target EPI's to achieve savings on litres of water / guest night and costs savings.

The Waste Profile of Hotels - Efficient management of the waste footprint of a typical hotel can offer various challenges. However, with planned and strategic management focused on closed loop waste disposal, waste streams can typically offer an added revenue stream to the hotel. Additionally, an integrated waste management model can also help lower the carbon footprint by diverting waste away from the landfill. Figure 4 represents the typical waste generation break up as registered in annual volumes by a hotel.

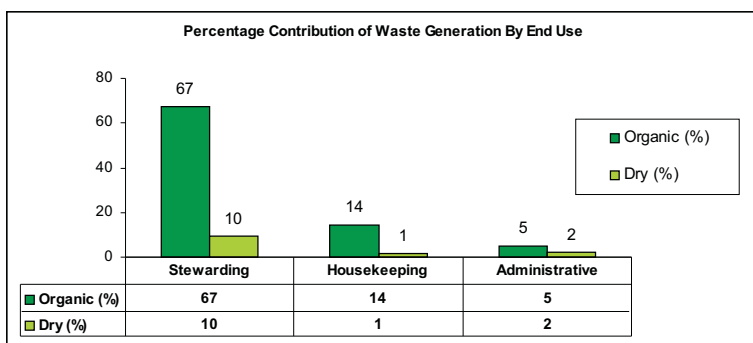


Figure 4. Source: Compiled by NatureFirst-GEMS

Key Insights

- Closed Loop Waste Disposal Systems need to be a key area of focus for hotels.
- The potential of converting the waste footprint to either energy sources or to manure is an area that is missed by hotels and hence becomes a non realisation of a key revenue stream.

Naturenomics™ Green Hospitality - Eco – Transformation Process

Step 1 - Establishing Baselines for Key Resources – Consumption – Carbon Footprint:

A defined, verifiable baseline for all the key natural resources – Land, Energy, Waste, Water, Air and Carbon – (LEWWAC). By setting the right baseline metrics, NGH provides the system's view, which is essential to achieve the economic and ecological savings.

Step 2 – Benchmark the current Baselines: Using the hospitality benchmarking standards to define the environmental performance indicators for the property in the current financial year.

Step 3 – Identify Initiatives based upon the Naturenomics™ Consumption Management Hierarchy: The Naturenomics consumption management hierarchy consists of; avoid, reduce, replace and offset; individual initiatives at the hotel were aimed at:

- **Enhancing** productivity through improved resource efficiency
- **Reduction** of consumption – carbon footprint
- **Achieving** the world class green hotel standards

Step 4 – Set Target Environmental Performance Indicators (EPI's): Set EPI's for the next financial year, based on the identified initiatives / projects from Step 3. With this appropriate EPI metric, the hotel can move from being 'excessive' in the business to "excellent", and will therefore achieve the eco – benefits.

Step 5 - Implement the Environmental Initiatives / Projects to achieve the set targets of EPI's.

Step 6 – Manage and Monitoring: ensure sustainability, ecological and economic savings. NGH ensures that the hotel is able to monitor and register all the savings that are promised to be delivered from the product's application to a hotel.

Summary; Ecological and Economics Savings

- Consider a Luxury Hotel with the following characteristics:
 - 400 rooms and 6 Banquets
 - A built up area of 67000 Sq. m
 - Annual Operating Costs = Rs. 62 Crores
 - Annual Energy Costs = Rs. 15 Crores
 - Annual Water Costs = Rs. 1.5 Crores
- With NGH, We can save over Rs. 5 - 6 crores annually by impacting:
 - 20 - 25% of the Energy Costs
 - 50 - 60% of the Water Costs
 - Generating an additional revenue of Rs. 50 - 60 Lacs / annum from Waste to Energy projects
- When applied across 25 properties will generate revenue in 5 years of Rs. 750 crores enough to help the group build one additional new luxury hotel of the same size.

Annexure

Setting Naturenomics™ Environmental Performance Indicators (NEPI's) to achieve Costs Savings.

Naturenomics Green Hospitality (NGH) defines the Naturenomics™ Environmental Performance Indicators (NEPI's) for the Hospitality sector in India. These NEPI's help in establishing realistic resource consumption benchmarks retrofitted into sufficiently specialised sub-groups representing facilities with comparable properties and benchmarks that are specifically designed to the Indian climatic Conditions.

The following case study demonstrates the application of NEPI to a typical 5 Star Business Hotel in Mumbai and summarises the impact on its energy conservation leading to operating cost savings.

Client Profile for a 5 Star Business Hotel, Mumbai

- 1) Case Study for Luxury Hotel:
 - a. Number of Rooms = 465
 - b. Serviced Area = 67636 Sq. m
- 2) Case Study for Mid – Range Hotel (Business Hotel)
 - a. Number of Rooms = 290
 - b. Serviced Area = 53655 Sq. m
- 3) Energy Costs = Rs. 7 / Unit

Case Study*	Rating	Excellent	Satisfactory	High	Excessive
	Parameter	Energy			
Luxury Fully Serviced	Existing Baseline (Fy 07 – 08)	350 kWh / m ²			
	EPI for Fy 08 - 09	260 kWh / m ²			
	Cost Savings@1 Property	Rs. 426 Lacs / Annum			
Mid – Range Serviced	Existing Baseline (Fy 07 – 08)	380 kWh / m ²			
	EPI for Fy 08 – 09	253 kWh / m ²			
	Cost Savings@ 1 Property	Rs. 476 Lacs / Annum			

Table 3. - EPI's for the Indian Hospitality Sector

Natural Gist

- A **Naturenomics™ Green Hospitality (NGH)** focuses on creating leadership positions in sustainable green hospitality by unlocking natural capital and focusing on the 3E's (Energy, Ecology and Economy).
- A Across the hospitality value chain, the NGH **impacts the operating costs** of the hotel industry – in terms of infrastructure, technology and processes. It also impacts the logistics and the marketing & sales indirectly.
- A **For Indian Hotels**, Cost centers like energy, fuels and utilities management contribute almost 40% of the total operating costs, out of which; 25% is contributed solely by energy sources; 5 – 8% is spent in water and trade waste charges a year and 3 – 5% cost are incurred in handling of 2000 – 3000 Tonnes of garbage.
- A **An eco-transformation process**, with focus on designing of an Energy Management System (EMS), achieving water neutrality through water conservation projects, designing and implementing closed loop waste management systems, maintaining indoor air quality and managing of the carbon footprint through mitigation and offset projects.
- A **Implementing NGH** for a typical luxury hotel of 400 rooms, 6 banquets halls and catering a area of 67000 sq meter, we can save over Rs. 5-6 crores annually impacting 20-25% of the energy costs, 50%- 60% of the water costs and additionally revenue of Rs. 50-60 lacs/annum from waste to energy projects.

Naturenomics™ in Practice

We learnt the concept of green hotels by working with our clients some of which include The Taj Group of Hotels and The Park Hotels. Additionally we have been advocating the concept of green hotels to the The Oberios, The Marriot and the The Leela Palace Hotels and Resorts as a part of their eco - strategy development.

“Be the change that you want to see in the world.”

“You may never know what results come of your action, but if you do nothing there will be no result”

“In the attitude of silence the soul finds the path in a clearer light, and what is elusive and deceptive resolves itself into crystal clearness. Our life is a long and arduous quest after Truth.”

- by Mahatma Gandhi



Green Sport Events

Surya Ganguly, Swati Gupta & Aditya Kitroo, NatureFirst

Large, global scope events have a role in the development of cities the world over

Cities, vie with each other to host 'hallmark' events such as the Olympics, Commonwealth Games, World Cups. Hosting such events is a matter of great pride and prestige, and in many cases is a sure way of propelling the host city into the limelight and up amongst elite 'world class' cities.

The impact of the nomination of a city as 'organiser' for such an event, ranges from the physical (i.e. construction projects) to the intangible (i.e. bringing local self-esteem or through new international attention). The impact that an event of this kind has on the urban landscape can largely be gauged by the size of the legacy it creates.

However, according to the traditional approach of development and rejuvenation, all of these activities are often programmed and designed around the sole objective of economic benefits and returns and legacy. Given the current state of the environment, and its downward trend, parameters of environment and sustainability need to be urgently prioritised while planning such overhaul activities.

Key environmental footprints of some recent hallmark events

To set the context on hallmark events in terms of their environmental burden, we have attempted to map out baselines for key environmental parameters of some recent events that are comparable with the forth coming New Delhi Commonwealth Games, 2010. These are; the Melbourne Commonwealth Games (1),(2),(3),(4) and the Beijing Olympics (5),(6) '(see numbered references at end of article). This has been followed by a comparison on the next page with projected baselines of the Commonwealth Games, Delhi.

Verticals	CWG, Melbourne	Beijing Olympics	CWG, Delhi 2010
Participants	Teams: 71 Athletes: 5770 Officials: 4,467	Teams: 193 Athletes: 10,708 Officials: N.A.	Teams: 71 Athletes: 5500 Officials: 3600 (app)
Tourists	Foreign: 90,000 Domestic: 8-10,00,000	Foreign: 3,82,000 Domestic: 61,38,000	Foreign: 1,00,000 Domestic: 10-15,00,000
Volunteers Direct	15,000	70,000	10,000
Volunteers Indirect	90,000	1,00,000	80,000
Stadiums	16	31	12
Large Ecological and Carbon Footprint			
Verticals	CWG, Melbourne	Beijing Olympics	CWG, Delhi 2010
Land (direct)	90 Acres	160 Acres	150 Acres
Energy (Direct-KWH)	37 Lac	200 Lac	80 Lac
Water (KL)	5,40,000	13,00,000	6,00,000
Waste (Tonnes)	61,200	1,04,000	68,000
Air	Not mentioned	PM - 10 mg.m ³	Not yet mentioned
Carbon (tCo ₂ e)	1,00,000	11,81,900	180-220,000
* estimated			* projected

Figure 1. Source: Compiled by NatureFirst - GEMS

Even a quick glance at the table above presents a grim picture of the ecological impact of such events and here only the direct impacts have been identified. As per estimates of the CWG (Commonwealth Games) in Melbourne, 2006, the event directly occupied 90 acres of land and consumed about 3.7 million kWh units of energy. In comparison, the Beijing Olympics, 2008, was spread over 160 acres and functioned on a continuous supply of a colossal 20 million kWh units of energy.

Consumption levels of water were to the tune of 0.54 million KL for the CWG Melbourne, while that of the Beijing Olympics, was a whopping 1.3 million KL units.

Hosting such events also means massive additions to the levels of waste generation for the city. The CWG in Melbourne had to deal with 61,200 tonnes of waste whereas the generated amount for the Beijing Olympics was even higher with 104,000 tonnes of waste for the entire event.

Leveraging the opportunity presented by large events to promote eco compliance

In light of this context, and given the growing concerns regarding the health of the environment and massive media coverage that these events receive, moving towards a path of eco complaint and sustainable development will result in obvious positioning benefits not only for the event, but also for the host city in general. Furthermore, such positioning benefits provide the host city with an edge over others when bidding for future 'hallmark' events, as global sporting federations like the, International Olympic Association (IOC), Fédération Internationale de Football Association (FIFA) lay increasing stress on sustainability and eco compliance of global sporting events.

Energy, in particular should be a key area of focus. A simple twofold approach of implementing efficiencies and conservation at infrastructure from the demand perspective and increasing generation from renewable and clean energy sources can lead to significant reductions in

Carbon footprints of the Games while leaving behind a lasting environmental legacy in terms of sustainable infrastructure and power generation.

Transportation makes up a significant component of the energy sector, especially in terms of its carbon footprint. Within transportation land and air travel are two of the biggest contributors. Given the current state of technology, addressing footprints of air transport may not be feasible and may be deemed 'unavoidable'. However, in terms of land transportation there is much scope for improvement. The introduction of alternately powered vehicles is the recommended way forward. At the city level introduction of low carbon fuel such as Compressed Natural Gas has led to marked improvements in local air qualities.

In the near future, as hydrogen cell fuel technology and battery operated technology improves and becomes a more assessable technology; a shift towards these sources of fuel will further improve sustainability of city level transportation systems the platform provided by such events can be utilised to usher in such technology.

Through integrated waste management and treatment plants a movement towards a status of zero landfill waste operations is another sustainable city priority. To do this the development of appropriate segregation and collection systems will need to be implemented to support new infrastructure for waste treatment.

Achieving a water positive status will further add to the environment and sustainability parameters of such events. Implementing demand management measures to constrict demand across stadiums through use of new technologies such as sensor fitted urinals and faucets and dual flushing OWCs can lead to as much as 33% reduction in water consumption.

Closing the loop on waste water, through in house treatment and recovery and reuse of waste water is also an essential component of achieving water positivity and supply security.

Maximising rainwater usage through appropriate harvesting systems are further sustainability goals that should be incorporated in planning infrastructural facilities.

The process of change has already begun – examples from recent events

Recent hallmark events, which have already taken place have led the shift towards improving eco

compliance and sustainability parameters. Two comparable cases are the Commonwealth Games, Melbourne, 2006 and the Beijing Olympics, 2008. Both these events have taken proactive measures, to greater and lesser degrees, to ensure nominal environmental impact of these events.

We have studied the off set initiatives for these two events at two levels; direct initiatives for the games and city level initiatives. The table on the next page presents a summary of the direct initiatives undertaken by these two events.



Opportunity to make an environmental statement

- Energy efficiency and use of renewable energy
- Carbon neutrality
- Zero wastage discharge
- Water positive
- Green code of conduct

Excellent global platform for awareness building

- Global reach
- single platform for buy in from several countries



Vertical	CWG, Melbourne	Beijing, Olympics
Land	<ul style="list-style-type: none"> - 50-60% under green cover - Drought tolerant and water efficient native plants 	<ul style="list-style-type: none"> - 78.5% area of the Olympic village under green cover - Drought tolerant heat enduring native species
Energy	<ul style="list-style-type: none"> - Energy efficient Athlete's village & games venues, solar lighting energy efficient appliances - 6 star rating in energy efficiency 	<ul style="list-style-type: none"> - 20% of total energy driven primarily by geothermal supplemented by natural gas, solar and wind energy - Various energy efficiency measures
Water	<ul style="list-style-type: none"> - AAA rated water efficient appliances - ETP and STP - Xeriscape landscaping - 60% savings achieved 	<ul style="list-style-type: none"> - RWH and reuse of water for lawns flushing and gardening. - Permeable bricks for increasing ground water table
Waste	<ul style="list-style-type: none"> - 90% waste segregated - 71% recycled and treated - Recycled 95% of construction waste - Eco friendly materials for construction 	<ul style="list-style-type: none"> - Almost 100% waste segregated - 98% recycled and 98% treated - Eco friendly materials for construction
Air	<ul style="list-style-type: none"> - Bicycle facilities - Green games vehicles 	<ul style="list-style-type: none"> - ODS free technologies in refrigeration & AC - Alternate transport (Battery operated cars)
Carbon	<ul style="list-style-type: none"> - 100% offset by afforestation around Victoria (450 hectares, 1 mn trees, 200 volunteers) 	<ul style="list-style-type: none"> - 100% carbon offset by urban afforestation around Beijing (2500-3000 hectares)
Awareness	<ul style="list-style-type: none"> - Encourage public transport 	<ul style="list-style-type: none"> - Volunteer lifestyle eco compliant workshops - Mascots to deliver clean green national messages

Table 1. Compiled by NatureFirst-GEMS

Many noteworthy initiatives have been successfully implemented at both games. Both events have done remarkably well in terms of improvements in green cover, with Beijing setting the standards for other events achieving close to 80% green cover.

In terms of energy, the major success of the Melbourne Games was energy efficiency, which achieved a six star rating. Beijing too had major efficiency and conservation measures, achieved through strategic knowledge partners. However details of achievements are still quite sketchy. Another key success factor for Beijing that received wide spread recognition was its extensive use of geo thermal energy and heat pump systems. Both are cutting edge technologies, and its wide scale use at such an event will lead to greater usage of these technologies over the long term.

For water, both events have performed fairly well, implementing conservation methods, through appropriate demand management systems and achieving greater resource efficiency through the reuse of treated water for flushing and landscaping. The Beijing event was perhaps the first event to utilise a large scale use of permeable bricks to harvest rainwater.

Two major achievements for Beijing, in terms of air quality were the Ozone Depleting Substance (ODS) free refrigerants and a comprehensive alternate transportation plan that led to massive improvements in air quality.

- In addition to direct initiatives for the games, Beijing has also taken significant initiatives from a city perspective using the games as a platform...

Beijing City	Population – 14 Mn					
	Land	Energy	Water	Waste	Air & Carbon	Awareness
	<ul style="list-style-type: none"> • 42.5% city green cover; Aim at 51% 	<ul style="list-style-type: none"> • 15% renewable energy by 2020 • Conversion of buses / cars to CNG • New technologies 	<ul style="list-style-type: none"> • 90% of sewage generation is treated 	<ul style="list-style-type: none"> • Processing rate of treatment capacity 3.98 mn tons, 96.5% 	<ul style="list-style-type: none"> • Relocate polluting industries 	Campaigns <ul style="list-style-type: none"> • Energy saving • Green consumption • Recycling • Photo exhibition • Bike, less cars • Green lectures

- ...and Melbourne too had its 'city' development efforts towards environmental sustainability

Melbourne City	Population – 3 Mn					
	Land	Energy	Water	Waste	Air & Carbon	Awareness
	<ul style="list-style-type: none"> • 56% under Green cover (4931 Hectares) 	<ul style="list-style-type: none"> • Daily usage is 87 MWH of which 28.3% is renewable energy • Using the games as a platform, to increase alternate energy proportion by 10% 	<ul style="list-style-type: none"> • 900 MLD of sewage generation of which 70% is treated • To save water by an additional 15% per capita 	<ul style="list-style-type: none"> • Using the games as a platform, waste processing increased from 36% to 71%, future planned to treat 95% of all waste 	<ul style="list-style-type: none"> • Increase public transport by 20% 	<ul style="list-style-type: none"> • Model environment friendly Green Tram Depot • Wind powered trams • Environmental education park

Figure 2. Source: Compiled by NatureFirst-GEMS

At the city level, the hosting of these events has also led to marked improvements in the local environments. Environment and sustainability parameters have been duly considered in drawing up of future policies. Beijing has set itself a target of meeting 15% of its energy requirements by 2020 from renewable energy. Melbourne too saw marked improvements in levels of power generation from renewable energy achieving close to 87 MWH of green power daily during the event.

Another parameter in which both these events has implemented considerable improvement is that of waste water treatment and its reuse. Both cities have now achieved in excess of a 70% waste water treatment capacity.

Solid waste management has also improved dramatically in both cities with Melbourne's treatment capacities almost doubled to 70% before the games.



For the Olympics Beijing transformed its public transportation fleet to run on more sustainable, less polluting fuel sources. Yet the remarkable improvements in local air quality has been credited to the shift of the polluting industries out of the city centre limits. This has been hailed by many as one of the major reasons for the dramatic improvements in Beijing's air quality.

Case Study:

Green Games in India – Commonwealth Youth Games, Pune, 2008, the launch pad

The III Commonwealth Youth Games was held in Pune, October, 12th – 18th, 2008. It was the first time that the Commonwealth Youth Games were held in Asia. The event had over 8000 athletes representing 71 nations. Apart from the major overhauls in urban infrastructure, the most unique feature of the Games and its key focus was the venue of the Games, Shri Shiv Chhatrapati Sports Complex, Balewadi.

The complex was built on 153 acres of land, on the outskirts of Pune, and was a truly world class sporting facility. The main Athletics stadium has a seating capacity of 20,000, while the Athletes village accommodated 1800 athletes and team officials, equipped with the most modern facilities to cater to the comfort of the athletes. The Commonwealth Youth Games, Pune was the first time ever that the organisers of a major sporting event in India set out for themselves, in the form of environmental guidelines targets an ecological code.

**Commonwealth Youth Games, Pune, 2008
Ecological Code for Sustainability & Environment**

LAND:

1. Undertake large scale bio-diversity driven afforestation and reforestation activities in Pune
2. Strive for zero toxic levels in the soil at Balewadi and enhance soil nutrition through organic inputs
3. Extensive use of eco-friendly construction

ENERGY:

1. Integration of green power during the games
2. Strive towards complete green transportation in Balewadi to reduce energy footprint
3. Extensive energy efficiency initiatives at Balewadi to reduce energy footprint

WATER:

1. Move towards self sufficiency on water at Balewadi through rain water harvesting
2. Strive towards complete reuse and recycling waste water through efficient and optimal treatment
3. Educate and learn from the local communities around Balewadi on water conservation techniques
4. Use water efficient fixtures and appliances
5. Provide safe drinking water for all participants and officials at Balewadi

WASTE:

1. Ensure optimal segregation of waste
2. Provide innovative and optimal solutions for waste treatment which will continue beyond the games
3. Ensure zero waste to landfills
4. Ensure appropriate treatment of hazardous waste - chemical, e-waste, etc

AIR:

1. Encourage the staff/employees to use public transport instead of private vehicles
2. Ensure that indoor/outdoor air and noise quality are as per standards defined

CARBON:

Significantly reduce the carbon footprint of the games through sustainability initiatives

Create awareness amongst the youth and other citizens of Pune towards terrestrial ecosystems, energy conservation, water conservation and waste management

Commonwealth Youth Games, Pune, 2008 will strive towards achieving this ecological code for sustainability and environment

Suresh Kalmadi (M.P)
Chairman, Commonwealth Youth Games, Pune, 2008 Organising Committee
Chairman, Commonwealth Games, Delhi, 2010 Organising Committee

October 12, 2008

Green Games Achievements

The focus for the Youth Games was to offset as well as to enhance productivity initiatives leading to reduction and neutralisation of the carbon footprint. Working with the Organising Committee and key stakeholders and delivery partners, the consortium was able to identify and implement key initiatives that would ensure that these events nominally impact not only the local, but also the global environment.

Key initiatives were identified along the environmental parameters of Land, Energy, Waste, Water, Air and Carbon. The Games platform was also leveraged to spread eco consciousness and awareness among a wide audience spectrum. The impacts of the sustainability initiatives implemented during the games are outlined below:-

Bio-diversity

- Restoration of Pashan Lake, a degrading ecosystem through a green cover expansion drive.
- Improved green cover gave a better aesthetic appeal to the games venues and will offset about 726.5 tCO₂e over a period of 2-3 years.
- Plantation of 21,663 trees namely Acacia Arabica (Babool), Azadirachta Indica (Neem), Peepal (Ficus Religiosa), Ficus Benghalensis (Banyan) that will sequester about 50 thousand tCO₂e over 30 years. Also about 28,500 saplings and seedlings were distributed during the games.

Renewable Energy & Energy efficiency

- Extensive use of solar lighting & water heating in the Balewadi sports complex.
- Use of battery operated golf carts for intra stadium commuting.
- Distributing over 10,000 CFLs in a village near Pune, thus saving 1567.8 MWh of energy and mitigating about 1260 tCO₂e.

Waste

- Vermi-composting of wastes generated during the games and the mobile composting unit in the YBR together processed 63.98 tons of waste, reducing close to 24.9 tCO₂e.

Offsets

- Purchased carbon offsets equivalent to 405 tons of CO₂ and the balance footprint of 726.5 tCO₂e will be neutralised by offsets by June 2009 thus making the event completely carbon neutral.

Awareness

- Several wildlife awareness programmes like the Save the tiger campaign were initiated to make stakeholders aware of the natural capital of the country.
- Also programmes like the Paryavarna Mitra were aimed at imparting information about climate change and how lifestyle change can help combat is challenge.
- Curtain raiser events like the 100 days to go where the Pashan lake of Pune, a degrading eco-system was restored. Also events like the Sustainable Transport Day in which 3000 people took part in a cycle rally from Lakadi pool to Sanas ground in Pune. This event promote of the use of sustainable transportation means and Dr. Shashi Tharoor was the chief guest.

In addition to the above, several innovative initiatives like **grey water treatment system** and **3 bin waste segregation techniques** were employed to reduce the consumption – carbon footprint of the games.


Achievements: Some of the landmark achievements of the Games in terms of environmental improvements and sustainability have been the delivery of:

- A Carbon neutral event.
- A Closed loop system for organic wastes through the mobile composting van in YBR and vermi-composting of the wastes generated during the games.
- Water and air quality standards far superior to the World Health Organisation (WHO) recommended standards.
- Eco friendly reconstruction materials to reduce noise and air pollutions.
- Implementation of major innovative awareness themes.
- A Green council, consisting of eminent members, who guided the process.

The structure of the green council was:

- Patrons: Mr. Suresh Kalmadi (Chairman OC), Dr. R.K. Pachauri (DG, TERI), Michael Fennell (President, Commonwealth Games Federation).
- Chairman of the Green Council: Dr. Shashi Tharoor (Former Under Secy. General, UN).
- OC members: V.K. Verma (DG, OC), Atul Chaturvedi (JDG, OC), Ms. Purnima Pendse (Director, Ceremonies & Green Games), Dr. Jyoti Prabha (Project Officer, Green Games).
- Invitee: Mr. V Subramaniam (Ex. Secy MNRE), Mr. Ranjit Barthakur (Chairman, NatureFirst), Mr. Prabhjot Sodhi (National Co-ordinator, GEF UNDP SGP).
- On 20th September 2008, Sustainable Transport Day was celebrated to promote the use of sustainable transport means for the event. Also the first Green Games Council Meeting was held on the same day.

Strategic Green Games Partnerships

<u>Knowledge Partners</u>	<u>Delivery Partners</u>	<u>Implementation Partners</u>
		

Green Games in India – Commonwealth Youth Games, Pune, 2008, the thrust pad

The XIX Commonwealth Games will be held in New Delhi, India, from 3 - 14 October 2010. This will be the first time India has hosted the Games and only the second time the event has been held in Asia. The Organising Committee Commonwealth Games, Delhi, 2010 has stated its vision as "to be the best Commonwealth Games to date with impeccable standards of service to be provided to athletes, officials and the general public". Further, the Games shall set up new benchmarks for other Host Cities with regards to urban sustainable development by showcasing excellent infrastructure and facilities which could be used by the society and the general public for generations to come.

Major components of the Games preparations include:

- Building state-of-the-art sporting and city infrastructure for the facilitation of the Games.
- Creating a suitable environment and facilitating opportunities for the involvement of the citizens in the Games.
- Showcasing the culture and heritage of India.
- Projecting Delhi as a global destination.
- Projecting India as a economic power.
- Leaving behind a lasting legacy.

The OC CWG, Delhi, 2010 is cognisant of the large eco ecological footprint that the above activities and the conduct of the Games will entail and its impact on the local and global environment. To ensure that the environmental impact of the Games are minimised and to ensure a sustainable Games and its legacy, the OC CWG has identified strategic reduction, mitigation and offset initiatives driven by the ecological code as follows.

Ecological Code - Proposed strategies

Vertical	Goals	Ecological Code (Strategic Imperatives)
Land	Enhance biodiversity through innovative landscaping and reduction in soil toxicity	<ul style="list-style-type: none"> • Undertake large scale bio-diversity driven afforestation and reforestation activities in NCT • Strive for zero toxic levels in the soil at the venues and enhance soil nutrition through organic inputs • Extensive use of eco-friendly construction
Energy	Energy security through green energy and efficiencies	<ul style="list-style-type: none"> • Integration of Green power during the games (grid and backup) • Use of clean fuel based transportation during the Games • Extensive energy efficient initiatives to reduce footprint
Water	Effective water management to optimise consumption	<ul style="list-style-type: none"> • Move towards self sufficiency on water through rain water harvesting and ground water recharge • Strive towards 100% reuse and recycling waste water through efficient and optimal treatment • Educate and learn from local communities on water conservation techniques • Use water efficient fixtures and appliances • Provide safe drinking water for all participants and officials
Waste	Effective closed loop waste management system	<ul style="list-style-type: none"> • Ensure optimal segregation of waste • Provide innovative and optimal solutions for waste treatment which will continue beyond the games • Ensure minimal landfill operations • Ensure appropriate treatment of hazardous waste – chemical, e-waste, etc.
Air	Reduce, measure and monitor air and noise levels	<ul style="list-style-type: none"> • Encourage staff/employees to use public transport instead of private vehicles • Ensure that indoor/outdoor air quality and noise quality are as per standards defined. • Significantly reduce the carbon footprint of the games through sustainability initiatives including use of clean fuel for captive power generation and transportation.
Carbon	Neutralise all emissions through bio diversity management	<ul style="list-style-type: none"> • Audited baselines of carbon emissions and subsequent sequestration through prorated afforestation around the national capital region.
Procurement	Green procurement of all material	<ul style="list-style-type: none"> • Procurement of eco friendly products, as per MoEF guidelines (Eco Mark Scheme)
Awareness	Mass green communication using the Commonwealth Games Platform	<ul style="list-style-type: none"> • Create awareness among citizens of Delhi towards terrestrial eco system, personal sustainability, waste management, sustainable transport.



This is the first time ever that the Organising Committee of any major sporting event has laid out such a robust and holistic set of environmental targets, encompassing all of the major footprints of sporting events.

The achievements of such targets will set the CWG, Delhi, 2010 as a benchmark for future sporting events in terms of sustainability and environment and lead to the conducted of the first consumption – carbon neutral sporting event.



"We may utilize the gifts of Nature just as we choose but in her books, the debits are always equal to the credits"

"Wildlife is decreasing in the jungles, but it is increasing in the towns"

"In matters of conscience, the law of the majority has no place."

"A 'No' uttered from the deepest conviction is better than a 'Yes' merely uttered to please, or worse, to avoid trouble."

"Action expresses priorities."

"Before the throne of the Almighty, man will be judged not by his acts but by his intentions. For God alone reads our hearts."

"Freedom is not worth having if it does not include the freedom to make mistakes."

"Strength does not come from physical capacity. It comes from an indomitable will."

"This little globe of ours is not a toy of yesterday."

- by Mahatma Gandhi

Natural Gist

- A Large multi sporting events entail a very large and intense ecological footprint and leave behind a lasting impact on the Global and local environment. This is clearly reflected in the fact that the Melbourne Commonwealth Games, 2006 has a carbon footprint of over 100 thousand tones, while the Beijing Olympics has an carbon emission footprint of over 11 lac tones.
- A Globally, sporting federations and host cities have responded to this challenge through prioritising implementation of reduction, mitigation and offset measure to ensure the minimisation of ecological footprint of the Games. Recent events – Melbourne Commonwealth Games, Beijing Olympics provided the right kind of impetus to the Green Games movement. While major upcoming events – CWG, Delhi and South Africa FIFA World Cup, are set to raise the bar higher with stiffer environmental targets.
- A Hallmark events provide a huge opportunity to incorporate principles of sustainability in planning and development related directly to the Games and the associated city developments. These provide an appropriate platform for implementation of energy and water efficiency and renewable energy programmes across a multitude of infrastructure facilities, including stadiums, Games Villages and accommodation facilities. Improvements in waste treatment capacities may be another major legacy initiative focused around such events, along with large scale afforestation. Such events also provide excellent platforms to conduct awareness out reach programmes to connect to a wide range of audiences, local and global.
- A The Green Games movement in India has got kick started with CYG, Pune, 2008 which through strategic initiatives has been able to achieve a status of carbon neutrality.
- A Delhi, 2010 will be the true proving grounds for the Green Games movement in India, and the OC CWG 2010 has set for itself strategic environmental targets to move the Games towards a status of consumption – carbon neutrality. This is the first time ever that such a mandate has been set out by any sporting body anywhere in the world.

Naturenomics™ in Practice

- The Consortium of IL&FS, IL&FS Ecosmart and Globally Managed Services won the mandate of advising and consulting the Organising Committee, Commonwealth Youth Games and Commonwealth Games to develop strategic initiatives utilising the framework of Naturenomics to ensure the consumption – carbon neutrality of both theses events.
- The Consortium has already successfully carried out pilot projects in Pune and published a post Games sustainability report for the Games with the achievements of from Pune highlighted here. Currently, the Consortium has shifted focus to Delhi, where a environmental strategy has been developed to ensure consumption – carbon neutrality for the Games.



Banking on Sustainable Development

Prabir Chetia & Jaspreet Arora, NatureFirst

Context & Background

Numerous policy developments and mechanisms have been introduced since 1997 that have led to financial companies having a growing interest in climate change.

The Kyoto Protocol (1997) to the United Nations Framework Convention on Climate Change was the most comprehensive environmental treaty. Under it, developed countries have legally binding targets to reduce greenhouse gas (GHG) emissions. Three mechanisms were proposed to help achieve this objective, namely Joint Implementation (JI), the Combined Development Mechanism (CDM) and emissions trading. To become operational the protocol needs to be ratified by at least 55% of the signatories. The US administration under George Bush pulled out of the protocol in 2001 leaving Russia as the only country large enough to make the 55% threshold.

The Protocol basically requires developed countries to reduce emissions of GHG by an average of 5.2%, below 1990 levels by 2012. This Protocol was adopted in 1997 by the countries party to the United Nations Framework Convention on Climate Change (UNFCCC). The Convention seeks to stabilise Green House Gas concentrations in the atmosphere at a level that would minimise interference with the climate system.

Under the Kyoto Protocol India is not required to reduce their emission of Green House Gases. However numerous response measures that are contributing to the objectives of the United Nations Framework Convention on Climate Change (UNFCCC) are being taken by India. India's development plans balance economic development with environmental concerns. India now has a planning process guided by the principles of sustainable development. Reforms in the energy and power sector have accelerated economic growth and enhanced the efficiency of energy use. These achievements have been complemented and enhanced by notable initiatives undertaken by the private sector.

Another important milestone for India's engagement in climate change and sustainable services has been the emergence of the Carbon Disclosure Project (CDP). The CDP is a coordinating secretariat for institutional investor collaboration on climate change.

In the last few years several measures relating to environmental issues have been introduced. Such measures are being taken by committing additional resources and realigning new investments, thus putting economic development on a climate-friendly path.

Some companies already had strategies or were developing ways to reduce greenhouse gas emissions. Companies also realised that the financial sector has an important role to play by

providing new finance for renewable technologies and energy efficiency investments. In today's financial markets shareholders are increasingly demanding that companies disclose carbon risks so that asset prices can reflect sustainability performance.

Financial sector products and services for sustainable business practices

The financial services sector has an important role to play in mitigating climate change risks and promoting sustainable business practices. Companies and investors face two main risks (costs) posed by climate change:

- Direct knock-on effects of climate change such as extreme weather conditions and changes in temperature. These have secondary impacts on economic sectors such as construction (loss of favourable construction days), insurance and tourism. Damage to life and property has implications for insurance losses and leads to higher premiums for businesses and consumers.
- Cost of compliance due to regulatory mechanisms (e.g. CCL and ETS). As these regulatory mechanisms favour energy efficiency and low carbon emissions practices, energy intensive companies could see their cost of production increase if they do not invest in environmentally friendly technologies. Moreover, the cost of non-compliance is not just fines and penalties for breaching environmental regulations but also loss of market image in the eyes of shareholders, investors and consumers.

Financial firms have a role to play in managing risks as new areas of uncertainty need to be underwritten. These risks include new environmental technologies, alternative energy sources and technologies, and carbon markets. Insurance companies need to safeguard themselves, their customers and their share holders from the increased value of claims due to changing climate patterns. Table 1 shows the impact of climate change on different segments of the financial sector.

Financial services industry segments	Potential impacts of climate change
Capital providers – Individuals, corporations and foreign investment	Disruption to global economy reduced confidence
Advisers – Consultants, analysts and credit rating	Impacts on equity value, debt quality Implications for investor resource
Investors – Fund managers, investment banks and project finance	Impaired investment performance New markets in clean technology Implications for fiduciary duty
Lenders – Corporate banking, mortgages and commercial loans	Reduced corporate creditworthiness Damage to property/physical assets New markets in clean technology
Insurers – Reinsurers, underwriters and brokers	Credit and liquidity problems Increased demand for risk transfer products Opportunities in GHG markets
Brokers/dealers – Investment dealers, commodity traders and brokers	Growth of GHG credit trading market growth or risk management requirements
Users of capital – Individuals, corporations and governments	Increased cost of mitigation requirements. Losses due to weather extremes Public/private partnerships
Regulators – Listing/disclosure, accounting standards and banking law	Demand for greater risk disclosure Need for accounting guidance Loss of investor confidence


Table 1. Compiled by NatureFirst-GEMS

Banking and Finance

Through their core functions of risk management, project finance and asset management, the financial sector has developed products and services to minimise the risks and costs of climate change. Furthermore, they have developed new markets related to climate change mitigation projects and processes.

As Table 2 shows, the finance industry faces various threats and opportunities because of climate change.

Table 2. Threats and opportunities to the finance industry



Financial sub-sector	Potential threats	Potential opportunities
General	Macroeconomic downturn hurts business volume. Uneven and unpredictable impacts on global markets. Greater pressure on public purse for disaster relief and infrastructure rebuilding. Compounding risk across entire portfolio of converging activities (asset management, insurance, reinsurance)	Development of new markets and demand for new products related to GHG emissions reductions and/or adaptation to climate change creates new momentum for economic expansion Public/private partnerships such as in green municipal funds
Corporate and retail banking and project finance	Property damage risks to project finance and real estate finance. Ability to cancel real estate insurance exposes property lender. Unanticipated GHG emissions mitigation costs at project level. Impaired value of GHG-intensive capital stock. Physical damage to corporate assets. Regulatory and political risks. Reduction in disposable income as climate change costs rise.	Financing clean energy technology development. Financing infrastructure development arising from adaptation. Enhanced project returns from sale of credits. Lending by commercial banks to customers for energy efficiency related projects. New markets, e.g. regulatory risk transfer.
Private equity	Reduction in competitiveness of GHG intensive business.	Growing demand for low carbon technologies and related goods and services.
Other	Compounded carbon risks for diversified fund. Managing hedge funds. Potential deterioration in project economics and investment viability due to national financial policy responses to climate change.	Hedging services for uninsurable GHG credit and energy price risks. GHG credit brokerage and trading. Consulting and advisory services. Microfinance opportunities in developing countries.

Table 2. Compiled by NatureFirst-GEMS

Insurance

As weather risks increase, the demand for innovative risk transfer solutions has also increased. Insurance of new environment technologies and carbon abatement equipment has led to underwriters developing specialist knowledge about the risks. As Table 3 shows, there are various threats and opportunities for the insurance sector resulting from climate change.



Insurance sub-sector	Potential threats	Potential opportunities
General	New and existing markets become unviable as climate change increases regional exposure. Asset management risks; loss of long-term value in securities affected by adaptation/mitigation regulations and measures. Compounding risk across entire portfolio of converging activities (asset management, insurance, reinsurance)	Use of pre-existing insurance tools (e.g. errors and omissions insurance to protect against errors in forward selling of climate-influenced contracts; business interruption insurance to be better prepared than competitors). Technology insurance and/or contingent capital solutions to guard against nonperformance of clean energy technologies due to engineering failure.
Property/casualty	Physical damage to insured property from extreme/more frequent weather events unbalancing insurer's assets and liabilities Liquidity problems due to above point Increases in population and infrastructure densities multiply size of maximum potential losses from extreme weather events. Regulatory change, for example relating to design standards Insufficient capital	Increase in demand for underwriting services as weather risk increases Insurance of GHG offset, clean energy projects and related financial services e.g. professional indemnity for carbon credit guarantors and certifiers.
Life/health	Increased risks to human health (thermal stress, vector-borne disease, natural disasters)	Increase in global demand for life/health insurance as human health risk increases

Table 3. Compiled by NatureFirst-GEMS

Home & Business Insurance

- i. Green Building Coverage, conventional insurance products largely fail to support the unique coverage associated with green building projects. Specialised product insures customers' investments in new, energy/water-efficient homes and green renovations for existing buildings. Schemes need to be designed to offer property upgrades, with options to rebuild with green alternatives, including EnergyStar® rated electrical systems; interior lighting systems that meet LEED or Green Globe requirements; water efficient interior plumbing; and energy EnergyStar® qualified roof and insulation materials.
- ii. Carbon Neutral Home Insurance, home insurance products that offset global GHG emissions i.e. home insurance policies to offset all emissions from a user's home, as well as their vehicle and in doing so achieve carbon neutrality.

Asset management

Asset Management has become one of the fastest growing segments in the financial industry and represents a core business unit of current banks. It focuses on providing financial advice to clients on estate planning, mutual funds, managed asset programs, taxes, trust services, international financial planning, global private banking and full-service and discount brokerages.

Asset managers are likely to specialise in the areas of:

- Advisory or discretionary management on behalf of investors'.
- Services which normally require rigorous financial analysis combined with asset and stock selection.
- Plan implementation, and regular monitoring and reporting of investment activity.

Pricing assets and exercising ownership is a key function of financial services. In order to account for sustainable development, asset prices need to reflect its green credentials. Table 4 examines the threats and opportunities faced by asset managers in terms of climate change.

Asset management	Potential threats	Potential opportunities
General	Climate related risks and mitigation policies. could impair market values of securities. Real estate impaired by weather events and increased energy costs. Potential absence of property insurance. Macroeconomic disruptions impairs long term asset appreciation. Pension funds see climate change issues as a potential threat to their interests.	Investment in climate leaders and best-in-sector securities. Hedge funds investing in GHG credits. Innovative climate-related theme funds e.g. renewable energy

Table 4. Compiled by NatureFirst-GEMS

Socially responsible investment needs to become a large scale movement in the investment markets. We believe that unless people and financial institutions are using their financial resources to make a positive impact on society and the environment their fulfilment will be limited.

Emissions trading

Carbon emissions trading has increased steadily in recent years. According to the World Bank's Carbon Finance Unit, 374 million metric tonnes of carbon dioxide equivalent (374 mtCo₂e) were exchanged through projects in 2005, a 240% increase relative to 2004 (110 mtCo₂e), which was itself a 41% increase relative to 2003 (78 mtCo₂e).

Critics of carbon trading, argue that it places disproportionate emphasis on individual lifestyles and carbon footprints, distracting attention from the wider, systemic changes and collective political action that needs to be taken to tackle climate change. The argument is that the market will choose the easiest means to save a given quantity of carbon in the short term, which may be different to the pathway required to obtain sustained and sizable reductions over a longer period, and also encourage a technological lock-in.

Financial institutions provide equity, loans and upfront or upon delivery payments to acquire carbon credits from CDM and JI projects. Most acquire carbon credits to serve their corporate clients' compliance needs, supply a tradable product to the Financial Institutions trading desks, or develop lending products backed by emission allowances and carbon credits.

Financial companies have two main interests in emissions trading:

- I. Potential financial gains from trading emission allowances. This involves brokerage, verification and certification of allowances.

- ii. Implications for their clients' business performance impacts on companies they invest in. This involves helping clients integrate climate change considerations, emission abatement and energy efficiency strategies, regulatory compliance, and profit maximisation into their business strategy. Financial services such as business management, accounting and insurance can help in the identification of the most cost-effective emissions reduction project, verifying an emission reduction, assessing sustainable development benefits and developing carbon asset management risk strategies.

Barriers

Even though climate change poses substantial threats and opportunities for financial companies, very few have taken a proactive role. The lack of substantial data and analysis on climate change and its impact on the economy has led to most financial companies taking a 'wait and watch' approach. Reinsurance companies are the trendsetters in this area and have taken a leading stance by developing services and products supporting GHG reductions. Regulatory barriers and the complex nature of the mechanisms involved are further obstacles that discourage positive action from the financial community.

The major barriers discouraging positive action are:

I. Unified effort is lacking

A recent report finds that commercial banks and insurance companies are not working in tandem on this issue. Banks are hesitant to provide loans where climate change effects may hinder debt servicing and insurance is not available.

ii. Low data availability

A general lack of good quality information on GHG emissions and climate change strategies undermines any serious attempt to incorporate climate change factors into stock evaluation.

iii. Complex market structure

The nature of the instruments and markets involved are inherently very complex. It has been heavily criticised on the grounds of having high transaction costs, time consuming legal advice and a lack of certainty over rules.

iv. Low awareness of sustainability benefits

There is limited understanding of the monetary value of sustainable business practices. Investors require stronger and clearer market signals for channelling funds into new environmental technologies.

v. Commitment and clarity from policy makers

Governments have not provided the right signals and incentives for reducing emissions. There is a lot of uncertainty about environmental regulations and concern regarding the compliance costs of adhering to changing regulations. Policy makers need a better understanding of the role and functions of the financial services industry's segments. Each segment plays a unique role in helping to understand the risks of climate change and determining how these risks should be included in investment decisions.

Emerging Opportunities

I. Green commercial real estate

Develop products and services aimed at the green commercial building sector, which is growing at a phenomenal pace. As in most potential growth markets, players that enter this space early on can build the credibility, reputation and expertise required to enjoy a competitive edge as the market flourishes. The faster this growth occurs, the better positioned and experienced a firm will be to effectively supply growing demand, prompting further credibility and enhanced reputation in the market.

ii. Carbon market

Capitalise on growing carbon markets. Carbon market products and services are developing at an extraordinary pace and many banks consider climate change as the most important environmental issue they face. Setting up emissions trading desks; offering cutting-edge derivatives products based on carbon assets; investing and buying credits from CDM and JI projects; minimising and offsetting the bank's own GHG emissions, are all likely to become mainstream in one or two years among all major banks globally.

iii. Clean technology

Supporting the clean technology sector, over the coming decades tapping into clean energy and environmental technology opportunities will continue to require innovative financing packages, developed through a long-term lens. Along with the market valuation of the environmental sector, global investment in clean technology companies continues to expand rapidly.

iv. Carbon neutrality “First Mover” opportunity

Marketing the benefits of being carbon neutral and selling products and services required for customers to reach this ideal. Going carbon neutral, on a product or corporate level, is becoming an aspirational practice for many organisations and individuals, while representing unparalleled opportunities for product development in the retail banking space. Generally speaking, no other sector has the capacity to reach such a diverse audience with this type of packaged emissions offset deal, nor is there another sector as well connected to provide the real reductions necessary to make a significant dent in global emissions.

Conclusion

This article highlights the role and potential of the financial centre in encouraging sustainable business practice. Financial institutions are the key economic drivers to fashion a change through sustainable action. Given the intrinsic complexities, the current long-term market forces alone will not change investment decisions towards more sustainable practices.

NatureFirst-GEMS has been working closely with international and national financial institutions to develop sustainable financing options and 'green' lending practices and to make available commercial funds towards ventures that are economically and ecologically viable. Through our projects and strategic correspondence with HSBC, IL&FS, IDFC, and others, we aim to develop a business case for the environment that proves the economic viability of sustained action to the financial and banking sector.

Sustainable business practices require shared responsibility between corporations and governments, developing a fiscal and regulatory environment. We continue to advocate the importance of developing national 'green' funds and governmental encouragement towards investment in such funds.

Our strategic discussions with various ministries and political parties show a unanimous vision towards upcoming regulations that encourage sustainable financing. Ecologically driven financing and banking will not only provide for sustainable business practices world-over, but will also create a new economic world-order that will ensure sustained benefits to the nations, and the nature at large.

Natural Gist

- A The financial services sector has an important role to play in managing climate change risks, underwriting new areas of uncertainty, together with **promoting sustainable business**, in areas such as green commercial real estate, carbon markets, clean technology and carbon neutrality.
- A In order to tackle environmental and economic crisis from climate change all institutions such as banking and financials, insurance and asset management firms should be encouraged to work for the **collective interest** as well as their own.
- A Market forces alone will not change investment decisions towards sustainable practice; a **business case for the environment** must be developed providing stakeholders with a superior return as a result of green practice.
- A Sustainable business practice requires a shared responsibility between corporations and governments, developing a **fiscal and regulatory environment** to make sustainable business a clear value driver.
- A Financial services has the capacity to reach a **diverse audience** so the promotion of sustainable practice and packages can provide real reductions and make a significant dent in global emissions.

Naturenomics™ in Practice

Through our projects and strategic correspondence with HSBC, IL&FS, IDFC, and others, we aim to develop a business case for the environment that proves the economic viability of sustained action to the financial and banking sector.

"The Laws of Nature are changeless, unchangeable, and there are no miracles in the sense of infringement or interruption of Nature's laws"

"We cannot have ecological movement designed to prevent violence against nature, unless the principle of non-violence becomes central to the ethics of human culture."

"Adaptability is not imitation. It means power of resistance and assimilation."

"Not to have control over the senses is like sailing in a rudderless ship, bound to break to pieces on coming in contact with the very first rock."

- by Mahatma Gandhi



Green Manufacturing: Greenovision through Innovation

Kalpesh Popat & Sourabh Joshi, NatureFirst

Greenovision

Greenovision refers to an era that is aware of the working principle of nature and the way nature creates, runs and sustains life and resources on earth. An era that can replicate the principles of nature to develop machinery and products that are truly environment friendly in their entire life cycle. How we can get there is what we need to find out next.

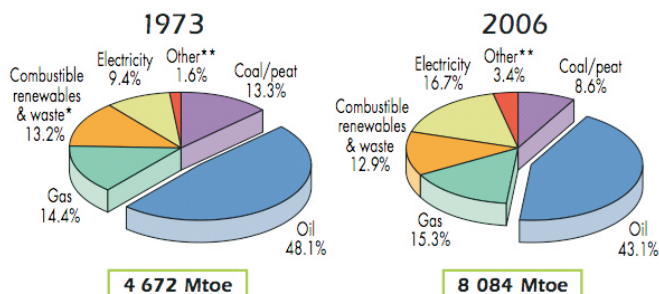
Before we find out what Greenovision means for industry, let us identify what industry itself really covers. Everything that comes in front of our eyes has been manufactured by someone. Be it simple and common products like pen, paper, my work desk, chair, or be it more sophisticated electronic equipment like a laptop and mobile phone and also of course the electricity that is being generated somewhere and distributed in the office. If you go out, the roads, the street lights and the vehicles again fall under the domain of industry including the buildings, offices, and air conditioning systems. Newer renewable energy production like solar and wind farms are also part of the manufacturing industry domain.

Directly or indirectly everything manufactured today is being transported, stored, used and/or disposed of someplace, right now, and it is impacting the world as a whole. Let us talk a little about the facts, before we move onto the subject of Greenovision. The following finding by Global Carbon Project – Carbon Budget 2007 will set the tone.

“Anthropogenic CO_2 emissions have been growing about four times faster since 2000 than during the previous decade, and despite efforts to curb emissions in a number of countries which are signatories of the Kyoto Protocol. Emissions from the combustion of fossil fuel and land use change reached the mark of 10 billion tones of carbon in 2007.

Natural CO_2 sinks are growing, but more slowly than atmospheric CO_2 , which has been growing at 2 ppm (parts per million) per year since 2000. This is 33% faster than during the previous 20 years. All of these changes characterise a carbon cycle that is generating stronger climate forcing and sooner than expected.”

From the consumption levels shown below, Industry consumed 23% of the total energy in 2006 (in the form of coal, oil, gas, electricity and renewable) while transport systems consumed 27% in the same year and the remaining energy was utilised by the residential, commercial and agricultural sectors, the overall global consumption is ever increasing and has doubled since 1973.



*Prior to 1994 combustible renewables & waste final consumption has been estimated.

**Other includes geothermal, solar, wind, heat, etc.

Figure 1. Source: www.iea.org

Innovation in technology has made equipment smarter and more efficient and has greatly reduced per-unit production costs and has to some extent improved the end product efficiency as well. Still the statistics of energy consumption indicates that the overall global scenario is failing. It will be interesting to know why.

The set of questions that immediately comes to mind are:

- What does green industry really mean?
- Is it limited to the way the product is manufactured or does green industry include the impact the product has over its entire lifecycle?
- Are the levels of production/ output controlled?

If we plot the trend of car mileage over the last 15 years, between 1990-2004 it remained almost flat. A detailed report is available from the National Highway Traffic Safety Administration, USA.

Similarly, according to a very recent report, "India generated 3,30,000 tonnes of e-waste in 2007. The figure is set to increase in the next five years. With the IT boom, India has become a cultivation ground for e-waste (waste electrical and electronic equipment) and short-listed by the US and European countries as a place to dump their e-waste. About 50,000 tonnes of e-waste is brought into the country every year under the pretext of charity and donation, say NGOs. Out of the 3,30,000 tonnes that is generated in India, only 19,000 tonnes (5.75%) is recycled, retained and reused.

In the UK, it costs \$40 to recycle e-waste and \$4 to send it to India. That most often decides the choice and tonnes of it is welcomed into India by traders who sell these goods in the second-hand market. Old obsolete computers, peripherals, mobile phones and TV sets find their way to India, where they are taken apart through crude methods to extract the metal content and dispose of the rest by dumping them in farmlands.

Now let us take a step back and think about what can be classified as innovation in the context of manufacturing. The following text identifies two broad categories. One refers to the source while the other refers to the end result. We will try to find out how these two categories perform in the context of green innovation of new products. Generally green innovation is moving at a steady pace (mainly driven by market opportunities), but the management of these processes has been much slower and for most it is not yet seen as a priority for concern.

The best example of the failure of both government and industries is their inability to handle and manage waste being generated. Government has also failed to ensure proper public transport for the masses or to manage road traffic for the ever growing demands of private cars and transport services required to bring our products from the factories to the end users.

To date the power sector of India, has been enable to keep up with industrial growth and the subsequent demand for energy, again a failure of our government to manage effectively. It has led to a huge increase in the use of non-conventional sources to fill the gap for supply, and this has resulted in more Co₂ emissions and also the importing of energy resulting in a higher unit cost for users. In India demand for electricity is currently 11% greater than supply.

There exists a clear gap right now in terms of accountability, which must be remedied in order for this issue to resolve itself. However we believe the illustration below will help us understand how different entities can work together as a whole to ensure the creation of a truly green industry.

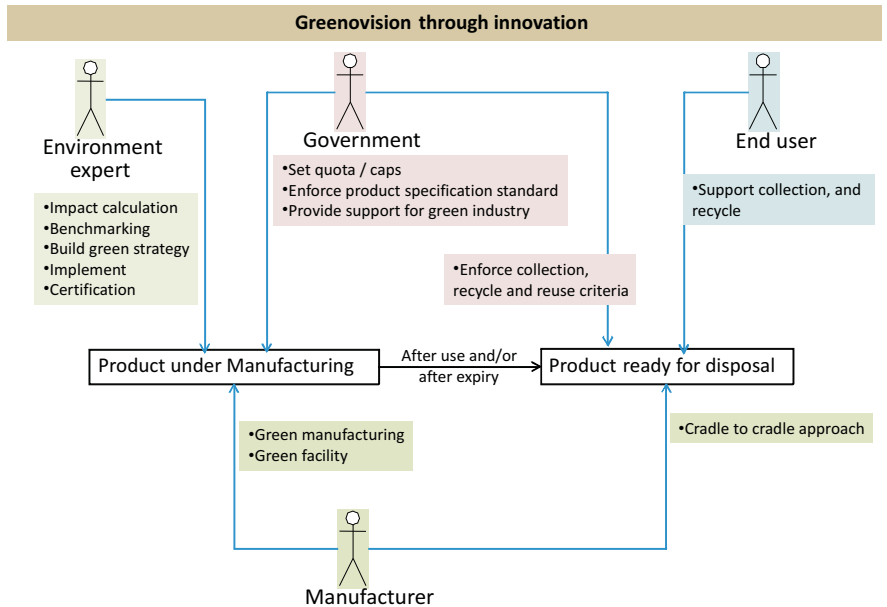


Figure 2. Source: Compiled by NatureFirst-GEMS

The above diagram represents a very simple interlink between each of the key entities. The following sections will go deeper into each of the roles illustrated above and the actions each of them needs to undertake to ensure the creation of true green manufacturing.

The role of industries towards greenovision

An immediate step that industry can take towards greenovision is to makes their facilities and manufacturing processes eco-friendly. Such “Green Industries” pursue a unified approach towards reducing the utilisation of raw materials and energy in business operations and minimising the amount of chemical discharge, hazardous waste, and air pollution produced by its processes.

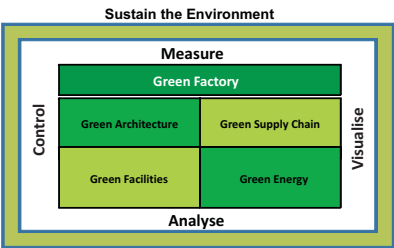



Figure 3. Source: Compiled by NatureFirst-GEMS

In going green, management should incorporate a three fold strategy approach leading towards self-sufficiency in the two key resources; energy, water.

a. Bring down the environmental burden; by reducing the carbon footprint of the factory. This can be done by incorporating the measures, set out in the diagram below:



	Action	Benefit
Green Architecture	Take necessary initiatives for eco-friendly design, construction & interior strategy right from scratch	Smart design reduces load on HVAC and Lighting system leading to cost savings
Green Energy	Efficient processes & utilities by following the best practices in energy management, supported by increased utilisation from renewable source of energy	<ul style="list-style-type: none"> - Reduction in dependency on petroleum products - Government subsidy and tax benefits - Reduced wastage of energy - Increased life of equipment - Reduced maintenance cost - Reducing demand of grid energy
Green Facilities	Bio-diverse land, water positive, zero waste zone, zero soil and air pollution	<ul style="list-style-type: none"> - Zero soil toxicity - Elimination of ground table contamination and also improved ground water tables leading to increased availability of water - Reduced hazardous waste generation leading to reduced cost of disposing the waste - Healthier environment by improved indoor & ambient air quality
Green Supply Chain	Raw material – reduction in consumption of input material and chemicals require, eco-friendly stationery procurement, Improved measurement for reducing transportation for employees / input raw materials / products required	<ul style="list-style-type: none"> - Reduced Co₂ emissions - Improved economic benefits by reducing the consumption

Table 1. Compiled by NatureFirst-GEMS

b. Take leadership in compliance; with existing and / or upcoming laws and regulation to prevent environmental risks and also heavy taxes.

c. Sustain the environment; through improved monitoring and measuring mechanisms. In this way it is possible to ensure a continuous and lasting mechanism for reducing the environmental burden and improved cost savings.

✓	Measure	Benchmarking indices specific to your product to standardise monitoring
✓	Visualise	A dashboard to monitor trends, load profile, consumption, and distribution of energy and water
✓	Analyse	Cost and performance analysis, Identify idle operations
✓	Control	Complete control over the utilisation of the equipment with logic based decision making system to ensure timely action with minimum human interference
✓	Save	Increase staff ownership by awareness programs and achieve savings by optimised consumption, minimised wasteful practices and increased machine utilisation.

Table 4. Compiled by NatureFirst-GEMS



Lipton

As a part of its environmental strategy Unilever decided to go green with its tea brand Lipton. The company introduced environmentally friendly 'slip sheets' to replace the wooden pallets that are traditionally used for transportation of its tea products throughout the world. This initiative saves the amount of wood used and also minimises shipping costs by achieving greater loadability per container. The slip sheets are thinner than the traditional wooden pallets, this cuts down transportation and fuel costs whilst reducing impact on the environment. This innovation also eliminates possible risk from wood related infestation to the tea product during shipping.

Anand group

In Behr, in India one of the Anand group of companies and a pioneer in automobile parts manufacturing will benefit immensely from a waste heat recovery system which, by creating a closed loop system, will save them 80% on their fuel cost and lead to a reduction in CO_2 of 800 tonnes.

Gabriel group

While, Gabriel, in India its other group company, can benefit by converting the entire paint shop process into a green paint shop with the help of innovative cogeneration initiatives, this will reduce the dependency on petroleum products by 100%, cut down the cost by 50% and ensure a reduction in CO_2 by over 3000 tonnes, equal to 70% of their total emission.

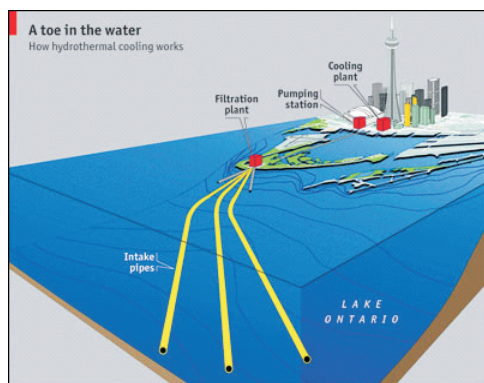


Figure 4. Source: www.treehugger.com

Toronto Dominion Center

The Toronto Dominion Center in Canada has implemented hydrothermal cooling to reduce its energy demand by 7.5 mw by replacing the use of 3 AC's in the buildings.

Three pipes running 5 km into the lake to a depth of approximately 83 m pump 4°C water to a filtration plant and then to a heat-transfer station located on its shores. The system, built by Enwave Energy Corporation, transfers the "cold" to a closed loop of smaller pipes that in turn supply the towers of Toronto's financial district. With plans in place to connect up to 52 more buildings to the cooling technology, the project is expected to reduce Toronto's

The role of environmental experts towards greenovision

Environmental experts work closely with Industries and government to provide a focused and dedicated approach towards reducing green house gas emissions. They bring in many advantages and help in making the most efficient and appropriate decision towards going green:

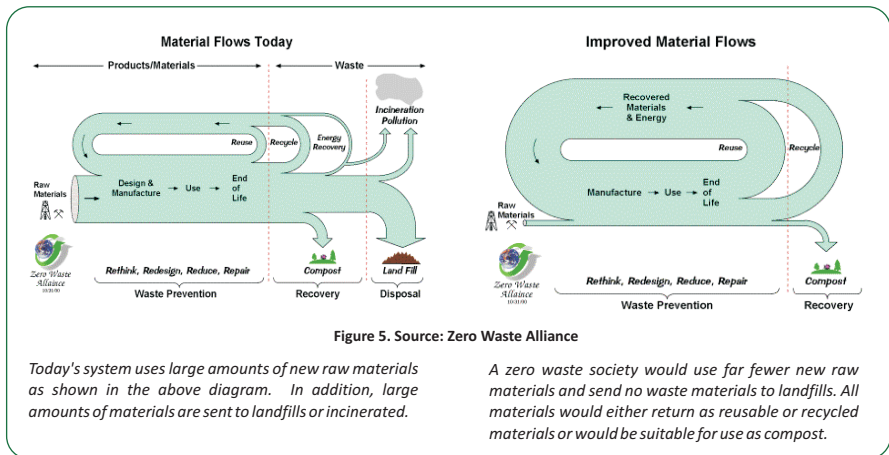
a. Start by correctly estimating the Impact of the practices followed by the industry: This will ensure a correct baseline which will become the starting point for setting reduction targets.

b. Creating a benchmark that suits the specific needs and then monitor it on regular basis: This is a step towards identifying a trend in the use of your resource, specific to the product being manufactured, that becomes the point of reference for triggering more initiatives to making the product manufacturing green. Comparing the benchmarks with your counterparts or with global standards. This is of great value as it will help set more focused targets and enhance your ability to improve the utilisation of resources in a more efficient manner.

c. Maintaining a database of technology and of the surrounding industry: This benefits in two ways:-

One the expert will know exactly what is best suited for your given scenario as they maintain a list of latest technologies and their providers thus ensuring the most efficient solution is implemented. Furthermore as a relationship already exists between the expert and the vendors it should ensure the best price for the technology, maximising long term savings.

The **second** need of the database is to have a complete map of raw material needed by all industries and consumers around, this will help in planning some very innovative closed loop systems for waste management and reduction. Wherein the waste generated at your factory goes as an input material to another factory. Generating revenue for one facility who sells their waste, and cost savings for the other. This approach is known as 'Cradle to Cradle' design as illustrated in the figure below:-



The role of government towards greenovision

We have mentioned that policies must support the growth of technology in order to manage them. At the same time we believe that a plan and vision should be in place to ensure such policies are implemented ahead of the new technology invented. Government can play a major role in setting up this visionary goal to ensure that industries and other stakeholders are playing inline with the vision set for the nation.

The policies that the government will enforce must be able to take care of the following key problems:

- To ensure that current technology keeps improving.
- To make sure there is a cap system on production enabling the correct and right utilisation of the technology.
- To provide timely management system for upcoming technology.

The need for innovation by and large has mostly been triggered by a shortage of resources i.e; fuel or water, or to get an additional cost benefit, rather than a desire of industry to go green.

A foremost goal is to ensure that our current products are being developed efficiently. This can be done by providing support and access to a vibrant pool of product and service providers in each vertical, to work with industries to design, implement and sustain green initiatives, and since capacity and skills would not always be available develop a policy that enables a smoother and easier method for technology transfer from the international community.

Coolants from industries in India generates over 1000 tonnes of hazardous sludge annually, this waste can be eliminated if bio-degradable coolant became readily accessible to our industry. Government can play a major role in driving industry towards research & development by enforcing stringent standards under which such products can be manufactured.

Correct utilisation of technology is also necessary for it to be effective, for example; solar power is best suited for heat capturing and applications related to heat rather than for generating electricity hence approval of such projects should be done after calculating all the options and impacts of the proposal and also considering the subsidy government may be in a position to contribute .

E-Waste management is the next big thing to be taken into the plan and stringent rules must be placed, both on industry and consumers, to ensure that all e-waste is being recycled rather than going to landfill. So a policy suited to India's current situation must be planned. In the US the manufacturer, and not the consumers or government, is responsible for the costs of recycling e-waste. In Taiwan the manufacturer pays for the collection and recycling of e-waste. In Japan, manufacturers are, again, responsible for collecting and recycling of obsolete electronic equipment and so they charge a recycling fee to the consumer at the point of sale.

Conclusion

To conclude, the future of green industry lies in innovation and it will be interesting to see what future innovation brings to industry. Already advances in fuel cell technology are providing greener power to nanotechnology replacing motors and engines, are all innovative steps towards the greenovision!

Natural Gist

- A **The global scenario is failing.** Industry consumed 23% of total global energy in 2006 and anthropogenic Co₂ emissions are growing, about four times faster since 2000 than during the previous decade. Despite improvements in efficiency and production costs energy consumption is still rising.
- A **Adoption of green practice** is driven by market conditions and the potential savings that can be achieved by adopting efficient technologies and approaches.
- A **Government plays a driving role** in research and development by enforcing stringent standards; implementing policies and guidelines for rapid adoption and management of green technology, imposing strict penalties for those not adhering to policy applicable to both manufacturers and consumers, maintaining a database of resource usage and waste generation enabling rapid decision making to improve policies.
- A **Developing the greenovision**; manufacturers must constantly develop and improve the efficiency of their products, but also must adopt methods for getting feedback on the way their products are used and can be improved.
- A **Effort will be needed from all players** from government to environmental experts, from manufacturers to consumers.

Naturenomics™ in Practice

We have been guided in our thinking on greenovision, based on the work which we have done with leading green manufacturers such as; Behr, India, Gabriel India, Mahale Filters India, Spicer and Tata Tea.

"You may not waste a grain of rice or a scrap of paper, and similarly a minute of your time. It is not ours. It belongs to the nation and we are trustees for the use of it."

"Victory attained by violence is tantamount to a defeat, for it is momentary."

"It is my own firm belief that the strength of the soul grows in proportion as you subdue the flesh."

- by Mahatma Gandhi



Lean Green Data Centres

Som Ganguly & Komal Parekh, NatureFirst

Information and Communication Technology

The increasing penetration of the internet is making it important for companies to establish their presence on the World Wide Web. Today, information and communication technology (ICT) has become a core component of business, education, government, media, telecommunication, and has influence on possibly every sphere of our lives. Information technology currently

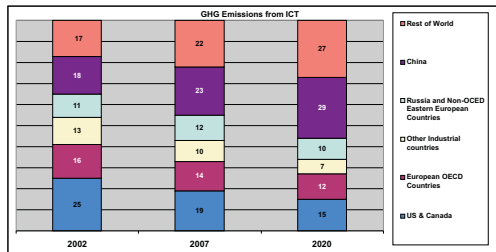


Figure 1. Compiled by NatureFirst-GEMS

accounts for 2% of the global carbon dioxide (Gartner Research). This carbon footprint is associated with ICT technologies, including laptops and personal computers, data centers and computing networks, mobile phones and telecommunication. Most companies today need more computing to run their websites, businesses and financial applications.

Data Centres

Today, IT managers are faced with rising energy bills, higher greenhouse gas emissions, and challenges to design their strategies and plans to bring environmental efficiencies. Similarly, CIOs (Chief Information Officers) are being challenged to rethink their strategies on data centres, energy efficiencies and operating parameters. The global scenario of electricity usage by data centres shows an upward sloping trend. This increased use of electricity will result in an increased emission of GHG gasses thereby contributing to the global issue of global warming. With the current levels of efficiencies, the global electricity consumption could be brought to a level of around 100 billion Kwh per year by the year 2010.

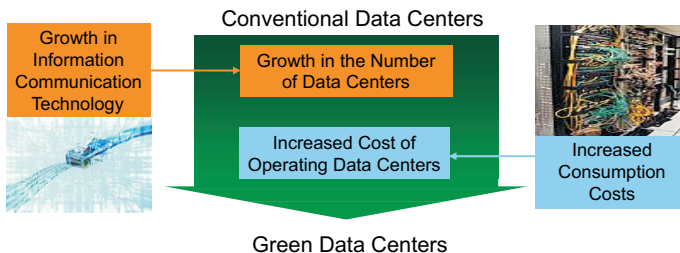


Figure 2. Source: Compiled by NatureFirst - GEMS

Consecutively rapidly expanding and maturing economies like India, China, South America, Eastern Europe, and Africa are all fighting for oil and power to fuel growth. Demand driven price increases can be a major problem for enterprises looking to maintain revenue streams and profit margins in a highly competitive world. The only reasonable responses are programs that increase operational efficiencies and reduce power demand.

The solution is green data centres

Our 'green' solution is focused on achieving economic benefit that are process driven and product based. These two components of the solution can be applied to both core (e.g. servers, microprocessors) and non-core (e.g. cooling) infrastructure.

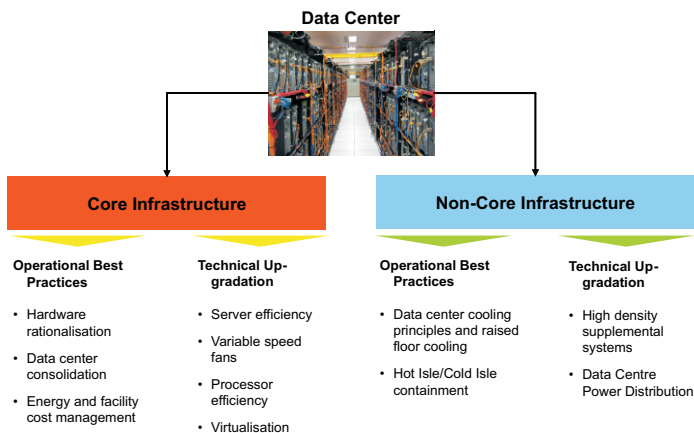


Figure 3. Source: Compiled by NatureFirst - GEMS

A green data centre can be defined as a repository for storage, management, and dissemination of data in which the mechanical, lighting, electrical and computer systems are designed for maximum energy efficiency and minimum environmental impact. A green data centre needs to incorporate the following:

- Use of alternate / renewable energy technologies.
- Water recycling.
- Installation of catalytic convertors on back up generators.
- Minimal building footprint.
- Implementing low emission building materials, carpets and paints.
- Sustainable landscaping.

Initial costs of building a green data centre are higher than delivering conventional data centres, however, long term, significant savings can be realised from the efficiency driven operations and proactive management of resources therein.

To build a solid business case for a green data centre, knowledge in these five areas is essential:

- Power consumption trends in data centres.
- Root causes of demand.
- Understanding why energy efficiency matters.
- Ways to implement energy efficiency in data centres.
- Metrics that measure green progress.

Core infrastructure

Adopting operational best practices

In June, 2009, Gartner released an outline of seven practical ways to save costs in existing data centres. Although these Gartner recommendations are more focused on managing the ICT budget in the most efficient way, they are also directly linked to lower consumption energy. Lowering energy consumption has a direct link to reduced carbon emissions. The publication highlighted the following:

1. *Rationalisation of hardware*; will result in savings in several areas: It will provide a clear picture of the hardware that are being used effectively and those that are not. It will lead to lower maintenance and support charges. Rationalisation will lower energy costs. Hardware rationalisation projects yield 5 – 10% of the overall hardware costs, when measured post project.
2. *Consolidate data centre sites*; most organisations maintain multiple data centres for their IT operations, ranging from large complex installations to small machine rooms. Consolidating these sites into a smaller number of larger sites will often result in financial savings. Outside of real estate savings, this will include decommissioning of redundant IT assets, software, maintenance and support and disaster recovery contracts. It is projected that consolidation can result in savings of 5 -15% of the overall data centre budget.
3. *Manage Energy and Facilities Cost*; year on year energy costs show an upward trend for most data centres as the energy consumption of the underlying hardware continues to increase as new technologies such as blade servers gain popularity. Also, towards savings floor space and to keep a shorter footprint, more hardware is accommodated into a smaller area, thus requiring higher levels of cooling. Raising the data centre temperatures to 24 degrees Celsius, use of outside / fresh air as an alternative to expensive air conditioning, use of hot/cold isle configurations, blanking panels and economisers and use of server based energy management software to run the workloads in the most energy efficient way, such as taking advantage of lower energy tariffs.

Leveraging technology to achieve efficiency

In this section, we have presented some of the product based solutions that reduce the consumption of these data centres and help achieve sustainability.

Ordinary rack servers are responsible for the bulk of IT energy crisis; both in terms of the number of units in place and also the amount of energy they waste. They are the largest portion of the IT energy load, estimated between 50 – 75%. They are also the heart and soul of the whole enterprise as the key element that drives the end result.

In February 2007, Jonathan Koomey, a staff scientist at the Lawrence Berkley National Laboratory and a consulting professor at Stanford University published the following estimate of total US and global server energy consumption:

- Using figures from Framingham, Mass -based research firm IDC, Koomey developed a weighted average for rack server energy use. In 2005 the three most popular server models in the U.S. were Dell Inc.'s 2850 and Hewlett-Packard Co.'s DL380 and DL360.
- The weighted average energy consumption of a 2005 model rack server is 217 watts (W) (or 217 kilowatts [kW]). Multiplied by 8,760 hours in a year, that figure translates to about 1,900 kilowatt-hours (kWh). Using 6 cents as a baseline price for kWh, it costs an average of \$114 annually to operate a rack server.

Server Efficiency

A fundamental area where data centres can gain server energy efficiency is in the power supply. This hardware component converts alternating current (AC) power at the plug into direct current (DC) power that a server can use. Historically, the power supplies in low end rack servers converted AC to DC inefficiently, typically at around 60% - 70% efficiency, but through engineering improvements and higher quality components, these power supplies have become increasingly more efficient.

Variable Speed Fans

Most server vendors have some sort of variable speed fan design built into their servers to avoid blowing air at full pressures when not required. The idea behind these low flow fans is that they can spin slower while still delivering sufficient cooling.

Server vendors have their own approaches to accomplish this. Dell, for example, codes the basic I/O system and firmware to understand which work loads a server runs and ensure that the right amount of cooling goes to the right place.

IBM now uses Calibrated Vector Cooling (CVC) on its System and Blade Center servers. CVC channels the cool air to the hottest parts of the server and is designed for efficiency.

Processor Efficiency

Considering the underlying assumption that energy efficiency means sacrificing processor speed and the debate that surrounds accurate measurement of processor efficiency, why address processors at all? Simply put it is unavoidable: processors account for half of server energy consumption.

Two main strategies have emerged to thwart power-hungry processors: power down features that reduce energy consumption on idle processors and multi-core processors that squeeze out better performance at lower clock speeds than comparable single-core configurations.

The recent trend toward multi-core processing may improve performance per watt on server hardware. A multi-core processor is a chip with two or more processors in the same socket. This feature enhances processors' ability for multithreading or simultaneous processing of multiple tasks.

Multi-core processors can be more energy efficient in two ways:

- They can offer increased performance within the same power and cooling envelope compared with single core machines; and
- The consolidate shared devices across a single processor core

Processor components like front-side bus and cache can be shared by multiple processors on a single die, reducing overall energy consumption. They also require less energy to communicate with one another.

Virtualisation

Until recently, each application needed to be isolated on its own server. These machines used only about 7% of their capacity while consuming nearly full power energy. Today, with the x 86 server virtualisation, data centres can consolidate unused servers and achieve massive energy savings. Server virtualisation software allows a single machine to run multiple operating system images at once.

In simple terms, virtualisation is defined as method of partitioning one physical server computer into multiple "virtual" servers, giving each the appearance and capabilities of running on its own dedicated machine.

Virtualisation was first introduced in 1960's to allow partitioning of mainframe hardware. Companies like IBM, Intel and many other developed the techniques, which were largely focused on performance. Earlier the reliability on virtualisation was small because of the micro processing technology speed being fast and the low cost of installing a new server. IT managers were able to install new servers to satisfy application needs. The application of virtualisation was rare as working groups didn't feel the need to deploy a change to the system.

The economic consequences of this approach became apparent in the mid nineties as the operational costs of running a data centre increased whilst running at low capacity, resulting into vast misuse of financial and administrative resources. This lack of efficiency resulted in an IT transition with better function management, power management and of course, virtualisation management. Today, once again, the focus is back to virtualisation of data centres, focusing on delivering ever increasing efficiency in data centres.

A key benefit of virtualisation technology is the ability to contain and consolidate the number of servers in data centres. This allows businesses to run multiple applications and operating systems on the same server. It can help in reducing the space, cooling, and power requirements whilst simultaneously making it flexible and agile.

To encourage the virtualisation technology and its impact on energy efficiency, utilities such as PG& E in North America, Southern California Edison, and many more are now paying customers to remove servers and consequently lower data centre energy use.

Non-core infrastructure

For data centre managers planning to implement green strategies, it is important to have short, mid and long term goals. When it comes to mechanical infrastructure efficiency, the alternatives range from the mundane to the experimental.

- Near time strategies; include auditing hot-aisle/cold-aisle implementation and raised floor maintenance. Another tactic is to ensure that the voltage from the PDU to the server runs at 208 V and not 120 V. These approaches can be achieved at low or no cost.
- In the midterm; data centre managers should investigate high-efficiency supplemental cooling units for high-density server deployments and smaller UPS systems for modular growth.
- Over the long term; when new construction is warranted, more energy efficiency data is available and standards are in place, one should investigate economisers, liquid cooling and DC power.

Chillers, air handlers, power distribution and back up power are all mechanical processes, that keep the server running smoothly and account for more than half of the IT energy bill. Data centre managers need to operate physical infrastructure support systems at maximum efficiency to achieve a green data centre. Luckily, energy efficient data centre infrastructure is now widely accepted and available.

Adopting operational best practices

Data centre cooling principles and raised floor cooling

Data centre cooling is an area where the greatest energy efficiency improvements can be achieved. The fundamental rule in energy efficient cooling is to keep hot and cold air separate. Hot isle/ cold isle is a data centre floor plan in which rows of cabinets are configured with air intakes facing the middle of the cold aisle.

Cold aisles have perforated tiles that blow cold air from the computer room air conditioning (CRAC) units up through the floor. The servers' hot air returns blow heat exhaust out the back of cabinets into hot aisles. The hot air is then sucked into a CRAC unit to be cooled and redistributed through cold aisles.

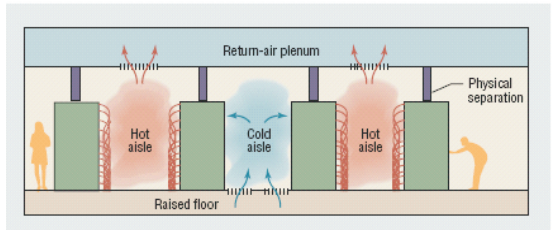


Figure 4. Energy Efficiency Computing in the 21st Century

Data centre design experts often recount horror stories about clients with highly engineered hot-aisle/cold-aisle layouts, where a data centre manager has put perforated or grated tiles in a hot aisle or used fans to direct cold air behind cabinets. As air conditioners operate most efficiently when they cool the hottest air. By placing perforated tiles in a hot aisle, the hot air isn't as warm as it should be when it gets to the air-conditioning units. By pre-cooling the hot air going into the air intake, the thermostat assumes it doesn't have to work as hard. The air conditioners don't recognise the true load of the room, and this miscue raises the temperature and creates a zone hot spot.

Hot aisle and cold aisle containment

As server density increase, the efficiency gains from the hot aisle/cold aisle arrangement are eroded. So data centre pros have extended the concept to hot-aisle/cold-aisle containment systems, using a physical barrier that separates the hot or cold aisle airflow. This can be done through makeshift design solutions like vinyl plastic sheeting used in meat lockers as well as ducted plenum systems and other commercial offerings.

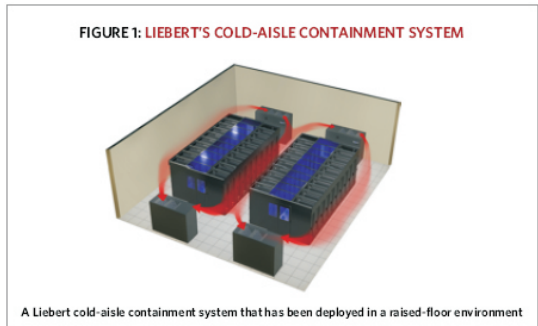


Figure 5. Hot aisle / cold aisle approach

Numerous data centre operators now employ hot-aisle/cold-aisle containment, including Sun Microsystems Inc. and Yahoo Inc. has utilised vinyl curtains in one of its data centres to deliver airflow containment.

Still the combination of hot-aisle/cold-aisle containment and variable fan drives creates significant energy savings. The separation of hot and cold air can provide much better uniformity of air temperature from the top to the bottom of the rack. This uniformity enables data centre pros to raise set-point temperatures more safely.

Leveraging technology to achieve efficiency

High density supplemental systems (such as forced air and liquid cooling)

There is only so much air we can push out of a plenum without blowing the tiles out of the floor. So how do you cool high-density heat loads? Many data centre pros have turned to supplemental, high-density cooling. Supplemental cooling systems like the Infrastructure

InRow from APC, the Liebert XD and other models from Rittal GmbH and Co., AFCO Systems Inc. and Wright Line LLC place a cooling unit next to or on top of the cabinet, delivering a higher volume of cold air directly to server intake. The result is more cooling than a raised floor can possibly deliver.

High-density cooling systems offer the following advantages:

- They deliver more cooling than do raised-floor options.
- They deliver air more evenly up a cabinet.
- They deliver cooling closer to the heat source.

Data Centre Power Distribution

While not as dramatic as removing waste heat, data centre power distribution and backup inefficiencies offer significant targets for data centre managers.

Lately, infrastructure vendors have paid a lot of attention to distribution of power at higher voltages. According to Chris Loeffler, a product manager at Eaton Corp., virtually all IT equipment is rated to work with input power voltages ranging from 100 volts (V) to 240 V alternating current (AC). The higher the voltage, the more efficiently the unit operates, but most equipment runs off lower-voltage power, such as the traditional 120 V.

A data centre could gain incremental advantage just by changing the input power and power distribution unit (PDU) in a rack. According to new research from Eaton, a Hewlett-Packard Co. ProLiant DL380 Generation 5 server, for example, operates at 82% efficiency at 120 V, at 84% efficiency at 208 V and at 85% efficiency at 230 V.

However one of the biggest energy loss items in the power chain is the uninterruptible power supply. A double-conversion UPS takes the AC power from the line and converts it to DC; the DC then charges the batteries and goes through a converter that changes it back to AC. All these steps involve some loss of energy.

Modular UPS systems are one way to mitigate the problems associated with low efficiency. With careful planning, modular UPS systems can be configured and readily re-configured to run closer to capacity. Some UPS's on the market are modular and operate in much smaller increments, such as 10 kilowatt (kW) to 25 kW models.

A smaller data centre that needs 80 kW of capacity, for example, can purchase nine 10 kW modules for 90 kW capacity. If one module breaks down, the system has enough headroom to cover it while running at far higher utilisation.

The idea of powering data centre equipment with DC has generated interest in the industry as a way to save energy in data centres, especially since the release of a 2006 LBNL study indicated that companies could see a 10% to 20% energy savings if they adopt DC power over AC.

In a traditional system, the utility company sends electricity to a data centre in AC, which is easier to distribute in that form over long distances. The AC is converted to DC at the power distribution unit, converted back to AC to begin its path to servers and finally converted back again to DC by each individual server.

In a DC system, there is only one conversion from the utility (AC) to the DC distribution plant and servers. Fewer conversions mean less energy is lost in the course of distribution. But the road to DC is rocky; there are myriad potential pitfalls:

- You can't just plug servers into the racks with DC power. Every time you plug something in, it changes the current draw. In fact, experts say you're going to need an electrical engineer on staff to deal with DC power in the data centre.
- A DC UPS can cost 20% to 40% more than AC.
- Some users say DC equipment is scarce. Sun, Cisco and Rackable Systems Inc. offer a lot of DC products, but HP, IBM Corp. and Hitachi Data Systems are lacking.

Case Study - Bharti Airtel

Bharti Airtel a large telecommunications provider operating throughout India gave NatureFirst™ - GEMS a mandate to develop a green data centre strategy for a data centre located in Noida, India.

Establishing baselines for key resources

In accordance with the Naturenomics Green Data Centre process NatureFirst™ - GEMS first conducted a detailed audit and identified the existing baseline conditions of the 6 key natural resources across land, energy, waste water, air and carbon (LEWWAC).

By doing this the following current and non-mitigated levels of consumption were identified (We note this is the key resources relevant to data centre consumption levels for one site, so omits the analysis of land and air):

Energy

- The facility receives energy through 33 kv line with an annual cost of Rs. 12 – 15 crore
- The cost of operating the diesel generator annually is Rs. 24 lac.

Water

- Water for the facility is sourced through bore well extraction and a municipal connection supplying 230 kilo liters per annum. The installed water tank has a total capacity of 5.5 lac liters.

Waste

- Annually, the facility generates 10,800 kg of dry waste and 3,300 kg of wet waste

Carbon

- The carbon footprint for one month was 1,276 tones and the predicted annual footprint is 15,475 tones.

NF-GEMS proposed initiatives and costs saved

From our LEWWAC assessment we were able to propose specific initiatives that would deliver for the company ecological compliance as well as economic savings. The table below illustrates a summary of the proposed initiatives together with their potential savings.

Areas identified	Cost Savings at Noida Data Center annually	Cost savings across 6 Data Center over 5 years	Co ₂ Reduction across 6 Data Center over 5 years
UPS system	Rs. 45 – 60 lacs	Rs. 13.5 - 18 Crore	21, 000 tonnes
PEC system	Rs. 24 lacs	Rs. 7 Crore	11, 000 tonnes
Lighting system	Rs. 9 lacs	Rs. 2.7 Crore	4,122 tonnes
Total	Rs.78 - 93 lacs	Rs.23.2 – 27.7 crore	36,122 tonnes



Table 1.

In conclusion - We identified that Bharti Airtel could save up to 27.7 core in operating costs over 5 years if they delivered our proposed initiatives across 6 of their data sites.

Conclusion

The Indian data centre industry is booming. A Gartner Inc research report suggests that the total data centre capacity in India is expected to touch 5.1 million square feet by 2012 and is projected to grow by 31% CAGR (Compounded Annual Growth Rate) from 2007 to 2012. This growth will result in an increased demand for energy.

Stakeholders need to address this challenge as an opportunity. Modern technology is increasingly focused on reducing electricity requirement.

Virtualisation, for example, is an emerging technology with the potential to address the issues of resource utilisation, efficiency, scalability and manageability.

Through effective utilisation of land, energy efficiency, resource efficiency, proactive waste management, air quality enhancement and carbon reduction management, data centres can be made more sustainable by reducing their impact on the environment.

Also, these activities directly reduce the cost of operating and maintaining a data centre thereby improving the bottom line for operators.

Natural Gist

- A Almost 2% of the global Co₂ emission is from the industry of Information Communication Technology (ICT) a result of the increased penetration of ICT and the high energy requirements of running data centres.
- A Adopting best practices and improving product driven efficiencies across core and non-core infrastructure is critical to conserve resources.
- A Half of all energy consumption in a typical data centre is used on powering and cooling computers. Initiatives like rationalisation of hardware, consolidation of data centres, and managing energy and facilities cost can bring significant savings to data centre managers.
- A Virtualisation is one of the best known technologies to enhance data centre efficiency on the technical side.
- A Greening data centres makes sense ecologically and economically by improving energy efficiency and lowering costs.

Naturenomics™ in Practice

We have developed our approach and learnings through support from clients Airtel, Vodafone and Loop Mobile, as well as interactions with our partners Tata Consultancy Services (TCS)



HRH. Prince Charles : 96 months to save the world

Source: www.princeofwales.gov.uk

The Richard Dimbleby Lecture, titled "Facing the Future", as delivered by HRH The Prince of Wales, St James's Palace State Apartments, London, 8th July 2009

Whilst working on Naturenomics™ 3.0, Prince Charles, the heir to the British throne delivered the 2009 annual Richard Dimbleby lecture in London. The exact script of this text is available on the Prince of Wales website, listed above, but we felt the relevance of his speech and sentiment it contained to the current Naturenomics publication made it highly appropriate for us to include a few key extracts here, enjoy...

... 'we in the industrialised world have increased our consumption of the Earth's resources in the last thirty years to such an extent that, as a result, our collective demands on Nature's capacity for renewal are being exceeded annually by some twenty-five per cent. On this basis, last year we had used up what we can safely take from Nature before the end of September. Between then and the New Year we were consuming capital as if it was income. And, as any investment advisor will tell you, confusing capital for income is simply not sustainable in the long-term.....'

'...The myriad, (of) invisible functions performed by these threatened ecosystems, operating in all their harmonious complexity, are a central element in the Earth's life-support system and yet we ignore the fact that without them we cannot survive'...

'Our current model of progress was not designed, of course, to create all this destruction. It made good sense to the politicians and economists who set it in train because the whole point was to improve the well-being of as many people as possible. However, given the overwhelming evidence from so many quarters, we have to ask ourselves if it any longer makes sense – or whether it is 'actually fit for purpose under the circumstances in which we now find ourselves'...

'It seems to me a self-evident truth that we cannot have any form of capitalism without capital. But we must remember that the ultimate source of all economic capital is Nature's capital. The true wealth of all nations comes from clean rivers, healthy soil and, most importantly of all, a rich biodiversity of life. Our ability to adapt to the effects of climate change, and then perhaps even to reduce those effects, depends upon us adapting our pursuit of "unlimited" economic growth to that of "sustainable" economic growth. And that depends upon basing our approach on the fundamental resilience of our ecosystems. Ecosystem resilience leads to economic resilience...'

... 'we are not the masters of creation. No matter how sophisticated our technology has become, the simple fact is that we are not separate from Nature – like everything else, we are Nature.'

... 'facing the future, therefore, requires a shift from a reductive, mechanistic approach to one that is more balanced and integrated with Nature's complexity – one that recognises not just the build up of financial capital, but the equal importance of what we already have – environmental capital ...'

... 'to take the necessary steps to avert irretrievable climate and ecosystem collapse... we only have ninety-six months.....we have every good reason to believe that carrying on as we are will lead to a depleted and divided planet incapable of meeting the needs of its nine billion citizens, let alone sustaining its other life forms.'

On the other hand, we can adopt the technologies, lifestyles and, crucially, a much more integrated way of thinking and perceiving the world that can transform our relationship with the Earth that sustains us.'

"Rights that do not flow from duty well performed are not worth having."

"Purity of personal life is the one indispensable condition for building up a sound education."

"Satisfaction lies in the effort, not in the attainment, full effort is full victory."

"Spiritual relationship is far more precious than physical. Physical relationship divorced from spiritual is body without soul."

"Self-respect knows no considerations."

"Intolerance is itself a form of violence and an obstacle to the growth of a true democratic spirit."

"If I had no sense of humor, I would long ago have committed suicide."

"I do not want to foresee the future. I am concerned with taking care of the present. God has given me no control over the moment following."

"Justice that love gives is a surrender, justice that law gives is a punishment"

"Moral authority is never retained by any attempt to hold on to it. It comes without seeking and is retained without effort."

- by Mahatma Gandhi

NatureFirst Ecological Code for Sustainable Development

NatureFirst - Green Ecological Managed Services (NatureFirst - GEMS) focuses on implementing ecologically compliant initiatives for industries and corporations, through effective utilisation of Land, Energy, Water, Waste, Air and Carbon (LEWWAC). The aim is to enhance economic capital whilst securing natural capital.

NatureFirst - GEMS pledges to work alongside our client partners to advise and facilitate implementation of this ecological code and strive for consumption - carbon neutrality.



LAND

1. Lower dependence on forest for raw materials (eg. tree pulp for paper manufacturing, timber for construction, etc). Lower by 10% - 12 % every year by promoting recycled materials.
2. Promote afforestation and reforestation projects through biodiversity.
3. Create awareness among people on the importance of terrestrial ecosystems.
4. Engage with local farmers to optimise land utilisation and enhance soil nutrition.
5. Strive for zero toxic levels in soil over the next 10 years, and 100% organic inputs in the soil.
6. Target 30% of total areas to be planted with bio-diverse endemic species to act as a carbon sink, dust and noise buffers.

ENERGY

1. Reduce energy consumption by 5% - 10% every year over next ten years.
2. Introduce renewable energy strive for supply of 30% - 50% over the next 10 years.
3. Undertake regular energy audits to track energy consumed and take steps to reduce energy use.
4. Contribute to research and development of innovative green energy technologies that will contribute to a reduction in green house gas emissions.
5. Provide support for local co-operatives and for renewable power production using wind, biomass, and other renewable sources and implement small scale cogeneration (CHP plant) to reduce reliance upon centralised power plants.
6. Target for employee transportation to be powered by 30% - 50% clean fuel over the next 10 years.
7. Within the organisation; increase awareness, encourage and incentivise stakeholders to use energy efficiently.
8. Target 60% of all energy requirements to be supplied through renewable energy and co-generation options, of which 75% should be from solar and wind.
9. Target 50% savings in energy consumption through energy efficiency initiatives.

WATER

1. Treat waste water and seek 100% reuse by creating closed loop systems.
2. Promote self sufficiency in water consumption through rainwater harvesting and ground water recharge.
3. Educate local communities on water conservation techniques.
4. Implement water efficient fixtures and appliances.
5. Explore potential for water conservation measures.
6. Optimise water & wastewater treatment solutions.
7. Maximise and safe drinking water solutions.
8. Deliver 100% water neutrality, so that all water consumed is replaced by a water recharge system.
9. Recycle 80% of all water used through implementing appropriate treatment mechanisms.

WASTE

1. Ensure 100% segregation of waste.
2. Optimise solutions for waste treatment.
3. Zero waste to landfills.
4. Implement appropriate hazardous waste treatment, such as chemical, e-waste, and so forth.
5. Implement 100% closed loop waste management systems, so it includes the reuse or recycle of waste.

AIR

1. Encourage staff and employees to use public transport instead of private vehicles.
2. Reduce air pollution levels by 25% over the next 10 years.
3. Ensure that indoor and outdoor air and noise quality meet the standards defined.
4. Establish enforceable clean air act.

CARBON

1. Reduce the cumulative carbon footprint of our client partners by at least 1 million tonnes.
2. Through advocacy with government, industry associations and other stakeholders deliver incentives for businesses, governments, and communities to implement clean and green initiatives. Similarly provide disincentives for governments, businesses, and communities who increase their ecological footprint.
3. Target reduction of carbon footprint by 50%, and its monetisation through compensatory mechanisms.



***NatureFirst - GEMS will strive towards
achieving this Ecological Code for
Sustainable Development***

Date : 1st November 2008

“The best way to find yourself is to lose yourself in the service of others.”

“The law of sacrifice is uniform throughout the world. To be effective it demands the sacrifice of the bravest and the most spotless.”

“Passive resistance is an all-sided sword; it can be used anyhow; it blesses him who uses it and him against whom it is used.”

- by Mahatma Gandhi

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- A Naturenomics™ Eco-Awareness (NEA)**
Eco-awareness is a critical first step in the eco-transformation roadmap of a corporation. This enables an eco-educated stakeholder group in the organisation which is critical for implementing and sustaining ecological projects.
- A Naturenomics™ Compliance Management & Reporting (NCMR)**
Naturenomics™ Compliance Management & Reporting caters to recording and documentation needs for both environmental compliance and environmental management related requirements of an organisation. It covers statutory and voluntary requirements around the entire ecological footprint of Land, Energy, Water, Waste, Air and Carbon (LEWWAC). In addition to standards such as LEED, ISO 14001, Green Globe (Hospitality) and Green Star that apply across all verticals of LEWWAC.
- A NatureSecure™ Rating System (NRS)**
NatureSecure™ Rating System (NRS) is the branding for the rating system that has been developed by NF-GEMS. NatureSecure™ is an output based rating system based on the Consumption-Carbon footprint and provides a rating of client facilities across the ecological elements of Land, Energy, Water, Waste, Air and Carbon (LEWWAC).
- A Naturenomics™ Environment Performance Indicators (NEPI)**
This enables establishing pragmatic resource consumption benchmarks retrofitted into sufficiently specialised sub-groups representing facilities with comparable properties and benchmarks that are specifically designed to the Indian conditions.
- A Naturenomics™ Business Solutions (NBS)**
Naturenomics™ Business Solutions helps address the challenges of economic and ecological distress, through identification of infrastructural efficiency pain points and opportunity areas in the parameter of Land, Energy, Waste, Water, Air and Carbon (LEWWAC). Derived from the consumption management hierarchy of Avoid, Reduce, Replace or Offset (ARRO), the initiatives will be identified to produce maximum bottom-line impact over short-term, and for continued long-term economic benefits.
- A Naturenomics™ Project Implementation and Monitoring (NPIM)**
Naturenomics™ Project Implementation & Monitoring (NPIM) is the means of designing, implementing and sustaining resource efficiency projects through initiatives under Land, Energy, Waste, Water, Air and Carbon (LEWWAC).
- A Naturenomics™ Project Development for CDM (NPDC)**
Analyse eligibility of project and value of emission reduction. Support project development, submission for approval and implementation.
- A Naturenomics™ Transaction Support (NTS)**
Ensure the project receives the Certified Emissions Reductions (CER) which support the monetisation of carbon credits generated.
- A Naturenomics™ Communication Strategy (NCS)**
Develop the appropriate communication strategy to highlight key activities.
- A Naturenomics™ Capability Development (NCD)**
Provide training and hands-on support to develop in house capability to support the process moving forward.
- A Naturenomics™ Natural Resource Planning Tool (NNRP)**
Plan, monitor and manage natural resources and compliance requirements across the enterprise.
- A Naturenomics™ Green Financing (NGF)**
Effective eco-valuation of assets and establishment of eco-financing mechanisms to implement. Initiatives that can create a new paradigm on development. This includes new green field initiatives and retrofitting existing structures. Establish Naturenomics™ Eco-Bank with green credits. Green debits and ratios to deliver the process of ecological transactions for economic sustainability. This will also establish a new class of eco-assets of eco-liabilities with appropriate risks and rewards.

Some Philanthropic Organisation / NGOs

<u>Name</u>	<u>Organisation</u>	<u>Website</u>
Andreas Ernst	UBS Philanthropy	www.ubs.com
Andrew Pidden	Clean Resources Asia	www.clsacapital.com
R. E. Turner	United Nations Foundation	www.unfoundation.org
Barry Appleton	Appleton Foundation	www.appletonfoundation.org
Bryan Martel	Environmental Capital Group	www.environmentalcapitalgroup.com
Charlotte Perra	Energy Foundation	www.ef.org
Craig Appel	Energy Foundation	www.ef.org
Chet Tchozewski	Global Green Grants Fund	www.greengrants.org
Dana Lanza	Environmental Grantmakers Association	www.ega.org
Danyal Sattar	Esmee Fairbairn Foundation	www.esmeefairbairn.org.uk
Denise Lee	Khemka Foundation	-
Dr. Michael Koeberlein	Heinrich Boll Foundation	www.boell.org
Frederick Mulder	The Funding Network	www.thefundingnetwork.org.uk
George Polk	The Catalyst Project	www.catalystproject.info
Jon Cracknell	JMG Foundation	-
Herschel Post	EarthWatch Institute	www.earthwatch.org
Jeremy Grantham	Grantham Foundation	www.granthamfoundation.org
Stephen B Heintz	Rockefeller Brothers Fund	www.rbf.org
Michael Northrop	Rockefeller Brothers Fund	www.rbf.org
Michele Grennon	Threshold Foundation	www.thresholdfoundation.org
Kadoorie Family	Kadoorie Family	-
John Sauven	Greenpeace	www.greenpeace.org
Laurence Lien	Lien Foundation	www.lienfoundation.org
Liz Hosken	Gaia Foundation	www.gaiafoundation.org
His Royal highness The Prince Philip	Alliance of Religions and Conservation	www.arcworld.org
Melissa A Berman	Rockefeller Philanthropy Advisors	-
Peter Chenoweth	CH Group	-
Peter Wheeler	New Philanthropy Capital	www.philanthropycapital.org
Fortune forum	Renu Mehta	www.fortuneforum.org
Robert Purves	Environment Business Australia	www.environmentbusiness.com.au
Hans Kann Rasmussen	V Kann Rasmussen Foundation	www.vkrf.org
Gerry Salole	European Foundation Centre	www.efc.be
Steve Howard	The Climate Group	www.theclimategroup.org
Victoria Garchitorea	Ayala Foundation	www.ayalafoundation.org
Jean Oelwang	Virgin Unite	www.virginunite.com
Nicholas Ferguson	Institute for Philanthropy	www.instituteforphilanthropy.org
Dr. Salvatore LaSpada	Institute for Philanthropy	www.instituteforphilanthropy.org
Sarah Teacher	Institute for Philanthropy	www.instituteforphilanthropy.org
Uday Khemka	Nand & Jeet Khemka Foundation	www.khemkafoundation.org

Some Philanthropic Organisation / NGOs

<u>Name</u>	<u>Organisation</u>	<u>Website</u>
Simon Roosevelt Foundation	Theodore Roosevelt Foundation	www.trassassociation.org
H .S.H Prince Albert II of Monaco	Prince Albert II of Monaco Foundation	www.princealbertiihofmonacooundation.com
Rebecca W. Rimel	The Pew Charitable Trusts	www.pewtrusts.org
Rupert Myer Foundation	Myer Foundation	www.myerfoundation.org.au
Robert S. Harrison	Clinton Foundation	www.clintonglobalinitiative.org
Robert E. Denham	McArthur Foundation	www.macfound.org
Dr. David T. Suzuki	David Suzuki Foundation	www.davidsuzuki.org
Sue Gillie	New Economics Foundation	www.neweconomics.org
Kathryn S. Fuller	Google Foundation	
Bill Gates	Ford Foundation	www.fordfoundation.org
Walter B. Hewlett	Bill & Melinda Foundation	www.gatesfoundation.org
	The William and Flora Hewlett Foundation	www.hewlett.org
Carol S. Larson	The David and Lucile Foundation	www.packard.org
Frances Seymour	Center for International Forestry Research	www.cifor.cgiar.org
Steve McCormick	Gordon & Betty Moore Foundation	www.moore.rog
Kartikeya Sarabhai	Centre for Environment Education	www.ceeindia.org
Chris West	Shell Foundation	www.shellfoundation.org
Dr. K. S. Bawa	Ashoka Trust for Research in Ecology and the Environment	www.atree.org
Dr. Archana Godbole	Applied Environmental Research Foundation	www.aerfindia.org
Brooks Browne	WinRock International	www.winrock.org
Ashok Khosla	Development Alternatives	www.devalt.org
Rohini Nilekani	Arghyam	www.arghyam.org
Sunita Narain	Centre for Science and Environment	www.cseindia.org
Prof. M S Swaminathan	M S Swaminathan Research Foundation	www.mssrf.org
Ashok Khosla	International Union for Conservation of Nature (IUCN)	www.iucn.org
Morag Carter	Climate Action Network Canada	www.climateactionnetwork.ca
Allison Chin	Sierra Club	www.sierraclub.org
Fred Krupp	Environmental Defense Fund	www.edf.org
Nitin Desai	Indian Youth Climate Network	www.iycn.in
Robert H Dunn	Synergos	www.synergos.org
Norman L. Dean	CERES	www.ceres.org
Bill Drayton	ASHOKA	www.ashoka.org
Michael Finley	Turner Foundation	www.turnerfoundation.org
Jacqui Reisner Bostrom	Rivers Foundation	www.riversfoundation.org
Jo temple	The Sainsbury Family Charitable Trusts	www.sfct.org.uk

"LEISURE"

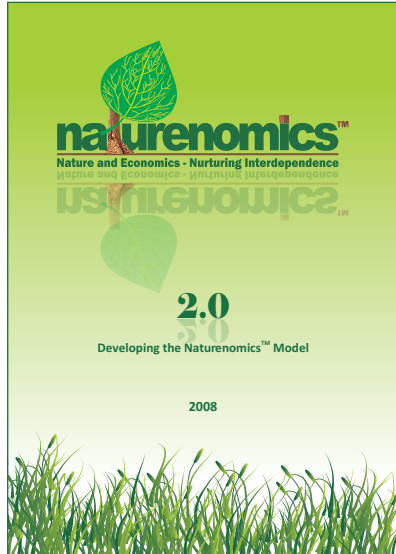
*What is this life if, full of care,
We have no time to stand and stare.
No time to stand beneath the boughs
And stare as long as sheep or cows.
No time to see, when woods we pass,
Where squirrels hide their nuts in grass.
No time to see, in broad daylight,
Streams full of stars, like skies at night.
No time to turn at Beauty's glance,
And watch her feet, how they can dance.
No time to wait till her mouth can
Enrich that smile her eyes began.
A poor life this if, full of care,
We have no time to stand and stare.*

- Wm. Henry Davies (1871-1940)





- ◆ We launched a collection of articles titled Naturenomics™ - Nurturing Interdependence between nature and economics as the first in a series of articles in 2007.
- ◆ The collection identifies itself with our natural inheritance and tries to highlight the overuse and misuse of nature leading to near collapse of our ecosystems.
- ◆ The articles highlights the deteriorating balance between nature and economics resulting in a stress around Food, Water and Energy.
- ◆ We have covered that have been attempting to create nature driven economics models including Green Accounting.
- ◆ Attempts have been made in the articles to understand global warming, both mitigation and adaptation
- ◆ The compilation concludes with an interesting articles on Philanthropy's role in the fight against global warming.



- ◆ Our second publication, "Naturenomics™ 2.0" takes a step further to address the need for a changed economic model to address the changing circumstances of overuse of our Natural Resources.
- ◆ An introduction to the concept of LEWWAC - Land, Energy, Water, Waste, Air, Carbon and the measurement of these resource utilization and patterns of consumption thereof.
- ◆ We have focused on articles highlighting the current wealth of nations and genuine progress indicators.
- ◆ The most challenging concern of our time if food security therefore focus has been on whether food shortage will bring down our civilization!
- ◆ Fascinating concepts have been presented on sustainable design and planning of urban areas, optimizing natural resources.

