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# The New Standard

for sustainable business and conservation in Sri Lanka



Convention on  
Biological Diversity



## BIODIVERSITY SRI LANKA

A Member of the Global Partnership on Business and Biodiversity of the Convention on Biological Diversity (CBD)

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### BIOMIMICRY: INSPIRATION FOR INNOVATION

#### From the Editors

Day by day, we come across various types of fauna and flora that inspire us in numerous ways. While painters and artists are constantly inspired to draw their subjects from nature, designers and engineers go after the mechanics of biological beings to adopt in their inventions and creations. In a world which encourages and promotes innovation as the main means of progression, what else can we look towards to for inspiration, other than Mother Nature? Making 'Biomimicry' and associated bio-innovations the theme of this issue, we explore the numerous possibilities and examples already in place, which have used various aspects from nature, to help mankind progress towards the future.

Encouraged by a presentation made by Prof. Ajith de Alwis – Project Director of the Coordinating Secretariat for Science, Technology and Innovation - at our World Environment Day celebrations, we share his expertise on the subject with you, through our Expert Q&A. Our main feature this time is an excerpt borrowed from the online Smithsonian Magazine which clarifies to us how biomimicry inspires human innovation. In the local context, we are delighted to bring to you, the work of our Members – National Development Bank PLC and Dons Renewables (Pvt.) Ltd. – through our Member Focus; great examples of lessons from nature being implemented to overcome national challenges, in addition to a collection of other great examples from across the world.

We hope you will collaborate with us in taking forward the key initiatives which were launched at our Second Meeting

#### Expert Q&A

Prof. Ajith de Alwis – Project Director of the Coordinating Secretariat for Science, Technology and Innovation - obliged us with his responses to the questions we raised on the topic, giving us a glimpse of his expertise and vision for Sri Lanka in terms of biomimicry-inspired innovation.



1. **Bio-innovations mean different things to different people. How will you define bio-innovations as applicable to the different sectors in industry and society?**

We can identify innovations considering their support to the three pillars of sustainability. The conventional innovations, we can place under the economic pillar. Eco-innovations come under the environmental pillar and social innovations come under the social pillar. I would say bio-innovations (another term developed) could be innovations inspired by the biosphere.

Technically, they can support many different sectors in industry and society, and need not be confined to one pillar. For example, the *Salvinia*-inspired recent finding is

...Continued on next page

of Members and CEO Forum which was concluded so successfully last week. This issue of TNS carries a summary of the event.

We sincerely hope you enjoy this issue of TNS and as always, invite you to forward your comments and suggestions at any time via email to [businessandbiodiversity@chamber.lk](mailto:businessandbiodiversity@chamber.lk).

### Secretariat of Biodiversity Sri Lanka

Shiranee Yasaratne  
Buddhi Seneviratne

R. M. Harshini de Silva  
Ranmali Liyanaarachchi

### Expert Q&A Contd.

scheduled to transform the shipping industry, in which we will experience both positive economic and environmental impacts. It will surely also have positive spinoffs which fall under the social pillar.

Bio-innovations can also support how cities should be developed in future. Technically, there are no limits. We just need to be curious and creative and have the stamina for execution. Nature has so much to offer which we have not really harnessed. Bio-innovations have to go hand in hand with an in-depth understanding of the biosphere and its interactions with modern science.

#### 2. Which industries in Sri Lanka do you think would benefit mostly from bio-innovations and the adoption of biomimicry strategies?

Look at the current issue with asbestos. The fibers which are acceptable as alternates are cellulose fibers. Imagine fibers from banana becoming the major fiber used for roofing! Anyway, we have banana fiber from Sri Lanka supporting Benz cars etc. I would say imagination and ingenuity is the only limit. One should start building up a possible sector list and a list of applications. That should stimulate further developments.

Ecological considerations will impact environmental management practices. Medicine is surely an area that would stand to benefit. Structures too, on the other hand when biomaterials come in, or even certain biological shapes such as the shape of the beak of a bird; the present Japanese high speed train design idea came from that. When a termite mound led to the design of the Westgate building in Zimbabwe that was revolutionary architecture.

#### 3. As you see it, where does Sri Lanka stand with regard to the adoption of bio-innovations, in relation to the global scenario?

Well we have been quite poor in pursuing this area. Even though Ayurvedha beckons, we really have not pursued this with scientific vigor to be effective. Natural resources from the biosphere have been studied as medicine, textile dyeing materials etc. with much less support. You need a movement.

#### 4. In your opinion, would the private sector of Sri Lanka propel this emerging trend and be the key driver of the use of bio-innovations?

Private sector should indeed start considering this sector as a niche area with prospects for growth. However, that should not be done with a short-term profit mindset; that would be nearly impossible, as we are not ready as a country. There are areas such as bio-based products which certainly can be started quite quickly. We have cosmetics, spa products, being produced with this concept already.

#### 5. Finally, how do you feel Sri Lanka's valuable biodiversity would be impacted by the development of more and more bio-innovations? Positively? Or negatively?

One should always consider the sustainability of any activity and this area too should not be an exception. Overall bio-innovations based on biomimetic etc. really cannot be against nature. This process will exploit biodiversity for sure as it is the presence of this diversity that would give an edge for Sri Lanka to embark on this area. Proper checks and balances along with ethical practices are a must. However one could expect more of these principles already to be followed by parties genuinely joining this kind of program.

### Become a Member of Biodiversity Sri Lanka and gain,

- Access to best practices/case studies in biodiversity conservation within the corporate sector.
- Access to national and international conservation priorities.
- Access to technical expertise on biodiversity conservation and environmental management.
- Discounted participation opportunities at subject-related capacity building and awareness programmes.
- Collaborative support to organize corporate training on mainstreaming biodiversity considerations in business.
- Access to a project bank which can be utilized to achieve core business and CSR objectives of the company.
- Access to participate in pilot and ongoing standardization, certification and awards schemes.
- Opportunities to add value, build corporate image, attract publicity and network with like-minded progressive businesses.

### General Membership is now open!

For more information and details on the application process, please call the Coordinator on +94115588833 or email [businessandbiodiversity@chamber.lk](mailto:businessandbiodiversity@chamber.lk).

Above details, application form and information on current membership is available at [business-biodiversity.lk/membership-2/](http://business-biodiversity.lk/membership-2/).

**Member Focus:**  
**Dons Renewables (Pvt.) Ltd.**



**Sustainability Innovation Needs More Simple Solutions**

Innovation, is making changes to an established system; introducing new methods and ideas for improvement. Our intrinsic aversion to change is a constant obstacle to innovation. In order to introduce new solutions and ideas to an established process or system, there is a definitive need for simplicity in the design of these solutions. Successfully introducing a new method to a process is achieved, not by radically changing its course, but in understanding and then enhancing its current flow. It is hard to convince industries to completely change their course in the name of the environment; extremely difficult to convince any business to focus on biodiversity over the bottom line. To be successful champions of environmental sustainability, we need to seek simple solutions with great impact, and yet, do not affect the bottom-line; we need solutions that reach equilibrium between environmental sustainability and financial sustainability.

Biomass briquettes are one such simple solution. Made from raw materials that are waste products from other industries, they are an energy efficient substitute for the unsustainable felling of timber. These briquettes are shaped like firewood logs, sans the necessary manual labor and maintenance costs to machinery. The simple method of compressing raw materials such as saw dust under high temperatures, produces a log-like briquette, with double the calorific value of wood logs, rendering it far more energy efficient. Don's Renewables (Pvt) Ltd., a leading provider of biomass briquettes, is dedicated to providing the most sustainable, energy efficient, and cost efficient solution to fuel all industries that use firewood. It hopes to bring added value to manufacturers by providing them with the opportunity to have more sustainable supply chains; something a rapidly increasing percentage of consumers are concerned with. Just like the most of us find it difficult to go out of our way on a daily basis to help those in dire need, however well-intentioned we are, no business wants to change their already established processes, if it lacks financial advantage, regardless of how concerned they are with the environment. This is the very reason we need simple products like biomass briquettes that benefit the environment around us, and the people in it, whilst allowing industries to continue with business as usual.



**Member Focus:**  
**National Development Bank PLC**



**A Sustainable Solution for the Human-elephant Conflict**

In an effort to alleviate the intensity of the human-elephant conflict in Sri Lanka and with the aim to support the conservation and sustenance of the natural environment, NDB together with 'Janathakshan' have come forward to implement the Palmyrah Bio-fencing project, trusted to be a sustainable, lasting solution for the issue.

The first phase of the project was initiated recently in Palugolla village in Nikaweratiya Pradeshiya Sabha of the Kurunegala district. Palugolla is a rural village with a population of about 300 families that is affected by the human-elephant conflict.

The project saw the rooting of four rows of Palmyrah plants parallel to the inner edge of the existing electric fence that lies on the border of the village and wild territory, with the long term objective of permanently removing the electric fence once the palms are fully grown. A fully grown Palmyrah palm is said to be robust and able to withstand the strength of a wild elephant while electric fences have been known to be vulnerable to such force. Given that the life span of a palm is between 80 to 100 years on average and since with minimum maintenance, the palms are able to withstand the climatic effects of the dry and wet seasons, Palmyrah palms have been identified as being more economic as well as sustainable than the use of electric fences.

Besides, while serving as a barrier preventing elephants from wandering out of their natural habitat, the Palmyrah fence is also expected to serve as elephant feed in the long run. The highest impact of this is likely to be experienced in the dry season when the elephants begin to journey in search of food, which in recent times has resulted in the damage of agricultural crops in the neighboring communities.

Over fifty staff members of NDB volunteered in the Palmyrah planting project in Palugolla and were eagerly supported by the residents and school children of the area. The Bank conducted an art competition for the children of the Palugolla village prior to implementation of the Palmyrah project in order to create awareness of the project objectives and the expected benefits; to which the residents responded with great enthusiasm.



## How Biomimicry is Inspiring Human Innovation

Excerpt from <http://www.smithsonianmag.com/science-nature/how-biomimicry-is-inspiring-human-innovation-17924040/?all>

Though biomimicry has inspired human innovations for decades - one of the most often-cited examples is Velcro, which the Swiss engineer Georges de Mestral patented in 1955 after studying how burs stuck to his clothes - better technology and more nuanced research have enabled increasingly complex adaptations. Design software created by German researcher Claus Mattheck - and used in Opel and Mercedes cars - reflects the ways trees and bones distribute strength and loads. A fan created by Pax Scientific borrows from the patterns of swirling kelp, nautilus and whelks to move air more efficiently. A saltwater-irrigated greenhouse in the Qatari desert will use condensation and evaporation tricks gleaned from the nose of a camel. Now, thanks in part to continuing innovations in nanoscale fabrication, manufacturers are bringing an expanding array of products to market.

Biomimicry isn't itself a product but a process, drawing on natural organisms and processes in order to spark innovation. Organizations and even cities can look to ecosystems for inspiration, says Tim McGee, a biologist and member of Biomimicry 3.8, a Montana-based consultancy. In Lavasa - described as "India's first planned hill city" by its developers, who hope to eventually build homes for more than 300,000 people there - the guild consulted with landscape architects. Thus the planting strategy included deciduous trees, forming a canopy to catch, and then reflect, through evaporation, nearly a third of the monsoon rain that hits it. That effect acts "like an engine that drives the monsoon inland," says McGee, which helps prevent drought there. The hydrodynamically efficient shape of banyan tree leaves influenced the design of a better water-dispatching roof shingle, while water divertment systems were inspired by the ways harvester ants direct water away from their nests. The first Lavasa "town" has been completed, with four more projected to follow by 2020.

Everyone's talking about ways to reduce the human footprint, or to get to "net zero" impact. But nature, says McGee, usually goes one step further: "It's almost never net zero - the output from that system is usually beneficial to everything around it." What if we could build our cities the same way? "What if, in New York City, when it rained, the water that went into the East River was cleaner than when it fell?" And what if, when forests caught fire, the flames could be extinguished by means that didn't depend on toxic substances? "Nature creates flame retardants that are nontoxic," notes McGee. "Why can't we?"

For years researchers have focused on the chemistry of flame retardants, without results. But perhaps natural processes could offer some path to innovation in the laboratory, McGee says. Maybe it's the way jack-pine cones open in the face of heat (to allow reproduction even as fire destroys the forest), or the way eucalyptus trees shed scattered pieces of quick-burning bark to suck up oxygen and take fire away from the main trunk. Jaime Grunlan, a mechanical engineer at Texas A&M, has developed a fire-resistant fabric that uses chitosan, a

renewable material taken from lobster and shrimp shells (and a chemical relative of the chitin in butterflies' wings), to create a nanolayer polymer coating that, when exposed to heat, produces a carbon "shell" that protects the fabric. Lepidoptera epitomizes a few of the problems that have been hammered out on nature's workbench over many millennia. In the evolutionary call and response between prey and predator, many moths have developed the ability to detect the ultrasound clicks of bats, and some can even send confusing countersignals. Butterfly wings tend to be black closer to their bodies, to help capture heat. Those wings are covered with a contaminant-resistant coating - they self-clean. The ornamental "eyes" on those wings, meant to scare away predators, are often positioned near the edge to minimize wing damage if the butterfly is bitten.

And then there's the color - what we think of when we think of butterflies. "People call them flying flowers," says Robbins. While some use color for camouflage, the most vivid species go the other route, advertising their toxicity to would-be predators in a gaudy display. The writer David Quammen dubs them the "bimbos of the natural world," an "evolutionary experiment in sheer decorative excess." Overall, Quammen writes, butterflies "represent an ideal of sweetness and gentle grace that seems almost innocent of the whole merciless evolutionary free-for-all." And there's a wealth of inspiration waiting to take flight on those gossamer wings.

Researchers at Shanghai Jiao Tong University, inspired by birdwing butterflies - the black area of their wings enables almost total light absorption, to trap heat - are creating a structurally similar super-black amorphous carbon film to help create more efficient solar technology. A project called NOtES, which grew out of research at Simon Fraser University in British Columbia, uses nanoscale light-interfering structures to create an anti-counterfeiting stamp that is more difficult to crack than a hologram and can be "printed" not only on bank notes, but on a whole range of other objects. Radio-frequency identification (RFID) tags, which are used for everything from tracking inventory to sensing the performance of one's tires, tend not to work well in extreme environments, particularly where there's water or metal. And so a company named Omni-ID adapted the interference principle to create a more reliable RFID, using tiny metal scales in the tags to improve their transmission of radio signals.

Given that the Morpho deploys color to attract attention, it seems appropriate that the butterfly has also inspired human fashion. Donna Sgro, a fashion designer in Sydney, Australia, and self-described "occasional lepidopterist," created three dresses from a fabric called Morphotex, a pigment-free, iridescent blue material that draws its color from optical interference. Sgro says that while Morphotex eliminates the need for dyes (and thus potentially bears a smaller environmental footprint), her interest ranged beyond the usual "problem-solution-type design approach" that biomimicrists tend to follow. Fashion, after all, is about more than the basic need for clothing. How can the way nature uses aesthetics inform the way we do? Sgro is now studying for a PhD in biomimicry and fashion at the Royal Institute of Fashion in Melbourne.

*Please refer to the provided link for the full article.*

## Productive Filtration: Living System Infrastructure in Calcutta

Excerpt from

<http://scenariojournal.com/article/productive-filtration-living-system-infrastructure-in-calcutta/>

### Living Systems Infrastructure and Urban Ecology

Living systems infrastructure utilizes landscape systems to perform ecosystem services (treating storm water, increasing air quality, treating or processing waste, sequestering carbon, producing energy and nutrients), taking advantage of synergistic relationships between system components and functions. In the urban environment, the performance requirements and constraints placed on infrastructure can rarely be met with truly natural, or unmediated systems. Living systems infrastructure presents a model of thinking and designing hybrid, high performance systems which use an ecosystem ecology perspective to construct and manage environments.

In order for living systems infrastructure to be a viable alternative or supplement to traditional modes of fixed, "grey" infrastructure, there must be a clear, and robust method for assessing the performance of these systems. As much as we may wish it otherwise, the challenge of measurement may very well be the largest impediment to utilizing living systems or green infrastructure at a meaningful scale. It will likely always be easier to predict the future performance of a mechanical system than a biological system. It is easier to accurately predict the flow rate of a culvert than a river; it is easier to assure the sewage treatment capacity of an activated sludge plant than a constructed wetland. Our ability to understand these systems, our ability to describe them and draw them, is crucial to our ability to see them as meaningful strategies and within the realm of design possibilities.

Bringing environmental engineering and environmental management to urban landscapes in a large scale and distributed manner is not just a question of assuring design quality and performance, it also causes us to reconsider the idea of the city, the functioning of its essential building blocks and the relationships of urban components – be they constructed or natural, social, economic or environmental.



East Calcutta Wetland, an example of living systems infrastructure tightly bound to urban fabric and performance. Image from Google Earth

Please refer to the provided link for the full article.

## Biomimicry Could Lead To Solar Cells That Store Energy for Several Weeks, New Study Says

Excerpt from

<http://www.forbes.com/sites/williampentland/2015/06/23/biomimicry-could-lead-to-solar-cells-that-store-energy-for-several-weeks-new-study-says/>

A new study by chemists at the University of California, Los Angeles (UCLA) suggests that rather than combining solar and storage, it may be easier to design solar cells that can do double duty as batteries.

The study, which was published in the most recent issue of the journal *Science*, describes a process for designing solar cells is capable of storing electricity for as long as several weeks at a time.

The solar cells, which are made from plastic rather than silicon, mimic a mechanism used by plants to generate energy through photosynthesis.

"Biology does a very good job of creating energy from sunlight," said Sarah Tolbert, a UCLA professor of chemistry and one of the senior authors of the research. "Plants do this through photosynthesis with extremely high efficiency."

The new technology has two basic elements: a polymer donor and a nanoscale fullerene acceptor. The polymer donor absorbs sunlight and passes electrons to the fullerene acceptor, which generates electricity.

Please refer to the provided link for the full article.

## BIODIVERSITY SRI LANKA

launched on the 6<sup>th</sup> of October 2015 at the  
**Second Meeting of Members and CEO Forum**

Key initiatives also launched at the meeting:

**Ranking Scheme for Biodiversity Projects**

**A Biodiversity Credit Accrual System  
for Sri Lanka**

**Environmental/Biodiversity Project Bank**

Launch of these initiatives was generously supported by:



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Look forward to detailed information  
on each of these initiatives  
and how you can get involved  
in our next issue of TNS  
scheduled for release on the 30<sup>th</sup> of November 2015!

Biodiversity Sri Lanka

C/o Ceylon Chamber of Commerce, 50, Navam Mawatha, Colombo 02. Tel.: +94.11.5588833  
Email: [businessandbiodiversity@chamber.lk](mailto:businessandbiodiversity@chamber.lk), Website: [www.business-biodiversity.lk](http://www.business-biodiversity.lk)



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