Confederation of Indian Industry

CII-ITC Centre of Excellence for Sustainable Development

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IBBI
INDIA BUSINESS & BIODIVERSITY INITIATIVE

REIMAGINING BUSINESS FOR BIODIVERSITY ENHANCEMENT

CASE STUDIES FROM INDIAN INDUSTRY

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Contents

FOREWORD

अनिल माधव दवे
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सत्यमेव जयते

राज्य मंत्री (स्वतंत्र प्रभार)
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भारत सरकार / GOVERNMENT OF INDIA

FOREWORD

India, a megadiverse country with only 2.4% of the world's land area, accounts for 8% of all recorded species, including over 45,000 species of plants and 91,000 species of animals. Four of the 34 globally identified biodiversity hotspots are represented in the country. India is also acknowledged as a centre of origin for crop diversity and harbours hundreds of varieties of crops. The diverse physical features and climatic conditions have resulted in a variety of ecosystems such as forests, grasslands, wetlands, desert, coastal and marine ecosystems which sustain rich biodiversity and contribute to human well-being.

Biodiversity underpins ecosystem functions and the provisions of life-supporting ecosystem services to meet human needs, both material and non-material. Biodiversity supported ecosystem services have high economic value, including for businesses in terms of direct or indirect use.

As Indians, we understand the significance of biodiversity, and are therefore committed to its conservation. As a Party to the Convention on Biological Diversity (CBD), India has developed 12 National Biodiversity Targets (NBTs) in line with the 20 global Aichi Biodiversity Targets adopted under the CBD. As an important stakeholder in biodiversity which is directly or indirectly dependent on biodiversity and its ecosystem services, involvement of business sector in achieving the NBTs is crucial.

I appreciate the efforts made by the members of the Indian Business & Biodiversity Initiative (IBBI) towards mainstreaming biodiversity aspects in their business decisions. Adopting of practices and strategies for management of biodiversity in their operations and value chains would contribute towards conservation and sustainable use of India's biodiversity, and help in achieving the NBTs. I welcome the initiative of bringing out a publication on case studies of selected Indian companies on their work for conservation and sustainable use of biodiversity contributing to the NBTs. This would not only inspire other businesses, but would also serve as a resource for good businesses practices.

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FOREWORD

These are challenging times both for the planet and humanity. We are witnessing monumental changes and we need to recognize our responsibilities towards the environment. Special consideration is necessary for everything that has something to do with biodiversity, which includes the presence of diverse animal and vegetal species and microorganisms. The challenges defying the conservation of the planet's richness of life threaten to overwhelm our efforts to limit species loss and degradation of ecosystems and the services that they deliver. The essential building blocks of biodiversity conservation for well over a century have been protected areas (Pas), but they are increasingly vulnerable to land use changes taking place around them. In response to these trends, ecologists and wild life experts have developed a new biodiversity conservation paradigm: biodiversity mainstreaming.

Biodiversity mainstreaming is more than applying 'defenses' to ensure business as usual does no harm to biodiversity; it is primarily about recognizing the potential of biodiversity to achieve desirable development outcomes. It is a complex, long-term, iterative process that entails integrating biodiversity concerns into company's policies, strategies, practices and then supporting their implementation.This approach is based on the idea that biodiversity and development are codependent; their challenges and solutions are linked, and so achieving both sustainably requires integration in both directions. In the long term, biodiversity will be just as critical to achieving business objectives, as economic development and poverty reduction is critical to achieving nation's biodiversity goals.

The present publication "Reimagining Business for Biodiversity Enhancement" provides insights into select Indian companies who have shown leadership in biodiversity mainstreaming in their business policies, strategies and practices. I would like to thank all the companies for their effort and presenting their case here.

It is my hope that sharing these examples will facilitate better understanding of the concept of biodiversity mainstreaming, the business case for doing so and businesses contribution to the national biodiversity targets of India.

R Mukundan
Managing Director, Tata Chemicals Limited
Chairman, India Business and Biodiversity Initiative

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Foreword

The German Government has closely cooperated with India since the last 60 years on the key areas of energy, environment and sustainable economic development. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) supports the German government in achieving its objectives in the field of international cooperation for sustainable development. With the aim of engaging private enterprises in the achievement of the Convention on Biological Diversity (CBD) objectives, Germany pioneered the Biodiversity in Good Company Initiative on the occasion of the German presidency of the 9th Conference of the Parties to the CBD.

We, the Indo-German Biodiversity Programme are happy to be associated with the India Business and Biodiversity Initiative (IBBI) and the commitment of its 26 signatory companies that has granted IBBI global recognition. IBBI is supported by the Indo-German Biodiversity Programme under its project, 'Incentives for Sustainable Management of Biodiversity and Ecosystem Services (ISBM)', which is commissioned by the German Federal Ministry for Economic Cooperation and Development.

IBBI, founded in 2014 speaks for the leadership of Indian Industry and is seen as a front-running business league in conservation and sustainable use of biodiversity. It is instituted within the Global Platform for Business and Biodiversity that is hosted by the Secretariat of the CBD. IBBI over the past couple of years has enabled the Indian businesses to understand the impacts and dependencies of their operations and value chain on nature, as well as in guiding them to incorporate biodiversity into their business decisions and strategies.

It gives me great pleasure to present this publication titled "Reimagining Business for Biodiversity Enhancement"- which highlights cases from industries where they have mainstreamed biodiversity in their business operations, policy and strategy. I sincerely hope that these case studies will encourage other businesses and organisations to understand the importance of biological diversity and the need to integrate biodiversity concerns into their strategic production and marketing planning. I would like to express deep felt thanks to the Ministry of Environment, Forests and Climate Change (MoEFCC) and CII-ITC Centre of Excellence for Sustainable Development for hosting and supporting IBBI.

Dr. Konrad Uebelhör
Director
Indo-German Biodiversity Programme

INTRODUCTION

Grus antigone (Sarus Crane)

The Sarus crane is the tallest flying bird in the world, standing 152-156 cm tall with a wingspan of 240cm. With pale red legs, it has a predominantly grey plumage, a naked red head and red upper neck. The estimated global population of the Sarus crane is 25,000-37,000 and is concentrated in three distinct regions – the Indian sub-continent, south-east Asia and northern Australia. In the Indian subcontinent, it is found in northern and central India, Terai Nepal and Pakistan. It was once a common site in the paddy fields of Uttar Pradesh, Bihar, Rajasthan, West Bengal, Gujarat, Madhya Pradesh and Assam. Their population is now on the decline with only 15,000-20,000 cranes found in India. The Sarus crane is known for its ability to live in harmony with humans, inhabiting open, cultivated, well-watered plains, marshlands and jheels. These areas suit them well for foraging, roosting and nesting. The main threat to the Sarus crane in India is habitat loss and degradation due to draining of the wetland and conversion of land for agriculture. The historic landscape is rapidly changing due to construction of highways, housing colonies, roads, and railway lines. More recently, many deaths have been recorded due to collision with power lines. Also, due to the increase in agricultural land, Sarus cranes are left with no choice but to forage in these fields, and as a result ingest pesticides, which leads to poisoning.

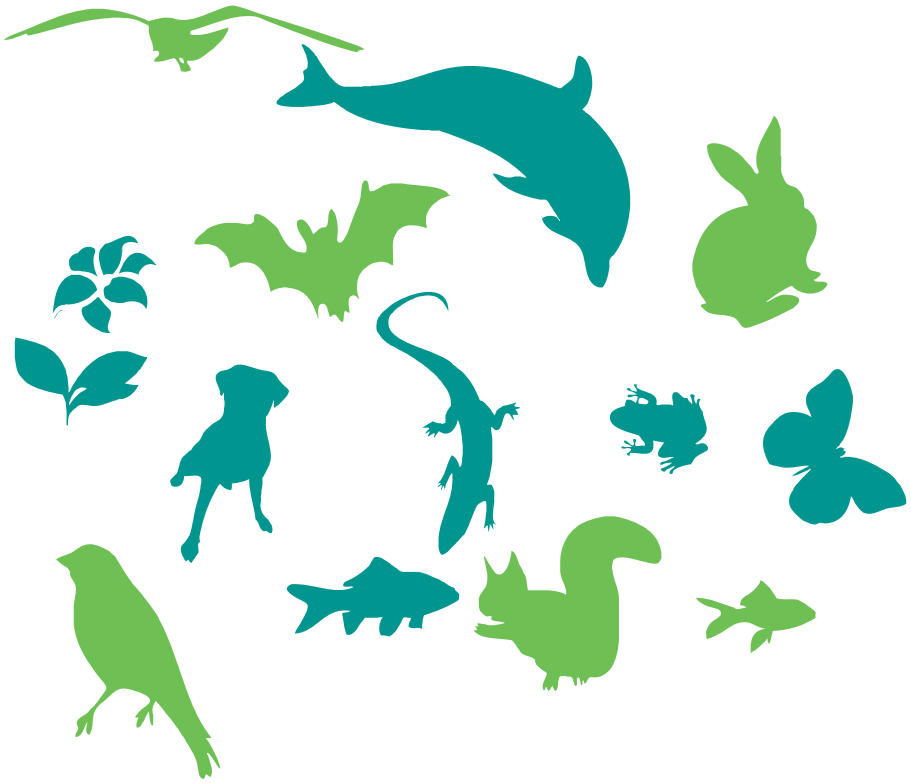
Planet earth has sustained life for about 3.5 billion years, providing resources for sustenance of life. But gradually, we have forgotten the path of co-existence and we race ahead ignoring the fact that we are an integral part of earth and the earth is an integral part of us. Rapid demographic changes, over-consumption, use of technologies that damage environment, combined with climate change, are pushing our planet to the so called 'Sixth Mass Extinction'.

We completely depend on nature for the air we breathe, water we drink, climate stability, the food & materials we use & the economy we rely on. Thoughtless and insensitive use of these resources has caused an impact which can be felt in all aspects –from social, economic and climate stability to energy, food and water security – resulting in environmental degradation and loss of biodiversity.

In recent decades, the world has experienced unprecedented biodiversity loss and ecosystem degradation. The anthropogenic (human caused) drastic extinction of plants and animals is more rapid than the natural rate of any extinction in the planet's longhistory. This is probably the severest wave of perishing species, a new era in earth's history, the Anthropocene in which humans, rather than natural forces, are the primary drivers of planetary change.

While environmental degradation continues, there are also exceptional signs of a 'great transition' towards an ecologically sustainable future. Today, at a global level, to have a diverse, healthy, resilient and productive natural environment, it is crucial to understand and battle poverty, improve health and build economies. The interdependencies between the social, economic, and environmental agendas is now acknowledged at all levels and the agenda of building a sustainable future is pushed through various revolutionary approaches adopted in achieving the new set of world's Sustainable Development Goals.

***Western Ghat,* Igatpuri**



The Convention on Biological Diversity (CBD) was inspired by the growing global commitment to sustainable development. It represents a dramatic step forward in the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources. The CBD is an international agreement adopted at the Earth Summit, in Rio de Janeiro, in 1992. Its main objectives are to conserve biological diversity to use its components in a sustainable way and to share fairly and equitably the benefits arising from the use of genetic resources. As a follow up of the convention, in 2010, Aichi Biodiversity Targets were set for a ten year framework (2011-2020). The goals and targets were set comprising both, aspirations for achievements at a global level as well as, a flexible framework for the establishment of national or regional targets.

On 1 January 2016, the 17 Sustainable Development Goals (SDGs), also known as 'the 2030 Agenda for Sustainable Development' came into force. With these universal goals, countries will mobilize efforts to end all forms of poverty, fight inequalities and tackle climate change.

The CoP-11 to the CBD has urged parties to develop national and regional targets of Strategic Plan for Biodiversity 2011-2020, as a flexible framework, in accordance with national priorities and capacities. Parties are also required to review, and as appropriate update are revise, their NBSAPs or equivalent instruments with the Strategic Plan, by integrating their Nation Biodiversity Targets (NBTs).

NBTs are a means to achieve the Millennium Development Goals (MDGs), which are quantified targets for addressing Social, Economic, Climatic and Environmental issues at national and state level.

ACTION PLAN AND STRATEGIES

Loss of Biodiversity is a global concern and is addressed in the international Convention on Biological Diversity (CBD), to which India is a party. In pursuance of Article 6 of the CBD, India had developed a National Policy & Macro level Action Strategy Plan on Biodiversity (1999). During 2000-2004, a National Biodiversity Strategy and Action Plan (NBSAP) was implemented involving various stakeholders. India also enacted the Biological Diversity Act in 2002 and the National Biodiversity Action Plan (NBAP) in 2008.

The NBAP was developed in consultation with various stakeholders, attempting to identify threats and constrains in biodiversity conservation. It was developed keeping in mind the ecological, social, cultural and economic mosaic of the country in order to integrate biodiversity concerns of various sectors. It requires, in the interest of national economic growth, to recognize and factor-in the contributions made by biodiversity and ecosystem services.

In 2008, business involvement in biodiversity conservation took center stage when a conference on business and biodiversity known as the Business and Biodiversity Initiative (BBI) was held. This is an initiative to formally integrate biodiversity issues with business development. Further, in 2014, India developed 12 National Biodiversity Targets (NBTs) as an Addendum to NBAP 2008.

Sustainable development requires societies to effectively manage their biodiversity and ecosystems. There is growing realization in the business world that for long-term sustainability and viability of any business, it is important to safeguard and value the natural resources and the services they provide. Directly or indirectly, businesses depend on biodiversity and ecosystem services. Biodiversity inter-twineswith the business operations, its benefits and risks. It is important for businesses to identify and mitigate the risks associated with biodiversity and ecosystem services.

Indian Business Biodiversity Initiative (IBBI), initiated on invitation from the Ministry of Environment, Forest and Climate Change (MoEFCC) in 2014 by Confederation of Indian Industry and supported by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), speaks for the leadership of the Indian Industry and the initiatives it is taking to address biodiversity concerns. IBBI members are taking a proactive approach in integrating biodiversity concerns and businesses in order to make businesses efficient and sustainable.

***Dactylorhiza hatagirea*– (Himalayan Marsh Orchid)**

Panthera tigris (Bengal Tiger)

Otus bakkamoena (Indian Scops Owl)

BUSINESS & BIODIVERSITY

Merely two and half centuries ago, human civilization began to tap into a seemingly inexhaustible energy source in fossil fuels – initially coal – to usher in the age of industrialization. As the use of this energy source, as well as use of oil and natural gas, spread across the globe, humans began to live more robust lives with improved healthcare, better and more abundant food supplies and rapidly improved housing and transportation. It was the beginning of major technological transitions – from the use of hand tools to power tools and eventually high technology-enabled production on large scales along with robust economic development – a continued legacy of Industrial Revolution.

Today's changing patterns – global warming, environmental degradation, food production challenges and a fast depleting state of the human condition – can all be attributed to coming of age of man's ingenuity: the Industrial revolution. Its fundamental effects continue to impact environment and societies in the face of increasing human population. All basic and other needs of existence are directly co-related to the demands and the usage of resources available to us. As human population rises, the consumption trend changes and the per capita consumption increases, thus increasing the demand for products. This drives the industrial growth and exploitation of natural resources at

Agriculture and human habitation

large scales. Therefore it becomes imperative for businesses to recognize the importance of maintaining and replenishing these resources and move towards a sustainable world.

A lot of industries such as forestry, fishing, agriculture and ecotourism, depend directly on biodiversity and ecosystem services, while others like mining, construction and energy, have an impact through their operations. Some industries like cosmetic and pharmaceuticals, depend on biological material and genetic resources in creation and manufacturing of their products. And in a lot of other cases the business risks associated with biodiversity loss may be indirect, operating through supply chains or through market decisions on investment, production, distribution and marketing.

Companies around the world are finding ways to identify, avoid and mitigate their Biodiversity, Ecosystem and Ecosystem Services (BES) risks, using a range of new tools developed by, with and for business. There is an increasing need to understand the association of business with these risks and identify ways to integrate BES into management systems for achieving the social responsibility goals. This means, creating policies and initiatives that measure and manage biodiversity and ecosystem risks in business, capitalising on new biodiversity business opportunities, and integrating business, biodiversity and sustainability development.

Businesses and Biodiversity are closely interlinked – businesses depend on the Natural Capital and Ecosystem Services, which form the foundation of all economic activities and provide vital inputs for businesses to function. Moreover, businesses also have significant impacts on the biodiversity, which if not addressed, may significantly limit future business opportunities and profits. Business risks associated with biodiversity loss include disruption of operations, reputational risks and financing risks.

Understanding the positive and negative impacts of the business on the environment is crucial, not only for sustainability, but for better decision-making and as a sound business strategy.

Nature provides us a healthy living environment, resources for education and recreation, aesthetic value, spiritual meaning, and artistic inspiration. These services provided by nature are categorized as ecosystem services –provisioning, such as the provision of food and water; regulating, such as the control of climate and diseases; supporting, such as nutrient cycles and crop pollination; and cultural, such as social spiritual and recreational benefits.

Businesses, including pharmaceuticals, food and agri-businesses, forestry, construction, and packaging, use animal genes, floral species and ecosystem services as critical inputs into their production processes. They depend on healthy ecosystems to sustain them and it then becomes the business' responsibility to treat and dissipate waste, maintain soil and water quality and help control air composition.

IMPORTANCE OF BIODIVERISTY AND ECOSYSTEM SERVICES TO BUSINESS

Biodiversity is a means to measure the complexity of interactions in an intricately interwoven network of relationships and inter-dependencies between living organisms and their environment. A conservation approach is required for integrating biodiversity considerations into policies, strategies and practices of key public and private actors to promote conservational and sustainable use of natural resources. Reversing biodiversity loss and ecosystem degradation is one of the most important challenges of our times.

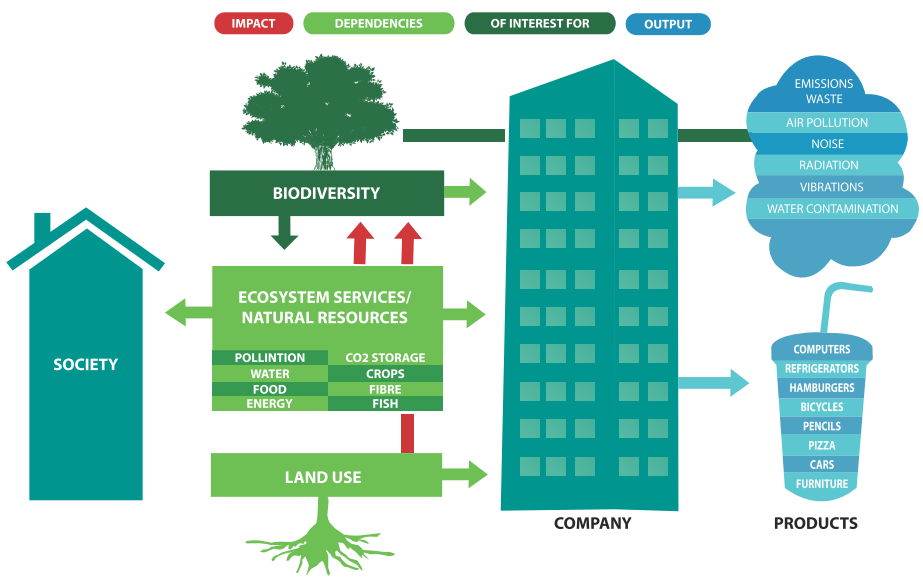
Man has always cultivated and produced for his food requirement and basic needs that now extend to ever-growing want for a better and healthier life. Clearance of natural habitat for specific crop cultivation has led to huge biodiversity loss and one of the primary contributors for biodiversity loss is agriculture and agricultural practices. Dependence on just a few crops and on a narrow gene pool, has resulted in loss of genetic diversity. Current industrial and domestic reliance on specific crops makes entire ecosystems more vulnerable to emergent pests and diseases or changes in environmental conditions. It is in businesses' interest to retain a diverse source of genetic resources through conservation of crop diversity and of wild relatives of domesticated species, in order to maintain plant-breeding opportunities. Some farming techniques such as use of pesticides on seeds and plants, may impact pollinators as well as pests and can have negative impacts on crop harvests. Maintaining a diversity of pollinators within the landscape, provides insurance against year-to-year variability particular pollinating species. Access to pollinator abundance and diversity can reduce risks as well as costs of artificial inputs or manual pollination. Increase in demands for organic crops and regulated pesticide use, necessitate a healthy biodiverse environment that provides natural predators and parasites for pest control.

Biodiversity also contributes to services such as the supply of clean water through natural filtering and regulating processes provided by forest and grassland cover and the removal of pollutants from water sources. Soil micro-organism biodiversity enables adequate and productive bio-geochemical cycling of nutrients through different forms of nitrogen, sulphur and phosphorus and through the degradation of organic matter that controls the release of plant nutrients. Climate change can trigger a shift in the range of species and can disrupt ecological communities through changes in patterns of rainfall or weather events. Elevated levels of atmospheric CO2 and changes in temperature, alter crop yields and also threaten corals through ocean acidification.

Competing user demands and interests have exerted an increased pressure on these limited resources resulting in imbalances in biodiversity. Per capita consumption particularly associated with wealth increase, and human population, is predicted to increase, resulting in greater pressure on natural resources. This subsequently increases competition over land and biodiversity resources and endangers business reputation and marketability of products.

Businesses are an integral part of the solution to biodiversity loss. They need to be confident in the value of investing in natural

capital and need understand that doing so will increase sustainability, profitability and their brand image. There is aneed to recognise the importance of biodiversity conservation and institutionaliseways, methods and instruments for integrating and mainstreaming biodiversity into business management and activities. New initiatives and technologies aimed at mitigating biodiversity loss need to be appropriately planned and managed. Although investing in main streaming and adaptation to safeguard biodiversity may require incurring some costs, the consequences of biodiversity loss may mean larger long-term losses as well as reputational harm.



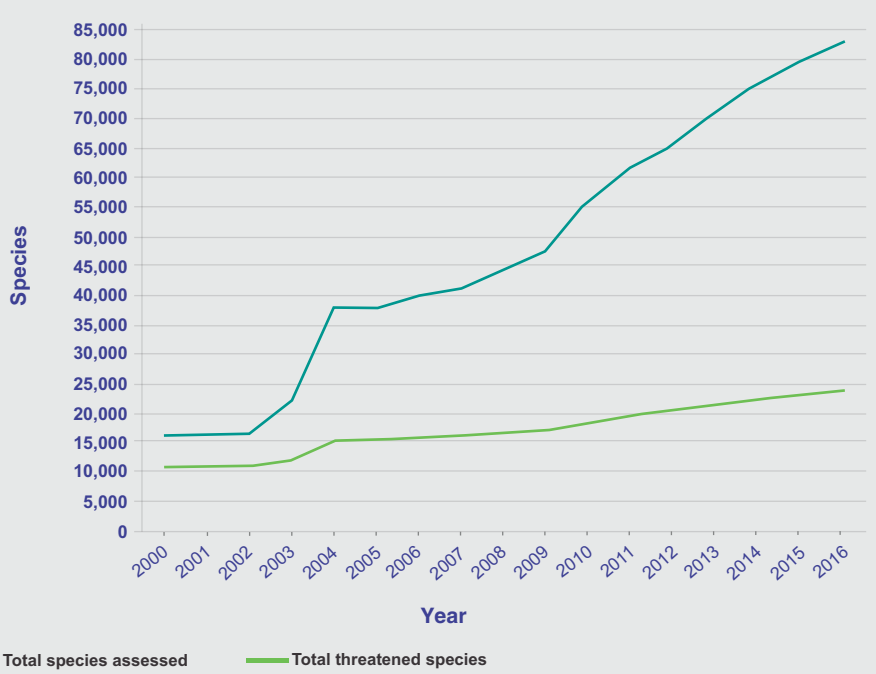


Figure: Increase in the number of species assessed for The IUCN Red List of Threatened Species ™ (2000–2016).

MAINSTREAMING BIODIVERSITY CONSERVATION

> Every inhabitant of this planet must contemplate the day when this planet may no longer be habitable. The weapons of war must be abolished before they abolish us.

"John. F. Kennedy"

Businesses affect and are effected by biodiversity and the ecosystems they operate in. The impact may be direct or indirect based on their operations, product, raw materials, manufacturing or supply chain. Forward and backward linkages need to be identified to gauge businesses' impact on biodiversity and vice-versa. Today, their success depends on factoring in biodiversity conservation into operations and management decisions.

Mainstreaming biodiversity conservation requires engagement with national level policies, production practices, financing mechanisms, and dominant social institutions and to modify their practices so has to factor in environmental costs.

The concept of mainstreaming was included in article 6(b) of the CBD, which called on the parties on convention to "integrate, as far as possible and as appropriate, the conservational and sustainable use of biodiversity into relevant sectoral and cross-sectoral plans, programs, and policies". It also involves fulfilling article 10 (a) which calls on the parties to "integrate consideration of the conservation and sustainable use of biological resources into national-decision-making".

"Maintain and enhance the goods and services provided by biodiversity and ecosystems in order to secure livelihoods, food, water and health, enhance resilience, conserve threatened species and their habitats, and increase carbon storage and sequestration."

Primary approaches to mainstreaming biodiversity conservation are human behavioural change and ecological restoration. Of crucial concern is the world's poor who depend directly on nature for food, clean water, medicine and shelter along with risks they face with regard to climate change and natural disasters. The need for global action to eradicate poverty and make growth and consumption sustainable, while combating climate change and respecting planetary boundaries is urgent and clear. In order to achieve sustainable development, nations need to address these concerns and challenges. Towards addressing these concerns, the international communities and national governments have adapted a Global agenda establishing Sustainable Development Goals. New emphasis is on mainstreaming activities for conserving, maintaining and restoring natural ecosystem, promoting their sustainable use, and equitably sharing the benefits arising from them.

The most significant risk is that of being forgotten. Aprerequisite for effective conservation and sustainable use is first and foremost, the knowledge of biological diversity and the understanding of its functional relationships. It is required to identify the biodiversity impacts, design measurable outcomes and take appropriate prevention and mitigation measures. Conservation allows for the realisation of rights & these rights can help effective management of resources. Nature provides with fundamental components for long term profits and survival. There are no geographical, economic, social, cultural and political boundaries for biodiversity loss. Industries need to recognise the importance of biodiversity conservation and institutionalise ways, methods and instruments for integrating and mainstreaming biodiversity into business management and activities.

What industries need to do?

- Realise the economic value of using ecosystem services smartly, reflecting upon expenditure, advantage over competitors, innovation, reputation and new markets.
- Understand the dependencies and impacts on ecosystem services and weigh associated opportunities.
- Assess the biodiversity and ecosystem services for an industry in terms of value, ecological footprint and sustainability of operations.

More details on how companies can identify its impacts, measure dependencies as well as guidelines on what companies can do to limit its risk, are available in previous IBBI publications[1].

Why it is essential for an industry to understand its dependency on natural resources, the processes that make those resources available (ecosystem services), its impact on those ecosystem services and biodiversity?

It is not just the business reputation that is at stake. Above all safe guarding the survival of the business, to stimulate innovation & to improve its processes for long-term profitability, is paramount. The fact that evolution is not survival of the strongest but of the one who adapts to the changing circumstances is an important lesson for every business. Environment problems compel industries to reconsider their strategies in order to reduce their dependence on natural raw materials and to safeguard a continuous supply of these materials at affordable prices.

The National Biodiversity Targets aid businesses in achieving long-term sustainable growth while maintaining natural resources, enhanced brand image and tenable consumer trust.

In this publication, we have attempted to link businesses with NBTs and presented case studies to show how they are aligning their business agendas and modifying business practices to ensure biodiversity maintenance and regeneration. The case studies represent major industries that have been champions of mainstreaming biodiversity into their decision making, planning, management and operations.

[1]http://businessbiodiversity.in/solutions/awareness-and-knowledge

National Biodiversity Targets

By 2020, a significant proportion of the country's population, especially the youth, is aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

By 2020, values of biodiversity are integrated in national and state planning processes, development programmes and poverty alleviation strategies.

Strategies for reducing rate of degradation, fragmentation and loss of all natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being.

By 2020, invasive alien species and pathways are identified and strategies to manage them developed so that populations of prioritized invasive alien species are managed

By 2020, measures are adopted for sustainable management of agriculture, forestry and fisheries.

Ecologically representative areas under terrestrial and inland water, and also coastal and marine zones, especially those of particular importance for species, biodiversity and ecosystem services, are conserved effectively and equitably, based on protected area designation and management and other are a based conservation measures and are integrated into the wider landscapes and seascapes, covering over 20% of the geographic area of the country, by 2020.

By 2020, genetic diversity of cultivated plants, farm livestock, and their wild relatives, including other socioeconomically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

By 2020, ecosystem services, especially those relating to water, human health, livelihoods and well-being, are enumerated and measures to safeguard them are identified, taking into account the needs of women and local communities, particularly the poor and vulnerable sections.

By 2015, Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization as per the Nagoya Protocol are operational, consistent with national legislations.

By 2020, an effective, participatory and updated national biodiversity action plan is made operational at different levels of governance.

By 2020, national initiatives using communities' traditional knowledge relating to biodiversity are strengthened, with the view to protecting this knowledge in accordance with national legislations and international obligations.

By 2020, opportunities to increase the availability of financial, human and technical resources to facilitate effective implementation of the Strategic Plan for Biodiversity 2011-2020 and the national targets are identified and the Strategy for Resource Mobilization is adopted.

BUSINESS CASE STUDIES

BIOCARE: SUSTAINABLE HONEY PRODUCTION

Honey has more than 20 aroma constituents, 19 organic acids, 5 enzymes, 28 minerals, 13 vitamins, apart from 22 types of sugars. It is therefore nature's brew of more than 100 elements valuable to human health.

About the Company

Biocare, a foremost business entity, is engaged in providing exclusive organic agriculture-basedinputs and agricultural products at an affordable price. Established in 1996, Biocare's state-of-art infrastructure supported by a league of research associates leading the manufacturing unit, has created a niche space in the industry. The company is dedicated and committed to a chemical-free agricultural inputs that ensure preservation of environment and a strong future.

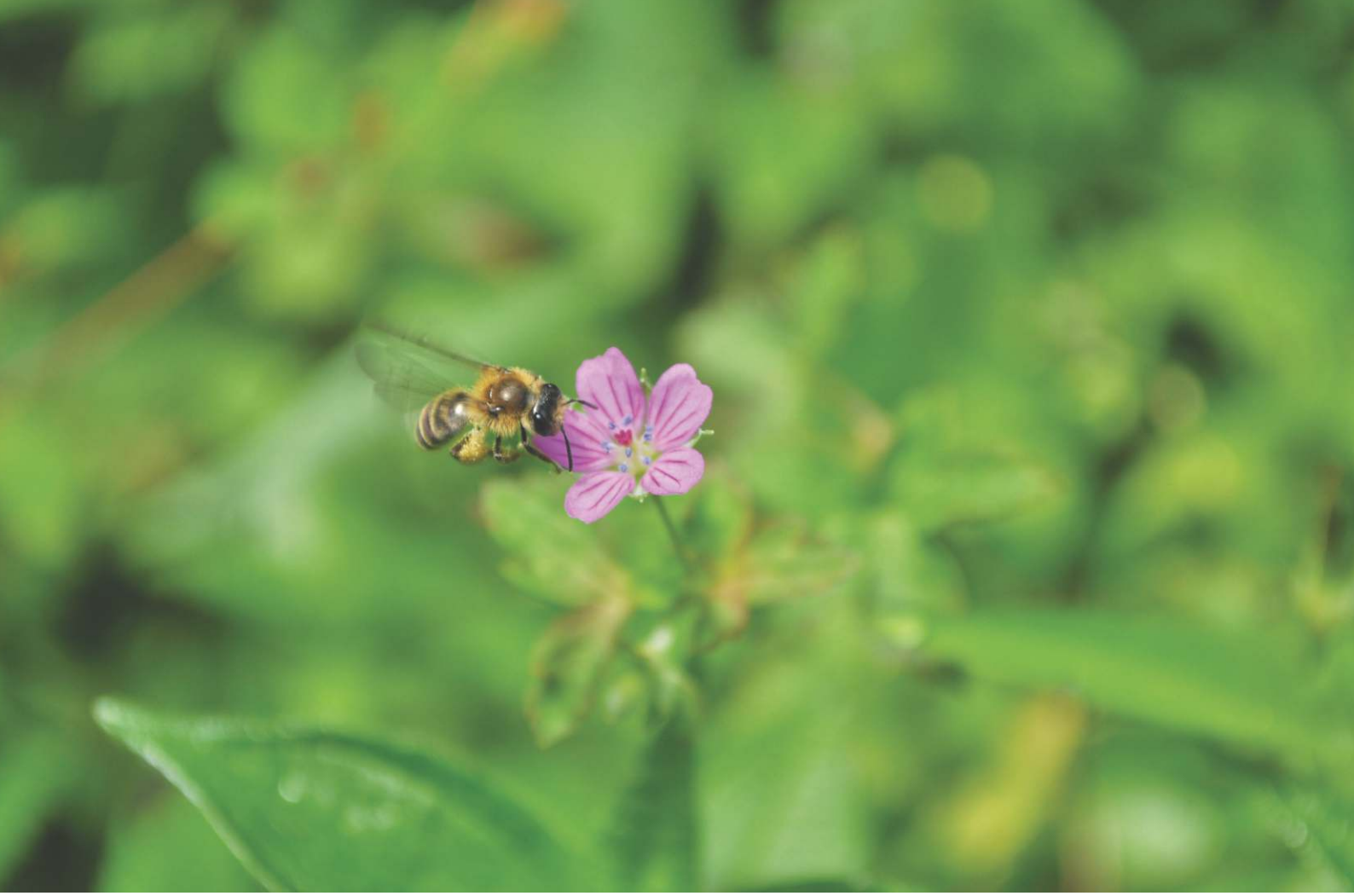
Interdependencies with Biodiversity

India is the centre of origin of honey bees.

Pollination, honey and wax are important ecosystem services provided by Honeybees to human beings. Each of these ecosystems has high economic importance for agriculture production, medicines, food and pharmaceutical sectors.

Apies darsata are major producers of honey in the forest ecosystems as they are very active in pollen collection. They build combs in elevated places such as on branches of tall trees or high raised buildings. They are generally migratory and ferocious in nature and hence domestication is difficult.

India is endowed with 3 species of native honey bees namely *Apis dorsata, Apis cerena* and *Apis florea.*



Worldwide total economic value of crop pollination by bees has been estimated at €153 billion annually.

It has been reported that India produces about 70 thousand tons of honey annually. A large part of this is said to come from *Apis dorsata*. The species is of great significance with regard to honey production as well as pollination. It is known to pollinate crops around its nest with as large a radius as 10 Km, which is an astounding area to cover.

Mostly the forest-dwelling tribals hunt for honey from *Apis dorsata* colonies. The harvest is carried out very crudely by setting fire to the nest to chase the bees away from the honey comb area and cutting the honey comb to gather honey. Part of the honey comb containing larvae and egg stages of the honey bee is destroyed resulting in loss of colonies of valuable pollinators. This results in the decrease in wild honey production and has a severe impact on pollination, a critical risk for the businesses.

Initiatives identified for minimizing impacts and dependencies

Honey, most of which is collected from wild habitat, is one of the critical ingredients in various products developed by BioCare,. Sustainable sourcing of honey is of utmost priority for the company.

BioCare collaborated with Center of Science for Villages (CSV), Wardha, Maharashtra to train honey hunters in sustainable honey collection processes and licenses were provided to them for honey hunting. These hunters follow a four-step approach for honey extraction with minimum disturbance to honey bees.

Training to honey hunters

Step I

Spraying of cold water:

Stinging behavior of *Apis dorsata* results from high temperatures in the bee colony. To overcome this problem, plain water is sprayed over the rock bee colony which mollifies the bees and restricts their free movement as their wings get wet and colony temperature comes down. A simple handy water spray is required to spray the bee colony at their nesting spot. The water spraying controls the honey bees and reduces the bites to honey hunters.

Step II

Identification of honey part in the honeycomb

In the honeycomb, the honey section is a mere 20% and rest is the eggs.

Step III

Eco-Pressure Technique for extracting honey:

This technique of making a slit in the midrib area of the honey storing portion of the honeycomb is used for draining out honey from rock bee honey chamber. It allows honey gatherers to extract honey repeatedly from the same honeycomb without adverse effect.

Step IV

Re attachment of honey part to the mother honeycomb:

After extraction of honey with eco-pressure method, the honey part is reattached to mother honeycomb. This reduces honey bees' work for additional wax preparation and they can use the same section for honey storing.

Benefits of integrating biodiversity

These four steps ensure minimum disturbance to the honey bee colonies and facilitates more than one harvest per colony. The overall improvement in the honey production from 2005 to 2016 is almost 80% along with improvement of honey bee colonies.

SIX MONTH SEASON OF HONEY EXTRACTION

Honey production in 2005: 100% unsustainable honey extraction

Honey production 5 to 6 kg/ honeycomb	Honeycomb wax 2 to 3 kg/ honeycomb	Huge loss of honeybees	Impacts on pollination	Honey production in a season is 4 to 5 quintal / honey hunter

Honey production in 2016: 90% sustainable honey collection

Day 1: 4 to 5 kg/ honeycomb	Day 20 to 30: 6 to 8 kg/ honeycomb	Day 60 to 30: 2 to 3 kg/ honeycomb	After 6 month: Honeycomb wax 2 to 3 kg/ honeycomb	Increased honey production up to 20 –30 quintal/season/ honey hunter

Business case for the company

Sustainable harvesting of honey and wax using a mix of modern and traditional knowledge is helping BioCare ensure a secure place in the supply chain by mitigating critical risks to business due to unavailability of certain honey type. In addition to saving costs, this initiative has also provided sustainable livelihood to the local tribal people with huge augmentation in honey production.

Linkages of initiatives with NBT's

TARGET	COMPOSITE INDICATOR	DESCRIPTION OF INDICATOR
 By 2020, a significant proportion of the country's population, especially the youth, is aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	Trends in promoting awareness at local levels	
 By 2020, measures are adopted for sustainable management of agriculture, forestry and fisheries.	Trends in sustainable forestry	Trends in proportion of product derived from sustainable sources

DABUR: SUSTAINABLE SUPPLY CHAIN MANAGEMENT

"Jagatyevamanoushadam n kinchitvidyatedravyamvasatnanartha yoga yoh."

(All plants have potential medicinal value) - This was recognized more than 1000 years ago in Ashtanga Hridaya.

There is nothing in this universe, which is non-medicinal, which cannot be made use of for many purposes and by many modes. - Sutra Ch.9 – verse 10, Ashtanga Hridaya

A nation's development is reflected in the quality of its people's lives. Health is one of the primary yardsticks in defining the same and hence a part of today's global goals. The pharmaceutical and medical sector is highly dependent on natural resources, especially plants with medicine value. India is a repository of vast and diverse plant species with medicinal value along with the knowledge (Ayurveda) on these plants and their utilization for therapeutic purposes. Conservation of the medicinal plants in order to conserve the tradition of Ayurveda as well as to have a continual availability of such plants to support human health is important.

Ayurvedic system of medicine has been prevalent in India since the Vedic period and as early as the dawn of human civilization. Flowering plants or floristic diversity is an imperative ingredient in ayurvedic formulations.

The World Health Organization (WHO) has estimated that the present demand for medicinal plants is approximately worth US $14 billion per year. The demand for medicinal plant based raw materials is growing at the rate of 15 to 25% annually, and according to a WHO estimate, the demand for medicinal plants is likely to be worth US $5 trillion by 2050.

About the Company

The Dabur journey as an FMCG & Health Care medicines manufacturer started in 1884.Over the years the company has transformed into Indian trans-national with manufacturing units spread across the world and products available in over 120 countries. Today, Dabur is the oldest yet the most modern face of Ayurveda in India and has been integrating modern day science with age-old traditional wisdom to develop products that meet the ever-changing needs of consumers and offering them holistic health and well-being.

At Dabur, sustainability is synonymous with the responsibility to deliver what they promise. It offers a wide range of products while taking care of its customers' well-being, parallely working towards keeping the planet clean and green.

According to the World Health Organization (WHO), 80 percent of the population in developing countries relies on traditional medicine, mostly in the form of plant drugs for their health care needs. Additionally, modern medicines contain plant derivatives to the extent of about 25 percent. An estimated 25,000 effective plant-based formulations are available in Indian medicine.

Inter-dependencies with biodiversity

India is one of the 17 mega diverse (biodiversity-rich) countries in the world (Mittermeier, 2000) with floral composition of estimated 45,000 forest plant species consisting of 17,000 species of flowering plants including 8,000 medicinal plants (Tewari, 2000[1]). Of these, about 5,725 species of flowering plants (33.5%) are believed to be endemic to India (Nayar, 1996)[2].

Medicinal plants across the world face danger of extinction due to ruinous harvesting practices and over-harvesting for production of medicines with little or no regard to the future. Extensive destruction of the plant-rich habitat as a result of forest degradation, agricultural encroachment, urbanization etc. are other factors challenging their existence (Gupta et al., 1998).

In India, 560 plant species of the total have been included in the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened species, out of which 247 species are in the threatened category.

Manufacturing of ayurvedic medicines is highly dependent on biodiversity and natural habitat through out the phases of drug development such as drug discovery, manufacturing and finally sales, distribution and product management.

Over extraction/exploitation of medicinal plants or plant parts leads to decline in the wild population of plant species and degradation of ecosystem, eventually leading to extinction of species.

[1]Tewari D.N. (2000) Report of the Task Force on Conservation & Sustainable use of Medicinal Plants, Planning commission, Government of India, New Delhi
[2]Nayar, M.P. 1996, "Hot Spots" of endemic plants of India, Nepal and Bhutan. Tropical Botanic Garden and Research Institute, Palode, Thiruvananthapuram, Kerala

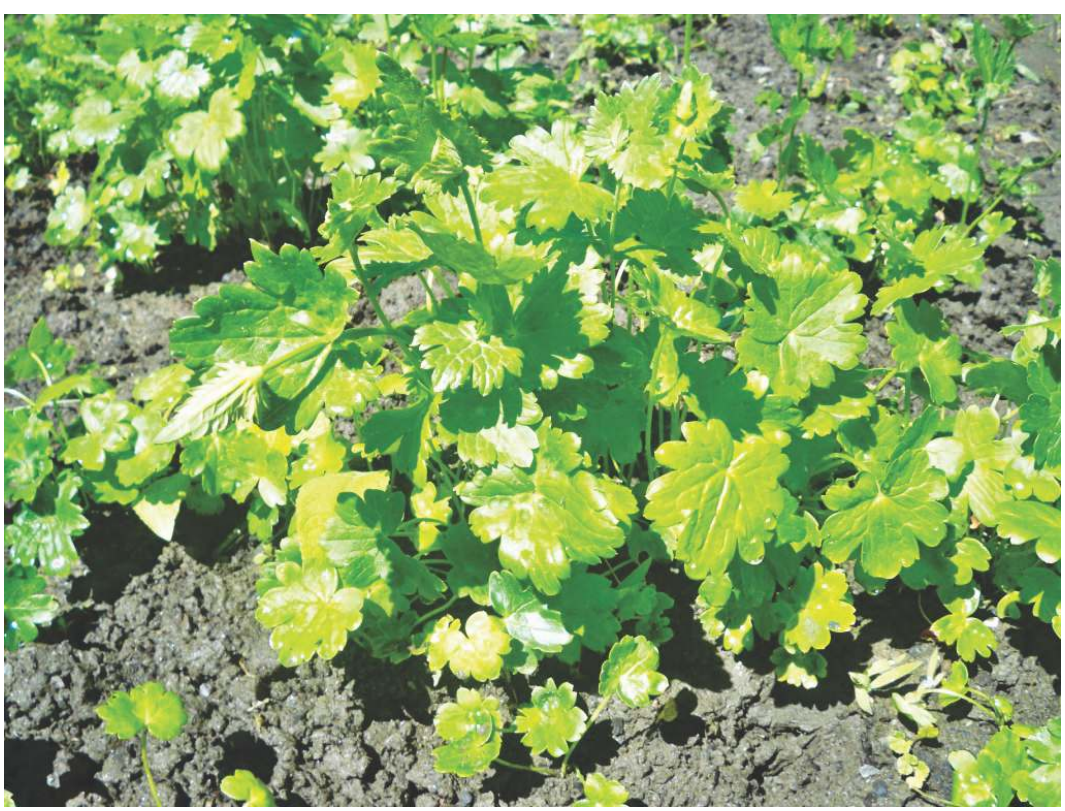
Currently more than 75 percent of the herbal requirement is met through wild collections. While the demand for medicinal plants is increasing, their survival in their natural habitat is undergoing a threat.

Initiatives to minimize impacts and dependencies on biodiversity

Medicinal plants form vital aspects of healthcare system in India and are major national resources. Hence, there is a gigantic need for conservation of diversity of the medicinal plant wealth.

Manufacturing of ayurvedic medicines on large scale requires sustainable and quality supply of specific medicinal plants. In order to meet the growing demand for these plants, it is imperative to conserve the plant species, either by way of domestication and cultivation, or by other ex-situ and in-situ conservation measures.

Dabur analyzed these risks and developed a strategy for mitigating risks due to continuous loss of biodiversity and stringent regulatory requirements:



10 Steps for mitigating risk

1. Scientific identification of plants and their parts having medicinal value:

The scientific identification of plant is an important step in the development of ayurvedic medicine. This ensures the quality of the product.

2. Analysis of plants' habitats (niche areas) and their conservation status:

Each plant species requires specific habitat and niche for growth and propagation. This step records the specific habitat and the population status based on site studies, IUCN Red list category and research material. These details are of critical importance for the propagation protocol development in the laboratory trials.

3. Collection of seed and live plants from authentic sources:

After confirmation of scientific identity and conservation status, samples of plant material and seeds from wild habitat are chosen/collected for trails in the greenhouse and propagation of plants.

4. Development of propagation protocol in laboratory:

The plant habitat data and scientific details are used for the development of protocol of specific species for its trials in greenhouse and field trails.

5. Trials in greenhouse (Jeevanti Center):

After development of protocol, the testing of plants is undertaken in a controlled area. Growth and propagation trails are undertaken for the development of sapling.

6. Laboratory analysis of plants:

In-house grown plants are analysed for specific ingredients in comparison with wild plants.

7. Development of saplings in greenhouse:

After successful trials in the controlled environment, the plant saplings are developed through seeds/ tubers/ plant cutting, etc. This minimises use of wild plant material and negative impact on the natural habitat of the plants.

8. Selection of agriculture field for cultivation:

The agriculture field is selected based on the local habitat of the selected species. Such cultivation may have to be initiated under well-defined conditions, for example micro-climates similar to the niche requirements of the various species.

9. Cultivation of saplings in selected agriculture fields:

Medicinal plants are cultivated in a grower's field to ensure authentic, reliable and continual raw material. Emphasis on cultivation of the wild forms, rather than collecting from the wild minimises negative impact on the wild habitat. Dabur also ensures supply of quality planting material of genuine varieties and extension of support in cultivation and processing.

10. Sustainable extraction of required parts for development formulation:

In-house team supports farmers for cultivation and proper extraction of medicinal plants.

Atish (*Aconitum hetrophyllum*) nursery to dispatch phase for cultivation

Benefits of integrating biodiversity aspects in decision making and during implementation phase

These 10 steps are followed for each and every species utilized for the production of medicines in the Dabur factory. In order to support this activity, Dabur has a state-of-the-art 'Jeevanti nursery' in the foothills of Uttrakhand. This nursery undertakes all in-house and field trials for the medicinal plant.

The ex situ cultivation and propagation of important medicinal plants in the nursery ensures quality, quantity and its sustainable supply to the farmers. It also reduces the dependency for raw material from the forest areas along with reducing negative impacts on forest resources due to uncontrolled extraction for plant materials.

Business case for the company

1. **Securing supply chain**
2. **Meeting consumer expectations**

Linkages of initiatives with the National Biodiversity Targets

TARGET	COMPOSITE INDICATOR	DESCRIPTION OF INDICATOR
 By 2020, measures are adopted for sustainable management of agriculture, forestry and fisheries	Monitoring agricultural extension	• Trends in awareness levels of farmers • Trends in awareness levels of extension service staff, scientists and agricultural research system with regard to agro-biodiversity and associated knowledge
 By 2020, genetic diversity of cultivated plants, farm livestock, and their wild relatives, including other socioeconomically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity	Plant genetic diversity	Trends in germplasm accessions in exsitu collections

DSCL SUGAR: MEETHA SONA PARIYOJANA

Sugar is prevalent in modern diet and increasingly a source of biofuels and bioplastics. As prices of petroleum rise, there is a growing market for ethanol from sugarcane.

About the Company

DSCL Sugar, a subsidiary company of DCM Shriram Group, entered the sugar business in 1997 with its first sugar manufacturing unit at Ajbapur in Lakhimpur Kheri District of Uttar Pradesh, followed by other manufacturing units at Rupapur, Hariawan and Loni in Hardoi District of Uttar Pradesh. The production facilities have co-generation power plants based on bagasse, a sugar by-product.

About the product

Today in India, sugarcane is the main source of sugar production and the sugar industry is the second largest agro-based industry of India after cotton textile industry. DSCL Sugar is vastly dependent on the productivity and quality of sugarcane in command area within a 40 km radius of projects. DSCL at Ajbapur had taken up the initiative,'MeethaSonaPariyojana', a Sustainable Agriculture programme to enhance the production of sugarcane and minimise the negative impacts of cultivation on biodiversity and the ecosystem.

Interdependencies with biodiversity

Sugarcane is a water intensive crop that remains in the soil year-round for 2 to 3 years. The sugarcane quality and production is directly dependent on the aspects such as soil quality, water availability and pest control. In most of the cases, farmers use chemical fertilisers, pesticides and ground water for irrigation. Over use of chemicals and uncontrolled extraction of water from ground table may result in degradation of the ecosystem resulting in loss of sugarcane production, a critical risk for sugar factories.

The biodiversity and a well-nourished ecosystem like soil nutrient recycling, pest control, pollination, water, etc., are critical for sustainable sugarcane production. Integrating biodiversity conservation and sustainable management of ecosystem will ensure a sustainability supply chain.

Initiatives identified for minimising impacts and dependencies

The DSCL Sugar identified this risk and developed a **'Meetha Sona Pariyojana'** (Sustainable Agriculture productivity) to work with farmers in command area and provide technical support for sustainable agriculture practice.

1. Capacity Building:

Training programmes on sustainable cultivation of sugarcane, crop rotation, use of bio chemicals and fertilisers, land levelling, furrow irrigation methodology and showcasing the best practices for cultivation, are provided to the farmers in the command area.

2. Soil Health Improvement:

Soil quality is of paramount importance for good agriculture. In order to understand the soil quality, a soil health card is created for each farmer in the command area. Based on the soil quality, the technical team provides suggestions to farmers for required fertilisers and prevent farmers from excessively using fertilisers. Techniques like tree mulching, (crop residues) incorporation into in site, and use of bio-compost from press mud, are adopted which results in use of chemical fertilisers.

3. Integrated Pest Management Approach:

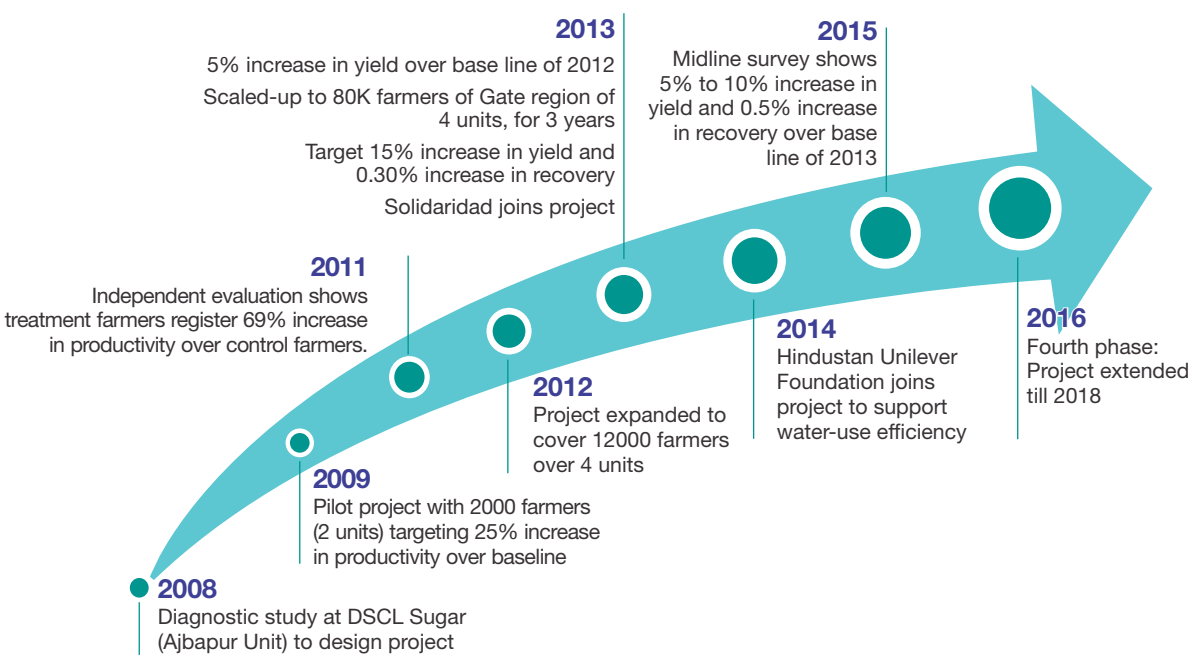
Use of chemical pesticides for pest control also impacts useful species and results in loss of biodiversity. Fertilizer over-use also increases tolerance in pest species. A bio-control lab was established to work on the development of bio-pesticites and biodiversity positive methodology for controlling pest and minimising the use of chemicals.

Farmers are supplied with bio-pesticides like Beauveriabassiana, Metarhiziumanisopliae & Tricoderma, especially for controlling pests. Pheromone and light traps are also used for the control of moth and other insects on sugarcane crops.

Benefits of integrating biodiversity

The project started in 2009 with 2000 farmers at Ajbapur and Lohni and now covers 1.25 lakh farmers from all four projects of DSCL Sugar. Sustainable agricultural practices have helped farmers in enhancing the yield from 150 to 300 quintals/ ha, a more than 50% increment in production with 10% to 20% reduction in input cost. Land levelling, furrow irrigation and trash mulching has reduced water requirement and resulted in saving 20 billion litres of water.

The overall project is helping in minimising the pressure on local biodiversity and the ecosystem with increase in productivity and financial stability of farmers.



Business case for the company

Business case for DSCL Sugar is to secure the supply chain by ensuring sustainable supply of sugarcane with 0.3% increase in sugar recover by using advanced sugarcane varieties. Enhancement of socio economic status and environment of the area also help the company in securing licenses to operate.

Linkages of initiatives with the National Biodiversity Targets

TARGET	COMPOSITE INDICATOR	DESCRIPTION OF INDICATOR
 By 2020, a significant proportion of the country's population, especially the youth, is aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	Trends in incorporating awareness and attitudes towards environmental conservation through communication and main stream education	Trends in coverage of environment related programmes and projects with increased involvement from the youth
 Strategies for reducing rate of degradation, fragmentation and loss of all natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being.	Trends in maintenance of fertility in agricultural lands using natural methods and means	• Soil health records • Organic carbon and humus buildup • Trends in keeping the health of near pristine soils
 By 2020, measures are adopted for sustainable management of agriculture, forestry and fisheries.	Trends in sustainable agriculture Monitoring agricultural extension	• Trends in ground water table • Trends in the use of bio-fertilizers/ bio fuels, organic manure and vermicom post

GODREJ INTERIO: DESIGN FOR ENVIRONMENT (DFE)

About the Company

Godrej Interio, India's largest furniture brand, is a business unit of Godrej & Boyce Mfg. Co. Ltd. With a pan-India presence, it has come a long way from manufacturing the humble Storwel cupboard 80 years ago, to a vibrant, innovative brand with a diverse portfolio.

About the product

Godrej Interio, Shirwal Plant, manufactures the 'WISH' office furniture, which is a panel based furniture system for open office layouts and is available in a range of sizes and configurations. The main materials of the WISH product line include aluminum, wood (MDF), paper, fabric, laminate, metal and glass, depending on the finish and configuration.

WISH products come with a Green Assurance Card. The cards provide a Green Assurance Score for the different Godrej Interio products stating recycled content, certifications, recyclability, low emitting material, renewable materials, material content and green features of the product.

Interdependencies of WISH model on biodiversity

Furniture businesses are directly dependent on forest and social forestry for raw material. Continuous extraction of wood from the forest leads to forest degradation, which depletes the timber yield and creates an ill-balanced ecosystem in the forests. Forest degradation also threatens the economic viability of forest operations by lowering the regenerative capacity of standing forests. The key challenge for the wood product industry is to supply more wood products with less impact on forests in order to reduce business risks.

For manufacturing of 'WISH' products, Godrej Interio, Shirwal Plantuses Particle boards and Medium Density Fiber boards (MDF). These boards are engineered wood products manufactured from breaking down hardwood or softwood residuals into wood fibers, often in a defibrator, combining it with wax and a resin binder, and forming panels by applying high temperature and pressure.

The wooden panels are prepared using fast-growing trees like Eucalyptus and Populus, mostly cultivated as an agro forestry initiative in India by the farmers. Use of these woods in wooden panel development reduces the extraction of wood from natural forests.

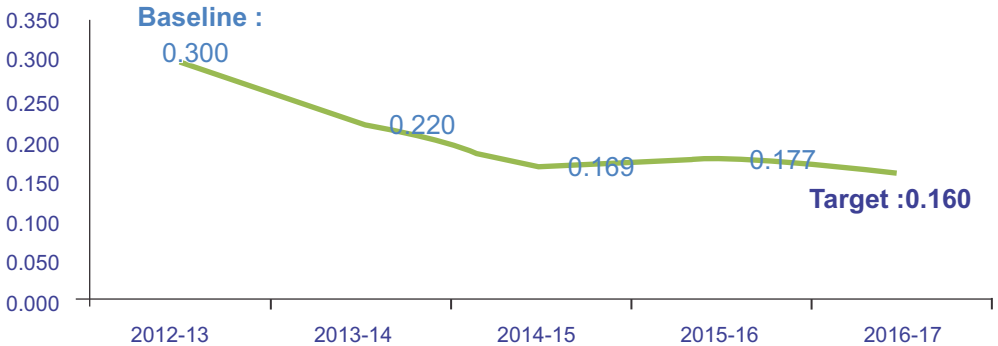
Initiatives to minimize impacts and dependencies on biodiversity

Urbanisation leads to increased demand for a continuous supply of wood-based products thus making the furniture industry a fast growing sector. The continuous growth in wood requirement from furniture sector is leading to the pressure on the agro forestry and some of the forest areas. The wooden panel requirement for the WISH product increased by 138% between 2012-13 and 2015-16. In order to cater to increased demand for wood in the face of depleting forests, Godrej Interio started using certified wood for the WISH product which ensures that wood is extracted from sustainable forests.

The world's natural forests cannot sustainably meet the soaring global demand for timber products under current forest management practices. According to the Center for International Forestry Research (CIFOR), approximately 24.7 million acres of fast-wood plantations — or commercially planted forests — exist worldwide. Each year around 2.5 million acres of land is converted to fast-wood forests. While intensive production is essential to meet the global demand and take pressure off of the world's forests, there can be significant negative impacts of these plantations. Some have been created from the conversion of high conservation value natural forests, and some have created in significant negative social and environmental impacts.

At Godrej Interio, in FY 2013-14, particle board scrap generated was 24% of total particle board consumed. High percentage of scrap, non-utilisation of scrap and low yield led to high conversion cost. To address these issues Godrej Interio has adopted a 5 pronged approach to increase yield, reduce scrap and minimise the dependency on the wooden panel requirement.

Particle boards are available in specific sizes and thickness. So optimisation of particle boards in size available with supplier becomes an important exercise in order to increase yield and reduce waste. Cut-rite software is used for optimisation of material which also helps in reducing process scrap. Design scrap and machine-wise process scrap is monitored separately. All these initiatives helped in reducing the specific wood waste generation from 0.300 kg/ sq.ft. in 2012-13 to 0.177 kg/ sq.ft. in 2015-16. The target is to reduce this waste to 0.160kg/ sq.ft. in 2016-17.



Benefits of integrating biodiversity aspects in decision making and during implementation phase

- Conservation of particle board through reduction in design and processed waste
- Reduction in scrap from 24% to 16% over the last three years
- Reduction in raw material consumption: 350 tons/year

Business case for the company

- Cost saving
- Securing supply chain
- Meeting consumer demands

Linkages of initiatives with the National Biodiversity Targets

TARGET	COMPOSITE INDICATOR	DESCRIPTION OF INDICATOR
 By 2020, measures are adopted for sustainable management of agriculture, forestry and fisheries.	Trends in sustainable forestry	Trends in proportion of product derived from sustainable sources

ITC: RAVANDOOR CASCADE DEVELOPMENT

About the Company

ITC Limited is a leading Indian multi-business conglomerate incorporated in 1910. Its portfolio of businesses spans fast moving consumer goods, hotels, paper boards and packaging, agribusiness and information technology. The Company's agribusiness is one of the largest exporters of agricultural products. The Agri-Business Division (ABD) of ITC Limited is among the large buyers, processors and exporters of various crops in India, creating a global benchmark as the single largest integrated source of quality agri-crops in India.

About the project

Biodiversity and ecosystem services are at the heart of several solutions for a sustainable increase in agricultural productivity that not only delivers better outcomes for food and nutrition security but also reduces externalities of production.

The present case study is from the Ravandoor tank cascade area located in the southern district of Mysore (Karnataka). The Ravandoor cascade, comprising 13 tanks, is one of the important habitats for local and migratory aquatic birds and also supports

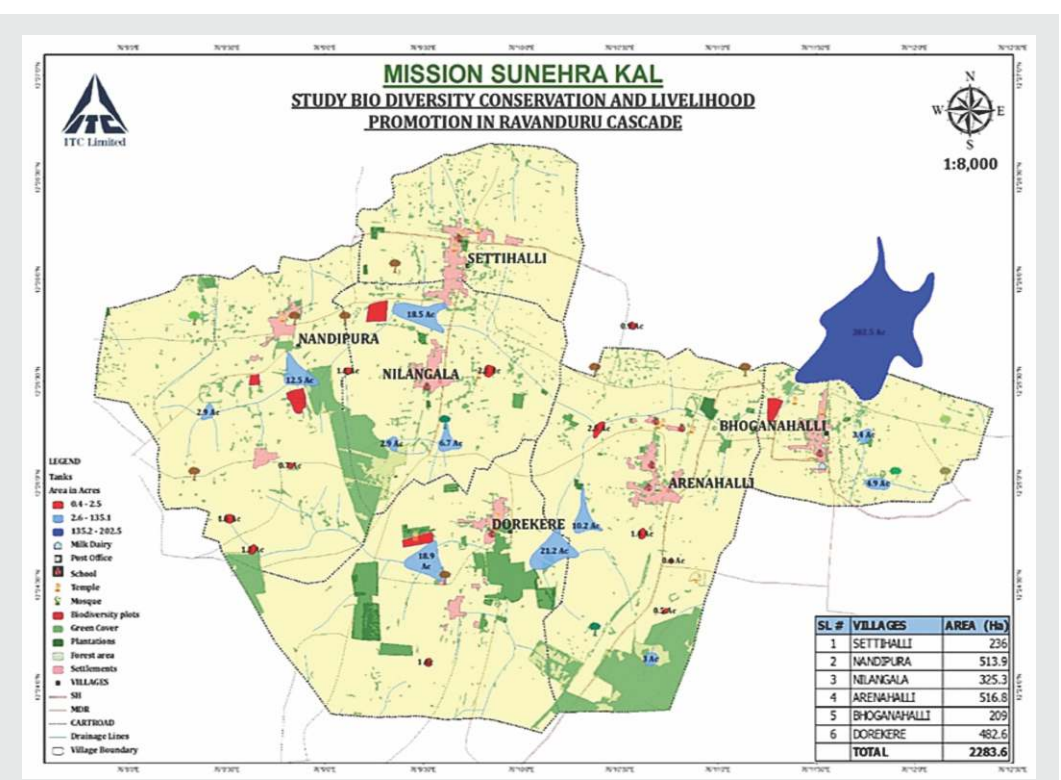


Figure 1 Ravandoor Cascade

irrigation for agriculture. The catchment area of Ravandoor cascade is also an important agri-produce sourcing location for ITC. The Ravandoor catchment covers an area of about 2,283 ha, of which76% area is used for agriculture and 19% is under green cover (forests and plantations). Six villages are part of this catchment area with agriculture as the primary source of income.

The farmers are dependent on various ecosystem services like water from the river and tanks for irrigation and fodder and timber wood from forest areas. However, continuous pressure on natural resources, has caused disruptions in some of the available ecosystem services.

Initiatives identified for minimizing impacts and dependencies

As a first step towards sustainability, ITC conducted a biodiversity risk and opportunity assessment in the Ravandoor catchment area to analyse the causes of reduction in agriculture production. The study identified two areas for immediate intervention: conservation of soil & water and biodiversity enhancement. A structured programme was developed for the catchment area by involving local stakeholders, NGOs, the Government, local panchayat institutions and the Forest Department, to work on the identified areas.

Soil & Water Conservation:

The Ravandoor cascade has a total of 13 tanks and many other farm ponds. Due to continuous siltation over the years, the water-holding capacity of these tanks is considerably diminished, resulting in less storage of water. Through ITC's desiltation project, all tanks in the cascade were restored and the silt was applied on farmlands.

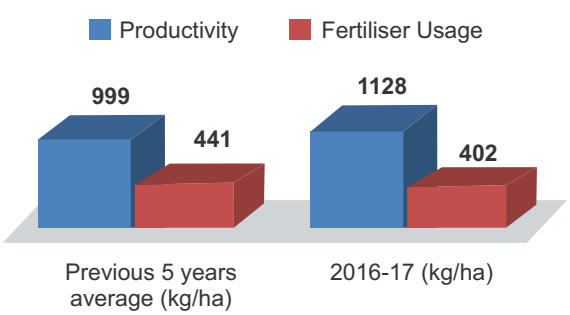


Figure 2: Trend of Production increase and fertiliser use reduction

A Ravandoor tank

During the biodiversity risk and opportunity assessment study period, it was also observed that the existing seasonal stream was partly encroached upon and silted up. The remaining drainage area was overrun with bushes and scrubs. Consequently, both, the volume of surface flows into the tanks, and the storage capacity of the tanks, were severely impaired. ITC addressed these issues systematically by

- clearing the encroachments through community mobilisation
- drainage line treatment of the entire area to capture the now abundant water flows to the tanks
- catchment area treatment to arrest soil erosion and increase in situ moisture retention
- development of existing pasture lands

ITC also put in place scientific monitoring systems by establishing sediment samplers and auto rain gauges in selected locations, at both, the control and project villages, to assess the silt and water flow impacts.

These interventions resulted in higher inflows into the tanks, and enhancement of water-holding capacity of all tanks in the cascade, leading to year-round availability of water. The use of silt on farmlands helped in improving organic carbon and other nutrients in the soil. This led to a 9% reduction in chemical fertiliser usage with a simultaneous increase in yields by approximately 13% as compared to the last 5 years' average (see figure 2 for details). The application of tank silt to agriculture lands led to savings in fertiliser costs of around INR 8,000 to 10,000 per hectare.

Biodiversity Enhancement

The baseline Shannon's Diversity index for flora was 2.23, which indicates a moderate scale of diversity and leaves considerable room for improvement. Biodiversity enhancement programme requires activities such as large-scale awareness generation and community participation, protection and conservation of existing trees, plantation of native species on field embankments and in-situ conservation of biomass in commons. ITC has taken the following biodiversity enhancement steps:

1. Creation of a buffer area of 500m along the drainage channels and planting of native tree species
2. Tree planting along farm boundaries and in the village common lands
3. Creation of kitchen gardens to improve diversity of shrubs and herbs
4. Sustained awareness drives on alternative sources of energy for fuel and no felling of trees
5. Creation of biodiversity parks across the cascade area along with planting of local fruit-bearing and other important trees, shrubs and herbs

6. Continuous monitoring of plant survival by village biodiversity committees

7. Preparation and submission of 'Peoples Biodiversity Registers' in partnership with the Gram Panchayats

8. Convergence with stakeholders like the Forest Department and other line departments for necessary approvals and for access to resources like tree saplings

9. Capacity building of the Tank User Group (TUG) /biodiversity committees through regular meetings, trainings, exposure visits, mass campaigns, display boards and IEC materials

Biodiversity Park by ITC limited for conservation of native flora

The conservation and augmentation of plant species and population resulted in enhancement of green cover in the catchment area. This was reflected in the Shannon's Diversity index for floral diversity that showed an increase to 2.49.This rise in the diversity index has taken place over the last three years and is likely to improve further since these interventions will continue for the next three to four years. Local people are also taking responsibility for the conservation of trees and other natural resources.

Business case for the company

Mainstreaming biodiversity and ecosystem services into agricultural production and providing alternative options to unsustainable agricultural practices helped ITC in safeguarding its agri-supply chain as well as in enhancing its brand reputation.

Linkages of initiatives with the National Biodiversity Targets

TARGET	COMPOSITE INDICATOR	DESCRIPTION OF INDICATOR
 By 2020, values of biodiversity are integrated in national and state planning processes, development programmes and poverty alleviation strategies.	Trends in incorporating natural resource/ biodiversity/ ecosystem service values in national and state planning processes and development programmes	Trends in area covered by catchment area treatment under irrigation projects
 Strategies for reducing rate of degradation, fragmentation and loss of all natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being.	Trends in aquatic ecosystems Trends in maintenance of fertility in agricultural lands using natural methods and means	• Changes in area under riverine ecosystems and wetlands (terrestrial and coastal) • Number of wetlands under integrated management plans • Organic carbon and humus buildup • Trends in keeping the health of near pristine soils, being awarded title sunder Forest Right Act (FRA) in forest areas
 By 2020, measures are adopted for sustainable management of agriculture, forestry and fisheries.	Trends in sustainable agriculture	• Trends in the production/ usage of agrochemical fertilizers • Trends in the use of bio-fertilizers/ biofuels, organic manure and vermicompost • Trends in soil quality and land use • Trends in groundwater table

MAHINDRA & MAHINDRA IGATPURI: DUST CONTROL

About the Company

Mahindra & Mahindra Ltd. is a leader in the tractor and utility vehicles space in India. The Igatpuri project in Maharashtra is a manufacturing site for engines of most popular cars of Mahindra such as the XUV500, Xylo, Bolero, and also other commercial vehicles such as the Genio and the Maxximo.

The project is located in Western Ghat in the state of Maharashtra. The Western Ghat is considered as a Biodiversity Hotspot area by the IUCN and is home to a variety of flora and fauna.

Interdependencies with biodiversity

Manufacturing and assembling of vehicles do not have any direct dependency on the biodiversity for raw material requirement. But operation of these facilities requires a good quality ecosystem such as fresh water requirement, dust control, ambient temperature regulation, etc.

Atmospheric dust is one of the crucial factors for the engine assembly unit. Atmospheric dust consists of solid suspended particles in air and it normally includes inorganic mineral materials, water-soluble salts, organic materials, and a small amount of water. If the dust is not controlled at source, it leads to major impact on the assembly unit and reduces the performance of engines in the use phase.

Dust particles that have high impact on engine assembly are 0.5, 1.0 and 5.0 micron. The baseline levels of these three particles before project is 69 lacs particle count/m^3 for 3.5 micron, 33 lacs particle count/m^3 for 1.0 micron and 2 lacs particle count/m^3 for 5.0 micron.

The development of green areas to control dust at source location helps in reducing this dust particle risk. In addition to this, the plantation also helps in soil conservation, enhance ground table and ambient temperature reduction.

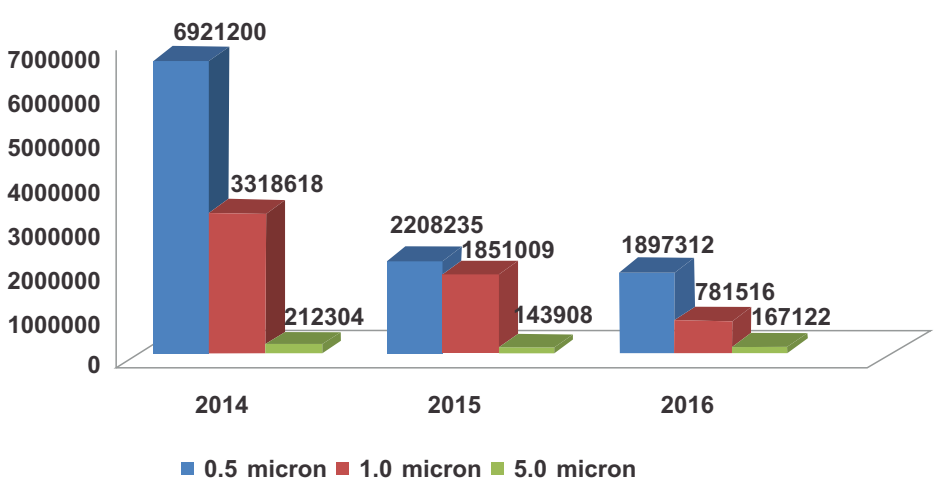
Initiatives to minimising impacts and dependencies on biodiversity

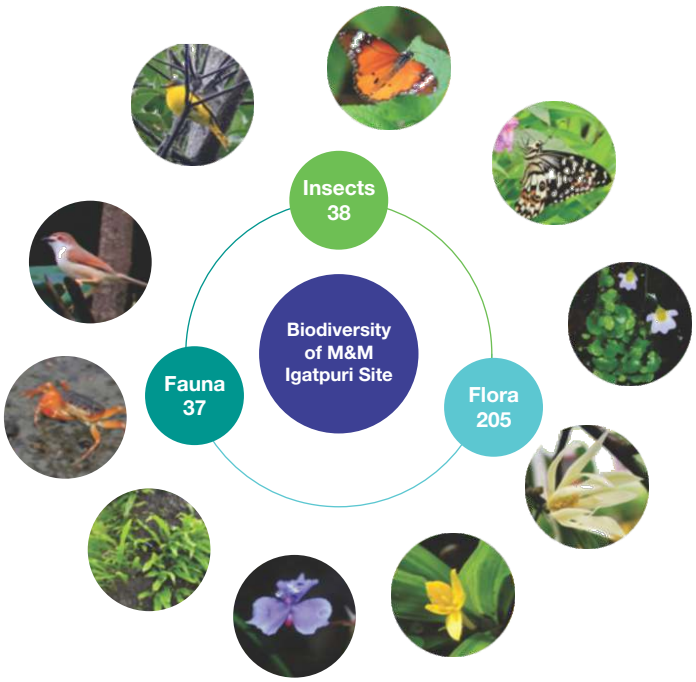
At the Igatpuri site, issues of dust emission were noticed due to open spaces in the assembly unit area. A plan was developed for covering all the dust hotspots. Plantation of trees, shrubs and setting up of lawns were few important parts of the strategy along with some engineering measures.

The project occupies about 40 ha of land, out of which 25 ha is under green cover. The plantation is based on the scientific analysis of the regional floral and faunal diversity and local and native species are selected for the plantation. Below are some of efforts implemented by the company to enhance the green cove in the project premises.

1. Plantation of shrub species like *Tecoma stans, Hibiscus rosa-sinensis, Nerium indicum*, etc, along the road side and near the buildings
2. Use of plants for fencing rather than the steel wires or constructing walls
3. Plantation of local trees in open spaces to control soil erosion due to water and wind
4. Covering of open areas with grass and flowing shrubs
5. Placing of plant pots on concrete areas
6. Control of invasive plant species
7. Use of recycled water for irrigation
8. Installed drip and sprinkler irrigation system

At present biodiversity of the site is represented by more than 220 species of plants and 75 species of fauna (birds, reptiles and mammals). All these measures substantially helped in reducing dust levels by more than 73% in 0.5 micron level, 76% in 1.0 micron level and 21% in 5.0 micron level.





Benefits of integrating biodiversity aspects in decision-making and during implementation phase

- 59% Improvement in Engine Assembly Cleanliness with respect to dust levels
- 76% Improvement in Field Complaint which comprises 80% reduction in Vehicle Immobilization

Business case for the company

- Cost saving
- Meeting customers' expectations

Linkages of initiatives with the National Biodiversity Targets

TARGET	COMPOSITE INDICATOR	DESCRIPTION OF INDICATOR
 Strategies for reducing rate of degradation, fragmentation and loss of all natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being.	Trends in afforestation and restoration	• Monitoring canopy cover, grasslands • and traditional grazing lands • Monitoring carbon stock • Assisted natural regeneration

TATA CHEMICALS LIMITED: CUSTOMISED FERTILIZERS

As per the Land use statistics the total geographical area of India is 328.7 million hectares, of which 139.9 million hectares is the reported net sown area and 194.4 million hectares is the gross cropped area with a cropping intensity of 138.9%. The net irrigated area is 66.1 million hectares.

About the Company

Tata Chemicals Limited (TCL) is a global company with interests in businesses that focus on essentials for LIFE: Living, Industry and Farm Essentials. Tata Chemicals is the world's second largest producer of soda ash and world's third largest producer of sodium bicarbonate.

TCL farm essentials portfolio today offers a complete suite of solutions for the Indian farmer and touches over 85 percent of India's arable land. TCL makes crop nutrients, including customised fertilizers, urea and phosphatic fertilizers.

TCL is a pioneer in the field of crop- and region-specific customised fertilizers that provide balanced nutrition to the soil, boost crop productivity and improve the overall quality of the yield. Sold under the Tata Paras Farmoola brand, these fertilizers contain macro and micro nutrients required by select crops in specific regions.

Inter-dependency of product with biodiversity

Agricultural mal-practices triggered major threat to biodiversity. Use of fertilizers has caused huge negative impact on environment and contributed to biodiversity loss. In addition to soil and water pollution, soil erosion and loss of fertility are the most important negative impacts related to the use of fertilizers. Due to agricultural mal-practices, soil loses its natural character and its quality is affected leading to compaction, loss of soil structure, nutrient degradation soild fertility and salinity. Use of synthetic fertilizers and pesticides leach through the soil and enter the water resources, further penetrating the food web. Eutrophication is one of the most widespread environmental problems of inland waters. Contamination of water bodies with chemicals causes threat to ecosystem and aquatic species.

Initiatives identified for minimising impacts and dependencies

In addition to impacting the agricultural produce, usage of synthetic fertilizers has a direct impact on biodiversity and ecosystem. In order to address this criticality, Tata Chemicals has developed customised fertilizers under the'Paras Farmoola' brand. The fertilizers are developed based on specific crop requirement, soil health, and water availability for irrigation, temperature and biodiversity of the area. The product has been commercialized after factoring in all the parameters and field-testing.

In 2006, Tata Chemicals Ltd. established Centre for Agri-solutions & Technologies (CAT) for developing customised fertilizers through research, field-testing and training farmers for its sustainable use. The centre is accredited by the DSIR, Ministry of Science and Technology, Government of India. The center follows Stage and Gate process for new product development. During product development, each stage is assessed and approved against the validation standards set by CAT. This is one of the requirements for analyzing the impact of a product on biodiversity and ecosystem services. After achieving the desirable score (Green Quotient >3) and successful field-testing, the product is ready for commercial production.

Green Quotient - Production

Product Name : xxxxx

Sl. No.	Question	Response		Score
		Correlation	Movement	
1	How does it impact the raw material consumption?	Strong	Decreases	25
2	How does it impact the energy consumption?	Medium	Decreases	15
3	How would it impact water consumption?	Strong	Decreases	25
4	How would it impact GHG emission?	Strong	Decreases	25
5	How would impact air pollution?	Strong	Decreases	25
6	How would impact water pollution?	Strong	Decreases	25
7	How would impact soil pollution?	Strong	Decreases	25
8	How would impact local flora & fauna?	Medium	Unaffected	9
			High	4.4

The center also regularly monitors soil quality in areas where the products are used and based on the results, corrective measures are suggested to farmers.

Paras Farmoola fertilizers help correct the nutrient imbalance in the soil, caused by prolonged inadequate or indiscriminate use of fertilizers. Below are some of the key benefits of customised fertilizers:

- Enhances crop productivity
- One-time application of all macro and micro nutrients (except nitrogen) and hence convenient to use with a synergistic effect on crop production
- Promotes balanced application of nutrients
- Granulated to ensure uniform distribution of nutrients
- Low wastage – Fertilizers are designed for easy and direct incorporation into crops, limiting the quantity and unwanted exposure to environment
- Capacity building for farmers to ensure sustainable use of fertilizers

Tata Chemicals Ltd. products and their benefits

Paras Farmoola:

- Reduces soil mining
- Improves soil health
- Increases nutrient use efficiency
- Reduces labour requirement

Urea Briquettes :

- Lesser denitrification loss (GHG)
- Lesser leaching loss (nitrate pollution)
- Low ammonia volatilisation (acid rain)

Foliar nutrition products :

- High use efficiency
- Better utilisation of soil nutrient
- Enrichment of micro nutrient in food (Zn, Fe)

Novel Bio-fertiliser Formulations :

- Better utilisation of applied nutrients
- Improves soil microbes
- Enhances nutrient cycling

Farm Gro:

- Stimulates better microbial formulation
- Improves nutrient retention and uptake
- Improves sink strength

Benefits to biodiversity and ecosystem services

Tata Chemicals Ltd is securing the scarce natural resources by providing products and services for sustainable farming practices. Availability of fertilizers specific to the cultivation of crops and soil helps in achieving desirable farm output. Services provided to farmers viz education and training about soil health and sustainable farming practices, has helped farmers enhance agricultural productivity while minimizing input costs on pesticides and fertilizers.

Business case for the company

Tata Chemicals Ltd is able to meet customer demand, reinforce consumer trust and enhance the brand reputation for providing biodiversity-friendly products. They are ensuring resilience of natural resources thereby minimising their impact on biodiversity and ecosystem services, thus strengthening sustainable business.

Linkages of initiatives with the National Biodiversity Targets

TARGET	COMPOSITE INDICATOR	DESCRIPTION OF INDICATOR
 Strategies for reducing rate of degradation, fragmentation and loss of all natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being.	Trends in maintenance of fertility in agricultural lands using natural means and methods	• Soil health records • Organic carbon and humus buildup • Trends in keeping the health of near pristine soils, being awarded titles under FRA in forest areas
 By 2020, measures are adopted for sustainable management of agriculture, forestry and fisheries.	Trends in sustainable agriculture	• Trends in production / usage of agro chemical fertilizers • Trends in soil quality and land use

TATA HOUSING: BIOPHILIC ARCHITECTURE

About the Company

TATA Housing Development Co. Ltd. established in 1984, is a closely held public limited company and a subsidiary of TATA Sons Limited. It has evolved into one of the fastest growing real estate development companies in India. With its primary business of developing properties in residential, commercial and retail sectors, the company's operations span across aspects such as land identification and acquisition, project planning, designing, marketing & sales, project execution, property services and estate management.

About the project

'Myst' is India's first residential project designed using biophilic architecture. It brings residents closer to the pristine nature of Kasauli hills, while presenting them with every luxury. Located on a high promontory, Myst blends contemporary design seamlessly with the unique ecology of the area.

Expansive mountain views, indigenous plants, clean air and cascading streams of water become a part of the luxurious living experience. It isn't just an architectural accomplishment but a unique way of living in harmony with nature that is both gratifying and sustainable. Never before has luxury been more sensitive in its approach and more evolved in the statement it makes about those who choose to live here.

Interdependencies between Project with biodiversity

Real estate development is globally facing the twenty-first century urban challenges — responsible use of energy resources, sustainable urban development within existing neighborhoods, comprehensive renovation and construction of new buildings, decreasing social exclusion, public transport development, and reduction of pollution — concerns that need to be integrated in real estate development projects. These processes have a huge impact on the real estate business, as sustainable urban development seems to be the backbone of the future of the real estate market. Thus, it is important to identify trends and predict directions towards this sustainable development.

The site is located in Kalth Ridge, near Kasauli, Himachal Pradesh. This area has a somewhat degraded Chir Pine forest at an altitude of around 1,600m above sea level. Development of a project such as 'Myst' on the foot hills of Himalayas, one of the most biodiverse areas, is likely to cause an imbalance in biodiversity and the surrounding ecosystem. Some of the factors that can disturb local biodiversity are cutting of trees, loss of ground vegetation, destabilisation of hill slopes and soil loss due to rain water. On another hand the success of the project depends on what the ecosystem provides – water, air purification and ambient temperature control.

Initiatives identified for minimizing impacts and dependencies

Tata Housing designed its project 'Myst' with an intent to achieve net ecological gain through habitat restoration, sustainable management of ecology and culture of the area. With this objective the Tata Housing undertook a detailed biodiversity assessment for the project and incorporated details in the biophilic approach.

Biophilic Approach to Master planning:

- Improving health and well-being in the built environment
- Conserving nature, water and other natural resources
- Using site assets such as natural site topography
- Using native and bird-attracting floral species
- Providing natural habitat for local birds
- Using bio-swales for reducing rainwater runoff

Benefits of addressing biodiversity concerns in decision-making and during implementation phase

The biophilic approach helped in addressing local biodiversity and ecosystem concerns right at the project planning stage and helped in achieving the objective of net ecological gain at the project site. The total site area is 11.6 acres, of which only 18.50% area is covered by buildings, road and other amenities, while remaining 82.50% is open area used for the enhancement of local biodiversity.

Chir Pine (*Pinus roxburghii*) is the dominant tree species in the project boundary interspersed with shrubs and open areas with grass. All houses and amenities are planned without disturbing the Chir Pine and other trees within the project boundary.

Local and native species are planted in order to provide natural habitat and important corridors or nectar groves for local fauna

Incorporation of the natural landscape features with drainage channels and bio-swales helped in controlling the extra water runoff from the project

Reduction of surface runoff by introduction of bio-swales and holding ponds

Plantation and terracing of slopes for slope stabilization and reduction of soil erosion

Bio-swales[1] and rain gardens (holding ponds) consist of native aquatic plants to control rain water run-off, remove impurities and reduce silt load.

Business case for the company

The residential development projects are leading causes of land-use change, with adverse implications on biodiversity, ecosystems and human well-being. But the Tata Housing Myst project by integrating biodiversity in design and planning will result in achievement of the net ecological gain objective of the company. The businesses for the company will be meeting customers' demands and enhanced brand reputation.

[1]Bio-swales are landscape elements designed to remove silt and pollution from surface runoff water. They consist of a swelled drainage course with gently sloped sides (less than 6%) and filled with vegetation, compost and/or riprap.

Linkages of initiatives with the National Biodiversity Targets

TARGET	COMPOSITE INDICATOR	DESCRIPTION OF INDICATOR
 By 2020, values of biodiversity are integrated in national and state planning processes, development programme sand poverty alleviation strategies.	Trends in incorporating natural resource/ biodiversity/ecosystem service values in national and state planning processes and development programmes Trends in policies considering biodiversity and ecosystem services in environmental impact assessment and strategic environmental assessment	Trends in biodiversity-inclusive climate change adaptation and mitigation measures formulated/implemented Trends in number of studies on biodiversity-inclusive environment impact assessment, cumulative environment impact assessment (CEIA) and strategic environment assessment (SEA)

TATA STEEL: REHABILITATION OF OVERBURDEN AND MINED OUT AREA

About the Company

Tata Steel Limited is among the top ten steel manufacturers in the world. It operates in more than 26 countries and has a commercial presence in over 50 countries. Responsible mining is the single most important reason for the growth and prosperity of the Company for over a century. Its mining operations are primarily focused on iron ore, chromite and coal. Iron-ore and coal being the two key raw materials for steel making, efficient and scientific mining operations give the Company a competitive edge in steel production.

Ever since the discovery of the mineral in 1903, Iron ore mining has become an integral part of steel making at Tata Steel. The iron ore mines are located in Noamundi and Katamati in Jharkhand, and Joda in Odisha.

Interdependencies with biodiversity

This case study is based on iron ore mining operations in Noamundi located in West Singhbhum District of Jharkhand. It is an opencast mine and like all mining operations there is a direct and indirect impact on the biodiversity and ecosystem. The primary effect of mining is land use change resulting in habitat degradation. Mine waste generation is another critical issue that requires additional land for dumping. The Noamundi mine is naturally endowed with a lower stripping ratio (overburden volume: ore in tonnage) and the overburden produced has been utilized in reclamation/restoration of the mine.

Ore beneficiation and dust suppression in mining areas require water. This water requirement is fulfilled by sourcing water from nearby rivers or ponds, which may lead to degradation of aquatic habitat and reduced water availability in downstream areas.

Initiatives to minimizing impacts and dependencies on biodiversity

Restoration of overburden dumps is one of the biggest tasks for the mining company and at the Noamundi mine site, the restoration is on 2 hills. It has been a very scientifically engineered process of afforestation and the plantation has been carried out with the involvement of local stakeholders. Till date, 126 ha have been covered under afforestation on Hill 1 & 2.

Process followed for overburden restoration

1. Removal of top soil from the identified dumping area
2. Scientific dumping of overburden in dumping area keeping a 25 degree slope
3. Selection of local and native tree species for plantation – 27 local species were selected for plantation in the overburden area
4. Strengthening of down slopes by using fast growing grass varieties like *Vetiveria zizanioides and Jama citronella*
5. After stabilisation of slopes, planationis undertaken using contour trenching method – The method of contour trenching is used for dump slopes where contour trenches are dug at 3m intervals along the contour. The excavated earth is stacked on the edge of the trench on the lower slope side to arrest the rain water flow that accumulates along the trenches. This gradually seeps through the strata, ensuring water and nutrients supply for healthy growth of the planted saplings.
6. Use of pitting and planting method for plantation on flat areas on overburden – Reclamation in the worked out mining benches is done by making 1.5 ft pits, six feet apart, and filling them with earth, sand and cow dung. Neem cake powder is applied to protect the saplings from white ants. No chemicals are used for pest control
7. Weeding is undertaken at regular interval to enhance plantation growth and to control growth of invasive species

19,13,366 saplings of 27 species have been planted to develop green belts in and around the mining lease area.

All these conscious steps and regular monitoring has resulted in creating the dense forest patch on Hill 1 & 2 with enriched local biodiversity and an improved ecosystem like fodder for cattle, medicinal plants, control of soil erosion and increased water holding capacity of the area.

Business case for the company

Meeting regulatory requirement: Restoration of mined-out area is a regulatory requirement. Adhering to the requirement with a positive biodiverse eco system is an achievement for the company. The restored mined out area is now providing habitat to local birds and animal species.

Livelihood to local stakeholders: Local stakeholders use these restored areas for extraction of traditional medicinal plants, thereby minimizing the stress on the natural forest areas.

Linkages of initiatives with the National Biodiversity Targets

TARGET	COMPOSITE INDICATOR	DESCRIPTION OF INDICATOR
 Strategies for reducing rate of degradation, fragmentation and loss of all natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being.	Trends in afforestation and restoration	Rehabilitation of mined out area

CII-ITC Centre of Excellence for Sustainable Development

CII-ITC Centre of Excellence for Sustainable Development is a not-for-profit, industry-led institution that helps business become sustainable organisations. It is on a mission to catalyse innovative ideas and solutions, in India, and globally, to enable business, and its stakeholders, in sustainable value creation. It's knowledge, action and recognition activities enable companies to be future ready, improve footprints profiles, and advocate policymakers and legislators to improve standards of sustainable business through domestic and global policy interventions. CESD leverages its role of all-inclusive ecosystem player, partnering industry, government, and civil society. It has been a pioneer of environment management systems, biodiversity mapping, sustainability reporting, integrated reporting, and social & natural capital valuation in India, thus upgrading business in India to sustainable competitiveness. With three locations in India, CESD operates across the country and has also been active in parts of South and South East Asia, Middle East, and Africa. It has held institutional partnerships and memberships of the United Nations Global Compact, Global Reporting Initiative, International Integrated Reporting Council, Carbon Disclosure Project, development agencies of Canada, the USA, the UK, and Germany.

german cooperation
DEUTSCHE ZUSAMMENARBEIT

giz

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- Environment
- Sustainable economic development
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