

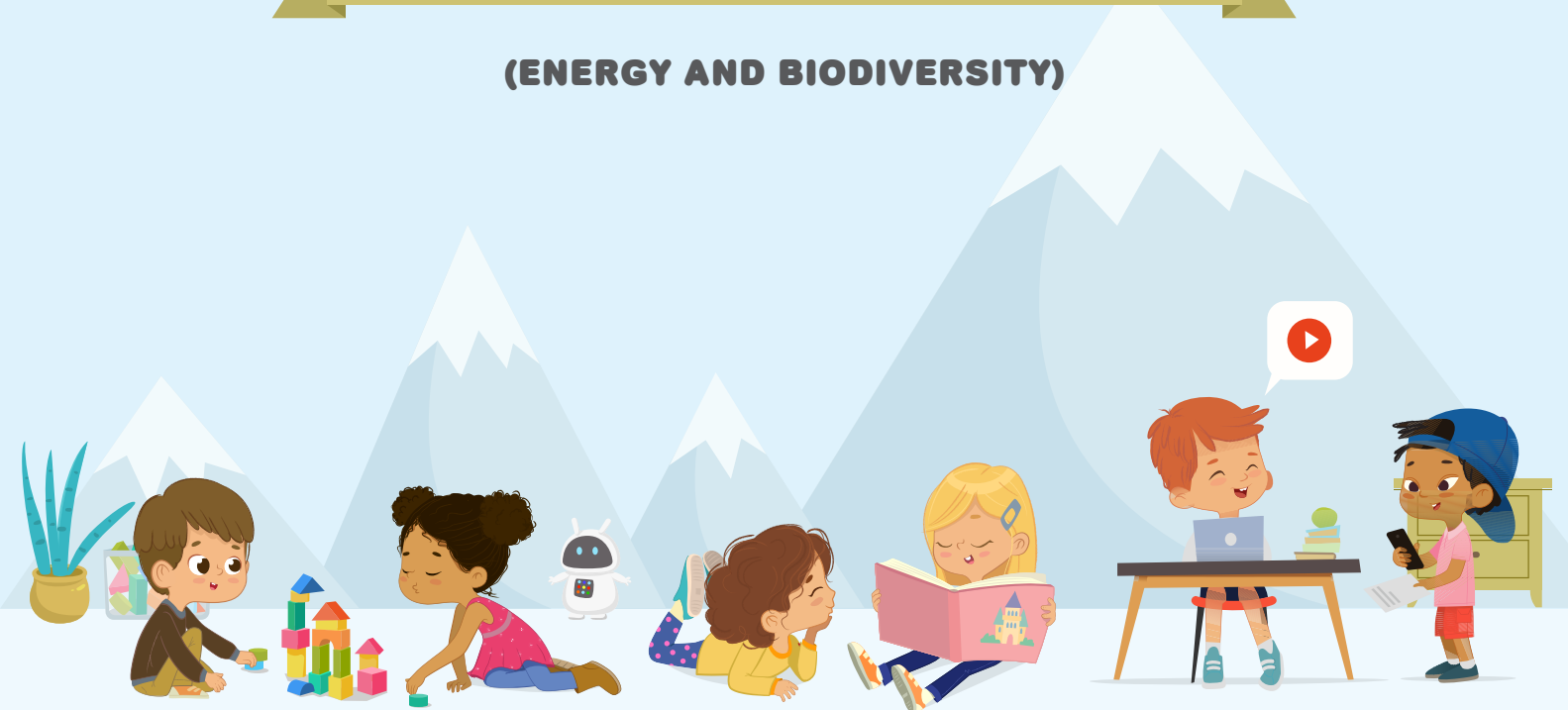


A Tata Steel Foundation-TERI Initiative

LEARNING MODULE FOR STUDENTS

Advancing a Step Towards Sustainable Behaviour

(ENERGY AND BIODIVERSITY)



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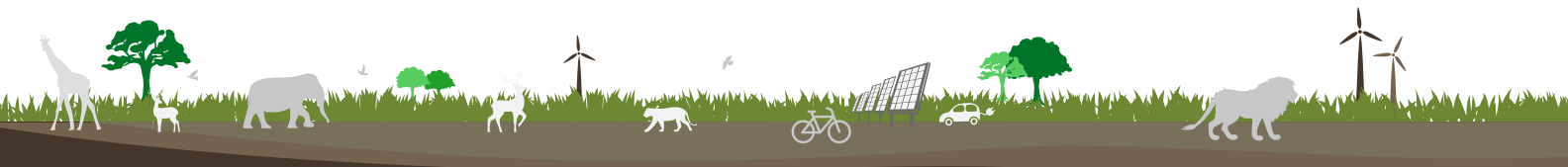
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ABOUT THE HANDBOOK

The global temperature has already risen 1.1°C above the pre-industrial level, with glaciers melting and the sea level rising.¹ The greenhouse gas emissions from human activities are driving climate change and continue to rise. They are now at their highest levels in history. Without action, the world's average surface temperature is projected to rise over the 21st century and is likely to surpass 3 degrees Celsius this century—with some areas of the world expected to warm even more.² However, we can only win this race if we take the initiative at the individual, institutional, and communal levels. One such initiative that enables students and teachers to engage in sustainable action by "doing their part" is through this handbook. This handbook will assist teachers and students in understanding the SDGs by concentrating on water conservation, waste management, forest & biodiversity conservation, and energy conservation. It will address these issues and provide the necessary information for discovering activity-based solutions. It acts as a manual for students, teachers, and schools that explains the idea of an Environment Impact Review (EIR) and walks them through the steps necessary to close any sustainability gaps in their current school system.

The most effective strategy for helping students learn and grasp non-trivial concepts more quickly is activity-based instruction, which is why it includes an explanation of the idea of a handbook that can be used at home or at school to close the sustainability gaps. The handbook will enrich readers with facts and activities that can be taken up at individual, household, and school levels. Additionally, it'll provide suggestions on how to fill in the gaps in current sustainability through various activities on the four themes. Students will be motivated to take up these activities at individual level in addition to the summer activities as shared on making the schoolbag sustainable. After this, EMC students along with other members of the school can plan a campaign either at school or community level to address the four themes.

1 <https://www.nature.com/articles/d41586-021-02179-1>

2 <https://www.niti.gov.in/goal-13-take-urgent-action-combat-climate-change-and-its-impacts>



Setting up EMC and its Role

The Environment Management Committee (EMC) is a group of like-minded informed students who have been green buddies and teachers coordinating different environment-related activities in the schools. The EMCs would carry out activities with their school, early school, local community institutions, gram panchayat, their community, etc. So, the experienced schools will help develop EMC in the early schools. This will help EMC aim towards establishing their schools as environmentally sustainable and develop a behavioural change among the school fraternity and community members through the initiation of guided actionable activities, to reduce environmental impacts as an individual, through the school community, and as citizens of the world. The primary purpose of creating the EMC is to develop an action team in the schools that would plan as well as carry out activities related to the environmental sustainability of the school. This will create a chain of knowledge as experienced school students and teachers will be able to expand their learnings to early schools and impart the knowledge gained over the years throughout the various activities from Phase I to Phase IV of the project. For an in-depth understanding of the process of formulating EMC and its role, refer to the 'Environment Management Committee Guidelines' a publication part of The Green School, A Tata Steel Foundation and TERI Initiative.

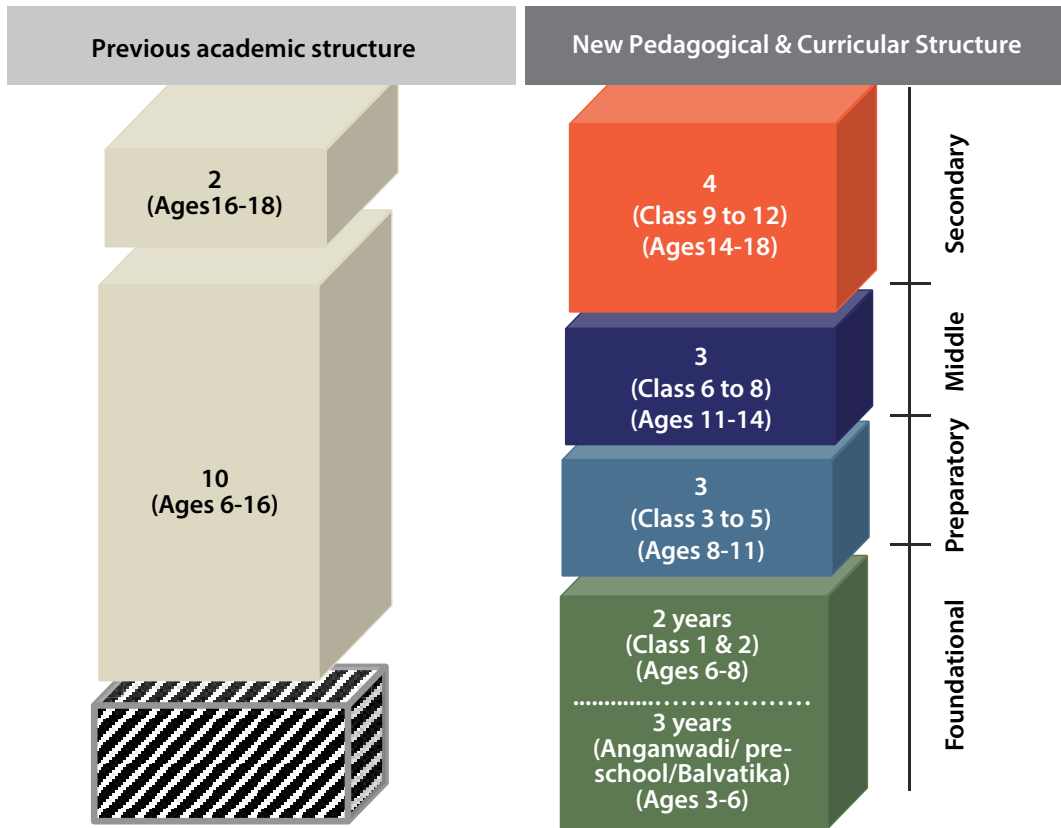
Themes

The Green School Initiative Phase VI is broadly categorized into two themes, i.e., Water & Waste in first half and Forest & Biodiversity and Energy in second half, for the experienced and early schools to share the understanding of the curriculum by looking into their studies and school calendar.

The handbook contains activities in three parts, aimed for preparatory, middle, and secondary school students.

All students are encouraged to contribute their initiatives or provide feedback. Your active participation is welcome and valued in shaping our collective efforts.

INDIA'S NATIONAL EDUCATION POLICY, THE 5+3+3+4 MODEL



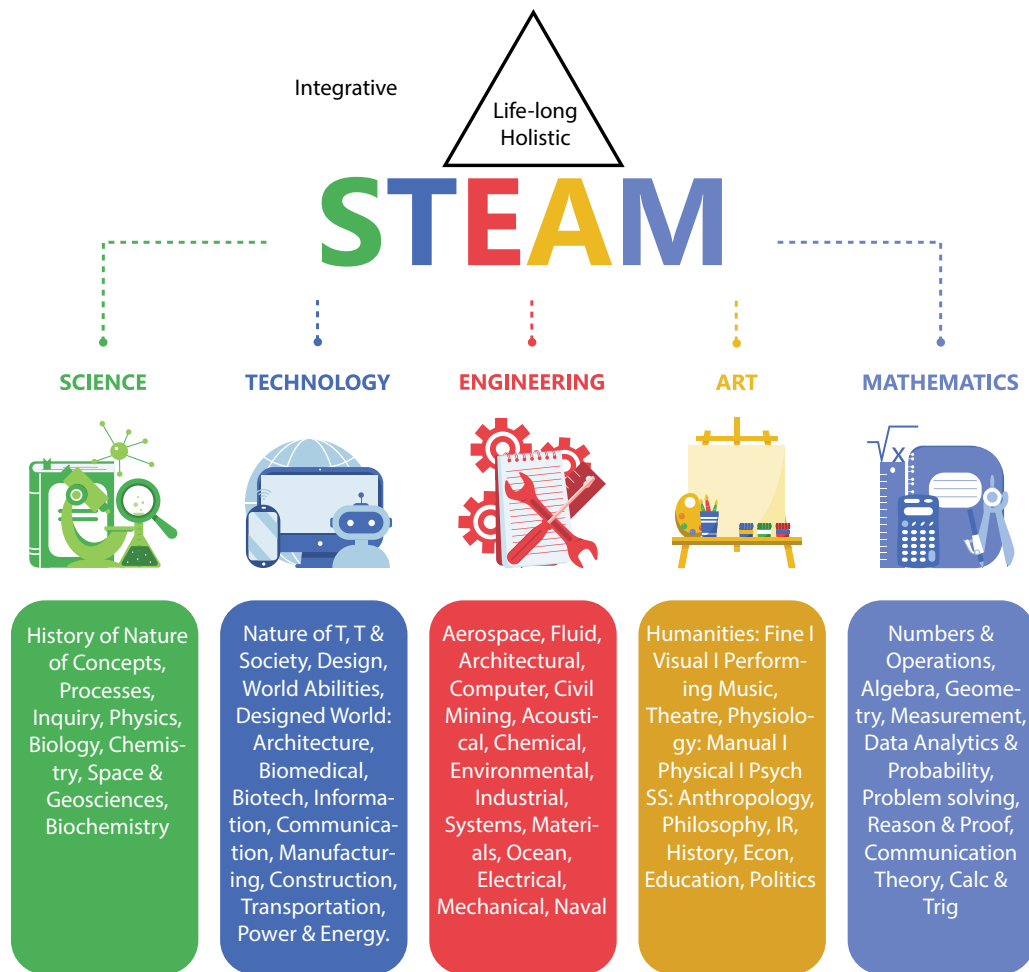
Source- Times of India, 2020.

India's National Education Policy's "5+3+3+4" model is a modern restructuring of the country's education system, emphasizing flexibility and holistic development. It divides the educational journey into four stages: Foundational (ages 3 to 8), Preparatory (ages 8 to 11), Middle (ages 11 to 14), and Secondary (ages 14 to 18). **The model promotes experiential learning, multi disciplinarity, and reducing rigid subject boundaries, allowing students to explore a broader range of subjects and develop essential skills.** It aims to prepare students for higher education, vocational training, or the job market while fostering creativity, critical thinking, and a strong foundation in fundamental knowledge and skills.

What is STEAM?

STEAM stands for Science, Technology, Engineering, Art, and Mathematics. It is an educational approach that integrates five disciplines into a cohesive learning framework. The goal of STEAM education is to encourage students to think critically, solve problems creatively, and apply their knowledge and skills in a multidisciplinary way.



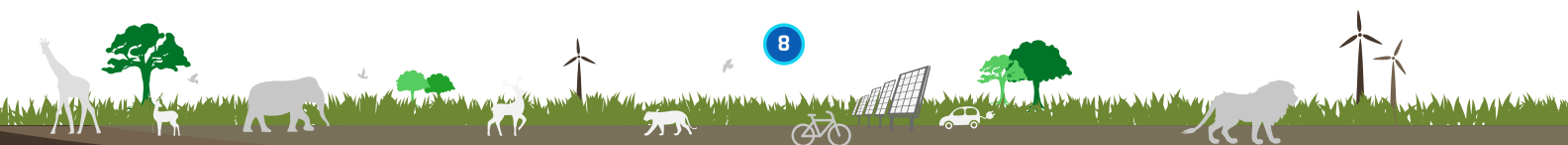


How can integrating STEAM to India's National Education Policy's 5+3+3+4 model be useful?

Integrating STEAM (Science, Technology, Engineering, Art, and Mathematics) into India's National Education Policy's 5+3+3+4 model can be useful for several reasons:

1. **Holistic Learning:** STEAM encourages a holistic approach to education by integrating multiple disciplines, promoting a well-rounded education that includes both scientific and artistic elements.
2. **Skill Development:** STEAM education equips students with a diverse set of skills, including critical thinking, problem-solving, creativity, and technical proficiency, which are highly valuable in today's rapidly evolving world.
3. **Innovation and Entrepreneurship:** STEAM fosters innovation and entrepreneurial thinking, aligning with the NEP's goal of nurturing a culture of creativity and problem-solving, which is essential for economic growth and development.
4. **Cross-Disciplinary Learning:** STEAM encourages cross-disciplinary learning, enabling students to see connections between subjects and apply knowledge in diverse contexts, which aligns with the NEP's aim of reducing rigid subject boundaries and promoting flexibility in education.

This handbook was specifically designed for the Preparatory, Middle, and Secondary school standard.



ENERGY INTERLINKAGE WITH CLIMATE CHANGE AND SDGs

Climate Change

Climate change refers to the long-term alteration of the Earth's global climate, primarily caused by human activities releasing greenhouse gases into the atmosphere, which trap heat and lead to a warming of the planet. The consequences include rising temperatures, extreme weather events, sea-level rise, and ecological disruptions, affecting various aspects of life, from agriculture and water resources to human health and ecosystems. Addressing climate change necessitates urgent and collaborative efforts to reduce greenhouse gas emissions, transition to clean energy sources, and enhance climate resilience, aiming to secure a sustainable future for the planet.

SDGs

The Sustainable Development Goals (SDGs) are a set of 17 global objectives established by the United Nations to address pressing global challenges and achieve a more sustainable and equitable world by 2030. These goals encompass various interconnected areas, including poverty eradication, quality education, gender equality, clean water and sanitation, affordable and clean energy, climate

SUSTAINABLE DEVELOPMENT GOALS



action, and more. The SDGs aim to integrate economic, social, and environmental dimensions of development, encouraging collective action among nations, businesses, and communities to tackle poverty, inequality, climate change, and other critical issues a thriving planet for present and future generations.

Climate change and SDGs are inherently interconnected and interdependent. Climate change poses one of the most significant challenges to achieving sustainable development worldwide. Addressing climate change is essential for achieving sustainable development because the impacts of climate change undermine progress towards all the SDGs. The SDGs provide a roadmap for integrating climate action into broader development efforts, fostering a holistic approach to solving the world's most pressing challenges.



Energy Interlinkage with Climate Change and SDGs

Energy production and consumption also significantly influence climate change and sustainable development. The burning of fossil fuels for energy generation is a primary driver of greenhouse gas emissions, exacerbating global warming and its associated consequences. Transitioning to clean and renewable energy sources, such as solar, wind, and hydroelectric power, is essential for reducing greenhouse gas emissions, mitigating climate change, and achieving SDG 7 (Affordable and Clean Energy). Sustainable energy practices contribute to other SDGs as well, such as SDG 12 (Responsible Consumption and Production) by promoting energy efficiency and SDG 9 (Industry, Innovation, and Infrastructure) by fostering innovation in clean energy technologies. Integrating biodiversity considerations in energy projects is crucial to avoid adverse impacts on natural habitats and species, promoting a holistic approach to sustainable development and climate action.



INTRODUCTION

Energy serves as the basis of human life and holds immense significance in our daily routines. It plays a pivotal role in various aspects of our lives, serving multiple purposes. The primary sources of energy for our daily needs include heat, transportation, and electricity. Energy is used for cooking on a large scale in the context of heat, spanning commercial, residential, and industrial contexts. Transportation is significantly reliant on energy, as vehicles such as automobiles and freezers are used. Furthermore, electricity, a versatile kind of energy, powers electrical devices, automobiles, and other machines.

Energy is the essence of modern societies, powering homes, industries, transportation, and technology. Majorly, all activity, whether carried out by machines, ourselves, involves either the transfer or transformation of energy from one state to another. Energy plays a pivotal role in driving economic growth, improving living standards, and enhancing human well-being. Technically, energy plays a significant role as infrastructure for economic development. Advancements in agriculture, industry, communication, transport and other sectors mandate the increased consumption of energy for developmental and economic activities but the source of energy is in the form of fossil fuels.

ENERGY SOURCES

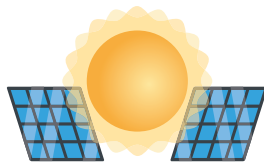
RENEWABLE ENERGY



Wind



Hydropower



Solar



Geothermal

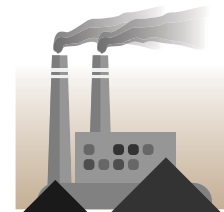


Biomass

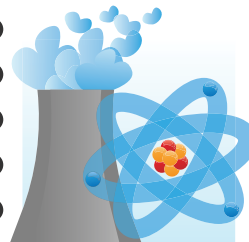
NON-RENEWABLE ENERGY



Oil



Coal



Nuclear



Natural Gas

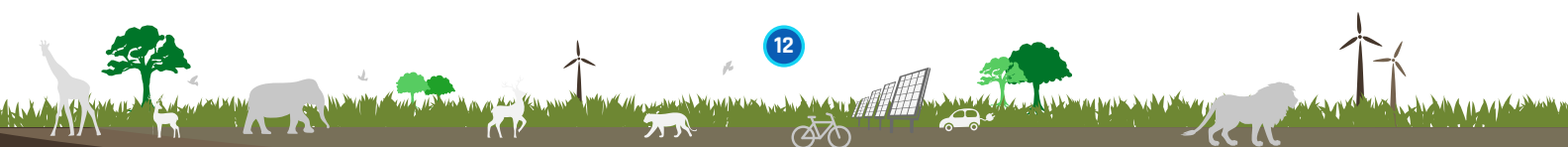
According to the first law of thermodynamics, which states that energy cannot be created or destroyed, energy consumption inevitably contributes to carbon emissions. These emissions contribute significantly to global warming and the detrimental effects of climate change. The increased frequency of natural disasters needs a systematic approach to energy consumption.

The extraction and combustion of fossil fuels lead to air and water pollution, affecting human health and ecosystems. Another major concern is burning fossil fuels, which releases greenhouse gases into the atmosphere, contributing to climate change and its associated impacts, such as rising global temperatures, extreme weather events, and sea-level rise.

However, excessive and unsustainable consumption of energy has significant environmental consequences. Energy management is crucial to transitioning to a more sustainable and low-carbon future. By embracing energy efficiency measures, promoting renewable energy sources such as solar, wind, and hydroelectric power, and adopting cleaner technologies, we can reduce greenhouse gas emissions, mitigate climate change, and alleviate the strain on natural resources. Globally, approximately 29% of electricity is derived from renewable sources. Renewable energy sources have the potential to supply 65% of the world's total electricity by 2030, resulting in more power. This shift has the potential to eliminate carbon dioxide emissions from 90% of the electricity sector by 2050, resulting in considerable carbon emissions reduction and contributing to climate change mitigation. Although fossil fuels continue to account for more than 80% of worldwide energy output, cleaner energy alternatives are gaining headway. (Renewable Energy - Powering a Safer Future | United Nations, n.d.)¹

The need to manage energy goes beyond environmental concerns; it also has economic and social implications. Energy costs represent a significant portion of household and industrial budgets, impacting affordability and competitiveness. By managing energy wisely and optimizing energy use, we can reduce energy bills, increase energy security, and enhance economic resilience. Moreover, energy management contributes to energy access and equity, ensuring that communities worldwide can access reliable and affordable energy services. By adopting sustainable energy practices, we can create a more inclusive society while preserving natural resources for future generations.

¹ <https://www.un.org/en/climatechange/raising-ambition/renewable-energy#:~:text=Cheap%20electricity%20from%20renewable%20sources,helping%20to%20mitigate%20climate%20change.>



ENERGY CONSERVATION

Energy management refers to the systematic and strategic process of optimizing energy use, enhancing energy efficiency, and reducing energy wastage across various sectors. It involves planning, implementing, and monitoring measures to ensure that energy is utilized efficiently and sustainably, with the aim of reducing energy consumption, lowering greenhouse gas emissions, and minimizing the environmental impact of energy production and consumption.

In India, energy management is of utmost

Secondly, India heavily depends on fossil fuels, such as coal, oil, and natural gas, for its energy needs, which contributes significantly to greenhouse gas emissions and air pollution. Transitioning to cleaner and more sustainable energy sources is crucial for mitigating climate change and improving air quality, protecting public health, and the environment. Additionally, managing energy effectively can lead to economic benefits by reducing energy costs and enhancing energy efficiency in industries, businesses, and households.

The need for energy management in India is evident for achieving various national and international goals. India is committed to the Paris Agreement and has set ambitious renewable energy targets to increase the share of renewable energy in its energy mix. Effective energy management is essential for meeting these targets and enhancing the deployment of renewable energy technologies. Furthermore, energy management can help India achieve the SDGs, particularly SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action). By promoting energy efficiency, adopting cleaner technologies, and integrating renewable energy sources, India can reduce its carbon footprint, contribute to climate change mitigation, and advance on its sustainable development journey. To address the need for energy management, India has implemented various policies and initiatives to promote energy efficiency,

DID YOU KNOW?

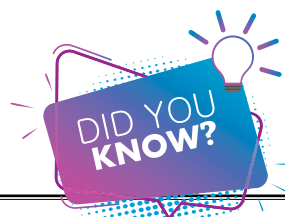
Odisha hosts the largest coal reserve for power grade coal—Talcher coalfields in the Angul district. The state plays a key role in meeting India's thermal power demand. It produces 23.7% of India's total coal annually and is an energy surplus state.

importance due to several factors. Firstly, India is one of the world's fastest-growing economies, and its energy demand is continuously increasing to support industrialization, urbanization, and improved living standards for its vast population. As a result, the country faces energy challenges related to energy security, affordability, and environmental sustainability.



renewable energy adoption, and sustainable practices across sectors. These include energy conservation programmes, energy labelling and certification standards, financial incentives for energy-efficient technologies, and capacity building initiatives.

The Ministry of Power and the Bureau of Energy Efficiency have been tasked with carrying out the NMEEE plans.²



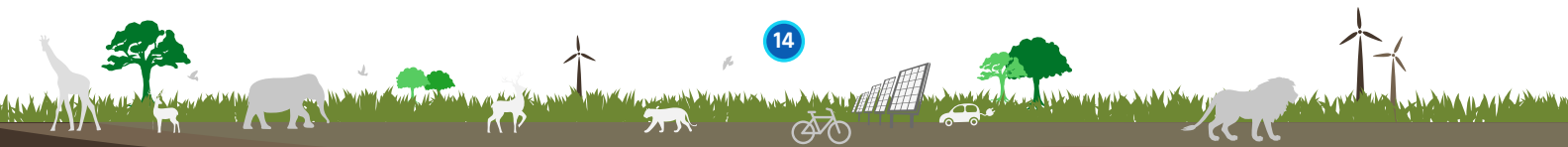
Jharkhand has abundant mineral resources, encompassing approximately 40% of the total mineral resources in India. The state leads the nation in coal reserves, holds the second position in iron reserves, and ranks third in copper ore reserves. (GOVERNMENT OF JHARKHAND, 2023)



In June 2008, the National Action Plan on Climate Change (NAPCC) was launched by the Prime Minister of India to address the harmful effects of Climate Change and sustain a high growth rate in order to raise the living standards. The NAPCC established eight national missions that outline extensive and long-term strategies for achieving critical goals in the field of climate change. The National Mission for Enhanced Energy Efficiency (NMEEE) is one of the eight missions established by the NAPCC.

The Bureau of Energy Efficiency (BEE) in 2006 initiated the **Standards & Labelling programme** for equipment and appliances to help consumers make informed choices regarding energy saving. The BEE conducted sector-specific studies to establish energy consumption norms and standards. These investigations found a wide range of Specific Energy Consumption (SEC) across diverse industrial sectors, showing a huge opportunity for energy reductions. The BEE did preparatory work to develop a transparent, adaptable, efficient, and robust system for the

² <https://static.pib.gov.in/WriteReadData/specificdocs/documents/2021/dec/doc202112101.pdf>



Perform, Achieve, and Trade (PAT) mechanism while setting targets for Designated Consumers. Furthermore, the BEE requested input from significant stakeholders such as Designated Consumers, Energy Auditors/Managers, Industry Associations, Academics, and others to ensure full consultation across the PAT Scheme's whole framework.³

In 2007, the Ministry of Power launched the Energy Conservation Building Codes (ECBC). Their codes set minimum energy requirements for new commercial buildings. The ECBC was once again updated in 2017—this time setting parameters for integrating renewable energy designs for builders, designers, and architects.



The Hon'ble Prime Minister Shri Narendra Modi has described the LED bulb as "Prakash Path" –"way to light". The Ujjwala scheme is part of his efforts to increase energy efficiency. To facilitate a higher acceptance of LEDs, it promotes efficiency at the residential level, enhances consumer's awareness and is attempting to aggregate demand to lower the initial high costs. The scheme is aimed to provide efficient usage of energy at residential sector.⁴

In 2013, Government of India launched National Electric Mobility Mission Plan (NEMMP) 2020. The objective was to enhance national fuel security by encouraging the adoption of hybrid and electric vehicles across the country. An ambitious target was set to attain annual sales of 6- 7 million hybrid and electric vehicles starting from 2020.⁵

By embracing energy management strategies, India can enhance its energy security, reduce its environmental impact, and build a sustainable and resilient energy future for the country.

³ <https://beeindia.gov.in/en/programmes/perform-achieve-and-trade-pat>

⁴ <https://eesindia.org/en/ourujala/>

⁵ <https://www.iea.org/policies/3151-national-electric-mobility-mission-plan-2020>



ACTIVITIES: ENERGY CONSERVATION

General Objectives

- » To help students **understand the significance** of energy conservation.
- » To promote the **utilization of renewable energy** and **efficient usage of energy**.
- » To adopt **sustainable lifestyle initiatives** at the household and school levels.

The following module comprises of 6 hands on energy for school children from primary school to senior secondary classes. It aims to provide a comprehensive educational experience. Its objectives include fostering an understanding of fundamentals of energy conservation

and preservation. The activities aim towards environmental importance, practical and age-appropriate learning through engaging activities and experiments. Through these activities, students instil a sense of responsibility towards environmental protection and conservation. Also, the activities will , encourage interdisciplinary learning, nurturing critical thinking, and problem-solving skills, inspiring environmental advocacy—all while making the learning process enjoyable and encouraging ongoing engagement with energy-related topics within the school, home, and community contexts.





PREPARATORY SCHOOL (CLASSES 3 TO 5) (AGES 8-11)

Activity 1: Thermostat and Light Switch Cards

Procedure and Message in Poem Form

Gather around for a new task
 What it could be, let's unmask
 Making Reminder plates is a task so new,
 With the right green energy-saving
 practices to pursue.
 Hang them high, by switches' side A visual
 nudge, a gentle guide
 A vision is shared through the nudge
 Adapt the right practices and be your own
 judge.

Procedure:

The following reminders can be written on the plates:

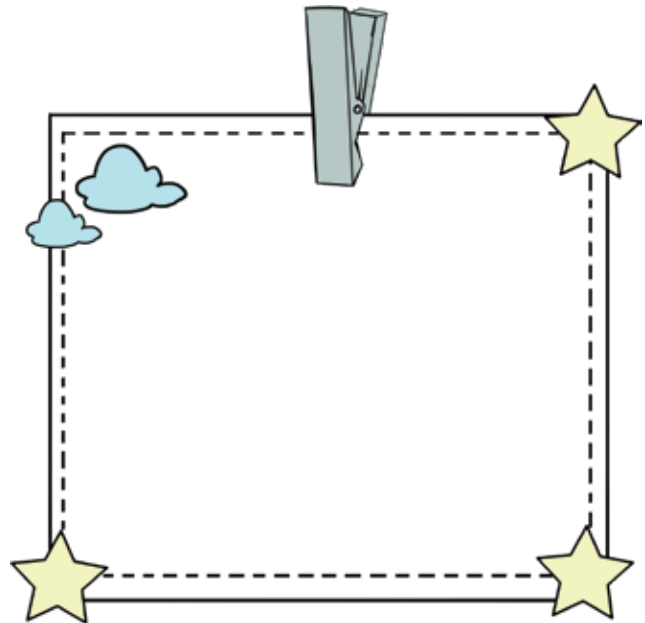
1. Remember to turn off the light switch when not in use.
2. Save energy by using natural daylight.
3. Hang your creative near the switch boards, ACs, thermostats, etc.
4. For example: Set the temperature for AC as the standard level like 24°C.

Activity description

Students will decorate and create beautiful reminder plates that they can hang near light switches and thermostats at their homes and classrooms.

Material required:

- Chart paper cut in rectangles for light switches and thermostats, colourful markers, waste card boards/old CDs/ Old carton box, painting colours



Share your Feedback:

Share your journey with us on social media and tag us to show the beautiful transformation of your initiative into lifestyle initiatives. Capture the moment of nurturing your activity and share it with us.





Post activity:

Research further and discuss some real-life applications of this phenomenon.

Activity 2: Sunlight and Three-Coloured Soil Surfaces

Activity description

By observing how three-coloured soil surfaces absorb sunlight differently, students can correlate the effects of solar energy on the planet.

Prior to the activity:

The sun is a source of energy for many natural cycles, but air, land, and water reflect and absorb energy differently. This affects weather patterns, ocean currents, winds, and temperatures. The amount of energy absorbed by the surfaces of the earth and the temperature of the surfaces of the earth are dependent upon their structure and composition: lighter surfaces such as deserts and clouds reflect more energy than darker surfaces such as oceans and forests.

Material required

A thermometer, three-coloured soils: sand, gravel, soil.

Procedure:

Step 1: By proxy, white sand represents the clouds and snow; black soil represents the lush lands; and grey gravel represents the ocean or dead grass.

Step 2: Place them in separate glass bowls.

Step 3: Insert a thermometer just below the surface of each.

Step 4: Leave the bowls out in the sunlight.

Step 5: Record the temperature of each.



Share your Feedback:

Spread the word on your social media platforms and showcase the magic of your incredible initiative! When your amazing project draws attention, share the colours, and seize the moment.

- Don't forget to tag us for the world to see! Your enthusiasm can inspire others, so let the world know about the brilliance you're creating!





MIDDLE SCHOOL (CLASSES 6 TO 8) (AGES 11-14)

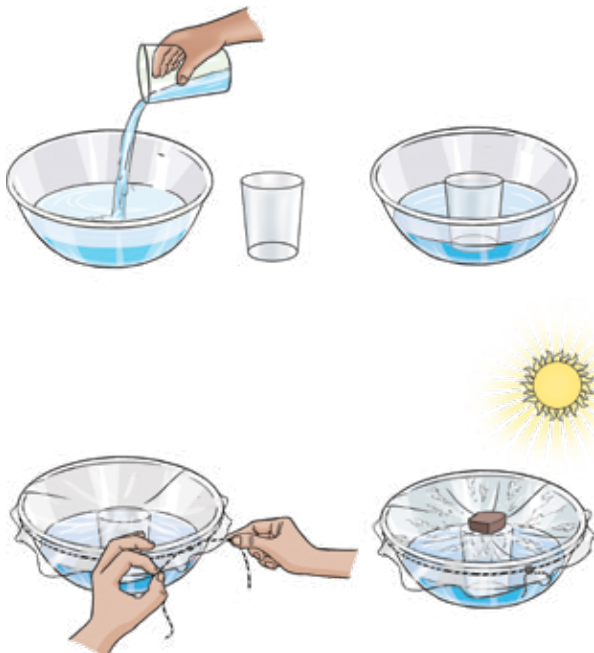
Activity 3: Extracting Clean Water with the Sun

Activity description:

The sun's energy plays an important part in purifying contaminated water. A solar still, or solar filtration system, is a device that uses the sun's energy that drives the water cycle—evaporation, condensation, precipitation—and extract clean water.

Material required:

1 small bowl (for clean water; to fit in larger bowl), 1 large bowl (for dirty water; must be large enough to hold smaller bowl), food colouring, water, plastic wrap, rubber band or tape, clean rocks.



Procedure:

Step 1: Fill the large bowl with water approximately an inch deep. Add a drop of food colouring to indicate it is dirty water. The food colouring will visually aid us in understanding the purification process.

Step 2: Place the smaller empty bowl in the middle of your larger bowl. You can use a heavy bound and put some rocks in it to prevent floating. Ensure that none of the food colouring water gets into the small bowl.

Step 3: Cover the large bowl with a plastic wrap. Secure it with a band or tape.

Step 4: Place a rock to create a dip in your plastic wrap right over the small bowl; this dip will cause the condensation that collects on the plastic wrap to roll down to the lowest point, i.e., the small bowl.

Step 5: Set the solar still outside at a very sunny spot. This will take a few days, observe your still and continue to check how much water collects on the small bowl.

Share your Feedback:

Don't forget to share on your social media handles and let others know about your sustainable initiatives. Also, do tag us!





Activity 4: Understanding Wind Turbines with Pinwheels

Activity description:

Pinwheels, held in front of steam of a boiling kettle moves. This model indicates how power stations convert kinetic energy to mechanical energy with the help of turbines.

Material required:

Paper, straw, pin or glue, ice-cream sticks, water & a kettle.



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Procedure:

Step 1: Cut a 6 by 6-inch square piece of paper.

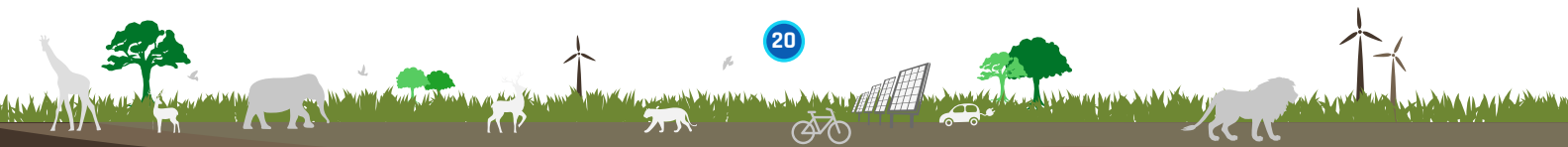
Step 2: With a ruler, trace a line, making a mark on each line $\frac{1}{3}$ away from the centre. Then, cut along those lines.

Step 3: Fold the edges towards the centre and stick them together with glue.

Step 4: Stick the ice-cream stick behind and on the centre.

Step 5: Heat water in a kettle, till you see the steam.

Step 6: Hold the pinwheel near the mouth of the kettle and observe as it moves. Conduct this part under supervision. Be careful to not burn yourself.





SECONDARY-SCHOOL (CLASSES 9 TO 12) (AGES 14–18)

Activity 5: Build a Mini-Solar Greenhouse

Activity description:

Many students have already engaged in several plantation activities. Now, they can construct their own mini-greenhouses and understand how such designs take advantage of heat and create controlled environments. Through this they can also continue to research and carry a discussion about the advantages and disadvantages of the greenhouse effect.

Material required:

Glass container or used plastic cups, soil and plant, thermometer, tape, wooden frame, watering can, decorative material (optional)

Procedure:

If growing seedlings, you can ensure young plants get off to a steady start. Inexpensive plastic cups can be easily placed upside-down, over seedlings and tiny plants. A biome is created and retained heat from the sun will ensure steady air temperature that allows roots and leaves to flourish.

Alternatively, place plants in a clear storage container.

Use a clear plastic grow bag to cover plants. You can also use a clear umbrella to shelter plants.

If you wish to get even more creative, you can even build using sustainable materials such as biodegradable plastics, an extensive greenhouse shed to cover all your plants.



Share your Feedback:

Spread the word on your social media platforms and showcase the magic of your incredible initiative!

When your amazing project draws attention, share the colours, and seize the moment—don't forget to tag us for the world to see! Your enthusiasm can inspire others, so let the world know about the brilliance you're creating!



Activity 6: Water Wheel with reusable spoons

Procedure and Message in Poem Form

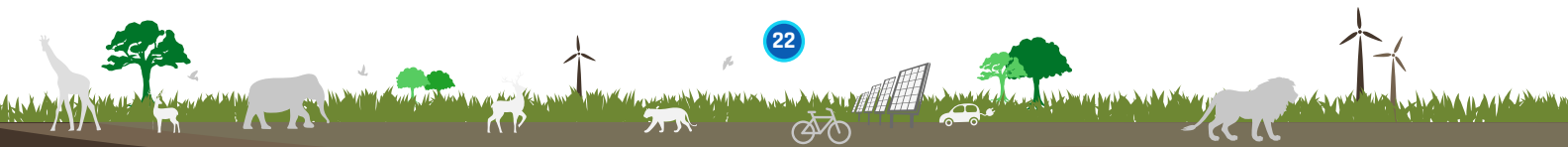
Gather 'round, kids, and let's do something new.
We're going to learn things that will stun you.
Grab some wood, gear, and a splash of stream,
Building a water wheel, as you daydream.
Water flows, Wheels turn,
Watch it spin and churn.
But this wheel's magic is not just for show.
It makes power, you've got to know!
Hydropower is what it is called,
You will make it, Let's applaud.

Activity description:

Having students build their own water wheel is a great way to teach them how hydropower is created.



Traditional water wheel



What is a Water Wheel?

A water wheel looks like a gear, it has a set of paddles that are mounted around a wheel. The wheel's rotating element transmits falling water to another machine, thereby converting energy of the falling water into power for work. Historically, they were used to grind grain, saw wood, and pump water.

Material required:

Reusable spoons and plate, cardboard (at least 2 inches (5.1 cm) thick), protractor, cutter, pen or pencils, hot glue, bucket.



Share your Feedback:

Don't forget to share on your social media handles and let others know about your sustainable initiatives. Also, do tag us! Let's together make a sustainable future with our small sustainable initiatives. Let's create a difference and celebrate our victory together.

Procedure:

Step 1: Cut 10 reusable spoons in equal halves, at an angle so that you can insert them at the edge of the cardboard at an equal length and evenly spaced. The spoons will serve as the paddles that turn the wheel when water passes over them.

Step 2: Use a protractor to draw a circle on the cardboard with a diameter that is equal to the length of a spoon. Use a cutter to cut the circle out of the cardboard.

Step 3: Insert the spoons into the cardboard. (Use hot glue if the spoons do not stick well). Make sure the spoons are all facing the same direction.

Step 4: Mark the centre of your cardboard as well as of two plates. Use glue to stick one plate to both sides of the cardboard. Your wheel is complete.

Step 5: Push a wooden skewer (which should be large enough to rest on a bucket) through the marked centre of your wheel. Balance it on the bucket.

Step 6: Where the frontside of the spoons are facing, slowly start to pour the water. This will result in the wheel to turn.

FOREST AND BIODIVERSITY

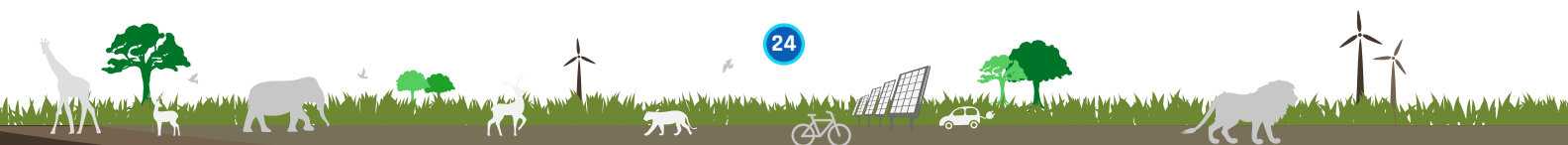
Introduction

The term 'biodiversity' refers to the wide variety of organisms in all environments, including terrestrial, marine, and other aquatic ecosystems, and the ecological complexes to which they belong. This includes the diversity and variability of life on Earth, including genetic diversity (within species), species diversity (between species), and ecosystem diversity (between ecosystems). It is essential for our survival and economic well-being, providing essential goods and services to human society and ensuring economic and social development.

Biodiversity is essential to our survival and economic well-being because it provides the basic goods and services that enable human society to exist while ensuring economic and social development. Biological resources are crucial for maintaining the basic processes of life, as they not only provide food, medicine and products for commercial and non-commercial use, but also provide various environmental services.

India is known for its rich heritage of biodiversity, having documented more than 101,167 species of animals and 47,485 species of plants, accounting for approximately 8% of the world's known flora and fauna (6.7% of the world's fauna and 11.2% of the world's flora). India ranks 8th in total biodiversity in the world due to its large land area covering multiple ecosystems and India is one of the 17 biodiverse mega-countries in the world. Therefore, to ensure the well-being of our planet and its inhabitants, it is important to understand and manage biodiversity, so that by protecting and conserving the diversity of life forms, we can maintain the balance of the ecosystem and secure our future for services.¹

¹ Details available at http://envis.nic.in/WriteReadData/userfiles/file/newsletters/3rdQtr21_22/1PSCST_Biodiversity%20Conservation-Newsletter.pdf



INTERLINKAGE OF FOREST AND BIODIVERSITY WITH CLIMATE CHANGE AND SDGS

Biodiversity holds immense importance not only for ecosystem functionality but also serves as a protective shield against natural disasters. Ecosystems offer a crucial regulatory service by helping to mitigate the impact of natural hazards, especially as climate change introduces greater unpredictability to weather patterns. Managing ecosystems to preserve biodiversity proves instrumental in reducing the severity of floods, landslides, forest fires, droughts, and storms. A case in point is the protective role of mangrove forests, which serve as breeding grounds for various species and contribute to local livelihoods while also mitigating the effects of natural disasters such as tsunamis. However, the rise in sea levels poses a threat to these coastal ecosystems.

Climate change, biodiversity loss, and pollution collectively constitute a planetary crisis that necessitates a unified approach for addressing the Sustainable Development Goals (SDGs) and fostering a sustainable future. The interconnectedness of forests, biodiversity, climate change, and SDGs is evident. Biodiversity plays a pivotal role in both mitigating and adapting to climate change. Robust ecosystems, teeming with biodiversity, function as carbon sinks by absorbing and storing substantial amounts of carbon dioxide, thereby regulating the Earth's climate. Safeguarding biodiversity and rehabilitating degraded ecosystems emerge as crucial strategies for countering climate change and enhancing resilience against its impacts. Diverse habitats not only act as a buffer against extreme weather events but also support essential ecosystem services vital for human well-being.

Furthermore, biodiversity conservation directly aligns with several SDGs, including SDG 13 (Climate Action), SDG 14 (Life below water), and SDG 15 (Life on Land). Recognizing and addressing the intricate connections between climate change, biodiversity, and the SDGs is imperative for fostering a more sustainable and resilient future.



The United Nations Sustainable Development Agenda has designated Goal 15 to concentrate on conserving life on land. The goal aims to protect and restore terrestrial ecosystems, manage forests sustainably, combat desertification, and halt and reverse land degradation to stop biodiversity loss. This goal strives to promote the sustainable use of ecosystems and preserve biodiversity, recognizing its crucial role in our survival.



FOREST AND BIODIVERSITY CONSERVATION

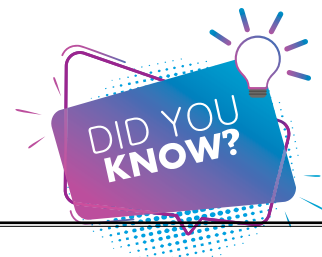
Biodiversity conservation involves the safeguarding, preservation, and sustainable management of the diverse life forms and ecosystems found on Earth. Its objective is to protect species, habitats, and genetic diversity to uphold the equilibrium of natural ecosystems and their functions. India, recognized as one of the most biodiverse nations globally, carries a distinctive responsibility for biodiversity conservation. Its expansive and varied landscapes encompass a diverse array of ecosystems, ranging from tropical rainforests and mangroves to high-altitude mountains and grasslands. India boasts a rich collection of flora and fauna, including numerous endemic and endangered species. Nevertheless, the escalating human population, rapid urbanization, industrialization, and unsustainable land use practices present significant threats to its biodiversity.

The imperative for biodiversity conservation in India is underscored by various factors such as the following:

- The preservation of biodiversity is vital for maintaining ecological balance and resilience. Many species fulfil specific roles in ecosystem functioning, and their loss can set off cascading effects on other species and ecological processes.
- Biodiversity conservation is intricately tied to the livelihoods and well-being of millions of people in India, particularly those in rural

communities reliant on natural resources for sustenance, water, and livelihoods.

- Biodiversity conservation aligns with India's commitment to international agreements and Sustainable Development Goals (SDGs). Through biodiversity conservation, India can contribute to global initiatives addressing climate change (SDG 13), advocating for sustainable land use (SDG 15), and safeguarding life on land and below water (SDG 14).



In the recent past, elephants from Dalma Wildlife Sanctuary began to move deeper into West Bengal. Now elephants have become almost resident and their increased presence in the landscape of South Bengal has caused serious problems like human-elephant conflict.²

² Details available at http://envis.nic.in/WriteReadData/userfiles/file/newsletters/3rdQtr21_22/1PSCST_Biodiversity%20Conservation-Newsletter.pdf

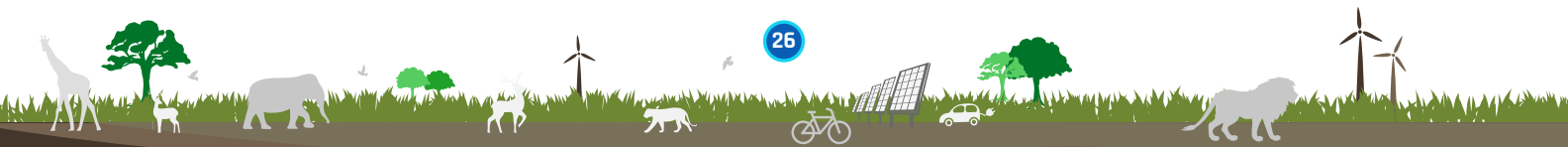




Figure 1: Elephants travel from Dalma to Bengal every year. In 2018-19 (till March 31, 2019), 452 people were killed across the country³ (Source- The Times of India, 2020).

Saranda Forest—The Hidden Gem in Jharkhand and Odisha



Source - Down to Earth, 2021.

Saranda forest is the most beautiful gift of nature to the people of Jharkhand and Odisha and the rest of Asia. Saranda is rich in flora and fauna, including several endemic and endangered species. The region is also known

for its elephant traffic, which provides habitat for the Central Indian elephant population that moves between Odisha, Jharkhand and Chhattisgarh, part of West Bengal. This forest is a support system for a large number of people, especially the Ho, Munda, Urao, Santhali and some primitive tribal communities. People depend on forests to collect forest products such as honey, mushrooms, mahua flowers and seeds, siali leaves, medicinal herbs, forest wood, firewood, sticks, straw, kusum and palas (for lac production), green manure, brush, tamarind and various fruits, etc.⁴

Odisha is like a special home for olive ridley turtles in India. Every year from November to December, these turtles visit the beaches there to make nests, and they stay until April and May. But, there's a big problem—people are causing trouble. Fishing too much, building on

³ Details available at <https://timesofindia.indiatimes.com/city/kolkata/dalma-elephant-corridor-green-brakes-on-rs-100cr-airport-project/articleshow/73399060.cms>

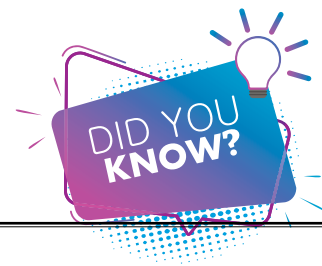
⁴ Details available at <https://forest.jharkhand.gov.in/en/saranda>





Figure 2: Gahirmatha in Kendrapara district, 150 km from the state capital Bhubaneswar, is the world's largest rookery for olive ridley sea turtles⁵ (Source- Hindustan Times, 2020).

the turtles' nesting spots, and lots of tourists are making things hard for them. Even though it's against the rules, people still hunt these turtles for their meat, shells, and leather. People also clandestinely sell turtle eggs, despite it being prohibited. It's a tough situation for these amazing turtles.



Animal pollination plays an important role to regulate ecosystem services in nature. Worldwide, almost 90% of wild flowering plant species are dependent, at least partly due to transfer of pollen by animals. Bees are integral to the biodiversity upon which we all rely for our survival. They offer a multitude of benefits beyond providing food, including contributions to medicine, biofuel production, and the creation of fibers used in construction materials. Moreover, bees play a role in the production of musical instruments, art, and crafts, while also providing entertainment. Their presence serves as a source of inspiration for various aspects of culture, including art, music, literature, religion, traditions, technology, and education.⁶

⁵ Details available at <https://www.hindustantimes.com/environment/olive-ridley-sea-turtles-sighted-off-adisha-coast-mark-commencement-of-annual-mass-nesting-101669018622517.html>

⁶ Details available at <https://www.hindustantimes.com/environment/olive-ridley-sea-turtles-sighted-off-adisha-coast-mark-commencement-of-annual-mass-nesting-101669018622517.html>



MAJOR CONSERVATION INITIATIVES FOR BIODIVERSITY IN INDIA



Figure 3. Painting showing the depictions of a live dodo by Ustad Mathur⁷

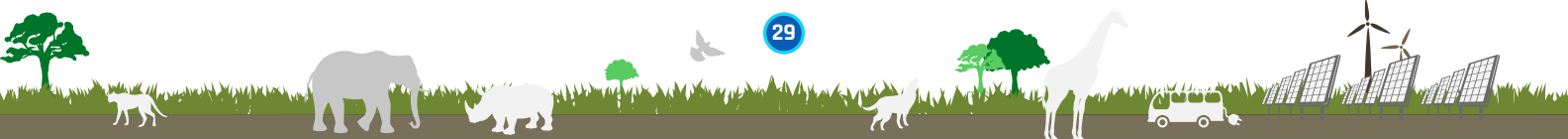
Wildlife management in India has a long history, with numerous initiatives focusing on nature conservation and the sustainable management of natural resources dating back millions of years to humanity's earliest interactions with the environment. This enduring practice stems from the diverse benefits provided by forests and other natural resources, which have supplied humans with medicinal plants, food, fuel, and fodder. Indian mythology is replete with references and examples illustrating the profound respect and affection for wild animals. From ancient times, there has been a commitment to safeguarding the flora and fauna, leading to the development of privileged protection ideals and sentiments enjoyed by the people.



Figure 4. The story of a talkative turtle capturing the essence of biodiversity. (Source - Katha Kids)⁸

⁷ <https://www.wikiart.org/en/ustad-mansur/untitled-dodo-1625>

⁸ <https://kathakids.com/folktales/panchatantra-stories/the-talkative-turtle/>



The endeavour to safeguard wild animals in India appears to have commenced as far back as the era of King Ashoka, who instituted laws for the protection of forests, birds, and animals. The earliest documented law in this regard traces back to the third century BC, when King Ashoka enacted legislation for wildlife and environmental protection. This law explicitly prohibited the killing of specific animal species, such as parrots, red geese, and rhinoceros. Emperor Ashoka, revered as India's greatest and most benevolent ruler, established an exemplary sanctuary for all living beings, encompassing both animals and birds.

"Dodo van Jahangir" was the story of Emperor Jahangir, who had a live dodo in his personal zoo. Dodo is believed to have been brought to Jahangir's court via Surat from Portuguese-ruled Goa. Ustad Mansur made a colourful painting of the dodo in the early 17th century. He was the first artist to paint both the Siberian crane and the dodo.⁹

In the present time, to address the challenges of biodiversity loss, India has implemented various conservation initiatives, including establishing protected areas, promoting community-based conservation projects, and enacting environmental laws and policies. India has an extensive system of protected areas (PA) encompassing at present 104 national parks and 567 sanctuaries.¹⁰



Figure 5: Stories like the Panchatantra and Buddha Jataka are reminiscent of stories told by parents or grandparents as bedtime stories to children and often contain elements of nature and animals, giving us a sense of biodiversity (Source- Buddha Weekly)¹¹

Project Tiger: Project Tiger, started in 1973 to conserve tiger populations and its natural habitat, has grown over the years to 27 tiger reserves in 14 states covering an area of 37,761 km². The second phase of Project Tiger expanded the programme to include establishment of tourism guidelines for tiger reserves, creation of nature interpretation programmes, integration of local population through eco-development programmes, and management of buffer zones

⁹ Details available at <https://www.cambridge.org/core/journals/journal-of-the-royal-asiatic-society/article/abs/jahangir-as-francis-bacons-ideal-of-the-king-as-an-observer-and-investigator-of-nature/7FD7EB9949303AF7CF37A913038F67E2>

¹⁰ Details available at https://wiienviis.nic.in/database/wls_8230.aspx

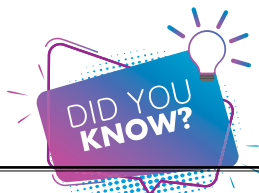
¹¹ https://buddhaweekly.com/the-jataka-tales-why-they-remain-relevant-for-adults-and-children-both-all-of-the-buddhist-teachings-contained-in-stories/buddha-weekly-buddha-feeds-himself-to-the-tiger-jataka-tales-buddhism/#google_vignette



Project Elephant: It is the major conservation initiative to protect Asian elephants, which was formally launched in 1992 based on the recommendations of a task force set up by the Ministry of Environment and Forests (MoEF) in 1990.

Ex-Situ Conservation: When endangered species are deemed too close to extinction that unless alternate control methods known as ex-situ conservation, i.e., outside its natural habitat are instituted, they will become extinct. Plants and animals are placed in artificial conditions under expertise attempting to multiply their species. India has successfully saved three species of crocodiles with ex-situ conservation.

Crocodile Conservation Initiative: On-site conservation of selected bird species and reptiles has been carried out through training programmes in captivity. The Government of India started a crocodile breeding and management project in 1976 to save three endangered crocodile species, the freshwater crocodile, the saltwater crocodile, and the gharial. Thousands of these three crocodile species have been bred in 16 centres and several have been released into the wild.¹²



The mangroves in the Brahmini-Baitarani delta, known as Bhitara Kanika, consist of 176 square kilometres, and was declared a refuge in May 1975 to increase the saltwater breeding crocodile population to several 100 adults and then keep them at that optimal level.

¹² Details available at <https://moef.gov.in/wp-content/uploads/wssd/doc2/ch10.pdf>



Figure 6: Eighteen months' old crocodile (1.1 m in total length) in the Bhitara Kanika Research and Conservation Centre, Dangmal, Odisha¹³

Beyond the Banks: India's Diverse Crocodilian Trio!



Mugger or marsh crocodile



Saltwater crocodile

¹³ Details available at <https://moef.gov.in/wp-content/uploads/wssd/doc2/ch10.pdf>



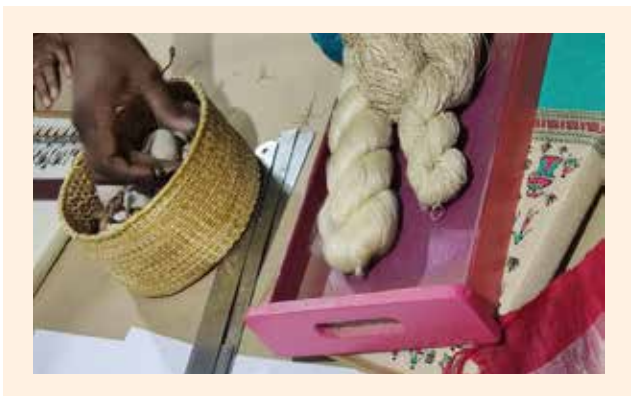


Gharial

Mugger or marsh crocodile: This species is known for its egg-laying behaviour and nesting in holes, characterized by a larger snout. Additionally, it is renowned for its dangerous nature.

Saltwater Crocodile: It is known as the largest Earth's living crocodile species found in Odisha Bhitarkanika National Park, the Sundarbans in West Bengal and the Andaman and Nicobar Islands.

Gharial: These are the crocodile with a long, thin snout which resembles a pot (Ghara). The population of gharial is a good indicator of clean river water and it is relatively harmless, fish-eating species. Once abundant in the rivers of northern India, the species was considered threatened due to habitat destruction, the deadly effects of nylon nets and poaching. The surviving populations were found to be very small.



The word 'Jharkhand' translates to 'forested land.' It derives from the Sanskrit term 'Jhari Khanda,' which historically referred to an area characterized by dense forest cover. Prospects for lac culture and tassar silks in Jharkhand are some of the living examples of livelihood-biodiversity linkages. Lac cultivation, promoted by the Lac Research Institute of India in Jharkhand, encouraged the conservation of species such as *Ziziphus zizyphus* (ber) and *Butea frondosa* (palash). Similar experiences have been encountered in promoting tassar cultivation on the host tree (*Terminalia arjuna*) in Jharkhand.



Figure 7: Navjeevan is a cooperative of women artisans from tribal families located in and around Kalinganagar, working towards creating sustainable livelihood opportunities

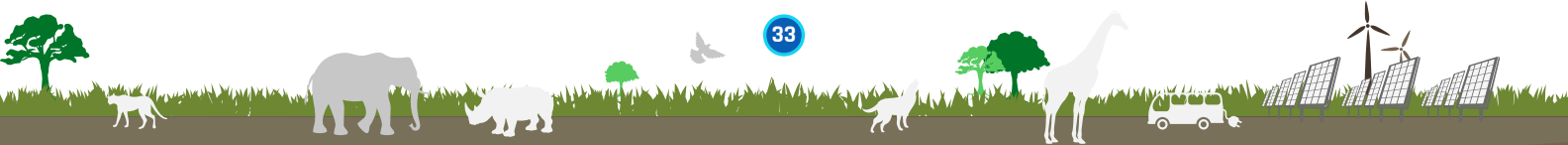
The name Nandankanan in mythology describes the ecstatic yet imaginary beauty of the heavenly garden. It also shows the truly beautiful places on earth where you can see panoramic views of nature and appreciate the allure of the external morphology of plants and animals.¹⁴ The birth of the white tiger from the ordinary coloured tigers has given Nandankanan in Bhubaneswar a special place in the world as one of the host zoos for white tigers.¹⁵



Figure 8: Picture from CCTV provided by Nandankanan Authority

¹⁴ Details available at <https://www.hindustantimes.com/india/four-cubs-born-to-white-tigress-at-nandankanan-zoo-one-of-them-is-black/story-oNi4H8q3xotHGUFySE6EnN.html>

¹⁵ Details available at <https://www.nandankanan.org/zoological-park.php>



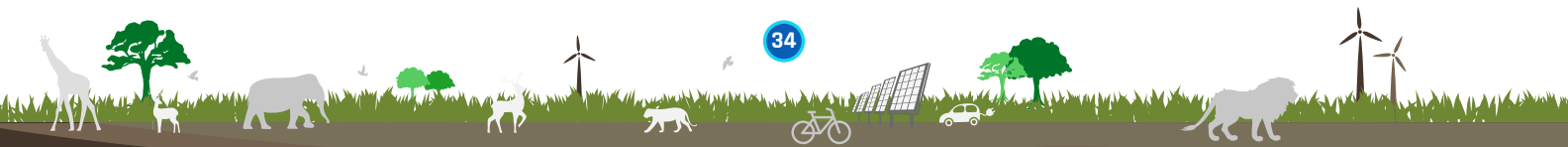
ACTIVITIES: FOREST & BIODIVERSITY CONSERVATION

General Objectives:

- To help students **understand the significance** of forest & biodiversity conservation.
- Preserve and protect diverse ecosystems within forests to maintain biodiversity at both local and global scales.
- To adopt **sustainable lifestyle initiatives** at the household and school levels.

The following module comprises of 6 hands on forest & biodiversity conservation for school children from primary school to senior secondary classes. It aims to provide a comprehensive educational experience. Its objectives include fostering an understanding of fundamentals

of biodiversity conservation and preservation properties. The activities aim towards environmental importance, practical and age-appropriate learning through engaging activities and experiments. Through these activities, students instil a sense of responsibility towards environmental protection and conservation. Also, the activities will encourage interdisciplinary learning, nurturing critical thinking, and problem-solving skills, inspiring environmental advocacy—all while making the learning process enjoyable and encouraging ongoing engagement with biodiversity-related topics within the school, home, and community contexts.





PREPARATORY SCHOOL [CLASSES 1 TO 5] [AGES 4-11]

Activity 1: Squirrels House

Procedure and Message in Poem Form

Let's lend a helping hand.
To squirrels across the land.
They need a home up in the tree.
A safe place for them to flee.
Grab some leaves and twigs around,
Build a nest above the ground.
Shelter from rain, a hideaway,
Where baby squirrels can safely stay.



Activity description

Creating squirrel house, or dreys, is important as they offer shelter from weather and predators, supporting their reproduction to help our furry friend. Additional dreys reduce competition and promote healthier populations, while enabling wildlife observation, learning, and education.

Material required

Natural materials such as leaves, twigs, small branches, moss, and bark; hollow wooden boxes; rope made from natural fibres or jute twines.

Procedure:

Step 1: Gather natural materials. These materials should be readily available in your surroundings. Avoid using any synthetic materials or chemicals as they may harm the squirrels and the environment.

Step 2: Build the house structure: Find a hollow wood box or build your own. Create a base using sturdy branches and twigs. This will provide a foundation for the house. Layer the base with leaves and moss to add insulation and comfort. Continue adding layers of twigs, branches, and leaves to form the walls of the nest. Create a spherical shape with an entrance on one side, leaving enough space for the squirrels to move in and out comfortably.

Step 3: Select an appropriate location: Choose a suitable location for the squirrel's house. Look for a sturdy tree with strong branches or a wooden structure that can support the weight of the house. Ensure the location is away from human disturbances and predators. The squirrel house should be placed at least 30 feet above the ground in a tree at least 10 inches in diameter. The entrance hole should face either east or south, away from prevailing winter winds.



Step 4: Secure the house: Make sure the house is securely attached to the chosen location. If you're building it on a tree, use natural fibres or jute twine to tie the house to the branches. Ensure that the house is stable and won't easily dislodge during strong winds or harsh weather conditions and nearby to any source of water (either natural or created).

Share your Feedback:

Don't forget to share with us on social media if your squirrel house attracts any furry visitors! Capture the moment and share the joy of hosting squirrels in your own crafted squirrel house.



Activity 2: Seed Ball Making

Activity description:

Seed ball making is a simple and fun activity. It involves using soil and compost to create a ball by inserting a seed. It is an effective and time-saving activity that helps to promote biodiversity and its conservation.



Material required:

Clay and soil/compost, water, a large bowl, native plant seeds, trays, containers, and newspapers.

Procedure:

Step 1: Start your activity by mixing your clay and soil/compost in a large bowl. The amount of clay should be more than compost/soil in the ratio of 2:5.

Step 2: Add a small amount of water to the mixture and create a dough-like consistency similar to flour, ensuring it is neither too wet nor too dry.

Step 3: After creating dough-like consistency, start inserting your seeds into the mixture and give them a ball-like shape.



Step 4: Place the seed balls on a piece of paper, cloth, or on the floor to allow them to dry. It may take more than 1 day to get completely hardened.

Step 5: Toss the seed ball into empty or neglected lots but ideal for providing germinating conditions to a plant. Best thrown just before a rainy spell to ensure germination.

Share your Feedback:

Share your journey with us on social media and tag us to show the beautiful transformation of your seed ball into a living plant. Go and admire the area where you have tossed your seed ball.



Activity 3: Know Your Nature

Activity description:

Students will explore the natural world and make observations about organisms, their interactions, and their environment. This activity will help to get students engaged in hands-on discovery and observation of nature while reinforcing concepts such as adaptation, habitat, and food chains. The small group structure and worksheet help focus their exploration. Let me know if you would like me to clarify or expand on any part of the activity!

Material required:

A4 sheets, pen, pencil, colour, etc.

Procedure:

1. Break students into small groups of 3-4. Provide each group with a plain worksheet with a heading 'Know Your Nature'
2. Take students outdoors to a nature area on school grounds, a park, garden, or natural area.
3. Give groups 15-20 minutes to explore the area and complete their worksheet by finding examples of:
 - Types of plants (tree, shrub, flower, fern, etc.)
 - Evidence of animal life (tracks, scat, nests, holes, etc.)
 - Natural objects (rock, seed, leaf, feather, etc.)
 - Water source (stream, pond, puddle)
 - Food chain (who eats whom)
 - Organism adaptation (physical features suited to environment)
 - Organism habitat (where it lives)

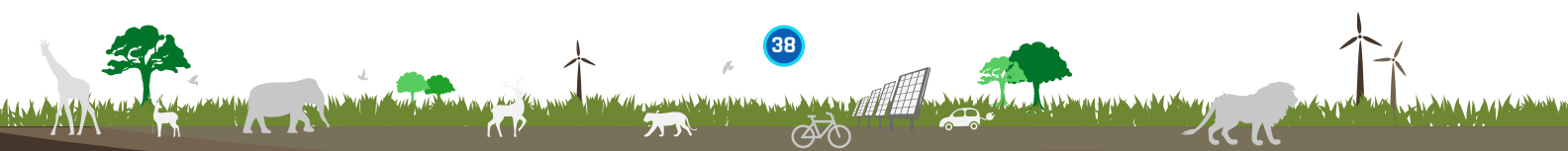


Note: The duration of the observation should be on weekly or monthly basis so that you can witness the wonderful changes in the nature. For example, how long it takes for a butterfly to complete one life cycle can vary from just over 30 days to over 200 days for the Monarch! Or the composting process can take from two months to two years, depending on the type of material, the soil conditions, earthworms or a plastic that can take anywhere from 20-500 years to decompose, depending on the material's structure and environmental factors such as sunlight exposure.

4. Have groups draw quick sketches of their discoveries on the worksheet. Remind them not to remove anything from the natural area.
5. Bring groups back together to share and discuss their findings. Talk about how organisms depend on their environment and each other.

Share your Feedback:

Share your journey with us on social media and tag us to show the beautiful discovery you have noticed in the nature and your artistic talent of how you have painted what you have witnessed.





MIDDLE SCHOOL [CLASSES 6 TO 8] [AGES 11-14]

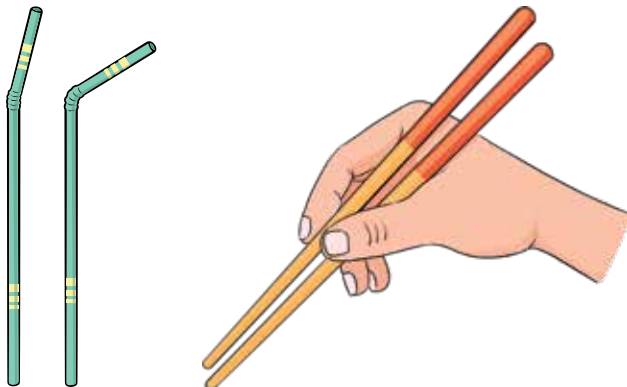
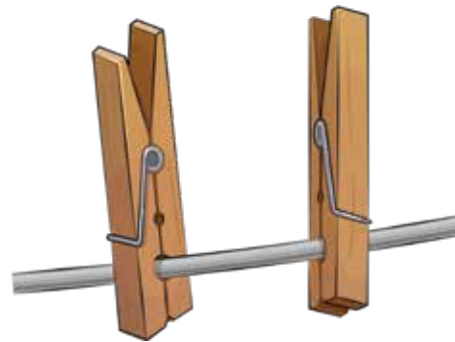
Activity 4: Beak Explorer

Activity Description:

In this activity, students will embark on a journey to discover the diverse ways birds use their beaks to feed. Through a series of interactive challenges, they'll explore the correlation between bird beak shapes and their feeding habits.

Materials Required:

- Tweezers
- Clothespins
- Chopsticks
- Straws
- Small seeds (sunflower, millet)
- Small insect-shaped objects
- Fish-shaped objects
- Coloured water (for nectar simulation)
- Cups and flowers (optional)



Procedure:

- 1. Introduction:** Provide a brief overview of bird beaks and their adaptations. Explain that players will engage in various activities to understand how different beaks are suited to specific foods.
- 2. Activity Stations:**
 - a. Seed Scoop:** Use tweezers (representing a bird's beak) to pick up different types of seeds (e.g., sunflower seeds, millet). Discuss how this relates to birds such as finches with small, pointed beaks.



- b. **Insect Catch:** Students simulate catching "insects" (small objects) with a clothespin (mimicking a bird's beak). Discuss how this mirrors the beaks of birds such as sparrows or warblers.
- c. **Fish Grab:** Use chopsticks (symbolizing a bird's beak) to catch fish-shaped objects. Relate this to birds such as herons or kingfishers with long, pointed beaks for fishing.
- d. **Nectar Sip:** Using a straw, players mimic sipping nectar (coloured water) from flowers (cups). Connect this to hummingbirds and their long, slender beaks.

3. Discussion: After each activity, facilitate a brief discussion on how the tools used in the game relate to the actual beaks of birds. Highlight the diversity of beak shapes and their adaptation to specific food sources.

Share your Feedback:

Share your observations and insights. Emphasize the connection between the tools used in the game and the real-world adaptations of bird beaks. Promote this hands-on approach for a deeper understanding of the ecological adaptation different bird species occupy based on their beak morphology.



SECONDARY SCHOOL [CLASSES 9 TO 12] [AGES 14 TO 18]



Activity 5: School Biodiversity Register

Students will create a biodiversity register for their school by surveying and documenting the different plant and animal species found on the school grounds and surrounding area. This will involve fieldwork such as taking photographs, making drawings, collecting samples, and recording observations. The students will use biodiversity mapping resources as a reference to help identify and classify the species. The biodiversity register will be an ongoing project, with students adding new species as they

are discovered. Creating the register will allow students to apply their knowledge of biodiversity and gain hands-on experience with species identification and scientific documentation. Maintaining the register over time will enable the students and school to monitor changes in the local ecosystem. Overall, this project provides an engaging way for students to explore biodiversity and contribute to a lasting school resource.

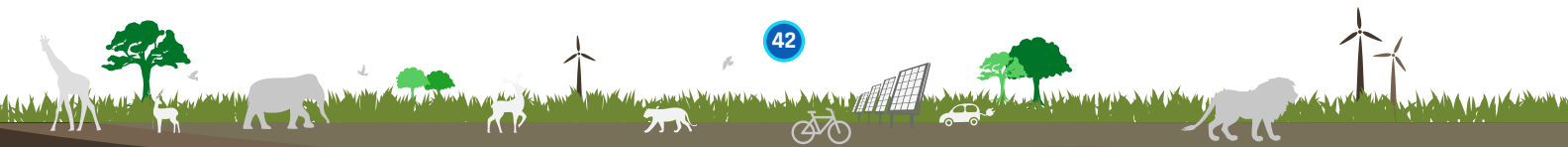
Fill the below checklist as per the given details:

Biodiversity Mapping Checklist

SCHOOL PROFILE	
Name of the School	
Type of School	
Total Boys	
Total Girls	
Name of Nodal Teacher	
Group's Name	
Name of Resource Persons from Local Community	
COMMUNITY PROFILE	
Name (Resource person on locally available trees and medicinal plants)	
Address	
Phone number	
Name (Resource person on locally available fruits, vegetables and crops)	
Address	
Phone number	



Name (Resource person on locally available flower and orchid plants)	
Address	
Phone number	
Name (Resource person on locally available domestic animals and birds)	
Address	
Phone number	
Name (Resource person on locally available wild animals and bird of prey)	
Address	
Phone number	
Name (Resource person on locally available aquatic animals and plants)	
Address	
Phone number	



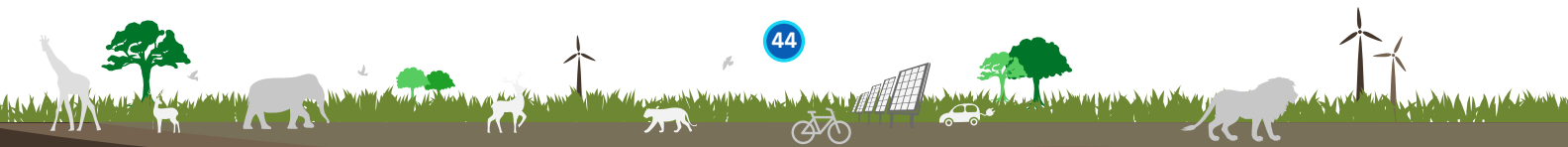
FLORA										
S. No	Panchayat/Village/ Hamlet Name	Plant Type (Tree/ Herb/Shrub)	Local Name	Scientific Name	Variety/ Habitat	Local Status - high / low	Month of Flowering	Month of Fruiting	Uses (if any)	Associated Traditional Knowledge (If any)
1										
2										
3										
4										

FAUNA											
S. No	Panchayat/ Village / Hamlet Name	Local Name	Scientific Name	Type of Animals (Mammals / Birds / Fish / Insect etc.)	Location/ Habitat	Remarks (Rare / Common etc.)	Local Status - high / low	Month of Flowering	Month of Fruiting	Uses (if any)	Associated Traditional Knowledge (If any)
1											
2											
3											
4											



MEDICINAL												
S. no	Panchayat/Village / Hamlet Name	Plant Type	Local Name	Scientific Name	Variety / Habitat	Location / Habitat	Local Status - high / low	Uses (usage)	Part used	Associated TK	Other details market/own use	Community/ Know. Holders
1												
2												
3												
4												

FOOD CROP													
S. no	Panchayat/ Village / Hamlet Name	Crop Name	Scientific Name	Local Name	Variety	Location / Habitat	Local Status - high / low	Cropping season	Uses	Associated TK (If any)	Other details	Source of Seeds/Plants	Community/ Knowledge Holder



Quantitative Evaluation

Note: The checklist questions are just for reference, and the school/students can customize them as per their need.

Consultation with School Staff

1. How would you spread the importance of biodiversity conservation in schools and community? Have you taken any initiatives? If yes, please specify.

Note: The questions are just for reference, and the school/students can customize as per their need.

Structure of Analysis Report

Develop the report as per the suggested below format. Make the report brief and pictorial by attaching as many pictures as possible to support the contents.

Section 1: Background and Introduction (in brief)

Section 2: Biodiversity mapping (mapping the collected data; both quantitative and qualitative in the form of the map)

Section 3: Add most enjoyable moments while performing the biodiversity mapping such as the most soothing bird's voice, the tastier fruit, beautiful flower, and many others.



Activity 6: Balance of Nature

Activity description:

This educational activity teaches students about local biodiversity in their local areas and how human activities impact ecosystems in their region. Students will create ecosystems found in their locality and maintain balance as development pressures increase.

Procedure:

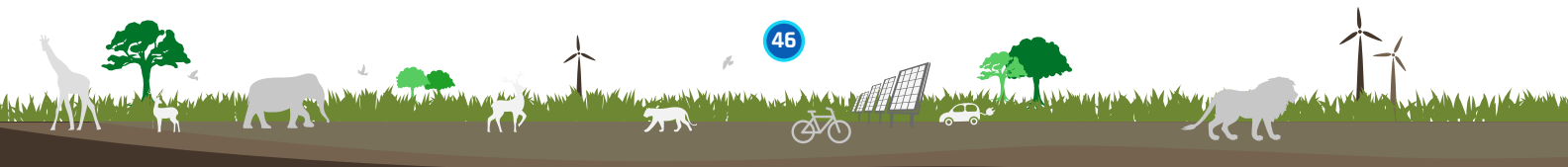
- Students start by creating an ecosystem with a certain number of tokens representing plants, animals, and resources like water and food. The ecosystem begins balanced.
- Students take turns drawing cards representing human activities like pollution, deforestation, hunting/fishing, agriculture, etc. Each activity card has instructions that force students to remove tokens from their ecosystem.
- After each turn, students must ensure their ecosystem meets biodiversity thresholds (minimum numbers for each type of organism). If biodiversity drops too low, they lose points or the ecosystem collapses.
- Students can take "conservation action" cards to counteract human impacts and restore biodiversity tokens. The goal is to maintain balance despite increasing human pressures.
- The game ends after a certain number of turns or when ecosystems collapse. The student with the most balanced, biodiverse ecosystem wins.
- Students start by constructing an ecosystem found in their state like a forest, grassland,



wetland, etc. Tokens represent local plants, animals, and resources.

For example:

- Biodiversity tokens are specific to the state. For Jharkhand this may include Asiatic elephants, leopards, sloth bears, Indian wolves, sal trees, bamboo, etc. For Odisha this may include olive ridley turtles, estuarine crocodiles, black buck, Chilika Lake fish, mangroves, etc.
- Human impact cards focus on local issues such as mining, dams, agriculture, urban growth, tourism, overhunting, overfishing, etc. Their ecosystem impacts are tailored to the state.
- Conservation action cards provide localized solutions like protecting elephant corridors, mangrove restoration, promoting ecotourism, sustainable farming, renewable energy, etc.
- The game map depicts areas of each state to highlight regional biodiversity. Custom cards provide facts about local species and ecosystems.
- Game rounds represent seasons (monsoon, summer, winter). Ecosystem dynamics change throughout the year.
- Winners are students who maintain balanced, biodiverse ecosystems native to their state despite increasing human pressures.




ABOUT THE GREEN SCHOOL

The Green School initiative launched in April 2017 by Tata Steel Foundation and TERI, aims to create awareness about environment conservation in the school network through curriculum linkages, action projects, and capacity-building activities on four broad environmental themes; Energy, Water, Forest & Biodiversity, and Waste, interlinking it with climate change and Sustainable Development Goals (SDGs).

THE GREEN SCHOOL PHASE VI

Phase VI aims to educate and empower young minds (age 12-14 years) on water, energy, forest & biodiversity, and waste management (interlinking with climate change) to undertake awareness and action projects at school/community levels to develop solutions to create a sustainable environment. The students will be motivated to volunteer to take up students' social responsibility (Green Champions) by engaging with early schools in the nearby vicinity and schools that were not able to be part of the project due to the pandemic to mobilize their peers by building their capacities and engaging them in replicating the learnings of the project.

A stylized illustration of a mountain range with four peaks of varying heights and shades of blue and white, set against a light blue background.

The Green School Team

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