

## IPSI Case Study Summary Sheet

### Basic Information

Title of case study <i>(should be concise and within approximately 25 words)</i>			
<b>Biodiversity Monitoring Indicators in Protected Areas</b> <i>A Study from Ratapani Wildlife Sanctuary, Madhya Pradesh, India</i>			
Submitting IPSI member organization(s)			
Integrated Development Organisation, Bhopal, Madhya Pradesh, India			
Other contributing organization(s) <i>(IPSI members and/or non-members)</i>			
Symbiosis International (Deemed University), Pune			
Author(s) and affiliation(s)			
<p><b>Ajoy Kumar Bhattacharya</b>, Ph D, IFS (R)  <a href="https://orcid.org/0009-0000-1231-7484">https://orcid.org/0009-0000-1231-7484</a>            Chairman, Integrated Development Organization,            Former MD &amp; Country Head, Green Highways Mission, Ministry of Road Transport &amp; Highways, India            Former Founder CEO, Madhya Pradesh Ecotourism Development Board, Bhopal, India</p> <p><b>Ravi Sharma</b>, Ph.D.            Symbiosis Institute of International Business,            Symbiosis International (Deemed University), Pune            Email Id: ravi.sharma@siib.ac.in            Orcid Id: 0000-0003-0819-4340</p>			
Format of case study <i>(manuscript or audiovisual)</i>	Manuscript	Language	English
Keywords <i>(3-5 key concepts included in the case study)</i>			
Biodiversity indicators; Indicators for management; Managed forests; Biodiversity Functions; Forest Conservation			
Date of submission <i>(or update, if this is an update of an existing case study)</i>	03-01-24		
Web link <i>(of the case study or lead organization if available for more information)</i>	idoglobal.org		

### Geographical Information

Country <i>(where site(s) or activities described in the case study are located – can be multiple, or even “global”)</i>									
India (State - Madhya Pradesh)									
Location(s) <i>(within the country or countries – leave blank if specific location(s) cannot be identified)</i>									
Madhya Pradesh									
Longitude/latitude or Google Maps link <i>(if location is identified)</i>									
Latitude. 22.9155° or 22° 54' 56" north. Longitude. 77.7034° or 77° 42' 12" east									
Ecosystem(s) <i>(please place an “x” in all appropriate boxes)</i>									
Forest	X	Grassland		Agricultural		In-land water		Coastal	
Dryland		Mountain		Urban/peri-urban		Other (Please specify)			
Socioeconomic and environmental characteristics of the area <i>(within 50 words)</i>									
The Delawari forest range is a part of the Ratapani Wildlife Sanctuary in the Raisen District of Madhya Pradesh, India. With its rich biodiversity and scenic landscape, the Delawari forest range plays a vital role in conserving wildlife and ecological processes in the region. The Sanctuary has teak forests (55% of the area), seasonal streams, and diverse wildlife like tigers and leopards. Conservation efforts focus on protecting habitat, curbing biotic pressure threats, and balancing local needs.									

Description of human-nature interactions in the area ( <i>land-use, traditional resource management practices etc. – within 50 words</i> )
Delawari Range of Ratapani Wildlife Sanctuary portrays the existing scenario of the pressures on biodiversity, such as tourism, forest fires, and infrastructure development. Identified pressures, including tourism, forest fires, infrastructure development, and noise generation, are crucial management considerations.

## Contents

Status ( <i>“ongoing” or “completed”</i> )	Completed	Period ( <i>MM/YY to MM/YY</i> )	2014
Rationale ( <i>why activities or policies described, or information shared in the case study are needed – within 50 words</i> )			
<b>Challenge:</b> The challenge facing conservation managers lies in determining which aspects of biodiversity to assess, how to measure them accurately, and how to interpret complex ecological data to effectively inform policy and management decisions.			
Objectives ( <i>goals of activities or policies described, or of producing the case study – within 50 words</i> )			
The study addresses the imperative of identifying indicators for assessing biodiversity in the context of managing forests sustainably.			
Activities and/or practices employed ( <i>within 50 words</i> )			
The study adopted a blended approach using structural indicators (physiognomy and associated indicators) and compositional indicators (indicator species, etc). Such combinations are deemed appropriate for presenting the current scenario of the region and, therefore, necessary for managing forests. From the outcomes, key biodiversity surrogates were identified and further used to assess the ecological functions of those surrogates (via panel discussion and expert opinion). In addition, the field-based indicators were identified using field surveys, sampling techniques, and biotic survey forms (visual assessment forms)—these aid in assessing the condition of biodiversity. The group discussion approach with the experts/ stakeholders and field data collection for noise level determination were deployed to identify significant components and the existing status of the condition of biodiversity and understand the impacts.			
Monitoring methodology ( <i>e.g. GIS-based monitoring, citizen science, Resilience Indicators in SEPLS, survey - within 40 words</i> )			
A formalized monitoring system based on identified and updated indicators is essential to inform management decisions effectively and support adaptive management by enabling complex biodiversity information to stakeholders, requiring indicators developed in response to identified needs with a risk assessment approach.			
Results ( <i>within 50 words</i> )			
Despite external pressures and disturbances, such as tourism and recreational activities, the Forest Range maintains its natural supporting attributes and connectivity with local resources and stakeholders. Identified pressures on the Range, including tourism, forest fires, infrastructure development, and noise generation, pose significant threats to biodiversity and ecosystem functioning that must be managed. Identified Pressures and Concerns form key Management Considerations.			
Lessons learned ( <i>factors in success or failure, challenges and opportunities – within 40 words</i> )			
Interpreting Biodiversity Indicators and Management Practices			
Funding ( <i>any relevant information about funding of activities or projects described in the case study</i> )			
NA			

## Contributions to Global Agendas

CBD Kunming-Montreal Global Biodiversity Framework (<https://www.cbd.int/gbf/targets/>)

Please place an "x" under a number to rate how much this case study contributes to each CBD Target.

Note 1: The number scale goes from 1, the lowest rating, to 5, the highest rating. N/A indicates "not applicable".

Note 2: Please only mark those to which the case study has or will actually contribute, not those to which it could potentially contribute in the future.

Target	Description	Contribution						
		1	2	3	4	5	N/A	
1. Reducing threats to biodiversity	1	Ensure that all areas are under participatory, integrated and biodiversity inclusive spatial planning and/or effective management processes addressing land- and sea-use change, to bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030, while respecting the rights of indigenous peoples and local communities.	X					
	2	Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and marine and coastal ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity.						X
	3	Ensure and enable that by 2030 at least 30 per cent of terrestrial and inland water areas, and of marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of indigenous peoples and local communities, including over their traditional territories.			X			
	4	Ensure urgent management actions to halt human induced extinction of known threatened species and for the recovery and conservation of species, in particular threatened species, to significantly reduce extinction risk, as well as to maintain and restore the genetic diversity within and between populations of native, wild and domesticated species to maintain their adaptive potential, including through in situ and ex situ conservation and sustainable management practices, and effectively manage human-wildlife interactions to minimize human-wildlife conflict for coexistence.			X			
	5	Ensure that the use, harvesting and trade of wild species is sustainable, safe and legal, preventing overexploitation, minimizing impacts on non-target species and ecosystems, and reducing the risk of pathogen spillover, applying the ecosystem approach, while respecting and protecting customary sustainable use by indigenous peoples and local communities.	X					
	6	Eliminate, minimize, reduce and or mitigate the impacts of invasive alien species on biodiversity and ecosystem services by identifying and managing pathways of the introduction of alien species, preventing the introduction and establishment of priority invasive alien species, reducing the rates of introduction and establishment of other known or potential invasive alien species by at least 50 per cent by 2030,						X

		and eradicating or controlling invasive alien species, especially in priority sites, such as islands.							
	7	Reduce pollution risks and the negative impact of pollution from all sources by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services, considering cumulative effects, including: (a) by reducing excess nutrients lost to the environment by at least half, including through more efficient nutrient cycling and use; (b) by reducing the overall risk from pesticides and highly hazardous chemicals by at least 8half, including through integrated pest management, based on science, taking into account food security and livelihoods; and (c) by preventing, reducing, and working towards eliminating plastic pollution.							<b>X</b>
	8	Minimize the impact of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction actions, including through nature-based solution and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity.							<b>X</b>
<i>2. Meeting people's needs through sustainable use and benefit-sharing</i>	9	Ensure that the management and use of wild species are sustainable, thereby providing social, economic and environmental benefits for people, especially those in vulnerable situations and those most dependent on biodiversity, including through sustainable biodiversity-based activities, products and services that enhance biodiversity, and protecting and encouraging customary sustainable use by indigenous peoples and local communities.	<b>X</b>						
	10	Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through a substantial increase of the application of biodiversity friendly practices, such as sustainable intensification, agroecological and other innovative approaches, contributing to the resilience and long-term efficiency and productivity of these production systems, and to food security, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services.		<b>X</b>					
	11	Restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, such as the regulation of air, water and climate, soil health, pollination and reduction of disease risk, as well as protection from natural hazards and disasters, through nature-based solutions and/or ecosystem-based approaches for the benefit of all people and nature.							<b>X</b>
	12	Significantly increase the area and quality, and connectivity of, access to, and benefits from green and blue spaces in urban and densely populated areas sustainably, by mainstreaming the conservation and sustainable use of biodiversity, and ensure biodiversity-inclusive urban planning, enhancing native biodiversity, ecological connectivity and integrity, and improving human health and well-being and connection to nature, and contributing to inclusive and sustainable urbanization and to the provision of ecosystem functions and services.							<b>X</b>
	13	Take effective legal, policy, administrative and capacity-building measures at all levels, as appropriate, to ensure the fair and equitable sharing of benefits that arise from the utilization of genetic resources and from digital sequence information on genetic resources, as well as traditional knowledge associated with genetic							<b>X</b>

		resources, and facilitating appropriate access to genetic resources, and by 2030, facilitating a significant increase of the benefits shared, in accordance with applicable international access and benefit-sharing instruments.						
3. Tools and solutions for implementation and mainstreaming	14	Ensure the full integration of biodiversity and its multiple values into policies, regulations, planning and development processes, poverty eradication strategies, strategic environmental assessments, environmental impact assessments and, as appropriate, national accounting, within and across all levels of government and across all sectors, in particular those with significant impacts on biodiversity, progressively aligning all relevant public and private activities, and fiscal and financial flows with the goals and targets of this framework.	X					
	15	Take legal, administrative or policy measures to encourage and enable business, and in particular to ensure that large and transnational companies and financial institutions: (a) Regularly monitor, assess, and transparently disclose their risks, dependencies and impacts on biodiversity, including with requirements for all large as well as transnational companies and financial institutions along their operations, supply and value chains, and portfolios; (b) Provide information needed to consumers to promote sustainable consumption patterns; (c) Report on compliance with access and benefit-sharing regulations and measures, as applicable;  in order to progressively reduce negative impacts on biodiversity, increase positive impacts, reduce biodiversity-related risks to business and financial institutions, and promote actions to ensure sustainable patterns of production.						X
	16	Ensure that people are encouraged and enabled to make sustainable consumption choices, including by establishing supportive policy, legislative or regulatory frameworks, improving education and access to relevant and accurate information and alternatives, and by 2030, reduce the global footprint of consumption in an equitable manner, including through halving global food waste, significantly reducing overconsumption and substantially reducing waste generation, in order for all people to live well in harmony with Mother Earth.						X
	17	Establish, strengthen capacity for, and implement in all countries, biosafety measures as set out in Article 8(g) of the Convention on Biological Diversity and measures for the handling of biotechnology and distribution of its benefits as set out in Article 19 of the Convention.						X
	18	Identify by 2025, and eliminate, phase out or reform incentives, including subsidies, harmful for biodiversity, in a proportionate, just, fair, effective and equitable way, while substantially and progressively reducing them by at least \$500 billion per year by 2030, starting with the most harmful incentives, and scale up positive incentives for the conservation and sustainable use of biodiversity.						
	19	Substantially and progressively increase the level of financial resources from all sources, in an effective, timely and easily accessible manner, including domestic, international, public and private resources, in accordance with Article 20 of the Convention, to implement national biodiversity strategies and action plans, mobilizing at least \$200 billion per year by 2030, including by:						X

	<p>(a) Increasing total biodiversity related international financial resources from developed countries, including official development assistance, and from countries that voluntarily assume obligations of developed country Parties, to developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition, to at least \$20 billion per year by 2025, and to at least \$30 billion per year by 2030;</p> <p>(b) Significantly increasing domestic resource mobilization, facilitated by the preparation and implementation of national biodiversity finance plans or similar instruments according to national needs, priorities and circumstances;</p> <p>(c) Leveraging private finance, promoting blended finance, implementing strategies for raising new and additional resources, and encouraging the private sector to invest in biodiversity, including through impact funds and other instruments;</p> <p>(d) Stimulating innovative schemes such as payment for ecosystem services, green bonds, biodiversity offsets and credits, and benefit-sharing mechanisms, with environmental and social safeguards;</p> <p>(e) Optimizing co-benefits and synergies of finance targeting the biodiversity and climate crises;</p> <p>(f) Enhancing the role of collective actions, including by indigenous peoples and local communities, Mother Earth centric actions[1] and non-market-based approaches including community based natural resource management and civil society cooperation and solidarity aimed at the conservation of biodiversity;</p> <p>(g) Enhancing the effectiveness, efficiency and transparency of resource provision and use;</p>						
20	<p>Strengthen capacity-building and development, access to and transfer of technology, and promote development of and access to innovation and technical and scientific cooperation, including through South - South, North-South and triangular cooperation, to meet the needs for effective implementation, particularly in developing countries, fostering joint technology development and joint scientific research programmes for the conservation and sustainable use of biodiversity and strengthening scientific research and monitoring capacities, commensurate with the ambition of the goals and targets of the Framework.</p>						<b>X</b>
21	<p>Ensure that the best available data, information and knowledge are accessible to decision makers, practitioners and the public to guide effective and equitable governance, integrated and participatory management of biodiversity, and to strengthen communication, awareness-raising, education, monitoring, research and knowledge management and, also in this context, traditional knowledge, innovations, practices and technologies of indigenous peoples and local communities should only be accessed with their free, prior and informed consent,[2] in accordance with national legislation.</p>	<b>X</b>					




	22	Ensure the full, equitable, inclusive, effective and gender-responsive representation and participation in decision-making, and access to justice and information related to biodiversity by indigenous peoples and local communities, respecting their cultures and their rights over lands, territories, resources, and traditional knowledge, as well as by women and girls, children and youth, and persons with disabilities and ensure the full protection of environmental human rights defenders.						<b>X</b>
	23	Ensure gender equality in the implementation of the Framework through a gender-responsive approach, where all women and girls have equal opportunity and capacity to contribute to the three objectives of the Convention, including by recognizing their equal rights and access to land and natural resources and their full, equitable, meaningful and informed participation and leadership at all levels of action, engagement, policy and decision-making related to biodiversity.						<b>X</b>

UN Sustainable Development Goals (SDGs) (<https://sustainabledevelopment.un.org/sdgs>)

Please place an "x" in the "direct" or "indirect" boxes next to any of the UN Sustainable Development Goals to which the work described in this case study contributes as appropriate. Note: please mark only those that the case actually has made or is making a contribution, not those to which it could make a potential contribution in the future.

SDG	Description	Direct	Indirect
 1 NO POVERTY	End poverty in all its forms everywhere		
 2 ZERO HUNGER	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture		
 3 GOOD HEALTH AND WELL-BEING	Ensure healthy lives and promote wellbeing for all at all ages		
 4 QUALITY EDUCATION	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all		
 5 GENDER EQUALITY	Achieve gender equality and empower all women and girls		
 6 CLEAN WATER AND SANITATION	Ensure availability and sustainable management of water and sanitation for all		X
 7 AFFORDABLE AND CLEAN ENERGY	Ensure access to affordable, reliable, sustainable and modern energy for all		
 8 DECENT WORK AND ECONOMIC GROWTH	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all		X
 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	Build resilient infrastructure, promote inclusive and sustainable industrialisation, and foster innovation		
 10 REDUCED INEQUALITIES	Reduce inequality within and among countries		
 11 SUSTAINABLE CITIES AND COMMUNITIES	Make cities and human settlements inclusive, safe, resilient and sustainable		X
 12 RESPONSIBLE CONSUMPTION AND PRODUCTION	Ensure sustainable consumption and production patterns		X
 13 CLIMATE ACTION	Take urgent action to combat climate change and its impacts		X
 14 LIFE BELOW WATER	Conserve and sustainably use the oceans, seas and marine resources for sustainable development		



 <p>15 LIFE ON LAND</p>	<p>Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss</p>	<p><b>X</b></p>	
 <p>16 PEACE, JUSTICE AND STRONG INSTITUTIONS</p>	<p>Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</p>		
 <p>17 PARTNERSHIPS FOR THE GOALS</p>	<p>Strengthen the means of implementation and revitalise the global partnership for sustainable development</p>		<p><b>X</b></p>