Emerging Tech and Biodiversity Management: Navigating the New Frontiers of Bio-diplomacy

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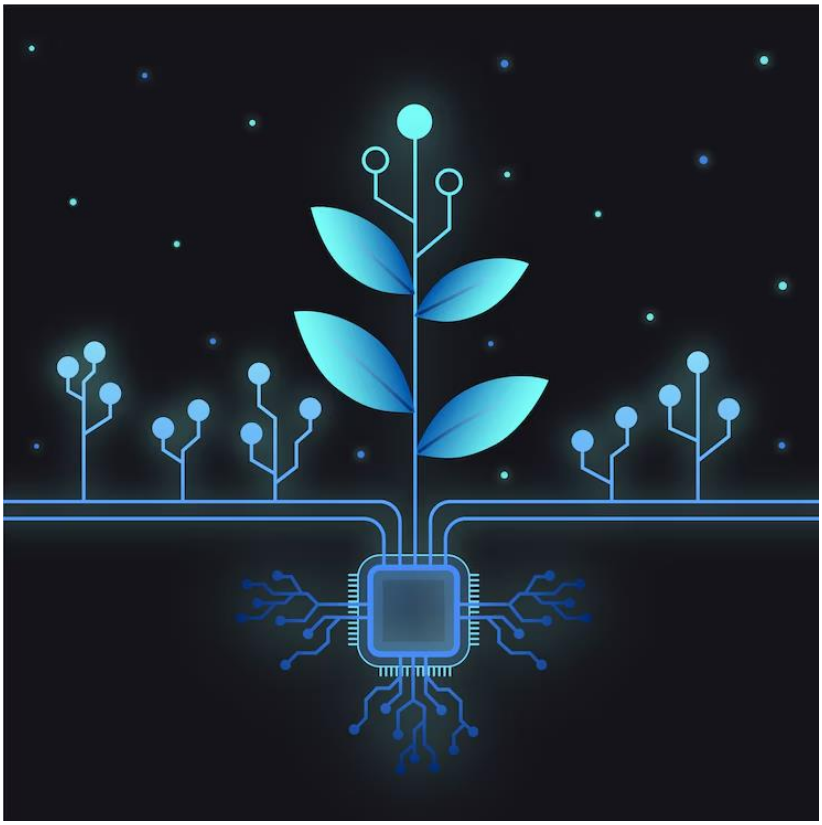

The conservation of biodiversity and its sustainable use have been widely seen as pivotal to facilitating sustainable development and addressing climate change. Conserving and nurturing biodiversity wealth has become central to novel economic and policy paradigms emanating from the Global South including India's Lifestyle for Sustainability and environment (LiFE) and socio-biodiversity bioeconomy from Brazil. Being a central concern for environmental governance in the era post the 1992 Rio Summit, the sustainable and equitable management of biodiversity has assumed new importance in the context of sustainability now regarded as non-negotiable within multiple policy streams. The advent of the fourth industrial revolution as well as the growing convergence between bio and IT realms have further created new issue areas of interest for bio-governance. In a comprehensive sense, bio-governance has been defined as "the deliberate and systematic management of human interactions with the natural world to promote ecological integrity, social equity, and long-term sustainability".

Access and Benefit sharing (ABS) which pertains to the mechanisms which facilitate access to genetic resources and how its benefits may be equitably distributed to the users, is one area sthat

has assumed a renewed importance in the recent past. Herein, Digital Sequence Information (DSI), a placeholder term which refers to data drawn from dematerialized genetic resources, has been a main topic of negotiations within the framework of the Convention on Biodiversity (CBD).

Aided by the diffusion of low-cost gene manipulation technologies and application of AI to biological datasets, users can benefit from data without directly accessing the underlying genetic information from providers. In this background, bio-governance has focused on improving extant ABS mechanisms to adapt to evolving challenges emanating from technology advances. One such multilateral effort translated to the outcome of the CBD COP which concluded in Rome in February 2025. The parties agreed to set up the "Cali Fund for the Fair and Equitable Sharing of Benefits from the use of Digital Sequence Information" to support CBD objectives and "ensure fair benefit-sharing from the use of Digital Sequence Information (DSI) on genetic resources."

While emerging technologies have thrown open a plethora of challenges before bio-governance, efforts around the world have successfully demonstrated the means to leverage them for biodiversity conservation. As evident from a number of ad hoc use cases from around the world, AI and geospatial technologies have been employed to effectively manage biodiversity and monitor sustainability. For instance, the Wildlife Conservation Society (WCS) in East Africa recently used predictive AI algorithms to map biodiversity hotspots in Mozambique's extensive 2,450 km coastline. Given their employment in analysing resource mapping and climate verification, geospatial technologies have also come to be regarded as "indispensable tools for optimizing conservation efforts".

Emerging tech can also serve as an important tool for bio-diplomacy, which focuses on evolving novel approaches to govern natural resources and address global challenges. Emerging tech can effectively be leveraged by bio-diplomacy to achieve CBD objectives. According to the UNDP, advanced AI models can be leveraged to "analyse and synthesise large volumes of policy data to provide actionable insights". Through allowing a wide range of stakeholders to access data related to biodiversity conservation, AI can help democratise biodiversity management. Use of AI can further help gauge effectiveness of biodiversity strategies and help formulate standards for policy discussions to take place. Such possibilities of using AI to ensure monitoring and compliance have already been discussed at the Convention on Biodiversity negotiations.

With emerging tech unleashing a wave of disruption across multiple issue-areas harnessing them to address global challenges has become a central priority for governance. Leveraging emerging tech to improve biodiversity conservation and ensure sustainability assumes particular importance as a central means to address environmental, social and economic challenges. Amid a growing momentum towards multilateral efforts to facilitate the same, bio-diplomacy has a significant role to play. By evolving innovative, inclusive and collaborative frameworks, bio-diplomacy can act "as a catalyst to address the global challenges more comprehensively". Through facilitating evidence-based policymaking, creating economic opportunities and drawing policy attention to promoting a sustainable and circular bioeconomy, bio-diplomacy can further the overall wellbeing and ensure intergenerational equity.