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Decarbonizing Development: A Critical Analysis of Costa Rica's Environmental Policy Evolution in the 21st Century

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ABSTRACT

Costa Rica is globally renowned for pioneering sustainable environmental governance within a developing country context. This article traces the evolution of its environmental policy framework from the 1990s reforestation programs to post-2015 climate adaptation and decarbonization strategies. Drawing on multilevel governance and environmental justice theory, the paper offers a critical analysis of institutional development, climate finance mechanisms (notably REDD+), community participation, and policy coherence across decentralization and biodiversity mandates. It also evaluates performance metrics such as forest cover increase, emissions stabilization, and the integration of the National Decarbonization Plan (2018–2050). Finally, the paper distills key policy lessons for countries like India, particularly in integrating climate action with community-centered approaches.

Keywords: Costa Rica, REDD+, Environmental Governance, Multilevel Governance, Climate Resilience

INTRODUCTION

Costa Rica is frequently hailed as a global environmental exemplar, often cited for its constitutional protection of nature (Article 50), ambitious reforestation policies, and leadership in global climate negotiations (OECD, 2020). It is internationally renowned for its pioneering approach to environmental conservation and sustainability. A tropical country covering just 51,100 km², Costa Rica hosts roughly 6% of the world's biodiversity and has long prioritized natural resource protection. With over 50% of its territory covered in forest and 98% of its electricity generated from renewable sources as of 2022 (MINAE, 2022), the country presents a rare case of harmonizing environmental ambition with democratic stability. However, this narrative of "green exceptionalism" requires critical re-evaluation in the context of the 21st century's climate challenges, financing demands, and governance complexity. By the late 20th century, however, Costa Rica had experienced severe deforestation driven by cattle ranching and agricultural expansion. Forest cover plummeted from around three-quarters of national territory in 1940 to an all-time low of 17–21% in the 1980s, leading to ecological degradation and heightened disaster risks (e.g. landslides, floods). In response, Costa Rica "turned the ship around" in the 1990s through bold legal reforms and incentive-based conservation programs. By 2020, the country had not only halted deforestation but achieved net reforestation – forest cover rebounded to nearly 60% of the land area (Fig. 1). This dramatic turnaround made Costa Rica the first tropical nation to reverse deforestation and a celebrated model of sustainable development.

Fig. 1. Forest cover change in Costa Rica, 1940–2022. Forest cover declined from ~75% of land area in 1940 to ~21% by 1987 at the peak of deforestation, then recovered to ~59% by 2022 through concerted conservation efforts. About half of remaining forests are under protection in national parks or biological corridors.

Entering the 21st century, Costa Rica expanded its

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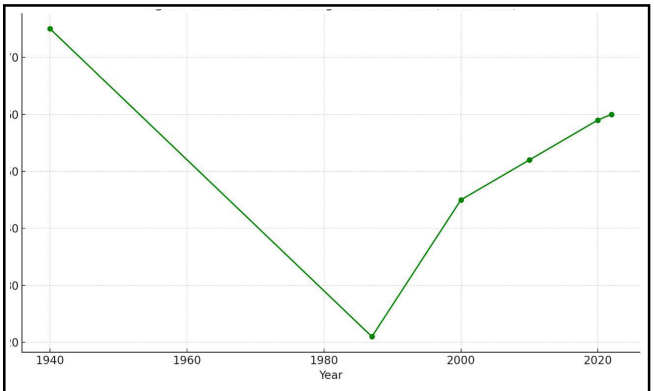


(Data source: MINAE/FAO)

Fig. 1 : Forest Cover Change in Costa Rica (1940-2022)

environmental agenda from saving forests to addressing broader aspects of climate resilience – including decarbonization, adaptation to climate change impacts, and inclusive sustainable development. The country set ambitious goals such as carbon neutrality (as early as 2021, later adjusted to net-zero by 2050) and drafted a comprehensive National Decarbonization Plan 2018–2050. Environmental policy evolved into a multi-faceted framework integrating climate change mitigation, biodiversity conservation, and socio-economic considerations (e.g. livelihoods, equity). Notably, Costa Rica pioneered payments for environmental services (PES) to incentivize reforestation, leveraged international carbon finance (e.g. REDD+ results-based payments), and co-chaired global coalitions for nature conservation. At the same time, the country faced new challenges: how to decentralize environmental governance effectively, how to include Indigenous communities and rural stakeholders in decision-making, and how to sustain financing for environmental programs in the context of economic and climate uncertainties. These challenges underscore the importance of environmental justice (fair distribution of environmental benefits and burdens) and multilevel governance (coordination across local, national, and international levels) in achieving climate resilience.

Scholarly attention to Costa Rica's environmental model has grown in the last two decades. Pagiola (2011) and Börner *et al.* (2017) examine the technical effectiveness of PES and REDD+, noting improved carbon outcomes but highlighting elite capture risks. Gudynas (2013) and Temper *et al.* (2018) caution against the neoliberalization of nature in Latin America, while Schlosberg (2013) expands the debate to environmental justice claims based on recognition and participation. Multilevel governance (MLG) frameworks, as developed by Hooghe and Marks (2010), prove useful in analyzing Costa Rica's decentralization trajectory. The interplay of state ministries (e.g., MINAE), municipal actors, and Indigenous Development Associations (ADIs) reveals a hybrid Type I–Type II structure. Institutionalism (Hall and Taylor, 1996) also helps evaluate path dependencies that shaped climate planning. Recent critiques (Köhne *et al*., 2022; Molina and Arias, 2020) interrogate the gap between legal frameworks and local empowerment. This review identifies a need to connect technical policy performance with normative concerns around equity, Indigenous rights, and climate adaptation.

This article critically explores the policy transition from reforestation to decarbonization, assessing key institutional mechanisms, climate finance, and social equity outcomes using multilevel governance and environmental justice frameworks.

Forest Cover Recovery and Land Use:

Costa Rica's success in forest cover recovery is clearly reflected in land use statistics. Deforestation rates peaked in the 1970s–1980s, when the country lost vast areas of tropical forest to cattle pasture and crops. By 1987, only about 21% of Costa Rica's land was forested – a dramatic decline from roughly 75% in 1940. Following the policy shifts of the 1990s (forest law reforms, deforestation ban, PES incentives), this trend reversed. Fig. 1 illustrates the turnaround: forest cover climbed to ~52% by around 2010 and reached 59–60% by 2020. According to the OECD Environmental Performance Review, Costa Rica is "among the few Latin American countries to have increased forest cover" in recent decades. Indeed, FAO data show Costa Rica with a positive net reforestation rate, unlike most countries in the region which still had net forest loss as of 2015. The recovery has been particularly notable in secondary forests on former pasture lands.

Dry tropical forests in Guanacaste and other regions have regenerated well, aided by both conservation policies and the diminishing profitability of extensive cattle ranching. However, the regrowth has not been uniform: humid and cloud forests show only low to moderate recovery, and some forest fragments remain isolated (indicative of fragmentation). A consequence is that regenerated secondary forests, while increasing tree cover and carbon sequestration, may differ in species

composition from original old-growth forests. Crucially, about 50% of Costa Rica's remaining forest area is under protection either within official protected areas or designated biological corridors. As of 2022, the country had 151 protected areas (Área Silvestre Protegida, ASP) covering 25% of terrestrial territory – exceeding global Aichi Targets and inching close to the new 30% by 2030 goal. Additionally, a major expansion of marine protected areas in 2021 brought 30% of marine waters under protection, demonstrating Costa Rica's commitment to ocean conservation as well (FAO, 2022). The extensive protected area network, combined with the PES program on private lands, has been effective in curbing biodiversity loss and maintaining ecosystem services. It is estimated that protected forests in national parks have become significant carbon sinks, helping offset the country's emissions growth (discussed below).

Despite these successes, recent signals suggest caution. Land-use conversion has been rising again since the mid-2010s – forest lands are once more being cleared or repurposed for pasture, agriculture (notably pineapples), and urban expansion at local scales. Investigative reports note that in certain areas, secondary forests that grew back thanks to PES and natural regeneration were later cut down when commodity prices (e.g. pineapple or cattle) rose, revealing the risk of reversal. For example, a study in Coto Brus (southwest Costa Rica) found that half of the forest patches that had regrown were cleared again within 20 years. Nationally, around one-third of Costa Rica's land remains in cattle pasture (as of late 2010s), and large-scale pineapple cultivation has expanded, making Costa Rica the world's largest pineapple exporter at an environmental cost. These trends underline that economic pressures can still undermine conservation gains if policies are not continually strengthened. The government has acknowledged related concerns: for instance, the lack of updated spatial planning in many municipalities has allowed real estate development to encroach into forested corridors and wetlands. Additionally, wildfires and climate change (drought stress) threaten forest health, especially in dry regions, potentially turning some forest areas from carbon sinks into carbon sources if degradation occurs. In response, current policy updates aim to reinforce forest conservation and expand it beyond forests. The National Forestry Development Plan and Biodiversity Strategy propose extending PES or similar incentives to other ecosystems (like wetlands, mangroves) given their valuable services. There is also an ongoing effort to complete a national land-use plan and integrate biodiversity safeguards into agricultural and urban sectors (MINAE, 2020).

Costa Rica's forest cover recovery stands as a flagship outcome of its environmental policy framework. The country achieved zero net deforestation by around 2005 and net reforestation thereafter – a rare accomplishment enabled by strict laws, economic incentives, and broad societal buy-in (e.g. via ecotourism benefits). However, maintaining and building on this success requires vigilance. The analysis underscores that forest conservation is not a one-time victory but an ongoing process: policies must adapt to new challenges like agricultural commodity booms and climate impacts. Costa Rica's experience also highlights the interplay between land rights and conservation – unresolved land tenure issues (especially in Indigenous territories) can lead to conflict and unsustainable land use, whereas secure community rights tend to favor forest stewardship.

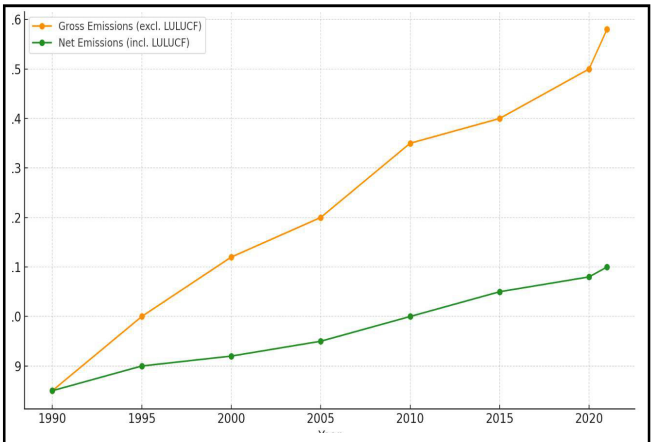
Climate Mitigation Performance: GHG Emissions Trends

To evaluate Costa Rica's shift towards climate resilience, it is important to examine its greenhouse gas emission trends and the effectiveness of mitigation efforts. As a small economy with high renewable energy use, Costa Rica's contribution to global GHG emissions is minimal (about 0.02% of global emissions). However, the country's emissions trajectory offers insight into the challenges of decarbonization even for a "green" country. Total GHG Emissions: Costa Rica's total GHG emissions (excluding land-use change and forestry) have shown a gradual upward trend from 1990 through the 2010s, driven largely by growth in the transport sector. In 1990, emissions were approximately 8.5 million tonnes CO_2 - equivalent ($MtCO_2$ e); by 2010 this reached around 12 $MtCO_2$ e, and by 2019–2021 emissions peaked at an estimated 15–16 $MtCO_2$ e. Fig. 2 illustrates this trend (in orange), depicting a roughly 80% increase in gross emissions over three decades. Key drivers include rising vehicle numbers, urbanization, and agriculture (livestock). Transport is by far the largest emitting sector, accounting for about three-quarters of energy-related CO_2 emissions. From 2010 to 2021, CO_2 emissions from fuel combustion grew ~11% as vehicle fleets expanded and car-centric development continued. Notably, more than 60% of Costa Rica's vehicles are over a decade old and

fuel-inefficient, and diesel use in buses/trucks remains significant. Outside of energy, agriculture (methane and nitrous oxide from cattle and fertilizer) is a substantial source, contributing roughly 25–30% of emissions, while industry and waste make up the balance. Net GHG Emissions and Forest Sink: When accounting for the land-use, land-use change and forestry (LULUCF) sector, Costa Rica's net emissions are considerably lower – reflecting the carbon sequestration by its forests. In fact, due to the forest expansion discussed earlier, Costa Rica's LULUCF sector became a net carbon sink by the 2010s. The Climate Action Tracker reports that Costa Rica even achieved net negative emissions in 2014, meaning the country's forests absorbed more CO_2 than the entire economy emitted that year. Although this was partly due to an anomaly (high hydroelectric output and modest economic growth that year), it underscores the impact of forest conservation on the national carbon balance. From 2010 to 2017, net GHG emissions dropped by 13%, a period during which forest carbon removals grew steadily. By 2017, the LULUCF sink offset over 20% of Costa Rica's gross emissions. Thus, while gross emissions in 2017 were on the order of 13–14 Mt, the net emissions were closer to ~10–11 $MtCO_2e$.

Fig. 2 contrasts the gross emissions trajectory with net emissions after the forest sink.

Fig. 2. Costa Rica's GHG Emissions Trend, 1990–2021 ($MtCO_2$ e). The orange line (▲) shows total annual emissions excluding LULUCF (left axis), which increased from ~8.5 Mt in 1990 to ~15.8 Mt in 2021. The green line (•) shows net emissions after accounting for forest carbon sinks, illustrating how net emissions plateaued around 10–12 Mt in the 2010s and dipped below zero in one year (2014) when sequestration exceeded emissions (Data sources: World Bank, Climate Action Tracker).



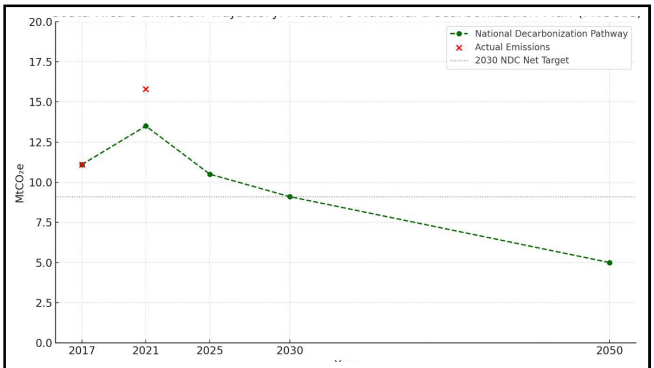
Source: UNFCCC BURs, Climate Action Tracker

Fig. 2 : Costa Rica's GJG Emissions Trends (1990-2021)

Decarbonization Progress:

The data above must be viewed in light of Costa Rica'sdecarbonization targets. The country's updated NDC (2020) set a 2030 net emissions limit of 9.11 $MtCO_2e$ including LULUCF. This implies a reduction of roughly 18% from 2017 net levels. The National Decarbonization Plan (NDP) outlines an emissions pathway where net emissions peak around 2025 and then decline towards net-zero by 2050, with an interim target of at most 5 Mt net by 2050. Are current trends on track? The Climate Action Tracker (2023) rates Costa Rica's policies as "1.5°C compatible" in terms of fair-share performance, but notes that actual emissions in 2021 (15.8 Mt excl. LULUCF) slightly exceeded the expected trajectory. With existing policies, projections for 2030 range from 13.2 to 15.8 $MtCO_2e$ (excl. LULUCF), which suggests that additional measures are needed to hit the net 9.11 Mt target (which, assuming a growing sink, corresponds to perhaps ~13 Mt gross in 2030). In simpler terms, Costa Rica likely needs to bend its gross emissions curve downward soon to meet its pledges. Sectoral data indicate where the challenges lie: transport decarbonization is essential, as noted, because road transport still grows (~+30% emissions in the last decade). Costa Rica has taken several steps – passing a law to promote electric vehicles (Law 9518), installing EV charging networks, and initiating an electric train project for San José. By 2023, EVs reached 12% of new vehicle sales (a significant uptick). However, the public transport modernization (electric buses, urban rail) has lagged due to financial and political hurdles. Additionally, a long-standing moratorium on oil exploration (in place since 2002) has yet to be cemented into permanent law, facing some legislative pushback. In the energy sector, Costa Rica's power generation remains impressively >98% renewable on average (heavy in hydropower, plus geothermal, wind). Drought events have occasionally forced reliance on backup fossil generators (as in 2019–2020), suggesting a need to diversify with more solar and wind to ensure resilience (Climate Action Tracker, 2022).

Meanwhile, agriculture emissions are being targeted through Nationally Appropriate Mitigation Actions (NAMAs) – e.g. a low-carbon coffee NAMA and a



Source: Climate Action Tracker (2022, 2023); MINAE NDP (2020); Costa Rica's Updated NDC

Fig. 3 : Costa Rica's EmissionTrajectory: Actual vs National Decarbonization Plan ($MtCO_2e$)

livestock NAMA – aiming to reduce methane via improved practices. The waste sector also offers opportunities (better waste management and methane capture), though implementation is at early stages.

Costa Rica's emissions profile is characterized by low per capita emissions (~3 tCO, e/person, half the world average) and a heavy reliance on its natural carbon sink to maintain a small net footprint. The country has made measurable progress, for instance, containing net emissions growth and possibly already peaking net emissions. Nonetheless, achieving deep decarbonization will require accelerating efforts in transport and agriculture especially. The notion of climate resilience in Costa Rica thus has a dual aspect: reducing emissions (mitigation) and enhancing the capacity to absorb emissions (through forests, which also builds adaptation capacity via ecosystem services). The interplay is evident: increased forest cover has bought Costa Rica time and credibility on the mitigation front. Going forward, the nation's strategy – as articulated in its NDP – is to double the LULUCF sink by 2050 to balance residual emissions, while cutting gross emissions via electrification and efficiency (Climate Action Tracker, 2022).

REDD+ and Carbon Finance Mechanisms:

One distinctive element of Costa Rica's approach to environmental policy is its proactive engagement with REDD+ (Reducing Emissions from Deforestation and forest Degradation) and other carbon finance mechanisms. Essentially, Costa Rica has sought to monetize its forest conservation success by obtaining performance-based payments for verified emissions reductions, which are then reinvested in conservation and community development. This reflects an innovative model of climate finance aligning with both mitigation and local resilience.

Costa Rica was an early participant in REDD+ under the UNFCCC framework and the World Bank's Forest Carbon Partnership Facility (FCPF). In 2018, it became the first country in Latin America to sign an Emission Reductions Payment Agreement (ERPA) with the FCPF Carbon Fund. The ERPA committed to pay Costa Rica up to USD $60 million for achieving 12 million tonnes of CO_2 emissions reductions from avoided deforestation by 2025. Payments are tranched: in August 2022, Costa Rica received the first payment of $16.4 million for reducing 3.28 $MtCO_2e$ in 2018–2019. A second payment of $17.5 million was disbursed in early 2023 after further verification. These payments were contingent on rigorous MRV (Monitoring, Reporting, Verification) processes and an approved Benefit Sharing Plan (BSP). According to the World Bank, Costa Rica's BSP ensures that a significant share of REDD+ funds flow to local stakeholders – including Indigenous communities, smallholders, and forest fire brigades – as recognition for their role in protecting forests. For example, through this mechanism, Indigenous associations like ADITICA (Cabécar Territory) have received funds to implement their own forest management and community projects. One Indigenous leader is quoted: "This project has enabled us to fulfill many of our dreams… It allows Indigenous territories to have a direct impact on decision-making and development of environmental and territorial plans". This exemplifies how carbon finance can empower local actors, aligning with environmental justice by rewarding those who traditionally have been stewards of the land.

In parallel, Costa Rica also accessed the Green Climate Fund's pilot program for REDD+ results-based payments. In 2019, it submitted evidence of emission reductions for the years 2014–2015 (totaling 14.08 $MtCO_2e$). The GCF Board approved a $54.1 million payment (FP144) in November 2020, which was fully disbursed by 2021. These funds, channelled via UNDP, are earmarked to bolster the country's Forestry Law implementation and upscale the PES program. Notably, one goal is to enhance Indigenous peoples' participation in the PES and forest policy programs. By stacking finance from FCPF and GCF, Costa Rica has effectively mobilized over $100 million of external funding for its climate-forest efforts in recent years.

Table 1 : Results-Based Carbon Finance for Costa Rica's Forest Conservation

Program and Donor	Period of Results	Emission Reductions Achieved	Payments Received (USD)	Utilization of Funds
FCPF Carbon Fund (World Bank)	2018–2025 (ERPA)	Up to 12 $MtCO_2$ (target)	$16.4 M (2022); $17.5 M (2023); *up to* $60 M total	To FONAFIFO and SINAC: expand PES, improve protected area management, community benefits via BSP.
GCF REDD+ RBP (UNDP as AE)	2014–2015	14.08 $MtCO_2$ (achieved)	$54.1 M (2021)	Reinvest in forest sector: reinforce PES under Forestry Law, support Indigenous inclusion, biodiversity co-benefits.
LEAF Coalition (private/public)	2022–2030 (est.)	"Excess" credits beyond FCPF	~$10 M (est.) for 100,000 tCO_2	Sale of high-quality credits to corporates; revenue to sustain PES and national carbon market initiatives.

Sources: World Bank (2022); World Bank Feature (2025); GCF (2021).

Table 1 summarizes the major REDD+ payments received or in pipeline:

Beyond multilateral funds, Costa Rica has capitalized on emerging voluntary carbon market opportunities. In 2021, it became the first country to sell "sovereign" carbon credits to the private sector through the LEAF Coalition (a consortium including governments and companies). The country agreed to sell 100,000 high-integrity REDD+ credits (representing emission reductions beyond those counted in the FCPF program) to a LEAF buyer, reportedly at a price around $10/ton, yielding approximately $1 million. While modest in scale, this sale is symbolic – it validates Costa Rica's robust MRV systems and opens a potential revenue stream from corporate net-zero pledges. Jorge Mario Rodríguez, Vice-Minister of Environment, noted that data from FCPF monitoring "is enabling the sale of carbon credits, ensuring the continuation of payments for environmental services" and strengthening the PES program's ability to reward carbon sequestration. Essentially, Costa Rica is positioning itself as a leader in jurisdictional REDD+ markets, leveraging decades of conservation as a commodity in carbon markets. The national Carbon Neutrality Program (since 2012) also complements this by running a domestic offset scheme where Costa Rican companies can buy locally certified offsets (after reducing their own emissions) to earn a "C-Neutral" label.

The infusion of carbon finance has concrete impacts on the ground. For instance, funds from the ERPA payments have been used to strengthen SINAC's capacity (such as hiring park guards, improving wildfire prevention) and to increase the number of hectares under PES contracts, particularly targeting strategic areas like biological corridors and Indigenous territories. The World Bank's *EnABLE* trust fund is supporting a new initiative in collaboration with Indigenous networks to channel resources into Indigenous-led eco-tourism, sustainable agroforestry, and cultural heritage conservation – all aimed at enhancing climate resilience at the community level. Transparent resource distribution and participatory monitoring are emphasized, which builds trust and local buy-in for climate initiatives.

Costa Rica's engagement with REDD+ and carbon finance exemplifies an innovative policy mechanism: turning global climate mitigation contributions into local sustainable development benefits. By quantifying and selling the carbon storage service of its forests, Costa Rica obtains external funding that helps relieve pressure on domestic budgets (which have been constrained in recent years by fiscal issues). It also creates a positive feedback loop – the more the country maintains and expands its forests, the more it can potentially earn through results-based finance, which in turn is invested back into maintaining those forests and supporting the communities living in and around them. This mechanism, however, depends on continued donor and market interest and on Costa Rica's ability to prove additional emission reductions beyond what might have happened under business-as-usual. As one analysis cautions, Costa Rica has accessed only a small fraction (~8.7%) of its theoretical REDD+ payment potential due to constraints in program design and baselines. Nevertheless, the country has been adept at navigating international climate finance – from debt-for-nature swaps in earlier decades to today's carbon fund payments – making it a case to watch for other forest-rich nations.

Environmental Governance and Budgetary Support:

To sustain an evolving environmental policy framework, Costa Rica has had to allocate adequate

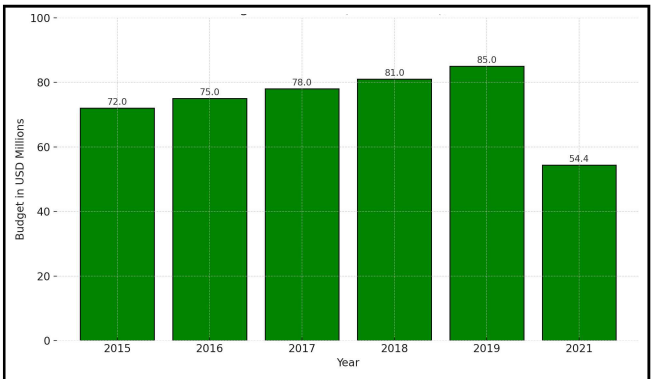
institutional and financial resources. In this sub-section, we analyze the structure of environmental governance (notably the role of MINAE and SINAC) and trends in budgetary support for environmental initiatives. We also assess whether the financial investments match the country's ambitious policy goals.

***Institutional Framework*:**

Costa Rica's environmental governance is anchored by the Ministry of Environment and Energy (MINAE), which oversees various departments (wildlife, water, climate change, etc.) and key parastatal bodies. The National System of Conservation Areas (SINAC), as introduced earlier, is the operative arm managing protected areas and overall biodiversity matters. SINAC's governance includes a Governing Council of Conservation Areas to coordinate between national and regional levels, and local conservation area councils and watershed committees to incorporate stakeholder input. Despite this structure, multiple institutions share environmental responsibilities. For instance, the Ministry of Agriculture (MAG) influences land use through farming subsidies, the water and sewer institute (AyA) handles water resources, and municipalities have some environmental regulatory powers (like local pollution control, land zoning). This multiplicity often leads to fragmentation – the OECD (2023) notes overlapping and sometimes conflicting objectives among agencies, and calls for streamlining governance through pending legislative reforms. One positive step cited is a 2022 draft law to strengthen MINAE's purview and consolidate certain functions under it. Additionally, Costa Rica has strong legal provisions for environmental democracy – public participation and access to environmental information. The country is a signatory of the Escazú Agreement (regional treaty on environmental access rights), and it maintains mechanisms like the National Environmental Council and Technical Secretariat for Environmental Impact Assessment (SETENA) that incorporate public input. Nonetheless, capacity issues (skilled personnel, equipment) at enforcement agencies can hamper implementation of regulations. For example, SINAC historically has dealt with a high volume of environmental complaints – over 5,000 cases in 2021, more than 70% of all cases in the national environmental infraction system– indicating both active citizen reporting and the burden on rangers to enforce laws on the ground.

***Budgetary Trends*:**

Financing is a critical component of governance capacity. Costa Rica's public spending on environmental protection has been described as modest relative to its goals. During 2015–2019, SINAC's budget averaged nearly CRC 40 billion annually (approximately USD $70–75 million). This budget grew about 5% per year in that period, reflecting increased government priority. However, in 2021, amid fiscal austerity measures (exacerbated by the COVID-19 pandemic), SINAC's budget was cut by 36%. Such a steep reduction poses risks to park maintenance, enforcement, and community programs. The OECD recommends establishing a dedicated trust fund for SINAC to stabilize financing and ensure resources are available for effective protected area management. Besides direct budget allocations, SINAC relies on park entrance fees as a significant revenue source – in 2015–2019, fees contributed about 24% of SINAC's income. With Costa Rica's booming ecotourism (over 2.2 million ASP visitors in 2019), these fees have grown, yet they still often fall short of covering operating costs of parks. Fees for foreigners are higher (a form of price discrimination to earn more from international tourists), but domestic fees remain low – arguably undervaluing the resource and leaving potential revenue untapped. Some reports suggest raising or diversifying fees (e.g. additional charges for diving, concessions, etc.) to better fund conservation.



Source: OECD (2023); Costa Rica Ministry of Environment (MINAE), Budget Reports, 2015–2021

Fig. 4 : SINAC Budget Allocation (USD Millions), 2015-2021

Another key funding component is the National Forestry Financing Fund (FONAFIFO), which administers the PES program. Traditionally, PES funding came primarily from the fuel tax (3.5% of fuel sales) dedicated

to FONAFIFO. This model successfully generated tens of millions of dollars annually during the 2000s, enabling payments across ~300,000 hectares at any given time. However, as noted, fuel tax revenues have declined since mid-2010s due to improved vehicle efficiency, partial shifts to hybrid/EVs, and an overall stagnation in fuel consumption (further accentuated by the pandemic). By 2016–2020, FONAFIFO often received less than what the law stipulated from fuel tax receipts. The government has recognized this issue: to secure the PES program's future, it is exploring diversified funding sources – e.g. more international carbon payments, budget support, water tariffs (some of which already fund PES for watershed protection), and even green bonds. In 2017, Costa Rica issued its first green bond (a $500 million bond) to finance renewable energy and sustainable land use projects, reflecting an innovative approach to raise capital for environmental objectives.

Costa Rica also has a history of debt-for-nature swaps (for example, deals with the United States in the 2000s under the Tropical Forest Conservation Act), which provided funding for conservation trusts. These mechanisms, along with the newer carbon finance streams (FCPF, GCF), contribute to the country's environmental budget mosaic. However, the overarching concern raised in reviews is that human and financial resources are not yet fully commensurate with the ambitions. The OECD 2023 report explicitly states: "Public environment-related spending does not seem commensurate with Costa Rica's goals. Human resources are insufficient to ensure adequate environmental planning, management and enforcement". This is evidenced by, for instance, limited staff to carry out environmental impact assessments or to monitor pollution and waste management across 82 municipalities. It also links to the slow progress in areas like wastewater treatment (only 30% of the population had safely treated sanitation as of 2020), which require heavy infrastructure investment.

The government's strategy to address these gaps includes engaging private sector and alternative finance. Costa Rica hopes to leverage its green reputation to attract more international green finance, building on successes like trust funds and REDD+. It's noteworthy that Costa Rica often punches above its weight in accessing environment-related grants and loans. For example, the country secured climate adaptation grants for water management in drought-prone areas and participates in the Global Environment Facility (GEF) and Green Climate Fund projects beyond REDD (e.g. an electric bus pilot funded by GCF). The principle is that external support can augment limited domestic funds, a notion aligned with climate justice (developed countries supporting a developing nation's climate efforts).

While Costa Rica's environmental institutions are well-established and innovative, ensuring they are well-funded and staffed remains a challenge. The shift from the era of deforestation crisis (when political momentum and donor support were high) to the current era of climate action requires sustained fiscal commitment. The country's experience suggests that success in conservation can bring economic returns – ecotourism (3% of GDP) dwarfs the biodiversity public budget (around 1% of GDP), illustrating a payoff – but translating those returns into government revenue for reinvestment is tricky. As Costa Rica continues to refine its environmental governance, the emphasis is on improving efficiency of spending, prioritizing critical gaps (like waste and water infrastructure), and tapping into innovative financing (carbon markets, green bonds, payment for ecosystem services from beneficiaries such as water users or tourists). By doing so, the country aims to align its resource allocation with the high bar it has set in policy commitments, thereby truly operationalizing its climate resilience agenda.

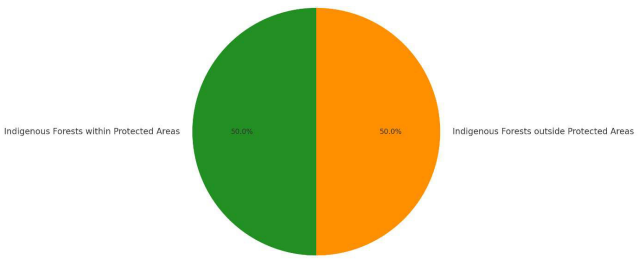
Social Inclusion, Decentralization and Biodiversity Governance:

The final set of results pertains to how Costa Rica's environmental framework addresses social inclusion (especially of Indigenous and local communities), the effectiveness of decentralization, and the integration of biodiversity conservation into broader governance. These aspects are intertwined with concepts of environmental justice and multilevel governance, and are critical for equitable climate resilience.

***Indigenous Inclusion and Rights*:**

As detailed in the literature review, Indigenous peoples in Costa Rica have historically faced marginalization in land and resource governance. However, recent years have seen some improvements in inclusion within environmental initiatives. Data from the National Biodiversity Strategy (ENB2) implementation show progress: for the *first time*, Indigenous Peoples were effectively included in the

formulation of ENB2 (2016–2025). One tangible target was to identify new areas for biodiversity conservation to be managed by Indigenous communities (often termed "Indigenous conservation areas"). By 2023, some groundwork had been laid, but progress was slow and overlapping claims between Indigenous territories and official protected areas remained a source of conflict. Currently, Indigenous territories cover about 7% of Costa Rica's land, and these areas overlap significantly with high-biodiversity forests – in fact, roughly 50% of the forest in Indigenous reserves is also part of the national protected areas system. This overlap has caused friction: while it can double-protect the land, it has sometimes meant restrictions on traditional Indigenous land uses without proper consultation, breeding resentment. The government has been working on formal mechanisms for comanagement or at least consultation. Under the REDD+ strategy, an Indigenous Roundtable on Climate Change was established to ensure Indigenous voices in climate policy. Moreover, the benefit-sharing structure of carbon finance explicitly lists Indigenous communities as key beneficiaries. For example, out of the first FCPF payment, a designated percentage was directed to Indigenous community projects in forest monitoring, sustainable livelihoods (like organic cacao production), and education.



Source: Costa Rica's National Biodiversity Strategy ENB2 (2016–2025); compiled using data from MINAE and WRI (2023)

Fig. 5 : Distribution of Forests in IndigenousTeritories, Costa Rica (2023)

Despite these advances, unresolved land tenure disputes undermine full Indigenous inclusion. As mentioned, two high-profile assassinations in 2019–2020 underscored the urgent need to grant Indigenous communities the lands titled to them under law. In response, the government launched the Integral Strategy for Indigenous Territory Recovery (known as "PIRET" in Spanish) in 2021–2022, aiming to systematically remove illegal occupants from Indigenous reserves and indemnify or relocate them. By end of 2022, some recuperation had occurred, but a sizeable portion of Indigenous land was still under non-Indigenous use, and tensions persisted. The incoming administration in 2022 under President Rodrigo Chaves initially alarmed activists due to his populist support base among farmers, but under both international pressure and the proven link between Indigenous stewardship and forest protection, efforts continued. It is widely recognized – including by Costa Rica's leadership at international forums – that empowering Indigenous guardians is one of the best strategies for forest conservation and climate resilience. Studies by WRI (2014) and others show community-managed forests often have lower deforestation and store more carbon than other forests. Thus, aligning Costa Rica's environmental policy with Indigenous land rights is not just a justice issue but a climate strategy.

***Decentralization and Local Governance*:**

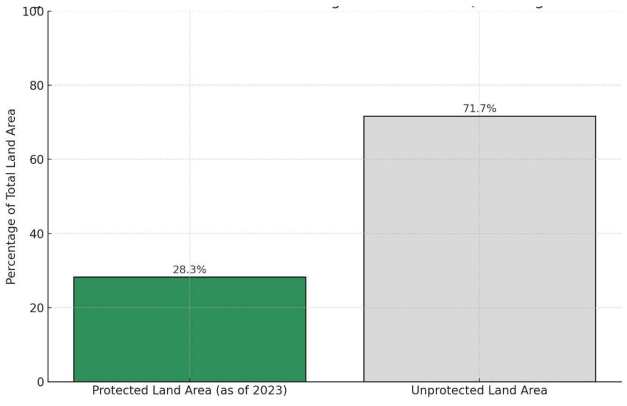
Costa Rica's model of dividing the country into Conservation Areas was, in theory, a move towards decentralization of environmental management – bringing decision-making closer to the local level. In practice, however, many decisions are still made centrally, and local governments have limited capacity. For example, only ~40 out of 82 municipalities had land-use plans (Planes Reguladores) as of 2021, and most of those were outdated or partial. Without robust municipal zoning, problems such as building in hazardous zones or critical habitats have occurred (especially in booming tourism areas on coasts). The OECD notes that weak inter-institutional cooperation and little participation of local communities impeded effective spatial planning in coastal areas. To address this, there are new initiatives like the National Urban Environmental Agenda and pilot projects (e.g. "Biodiver_City" in San José) to incorporate biodiversity and climate considerations into urban planning. These are in early stages but represent attempts to integrate local development planning with environmental goals – essentially horizontal integration at the local level.

At the regional level, SINAC's Conservation Area councils include representatives from local governments, NGOs, and sometimes private sector, advising on park management and corridor projects. Some local success stories include community-based ecotourism ventures adjacent to national parks (where local guides and

businesses benefit from conservation) and ecological Blue Flag programs that involve communities in sustainable practices (e.g. beach cleanliness, which ties into marine conservation). However, the reach of these programs is not universal. There is a continuous need to strengthen local administrative capacity – a point the OECD made, suggesting more financial and technical support to municipalities so they can deliver environmental services (like waste management, which is currently uneven across municipalities). Another aspect is environmental education and citizen engagement, which are crucial for decentralized enforcement (communities acting as watchdogs). Costa Rica's high literacy and awareness have helped, but knowledge gaps remain, particularly on climate change impacts at the local level.

***Biodiversity Mainstreaming*:**

Costa Rica's environmental policy has traditionally had a strong biodiversity conservation core (given the country's megadiversity status and reliance on ecotourism). The challenge in recent years is mainstreaming biodiversity into all sectors – agriculture, fisheries, tourism, infrastructure – to reconcile development with conservation. The National Biodiversity Policy 2015–2030 and ENB2 (Strategy) set 100 concrete targets. By latest accounts, most targets related to protected area expansion, forest cover, and PES area were achieved or on track. However, targets lagging behind included: strengthening enforcement against wildlife poaching and illegal logging, reducing pesticide use (Costa Rica has one of the world's highest pesticide application rates per hectare), and restoring ecosystems like mangroves and coral reefs. For instance, mangrove protection saw limited progress despite their importance for coastal protection and carbon storage. To address such gaps, Costa Rica updated its Wildlife Conservation Law and has been developing a National Wetlands Policy (with help from SINAC's Wetlands Project). As part of mainstreaming, the government also reviewed harmful incentives: one recommendation is to reform subsidies in agriculture and fishing that encourage overuse of chemicals or overfishing, possibly replacing them with incentives for sustainable practices.



Source: MINAE (2023), OECD Environmental Reviews (2023), Kunming-Montreal Global Biodiversity Framework.

Fig. 6 : Process Toward 30% Land Protection Target in Costa Rica (Kunning-Montreal GBF)

A critical area of mainstreaming is spatial planning: integrating biodiversity into land-use decisions. The absence of comprehensive land-use plans has been a "major indirect driver of biodiversity loss" in Costa Rica. Recognizing this, there's urgency to finalize territorial plans that include ecological zoning – e.g. buffers around protected areas, maintaining biological corridors (Costa Rica has designated dozens of corridors linking parks, but development in them is not well regulated). The country's pledge under the Kunming-Montreal Global Biodiversity Framework (GBF) is to protect 30% of land and sea by 2030, which it is close to achieving. The bigger challenge is Target 3's other half: ensuring those areas are effectively managed and representative of all ecosystems. Currently, gaps remain (e.g. some marine ecosystems outside the big reserves, like seamounts or deep reefs, are not covered; some private lands with unique habitats aren't protected).

***Environmental Justice*:**

Beyond Indigenous issues, environmental justice in Costa Rica also touches on rural smallholders and women. The PES program has tried to improve equity by creating modalities for low-income landowners and by including agroforestry, which can benefit small farmers. Additionally, a Gender Action Plan in the environment sector seeks to involve more women in conservation jobs (park rangers, extension officers) and ensure women-headed households can access programs like PES. In the climate domain, Costa Rica's 2020 updated NDC included a focus on Just Transition – aiming for no one to be left behind as transport shifts to electric or as certain industries (like fossil fuel-related) are phased out. Since Costa Rica has no oil or coal industry domestically, just transition mainly concerns sectors like transport (e.g.

ensuring public transport improvements benefit poorer communities who rely on buses). The multilevel governance aspect also means involving civil society: Costa Rica has active environmental NGOs and academia that often partner in policy (e.g. University of Costa Rica and CATIE do research feeding into policy decisions). This inclusive approach contributes to legitimacy and resilience of policy – for example, when Costa Rica's national decarbonization plan was launched, it had inputs from various sectors and has largely survived a change of administration, indicating broad support.

The social and decentralized dimensions of Costa Rica's environmental policy reveal a mix of strengths and areas needing improvement. The country has strong social capital for the environment – a public that generally values nature – and institutional channels for participation. It has begun to more fully recognize the central role of Indigenous and local communities in achieving conservation and resilience outcomes. However, transforming recognition into practice is ongoing work, requiring conflict resolution, capacity building, and sometimes cultural change within institutions. Decentralization in environmental governance is only partial; more devolution of power and resources to local entities (with accountability) could enhance responsiveness to issues like local pollution, land-use conflicts, and climate adaptation needs on the ground. Ultimately, Costa Rica's path illustrates that true sustainability involves multi-level governance: harmonizing actions from the village level (e.g. a community reforesting a watershed) to the global level (e.g. advocating ambitious climate and biodiversity targets). The payoffs are visible in Costa Rica's rich forests and low emissions, but so are the pain points – which the country is actively trying to address as it moves further into the climate resilience era.

Conclusion and Policy Implications:

Costa Rica's evolving environmental policy framework in the 21st century – transitioning from a focus on forest conservation to a comprehensive climate resilience agenda – offers rich insights for sustainable development policy and practice. Through this deep analysis, several overarching conclusions emerge:

An Integrated Approach Yields Tangible Outcomes:

Costa Rica demonstrates that simultaneous investment in conservation, climate mitigation, and social development can be mutually reinforcing. The country's forest cover recovery (from ~21% in 1987 to ~59% in 2020), expansion of protected areas (25%+ of land), and near-zero net emissions trajectory (achieving net carbon neutrality in some years)are tangible results of policies that integrate strict environmental regulations, market-based incentives (PES), and community engagement. By valuing forests for both biodiversity and carbon, Costa Rica doubled the benefit – conserving ecosystems while offsetting fossil emissions. This integrative strategy, underpinned by robust institutions like SINAC and innovative financing (REDD+ payments, ecotourism revenue), has made Costa Rica a prototype of the "eco-state" in a developing country context.

Governance Matters – Multilevel and Inclusive Structures Improve Effectiveness:

Costa Rica's case underscores that how policies are implemented is as important as their substance. The country's experience with SINAC's regional conservation areas, while not without issues, highlights the value of decentralized management and stakeholder participation in environmental governance. Similarly, integrating Indigenous and local community voices – through participatory planning (e.g. Biodiversity Strategy process) and equitable benefit-sharing of carbon finance – has gradually improved policy legitimacy and outcomes. The challenges Costa Rica faced (e.g. Indigenous land conflicts, municipal capacity gaps) illustrate that environmental justice and social inclusion are prerequisites for long-term resilience. Where governance was fragmented or exclusionary, progress slowed (e.g. overlapping land claims, illegal logging hotspots), whereas inclusive, transparent governance (e.g. open environmental data systems, citizen oversight of PES) enhanced compliance and support. The theoretical notions of multilevel governance and environmental justice thus find practical validation: aligning national goals with local action and ensuring fair distribution of environmental benefits lead to more sustainable and equitable results.

Financial Sustainability and Innovation are Key to Policy Longevity:

A crucial lesson from Costa Rica is the importance of securing sustainable financing for environmental initiatives. The country was a pioneer in earmarking national funds (fuel tax for PES) and later adeptly attracted international payments for ecosystem services (FCPF,

GCF). These funds have filled the gap as traditional revenue (fuel tax) declines, illustrating the need for adaptive finance models in the face of economic transitions (e.g. decarbonization itself reducing fossil-tax income). Costa Rica's use of debt-for-nature swaps, green bonds, and carbon credit sales shows that creativity in finance can significantly bolster environmental budgets. However, the nation also learned that reliance on a narrow funding base is risky; broadening finance sources (tourism fees, private sector contributions, etc.) is necessary to buffer economic shocks (like COVID-19's hit to tourism and tax revenue). For policymakers, the takeaway is to institutionalize financial mechanisms (trust funds, endowments, payment schemes) that ensure environmental programs outlive political and economic cycles. Aligning environmental objectives with economic incentives – as Costa Rica did by tying conservation to income for landowners and communities – creates vested interests in maintaining those programs, thereby enhancing policy durability.

Adaptation and Resilience Require Next-Generation Reforms:

While Costa Rica has excelled in mitigation and conservation, the path forward emphasizes climate adaptation and integrated landscape management as climate impacts intensify. The study found that issues like land-use planning, water security, and urban resilience are now at the forefront. Costa Rica's evolving policies (National Adaptation Plan, urban biodiversity initiatives) acknowledge that resilience is a cross-sectoral endeavor: protecting forests alone is not enough if, for example, watersheds are stressed by drought or coastal ecosystems by development. Future reforms need to break silos – ensuring agriculture, urban development, and infrastructure planning internalize climate and biodiversity considerations (as recommended by OECD). Furthermore, as climate extremes grow, the country must bolster disaster risk reduction (e.g. using mangroves for storm surge protection, restoring upstream forests to mitigate floods) – areas where progress has been slow. The policy implication is that even environmental leaders must continuously update their frameworks for adaptive management, using science and community knowledge to respond to new risks.

Policy Implications and Lessons for India: India, with its vast population and ecological diversity, is charting its own environmental governance journey. Several lessons from Costa Rica's experience could inform India's policies:

- *Invest in Natural Climate Solutions:* Costa Rica's reversal of deforestation through legal and economic means shows that strong forest governance combined with incentives can yield rapid gains in carbon sequestration and ecosystem services. India has sizable forest cover (~24% of land) and an ambitious afforestation target (33% of land). Adopting PES-like schemes at scale – for example, rewarding communities under India's Joint Forest Management or compensating states for maintaining forest (as partly done via the Finance Commission's forest cover index) – could enhance India's afforestation and REDD+ outcomes. Community-based conservation models, akin to Costa Rica's empowerment of local groups through PES and benefit-sharing, can complement India's existing programs like the CAMPA (Compensatory Afforestation Fund) by directly involving and incentivizing forest dwellers as stewards.
- *Strengthen Multilevel Environmental Governance:* India's federal structure already involves states in environmental management, but often local bodies are less engaged. Costa Rica's model suggests building capacity and forums for local governments and communities in environmental decision-making improves outcomes. In India, this could mean greater devolution of forest management to Gram Sabhas under the Forest Rights Act, participatory land-use planning in ecologically sensitive regions (Western Ghats, Northeast), and inclusion of indigenous knowledge in climate adaptation planning. India's recent push for district-level climate action plans and urban climate resilience missions would benefit from the inclusive, consultative processes that Costa Rica employed for its national strategies.
- *Align Economic Development with Conservation:* A key lesson is the possibility of decoupling economic growth from environmental degradation. Costa Rica grew its GDP and improved human development while expanding forest cover and shifting to renewable energy. For India, which is industrializing and urbanizing

rapidly, integrating sustainability into growth is paramount. Policies encouraging ecotourism, sustainable agriculture (like agroforestry systems that mirror Costa Rica's silvopastoral PES projects), and green energy can create jobs without undercutting environmental goals. Additionally, carbon finance could play a role – India might explore monetizing ecosystem services (as Costa Rica did) by perhaps creating a domestic carbon market that rewards states or communities for verified emission reductions or removals. The concept of natural capital accounting – valuing forests, wetlands, and biodiversity in economic terms – as done in some Costa Rican analyses, could inform India's planning and make a case for conserving natural assets as foundational infrastructure for climate resilience.

- *Prioritize Environmental Justice and Social Inclusion:* Costa Rica's course correction to involve Indigenous communities and address environmental injustices holds a mirror to India's context, where tribal communities and rural poor often bear the brunt of conservation restrictions and climate impacts. Ensuring tenure security and benefit-sharing (for example, giving communities stakes in ecotourism or forest produce markets) can turn potential conflict into collaboration. India's Forest Rights Act (2006) is a step in that direction; effective implementation can draw from Costa Rica's experience that recognizing community rights leads to better conservation outcomes. Moreover, educating and empowering women in environmental initiatives (akin to Costa Rica's gender mainstreaming in PES and conservation jobs) can amplify success, as women are key environmental managers in many Indian rural contexts.

In summation, Costa Rica's evolving environmental policy showcases that a holistic, well-governed, and inclusive approach can yield a resilient socio-ecological system – one where forests flourish, emissions remain low, and communities derive benefits, thus fostering a virtuous cycle of sustainability. It reinforces the idea that environmental health and human well-being are deeply interconnected, a principle highly relevant to India and any nation seeking sustainable growth. By learning from Costa Rica's successes and missteps, policymakers can adapt these insights to local realities – whether it's crafting state-level PES programs in India's Himalayas, improving inter-agency coordination for climate action, or mobilizing green finance for India's ambitious renewable energy and restoration targets.

Ultimately, Costa Rica's journey from crisis to exemplar underscores a hopeful message: even with limited resources, a country can innovate its way to a greener future, balancing development needs with planetary stewardship. The path is not linear or easy – it requires political will, public support, and continuous innovation – but the benefits, as Costa Rica evidences, are profound and lasting. For India and others, the task is to tailor these lessons in forging their own path to climate resilience and sustainable prosperity.

Takeaways and Lessons for India's Environmental Governance Journey:

- *Community-Centric Conservation:* Empowering local communities with rights, incentives, and responsibilities (as Costa Rica did via PES and recognizing Indigenous roles) leads to more effective and just environmental outcomes. India can amplify programs like Joint Forest Management and Eco-Development by ensuring benefit-sharing (e.g. tourism revenue, carbon credit income) reaches villagers, incentivizing long-term stewardship of forests and wildlife.
- *Integrated Climate and Development Planning:* Costa Rica's example shows the value of integrating climate goals into national development strategies (decarbonization plan, adaptation policy). India should continue to embed climate resilience in sectoral plans (urban planning, agriculture, energy) – for instance, designing infrastructure with nature-based solutions (wetlands for flood control, urban forests for cooling) and scaling renewable energy while protecting ecosystems. A unified vision that economic growth, climate action, and conservation are complementary (not conflicting) can drive holistic policy reforms.
- *Innovative Environmental Finance:* Stable funding is the bedrock of successful environmental programs. India can explore innovative financing inspired by Costa Rica –

such as green bonds for afforestation or clean energy projects, payment for ecosystem services schemes at watershed or landscape levels (perhaps facilitated by public-private partnerships where industries pay communities for watershed conservation), and leveraging international climate finance. A carbon pricing mechanism (tax or market) that channels revenue to ecosystem restoration and low-carbon development could both cut emissions and fund resilience efforts, aligning financial incentives with environmental goals.

- *Strong Institutions and Legal Frameworks:* Underlying Costa Rica's progress is a strong legal-institutional framework (wildlife laws, forest law, climate laws) enforced by capable institutions (MINAE, SINAC). India's well-crafted environmental laws need stronger on-ground enforcement and inter-agency coordination. Investing in institutional capacity – from forest guards and climate scientists to pollution regulators – and improving center-state-local coordination (possibly through empowered environmental councils at state and district levels) will be critical. Moreover, fostering transparency and public participation in environmental decision-making (akin to Costa Rica's open data and public consultation practices) can enhance accountability and public trust in India's environmental governance.

By incorporating these lessons, India can work towards an environmental governance model that not only addresses its unique challenges at scale but also ensures that sustainability and equity are at the heart of its development pathway. The convergence of global lessons and local innovation will be key for India as it strives to protect its rich natural heritage and build a climate-resilient future for its 1.4 billion people.

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