

Legal Model of Conservation in the Galápagos Islands: Replicable Lessons for Sustainability

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ABSTRACT

Purpose: To analyse, from a comparative perspective, the factors that determine the effectiveness of environmental conservation and enforcement mechanisms, as well as their application in the case of the Galápagos Archipelago.

Methodology/Approach: A comparative approach was used based on experiences from Asia, Europe, and Latin America, considering operational metrics, governance mechanisms, and enforcement systems.

Findings: Effective conservation is based on three pillars: zoning with effort limits, multilevel governance, and precautionary enforcement mechanisms with adaptive management. Social legitimacy, meaningful participation, and the use of operational metrics are key factors in closing the gap between regulations and outcomes. The Galápagos emerges as a robust model by integrating zoning, biosecurity, and the regulation of tourism and fisheries through transparency and public monitoring. Challenges persist related to dependence on tourism, pressure from invasive species, and asymmetries in enforcement.

Research Limitation/Implication: Structural challenges persist, related to dependence on tourism, pressure from invasive species, and asymmetries in enforcement.

Originality/Value of paper: The paper proposes adjustments aimed at standardising precautionary thresholds, strengthening open data and audits, diversifying funding sources, and consolidating local technical capacities.

Category: Conceptual paper

Keywords: Galápagos Islands; conservation; zoning; biosecurity

Research Areas: Quality by Sustainability

1 INTRODUCTION

Conservation laws are central to safeguarding humanity's natural and cultural heritage. The 1972 Convention concerning the Protection of the World Cultural and Natural Heritage adopted by the United Nations Educational, Scientific and Cultural Organization establishes state obligations to protect properties of outstanding universal value through legal, administrative, scientific, and financial measures and international cooperation, while UNESCO's recent biodiversity commitments stress the need for regulatory frameworks integrating conservation, sustainable use, local and Indigenous knowledge, and social equity in response to climate change and species loss (UNESCO, 1972; UNESCO, 2025).

Comparative evidence confirms that designation alone is insufficient. In the Mediterranean, the MaPAF framework combines legal and management indicators to assess real protection outcomes, and in Russia Federal Law No. 33 FZ balances conservation with development and local rights (Rodríguez, Rodríguez, & Abdul, 2016; Massé, 2019). In China, Indonesia, Vietnam, and India, reforms emphasise zoning, multilevel governance, regulatory clarity, and local capacity to align conservation with development needs (Nikolaychuk, 2023; Lü, 2019; Lubis, 2017; Nugraha, Febrian, & Chen, 2020). Island microstates such as Seychelles confront fragmentation but advance integrated ocean governance through blue economy frameworks (Saddington, 2023). In Europe, greater coherence among objectives, zoning, and enforcement improves outcomes, though overlaps remain, particularly in England (Dardi & Shanthakumar, 2023; Puritz & Hill, 2020).

In Latin America, Colombia's constitutional anchoring strengthens environmental governance, while Brazil's experience with oceanic archipelagos highlights the need for harmonized legal categories and innovative tools such as legal personality for protected areas (Munévar & Ramírez, 2021). Ecuador's ACUS model in Santo Domingo shows how special regimes and prioritization methodologies can operationalize conservation mandates (Calva, Cacpata, & Montece, 2022). These cases underscore the regional challenge of translating constitutional principles into binding and workable mechanisms.

Within this comparative landscape, the Galápagos Archipelago operates as an exceptional ecological legal laboratory. Its constitutional special regime under Article 258, developed through LOREG and the Galápagos National Park planning instruments, integrates zoning, biosecurity, fisheries regulation, tourism control, and community participation. The Galápagos Protected Areas Management Plan for Buen Vivir embeds precaution, rights of nature, and restoration within a dedicated institutional structure led by the Governing Council and the National Park Directorate. By linking environmental protection and human development under the paradigm of Buen Vivir or Sumak Kawsay, the Galápagos model represents a distinctive framework of integrated and operational conservation (Figure 1).

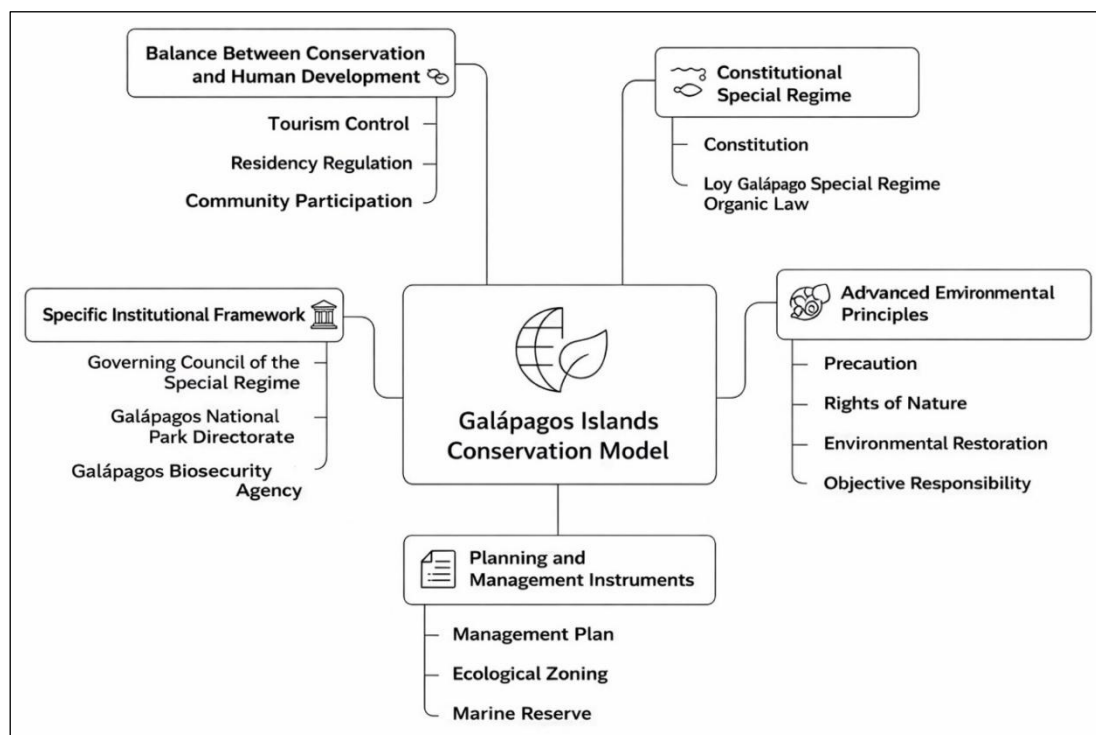


Figure 1 – Conservation model of the Galápagos Islands

However, the challenge is not exclusively normative, as a solid legal architecture does not by itself ensure effective conservation outcomes. In this regard, certain legal and institutional elements function as friction creators, namely limits, controls, and procedures that slow harmful activities and guide behaviour toward sustainability in the face of recurrent pressures such as tourism, fishing, and biological invasions. It is therefore essential to identify which instruments, such as zoning, biosecurity, effort limits, and sanctions, demonstrate greater coherence and effectiveness, how they are articulated with adaptive management, and what lessons can be extrapolated to other island and coastal marine territories in Latin America (UNESCO, 1972; Rodríguez et al., 2016; Massé, 2019).

In this sense, an analysis of the Galápagos legal conservation model makes it possible to identify transferable strategies and lessons for other countries and for insular and coastal marine contexts. The objective of this study is to critically examine this model in terms of its normative design and implementation, extract replicable conservation lessons, and propose improvement strategies that can be incorporated into the current Galápagos framework. The analysis considers enabling governance conditions such as internormative coherence, multilevel coordination, and the existence of effective management metrics, together with legitimacy safeguards grounded in substantive participation and democratic oversight, in order to prevent the drift toward paper parks and to orient instruments such as zoning, biosecurity, effort limits, and sanctioning regimes toward verifiable and socially accepted ecological outcomes.

2 METHODOLOGY

This study adopts a legal dogmatic approach through a case study of the special regime of the Galápagos Islands, aimed at interpreting and systematising the regulatory framework governing conservation in a territory marked by high ecological sensitivity and significant anthropogenic pressure. The analysis consists of a critical review of legal norms, principles, and doctrine to assess their internal coherence and practical applicability in environmental governance. The analytical corpus includes the 2008 Constitution, the Organic Law of the Special Regime of the Province of Galápagos (LOREG), its implementing regulations, current management plans, specialised doctrine, constitutional and administrative case law, and official reports, selected based on validity, normative relevance, and applicability to the insular context.

The study proceeds at three complementary levels. First, it evaluates vertical and horizontal coherence, examining alignment among constitutional, legal, regulatory, and planning instruments, as well as intersectoral consistency among environmental, tourism, and local development policies, considering their evolution between 2008 and 2030. Second, it maps institutional competencies by identifying mandates, gaps, overlaps, and operational capacity in terrestrial and marine protected areas. Third, it incorporates a policy-oriented comparative analysis contrasting the Ecuadorian framework with insular and coastal marine conservation regimes in other jurisdictions, using criteria such as zoning, multilevel governance, compliance metrics, social legitimacy, and transparency.

Evaluation is guided by criteria of normative coherence, enforcement effectiveness, ecological adequacy in relation to conservation objectives and carrying capacity, legitimacy and participation through social oversight, and transparency, emphasising open data, audits, and public reporting. The strategy is strictly documentary, based on systematic interpretation, normative comparison, and triangulation of legal texts, doctrine, jurisprudence, and official statistics. Limitations include potential source bias, uneven data quality, and conditional transferability due to the singular nature of the Galápagos regime; these are mitigated through comprehensive documentary analysis, comparative perspective, and a longitudinal assessment of regulatory evolution.

3 DEVELOPMENT

3.1 Rights of nature, the precautionary principle, and their operation in protected areas

The Constitution of the Republic of Ecuador (2008) represents a milestone in environmental constitutionalism. Articles 71 to 74 recognise Nature as a subject of rights, guaranteeing its existence, persistence, and regeneration, and empower individuals and communities to demand their enforcement, consolidating a biocentric vision inspired by Andean cosmology. Complementarily, Article 73

establishes the precautionary principle, which requires the adoption of preventive measures even under conditions of scientific uncertainty, prioritising the protection of ecological functions and applying the rule in dubio pro natura as an interpretive criterion (Lozano, 2023; Astudillo & Maldonado, 2025).

This recognition is not merely declaratory but constitutes a binding mandate that reconfigures the legal order. The protection of Pachamama acquires the status of a public duty and a substantive limit on public and private decision-making. Within this framework, the precautionary principle functions as a key instrument for preventing serious or irreversible damage under scientific uncertainty, while the right to restoration imposes an obligation of full environmental remediation. The convergence of these elements is particularly relevant in the management of natural protected areas, which constitute the core of national and global biodiversity (Barahona & Añezco, 2020; Garate et al., 2024).

Protected areas cover nearly 20 per cent of the national territory and include national parks, ecological reserves, and wildlife refuges. In these areas, the operationalisation of the Rights of Nature, precaution, and restoration is articulated through the National System of Protected Areas (SNAP), designed to ensure biodiversity conservation, the maintenance of ecological functions, and the collective enjoyment of ecosystem services. Any policy or intervention in these spaces must be subject to reinforced constitutional protection, with strict standards of prevention, mitigation, and remediation (Sandoval, Galarraga, & Galarraga, 2021).

This normative framework is integrated with the paradigm of Buen Vivir (Sumak Kawsay), a guiding constitutional principle that directs public action toward the harmonious integration of society, the economy, and ecological integrity. In protected areas, this requires management decisions that incorporate intergenerational justice, substantive participation of local and Indigenous communities, and territorial equity, so that conservation becomes the foundation of human development compatible with ecological limits. However, the coexistence of an extractive development model with the biocentric mandate undermines the effectiveness of precautionary and restoration principles and weakens public trust. Overcoming these gaps requires strengthening monitoring and social oversight mechanisms, ensuring transparency in environmental information, promoting effective interinstitutional coordination, and fostering citizen participation with real decision-making capacity, in line with the objectives of Buen Vivir and with governance oriented toward verifiable and socially legitimate ecological outcomes (Barragán, 2020; Benalcazar et al., 2024).

3.2 Operational legal model of Galápagos

The regulatory design of Galápagos is grounded in the special regime of constitutional hierarchy established in Article 258 of the Constitution and in the Organic Law of the Special Regime of the Province of Galápagos (LOREG), complemented by the planning instruments of the Galápagos National Park. This

framework establishes clear public purposes, including effective conservation, community well-being, and intergenerational justice, and incorporates friction mechanisms such as effort limits, zoning, biosecurity measures, regulated tourism, sanctions, and mechanisms for substantive participation. These instruments seek to align human activity with ecological carrying capacity and to ensure that the use of natural resources remains within sustainability thresholds (Moya & Muñoz, 2022).

For practical effectiveness, legal mandates must be translated into operational procedures with quantified and verifiable targets. Effort limits require quotas, seasonal restrictions, and permitted gear supported by monitoring and review cycles; zoning demands coherence between terrestrial and marine areas, ecological connectivity, patrol systems, and traceability; biosecurity prioritizes entry controls, early detection, and rapid response; tourism management applies site specific carrying capacities, mandatory itineraries, operational standards, and audited reinvestment; sanctions must ensure proportionality, effective enforcement, confiscation, and environmental remediation; and participation mechanisms must guarantee real decision making influence grounded in local evidence (Rodríguez et al., 2016; Pino & Casanova, 2019).

The connection between design and implementation depends on clear and coordinated institutions, stable multi-annual funding, trained personnel, adequate infrastructure, interoperable information systems, transparency, and accessible environmental justice. Adaptive management reinforces this linkage through public indicators of pressure, state, and response, predefined decision thresholds, and periodic adjustments of quotas, zoning, and biosecurity protocols. Under the principle of *in dubio pro natura*, doubt favours ecological integrity, and restoration is an enforceable obligation in cases of harm, ensuring that normative design yields verifiable and socially legitimate outcomes consistent with *Buen Vivir* and comparative conservation standards (Ochoa, 2024; Díaz, Chiriboga, & Zambrano, 2025).

3.3 Replicable Lessons within leading ecosystem conservation models

Ecosystem conservation has become an essential pillar for ensuring environmental sustainability and biodiversity protection across diverse geographic and regulatory contexts. Globally, various countries have developed legal frameworks and operational instruments that combine zoning, sectoral regulation, access control, and community participation to ensure that conservation objectives translate into concrete and verifiable outcomes. However, the effectiveness of these models depends on institutional coordination, adequate funding, technical capacity, and adaptive monitoring mechanisms. Comparative experiences provide valuable lessons on how to harmonise legal frameworks, operational management, and social participation, offering replicable tools to strengthen conservation at local and regional levels (Villarroel, Rivera-Velasco, & Arandia-Zambrano, 2022). Table 1 below presents an analysis of international ecosystem conservation

models, emphasising their instruments, implementation challenges, and replicable lessons.

Table 1 – Ecosystem conservation models

| Country | Legal Basis or Main Framework | Key Instruments | Implementation Challenges | Replicable lessons | Legal sources/Regulation |
|---------------------------|---|---|---|---|--|
| Ecuador Galapagos Islands | Special constitutional regime Art. 258, LOREG, Galapagos National Park Management Plan, Rights of Nature and Good Living. | Zoning, biosecurity, fisheries regulation, regulated tourism, effort limits, and participation. | Funding and interinstitutional coordination; risk of paper parks if implementation fails. | Regulatory friction combined with adaptive management and meaningful participation. | Constitution of the Republic of Ecuador 2008; LOREG 2015; Galápagos National Park Law. |
| Russia | Federal Law No. 33 FZ with six categories of protected areas and internal zoning. | Specific prohibitions and use mechanisms; recognition of local and Indigenous rights. | Balancing restrictions and resource use under development pressures. | Combine zoning and local rights to enhance legitimacy and compliance. | Federal Law No. 33 FZ; Protected Areas Law of Russia. |
| China | National park system reform; systemic design with forthcoming Protected Areas Law. | Zoning as a central tool; multilevel governance; multiagency coordination. | Full regulatory articulation and operational deployment. | Systemic design and multilevel coordination for coherence and effectiveness. | National Parks Law of China in reform process; Protected Areas Law in reform process |
| Indonesia | Domestic framework plus CITES addressing wildlife trafficking and coastal and marine pressures. | Interinstitutional coordination, regulatory clarity, trade control. | Strengthening sustained coordination and clarity of competencies. | Integrate international commitments with domestic frameworks and agencies. | Biodiversity Conservation Law; Indonesia Protected Areas Law. |
| Vietnam | Operational forest management based on ranger stations and patrol systems. | Planning adapted to altitude, patrol speed, and patrol hours. | Fine-tuning to territorial conditions and local capacities. | Patrol metrics and territorial adaptation to improve effectiveness. | Forest Management Law of Vietnam; Biodiversity Conservation Law. |
| India | Biodiversity regime for maritime zones and | Regulatory and operational adjustments for | Effective enforcement in marine protected areas and | Harmonise marine frameworks with enforcement capacity. | Biodiversity Conservation Law of India; Marine |

| Country | Legal Basis or Main Framework | Key Instruments | Implementation Challenges | Replicable lessons | Legal sources/ Regulation |
|------------|---|---|--|--|--|
| | marine protected areas. | marine enforcement. | regulatory coherence. | | Protected Areas Act. |
| Seychelles | Insular framework with sectoral overlap. | Need for simplification and institutional clarity. | Regulatory fragmentation and overlapping mandates. | Regulatory simplification and clarity of mandates. | Seychelles Protected Areas Act. |
| England | Marine regime within the European and national framework. | Coherence among objectives, zoning, and compliance standards. | Overlapping instruments and coherence gaps. | Align objectives with zoning and verifiable standards. | Wildlife Protection Act of England; United Kingdom Marine Protected Areas Act. |
| Colombia | Normative and institutional system with constitutional and international anchoring. | Articulation of environmental rights and principles for governance. | Maintaining capacity and coordination for implementation. | Constitutional anchoring strengthens legitimacy and compliance | Constitution of 1991; Colombia Protected Areas Law |
| Brasil | Vitória Trindade chain: protection alternatives for oceanic archipelagos. | Harmonisation of categories and jurisdictions; proposal for legal personality of protected áreas. | Coordination across levels of government and productive sectors. | Multijurisdictional harmonisation and innovative legal tools. | Brazil Protected Areas Law; Oceanic Archipelagos Management Law. |

The special regime of Galápagos articulates constitutional mandates concerning the province and the Rights of Nature with the Organic Law of the Special Regime of the Province of Galápagos and the 2014 Management Plan, which integrates terrestrial and marine management through zoning, biosecurity, and limits on fishing and tourism effort. This framework establishes a Governing Council with planning, land use regulation, and interinstitutional coordination powers, and requires monitoring through indicators and protocols to sustain adaptive management and prevent gaps between regulation and implementation. Taken together, institutional design, zoning, and control mechanisms transform the conservation mandate into verifiable and socially legitimate outcomes in a context of high bioinvasion and tourism pressure (Constitution of the Republic of Ecuador, 2008; Organic Law of the Special Regime of the Province of Galápagos, 2014).

Russia consolidates a system of specially protected territories through Federal Law 33 FZ, which establishes categories and internal zoning to regulate uses and prohibitions. Official doctrine and compilations highlight its broad coverage and

implementation challenges, including balancing conservation and resource use (Russian Federation, 1995).

China formalised in 2021 its first batch of five national parks within a multilevel reform aimed at regulatory coherence and integrated governance, with recent progress in registering natural asset rights within these parks, strengthening legal certainty and adaptive management (State Council of the People's Republic of China, 2021; State Council Information Office, 2025).

Indonesia bases conservation on Law No. 5 of 1990 on Living Natural Resources and Their Ecosystems, which serves as the cornerstone for wildlife trade control measures and coordination with international commitments. However, the literature emphasises the need for sustained enforcement and clear allocation of competencies in addressing illegal trafficking (Republic of Indonesia, 1990). In Vietnam, the 2017 Forestry Law strengthens the legal foundation for management and enforcement, while the adoption of the SMART system enhances patrol operations, data collection, and operational feedback, improving adaptive decision making in protected areas (National Assembly of Vietnam, 2017).

In India, the Wildlife Protection Act of 1972 provides the conservation framework, and official reports indicate an extensive network of marine protected areas, with ongoing challenges in coastal enforcement and operational coherence across administrative levels (Government of India, 1972). Seychelles has institutionalised its Marine Spatial Plan through zoning and management plans that seek to align conservation objectives with blue economy development, legally committing nearly 30 per cent of its jurisdictional waters (Government of Seychelles, 2025). In England, the Marine and Coastal Access Act of 2009 enables the establishment of Marine Conservation Zones and related byelaws, supported by technical guidance and scientific advisory protocols that promote verifiable compliance standards (UK Parliament, 2009; Joint Nature Conservation Committee, 2019).

Colombia anchors its environmental governance in Law 99 of 1993, which created the National Environmental System, and in Decree 2372 of 2010, which organises the National System of Protected Areas and its management categories, strengthening interinstitutional coordination and the legitimacy of conservation decisions (Congress of the Republic of Colombia, 1993; Presidency of the Republic of Colombia, 2010). Brazil structures its system under Law 9.985 of 2000 and Decree 4.340 of 2002, which establishes the National System of Conservation Units and its internal zoning. In the oceanic domain, the expansion of protected areas and regulatory alternatives for the Vitória Trindade chain demonstrates both progress in coverage and ongoing challenges in governance and ecological connectivity (Federative Republic of Brazil, 2000, 2002; International Union for Conservation of Nature, 2018).

3.3 Performance evaluation of the Galápagos Islands conservation model

The performance evaluation of the Galápagos model integrates three complementary layers of planning and management. The 2014 Management Plan establishes the conceptual framework, zoning scheme, and monitoring and evaluation system for conservation and sustainable use of the archipelago. In 2015, the Management Model operationalised these guidelines through the definition of programs and projects and the implementation of an external evaluation system that ensures indicator traceability. The Galápagos 2030 Plan incorporates a transparency and openness approach, introducing a public monitoring and indicator classification system to strengthen accountability (see Table 2). This structure ensures coherence among conservation objectives, public use, and the sustainable development of the archipelago.

Table 2 – Performance evaluation of the Galápagos model in accordance with the 2014 to 2020 protected areas management plans

| Dimension | Current Performance / Achievements (based on 2014 Plan and 2015 to 2020 period) | Opportunities for Improvement (Key Actions) | Suggested KPI (definition · unit · frequency · baseline / 2030 target) |
|-------------------------------|--|---|--|
| Governance | Programmatic and project framework defined in the 2015 Management Model, including programs, projects, and interinstitutional coordination. The 2014 Plan establishes zoning and a monitoring and evaluation chapter with indicators. The 2030 Plan aligns axes and objectives with the SDGs and participation mechanisms. | <ul style="list-style-type: none"> • Implement a public dashboard tracking progress by program and project • Formalise coordination spaces such as advisory councils and working groups • Digitise permits and administrative procedures | % projects on track = (green projects or ≥80% completion / total projects) × 100. Quarterly · Baseline: 2025 · Target 2030: ≥90% % procedures digitised = (fully online procedures / total procedures) × 100. Semiannual · Baseline: 2025 · Target 2030: ≥95% |
| Biodiversity and Conservation | High pressure from introduced species (1,579 recorded by 2017; +156 between 2008 and 2017) and ambitious conservation targets such as 95% of species in optimal status as an aspirational benchmark. | <ul style="list-style-type: none"> • Strengthen biosecurity at ports and airports • Prioritise eradication and control in critical islands and sites • Implement systematic ecological monitoring | Number of invasive species eradicated or controlled per year · count · index 0–1 · annual Baseline: establish in 2025 · Target 2030: ≥0.8 |
| Tourism and Public Use | Historical tourism growth of +8% annually since 1979; | <ul style="list-style-type: none"> • Diversify tourism supply, increasing land- | % sites complying with acceptable visitor capacity = |

| Dimension | Current Performance / Achievements (based on 2014 Plan and 2015 to 2020 period) | Opportunities for Improvement (Key Actions) | Suggested KPI (definition · unit · frequency · baseline / 2030 target) |
|----------------------------------|--|---|--|
| | 275,817 visitors in 2018 and 271,238 in 2019 (-1.7%). SIMAVIS functions as an acceptable visitor carrying capacity management tool. | based and community tourism value <ul style="list-style-type: none"> Decentralise visitor flows and reinforce control in sensitive sites Professionalise service quality | (sites meeting capacity / monitored sites) × 100 Quarterly · Baseline: 2025 · Target 2030: ≥95% Average expenditure per visitor (national/international) = USD per visit Annual · Baseline 2014: USD 694.75 / USD 2,296 Target 2030: +15% for both groups and reduced gap between them |
| Local Economy | High dependence on tourism: tourism-related activities represent 64% of provincial gross value added; public administration accounts for 9.4%. | <ul style="list-style-type: none"> Promote local value chains such as agriculture, sustainable fisheries, and manufacturing Support entrepreneurship, innovation, and local public procurement | % non-tourism GVA = share of gross value added not derived from tourism Annual · Baseline: 36% · Target 2030: ≥45% Diversification index (inverse HHI) Target 2030: +20% |
| Energy | Household electricity coverage 99.7%; only 14% renewable energy; electricity subsidy 73%; annual energy subsidy expenditure approximately USD 53 million; demand grows 6.6% annually. | <ul style="list-style-type: none"> Increase renewable energy through solar diesel hybrid systems and storage Improve energy efficiency in urban islands Decarbonise maritime and land transport | % renewable energy = (renewable MWh / total MWh) × 100 Monthly · Baseline: 14% (2019) · Target 2030: ≥50% Avoided tCO ₂ compared to diesel = tons of CO ₂ not emitted due to renewable use Target 2030: ≥35,000 tCO ₂ per year |
| Mobility | 4,536 land vehicles in 2019; 49% without entry permit; 355,000 air passengers in 2019; household internet coverage 41.8%; approximately 60% smartphone usage, indicating a digital divide. | <ul style="list-style-type: none"> Regularise and renew vehicle fleet and discourage unauthorised vehicles Promote shared electric mobility and improve public and maritime transport Implement fibre optic plan and digital literacy programs | % trips using sustainable mobility (public transport, bicycle, walking, shared electric) Annual · Baseline: 2025 · Target 2030: ≥40% % vehicles regularised = (vehicles with permit / total vehicles) × 100 Semiannual · Baseline: 51% (2019) · Target 2030: ≥90% |
| Community (Education and Health) | Basic coverage guaranteed, but frequent medical transfers; limited local higher education; 2030 Plan prioritises quality of life and empowered citizenship. | <ul style="list-style-type: none"> Train technical talent on islands in energy, tourism, biosecurity, and data Strengthen telemedicine and referral networks Promote affordable housing near essential services | Doctors per 10,000 inhabitants · ratio · annual · target ≥ mainland Ecuador % higher education degrees completed on islands Target 2030: ≥25% |
| Habitat and Basic Services | 81.4% of population in urban areas; 3.28% of the territory occupied | <ul style="list-style-type: none"> Accelerate safe drinking water and sanitation systems | % households with safe drinking water Target 2030: ≥95% |

| Dimension | Current Performance / Achievements (based on 2014 Plan and 2015 to 2020 period) | Opportunities for Improvement (Key Actions) | Suggested KPI (definition · unit · frequency · baseline / 2030 target) |
|--|--|---|---|
| | by settlements; 51.3% unsatisfied basic needs; waste generation 0.78 kg per resident per day and 0.85 kg per visitor per day; dispersed urban expansion increases cost and risk. | adapted to volcanic terrain. <ul style="list-style-type: none"> • Implement integrated waste management, including reduction, recycling, and recovery. • Promote compact urban planning and affordable housing near employment. | Waste management rate and generation reduction Baseline 2019: 0.78 kg resident / 0.85 kg visitor per day Target 2030: ≥85% properly managed and –20% generation reduction (approximately 0.62 / 0.68 kg per day) |
| Finance and Institutional Sustainability | High dependence on tourism revenue and public transfers as described in the 2014 and 2030 Plans. | <ul style="list-style-type: none"> • Diversify funding sources, including environmental service fees, international cooperation, debt for nature swaps, and conservation payments • Improve self-management and cost recovery | $\% \text{ non-tourism own revenues} = (\text{non-tourism revenues} / \text{total revenues}) \times 100$ Annual · Baseline: 2024 · Target 2030: ≥30% $\text{Revenue elasticity relative to arrivals} = (\% \text{ revenue change} / \% \text{ visitor change})$ Annual · Target 2030: <1.0 |
| Monitoring and Evaluation | The 2014 Plan defines a management and impact indicator system with periodic reviews; the 2030 Plan emphasises transparency and participation. | <ul style="list-style-type: none"> • Publish quarterly reports and open datasets • Integrate observatories for tourism, energy, and biosecurity • Promote citizen audits | $\% \text{ indicators updated within 12 months}$ Quarterly · Target 2030: ≥95% |

The zoning scheme established in the 2014 Management Plan classifies areas into protection, conservation, and controlled use zones, managing natural resources according to their ecological fragility. Acceptable visitor carrying capacity, measured through SIMAVIS, regulates tourist flows to prevent ecological overload. Compliance with these guidelines serves as an indicator of zoning effectiveness and ensures conservation without compromising tourism development. In addition, the Plan’s monitoring and evaluation system compiles annual and quarterly indicators, externally assessed, enabling management plans to be adjusted based on empirical data and promoting efficient adaptive management.

The 2015 Management Model strengthens the implementation of the 2014 Management Plan by establishing a clear structure of responsibilities, timelines, and continuous evaluation. Each project includes a defined baseline, allowing progress to be measured against established objectives. External evaluations conducted by independent assessors ensure that projects are implemented according to defined standards and that expected outcomes are achieved. This approach guarantees transparency and accountability, which are fundamental to the effective implementation of the model and the continuous improvement of the

Archipelago's management system (Ministry of the Environment of Ecuador, 2014).

The Galápagos 2030 Plan promotes transparency by publishing monitoring results in real time, allowing managers and citizens to track compliance with indicators. The classification of results as achieved, below expectations, or lacking information facilitates decision-making and the identification of areas for improvement. This openness enhances accountability and encourages community participation in conservation and development processes within the archipelago. By integrating technology and access to information, the 2030 Plan strengthens the adaptive capacity of the management model, closing the cycle of planning, implementation, evaluation, and adjustment (Ministry of the Environment of Ecuador, 2019).

4 DISCUSSION

Comparative evidence shows that effective conservation frameworks combine graded zoning, multilevel governance with defined competencies, and participation mechanisms with real decision-making influence. These systems are reinforced by regulatory friction tools such as controls and sanctions that slow high-impact activities and secure minimum ecological safeguards. Their success depends on converting principles into verifiable compliance standards and adaptive management cycles supported by public data and stable financing (UNESCO, 1972; UNESCO, 2025; Rodríguez et al., 2016; Massé, 2019; Villarroel, Rivera-Velasco, & Arandia-Zambrano, 2022).

European and island experiences demonstrate that conservation is most effective when legal design is aligned with technical capacity and operational metrics, including marine byelaws, spatial planning targets, and monitoring systems that link evidence to management adjustments. Conversely, misalignment between objectives, zoning, and enforcement standards increases regulatory inefficiency (UK Parliament, 2009; Joint Nature Conservation Committee, 2019; Government of Seychelles, 2025; Puritz and Hill, 2020; Dardi and Shanthakumar, 2023).

Asia, Russia, China, and Indonesia illustrate complementary strategies such as categorical zoning with recognition of local rights, systemic national park reforms, and alignment of international commitments with domestic enforcement. Vietnam and India highlight the importance of patrol metrics and marine enforcement coherence. In Latin America, Colombia's constitutional anchoring and Brazil's innovative legal approaches, including proposals for the legal personality of protected areas, reinforce legitimacy and governance capacity.

Within this comparative landscape, Galápagos functions as a legal ecological laboratory. Its constitutional special regime, implemented through LOREG and successive planning instruments, integrates zoning, biosecurity, fisheries and tourism regulation, and participatory governance under the framework of Buen Vivir and the Rights of Nature. The 2014 Plan, the 2015 Management Model, and

the 2030 Plan together close the cycle of planning, implementation, evaluation, and transparency, positioning Galápagos as a regional benchmark of verifiable conservation (Constitution of the Republic of Ecuador, 2008; LOREG, 2015; Ministry of the Environment of Ecuador, 2014; Ministry of the Environment of Ecuador, 2019; Barahona & Añazco, 2020; Garate et al., 2024).

However, structural tensions remain, including tourism dependence, invasive species pressure, and enforcement gaps. Strengthening *in dubio pro natura*, restoration obligations, and internormative coherence is essential to prevent sectoral permits from undermining ecological thresholds. Converting indicators into binding standards with precautionary triggers, ensuring open data and interoperable systems, and consolidating financial and institutional innovations such as multi-year trust funds and mandatory traceability would enhance deterrence and sustainability. The long-term projection of Galápagos as a replicable model depends on embedding operational standards into binding law and translating the Rights of Nature into tangible ecological outcomes (Rodríguez et al., 2016; Massé, 2019; Pino and Casanova, 2019; Sandoval, Galarraga, & Galarraga, 2021; Barragán, 2020; Benalcázar et al., 2024; Ochoa, 2024; Díaz, Chiriboga, & Zambrano, 2025; UK Parliament, 2009; Joint Nature Conservation Committee, 2019; National Assembly of Vietnam, 2017).

5 CONCLUSION

Effective conservation is not achieved solely through the designation of protected areas, but through a regulatory and institutional framework that integrates zoning with clear effort limits, multilevel governance with defined competencies, and enforcement mechanisms grounded in precautionary criteria and adaptive management. Only the coherent integration of these elements ensures tangible and socially legitimate outcomes.

The Galápagos special regime represents an advanced institutional architecture in the regional context by combining the Constitution, LOREG, and successive management plans (2014, 2015, and 2030). However, its effectiveness faces structural vulnerabilities, including high dependence on tourism, increasing pressure from invasive species, asymmetries in coastal and marine enforcement, and certain regulatory inconsistencies. Addressing these gaps requires strengthening legal enforcement, ensuring integration between terrestrial and marine management, and consolidating stable technical and financial capacities.

Comparative analysis of Russia, China, Indonesia, Vietnam, India, Seychelles, the United Kingdom, Colombia, and Brazil reveals replicable patterns, including internal zoning with recognition of local rights, systemic frameworks coordinated across agencies, mandatory operational metrics, marine spatial planning with verifiable standards, and constitutional anchoring that reinforces the legitimacy of conservation. These experiences provide valuable inputs for refining the Galápagos model and strengthening its adaptive governance.

Consolidating the insular model requires transforming indicators into legally enforceable standards under precautionary criteria, ensuring externally audited open data, establishing traceability in fisheries, tourism, and biosecurity, conditioning licenses on environmental performance, creating a multi-year trust fund supported by national and international contributions, and advancing institutional innovations such as legal recognition of protected areas and formal registration of natural assets. These measures would strengthen ecological protection, secure regulatory coherence, and enhance the long term institutional resilience of the archipelago.

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CONFLICTS OF INTEREST

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