

Hi-sAFe: A 3D Agroforestry Model for Integrating Dynamic Tree–Crop Interactions

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Article

Integrated Coastal Zone Management in Continental Ecuador and Galapagos Islands: Challenges and Opportunities in a Changing Tourism and Economic Context

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Abstract: The objective of the study is to analyze integrated coastal zone management in mainland Ecuador and the Galapagos Islands, and to discuss its challenges and opportunities in the face of constant changes in tourism and economic realities. The methodology used is based on the analysis of ten key elements to analyze national coastal management: policies, regulations, institutions, strategies, instruments, information, education, resources, managers, and participation. The main results indicate that Ecuador received support in terms of training and international financing for ICZM, but this has not been sufficient to guarantee correct management, due to a high discontinuity in economic and administrative political factors. All this has harmed the development of tourism and the dynamization of the economy in coastal areas. It is advisable to apply new policies where gastronomic and cultural aspects are strengthened.

Keywords: management; decalogue; policies; planning; island Ecuador

1. Introduction

The current state of integrated coastal zone management (ICZM) in Latin America and the Caribbean has made great advancements; several studies have been conducted in countries such as Cuba [1], Mexico [2], Peru [3], Argentina [4], Brazil [5], Chile [6], and Colombia [7]. On the global scale, excellent examples of integrated management practices exist [8], which are critically contributing to maintenance in coastal zones. The physical and ecological interconnections of such living systems allow for the exchange of sediments, the flow of nutrients, and the passage of organisms from one ecosystem to another. Therefore, the understanding of these exchanges, the identification of the discharge in systems, the fragility or robustness of the trajectory, and the effects of possible alterations are fundamental elements in the design of management plans for any ecosystem. Coastal zones are environmentally dynamic areas, where earth, atmosphere, sea, and continental waters interact among them. The benefits that these areas offer society include the protection of their inhabitants, their ecological wealth, and a variety of sea-based livelihoods [9]. The

composites of sediments, floods, and saline elements provide for a diverse terrestrial ecosystem on the coast. The beaches and dunes are interdependent and continually exchange sedimentation, and it is this interaction that makes for a critical impact on evolution and development throughout the coasts. The integral management of coastal zones should consider that these diverse ecosystems are interconnected from the highest elevation to the continental plateau via the diversity of biotic and abiotic components [10].

Climate change is already posing a serious threat to today's world. Severe consequences are impacting coastal zones such as sea-level rise, ocean acidification, and loss of beaches, among other impacts [9,10]. Furthermore, coastal areas are subject to high environmental stressors due to increasing population growth; urbanization; tourism; as well as the excessive use of resources, in particular to obtain sources of energy [11]. Innovative and integrative policies are required when considering economic development in coastal areas. In essence, ICZM is a mechanism for bringing together multiple participants, stakeholders, and relevant decision-makers in these coastal zones to ensure more effective ecosystem management. These dynamic strategies are important, especially in order to innovate new forms of sustainable tourism in these areas [12].

It is estimated that at least 60% of the world's human population lives within the coastal strip, ranging from the shoreline up to 60 km inland. Moreover, many coastal areas are attracting development activities at a higher rate than inland areas. As a result, immense pressures are created on coastal wetlands due to housing and industry expansion, port developments, and tourism activities, all leading to increased concentration of pollutants and depletion of natural resources [13]. Anthropogenic activities and their inefficient practices generally alter the dynamics of the coastline, resulting in serious coastal erosion processes [14,15].

In coastal areas, conflicts are often the result of competition over the allocation of coastal resources. Typical conflict examples include incompatibility between sectoral uses that cannot coexist at the same time, private ownership that prevents public use or access to coastal resources, long-term sustainable development goals that prevent short-term economic benefits, and the construction of infrastructure to protect the coasts [16,17]. In addition, the sustainable use of coastal resources can be severely affected by artificial and natural disruption of coastal processes, including cumulative impacts from large-scale development projects, gradual alterations such as climate change and rising sea levels, episodic natural phenomena such as storms and floods, or sudden man-made disasters such as large oil spills. Such combined human and natural factors have the potential to detrimentally augment the impact on natural functions and processes in coastal zones [18,19].

In the last decades of the twentieth century, the need to implement more effective and integrated coastal zone management (ICZM) has been increasingly recognized, particularly noted in the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, Chapter 17 of Agenda 21. This impulse involves the recognition of the existing coastal spectrum of stakeholders to collaborate with the complexities of government institutions and agencies who hold regulating functions in the marine, intertidal, and terrestrial sectors. [20,21]. The conservation and proper management of coastal zones can greatly contribute to the mitigation of impacts in the event of storms, ultimately saving lives and preventing damage of material and infrastructure. Those responsible for development look to source preliminary information on these issues from management professionals in their daily work within coastal areas and protected marines. On a daily basis, these professionals deal with a wide range of situations, events, and problems, ranging from purchasing boats to securing financial support. Furthermore, these diverse actions take place often in remote locations, where there is little to scarce access to sources of information or assistance [22,23].

Currently, the trend in marine protected areas is to seek a customized management approach based on the presence and characteristics of their ecosystems. Marine protected areas endow critical support to combat the effects of climate change. The main reason and objective for the creation of protected areas in coastal zones is to protect and conserve biodiversity without neglecting the elevated interest of social and economic components [24].

From 1950 to 1990, the Ecuadorian coastal population accelerated rapidly. According to the latest official population figures from Ecuador, habitants increased from 33% in 1950 to 50% in 2017. This

population increase has generated a combination of impacts on the ecosystems of the coastal marine zones, generating a detrimental loss of productivity in the natural systems. The combination of accelerating human populations and the decreasing productivity of these ecosystems for resources and incomes has increased the correlated relationship between poverty and environmental degradation in coastal areas [23,25].

Due to its unique geomorphological and climatic characteristics, Ecuador's marine and coastal areas include a wide diversity of ecosystems, thereby supporting high biological diversity. In the coastal spaces, 29 distinct ecosystems have been identified, ranging from the evergreen forests of Chocó in the north, to the deciduous and semi-deciduous forests of Jama-Zapotillo in the southern limit [18,22]. These ecosystems are under great pressure due to anthropogenic activities. Approximately 3.38 million hectares make up the coastal cantons, with an estimated 45% occupied in land management practices. The remaining 55% is notably overgrown with natural vegetation; however, the severity of the fragmentation occurring in these sectors is causing increasingly smaller patches of these natural ecosystems, ultimately reducing their functionality. This is one of the main causes of loss of diversity in natural ecosystems [19].

The distribution of land management within these 29 districts shows a predominance of intact natural habitats, covering around 55.4% of the total surface area, followed by agricultural practices with 36%. Other urban applications and fishing uses occupy the remaining 8.5% of the total area of these coastal districts. Technical reports from the development plans and territorial planning of these coastal districts as well as technical reports from the Ecuadorian Space Institute show that agricultural practices are continuously expanding, emphasizing the dominant cultivation expansion of cocoa, banana, coffee, and African palm. The economic activities that constitute the greatest contributions to the gross profit of the districts within this coastal profile are related to manufacturing, agricultural, and environmental services.

The main objective of this study is to provide an analysis of integrated coastal zone management from a governance perspective in mainland Ecuador and the Galapagos Islands, as well as to discuss its challenges and opportunities around the principle strengths and weaknesses in the face of constant changes in today's tourism and economic realities. Finally, ideas are put forward for a new political agenda that will enable economic development and dynamization from a touristic perspective.

2. Materials and Methods

2.1. Materials

Ecuador's territory constitutes a geographical and historical niche of natural, social, and cultural diversity through the legacy of its precedents and ancestral peoples [23]. Ecuador has a population of 16.8 million inhabitants. This territory covers 256,370 km², including the Ecuadorian mainland and the Galapagos Islands [24]. The surface area of its aquatic spaces, continental plateau, and seabed is 1,367,188 km² [25]. Ecuador is a constitutional state, being social, democratic, sovereign, independent, unitary, intercultural, and plurinational. It is organized as a republican system and governed in a decentralized manner [23].

Ecuador is located in the northwestern part of South America (Figure 1), on the equatorial line with its territory falling in both hemispheres. The Pacific Ocean lies on the west coast of Ecuador with Colombia on its northern border and Peru to the south and east [25]. This diverse country is made up of lush landscapes divided into four regions: Coast, Andes, Amazon, and Galapagos. The Galapagos Archipelago consists of 13 main islands, 17 islets, and dozens of ancient rocks. The coast is a region comprised of the five provinces (Esmeraldas, Manabí, Santa Elena, Guayas, and El Oro), which are important to the Ecuadorian economy and are divided into the 29 distinct coastal districts of focus in this research. Located to the west of the Andes mountains, and intercrossed with extensive alluvial plains, the economy of these regions is based on tourism, agriculture, and fishing, among others. The climate varies throughout the year, affecting tourism [26].



Figure 1. Map of Ecuador, Administrative Divisions [27].

The Ecuadorian coast is characterized by an agro-export economy based on large plantations of varied production. In order to meet the demand of national and international markets, the coast is extensively cultivated with important products such as banana, coffee, cocoa, rice, soybean, sugar cane, cotton, and a diversity of fruits and other tropical crops [28]. Mangroves and the marine environment are critically sensitive habitats for fish and crustaceans, which are sustainably managed by small fishermen who benefit from the abundance of these natural populations. Furthermore, hundreds of people work on shrimp farms, with shrimp being one of the main exported resources; such farms occupy over 126,000 hectares of coast.

2.2. Methods

The present study has used a method known as the mandates for integrated coastal zone management (ICZM) [29], which is based on an analysis of the main deficiencies of the coastal management system from a governance perspective in mainland Ecuador and the Galapagos Islands; it also discusses the challenges and opportunities faced by Ecuador and the Galapagos islands regarding their principle strengths and weaknesses in the face of constant changes in tourism and economic realities. This methodology consists of 10 strategic indicators for coastal management (Table 1) in terms of sustainability and governance, to be used as principles in public policies for proper coastal management. This methodology has been tested in several countries in Latin America, including Peru, Cuba, Mexico, Argentina, Brazil, Chile, and Colombia [1–7].

Table 1. Decalogue for the analysis of integrated coastal zone management (ICZM).

Aspect	Objective
1. Policies	Determine the existence, if any, of institutional policies on integrated coastal management. Initiatives are detected by NGOs, political parties, and universities, among others.
2. Regulations	Indicate the legal basis governing integrated coastal management, resource management, or coastal activities. Analyze the situation of field regulations with respect to coastal management.
3. Management Strategies	Presence of distribution plan of public responsibilities in relation to the management of coastal spaces and resources, and the analysis of their effectiveness.
4. Institutions	List the institutions involved in marine coastal management issues and qualitatively analyze their relationship with integrated coastal management.
5. Instruments	Identify strategic and operational instruments of interest for integrated coastal management and their functionality.
6. Education and Training	Analyze the training plans for the administrators and managers of integrated coastal management and pinpoint the shortcomings detected.
7. Economic Resources	Understand the coastal management budget for its sustenance and application by means of a qualitative analysis.
8. Literacy and Information	Determine the degree of literacy of coastal subsystems and accessible public information relating to the management model.
9. Education for Sustainability	Identify the main educational initiatives for citizens and general coastal users related to the sustainability of the shoreline and marine environment.
10. Citizen Participation	Document whether the indicated decision-making methods for integrated coastal management incorporate citizen participation.

After establishing the aspects to be evaluated through the mandates, the research was carried out through bibliographic analysis, documentary reviews, and in-person interviews (120 legal and management studies including constitution, laws, plans, programs, and strategies, among others, and 20 interviews (Table 2) that were designed to analyze tourism and economic perspectives with independent managers and tourists, public officials, and academic experts in ICZM). These resources were valuable tools to comprehend the current situation and progress on ICZM in Ecuador. The study period ranged from the implementation of Ecuador's coastal resource management program (1986–2008) through its political changes during the period of the citizen's revolution (2007–2017), following all the way to the current 2019 analysis of possible coastal policies, which are yet to be implemented.

Table 2. Nature of interviews.

Type	Actors	Mode	Questions
Informal Talks	Independent managers and tourists	Face-to-face interview group discussions	Tourism and economic perspectives. Current situation and progress on ICZM.
Semi-structured interviews	Public officials	Telephone and email interviews, bilateral interviews	
Structured interview	Academic experts	Face-to-face interviews, bilateral interviews	

Sufficient information was gathered from the bibliographies, documental resources, and interviews about the ICZM mandates. A final analysis of ideas were put forward for a new political agenda that could enable economic development and dynamization from a tourism perspective on the continental coast and in the Galapagos Islands regions.

3. Results

3.1. Management Model for the Coastal Zone of Ecuador

After an in-depth bibliographic and documental analysis of coastal zone management of the last three decades in mainland Ecuador and the Galapagos Islands, as well as applying the mandates [30] (Table 1) for ICZM, the following results are evident:

3.1.1. Policies

In 1985, Ecuador created the Coastal Resource Management Program, which pioneered the country in the management of its coasts and resources. Many of these conceptual developments and experiences served to organize efforts in other countries worldwide.

Currently, in Ecuador, a National Oceanic and Coastal Policy has been in force since 29 December 2011, approved by Executive Order No. E.05. 990. This policy addresses the need to develop scientific and technical research, productive and logistical activities, sustainable exploitation of coastal and marine resources, and the conservation of natural and cultural heritage. Furthermore, the policy addresses the control of pollution and the protection of the coast against natural and/or anthropogenic threats, and the safety and defense of marine areas of national interest. These mandates specifically enforce policy number nine (9): the ordering to articulate the various human interventions in a coherent, complementary, and sustainable manner. These policies are conceived with a political oceanic vision of the Ecuadorian state, promoting a strong marine awareness within its population. With this framework of policies, the coastal marine spatial plan (CMSP) was formed and projected until the year 2030, in accordance with the country's development perspectives, as well as the objectives of the United Nations' Sustainable Development Agenda 2030 [23–27,31].

The Government of Ecuador is aligned with the policies of the United Nations (UN) and the World Tourism Organization in promoting inclusive tourism. Since the beginning of its mandate, the current government has placed tourism as a national objective, considering that the country has all the characteristics to be a leading destination in the world. It is currently socializing a new national tourism policy to promote the country as a power in the sector. To this end, three main lines of action are considered: promote local tourism incentives, develop safe destinations, and innovate products and services. The new government policies seek to consolidate tourism as a dynamizing element of economic and social development, with the participation of the public sector under the guidelines of the Ministry of Tourism; decentralized autonomous governments; and the participation of private sectors and community actors through all chambers of tourism, unions, and local communities [31].

3.1.2. Regulations

Both marine and coastal zones are subject to numerous regulations that administer uses and activities for public and private action. In the marine environment, national norms coexist with those derived from international agreements and conventions to which the Ecuadorian State has adhered, ratifying them and obliging itself to comply with and further develop these norms; while in the terrestrial environment, the Ecuadorian State has endowed the regulations of its own activities. The CMSP seeks to establish the order of uses, activities, and infrastructure within the scope defined by the Ecuadorian national marine interests, taking into consideration the National Oceanic and Coastal Policies issued by the Interinstitutional Sea Committee on 20 October 2014 and published in Official Registry No. 383 of 26 November 2014 [32].

The Unified Text of Secondary Legislation—Environment, according to Executive Order No. 3516, Official Register Special Edition No. 2 of 31 March 2003, is a regulation in which the basic

environmental policies are established in Book V on the environmental management of coastal resources [33].

In 2018, the project for Marine and Coastal Protected Areas Network was officially launched with the objective of substantially improving the conservation and sustainable use of marine and coastal biodiversity of continental Ecuador through the effective management of protected areas. The project is financed by the Global Environment Facility and executed by the Undersecretariat of Marine and Coastal Management of the Ministry of the Environment, Conservation International Ecuador, and WildAid. The project has three components: to improve technical and institutional capacity with a normative base, to implement a sustainable financial mechanism, and to establish administrative structures within the framework of the National System of Protected Areas [34].

Various regulations exist in the field of tourism, including laws (in particular the Tourism Law), three decrees (General Regulation of Tourism Activities, General Regulation of the Tourism Law, and Special Regulation of Tourism in Protected Natural Areas), and a resolution (Instructive for the Departments of Registration and Control of Tourism Activities of the Ecuadorian Tourism Corporation). There are approximately fifty related regulations (laws, codes, decrees, reforms, manuals, instructions, resolutions, and ministerial agreements) in various areas (accommodation, transport, trade, services, operations, tariffs, and sanctions) that contribute to proper tourism management.

3.1.3. Management Strategies

In relation to the management strategies of coastal zones and resources, it is important to note that Articles 141 and 147 of the Ecuadorian Constitution grant powers to the President of the Nation over the stewardship, planning, execution, and evaluation of national public policies and the plans created to implement them, which will be submitted to the National Planning Council for approval [24].

Responsibility for coastal management in the continental zone lies within the districts' Decentralized Autonomous Governments. In the Galapagos Island region, the Territorial Plan is a planning tool that provides development guidelines. The Organic Code of Territorial Organization Autonomy and Decentralization establishes the attributions of the Government Council of the Special Regime of Galapagos: to dictate the general policies for the conservation, sustainable development, and regime of the well-being of the province of Galapagos, subject to national policies; to exercise environmental management in the province of Galapagos; and to formulate the provincial plan for the Sustainable Development and Territorial Ordering of the Special Regime of Galapagos [22,24].

The 2008 Constitution recognizes and guarantees people the right to a dignified life that ensures, among other things, rest, recreation, and leisure, as well as the right to free time, which can be exercised through the various forms of tourism established by law. The National Council of Management regulates the faculties and attributions of the municipal, metropolitan, provincial, and rural parish governments, with respect to the development of tourist activities by means of Resolution No. 0001-CNC-2016 of 11 March 2016 and published in the Official Registry No. 718 of 23 March 2016. The Ministry of Tourism is the supreme authority of tourism activity at the national level. Among its powers is the promotion and encouragement of all types of tourism, especially receptive and social. The Ministry of Tourism governs the implementation of projects, programs, and the provision of complementary services with organizations, entities, and public and private institutions, including indigenous and peasant communities in their respective localities.

3.1.4. Institutions

In the coastal marine zone, numerous institutions collaborate (Table 3) with their distinct attributions, as well as other stakeholders with active implications in planning and management. The main institutions and the role they play in the coastal marine space are detailed below:

Table 3. Institutions and their role in coastal maritime space.

State Level	Institution	Roll
Ministry of Security Coordinator	Joint Command of the Armed Forces of Ecuador	Defend sovereignty and territorial integrity. Support national development mission. Contribute to public and State security. Participate in peace operations and humanitarian aid.
	Navy of Ecuador	Develop marine capabilities and provide comprehensive safety in aquatic spaces. Manage the safety of aquatic spaces by controlling maritime and river activities, navigation safety, and safety of human life at sea. Collaborate on the control of the coastal marine environment.
	Military Geographic Institute	Manage and execute the activities of research, generation, and control of geoinformation, and transfer of knowledge and technology in the fields of geodesy, geomatics, cartography, and technological development.
Ministry of the Environment	Sub-Secretariat for Coastal Marine Management	Direct, manage, and coordinate the conservation, restoration, protection, and sustainable use of Ecuador's marine and coastal resources and biodiversity.
	Directorate of the Galapagos National Park	Conserve ecological integrity and biodiversity of the island and marine ecosystems of the archipelago's protected areas, as well as the rational use of the goods and services they generate for the community.
	Agency for the Regulation and Control of Biosafety and Quarantine for Galapagos	Control, regulate, prevent, and reduce the risk of the introduction, movement, and dispersion of exotic organisms, by any means, that endanger human health and the conservation of the ecological integrity of the island and marine ecosystems and biodiversity of the Galapagos province.
Governing Council of the Special Regime of Galapagos		Planning, resource management, and organization of activities carried out in the territory of the Galapagos province and inter-institutional coordination with State institutions.
Ministry of Tourism	Under Secretariat for Management and Development	Direct and coordinate actions aimed at strengthening the capabilities of human talent working in tourism; quality management in tourism activities and modalities; and promoting innovation in products, services, and destinations, with the aim of increasing levels of satisfaction of tourists and enhancing tourism management.
	Under Secretariat for Regulation and Control	Define policies and strategies for registration, regulation, control, capacity building, quality management, innovation, territorial planning, development of facilities, signposting, and safety coordination of tourist activities and modalities; improve the quality of tourist destinations and services, strengthen sustainable and conscious tourism.
	Under Secretariat for Markets, Investments, and International Relations	Define policies and strategies for the diversification and prioritization of markets; the development of connectivity; and the strengthening of marketing channels, national and international distribution networks, and mechanisms for the insertion of touristic product offerings.
Ministry of Finance	Central Bank of Ecuador	Guarantee the liquidity of the Ecuadorian economy through the implementation of monetary, credit, exchange, and financial policies.

3.1.5. Instruments

Article 280 of Ecuador's Constitution establishes that the National Development Plan (NDP) is the instrument to which public policies, programs, and projects will be subject. These policies include the programming and execution of the State budget; the investment and allocation of public resources; and the coordination of exclusive competencies between the central State and the decentralized autonomous governments. Its policies will be mandatory for the public sector and indicative for other sectors.

The NDP 2007–2010 promotes the proposal related to the coastal zone with the objective of approving a future policy for the management of the coastal zone and its resources. In the 2010–2017 NDP, which focus on spatial planning and exploitation of marine resources, ICZM policies lose importance, ultimately lowering the quality of environmental policy management.

In 2009, the National Secretariat for Planning and Development focused on developing a management instrument based on the zoning of Ecuadorian territory (Figure 2), with the intention of improving sector coordination and effectively managing public investment. It is here where the local agendas arise in the Decentralized Autonomous Governments for the analysis and management of coastal areas and coastal-marine transition.

For the period 2017–2021, the National Development Plan of the Galapagos and coastal areas is prioritized and considered strategic. The coastal zones present deficiencies in management, as they are considered to be limited to only marine space, and not as a coherent unit within an ecological, social, or economic aspect. For example, marine–coastal natural resources are associated with inland waters, the marine territory, the contiguous zone, and the exclusive economic zone. To solve this problem and to develop an effective coastal policy, the National Secretariat for Planning and Development (SENPLADES, Spanish acronym) proposed the drafting of the Plan for the Coastal Marine Area in 2014.

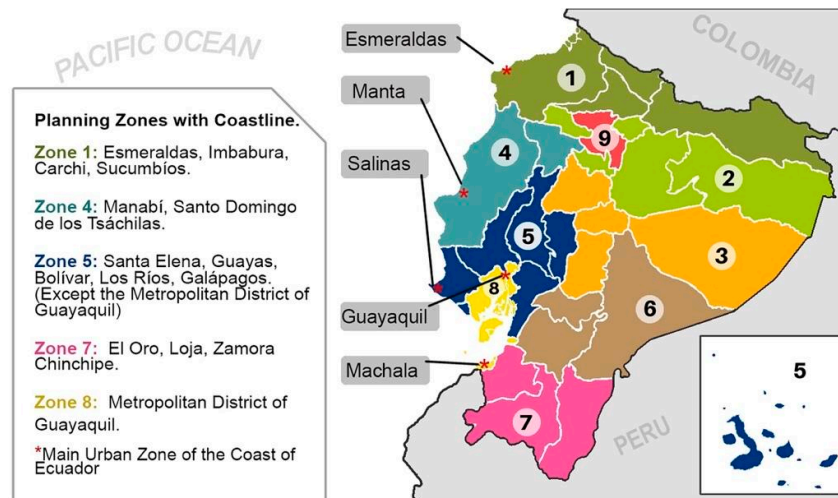


Figure 2. Planning areas in Ecuador, National Secretariat for Planning and Development [35].

The main existing planning instrument (Table 4), the Coastal Marine Spatial Plan, has four purposes: (1) to improve decision-making in the coastal marine space; (2) to mitigate the impact generated by diverse activities in fragile environments; (3) to protect the natural environment, which is fundamental to guarantee life, by reducing natural and anthropogenic threats; and (4) to strengthen the processes of administration and control among the Decentralized Autonomous Governments by the Central Government and local actors to achieve integral management of the coastal marine zone. It is important to detail the most relevant instruments for support of the management of coastal maritime space.

Table 4. Main instruments for coastal marine management.

Continental Ecuador	
Instrument	Purpose
Environmental Management Law	Establish the environmental policy and indicate the permitted limits, controls, and sanctions in this matter. Constitute a tool for the protection of ecosystems. Improve the quality of life of communities that depend on coastal marine resources and maintain the diversity and biological productivity of these ecosystems. Last modified in May 2016.
Forestry law and conservation of natural areas and wildlife	Regulate the conservation, protection, and management of marine flora and fauna. Promote the sustainable use of marine and coastal resources. Last modified in December 2014.
Tourism law	Guarantee the rational use of the natural, historical, cultural, and archaeological resources of the nation, and promote the coordination of the different levels of the National Government and local governments for the achievement of tourist objectives related to the coastal marine space. Last modified in December 2014.
Fishing area reserved for artisanal fishing	Establish fishing areas reserved for artisanal fishing. Declare reserved areas exclusively for artisan fishermen, including eight marine miles measured from the line of the continental coastal profile, and the Puna Island of the Gulf of Guayaquil. Establish geographic coordinates and reference points.
Regulations that regulate whale and dolphin watching in Ecuador	Regulate the activity of whale and dolphin watching in Ecuadorian waters in public and private vessels dedicated to tourism and recreation, in order to safeguard human life at sea and ensure the conservation and protection of these species. Ministerial Agreement 30 June 2014.
Cultural Heritage Law	Issue provisions for the control of tangible and intangible cultural heritage of the coastal marine space. Official Register 2004.
Regulations on activities directed at underwater cultural heritage	Regulate the activities directed to the Underwater Cultural Heritage. Executive Decree No. 1208 of 2008.
Procedure for Sustainable Use Agreements and Mangrove Custody	Regulate mangrove concessions in favor of ancestral communities and traditional users. Ministerial Agreement No. 129, last amended 2014.
Galapagos	
Instrument	Purpose
Regulations to the Special Law for the Province of Galapagos.	Establish the administrative legal regime that the articles in the law references and the respective organizations of the dependent sectional regime and the autonomous sectional regime. All in reference to the human settlements and their related activities to health, education, basic services, conservation, and sustainable development, among others. Executive Order No. 358, last modified 2012.
Environmental standards for tourism in protected areas of Galapagos	Establish environmental standards for tourist operation boats, and their competencies and procedures, to comply with legal provisions on the administration and management of protected areas of the Galapagos Archipelago.
Administrative Statute of the Galapagos National Park.	Establish the legal regime for the application of the regulations and procedures to be implemented in order to fulfill the legal dispositions on the administration and management of the protected areas of the Galapagos Archipelago. Ministerial Agreement 208 of 2007, last amendment 2016.
Regulations for fishing activity in Galapagos marine reserve	Establish the administrative regime for artisanal fishing in the Galapagos Marine Reserve, in order to ensure responsible conservation and sustainable use of bio-aquatic species existing in it. Ministerial Agreement 173 of 2008, last amendment 2013.
Technical Standard for main and accessory tourist activities.	Determine minimum levels of quality in tourist services and activities for the tourist operation of "Navigable Cruises" in the Galapagos National Park and Galapagos Marine Reserve. Ministerial Agreement 75 of 2009.
Management plan for protected areas of Galapagos for good living.	An instrument used for technical planning that governs and merges the environmental management of the protected areas of the Galapagos National Park and the Galapagos Marine Reserve. The instrument contains the principles, guidelines, and standards to achieve harmonious coexistence between the rational use of resources, environmental goods, and services generated, and the conservation of ecological processes. Determining the functionality of ecosystems immersed in protected areas is a vision resulting from conceptualizing Galapagos as a socio-ecological system based on and sustaining the well-being of the local population. Ministerial Agreement 162 of 2014.

To enforce compliance with tourism regulations in coastal areas, general instruments were established to sanction misconduct activities, which impose varying degrees of fines or punishments according to severity.

3.1.6. Education and Training

In Ecuador, there are 29 public universities and 22 private universities, 82 public technical and technological institutes, and 84 private individual institutes. The 217 higher education institutions offer a total of 2102 careers. Of all the undergraduate or graduate degree programs offered, not one of them meets the needs of integrated coastal management [36]. It is important to clarify that there are universities and careers in the coastal strip (Table 5) that focus on oceanic, coastal, and marine biodiversity, located in the area of influence of port facilities with a slight affinity to management:

Table 5. Careers related to the oceanic and coastal environment.

University	Career
Pontifical Catholic University of Ecuador	Environmental management
Lay University “Eloy Alfaro” of Manabí	Biology
Santa Elena Peninsula State University	Marine biology
University of Guayaquil	Biology
Ecole Polytechnique du Littoral	Oceanic engineering and environmental sciences, with a specialization in marine biology
Technical University of Machala	Environmental management
University of San Francisco de Quito, Galapagos	Environmental sciences

The Coastal Marine Spatial Plan addresses the problems prioritized in the diagnosis of the coastal marine space, and establishes objectives, guidelines, and indicators that are framed in the National Oceanic and Coastal Policies and Sustainable Development Goals. These guidelines are necessary for the management of the coastal marine space, through institutional articulation and the distinct levels of government. With regard to education and training, there has been scarce marine awareness among the population due to the lack of mechanisms for the formation of personal identity with their local sea and its importance for national development. One of the proposals in objective 5 aims to strengthen marine awareness and ocean literacy within the Ecuadorian population, according to the country’s oceanic political vision, thereby developing and promoting training, scientific research, and technological innovation for the society on awareness and solidarity for oceanic and coastal marine areas.

The formula to strengthen marine awareness and ocean literacy within the Ecuadorian population is centered on (a) incorporating curriculum programs into the educational system with contents referring to the marine and coastal zones with an oceanic political vision of Ecuador and (b) developing specific trainings on the importance of the coastal marine spaces, with an oceanic political vision of Ecuador, for public and private actors.

The institutions in charge of the development of the proposed guidelines are Ministry Coordinator of Knowledge and Human Talent, National Secretariat of Science and Technology, Ministry of Education, Ecuadorian Navy, Ministry of the Environment, General Directorate of Marine Interests, Ministry of National Defense, and Ministry of Coordination of Strategic Sectors.

The Directorate of Quality and Technical Training of Ecuador has developed training courses in coastal areas and Galapagos to provide comprehensive training to operational, administrative, and managerial personnel who are part of the tourism sector, as well as complementary and indirect actors in tourism. These courses allow the beneficiary to improve and enhance their skills, abilities,

attitudes, and technical knowledge and put them into practice in the establishments where they work. In addition, as part of the Plan Toda una Vida, the State provides a permanent formation for participants, free of charge. The training offer includes courses in jobs such as receptionist, waiter, sales agent, hospitality worker, manager and administrator of tourism enterprises, and food security worker, among others. The trainings for the facility of the population are online and free, and, in general, they are longer than 40 h.

3.1.7. Economic Resources

The economic contributions for coastal marine management come from the highest economic and institutional levels. The Ministry Coordinator of Economic Policy facilitated by the Ministry of Finance and the Central Bank of Ecuador are responsible for ensuring the liquidity of the Ecuadorian economy, through implementation through monetary, credit, exchange, and financial policies.

Having reviewed the available information regarding the application of the constitutional mandate and public policy, the historical records indicate the following: the sectoral planning, programming, and budgets give negligible attention to the management of marine zones and, in particular, provide little for the prevention and control of threats to marine biodiversity.

In contrast, data from the Ministry of Finance of Ecuador show that economic resources for institutions related to coastal marine issues (Table 2) have increased considerably in the last decade. The allocation for management, research, education, and training, among others, was subject to notable fluctuations due to bureaucratic factors and non-ideal investments. On the other hand, it is observed that budgetary allocations destined for the execution of programs and projects in coastal marine management issues at the level of the Annual Operational Plans are notoriously low in relation to the total budget of the institutions (Table 2), being only 10%.

It should also be noted that, despite this information being available to the public, it does not include the detail assigned to programs and projects in matters of coastal marine management. It is clear that in order to make changes in policies, specific budgetary allocations without ephemeral end dates are required, which would guarantee the execution of long-term programs, as required for proper management. During the last few years, institutional budgets have increased, and in terms of management, the institutional Annual Operational Plans have been accompanied by limited financial distribution.

Ecuador had already been a tourist power for several years when the Ministry of Tourism launched some campaigns of global relevance such as “All You Need Is Ecuador”. This country is the territory of the “four worlds”, so in just a few hours you can move from the peaks of the Andes to the Pacific coast, to the Galapagos Islands to the mysterious depths of the Amazon jungle. Currently, the importance of tourism in Ecuador’s economy is indisputable. The increasing activity continues to consolidate its participation in economic production, employment, foreign exchange, and recognition. The financial contribution of tourism in the country is comparable to exports of bananas, tuna, roses, and shrimp.

3.1.8. Knowledge and Information

One of the objectives for the Coastal Marine Spatial Plan is (a) to strengthen the marine awareness and ocean literacy within the Ecuadorian population, according to the country’s oceanic political vision and (b) to encourage scientific and technical research and innovation throughout the marine and coastal zones, in order to improve the awareness and availability of biotic and abiotic resources. These objectives seek to comply with oceanic and coastal policies that seek to reduce vulnerability, while improving the adaptation of populations and ecosystems to climate change and natural events affecting the oceanic and marine-coastal zone, and to develop and promote scientific research and technological innovation for a just society in the oceanic and marine-coastal environments.

The Ecuadorian government, through its legislation, prioritizes awareness and information through scientific and technological research in order to promote the change of its productive matrix, with its essential purpose to improve the articulation and enhance the interaction between the

educational system, the literacy-generating institutions, the technological innovation processes, and the productive and commercial sectors. Despite all these attempts, it is clear that the links between institutions (ministries, academic institutes) and civil society are inefficient. The decrease in the budget in recent years for research and literacy implementation has had a critical debilitating impact on society related to ICZM issues in Ecuador.

3.1.9. Sustainable Education

The main education initiatives designed for citizens and coastal users concerning coastal and maritime sustainability are observed in Section 10 of the project Marine Spatial Plan. In order to address the problems prioritized in the diagnosis of the coastal marine space, it is important to clarify the objectives, guidelines, and indicators framed in the National Oceanic and Coastal Policies and Sustainable Development Objectives (Table 6). These guidelines are necessary for the management of the coastal marine zone, through institutional articulation and the distinct levels of government in the field of sustainable education.

Table 6. Proposed measures to improve sustainable education.

Problem	Objective	Policy
Low marine awareness in the population due to the lack of mechanisms for personal identity formation with the sea and its importance for national development.	Strengthen the maritime awareness and knowledge of the sea of the Ecuadorian population, according to the country's ocean political vision.	To develop and promote training and scientific research with technological innovation for a just society, in the coastal, oceanic, and marine fields.
Lack of information about potential areas for the exploitation of marine species and geological resources in the marine zones, continental shelf, and probable areas of extension.	Encourage scientific-technical research and innovation throughout the oceanic and coastal zone, to improve the knowledge and availability of biotic and abiotic resources.	

The guidelines (Table 7) that have been adopted to improve the education of citizens on issues related to ICZM are based on incorporating contents related to marine and coastal spaces into the curricula of educational institutions and developing specific training on the importance of coastal marine spaces. It is important to emphasize that motivational projects have been carried out, as well as sensitization, strengthening, and awareness on ICZM issues, by applying activities such as campaigns, educational tours, open houses, talks in communities, dissemination in the media, and door-to-door campaigns.

Table 7. Guidelines and indicators for sustainable education.

Indicators	
Modify curricular themes	<ul style="list-style-type: none"> • Percentage of population between the ages of 4–18 that receives educational content related to ICZM. • Percentage of the university population between the ages of 17–24 that receives optional higher education on ICZM.
Implement training programs	<ul style="list-style-type: none"> • Percentage of public servers in coastal and island provinces who have received training on the importance of coastal marine spaces with a ICZM-oriented vision.

-
- Number of private entities in coastal and island provinces that have received training on the importance of coastal marine spaces with an ICZM vision.
-

With educational policies in coastal areas for sustainable tourism, Ecuador promotes the development of responsible recreational activities, which integrate conservation of natural and cultural resources, sustain local welfare by ensuring economic viability, and raise awareness through education and environmental interpretation to visitors and managers of the activities. This is how ecotourism was born as an activity that focuses directly on rural and pristine areas and that, due to its characteristics, besides complying with the axes of sustainable tourism, guarantees environmental and social responsibility regarding natural attractions and those who have the opportunity to visit them.

3.1.10. Citizen Participation

Citizen participation is primarily a human right, individually and collectively, in Ecuador, defined as participating in a protagonist manner in decision-making, planning, and management of public affairs, and in popular control of State and society institutions with their representatives, to form a permanent process of fortifying citizen power and participation. The national decentralized participatory planning system (NDPPS) is responsible for organizing and coordinating development planning through a set of processes, entities, and instruments that allow the interaction of different social and institutional actors. The NDPPS is made up of a National Planning Council, which integrates distinct levels of government; citizen participation; and a technical secretariat that coordinates these.

The objective of the marine awareness programs in Ecuador is to increase national marine responsibility and, through actions that involve the active participation of the population to promote and disseminate knowledge and appreciation of the sea, Ecuador's coasts and resources. The formation of effective citizen participation spaces for responsible ICZM promotes the reinforcement of awareness, creation of responsible attitudes, improvement of behaviors, encouragement of educational activities, and strengthening of social links with the coastal marine environment. The creation of spaces for citizen participation for education and exchange of knowledge have been based on the formation of inter-institutional agreements to consolidate spaces for dialogue with communities in the coastal profile.

Artisans, entrepreneurs, and representatives of groups in coastal areas have formed Tourism Development Committees, which aim to formulate strategies in which citizen participation is the basis for the development of competitive advantages in the territories, in order to turn them into quality tourist destinations.

4. Discussion

Ecuador is one of the pioneering countries in receiving international advice and funding on ICZM issues in Latin America. However, all this support received has been insufficient to demonstrate proper coastal management, due to the discontinuity of processes, insufficient political support, and lack of stability among managers regarding coastal management. Despite being one of the pioneering countries to navigate ICZM, other countries of the region that have been exposed after Ecuador now show more efficient ICZM practices than Ecuador.

Coastal public policies recognize the need to maintain the dynamic flows and natural processes that link land and sea, and recognize coastal and marine biodiversity as fundamental to the subsistence and development of the country. Henceforth, the Ecuadorian state agrees to ensure conservation of coastal and marine biodiversity by focusing on the preservation of fragile or essential environments and species, the sustainable use of natural resources and goods, and the restoration of environments and wild populations that have been affected by natural or human effects [37,38]. To this end, marine and coastal protected areas will be expanded and strengthened without prejudice to address priority issues such as sustaining fisheries, aquaculture, and tourism.

The activities that use natural resources of coastal zones are an essential pillar for national development and contribute to the formation of prosperous and enterprising populations. For this reason, the development of competitive, sustainable, and responsible production activities will be encouraged [38]. Since there is no longer prejudice and private interests in these productive activities within coastal zones, special attention can be paid to fishing, aquaculture, agriculture, tourism, mining, and oil. With the respective guilds in mind, there are growing incentives for the productive activities of coastal resources to implement certification strategies for goods and services that provide competitive advantages such as quality, social responsibility, sustainable fishing, and tourism, with respect to the environment and eco-labels. However, such efforts could lower the levels of production compared to other countries in the region [3,6,7].

In response to the challenge of maintaining tourism, as an opportunity to boost the country's development, the Ministry of Tourism has promoted an Ecuadorian Tourism Competitiveness Plan for almost two decades. The plan aims to position Ecuadorian tourism in the main tourist circuits of the world market. As one of the axes of national development to support quality of services, they are promoting the professionalization of human resources, raising of the quality of tourist destinations, and the improvement of the country's international promotion [39]. In the last decade, this plan has shown an increase in tourist arrivals [13,40], notably drawing attention to the greater presence of tourists in the insular zone, attracted by greater scenic beauty in physical and anthropogenic aspects. All these efforts have not been sufficient to maintain competitiveness with countries with more ideal beach tourism and sunny seasons. If economic aspects are to be improved through tourism, ICZM will need to focus more on valuing pristine, cultural, and gastronomic factors.

5. Conclusions

In Ecuador, no efficient planning for the marine environment exists. With regard to the continental coastal zone, the Decentralized Autonomous Governments have only in a few cases considered the treatment of the coastline in their development and land use plans. The Galapagos has recently approved a plan that territorially includes the islands and inland waters, leaving the territorial sea, contiguous zone, and exclusive economic zone outside their physical intervention space.

It is critical to emphasize that participatory processes, political will, evaluation processes, and funding are critical to the success of an ICZM process. With respect to recommendations, it is relevant to incorporate aspects that contemplate accessibility to information into any management plan. This is fundamental to manage transparent processes, the implementation of pilot projects, and initiatives of Regional Integrated Coastal Management Programs. A final recommendation is aimed at strengthening the generation of knowledge on the implementation processes of Integrated Coastal Management Plans through more international comparative research, in order to avoid the emergence of impacts to coastal ecosystems and alterations to coastal dynamics and stabilization.

ICZM is one of the most appropriate strategies for planning the development of marine and coastal areas, and even more so in a context of adaptation to climate change. In Ecuador, it is necessary to integrate different actors (government, academic, and community), whether public or private, that allow for consensus on programs for the protection and sustainable development of coastal environments and resources. Objectives should be made to build more advanced approaches to vertically and horizontally integrate technicians, politicians, and coastal communities, which should consider experiences from other regions of the world.

The junction of numerous institutions makes the integrated management of this space especially difficult; in fact, determining which actors have a direct or indirect involvement is an arduous task. It is insufficient to solely recognize the distribution of competences among the different administrations, or to ignore how these will thereafter attribute them to further institutions. Oftentimes, these institutions may have an ephemeral life, from being grouped with other organizations, restructured in their attributions and functions, or simply suppressed.

Ecuador's coasts are our past and our future. Evidence shows that the first human beings prospered from coastal resources thousands of years ago, which is assumed to have been a

fundamental element in sustaining migrations in what is now Ecuador. Today, we continue to use and depend on these resources. We feed on fish and seafood, we heal ourselves with medicines from the sea, we build infrastructure with wood and stone materials from the coast, we cultivate food in rich alluvial soils, we find recreation and joyous activities on the beaches and wetlands, and we extract petroleum and natural gas from the coasts and seabeds. Our coasts are home to dynamic entrepreneurs who have developed important cultural manifestations and economic activities.

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