INTEGRATED RISK MANAGEMENT FOR PRESERVATION AND RESTORATION PROJECTS:

The Case of Terrasos Habitat Banks

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Integrated risk management for preservation and restoration projects: The case of the Terrasos Habitat Banks

As part of Terrasos's ongoing effort to improve its processes and methodologies and generate knowledge on best practices for other actors, ARCO Consultores was contracted to develop the Terrasos Habitat Bank Risk Management System (SGRT), and Produteka was responsible for the design and implementation of the technological tool.

These activities were made possible through funding from the Technical Assistance Fund for Land Degradation Neutrality, administered by IDH.

August 2025

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English translation and correction: Emily Laycock
Layout design: Jhon Puerto

Cite as: A. Rivera and ML. Rodríguez (2025). Comprehensive risk management for the sustainability of ecosystem conservation projects: The case of the Terrasos Habitat Banks.

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Summary

Strategic and proactive risk management is essential to ensuring the sustainability and effectiveness of environmental conservation projects. These projects, which serve as risk mitigators, rely on the ability to identify, anticipate, and address threats across multiple dimensions: strategic, environmental, financial, regulatory, social, and operational.

This article presents the lessons learned from the development of the Terrasos Habitat Bank Risk Management System [1] (SGRT), a strategic tool that not only enhances the viability of environmental initiatives, but also builds trust among investors and key stakeholders, fostering more effective and resilient long-term conservation.

Conservation projects face a range of risks, including environmental, ecological, regulatory, legal, financial, economic, social, community, operational, managerial, and physical security risks. Habitat Banks, however, tend to experience lower levels of risk due to their structured approach and their incorporation of solid regulatory frameworks.

Terrasos has developed the SGRT to ensure the sustainability and viability of its Habitat Banks and is aligned with the provisions of ISO 31000. Its six iterative stages are strategic understanding, identification, analysis, assessment, treatment, and monitoring.

The SGRT is based on three fundamental pillars:

1. **Methodology and procedure for risk management:** Provides a structured framework for risk identification, assessment, and mitigation.
2. **Governance model:** Defines the organizational structure and the roles and responsibilities within the risk management system, organized across three levels: strategic, tactical, and operational.
3. **Technology tool:** Utilizes the Notion platform for real-time risk recording, analysis, and tracking.

SGRT implementation offers short-, medium- and long-term benefits, including reduced uncertainty, resource optimization, regulatory compliance, enhanced governance, and increased investor confidence. Lessons learned include an established risk management culture, coordinated and integrated processes, and risk management as a dynamic and ongoing process.

The reflections outlined in this document extend beyond the scope of Habitat Banks, as they are applicable to other environmental conservation macro-projects aiming to integrate risk management strategies to ensure successful project implementation.

1 Habitat Banks are a type of biodiversity conservation project that allow environmental offsets to be grouped together.

Content

Introduction

Environmental conservation projects help reinforce ecological infrastructure,[2] mitigating its risks and ensuring ecosystem resilience so that the provision of essential environmental services is uninterrupted. However, this work entails a long-term commitment, accompanied by significant challenges and uncertainty.

Factors such as time, resources, and leadership are crucial to this monumental undertaking, which requires vision, perseverance, and sustained action. Those involved in this work face significant challenges, including deforestation, ecosystem degradation, and even the natural resistance of some systems to recovery. In addition, economic, social, and legal risks may hinder the effective implementation of restoration projects, as well as the mobilization of community support and the long-term sustainability of interventions.

How do these environmental conservation projects work?

Environmental conservation projects combine preservation and restoration strategies to protect and restore the ecological functionality of ecosystems.

Preservation strategies focus on preventing environmental degradation and ensuring the permanence of ecosystems by::

- Defining protected areas.
- Protecting endangered species.
- Ensuring the sustainable use of natural resources.
- Promoting environmental education and responsible practices.
- Conducting ecological monitoring and surveillance..

2 The idea of nature as infrastructure dates back to the 1800s or earlier. To address nature loss, it is essential to reframe the conversation within a long-term market framework, similar to that of traditional infrastructure, where valuable green infrastructure is repaired, built, and maintained. This stands in contrast to the carbon market, which is designed to create incentives for reducing emissions and is therefore oriented toward obsolescence, as the energy transition progresses towards 2050. Sarmiento and Bedford (2024), Biocredits and Habitat Banks: Thinking about the development and maintenance of ecological infrastructure. Working document. https://www.terrasos.co/publicaciones/

Restoration strategies, on the other hand, aim to reverse damage to already degraded ecosystems by:

- Implementing reforestation and soil restoration measures.
- Recovering water sources.
- Controlling invasive species.
- Restoring ecosystems with community participation.

In this context, Habitat Banks have emerged as an innovative and effective strategy. But what exactly are they? Why are they important? And what impact do they have on environmental conservation?



Habitat Banks: Innovation for Biodiversity Conservation

Habitat Banks are areas of land where environmental investments are pooled, stemming from compensation requirements and/or voluntary contributions to biodiversity. These projects operate under a pay-for-results scheme that reduces risks for companies and government[3]s by providing a structured solution with technical, legal, and financial guarantees to ensure the effective fulfillment of both obligations and voluntary commitments.

Unlike traditional offsets, which are often implemented in a dispersed manner with limited oversight, Habitat Banks concentrate actions in previously assessed areas with long-term management plans, ongoing monitoring, and independent verification. This approach enhances the traceability, efficiency, and quality of environmental investments. Through Habitat Banks, measurable gains in biodiversity are generated and represented as tradable units called biodiversity credits,[4] biocredits, or biodiversity units.

3 Sarmiento and Bedford (2024), Biocredits and Habitat Banks: Thinking about the development and maintenance of ecological infrastructure. Working document. https://www.terrasos.co/publicaciones/.

4 Voluntary Biodiversity Credits or Certificates are positive, permanent contributions to biodiversity that are fully traceable and verifiable. This mechanism operates under a pay-for-results model and supports the protection of biodiversity in highly degraded ecosystems. Source: https://www.terrasos.co/terrasos-apunta-a-los-creditos-voluntarios-de-biodiversidad/

Biodiversity units are intangible assets derived from the conservation and management of land, either voluntarily or in compliance with environmental regulations, with a minimum commitment of 30 years.[5] These biocredits are future-oriented, focusing on the delivery, maintenance, and restoration of ecological infrastructure, while also fostering the development of institutional and social frameworks capable of supporting it. Moreover, they serve as a key mechanism for integrating nature's externalities into development processes,[6] ensuring that environmental benefits are both recognized and valued within the economy and territorial planning.

Habitat Banks and biodiversity credits originated in the United States in the 1980s as an environmental offset strategy, enabling companies to purchase biodiversity credits to finance ecosystem restoration in areas other than the site of impact, particularly in wetlands.

In Colombia, this mechanism was regulated in 2016 by Decree 2099, followed by Resolutions 1051 of 2017 and 256 of 2018, which established the legal framework for its creation and operation. As of October 2024, Colombia had 22 Habitat Banks on approximately 9,737 hectares, spanning various ecosystems.[7]

I. Main risks faced by ecosystem conservation projects

Preservation and restoration projects, including Habitat Banks, operate in dynamic, and often complex, environments. Although these initiatives are designed to mitigate risks to green infrastructure, they are also exposed to regulatory, financial, and operational challenges.

The relevance and severity of each risk vary depending on the type of initiative. The main risks identified from a global perspective are outlined below, taking into account the different types of projects that may be developed. See Annex II for definitions of risk categories according to ISO 31000.

5 Although the Protocol established by Terrasos for the Issuance of Voluntary Biodiversity Units stipulates a minimum project permanence of 20 years, the projects managed by Terrasos have a duration of 30 years.
6 Sarmiento and Bedford (2024), Biocredits and Habitat Banks: Thinking about the development and maintenance of ecological infrastructure. Working document. https://www.terrasos.co/publicaciones/.
7 Information collected and prepared by the authors, along with open data from the Single Registry of Ecosystems and Environmental Areas (REAA).

Environmental Risks

- **Restoration failure:** When the intervened ecosystems do not achieve the expected levels of ecological functionality.
- **Extreme weather events:** When floods, fires, or droughts affect ecosystem regeneration and stability.
- **Biodiversity loss:** When habitats are fragmented, invasive species are detected, or there are problems with regeneration.

Regulatory and Legal Risks

- **Changes in environmental legislation:** Regulatory shifts that may impact projects' financial and operational viability.
- **Regulatory non-compliance:** Failure to meet legal requirements, potentially leading to fines or project closure.
- **Land use rights conflicts:** Disputes with local communities, landowners, or governments that may disrupt the project.
- **Administrative processes and permits:** Lengthy and bureaucratic authorization procedures can delay project implementation.

Financial and Economic Risks

- **Lack of demand for biodiversity credits:** If companies do not purchase credits to offset their environmental impact, the Habitat Bank may become financially unviable.
- **High operating costs:** Unforeseen maintenance, surveillance, or restoration expenses may affect economic viability.
- **Access to financing:** Attracting investment can be challenging, particularly in emerging markets, where demonstrating the profitability of these projects may require additional effort.
- **Dependence on subsidies or external financing:** Projects may become unsustainable if funding sources are reduced.
- **High upfront costs:** Conservation efforts—especially ecological restoration strategies—require significant investments.
- **Long-term profitability:** Financial returns may take years to materialize, posing challenges to the project's economic sustainability.

Social Risks

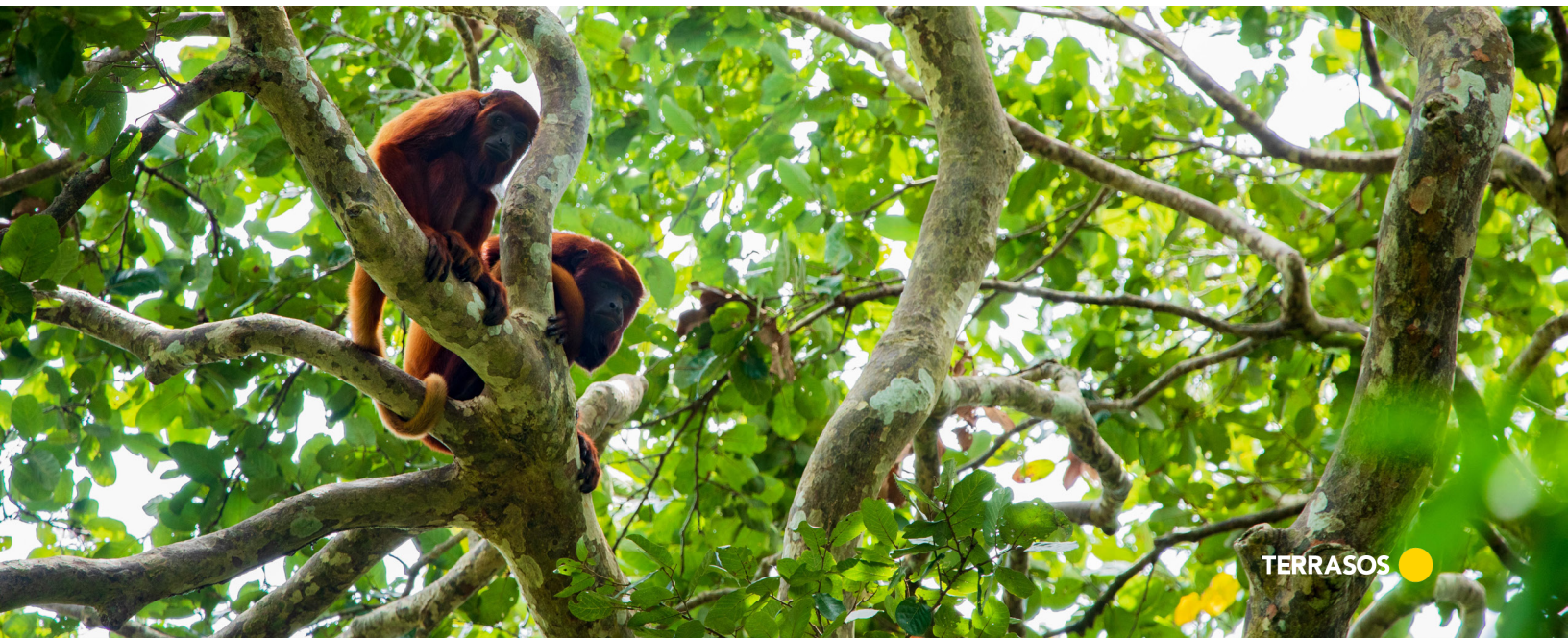
- **Opposition from local communities:** Communities may be resistant to projects if they affect access to natural resources or do not involve the community.
- **Lack of public acceptance:** Projects may face social rejection if their purpose and benefits are not clearly and effectively communicated.
- **Imbalance between conservation and economic development:** If environmental restoration does not lead to tangible social and economic benefits, the value created by the Habitat Bank may be undervalued.

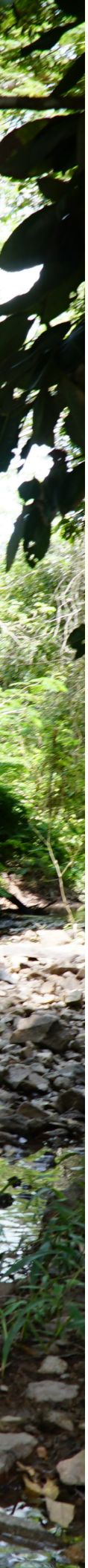
Operational and Management Risks

- **Monitoring and maintenance deficiencies:** Insufficient follow-up can compromise the functionality of the restored habitat. Effective ecosystem restoration requires continuous monitoring over decades.
- **Inadequate resource management:** Conflicts of interest or poorly managed resources can affect the conservation project's credibility and sustainability.
- **Technological and information risks:** Failure to implement adequate tools for monitoring, tracking, and managing biodiversity credits may lead to a lack of transparency and undermine credibility, traceability, and reporting.
- **Errors in ecological models:** Inaccurate methodologies for assessing restoration outcomes can jeopardize project success.
- **Cyberattacks or data loss:** The Habitat Bank's dependence on digital credit management platforms may increase its vulnerability to cyber threats.
- **Availability of suitable land:** Strategic conservation areas may be challenging to find due to competition with other land uses.

Physical Security Risks

- Equipment exposure to extreme weather conditions and natural disasters.
- Traffic-related risks and challenges accessing remote or hard-to-reach areas.
- Injuries from wildlife encounters, including bites or attacks.
- Accidents caused by improper handling of tools or hazardous substances.
- Symptoms related to fatigue and overexertion.
- Exposure to security threats or public order disturbances.
- Limited access to emergency services or medical assistance in remote areas.





Guarantees of the Terrasos Habitat Banks

Since 2016, Terrasos has been a pioneer in the implementation of Habitat Banks in Colombia, consolidating a model that channels environmental investments with a long-term vision. It currently manages 13 registered Habitat Banks across Meta, Casanare, Santander, Cesar, Antioquia, Chocó, Caldas, and Cundinamarca, protecting over 7,288 hectares of strategic ecosystems. Unlike traditional conservation projects, Habitat Banks operate within a regulated and standardized framework that incorporates technical, legal, and financial guarantees, significantly reducing risks for the entities that finance or implement them.

Technical guarantees:

Habitat Banks are guided a detailed environmental management plan that directs all conservation and restoration activities over the 30-year operational period. This plan is supported by a monitoring and follow-up system that includes specific biodiversity impact indicators, enabling continuous and objective measurement of results. Regular external audits provide an additional layer of independent oversight. This technical structure minimizes the risk of non-compliance or low effectiveness by ensuring that actions are carried out according to clear, traceable, and adaptable technical criteria.

Legal guarantees:

Each Habitat Bank must be registered with the Ministry of Environment and Sustainable Development (MADS), which validates it as an instrument recognized by the environmental authority. The permanence of conservation actions is secured through a usufruct agreement signed with the landowners, ensuring exclusive use of the area for environmental purposes. An operating contract further reinforces these commitments by defining the roles and responsibilities of all involved parties. Together, these legal guarantees reduce the risk of land-use reversal or disputes over the legality of compensation efforts.

Financial guarantees:

The financial management of a Habitat Bank is carried out through a trust, ensuring transparent administration aligned with the project objectives. In addition, a sustainability fund is established to cover the long-term maintenance and operation of the bank, even after all biodiversity credits have been issued and sold. This financial structure protects companies and governments from risks such as project discontinuity, resource diversion, or long-term budget shortfalls.

II. The Terrasos Habitat Bank Risk Management System

As both a witness to and participant in the ongoing challenges faced by Habitat Banks—and with the goal of ensuring their sustainability and long-term viability—Terrasos has developed the **Terrasos Habitat Bank Risk Management System (SGRT).** This system is the result of the project *Definition of a Methodology and Process for the Identification, Conceptualization, Characterization, Evaluation, and Monitoring of Risks in Terrasos Habitat Banks*, carried out between July 2024 and March 2025 with funding from the Technical Assistance Mechanism of the Land Degradation Neutrality Fund (LDN TAF).

The project aimed to strengthen the operation of Terrasos Habitat Banks by embedding proactive and effective risk management into the core of the organization's business and strategic objectives.

Main deliverables:

A. **Risk management policy** for Terrasos Habitat Banks.

B. **Risk Management System (SGRT),** including its own methodology and governance model.

C. **Identification and characterization** of specific risks in four Terrasos Habitat Banks.

D. **Training** to improve the organization's risk management culture.

E. **Technological tool** for managing risks in Terrasos Habitat Banks.

A. Risk Management Policy for Terrasos Habitat Banks

Although it is not part of the Risk Management System (SGRT), this policy plays a crucial role in ensuring its effectiveness and reflects the institutional commitment to risk management, establishing the principles, objectives, and guidelines for SGRT implementation and operation.

The policy establishes the following main commitments:

- **Continuous disclosure:** Ensure that all employees are familiar with and understand the risk management policy, along with the most relevant risks and mitigation measures, through regular communication and ongoing training.
- **Information programs:** Implement information and training programs to reinforce the actions needed to ethically, efficiently, and responsibly manage risks.
- **Transparency and accountability:** Clearly and transparently communicate identified risks and the measures taken to manage them, with a focus on accountability to stakeholders.

- **Continuous improvement:** Promote continuous improvement in our processes and services, ensuring that risk management evolves to address new challenges and opportunities.

- **Regulatory compliance:** Ensure compliance with applicable regulations and. The requirements of our clients and stakeholders, consistently upholding the principle of integrity in all our actions.

B. The Terrasos Habitat Bank Risk Management System (SGRT)

The SGRT is a comprehensive framework for the identification, assessment, and management of risks in Habitat Banks. It establishes key guidelines, methodologies, and responsibilities to anticipate, mitigate, and monitor risks, ensuring the continuity and sustainability of operations in Terrasos Habitat Banks. The system is built upon three fundamental pillars:

a. Methodology and procedure for risk management

- Provides a structured framework for the identification, characterization, assessment, and mitigation of risks.
- Defines criteria and strategies for decision-making based on risk analysis.
- Enables proactive management, minimizing uncertainties and supporting the long-term sustainability of Habitat Banks.

b. Governance model

- Establishes the organizational structure and the roles and responsibilities within the risk management system.
- Ensures accountability and transparency in decision-making.
- Fosters an organizational culture that aims to prevent and mitigate risks.

c. Technological tool for risk management, monitoring, and control

- Facilitates real-time recording, analysis, and monitoring of risks.
- Optimizes traceability and reporting, improving responsiveness to adverse events.
- Enables centralized and efficient management aligned with the strategic objectives of the Habitat Banks.

C. Methodology and procedure for risk management

The project included a state-of-the-art study on risk management methodologies and standards, which focused on ecosystem conservation projects, such as the Terrasos Habitat Banks.

The study analyzed various methodologies and frameworks, including ISO 31000, risk assessment based on probability of impact, the Layers of Protection Analysis (LOPA), and methodologies backed by the Inter-American Development Bank (IDB) and the National Environmental Impact Assessment System.

As a result of this study, Terrasos decided to base its risk management methodology and procedure on ISO 31000,[8] as this international standard provides the following key benefits:

- Standardization of criteria and concepts to facilitate integration with other standards, improve coordination between teams, and enhance clarity in communication.
- Integration of a comprehensive risk perspective, aligned them with the strategic objectives of projects and processes.
- Resilience and sustainability, through the development of capabilities to anticipate, respond to, and adapt effectively to adverse events, minimizing their impact and ensuring the continuity of operations over time.
- Contextual adaptability, allowing for effective implementation in complex environment, such as Habitat Banks.
- Regulatory compliance and credibility, reinforcing trust among stakeholders.
- Continuous improvement, ensuring regular updates in response to emerging threats or environmental changes.

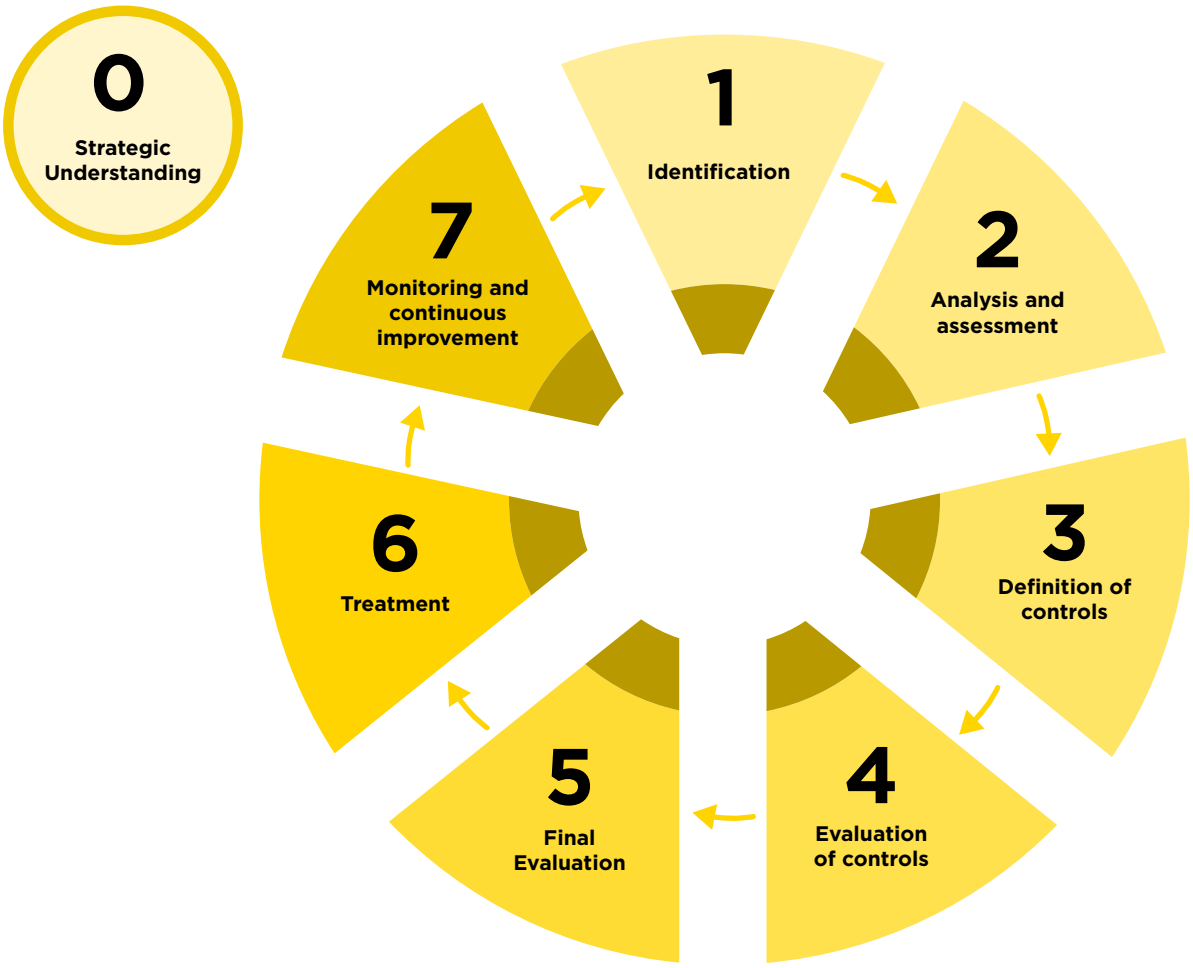
8 International Organization for Standardization. https://www.iso.org/obp/ui#iso:std:iso:31000:ed-2:v1:es

The risk management procedure for Terrasos Habitat Banks consists of six iterative and fundamental stages:

0. Strategic Understanding
1. Identification
2. Analysis and assessment
3. Defining Controls
4. Evaluation of controls
5. Final Evaluation
6. Treatment
7. Monitoring and continuous improvement.

The primary tool used is the risk matrix (Annex 1), which supports the identification, prioritization, and monitoring of identified risks.

Illustration No. 1. Stages of the risk management procedure for Habitat Bank projects.



Source: Prepared by the authors.

0. Strategic Understanding

To understand the strategic context, the Habitat Bank process map is used as a key input. It provides a general overview of activities and helps identify internal and external conditions[9] that may lead to opportunities or pose risks to the fulfillment of the project's mission and objectives.

1. Identification

The risk identification process is continuous and interactive, grounded in a thorough analysis of the strategic context and aligned with the planning process. It is conducted in conjunction with the project team, whose experience and knowledge provide a comprehensive understanding of current and potential risks.

This process takes into account both internal and external factors that may influence the performance of Habitat Banks, including environmental, regulatory, operational, and financial aspects. Its objective is to ensure a preventive approach, enabling the implementation of mitigation strategies and timely responses to possible contingencies.

2. Analysis and assessment

The objective of risk analysis is to determine the likelihood of each risk occurring and to assess the potential impact of its consequences, enabling effective classification and prioritization. This process helps establish the level of criticality for each risk and provides essential information for defining mitigation, control, and response strategies, ensuring that resources are allocated efficiently to minimize adverse effects.

This analysis draws on information gathered during the risk identification stage, supplemented by historical data, technical references, and the expert knowledge of the project team. It also considers contextual variables that may influence the likelihood of risk materialization, enabling a more accurate assessment aligned with the strategic objectives of the Habitat Bank.

9 External conditions may be related to economic, environmental, political, social, or technological factors. Internal conditions may be related to infrastructure, human resources, processes, or technology.

3. Definition of controls

Once the risk has been analyzed and assessed, controls are established to address it, with an evaluation of their projected effectiveness. These controls may be preventive—reducing the likelihood of occurrence—or corrective—minimizing the impact once the risk has materialized. Their design is guided by key criteria such as relevance, efficiency, proportionality, regulatory compliance, clear assignment of responsibilities, and mechanisms for monitoring and continuous improvement.

4. Evaluation of controls

The evaluation of controls aims to determine their effectiveness and adequacy through an analysis guided by key questions related to their existence, implementation, performance, cost-benefit ratio, and regulatory compliance. A control is considered effective if it receives affirmative responses to at least five of the key questions. Otherwise, it is classified as ineffective and requires adjustments or reinforcement.

This approach enables an objective assessment of control robustness and supports informed decision-making regarding their improvement or replacement, ensuring that risk management remains aligned with the strategic objectives of the Habitat Bank.

5. Final Evaluation

The final risk assessment is a key step in risk management process, as it measures actual risk exposure after existing controls have been applied. At this stage, a new assessment of the likelihood and the potential impact is conducted, taking into account the effectiveness of the implemented mitigation measures. This analysis helps identify residual risk—i.e., the risk that remains despite the applied controls—providing essential information for strategic decision-making.

Based on the results obtained, specific actions are defined to reinforce, adjust, or complement existing controls, ensuring their alignment with organizational objectives and the evolving operational context. This stage also allows for an assessment of whether the controls have reduced the risk to an acceptable level or if additional measures are required. In this way, the final risk assessment enables more accurate and effective risk management.

6. Treatment

The Risk Treatment Plan aims to define and implement actions to mitigate, avoid, transfer, or accept identified risks, ensuring that their likelihood and impact are reduced to acceptable levels. Various treatment options are analyzed based on the risk assessment, enabling informed decision-making aligned with organizational objectives. This stage also establishes the overall risk management guidelines and reflects management's position, providing clear direction for the entire Terrasos team.

The main treatment strategies include: reducing risk through preventive and protective measures; avoiding risk by eliminating its root cause through improvements or redesigns; sharing or transferring risk via insurance or agreements with third parties; and accepting risk when the residual risk is acceptable, accompanied by contingency plans. The choice of strategy depends on the risk analysis and its potential impact on the operation.

The review of these actions is a continuous process that enables the evaluation of their effectiveness and the identification of areas for improvement. This includes verifying the implementation of measures, assessing their impact, identifying gaps, and updating the risk matrix based on the results obtained.

7. Monitoring and continuous improvement

The monitoring and continuous improvement stage is essential to ensuring the effectiveness of risk management, as it enables controls to be updated and optimized in response to environmental changes, regulatory updates, emerging threats, or internal insights. Systematic monitoring of the Risk Management Matrix strengthens organizational resilience and ensures an agile, adaptive response, keeping risk management aligned with strategic objectives.

Key actions include the periodic review of the system to evaluate the effectiveness of controls and identify risk trends, as well as the integration of feedback and analysis of lessons learned to improve strategies. Controls are adjusted and optimized based on their performance, with new measures incorporated as needed. Additionally, continuous training is encouraged to foster a preventive culture, and the Risk Matrix is regularly updated to reflect new threats and recalibrate risk classifications based on impact and likelihood.

Communication and Feedback

Clear, accessible, and consistent communication is essential for effective risk management and continuous improvement. Keeping all key stakeholders informed about identified risks, implemented measure, and monitoring results ensures an agile and coordinated response. Ongoing feedback fosters a collaborative environment where strategies can be adjusted, controls strengthened, and emerging threats anticipated. This exchange of information not only improves decision-making, but also reinforces an organizational culture focused on prevention and resilience.

D. Governance model

Effective risk management requires a clear organizational structure with well-defined roles, ensuring accountability and transparency in decision-making. This reinforces a proactive culture of prevention and mitigation, enabling structured responses to potential threats.

Top management is responsible for ensuring organizational commitment and resource allocation, while all employees contribute to identifying and mitigating risks within their respective areas. The SGRT operates under the Three Lines Model established in the Risk Management Policy for Habitat Banks.

Illustration No. 2. Three lines model to govern the Habitat Banks' risk management system.

Source: Prepared by the authors[10]

10 Definition of a methodology and process to identify, define, conceptualize, characterize, evaluate, and monitor Terrasos Habitat Banks.

Strategic level

Its primary function is to ensure the sustainability of the business by approving structural changes and monitoring overall risk exposure.

Responsibilities:

- Monitor overall exposure to critical risks, ensuring a balance between decision-making and impact mitigation.
- Validate significant changes to the risk matrix managed at the tactical level, ensuring alignment with the organization's strategic objectives.
- Define and approve mitigation strategies and contingency plans, establishing effective measures to reduce the likelihood and impact of identified risks.
- Continuously monitor key risks, asses their evolution, and make timely strategic decisions to prevent or minimize their effects.

Tactical level

This level includes the directors of the key areas (Financial, Administrative, Commercial, People and Organizational Development, Technical, and Operational Development) and is responsible for managing risks within their respective areas and adjusting probability and impact assessments as needed.

Responsibilities:

- Ensure the effective implementation of risk management strategies approved at the strategic level.
- Evaluate, adjust, and approve risks within their respective areas of responsibility.
- Oversee the execution of mitigation plans to ensure compliance.
- Continuously monitor key risks and make timely decisions to minimize their impact on the organization.

Operational Level:

This level fosters an organizational culture of risk awareness and serves as the first line of detection for new risks within the organization. It plays a critical role in identifying situations that may affect operations and in communicating them promptly to the tactical and strategic levels.

Responsibilities:

- Identify and report risks within operational processes, ensuring proactive and timely management.
- Implement mitigation and control measures to support compliance with established strategies.
- Adjust the probability and impact of operational risks based on project realities, ensuring alignment with organizational objectives.

Through Internal Audit and the execution of the Annual Risk-Based Audit Plan, both risks and the effectiveness of implemented controls are evaluated. In this process, controls are assessed in terms of their design and operational performance. The audit results generate reports that feed back into the risk management process. This cycle of review and continuous improvement helps strengthen the risk management system and ensures its ongoing evolution.

E. Technological tool for risk management, monitoring, and control.

The implementation of a digital, centralized risk management system enables real-time recording, analysis, and monitoring, enhancing traceability and supporting informed decision-making. For this purpose, the system has been configured in Notion, a collaborative platform that integrates databases, project management, and real-time tracking. Notion allows for structured visualization, updates, and assignment of responsibilities, ensuring an efficient and adaptable risk management process. Additionally, it facilitates the generation of reports for senior management and enables operational teams to update information using mobile devices, allowing for continuous and timely monitoring.

The pilot project, developed with four Habitat Banks—Mata de Lata, Rio Cauca, La Lope, and Meta—highlighted key advantages of using the Notion-based risk management system. These include centralized information management, which prevents the dispersion of data across separate documents; customization and flexibility, allowing databases and dashboards to be adapted to the team's needs; and real-time collaboration, which supports simultaneous updates and maintains traceability. In addition, automation and data integration optimize analysis and the design of mitigation plans, while the platform's accessibility and user-friendliness enable risk management from any device. Finally, the change history and tracking features ensure clear assignment of responsibilities and full traceability of modifications.

Among the challenges identified is scalability; as projects increase in size and complexity, risk management becomes more demanding, potentially revealing performance limitations within Notion. Additionally, the learning curve for advanced features may require an adaptation period for the team. Other challenges include integration with external systems—such as ERP or CRM platforms—which is not always seamless, as well as limitations in security and access control. While Notion offers permission settings, they may not be as robust as those found in specialized solutions. Lastly, automation within Notion is more limited compared to platforms specifically designed for risk management, often requiring external integrations to improve its functionality.

III. Benefits of structured risk management.

Although the project that led to the creation of the Habitat Bank Risk Management System included a pilot in only four of the thirteen Terrasos Habitat Banks, the experience revealed a range of strategic and operational benefits in the short-, medium-, and long-term, applicable across the entire Terrasos Habitat Bank ecosystem. As the system is extended to the remaining Banks and other strategic projects, its implementation will be further strengthened, optimizing comprehensive risk management and enhancing conservation and restoration efforts.

Short-term benefits:

Reduced Uncertainty and Increased Stability

- Enables the identification and mitigation of risks before they materialize, supporting the long-term viability of Habitat Bank projects.
- Strengthens operational resilience to environmental, financial, and regulatory factors..

Resource Optimization and Financial Sustainability

- Facilitates efficient resource allocation to minimize losses and optimize investments.
- Reduces unforeseen costs caused by adverse events, improving financial planning.

Regulatory Compliance and Transparency

- Ensures alignment with environmental regulations and conservation policies.
- Improves accountability and facilitates communication with regulators and investors.

Strengthening Governance and Decision-Making

- Provides structured information for decision-making based on risk analysis and up-to-date data.
- Defines clear roles and responsibilities within the team, promoting efficient management.

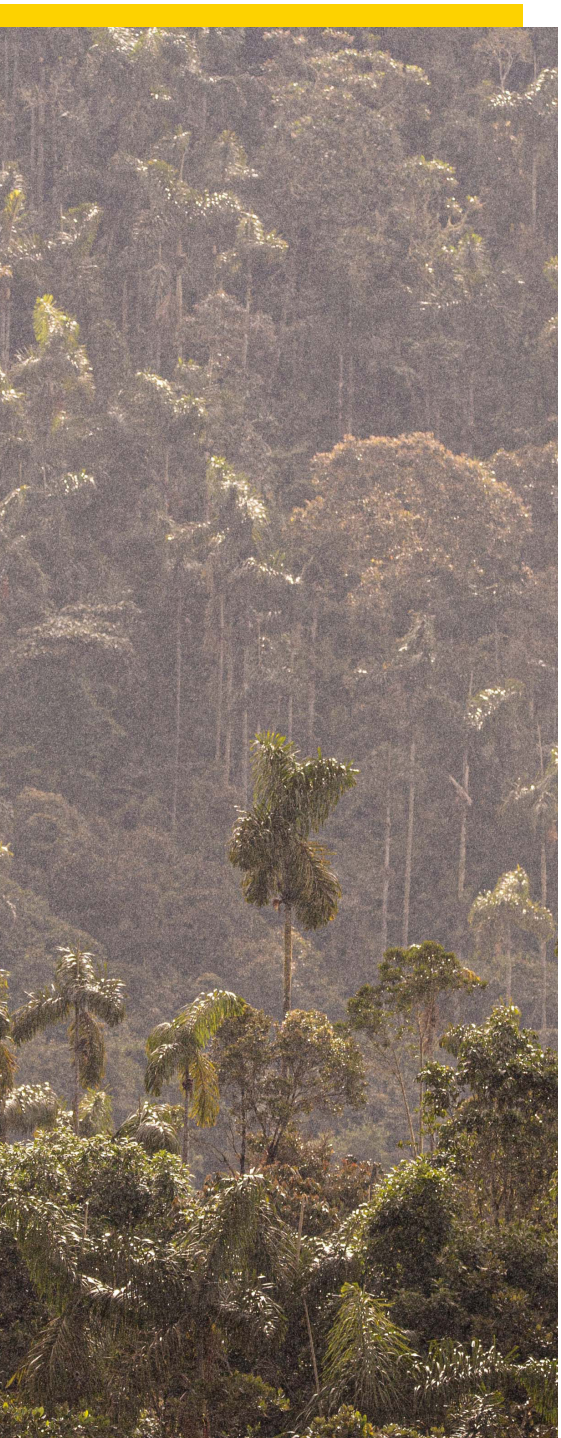
Medium- and long-term benefits:

Increased Investor and Stakeholder Confidence

- Builds credibility with funders, conservation credit buyers, and other stakeholders.
- Increases the attractiveness of investment and financing opportunities for ecological restoration.

Monitoring and Continuous Improvement

- Implements ongoing evaluation and adjustment processes, enabling the continuous improvement of conservation strategies.
- Fosters a proactive organizational culture focused on efficient risk management.



IV. Lessons learned and recommendations for the future

Established risk management culture

Risk management should not be viewed as an isolated task, but rather as an integral component of the planning and implementation of conservation projects. To support this, it is essential to develop parallel processes that foster awareness and cultivate an organizational culture where risk management is understood as a shared responsibility—not limited to specific roles within the organization.

Coordinated and integrated processes

Risk management must be aligned with both operational and strategic processes, ensuring its integration from initial planning through to project implementation and monitoring. Effective integration requires strong leadership and support from senior management, along with the provision of adequate financial, human, and technological resources.

Risk management as a dynamic process

Risk management is not a static endeavor or a one-time requirement, but a continuous process of learning and improvement. Its success relies on regular updates informed by field experience and the early identification of risks by the teams who encounter them daily. Effective management depends not only on agile, digital tools, but also on the human commitment to their appropriation and use.

Conclusion: Towards a sustainable and resilient model for conservation projects

The future of ecosystem preservation and restoration depends on strategic decision-making and innovative approaches that ensure the long-term sustainability of our ecosystems. Comprehensive risk management is not a standalone effort, but a foundational pillar for strengthening project resilience. Investors, governments, environmental organizations, and other stakeholders committed to biodiversity conservation have both the opportunity and the responsibility to embrace this vision, integrating it as a core element of their initiatives.

More than just a mitigation tool, risk management serves as a catalyst for trust, efficiency, and long-term sustainability. By anticipating challenges and strengthening response capacity, it not only ensures the viability of projects but also amplifies their real impact on habitat restoration and conservation.

Life, in all its forms, is the driving purpose behind these efforts, and only through strategic, collaborative, and adaptive management can we truly honor the commitment to regenerate and preserve it for future generations.

Annex 1. Risk matrix for risk management of the Terrasos Habitat Banks

This Excel matrix has been formatted in portrait orientation to improve readability.

1. Risk Identification		**Value Activity** Identify the Main Activities of Habitat Banks	
		Source of Risk (See Table 1. Risk classification)	
		Risk Description Identify potential failures within the activity that could impact the achievement of the process objective 2. It could cause...	
		Causes Identify the cause(s) that could lead to the failure 1. Due to...	
		Potential Consequences Identify what effects its materialization could have 3. Which could impact...	
2. Risk Analysis and assessment	**Inherent Risk** (Assess risk without controls)	**Likelihood of risk occurrence** (See Table 2. Probability Scale)	
		Impact (See Table 3. Impact Scale)	
		Risk Level (See Table 4. Risk Zone)	
3. Definition of Controls	**Control**	Control Description	
		Responsible for Control	
		Control Type **Preventive:** Control addresses the cause of the risk **Corrective:** Addresses the impact of the problem (See Table 5. Types of controls)	

4. Evaluation of controls	**Control Evaluation** **(See Table 6.)**	Is the control automated?	
		Is there a person responsible for this control mechanism??	
		Is the control mandatory?	
		Is it documented?	
		Is there evidence of its implementation and monitoring?	
		Are the results of the control replicable?	
		Are the exclusions documented and duly justified?	
	Control Effectiveness	Effective / Not effective	
5. Final Risk Assessment	**Residual Risk** (Risk Assessment with Controls)	Likelihood of occurrence	
		Impact	
		Final risk level	
6. Treatment Plan	**Treatment Option** (See Table 7. Risk treatment options)		
	Actions to Mitigate Risk		
	Date of implementation		
	Responsible party		
	Contingency Plan Establish actions in case risk materializes (See Table 8. Type of actions in the risk treatment plan)		
	Contingency Plan Manager		
Review of actions taken	Effectiveness of the actions taken		

Annex 2. Reference tables for filling out the risk matrix

Table 1. Classification of risks according and adaptef from ISO 31000:2018. Risk management – Principles and guidelines.

Source of the risks	Description
Strategic	Associated with the overall management of Habitat Banks, strategic risks involve global issues related to the organization's mission and the achievement of strategic objectives. This includes the clear definition of policies, as well as the design and conceptualization led by senior management.
Operational	These involve risks related to the operational and technical aspects of Habitat Banks, including deficiencies in information systems, process definition, organizational structure, and coordination between departments or units. These issues can lead to inefficiencies, opportunities for corruption, and non-compliance with institutional commitments.
Financial	Related to the management of the organization's resources, including budget execution, financial reporting, payments, cash flow management, and asset administration. The success or failure of financial performance largely depends on the efficiency and transparency of resource management, as well as effective coordination with other areas.
Legal	Associated with Terrasos's ability to comply with regulatory, contractual, and public ethics requirements, as well as its overall commitment to stakeholders.
Technology	Related to the ability of available technology to meet current and future needs and to support the fulfillment of the organization's mission
Reputational	Related to the potential loss of credibility and public trust in the organization or its services (e.g., Habitat Banks), due to factors such as fraud, insolvency, employee misconduct, rumors, operational errors caused by inadequate staff training, or poorly designed procedures. This type of risk can result in decreased demand or the loss of business opportunities stemming from reputational damage.
Corruption	Associated with the possibility that, through action or omission, the improper use of power, resources, or information may compromise the interests of Habitat Banks in order to obtain personal or undue benefits.
Environmental[11]	Refers to the possibility that Habitat Bank operations may negatively impact the natural environment. This includes risks related to pollution, biodiversity loss, unsustainable use of natural resources, and non-compliance with environmental regulations.
Social	Associated with the potential negative impacts that Habitat Bank activities may have on communities and stakeholders. This includes risks related to social responsibility, equity, respect for human rights, and the potential for generating social conflict.

11 Source: International Organization for Standardization. (2015). ISO 14001:2015.

Table 2. Probability Scale

PROBABILITY SCALE		
PROBABILITY		**DESCRIPTION**
5	**ALMOST CERTAIN**	The event is expected to occur in most circumstances more than 1 time a year.
4	**LIKELY**	The event will likely occur in most circumstances at least 1 time in the last year.
3	**POSSIBLE**	The event could occur at some point, at least 1 time in the last 2 years.
2	**IMPROBABLE**	The event may occur at some point at least 1 time in the last 5 years.
1	**STRANGE**	The event may occur only in exceptional circumstancesIt has not occurred in the last 5 years.

Source: Taken and adapted COSO ERM. (Committee of Sponsoring Organizations- "Enterprise Risk Management (ERM)") DAFP and Marsh Risk Consulting.

Table 3. Impact Scale

IMPACT SCALE		
IMPACT		**DESCRIPTION**
1	**INSIGNIFICANT**	Interruption of operations for a few days. No economic or administrative sanctions are generated. The institutional image is not significantly affected. Temporary unavailability of personnel or non-incapacitated injuries attributable to the company The objectives of the process are not affected
4	**MINOR**	Interruption of operations for 2 months or less. Unfavorable concepts in a customer segment or in an important customerProlonged unavailability of less than 20% of the staff Injuries with disability of up to 30 days attributable to the company's responsibilityMinor failure to meet the objectives of the process

3	 **MODERATE**	Interruption of operations for 4 months or less. An unfavorable public concept that transcends at the local level. Reprocessing of activities and increase in operational load. Prolonged unavailability of 2 to 5 per cent of missionary personnel. Injuries with temporary disability for more than 30 days attributable to the company's liability. Failure to comply with the organization's strategy for one semester. Partial non-compliance with the objectives of the process.
4	 **MAJOR**	Interruption of operations for 6 months or less. An unfavorable public concept that transcends the regional level. Sanction by a control entity or other regulatory entity. Prolonged unavailability of 5% to 10% of staff in a mission process. Injuries with permanent partial disability attributable to the company's liability. Failure to comply with the organization's strategy for two continuous semesters.
5	 **CATASTROPHIC**	If the event were to occur, it would have disastrous consequences or effects on the entity. Interruption of operations for more than 6 months. Loss of critical information that can be partially or incompletely recovered. Unfavorable public concept that transcends nationally or internationally. Intervention or Sanctions that imply the closure of the facilities. Prolonged unavailability of more than 10% of the missionary personnel. Fatal injuries or injuries with permanent total disability attributable to the responsibility of the company. Total non-compliance with institutional goals and objectives.

Source: Taken and adapted COSO ERM. (Committee of Sponsoring Organizations- "Enterprise Risk Management (ERM)") DAFP and Marsh Risk Consulting.

Table 4. Risk Zone

Risk Zone					
IMPACT					
PROBABILITY	INSIGNIFICANT (1)	MINOR (2)	MODERTE (3)	MAJOR (4)	CATASTROPHIC (5)
ALMOST CERTAIN (5)	HIGH RISK ZONE	HIGH RISK ZONE	EXTREME RISK ZONE	EXTREME RISK ZONE	EXTREME RISK ZONE
PROBABLE (4)	MODERATE RISK ZONE	HIGH RISK ZONE	HIGH RISK ZONE	EXTREME RISK ZONE	EXTREME RISK ZONE
POSSIBLE (3)	LOW RISK ZONE	MODERATE RISK ZONE	HIGH RISK ZONE	EXTREME RISK ZONE	EXTREME RISK ZONE
IMPROBABLE (2)	LOW RISK ZONE	LOW RISK ZONE	MODERATE RISK ZONE	HIGH RISK ZONE	EXTREME RISK ZONE
RARE (1)	LOW RISK ZONE	LOW RISK ZONE	MODERATE RISK ZONE	HIGH RISK ZONE	HIGH RISK ZONE

SOURCE: Taken and adapted by COSO ERM. (Committee of Sponsoring Organizations- "Enterprise Risk Management (ERM)") DAFP and Marsh Risk Consulting.

Table 5. Types of controls

CONTROL TYPE	DESCRIPTION
Preventive	Those that act to eliminate the causes of the risk, to prevent its occurrence or materialization.
Corrective	Those that allow the restoration of activity after an undesirable event is detected; they also allow the modification of the actions that led to their occurrence.

Source: Authors, based on ISO 31000

Table 6. Questions to assess the effectiveness of risk control(s)

No.	QUESTION
1	Is the control automated?
2	Do you have a person in charge assigned?
3	Is the control mandatory?
4	Is it documented?
5	Is there evidence of its execution and monitoring?
6	Are the results of the control repeatable?
7	Are the exclusions documented and duly justified?

Source: Authors, based on ISO 31000

Table 7. Risk treatment options

TREATMENT OPTION	DESCRIPTION
Reduce risk	It involves taking measures aimed at reducing both the Probability (prevention measure) and the Impact (protective measures). Risk reduction is probably the simplest and most economical method of overcoming weaknesses before implementing more costly and difficult measures. This is achieved by optimizing procedures and implementing controls.
Avoid risk.	take measures aimed at preventing its materialization. It is always the first alternative to consider, it is achieved when substantial changes are generated within the processes by improvement, redesign or elimination, as a result of adequate controls and actions undertaken. An example of this can be quality control, management of supplies, preventive maintenance of equipment, technological development, etc.
Sharing or transferring risk.	Reduce its effect by transferring losses to other organizations, as in the case of insurance contracts through other means that allow a portion of the risk to be shared with another entity, such as in risk-sharing contracts. Thus, for example, information of great importance can be duplicated and stored in a distant and secure location, instead of leaving it concentrated in one place.
Take a risk.	After the risk has been reduced or transferred, there may remain a residual risk that remains, in this case the process leader simply accepts the probable residual loss and makes contingency plans for its management.

Source: Authors, based on ISO 31000

Table 8. Type of actions in the risk treatment plan

ACTIONS	DESCRIPTION
Mitigation	They consist of designing, selecting, and implementing specific measures to **reduce the probability of risk occurrence** or its negative impact on the organization's objectives
Contingency	They are planned measures that are designed to respond to **and manage** adverse events or situations that may occur, once the final risk assessment has been carried out and it is identified that the probability or impact of the risk cannot be completely reduced.

Source: Authors, based on ISO 31000

References

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