



# PREPARATION OF THE LIFE MATRIX OF IMPACTS AND DEPENDENCIES ON BIODIVERSITY AND ECOSYSTEM SERVICES – LIFE MATRIX

LIFE-BB-IN-RD004-1.0-R1-EN

Version: 1.0-R1

Language: English

Applicability: International

Title: Preparation of the LIFE Matrix of Impacts and Dependencies on Biodiversity and Ecosystem Services – LIFE MATRIX

Code: LIFE-BB-IN-RD004-1.0-R1-EN

Applicability: International

Type: Reference Document (RD)

Version: 1.0-R1

Status: Final

Language: English

Approval: LIFE Institute Board of Directors

Date: 08/31/2023

*In case of doubt and/or inconsistency between versions, the original document must be consulted (Portuguese version).*

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## **OBJECTIVE**

This Reference Document aims to define the minimum requirements that must be considered in the Preparation of the LIFE Matrix for the assessment of Impacts and Dependencies on Biodiversity and Ecosystem Services – LIFE Matrix.

## **APPLICATION**

This Reference Document applies to organizations interested in applying the LIFE Methodology, Certified companies, auditors, consultants and other interested parties.

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## 1. INFORMATION AND SUBSIDIES FOR PREPARATION OF THE LIFE MATRIX

The LIFE Methodology requires, in its management indicators, the organization to prepare a matrix to assess impacts and dependencies on biodiversity and ecosystem services (LIFE Matrix).

This matrix must be updated periodically, consistent with the scale, intensity and risk of the activities and with the actions foreseen in the Action Plan for Biodiversity and Ecosystem Services (APBE).

The LIFE Matrix should focus on preventing damage to biodiversity and ecosystem services, ensuring the hierarchy of impact mitigation with an emphasis on avoiding them.

This assessment of impacts and dependencies, carried out through the LIFE Matrix, should also incorporate the identification of risks and opportunities for the business. In this Reference Document (RD), the content of the complete analysis (risks, opportunities, impacts and dependencies) will be referred to only as the LIFE Matrix.

The following information must be collected by the organization to support the completion of the Matrix, according to Annex 01. The applicability of the following items may vary according to the complexity of the organizations.

- Sufficient information to provide a good understanding of the organization/project/enterprise;
- Breakdown of the **organization's main process**, activities, inputs and raw materials, based on biological resources or affected ecosystem services;
- Identification of actions aimed at prevention, minimization, mitigation, restoration, recovery and, ultimately, compensation for negative impacts on biodiversity and ecosystem services;
- Measures and actions that are already provided for in the organization's management system and which need to be incorporated.

## **2. PREPARATION OF THE LIFE MATRIX**

The LIFE Matrix must be clear and objective in analyzing the correlations between: activities related to the organization's main process; aspects that generate environmental impacts, impacts on biodiversity and ecosystem services, actions aimed at prevention, minimization, mitigation, restoration, recovery and compensation mapped in the Action Plan for Biodiversity and Ecosystem Services (APBE).

### **2.1 STRUCTURE OF THE LIFE MATRIX**

The LIFE Matrix was prepared following the criteria proposed in the document Guidelines for the Identification of Business Risks and Opportunities Resulting from the Amendment of The Corporate Ecosystem Services Review (ESR). The model is presented in Annex 1 of this RD.

The terms and definitions that are complementary to the LIFE Glossary and that are related to the ESR document are found in Annex 2.

## **3. FILLING IN THE IMPACT, DEPENDENCE, RISKS AND OPPORTUNITIES WORKSHEET IN ECOSYSTEM SERVICES AND NATURAL RESOURCES**

The worksheet must be filled in by following the steps below:

### **3.1 STEP 1: IDENTIFICATION OF THE ORGANIZATION**

Data belonging to the company and responsible for filling in the LIFE Matrix.

### **3.2 STEP 2: FILLING IN THE LIFE MATRIX**

#### **a) Description of the organization's main operational process:**

- **Definition** of the organization's main operational process: process identified as the most important in relation to the organization's core activity;
- **Activities related to the main operational process:** activities causing expected or actually verified impacts;

- **Environmental aspects of activities related to the main operational process:** environmental aspects related to the activities and generators of environmental impacts;
- **Relation of the environmental aspects of the activities with the Biodiversity Pressure Index:** identification of the environmental aspect related to the BPI, of the LIFE Methodology (water, waste, energy, greenhouse gases, area);
- **Relation of the environmental aspects of the activities with the ecosystem service:** identification of the impact and/or dependence relation of environmental aspects with the Ecosystem Service.

#### b) Definition of Impacts on Biodiversity and Ecosystem Services

- **Description:** description of impacts on biodiversity and ecosystem services caused by the activities of the main operation. Any modification of the environment, adverse or beneficial, wholly or partially resulting from the activities of an organization, its products or services;
- **Category of the affected ecosystem service:** classification of ecosystem services as provision, regulation, cultural and support (see Annex 02);
- **Classification of the affected ecosystem service:** identification of subclasses of the categories of the affected ecosystem services (see Annex 02);
- **Recovery time:** period of rehabilitation of the ecosystem natural resource after the impact has ceased;
- **Area of influence:** identification of the areas of influence of identified impacts, based on environmental criteria, and considering those related to biodiversity and ecosystem services. They can be classified according to the impact coverage area: local, restricted to the basin or bigger than the basin;
- **Mitigation and Compensation Cost:** cost involved in mitigating and compensating for the environmental impact, according to the size of the enterprise.

### c) Definition of Dependences on Biodiversity and Ecosystem Services

- **Operation damages:** damage caused by the lack of natural resource in the activity on which it is dependent;
- **Replacement alternative:** possibilities of substitution of the activity that generates dependence on the ecosystem service;
- **Replacement cost:** cost for replacing the activity that generates dependence on the ecosystem service, according to the size of the enterprise;
- **Priority and degree of dependence on the affected ecosystem service:** classification between high, medium and low dependence of the organization's operations on the identified ecosystem service.

### 3.3 STEP 3: GRAPH - RELATION IMPACT / DEPENDENCE ON ECOSYSTEM SERVICES

- **Maximum Impact Score:** Sum of the maximum impact degree values of the activities;
- **Percentage in relation to Maximum Score (Impact):** Percentage of the impact degree value obtained by the activities, in relation to the maximum impact score;
- **Maximum Dependence Score:** Sum of the maximum levels of dependence on activities;
- **Percentage in relation to Maximum Score (Dependence):** Percentage of the dependence degree value obtained by the activities, in relation to the maximum dependence score.

### 3.4 STEP 4: RELATION OF APBE WITH IMPACT AND DEPENDENCE ON ECOSYSTEM SERVICES

- **Relation with APBE:** identification of actions that contribute to the maintenance of the composition, structure and function of ecosystems in accordance with the LIFE Methodology. Code or classification according to APBE prepared;

- **Avoid:** actions aimed at preventing an impact or damage to biodiversity and ecosystem services;
- **Mitigate:** Measures that aim to reduce impacts to the point where they have no adverse effects;
- **Restore:** refers to the obligation to return the area to its original state, before degradation. For the return to the original state, it is understood that all aspects related to topography, vegetation, fauna, soil, hydrology, etc., present the same characteristics as before degradation. The objective of this process is to restore the structure, function, diversity and dynamics of the specific ecosystem;
- **Compensate:** Involves measures to compensate, repair or pay for the damages of loss of biodiversity caused by a project/activity;
- **Ensure quality and availability:** Actions that aim to ensure the quality and availability of the natural resource on which there is dependence.

### 3.5 STEP 5: RISK MATRIX AND OPPORTUNITIES OF ECOSYSTEM SERVICES

- **Operational:** check classification in Annex 02
- **Regulatory and legal:** check classification in Annex 02
- **Reputational:** check classification in Annex 02
- **Market and product:** check classification in Annex 02
- **Financial:** check classification in Annex 02

## ANNEX 1 - LIFE MATRIX MODEL OF IMPACTS AND DEPENDENCES ON BIODIVERSITY AND ECOSYSTEM SERVICES



MATRIX OF IMPACT AND DEPENDENCE OF ECOSYSTEM SERVICES / NATURAL RESOURCES IN THE MAIN OPERATIONAL PROCESS

| Main Operational Process | Activity | Environmental Aspects of the Activity | Relationship with the IPB* | Ecosystem Service (ES) / Natural Resource (NR) |                                           |             |                   |               |               |                |               |                                |               |             |              |                  |          |                |                   |               |                         |               |                  |               |
|--------------------------|----------|---------------------------------------|----------------------------|------------------------------------------------|-------------------------------------------|-------------|-------------------|---------------|---------------|----------------|---------------|--------------------------------|---------------|-------------|--------------|------------------|----------|----------------|-------------------|---------------|-------------------------|---------------|------------------|---------------|
|                          |          |                                       |                            | Relation with the SE                           | IMPACT                                    |             |                   |               |               |                |               |                                |               |             | DEPENDENCE   |                  |          |                |                   |               |                         |               |                  |               |
|                          |          |                                       |                            |                                                | Description of the impact of the activity | ES category | ES classification | Recovery Time | Partial Index | Influence area | Partial Index | Mitigation & Compensation Cost | Partial Index | Total Index | Impact Level | Degree of Impact | Category | Classification | Operation damages | Partial Index | Replacement Alternative | Partial Index | Replacement Cost | Partial Index |
|                          |          |                                       |                            |                                                |                                           |             |                   |               |               |                |               |                                |               |             |              |                  |          |                |                   |               |                         |               |                  |               |

## ANNEX 2 - TERMS AND DEFINITIONS RELATED TO THE REFERENCE DOCUMENT OF THE CORPORATE ECOSYSTEM SERVICES REVIEW (ESR)

| Term                                     | Definition                                                                                                                                                                                                | Reference    |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Categories of Ecosystem Services</b>  |                                                                                                                                                                                                           |              |
| <b>Provisioning Services</b>             | <b>Goods or products obtained from ecosystems.</b>                                                                                                                                                        | ESR document |
| Food provision                           | Services related to the production of agricultural crops, animal production, capture fisheries, aquaculture or exploitation of native species.                                                            | ESR document |
| Provision of biological materials        | Services related to the production of wood, woody fibers and non-woody fibers, resins, animal skins, ornamental resources.                                                                                | ESR document |
| Biofuel Provision                        | Services related to living or recently living organisms that serve as a source of energy.                                                                                                                 | ESR document |
| Water Provision                          | Services related to inland water bodies, groundwater and surface water for domestic, industrial and agricultural use.                                                                                     | ESR document |
| Provision of genetic resources           | Services related to genes and genetic information used for animal reproduction, plant improvement and biotechnology.                                                                                      | ESR document |
| Provision of biochemicals and medicines  | Services related to medicines, biocides, food additives and other biological materials derived from ecosystems for commercial or domestic use.                                                            | ESR document |
| <b>Regulation Services</b>               | <b>The benefits gained from an ecosystem's control over natural processes.</b>                                                                                                                            | ESR document |
| Air quality regulation                   | The influence that ecosystems have on air quality by emitting chemicals into the atmosphere (i.e., serving as a “source”) or by extracting chemicals from the atmosphere (i.e., serving as a “sinkhole”). | ESR document |
| Global climate regulation                | The influence that ecosystems have on the global climate by emitting greenhouse gases or aerosols into the atmosphere or by absorbing greenhouse gases or aerosols from the atmosphere.                   | ESR document |
| Regulation of regional and local climate | The influence that ecosystems have on temperature, precipitation and other local or regional climatic factors.                                                                                            | ESR document |
| Water regulation                         | The influence that ecosystems have on the timing and magnitude of water runoff, flooding and aquifer recharge, in particular in terms of the water storage potential of the ecosystem or land.            | ESR document |
| Erosion regulation                       | The role of vegetation cover in soil retention, preventing erosion.                                                                                                                                       | ESR document |

|                                        |                                                                                                                                                                                                                               |              |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Water purification and waste treatment | The role of ecosystems in filtering and decomposing pollutants and organic waste in water; assimilation and detoxification of compounds through soil and subsoil processes.                                                   | ESR document |
| Regulation of Diseases                 | The influence that ecosystems have on the incidence and abundance of human pathogens.                                                                                                                                         | ESR document |
| Maintenance of soil quality            | The role of ecosystems in the maintenance of biological activity, soil diversity and productivity, regulation and partitioning of water and solute flow, storage and recycling of nutrients and gases, among other functions. | ESR document |
| Pest regulation                        | The influence that ecosystems have on the prevalence of pests and diseases in crops and animals.                                                                                                                              | ESR document |
| Pollination                            | The role of ecosystems in transferring pollen from male to female parts of flowers.                                                                                                                                           | ESR document |
| Regulation of natural hazards          | The ability of ecosystems to reduce damage caused by natural disasters such as hurricanes and to maintain the frequency and intensity of natural fires.                                                                       | ESR document |
| <b>Cultural Services</b>               | <b>Non-material benefits obtained from ecosystems.</b>                                                                                                                                                                        | ESR document |
| Recreation and ecotourism              | Recreational entertainment arising from natural or cultivated ecosystems.                                                                                                                                                     | ESR document |
| Ethical values                         | Spiritual, religious, aesthetic, intrinsic, “existential” or other values associated with ecosystems, landscapes or species.                                                                                                  | ESR document |
| Inspirational and educational values   | Information derived from ecosystems used for intellectual development, culture, art, design and innovation.                                                                                                                   | ESR document |
| <b>Support Services</b>                | <b>The natural processes that maintain other ecosystem services.</b>                                                                                                                                                          | ESR document |
| Habitat                                | Natural or semi-natural spaces that maintain populations of species and protect the ability of ecological communities to recover from disturbances.                                                                           | ESR document |
| Nutrient cycle                         | The role that ecosystems play in the flow and recycling of nutrients (for instance, nitrogen, sulfur, phosphorus, carbon) through processes such as decomposition and/or absorption.                                          | ESR document |
| Primary production                     | The formation of biological material by plants through photosynthesis and the assimilation of nutrients.                                                                                                                      | ESR document |
| Water cycle                            | Flow of water through ecosystems in its solid, liquid or gaseous forms.                                                                                                                                                       | ESR document |

| Risks                              |                                                                                                                                                                                                                                                                            |              |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Operational risks                  | Risks related to the increase in freshwater costs due to scarcity, the decrease in production from hydroelectric facilities due to silting or failure of coastal companies due to floods.                                                                                  | ESR document |
| Regulatory and legal risks         | Risks related to new fines, new user fees, government regulations or lawsuits brought by local communities that lose ecosystem services due to business activities.                                                                                                        | ESR document |
| Reputational risks                 | Image-related risks, such as: companies that are targeted by campaigns by non-governmental organizations against the purchase of wood or paper from sensitive forests or banks that face similar protests over investments that degrade ecosystems in their natural state. | ESR document |
| Market and product risks           | Market-related risks, such as: the loss of customers to other suppliers that offer products with a lower impact on the ecosystem or the implementation by government authorities of new sustainable sourcing policies.                                                     | ESR document |
| Financial risks                    | Risks such as the implementation by banks of stricter credit conditions for business loans.                                                                                                                                                                                | ESR document |
| Opportunities                      |                                                                                                                                                                                                                                                                            |              |
| Operational opportunities          | Opportunities for process improvement. Example: increasing water use efficiency or building wetlands areas, helping to reduce the need for new water treatment infrastructure.                                                                                             | ESR document |
| Regulatory and legal opportunities | Opportunities such as actions with government authorities to protect or restore ecosystems that provide necessary services to the company.                                                                                                                                 | ESR document |
| Reputational opportunities         | Opportunities such as the implementation and dissemination of sustainable purchasing, operating and investment practices in order to differentiate corporate brands.                                                                                                       | ESR document |
| Market and product opportunities   | Opportunities related to the launch of new products and/or services that reduce the organization's impact on ecosystems. Example: participation in emerging carbon sequestration markets and/or offering products with a recognized eco-label.                             | ESR document |
| Financial opportunities            | Opportunities such as the offer by banks of more favorable credit conditions or the interest of investors in companies that supply products and services that increase the efficiency of use of resources or restore degraded ecosystems.                                  | ESR document |

## **NOTES ON DEVELOPMENT OF THIS DOCUMENT**

Version 1.0: approved on 02/10/2022, by the LIFE Institute Board of Directors. Initial issue of the document.

Version 1.0-R1: approved on 08/31/2023, by the LIFE Institute Board of Directors. Change of document layout and insertion of the new LIFE Institute logo.