Leopold Matrix

In Honduras, identification of environmental impacts is based on a Leopold Matrix.

In the matrix, the rows cover the key aspects of the environment and society, while the columns list the project's activities during all stages of the project. Environmental factors must correspond to all those that could be affected by the development of the activity in the project area and the area of influence (see example in Table 12). Each box of interaction must determine whether the action in question will have an impact on the environmental factor given. If it will not, an empty or open circle is placed. If it will have an impact, you can place a filled circle and qualitatively describe the impact as: (A) High (B) Moderate or (C) Low. The corresponding letter is placed next to the filled circle, as shown in the example in Table 12.

There are three steps involved in building the matrix:

1. Mark a diagonal line on all boxes where the impacts of the action on the environment are considered significant.
2. Rate it from 1 to 10, 1 being lowest and 10 being highest, with the number placed in each box identified in Step 1 to indicate the *magnitude of the specific action's impact on that aspect of the environment*. This number is to be placed in the upper left-hand corner.
3. Using the same rating system, a rating is made in the lower right-hand corner of the defined boxes, representing the importance of the impact to the project.

Once all the impacts have been identified and rated, a detailed narrative must be written to describe and justify the impact significance (FAO, 1996).

Once you have finished filling out all fields, an inventory is made of the identified environmental impacts. Because there are impacts that have similarities, they should be summed up into one, whenever possible. The integrating factor used this case is that the activities that generate an impact are given simultaneously. The final product of this phase is a prediction of significant environmental impacts that could occur in both the construction and the operation phase of the activity or work.

Table 1. Example of a Leopold Matrix (modified) to identify impacts of a project construction works

Actions → Factors	Construction			Operation			
	Movement of land	Urban services of the project	Building works	Use of housing draft	Consumption services	Generation of waste	Maintenance works: built and green areas
Air (Quality Air System Sonic)	H	H	H	M	L	L	M
Floor (Use)	H	M	H	M	H	M	M
Surface water (Storm drain)	H	M	H	M	H	M	M
Underground water (Aquifer Level, Groundwater)	M	H	M	L	L	L	M
Flora fauna (Biotopes)	H	M	L	L	L	L	H
Empowerment	H	M	H	M	B	B	B

Sociocultural Condition (neighbours)	H	M	H	H	M	M	M
Generation Solid Waste	H		H	H	M	M	M
Management of dangerous substances (Combustibles etc.)	H	M	H	H	H	L	M
Scenery	H	M	H	H	B	B	H

Key: Significant Impact – requires assessment and establishment of measures
Impacts of low or non-existent significance (rated as A = High, M = Moderate, L = Low)

Once the more significant environmental impacts have been identified and placed in order (according to either the construction or operational phase) and according to relevant environmental factors, we proceed to assess the impacts according to Matrix of Importance of Environmental Impact (MIIA). This methodology allows for a score (from 1 to 100) for each of the identified environmental impacts, which may, at the end of the process, produce a total score of environmental impacts generated by the activity or work. An impact assessment for the reference areas to be must considered the overall and net project areas.

The outcomes of the impacts assessment and mitigation then include:

- A list of impacts and description of the severity of the impacts over the lifetime of the project in the context of the environmental, social, cultural and esthetical resources and issues using the Leopold Matrix.
- A grouping of similar types of impacts using the MIIA methodology.
- A list of mitigation actions linked to the groups of impacts.
- The presentation of the groups of impacts and related mitigation measures in a table.