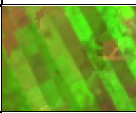
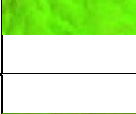


## Supplementary Information

Table S1: Key to interpreting the mapping classes

Table S2: Predictor variables used in the model

**Table S1** Key to interpreting the mapping classes

| Level 2                                          | Pattern Example (RGB654)                                                            | Description                                                                                                                                                                                                                                                                                                       | Characteristics                                                                                                                                                                                                             | Number of samples per class |
|--------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 1.1<br>Urban Areas                               |    | These are areas characterized by medium or high-density urban buildings.                                                                                                                                                                                                                                          | It features light to medium gray tones, an irregular shape, a rough texture, and a checkered pattern.                                                                                                                       | 1040                        |
| 1.2<br>Aquaculture                               |    | Area referring to artificial lakes intended primarily for the breeding of aquatic organisms for economic purposes. In addition to the practice of salt production.                                                                                                                                                | It may feature shades of light blue or green and black. The texture is uniform and smooth, the pattern geometric and regular.                                                                                               | 684                         |
| 2.1<br>Croplands                                 |    | Areas identified as having temporary or permanent crops, irrigated or not.                                                                                                                                                                                                                                        | It is characterized by its regular shape, light to medium green tones, and rough texture.                                                                                                                                   | 1195                        |
| 2.2<br>Pasture                                   |    | It includes native and planted pastures. These are environments under human interference, which may be for the grazing of cattle and other animals. Herbaceous vegetation can be found, including Grassland-Woody Savanna, Park Savanna-Steppe, interspersed with shrub species, as well as grassland formations. | It is characterized by its irregular shape and undefined pattern. It presents shades of light brown or light pink; however, depending on the humidity and health of the vegetation, it can display various shades of green. | 1948                        |
| 3.1<br>Forest Vegetation                         |    | Savanna-steppe Forest areas, Semi-deciduous and Deciduous Seasonal Forest, with a predominance of continuous canopy, including riparian forest. Additionally, contact environments are represented by mixtures or interpenetrations of Savanna-Steppe and Seasonal Forest species.                                | It has an irregular shape, medium to dark green tones, an intermediate rough texture, and a non-systematic pattern.                                                                                                         | 556                         |
| 3.2<br>Savanna vegetation                        |   | Vegetation with a predominantly shrubby stratum, sparsely distributed over a grassy-woody stratum. Similar to this category are Savanna-steppes, Wooded Savanna-steppes, and Shrubby Savanna-steppes. The savanna enclave (cerrado) was also included.                                                            | It is characterized by its irregular pattern, coarse texture, and light green tones.                                                                                                                                        | 1989                        |
| 3.3<br>Mangrove                                  |  | This refers to the coastal mangrove ecosystem, where the vegetation is dense and frequently flooded by the tide.                                                                                                                                                                                                  | It features shades of dark green or olive green, with an irregular and rough texture.                                                                                                                                       | 179                         |
| 3.4<br>Herbaceous Restinga (Sandbank Vegetation) |  | Herbaceous vegetation found in coastal sandy-water fields.                                                                                                                                                                                                                                                        | It has a green hue with exposed soil, a slightly rough texture, and an irregular pattern.                                                                                                                                   | 106                         |
| 3.5<br>Apicum (Hypersaline Tidal Flat)           |  | It is formed in saline and hypersaline areas, subject to sporadic flooding, in the transition to land or dune fields. It features vegetation known as halophytes.                                                                                                                                                 | It is characterized by shades of gray and light brown. It has an irregular pattern and a rough texture.                                                                                                                     | 165                         |
| 4.1<br>Rivers, Lakes, and Ocean                  |  | It refers to rivers, reservoirs, lakes, lagoons, and saltwater.                                                                                                                                                                                                                                                   | It is featured in shades of black or blue. Its pattern is well-defined with smooth texture.                                                                                                                                 | 723                         |
| 5.1<br>Non-vegetated areas                       |  | Areas with no vegetation cover, such as rocky outcrops, beaches, and dunes, both coastal and inland.                                                                                                                                                                                                              | It is characterized by various color tones depending on the area, such as reddish, light brown, gray, and beige. The texture varies between                                                                                 | 1223                        |

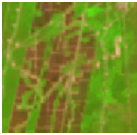
|                   |                                                                                   |                                                                                                                                                                                                                                                                                                        |                                                                                          |      |
|-------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------|
|                   |                                                                                   |                                                                                                                                                                                                                                                                                                        | smooth and rough. Its pattern is undefined and scattered.                                |      |
| 5.2<br>Other uses |  | These correspond to industrial, commercial, communication network, mineral extraction, oil, and renewable energy (wind and solar farms) areas. Additionally, they include locations where it was not possible to identify land uses or where there are multiple uses, such as agriculture and pasture. | It features shades of gray, dark brown, or even black, with a defined geometric pattern. | 1271 |
| 6                 |                                                                                   | Areas blocked by clouds or atmospheric noise.                                                                                                                                                                                                                                                          | -                                                                                        | -    |

**Table S2.** Predictor variables used in the model.

| Name (Variable)                                                             | Description                                                                                        | Formula                                                            | Reference                  |
|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------|
| Normalized difference vegetation index (NDVI)                               | Estimation of the quantity and vigor of vegetation.                                                | $(NIR - RED) / (NIR + RED)$                                        | Rouse et al., 1974         |
| Normalized difference water index (NDWI)                                    | Water content estimate                                                                             | $(GREEN - NIR) / (GREEN + NIR)$                                    | Gao, 1996                  |
| Soil-adjusted vegetation index (SAVI)                                       | Vegetation index adjusted to minimize the influence of soil in areas with little vegetation cover. | $(NIR - RED) / ((NIR + Red + L) \times (1 + L)); L = 0.5$          | Huete, 1988                |
| Modified soil-adjusted vegetation index (mSAVI)                             | Modified version of SAVI to increase accuracy in exposed soils.                                    | $[(2 * NIR + 1) - \sqrt{(2 * NIR + 1) * 2 - 8 * (NIR - RED)}] / 2$ | Qi et al., 1994            |
| Green soil-adjusted vegetation index (gSAVI)                                | SAVI version that uses the green band to highlight vegetation.                                     | $(NIR - GREEN) / ((NIR + GREEN + 0.5) * (1 + 0.5))$                | Sripada et al., 2006       |
| Normalized Difference Built-up Index (NDBI)                                 | Index for identifying urban and built-up areas.                                                    | $(SWIR - NIR) / (SWIR + NIR)$                                      | Zha et al., 2003           |
| Green Normalized Difference Vegetation Index                                | NDVI version that uses the green band to assess vegetation.                                        | $(NIR - GREEN) / (NIR + GREEN)$                                    | Gitelson et al., 1996      |
| Enhanced vegetation index (EVI)                                             | Estimation of densely vegetated areas                                                              | $2.5 * (NIR - RED) / (NIR + 6 * RED - 7.5 * BLUE + 1)$             | Liu & Huete, 1995          |
| Difference vegetation index (DVI)                                           | Simple vegetation index                                                                            | $NIR - Red$                                                        | Tucker, 1979               |
| Modified normalized difference water index (mNDWI)                          | A variant of NDWI, adjusted to identify water bodies.                                              | $(GREEN - SWIR) / (GREEN + SWIR)$                                  | Xu, 2006                   |
| Moisture stress index (MSI)                                                 | It measures water stress in vegetation.                                                            | $SWIR1 / NIR$                                                      | Hunt Jr & Rock, 1989       |
| Chlorophyll Vegetation Index (CVI)                                          | Evaluates chlorophyll concentration.                                                               | $(NIR / GREEN) * (RED / GREEN)$                                    | Vincini et al., 2008       |
| Green Ratio Vegetation Index (GRVI)                                         | Index based on the proportion of green to assess vegetation.                                       | $(NIR / GREEN)$                                                    | Motohka et al., 2010       |
| Modified Simple Ratio (MSR)                                                 | A modified version of the Simple Ratio for assessing vegetation health.                            | $((NIR / RED) - 1) / (\sqrt{(NIR / RED) + 1})$                     | Chen, 1996                 |
| Ratio Vegetation Index (RVI)                                                | Estimation of the proportion of vegetation                                                         | $(NIR / RED)$                                                      | Richardson & Wiegand, 1977 |
| Normalized Burn Ratio (NBR)                                                 | Index used to detect burned areas.                                                                 | $(NIR - SWIR) / (NIR + SWIR)$                                      | Key & Benson, 2006         |
| Normalized Difference Tillage Index (NDTI)                                  | Index for detecting soil management practices, such as cultivation.                                | $(SWIR1 - SWIR2) / (SWIR1 + SWIR2)$                                | Van Deventer et al., 1997  |
| Modified Photochemical Reflectance Index (MPRI)                             | Vegetation estimate.                                                                               | $(GREEN - RED) / (GREEN + RED)$                                    | Yang et al., 2008          |
| MDE (Slope, hillshade, elevation, aspect)                                   |                                                                                                    | -                                                                  | SRTM                       |
| Spectral Linear Mixture Model (Fraction_solo, fraction_agua, fraction_vege) | Soil, water, and vegetation ratio.                                                                 | -                                                                  | Shimabukuro & Smith, 1991  |
| Tasselled cap (vegetation, wetness, brightness)                             |                                                                                                    | -                                                                  | Kauth & Thomas, 1976       |
| Spectral Bands (B2, B3, B4, B5, B6)                                         | Spectral bands of different wavelengths.                                                           | -                                                                  | Landsat-8                  |
| Precipitation (precipitacao_2023)                                           | Estimated precipitation data for 2023.                                                             | -                                                                  | Silva et al., 2024         |
| Land Surface Temperature (LST_2023)                                         | Earth's surface temperature in 2023.                                                               | -                                                                  | Jesus & Santana, 2017      |

|                                                |                                                     |   |   |
|------------------------------------------------|-----------------------------------------------------|---|---|
| Geographical Position (Latitude,<br>longitude) | Measurements of position on the Earth's<br>surface. | - | - |
|------------------------------------------------|-----------------------------------------------------|---|---|