

## REQUEST FOR EXPRESSIONS OF INTEREST CONSULTING SERVICES

Selection #: BR-T1430-P005

Selection Method: Simplified Competitive Selection

Country: Brasil

Sector: IFD/CTI

Funding – TC #: ATN/KK-17838-BR

Project #: BR-T1430

TC name: *Support for Establishing the University-Led International Hub for Sustainable Development (HIDS) in Campinas*

Description of Services: *Consultancy for the diagnosis of the environmental and cultural heritage of HIDS*

Link to TC document: [<https://www.iadb.org/projects/document/EZSHARE-141652983-20?project=BR-T1430>]

The Inter-American Development Bank (IDB) is executing the above mentioned operation. For this operation, the IDB intends to contract consulting services described in this Request for Expressions of Interest.

Expressions of interest must be delivered using the IDB Portal for Bank Executed Operations ( <http://beo-procurement.iadb.org/home> ) by: July 28<sup>th</sup> ,2021, 5:00 P.M. (Washington D.C. Time).

The consulting services (“the Services”) include the diagnosis of the environmental and cultural heritage of the International HUB for Sustainable Development - HIDS. The goals are:

- Carrying out studies on the assessment, characterization and diagnosis of vegetation and forest fragments, as well as of the associated ecosystem services in the defined area that makes up the HIDS;
- Conducting geotechnical and hydrogeological surveys 1: 5000 scale or greater, in the enclosed area that composes the HIDS, using as inputs the digitalization of topographic charts at the best available scale, DTM of adequate spatial resolution, aerophotogrammetric reconstitution from accuracy surveys, or using the SEPLAN survey (Campinas Prefecture), if provided by the contractor;
- Conducting studies of climatic characterization in the enclosed area that makes up the HIDS;

These studies are necessary, since the preliminary studies carried out within this thematic to the HIDS territory by the Municipality of Campinas (available in <https://informacao-didc.campinas.sp.gov.br/metadados.php> and <https://www.iac.sp.gov.br/atlasanhumas/>) have smaller scales, which are insufficient to record the environmental data required for an accurate characterization of HIDS;

Although on a more precise scale, all studies and methodologies to be used in the environmental diagnosis of HIDS are aligned with the technical guidelines of the Municipality of Campinas for related works.

Eligible consulting firms will be selected in accordance with the procedures set out in the Inter-American Development Bank: [Policy for the Selection and Contracting of Consulting firms for Bank-executed Operational Work](#) - GN-2765-4. All eligible consulting firms, as defined in the Policy may express an interest. If the Consulting Firm is presented in a Consortium, it will designate one of them as a representative, and the latter will be responsible for the communications, the registration in the portal and for submitting the corresponding documents.

The IDB now invites eligible consulting firms to indicate their interest in providing the services described above in the [draft summary](#) of the intended Terms of Reference for the assignment. Interested consulting firms must provide information establishing that they are qualified to perform the Services (brochures, description of similar assignments, experience in similar conditions, availability of appropriate skills among staff, etc.). Eligible consulting firms may associate in a form of a Joint Venture or a sub-consultancy agreement to enhance their qualifications. Such association or Joint Venture shall appoint one of the firms as the representative.

Interested eligible consulting firms may obtain further information during office hours, 09:00 AM to 05:00 PM, (Washington D.C. Time) by sending an email to: [darci@iadb.org](mailto:darci@iadb.org)

Inter-American Development Bank – Representation in Brazil

Division: *IFD/CTI*

Attn: *Diego Arcia*

Setor de Embaixadas Norte Quadra 802 Conjunto F Lote 39 - Asa Norte

E-mail: [darci@iadb.org](mailto:darci@iadb.org)

Web site: [www.iadb.org](http://www.iadb.org)

## **TERMS OF REFERENCE**

### **Consultancy for the diagnosis of the environmental and cultural heritage of HIDS**

**Brazil**

**BR-T1430**

**Support for the creation of the International Sustainable Development Hub (HIDS) led by the University in Campinas**

#### **1. Background and Justifications**

- 1.1.** Established in 1959, the Inter-American Development Bank (IDB) is the main source of multilateral financing for economic, social and institutional development in Latin America and the Caribbean. It offers loans, grants, guarantees, political advice and technical assistance to the public and private sectors of its borrowing member countries.
- 1.2.** The Inter-American Development Bank, through its Competitiveness and Innovation Division (IFD / CTI), promotes the creation and growth of dynamic companies in the countries of Latin America and the Caribbean with the capabilities and tools to innovate and compete in international markets. In addition, CTI, together with the Housing and Urban Development Division (HUD), is supporting the establishment of the International Center for Sustainable Development (HIDS) led by the State University of Campinas, in Brazil.
- 1.3.** The International HUB for Sustainable Development (HIDS) is a project that combines and articulates actions through partnerships and cooperation between institutions that have competencies and interests aimed at providing concrete contributions to sustainable development in a broad way, including actions that have an impact on social, economic and environmental axes. Its vision is to contribute to the sustainable development process, adding national and international efforts to produce knowledge, innovative technologies and education for future generations, mitigating and overcoming the social, economic and environmental weaknesses of contemporary society.
- 1.4.** The HIDS has an area of 11.3 million square meters, which includes, besides the State University of Campinas (Unicamp), the Catholic University of Campinas (PUC) and the Faculdades de Campinas (FACAMP), several public and private entities located in the region of the Strategic Development Pole of the municipality of Campinas (CIATEC II).
- 1.5.** As an essential part of its vision of sustainability, HIDS is committed to the knowledge and appreciation of its environmental and cultural heritage as a way of integrating these elements in the creation of a sustainable district, to be a national and international reference, promoting the coexistence of development social and economic development without the dilapidation of its natural heritage.
- 1.6.** The objective of Technical Cooperation is to develop a master plan and support the conceptualization and construction of the strategic framework for the creation of HIDS.

#### **2. Goals**

- 2.1.** Carry out studies on the assessment, characterization and diagnosis of vegetation and forest fragments, as well as of the associated ecosystem services in the defined area that makes up the HIDS;
- 2.2.** Conduct geotechnical and hydrogeological surveys 1: 5000 scale or greater, in the enclosed area that composes the HIDS, using as inputs the digitalization of topographic charts at the best available

scale, DTM of adequate spatial resolution, aerophotogrammetric reconstitution from accuracy surveys, or using the SEPLAN survey (Campinas Prefecture), if provided by the contractor;

- 2.3. Conduct studies of climatic characterization in the enclosed area that makes up the HIDS;
- 2.4. These studies are necessary, since the preliminary studies carried out within this thematic to the HIDS territory by the Municipality of Campinas (available in <https://informacao-didc.campinas.sp.gov.br/metadados.php> and <https://www.iac.sp.gov.br/atlasanhumas/>) have smaller scales, which are insufficient to record the environmental data required for an accurate characterization of HIDS;
- 2.5. Although on a more precise scale, all studies and methodologies to be used in the environmental diagnosis of HIDS are aligned with the technical guidelines of the Municipality of Campinas for related works.

### 3. **Scope of Services**

- 3.1. Thus, the general scope of this document is to contribute to the diagnosis of the HIDS Environmental and Cultural Heritage, defined here as its biodiversity and ecosystem services, geodiversity and microclimate elements.
- 3.2. All contracted services must be limited to the area defined in the map in Figure 1.



Figure 1. Territorial limits of HIDS in the District of Barão Geraldo, Campinas, SP and delimitation of the polygons for the diagnosis of vegetation and ecosystem services.

### 4. **Main activities**

## I. SURVEY, CHARACTERIZATION AND DIAGNOSIS OF VEGETATION AND FOREST FRAGMENTS, AS WELL AS ASSOCIATED ECOSYSTEM SERVICES

The diagnosis of the areas will occur in all the polygons indicated on the map in Figure 1, and where there is a predominance of tree vegetation, the survey to characterize the vegetation will occur by sampling using the methods of walking and sample plots. In the remaining areas of the polygons, where there is a predominance of grasses, a general diagnosis of the entire area should be carried out with the identification of existing tree individuals. In these same polygons, and around them (not exceeding the limits of ownership), the consultancy should identify all the actors involved and the possible conflicts of interest in terms of the maintenance and use of ecosystem services, as well as the mapping and evaluation of ecosystem services, as indicated in item 4.4.

### 4.1. Inventory, characterization and diagnosis of vegetation in the forest fragments.

#### 4.1.1. Floristic survey using the "walking" method.

- a) To carry out the floristic survey in a representative manner for the evaluated areas, the method called "walking" should be used, as described by Filgueiras *et al.* (1994)<sup>1</sup>, where the identification of tree plant individuals will occur along pre-established trails in forest fragments called "polygons" in Figure 1.
- b) Along the trail journey, the shrub-tree life forms (including palms) seen in a range of 5 meters to each side of the track shall be identified. The survey in these trails will be finalized when no additional species is found in a period of 20 minutes.
- c) The collection of botanical material from at least one specimen of each species found, containing flowers and fruits, should be carried out whenever possible. This material must be herborized containing the date of collection, location obtained by georeferencing, identification of the collector and the species collected, and subsequently delivered to the CONTRACTING PARTY.
- d) Each trail covered must be georeferenced and demarcated every 30 meters with the placement of PVC stakes 1 meter high above the ground and 0.50 m buried in the ground. The piles should be 1 inch in diameter and have the ends painted in red with 0.15 m with the line identification (ex: L1, L2, L3).
- e) During the trail journey, the bee nests of the Meliponini tribe in a range of 5 meters to each side of the track shall be located and identified. The survey must be carried out along the entire trail. All trees present within this area must be carefully inspected with the naked eye or with the aid of binoculars looking for signs of a possible nest. These signs are: the flow of incoming and outgoing foraging bees from somewhere in the tree; inlet tubes constructed with wax, resin or batumen; or even the nest itself (for exposed nests). The roots of the trees and the soil of the area also need to be inspected for underground nests. The located nests must be identified with the placement of PVC stakes 1 meter high above the ground and 0.50 m buried in the soil close to the nest site. The piles should be 1 inch in diameter and have the tips painted in yellow with 0.15 m with the nest identification number. Worker samples should be collected for identification at the species level.

#### 4.1.2. Survey of vegetation in sample plots.

- a) The survey of vegetation data will be carried out in rectangular working plots 15 meters wide by 20 meters long distributed among the fragments. The number of plots for each fragment must be defined by the contractor so that the area is statistically well represented.
- b) The definition of allocation of parcels must be presented by the CONTRACTOR and validated by the CONTRACTING PARTY within the area of the fragments so that the sampling is representative.

---

<sup>1</sup> Filgueiras T.S.; Nogueira, P.E.; Brochado, A.L. & Guala, G.F. 1994. Caminhamento: um método expedito para levantamentos florísticos qualitativos. *Cadernos de Geociências* 12: 39-43

their fixation with a diameter of 1 inch. All stakes must have the ends painted in red with 0.15 m, also containing the numbering of the parcel.

- d) In all arboreal individuals with DBH (trunk diameter to be measured at 1.30 m from the ground) equal to or greater than 0.05 m, within the sampled plots, metallic platelets with sequential identification number should be fixed. For these individuals, taxonomic identification up to species should be performed, whenever possible, as well as the collection of data on height and DBH in meters.
- e) The taxonomic nomenclature for presentation of the final report will follow the classification guidelines of the Angiosperm Phylogeny Group III (APG III).
- f) The characterization of the understory (natural recovery) should be performed at subplots of 1.5 x 2.0 meters allocated within the sampled portions. Individuals with a height greater than or equal to 0.10 m and DBH less than 0.05 m should be lifted. These individuals should be quantified and identified by species, whenever possible.
- g) The presence of epiphytes, vines and bamboo should be carried out in the sampled parcels.
- h) For the characterization of the litter, the characteristics of the existing layer in the total area of the sampled plots must be recorded as: fine and little decomposed; or present with variable thickness; or present with decomposition.
- i) The frequency of invasive exotic grasses should be indicated, such as: in the whole area (coverage > 70% of the area), in part of the area (coverage < 70% of the area) or absent.
- j) The presence of bee nests of the Meliponini tribe must be recorded in the plots (see item 4.1.1.E for detailed recommendations).

#### 4.2. Survey and diagnosis of the polygon areas.

- a) In the total area of the polygons for evaluation, it should be noted, when present, degradation factors, such as the presence of invasive alien species, indicative of erosion process, presence of anthropic residues, among others.
- b) In all polygons to be assessed, areas free of arboreal vegetation should be pointed out and measured.
- c) In the areas of the polygons that are not characterized as a fragment of vegetation, a survey of the tree vegetation must be carried out, according to item 4.1.2 d) and e).

#### 4.3. Characterization of vegetation and analysis of the data.

##### 4.3.1. *Phytosociological parameters.*

Based on the data collected in the plots, the following analyzes of phytosociological parameters should be carried out:

- a) Density: is the number of individuals of each species or group of species that make up a plant community per unit area, usually hectare. The relative density refers to the total number of individuals of the same species per unit area, and the relative density reveals, in percentage, the participation of each species in relation to the total number of individuals of all species.
- b) Dominance: it is a parameter that seeks to express the influence of each species in the community, through its biomass. Absolute dominance is obtained by adding the transversal areas (g) of individuals of the same species, per hectare. Relative dominance corresponds to participation, in percentage, in relation to the total basal area (G).
- c) Frequency: expresses the number of occurrences of a particular species in different portions allocated; it can be absolute frequency, when obtained by the percentage of the parcels in which the species occurs, or relative frequency, obtained by the total sum of the absolute frequencies, for each species.
- d) Value of Importance: consists of the sum of the relative values of density, dominance and frequency.
- e) Sociological Position: parameter that is part of the vertical structure of the vegetation; it concerns the position that different species occupy in the different strata that the forest presents.
- f) Natural Regeneration: consists of the survey of the descendants of the tree plants, generally involving the plants between 10 cm in height up to the diameter limit established arbitrarily in the structural survey.

#### 4.3.2. Classification of phytophysionomies.

Based on the total survey of each fragment, the phytophysionomies and the type(s) and stage(s) of vegetation development must be identified according to CONAMA Resolution nº 10 of October 1/1993, CONAMA Resolution nº 1 of January 31/1994, IBAMA/SMA Joint Resolution nº1 of February 17/1994 and CONAMA Resolution nº7, of July 23/1996 (for the Atlantic Forest), SMA Resolution nº 64, of October 13/1995 (for Cerrado), SMA Resolution nº8 of January 31/2008.

The justification for the classifications must be based on descriptive and photographic explanations considering all the following parameters:

- I - Physiognomy
- II - Strata of predominance
- III - Diametric and height distribution
- IV - Existence, diversity and quantity of epiphytes
- V - Existence of diversity and quantity of vines
- VI - Presence, absence and characteristics of litter
- VII - Understory
- VIII- Diversity, represented by the number of species and species dominance by the% of a species in relation to the whole;
- IX- Indicator plant species, both for the identification of successional stages and for phytophysionomies.

#### 4.4. Mapping and evaluation of ecosystem services.

For the purposes of the object of this contract, ecosystem services (ES) are understood to mean any and all benefits of nature for people, and that contribute to their well-being, including human activities that favor conservation, restoration and/or improvement ecosystems and, consequently, of the services provided by them. This contracting stage will consist of four items, all detailed in greater depth in the addendum document provided by the CONTRACTING PARTY:

**4.4.1.** Definitions of the land-use and land-cover classes for the soil and vegetation of the area of the present contracting based on data provided by the map in Figure 1.

**4.4.2.** Based on the CICES list (Common International Classification of Ecosystem Services), available at <https://cices.eu/>, the Contractor shall draw up a list of ecosystem services - especially those to control erosion and sedimentation, climate regulation, pollination and maintenance habitat and biodiversity - based on the different classes of land use and cover defined in item 4.4.1, as well as in item 4.3. At the end, for each land use class (rows of a matrix or X axis) there will be an associated ES (columns of a matrix or Y axis) and at the intersection of both values (between 0 and 4 , see item 4.4.3 , below) assigned by the contracted specialist;

**4.4.3.** Method for evaluating the ES: based on the information that emerges from items 4.4.1 and 4.4.2, the CONTRACTOR shall prepare a matrix to evaluate, on a scale of 0 to 4 (0 = service offer is not relevant in the use and current land cover), the provision of that service. This assessment is qualitative and based on the opinion of the contracted specialist. At the end, there is the median of each ecosystem service by class of use and land cover. To refer to this stage of this term, the CONTRACTOR may use the material "MAPPING ECOSYSTEM SERVICES IN THE TERRITORY - Methodological Booklet" to be made available by the CONTRACTING PARTY.

**4.4.4.** Mapping the ES: creation of maps for the provision of ecosystem services (one map per ES) using Geographic Information Systems (GIS). The first step in creating the final ES maps is to obtain the land use map (item 4.4.1). The maps must be generated on the same scale as that indicated in Figure 1.

**4.5.** Survey, plating (according to item 4.1.2 D), characterization and georeferencing of all isolated trees in the area of the property that are outside the forest fragments, indicating species, DBH and height of each individual.

## **II. GEOTECHNICAL AND HYDROGEOLOGICAL SURVEY**

**4.6.** Research of data and information sources, such as technical articles, geological and geotechnical surveys, study reports of the region and stratigraphic, geomorphological, pedological and hydrogeological maps and charts.

**4.7.** Research of existing tubular wells in the area and collection of data from well records and piezometric data, with analysis of the sufficiency of the data for the study or the need to propose additional drilling wells, based on ABNT NBR 15492.

**4.8.** Elaboration of a geological and hydrogeological conceptual plan for the area under study.

**4.9.** Elaboration of stratigraphic and geomorphological characterization of the area under study.

**4.10.** Preparation of a preliminary geotechnical map of urban aptitude on terrain for road construction, excavation, foundation and urbanization, on a 1:5000 scale, including georeferenced and orthorectified imaging and extraction of DTM (Digital Terrain Model) and thematic maps.

**4.11.** Characterization of aquifers, based on regional and local technical reports, scientific articles and inventory of tubular wells, with interpretation of the underground flow for the elaboration of a potentiometric map with direction and direction of the flows,  $f =$  gradients and hydraulic conductivity of the aquifers.

**4.12.** Elaboration of a susceptibility chart to natural disasters.

**4.13.** Organization of a database containing all cartographic and geospatial products generated and compiled during all stages of the work, including maps, charts, images and other data, in addition to a georeferenced information system. The database must be delivered in Geodatabase and PostgreSQL/PostGIS formats.

## **III. CLIMATE SURVEY**

**4.14.** As it is a relatively small area, the resolution of the maps delivered must be less than 100m (preferably less than or equal to 30m), using the data observed at the CEPAGRI -UNICAMP weather station.

**4.15.** The following variables must be included in the survey, in a spatially explicit and georeferenced manner:

- I - Surface temperature and/or atmospheric temperature close to the surface.
- II - Precipitation.
- III - Atmospheric humidity close to the surface (data observed from the CEPAGRI - UNICAMP weather station).
- IV - Wind (direction and magnitude) close to the surface (data observed from the CEPAGRI weather station).

**4.16.** Analysis of the variables listed above using the following:

- I - Annual average.
- II - Monthly average (from January to December).
- III - Range of diurnal variation (if possible).
- IV - Range of seasonal variation.



**4.17.** The temporal coverage (history series) for calculating the variables listed in 4.15. may not be less than 5 years.

**4.18.** Use of the satellite data in high resolution for the variables listed in 4.15. being able, if necessary, to make spatially explicit modeling of these same variables, considering as a boundary condition the observational data from the meteorological station of the Center for Meteorological and Climate Research Applied to Agriculture - CEPAGRI of the State University of Campinas - UNICAMP because it is the station closest to the HIDS area.

## **5. Products**

**5.1. Product 1:** Monthly technical reports containing all the data collected, as well as the presentation of maps in scale and schematic of the areas to analyzed in the survey, characterization and diagnosis of the vegetation and the forest fragments, as well as the associated ecosystem services in the defined area that makes up HIDS. The presentation of the data must be in accordance with the table models in the annex. All data collected, results and conclusions of the analyzes carried out on the trails and plots must be delivered.

**5.2. Product 2:** Monthly technical reports containing the data collected in the period (30; 60; 90; 120; 150; 180 days), as well as the presentation of maps in scale and schematic of the areas to analyzed in the geotechnical and hydrogeological survey in the defined area that makes up the HIDS;

**5.3. Product 3:** Monthly technical report containing all the climatic data to be surveyed, as well as the presentation of maps in scale and schematic of the areas to analyzed.

**5.4. Product 4:** Final report including a detailed technical report and territorial environmental plan.

### **5.4.1. *A detailed technical report covering:***

- a) Description of the methodologies used;
- b) Table containing all field survey data in accordance with the models of the attached table ;
- c) The analyzes carried out in relation to floristics, phytosociology, phytophysiology, successional stage, degradation factors and areas without tree vegetation, as well as the corresponding ecosystem services, with results and conclusions on the situation of all evaluated areas;
- d) Photographic interpretation of the areas, indicating the points where the photos were taken, which fairly represent the results and conclusions presented;
- e) The report must be accompanied by georeferenced maps of the areas covered by the services, with the following themes:
  - I - Delimitation of plots corresponding to the type of phytophysiology and successional stages.
  - II - Indication of work parcels.
  - III - Delimitation of the trails covered in the survey by walking.
  - IV - Delimitation of areas free of arboreal vegetation.
  - V - Current view of ecosystem services in the entire area.

### **5.4.2. Environmental map of the territory.**

Based on all studies conducted in the scope of this contract it should be drawn up the digital environmental map of the territory in format shapefile or geodatabase (DATUM SIRGAS 2000), containing: the delimitation of the fragments, polygons and plots as described in item 5. 4.1. e), of the degraded areas in need of recovery, as well as the demarcation of the isolated trees on the property already identified and with the DBH and height data present in the layer attributes table. In addition to the digital format, this plan must be delivered printed in 3 copies and accompanied by

the Technical Liability Note of the technical professional responsible for the services.

**5.5. Product 5:** Final report of geotechnical and hydrogeological survey in the defined area that composes HIDS, contemplating:

- a) Description of the methodologies used.
- b) Results and products obtained related to the Geological-Geotechnical Compartmentation and Elaboration of the Natural Disaster Susceptibility Chart on a 1:5000 scale, and of the geological type sections used for the elaboration of hydrogeological sections.
- c) Results and products obtained related to the Geotechnical Mapping of Aptitude of urban land to land uses on a scale of 1:5000, with the inclusion of methodological aspects and thematic charts and the GIS manual accompanying the project.
- d) Results and products obtained related to Aquifer Characterization.
- e) Database containing all cartographic and geospatial products generated and compiled during all stages of the work.

**5.6. Output 6:** Final climate survey report covering:

- a) Description of the methodologies used.
- b) Results and products obtained related to climatological variables.
- c) Database containing all the climatological and space products generated and compiled during all stages of the work.

## **6. Supervision and Accountability**

- 6.1.** The consultant shall be subject to the Team Leader, Diego Arcia, specialist to the Housing and Urban Development Division (CSD/HUD) for supervision of consulting, submission of deliverables and approval.
- 6.2.** The consulting firm, the Steering Committee of the HIDS and Team Leader mutually agree with the Bank on the schedule of activities and the delivery dates of deliveries. It will be the responsibility of the Consulting Firm to ensure that the results are presented to the Bank in accordance with the schedule.
- 6.3.** All submissions will be reviewed by the Team Leader for approval. The Consulting Firm must address the comments provided by the Team Leader for correction and review in order for the delivery to be accepted.

## **7. Consulting Features**

- **Category and modality of consultancy:** Contract of External Products and Services, International, Firm, Total Amount
- **Contract duration:** 6 months
- **Start time:** August 30, 2021
- **Workplace:** Campinas, Brazil
- **Supervisor:** Diego Arcia, Specialist in the Housing and Urban Development Division, CSD/HUD
- **Language:** Portuguese and English

## **9. Qualificação**

- 9.1.** Team Composition: The team must be able to define all aspects of this task. The team must demonstrate knowledge and experience in conducting studies, collecting and analyzing data related to vegetation and forestry, geotechnical and hydrogeological and climatic.
- 9.2.** The consulting company that leads the team must have at least five years of experience in environmental projects and demonstrate a portfolio that proves its competence in this area and in works similar to the scope of these terms of reference. The team must include at least one team leader who will be responsible for the overall supervision and coordination of all project activities, for the management of the team and will act as the primary communications contact for the HIDS and IDB Coordination Committee. The expectation is that the team will have a local presence.

**9.3.** The team must be composed of the following specialists:

- a) At least one high-level professional graduated in ENG. FORESTRY OR BIOLOGY OR ENG. AGRONOMIC, with proven experience of at least five years in the areas of floristic surveys and botanical taxonomy in the Atlantic Forest Biome, who will be the executor and technically responsible for the performance of the services.
- b) At least one high-level professional graduated in GEOLOGY, with proven experience of at least five years in the areas of geotechnics and hydrogeology, who will be the executor and technically responsible for the performance of the services.
- c) At least one high-level professional graduated in METEOROLOGY, GEOGRAPHY, PHYSICS, or other related areas, with proven experience of at least five years in the areas of remote meteorological-climatic sensing, who will be the executor and technically responsible for the performance of services.
- d) At least one high-level professional qualified in GEOPHRAPHIC INFORMATION SYSTEMS (GIS), with proven experience of at least five years.

**10. Payment Schedule**

| <b>Payment Schedule</b>                               |          |
|---|----------|
| <b><i>Result</i></b>                                  | <b>%</b> |
| 1. Signature and delivery of the work plan            | 25%      |
| 2. Delivery and after approval of the product 1, 2, 3 | 30%      |
| 3. Delivery and after approval of the product 4, 5, 6 | 45%      |
| <b>TOTAL</b>  | 100%     |

## ATTACHMENT. MODEL TABLES FOR VEGETATION DATA

Table I - Tree and shrub vegetation in areas of forest fragment and in the area of polygons with a predominance of grasses.

| Tree and Shrub Vegetation |          |         |    |                 |        |              |                    |                 |                     |     |        |           |
|---------------------------|----------|---------|----|-----------------|--------|--------------|--------------------|-----------------|---------------------|-----|--------|-----------|
| Polygon                   | Fragment | Portion | ID | Scientific name | Family | Popular name | Successional stage | Threat category | Dispersion syndrome | DBH | Height | %/species |
|                           |          |         |    |                 |        |              |                    |                 |                     |     |        |           |

Table II - Understory vegetation.

| Understory vegetation (natural regeneration) |          |         |    |                 |        |              |                    |                 |                     |           |
|--|----------|---------|----|-----------------|--------|--------------|--------------------|-----------------|---------------------|-----------|
| Polygon                                      | Fragment | Portion | ID | Scientific name | Family | Popular name | Successional stage | Threat category | Dispersion syndrome | %/species |
|  |          |         |    |                 |        |              |                    |                 |                     |           |

Table III - Litter characteristics

| Litter Features |          |         |                            |                                 |                            |
|-----------------|----------|---------|----------------------------|---------------------------------|----------------------------|
| Polygon         | Fragment | Portion | Thin and poorly decomposed | Present with variable thickness | Present with decomposition |
|                 |          |         |                            |                                 |                            |

Table IV - Invasive grasses in the plots

| Invasive grasses in plots |          |         |  |                                    |                                 |
|---------------------------|----------|---------|--|------------------------------------|---------------------------------|
| Polygon                   | Fragment | Portion | In the whole area (more than 70% coverage) | Part of the area (10-70% coverage) | Invasive exotic grasses present |
|                           |          |         |  |                                    |                                 |

Table V - Areas free of tree vegetation in the polygons

| Areas free of tree vegetation in the polygons |
|---|
|   |

|         |   |   |
|---------|---|---|
| Polygon | Vegetation-free area within the fragments in m <sup>2</sup> | Vegetation-free area in the total area of the polygon in m <sup>2</sup> |
|         |   |   |

Table VI. MODEL FOR ECOSYSTEM SERVICES DATA

| Polygon | Fragment | Phytophysiology<br>* | Class of land use and<br>land cover | Associated<br>Ecosystem<br>Service | ES category |
|---------|----------|----------------------|-------------------------------------|------------------------------------|-------------|
|         |          |                      |                                     |                                    |             |

\* Previously defined by the consultancy contracted according to item 4.3.2 of this Term of Reference