

TC ABSTRACT

I. Basic project data

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| ▪ Country/Region: | Brazil / Southern Cone |
| ▪ TC Name: | Assessment of the impacts of climate on the stability of the Amazon rainforest |
| ▪ TC Number: | BR-T1284 |
| ▪ Team Leader/Members: | Axelle Boulay (INE/CCS, team leader), Juan Chang (CCS/HQ, alternate team leader), Simone Bauch (CCS/CBR, team member) Anne Gander (CCS/CBR, team member), Fernanda do Vale Caribé (CCS/CBR, operational analyst), and Milagros De Pomar (project assistant). |
| ▪ Indicate if: Operational Support, Client Support, or Research & Dissemination. | Client Support |
| ▪ Reference to Request: (IDB docs #) | 37931922 |
| ▪ Date of TC Abstract: | Aug 1 st 2013 |
| ▪ Beneficiary: | Brazilian Ministry of Science, Technology and Innovation (MCTI) |
| ▪ Executing Agency and contact name: | Fundação Amazônica de Defesa da Biosfera (Amazonian Foundation for Biosphere Protection) |
| ▪ IDB Funding Requested: | US\$ 1,000,000.00 |
| ▪ Local counterpart funding, if any: | US\$ 500,000.00 |
| ▪ Disbursement period (which includes execution period): | 24 months |
| ▪ Required start date: | February, 2014 |
| ▪ Types of consultants (firm or individual consultants): | Firms |
| ▪ Prepared by Unit: | CCS/CBR |
| ▪ Unit of Disbursement Responsibility: | CCS/CBR |
| ▪ Included in Country Strategy (y/n); ▪ TC included in CPD (y/n): | N Y |
| ▪ GCI-9 Sector Priority: | Protect the environment, respond to climate change, promote renewable energy and ensure food security. |

II. Objective and Justification

This TC will support: (1) technical assessments, (2) institutional arrangements, (3) economic assessment of dieback implications, and (4) proposal preparation that eventually will lead to a larger and innovative study on the effects of rising CO₂ levels on the Amazon forest. This study will substantially improve our understanding of the risk of a possible ‘dieback’ of Amazon rainforest under future climate change. The possibility of such a dramatic path for the Amazon forest is listed in the Bank’s 2012-2015 Climate Change Action Plan as one of the key impacts on the natural resource base of Latin America that may result from 21st century climate change. The effects on forest ecosystems of an increase in atmospheric CO₂ concentration during this time have been repeatedly modeled to potentially counterbalance the negative effects of climate change by stimulating forest growth and resilience to drought. However, this “CO₂ fertilization effect” remains untested in tropical forests. If it does not occur, then tropical forests

are predicted to be much more vulnerable to climate change. At large scale, this would represent a significant threat to the region's economy, via the occurrence of natural disasters associated to the regional and global rainfall patterns, agricultural losses and impairment of hydropower supply. Reducing uncertainty in this area is critical to steer future development policies for the Amazon region.

This TC will support preparatory studies and workshops on the implementation of an elevated-carbon dioxide (CO₂) experiment in the Amazon rainforest. The topic covered in this TC is new since no such experiment has yet been conducted. This TC is consistent with the GCI-9 objective to “protect the environment and response to climate change”, as it substantially increases the information available to design IDB projects. This TC is also in accordance with the IDB Brazil country strategy for 2012-2014 (document GN-2662-1). It is also in line with the National Strategy for Science, Technology and Innovation 2012-2015 of MCTI and its priority program for climate change objective #5: “implementation of monitoring systems to observe the impacts of climate change”, which is consistent with the attributions of the National Center for Monitoring and Alert of Natural Disasters – CEMADEN (Federal Decree 7.513/2011; Art. 4).

General objective: Assist the government of Brazil, through the Ministry of Science, Technology and Innovation, to assess the likelihood and implications of the potential for Amazon dieback and the relevance of carbon fertilization to ameliorate its effects.

Specific objectives:

- Define the location, engineering plans and costs for an elevated CO₂ experiment in the Amazon rainforest
- Conduct site characterization studies and parameterize ecosystem models for the site
- Develop a protocol of measurements to be used in the experiment
- Compile a milestone report on technical and methodological recommendations for an elevated CO₂ experiment in the Amazon rainforest.
- Prepare workshops with the participation of academic experts and policy makers.
- Communicate the outcomes of this TC to the non-specialist community
- Consolidate a proposal to finance the CO₂ fertilization experiment in the Amazon rainforest

III. Description of activities and outputs

The execution of this TC will be divided into four components, which are designed to lead to development of a proposal to other potential funders (e.g. Amazon Fund, with support from MCTI) to secure the long-term provision of funds for the full implementation of the experiment.

Component 1: Design and Assessment. This component will finance consultancies by world-renowned experts from universities, research institutions, and national laboratories in Brazil, Europe, Australia, and the United States. The first objective is to do an economic assessment of the implications of an Amazon dieback. The second objective is to develop full engineering plans for construction and implementation of a full replicated CO₂ experiment. Activities include identifying an appropriate location for experimental plots, evaluating logistical constraints (roads, power, and hazards), developing a list of sources and costs of all materials and equipment needed for CO₂ exposure and canopy access, preparation of construction plans, and pre-construction site preparation. A technical report with recommendations on these issues and full engineering plans is the outcome to be reported at the end of this component.

Component 2: Site Characterization. This component will finance the acquisition of the equipment and instrumentation necessary for measuring ecosystem responses and for support for students and senior researchers to make initial measurements in the experimental plots identified in Component 1. Measurements will include environmental monitoring, tree inventories, historical growth rates, soil

characteristics, and root distribution. This data will be used to parameterize ecosystem models for generating testable hypotheses to guide experimental protocols. A milestone report will be prepared describing site conditions and initial model results.

Component 3: Workshops. This component will finance annual closed workshops gathering the scientific community to discuss progress and broader impacts of outcomes. In parallel, two specific thematic workshops/meetings (on topics such as plant physiology, soil dynamics, and modeling) will also take place. Outcomes will be short reports elaborated after each workshop. This component will also finance a proposal preparation for a major and innovative study on the effects of rising CO₂ on the Amazon forest based on experiences acquired in preliminary studies.

Component 4: Outreach. This component will finance outreach through three fronts:

- a. **Open event:** One open workshop will be organized gathering not only the scientific community, but also stakeholders and policy makers to evaluate the context, background and broader impacts of the outcomes of this TC.
- b. **Training:** around 15 graduate students from Universities/Research Institutes associated with the scientific planning for this TC will be brought, once per year, to the experimental site as part of a short course on climate change and tropical forests to build regional capacity in the topic.

IV. Budget

This TC will finance consultancies, acquisition of goods (limited to 30% of total request), workshops and training courses. As such, the procurement plan is divided into consulting services (US\$815,000), acquisition of goods (US\$500,000), events (US\$125,000) and training course logistics (US\$60,000).

Indicative Budget

| Component | Description | Type of cost | IDB funding (USD) | Counterpart funding (USD) | Total funding (USD) |
|--------------|-------------------------------|----------------------|--------------------|---------------------------|---------------------|
| 1 | Experimental design | Consultants | \$565 000 | \$250 000 | \$815 000 |
| 2 | Site characterization | Acquisition of goods | \$300 000 | \$ 200 000 | \$500 000 |
| 3 | Closed workshops with experts | Event | \$50 000 | \$50 000 | \$100 000 |
| 4 | Open workshop | Event | \$25 000 | -- | \$25 000 |
| 4 | Training course | Training | \$60 000 | -- | \$60 000 |
| TOTAL | | | \$1 000 000 | \$ 500 000 | \$1 500 000 |

V. Executing agency and execution structure

Brazil's Amazonian Foundation for Biosphere Protection (FDB) will execute this TC upon request by the Brazilian Ministry of Science, Technology and Innovation. Located in Manaus, the Foundation, whose council is mostly composed by members from the National Institute for Amazonia Research (INPA), has substantial expertise in the management and execution of large projects in the region (such as the PPD-G7 [Pilot Program for The Protection of The Tropical Forests of Brazil]) and in the context of climate change and tropical forests. The executing team is qualified for the selection and hiring of high quality consulting services. As such, FDB will have the principal technical and fiduciary responsibility. The IDB procurement policies will apply to this TC.

VI. Project Risks and issues

The risks associated to this TC pertain to the execution by FDB. To ensure quality products and processes CCS/CBR will oversee the execution.

VII. Environmental and Social Classification

Category C, as minimum environmental impacts are expected for this TC.