

**ENVIRONMENT, RURAL DEVELOPMENT AND DISASTER RISK MANAGEMENT  
(INE/RND)**

**RG-T2532: NATURAL AND HUMAN SYSTEMS OF THE AMAZON BASIN: AN  
INTERACTIVE MAP FOR INFORMED POLICY MAKING**

**INDICATIVE TERMS OF REFERENCE**

**I. Background**

- 1.1 The Latin America and Caribbean (LAC) Region has been deemed the superpower of biodiversity because it is the region with the most natural capital in the world.<sup>1</sup> The Amazon forest is the largest and most diverse tropical forest in the world.<sup>2</sup> The Amazon basin produces over two thirds of all fresh water on earth, 20% of the earth's oxygen, and it is home to an extraordinary array of – land and fresh water – biodiversity. The Amazon basin has an area of approximately 2.5 million hectares, equivalent to 40% of South America's total land area, and if superimposed on the USA, it would cover nearly all of the 48 contiguous states.<sup>3</sup>
- 1.2 It is widely recognized that natural capital and its associated environmental services (although not fully captured in market transactions), are vital elements of economic performance, and without them economies would come to a grinding halt.<sup>4</sup> The Amazon Basin is the largest river system in the world, unique in the size and abundance of its forests, flooded forests, floodplain lakes, and other wetlands. These rivers and floodplains are critical to urban and rural livelihoods across the Amazon as they deliver ecosystem services such as: 1-Supporting services (soil formation, water, biodiversity; for example, between 200-300 tree species can be found in one hectare of the Amazon, more than in the entire European Union); 2- Regulating services (e.g., hydrological services, nutrient retention, pollination). For example, the annual value of soil erosion prevention in the amazon is estimated around \$238 ha per year. 3- Provisioning services (e.g. timber, non-timber forest products, NTFPs). The annual commercial value of NTFPs in the Brazilian Amazon<sup>5</sup> has been estimated at around \$100 million for 2005; 4- Cultural services (non-use values, recreation, religious).<sup>6</sup> These environmental services are of significant importance not only at the local level but at the regional and global level as well.<sup>7,8</sup>

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<sup>1</sup> Bovarnick, A., F. Alpizar, C. Schnell (eds.). 2010. Latin America and the Caribbean: A biodiversity superpower. United Nations Development Program (UNDP) and United Nations Environment Program (UNEP). 2010. Atlas of Our Changing Environment: Latin America and the Caribbean, UNEP.

<sup>2</sup> Lima, E., F. Merry, D. Nepstad, Gregory Amacher, C. Azevedo-Ramos, P. Lefebvre and F. R. Jr. 2006. "Searching for sustainability: Forest, smallholders, and the trans-amazon highway." *Environment* 48(1): 26-38.

<sup>3</sup> See: <https://www.wcupa.edu/aceer/amigos/cd/rainforest.htm>

<sup>4</sup> Costanza, R., R. d'Arge, R. d. Groot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R. V. O'Neill, J. Paruelo, R. G. Raskin, P. Sutton and M. v. d. Belt. 1997. "The value of the world's ecosystem services and natural capital." *Nature* 387(6630): 253-260.

<sup>5</sup> Food, oil products, fibers, rubber, aromatics and medicines, among others.

<sup>6</sup> Verweij, P., M. Schouten, P. v. Beukering, J. Triana, K. v. d. Leeuw and S. Hess. 2009. Keeping the Amazon forests standing: A matter of values. WWF Netherlands. Zeist, The Netherlands. Available from: [http://d2ouvy59p0dg6k.cloudfront.net/downloads/wnf\\_amazonerapport\\_def.pdf](http://d2ouvy59p0dg6k.cloudfront.net/downloads/wnf_amazonerapport_def.pdf).

<sup>7</sup> Barthem, R. B., P. Charvet-Almeida, L. F. A. Montag and A. E. Lanna. 2012. Global International Waters Assessment: Amazon Basin. GIWA Regional assessment 40b. UNEP/University of Kalmar. Kalmar, Sweden.

- 1.3 Large-scale infrastructure development (such as hydroelectric dams, roads, and pipelines), agricultural expansion and selective logging are significant drivers of the loss and degradation of natural resources in the Amazon.<sup>9</sup> In the case of Brazil, from the late 1970s to the early 1990s, the development of highways to link the Amazon to domestic markets in the southeast and the northeast of the country enabled human encroachment in areas previously inaccessible. Human encroachment and deforestation were aided by government policies which encouraged land use change in the Brazilian Amazon. This process of forest loss was also aided by large public investment programs for the construction of dams, hydropower plants and transport infrastructure for mining operations.<sup>10</sup>
- 1.4 Public – sectoral, uncoordinated – policies and market forces, such as the demand for timber, are significant underlying causes of the loss of these resources across the Amazon.<sup>11</sup> Between 1990 and 2005, approximately 55.8 million hectares were deforested in the Amazon, accounting for roughly 35% of emissions from global tropical deforestation.<sup>12</sup> Aquatic and terrestrial ecosystems, as well as societal wellbeing, will increasingly be impacted by changes in the hydrological cycle caused by dam and road projects, and by upland and floodplain deforestation associated with land use change, and by climate change.<sup>13,14</sup>
- 1.5 The impact on natural capital of additional infrastructure – particularly roads that enable agriculture, human settlements and other productive activities – is assessed as highly significant in research literature.<sup>15,16</sup> This highlights the need to inform policy decision makers (and civil society in general) about the richness, importance, and interconnectedness, of natural resources and ecosystems found across the Amazon basin, as well as on the impact different policies have on the Amazon's natural capital. The challenge is then to make information available to legislatures in a holistic, concise, yet rich and user friendly manner to inform policy decision making.
- 1.6 Although there are many maps depicting the political boundaries and natural resources of the Amazon basin, they do not provide comprehensive information about the topics discussed in the above paragraphs. Even though some maps are presented in an interactive way,<sup>17</sup> they lack the information layers necessary to appropriately inform decision makers, or users wanting to gain detailed

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<sup>8</sup> Case, M. 2007. Climate change impacts in the Amazon: Review of scientific literature. WWF. Available from: [http://assets.panda.org/downloads/amazon\\_cc\\_impacts\\_lit\\_review\\_final\\_2.pdf](http://assets.panda.org/downloads/amazon_cc_impacts_lit_review_final_2.pdf).

<sup>9</sup> Carvalho, G. O. 2006. "Environmental resistance and the politics of energy development in the Brazilian Amazon." *The Journal of Environment & Development* 15(3): 245-268.

<sup>10</sup> Lima, E., F. Merry, D. Nepstad, Gregory Amacher, C. Azevedo-Ramos, P. Lefebvre and F. R. Jr. 2006. "Searching for sustainability: Forest, smallholders, and the trans-amazon highway." *Environment* 48(1): 26-38.

<sup>11</sup> Contreras-Hermosilla, A. 2010. "People, governance and forests: The stumbling blocks in forest governance reform in Latin America." *Forests* 2(1): 168-199.

<sup>12</sup> Wertz-Kanounnikoff, S., M. Kongphan-Apirak and S. Wunder. 2008. Reducing forest emissions in the Amazon Basin: A review of drivers of land-use change and how payments for environmental services (PES) schemes can affect them. Center for International Forestry Research (CIFOR). Bogor, Indonesia. Available from: <https://cgspace.cgiar.org/handle/10568/19997>.

<sup>13</sup> Ibid.

<sup>14</sup> Chomitz, K. M. 2007. At loggerheads? Agricultural expansion, poverty reduction and environment in the tropical forests. The World Bank. Washington DC. Available from: <https://openknowledge.worldbank.org/handle/10986/7190>.

<sup>15</sup> Soares-Filho, B. S., D. C. Nepstad, L. M. Curran, G. C. Cerqueira, R. A. Garcia, C. A. Ramos, E. Voll, A. McDonald, P. Lefebvre and P. Schlesinger. 2006. "Modelling conservation in the Amazon Basin." *Nature* 440(23): 520-523.

<sup>16</sup> Oliveira, P. J. C., G. P. Asner, D. E. Knapp, A. Almeyda, R. Galván-Gildemeister, S. Keene, R. F. Raybin and R. C. Smith. 2007. "Land-use allocation protects the Peruvian Amazon." *Science* 317: 1233-1236.

<sup>17</sup> See for example: <http://www.internationalrivers.org/resources/principal-dams-brazil-4582> ; or <http://ngm.nationalgeographic.com/2007/01/amazon-rain-forest/amazon-map-interactive>

knowledge of the Amazon basin in terms of not only its natural resources, but also of productive activities, their impact on natural capital, and the institutional frameworks ruling them.

- 1.7 The Inter-American Development Bank launched the Biodiversity and Ecosystem Services Program in March 2013 in Panama. The general objective of the Program is to create opportunities and utilize the comparative advantage of the region in biodiversity and ecosystem services for sustainable and inclusive development. Informing policy decision makers in regions with ecosystems of regional and global significance for biodiversity conservation and ecosystem services – such as the Amazon basin – is a critical aspect of the Biodiversity and Ecosystem Services Program.
- 1.8 The IDB is seeking an internationally-recognized specialized organization to: (i) produce an annotated map of the Amazon Basin and; (ii) produce an annotated digital map of the Amazon basin. The digital version of the map must enable the user to compare, contrast and combine data on; the status of existing natural resources along the basin, the productive activities that take place in it, how they impact the existing natural capital, and the institutional frameworks that govern the use of natural resources.

## **II. Consultancy objective**

- 2.1 The objective of this consultancy is to produce information materials in the form of an annotated map (printed and digital) laying out the terrestrial and hydrological resources of the Amazon basin to inform policy makers and society at large. The map will include several layers of information depicting biophysical resources (terrestrial and hydrological), major infrastructure projects, human productive activities as well as the basic institutional frameworks defining the rules under which different productive activities (e.g. hydropower, agriculture, logging, mining, etc.) take place. Both maps will be available in English, Spanish and Portuguese.

## **III. Tasks/deliverables**

- 3.1 The activities to be carried out by this consultancy include three main tasks:
  - **Task 1: Editorial.** Creation of a highly detailed, visually-compelling two-sided print map supplement that illuminates the vitality and breadth of resources of the Amazon basin as well as the competing resource demands that threaten it; and a robust online collection of Amazon-related educational assets in English, Spanish, and Portuguese. Specific activities include:
    - a. Development, review, and approval overall design of two-sided print supplement and digital map
    - b. Research, acquisition, and compilation of all required data for map elements and supporting text for both print and digital formats
    - c. Creation, approval, and editing of illustration, text, and map notes
    - d. Storyboarding of animated, interactive, and/or video assets for web and e-publications
    - e. Creation of online educational material collection to complement the digital map supplement

- **Task 2: Digital map.** National Geographic will produce a dynamic, immersive digital map in English, Spanish, and Portuguese, with sophisticated layers of data to enhance reader knowledge of the Amazon basin using state of the art layering tools and data. **Note:** Research and creation of initial editorial elements of the digital map are included in Task 2: Editorial. Translation and webhosting of the map are both included in Task 1: Production, Translation, and Distribution. The digital version of the map will involve the development and production of additional assets and layers for the digital version of map to expand and enhance the online experience beyond the print version of the map to:
  - a. Allow the user to manipulate the data, enabling comparison, contrast and combination of information in interest areas.
  - b. Take the user through a narrative illustrating data-driven spatial stories.
  - c. Include a description of the institutional frameworks (laws, regulations and main actors) that rule productive activities in the basin. National Geographic will coordinate this task in partnership with an outside NGO that will compile, and aggregate information on institutional frameworks relevant to productive activities in the Amazon basin. The digital map will provide a hyperlink to the section of the partner NGO's site where this information will be assembled.
- **Task 3: Production, translation and distribution.** Worldwide distribution of map supplement in English in print and online; translation of both print and digital formats into Spanish and Portuguese, with regional distribution and digital hosting in Latin America. Specific activities include:
  - a. Production – including printing and folding – of print supplement for inclusion with the October 2015 issue of National Geographic magazine
  - b. Worldwide distribution of the amazon-themed supplement in English
  - c. Translation of the print and digital supplement, with local web-hosting in Latin America and Brazil
  - d. Five thousand (5,000) additional copies of the map printed for distribution to IDB clients as follows:
    - i. 500 in English
    - ii. 2,500 in Spanish
    - iii. 2,000 in Portuguese

#### IV. Outputs

**Output 1:** Comprehensive printed map of the Amazon basin depicting biophysical resources (terrestrial and hydrological), major infrastructure projects, and human productive activities.

The printed map will have two sides, A and B. The printed version of the map will have two sides, A and B. Side A will focus on both terrestrial and aquatic resources, and will illustrate the waterways comprising the amazon basin as well as man-made infrastructure (such as hydrological dams). The map will be annotated with explanations of selected water projects, biodiversity hotspots and hydraulic chokepoints. Information on terrestrial resources will include forest cover, deforestation, protected areas, indigenous reserves, road networks and oil and gas pipelines. The map will be annotated with explanations of selected reserves, energy resources, and land transportation corridors. Side B of the map will focus on ecosystemic features of the Amazon basin, including a cross-section view from the Andes to the sea, highlighting the diversity of flora and fauna of the basin.

**Output 2:** Interactive digital map of the Amazon basin (including the information of Output 1).

The digital version of the map will be constructed in a layered format. Three digital layers are envisaged: The first one will allow the user to manipulate the data, enabling comparison, contrast and combination of information in interest areas. The second layer will take the user through a narrative illustrating data-driven spatial stories. The third layer of the map will include a description of the institutional frameworks (laws, regulations and main actors) that rule productive activities in the basin.

**Note:** Due to the nature of this work (research and dissemination), property rights to the outputs produced under this TC will be shared among the participating organizations. See paragraph 4.4 in TC document.

## **V. Schedule of payment**

The consultancy services will be contracted for a lump-sum and will be paid in the following manner:

- 20% upon contract signature
- 40% upon completion of Output #1
- 40% upon completion of Output #2

## **VI. Coordination**

- **Team leader/coordinator:** Michele Lemay, Natural Resources Lead Specialist (INE/RND) [michelel@iadb.org](mailto:michelel@iadb.org) and Enrique Ibarra Gené, consultant (INE/RND) [eibarra@iadb.org](mailto:eibarra@iadb.org)
- **Department/division:** INE/RND

## **VII. Characteristics of the consultancy**

- Consultancy Category & Modality: Firm & lump sum
- Contract Duration: Work will begin in April 2015 and will finish in March 2016
- Place(s) of work: Washington DC. It is expected that the firm keeps the project coordinator informed on the progress of the work. This may be through emails and/or phone calls.

**VIII. Qualifications:** Specialized firm, non-profit organization or research center/institute with demonstrated experience and in-depth expertise in the development of annotated maps (in print and digital forms) and comprehensive information materials. Extensive experience in themes related to the amazon basin (terrestrial and aquatic resources, productive activities and use/degradation of natural resources) is essential.