IDB Inter-American Development Bank

# REQUEST FOR EXPRESSIONS OF INTEREST
# CONSULTING SERVICES

**Selection # as assigned by e-Tool:** RG-T3489-P001
**Selection Method:** Full Competitive Selection
**Country:** Regional (Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela)
**Sector:** Water and Sanitation
**Funding – TC #:** ATN/LA-17501-RG
**Project #:** RG-T3489
**TC name:** Integrated Management of Transboundary Water Resources in Latin America
**Description of Services:** Development of a Regional Hydrological Platform and a Multi-Sector Nexus Model for the Amazon Basin

**Link to TC document:** *https://www.iadb.org/en/project/RG-T3489*

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: May 7, 2020, 5:00 P.M. (Washington D.C. Time).

The consulting services ("the Services") include the development of an integrated modeling tool that allows the exploration of different physical (e.g., climate, land use) and socioeconomic (e.g., population, economic activities, policy implementation) scenarios in the entire Amazon basin. There is a need for quantitative (modeling) tools to support the conceptualization and analysis of scenarios to visualize different regional results taking into account the economic, environmental, social and institutional dynamics, among others, of the region. The estimated timeframe for the performance of such service is 24 months and the start of services is expected for the third quarter of 2020.

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-2765-1. 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 below 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: Raúl Muñoz, raulmu@iadb.org

Inter-American Development Bank
Division: Water and Sanitation Division (INE/WSA)
Attn: Raúl Muñoz (INE/WSA)

1300 New York Ave, NW, Washington DC 20577, USA
Tel: (202) 623-1000
Fax: (202) 623-3096
E-mail: raulmu@iadb.org
Web site: www.iadb.org

**Draft Summary of Terms of Reference**

The Amazon Basin is a place of immense natural and cultural wealth. Formed more than 30 million years ago,[1] this massive basin has been inhabited by indigenous peoples for more than 11,000 years.[2] The political-administrative boundaries of the basin span approximately 7.4 million km$^2$ and stretch across the territory of eight countries: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela[3]; about 5.5 million km$^2$ of this area is forested.

The Amazon Basin plays a critical role in global water and biogeochemical cycles. Its rivers hold one fifth of all the fresh water of the planet; the average drainage volume of the basin exceeds 6.5 km$^3$/year, which represents over 70 percent of the freshwater discharge in Latin America and approximately 20 percent of the planet's freshwater discharge. The Amazon River is the largest tributary to the world's oceans.[4] The forest itself helps to regulate climate and rainfall patterns at local and regional scales, providing favorable conditions for agricultural production and food security across the continent and beyond[5]. Daily, the evapotranspiration process transfers 20 billion tons of water from soil to the atmosphere in the Brazilian Amazon and 22 billion in the entire basin. Around 70% of the South American GDP is under the zone of influence of the rain produced by the Amazon[6].

The overarching objective of this work is the development of an integrated modeling tool that allows the exploration of different physical (e.g., climate, land use) and socioeconomic (e.g., population, economic activities, policy implementation) scenarios in the entire Amazon basin. Some specific objectives that this project seeks to achieve are as follows:

(i) Develop a modeling tool (or suite of integrated modeling tools), which includes an analysis of environmental functions / ecosystem services/ nature's contributions to people, and overall global drivers such as SDGs and NDCs.
(ii) Carry out a diagnosis of regional scope and identification of information gaps on key development aspects of the basin such as : (i) the quantity and quality of water, (ii) water balance; (iii) infrastructure for provision of basic services; (iv) land, water and biodiversity conservation.
(iii) Identify the scope of specific needs and associated investments that are required in the different areas, however conceptualized using an integrated (nexus) approach.

---

[1] Burnham, Robyn J, and Kirk R. Johnson. (2004). South American paleobotany and the origins of neotropical rainforests. *Phil. Trans. R. Soc. London. B* 359(1450): 1595-1610.
[2] Roosevelt, A.C. *et al*. (1996). Paleoindian cave dwellers in the Amazon: the peopling of the Americas. *Science* 272(5260): 373-384.
[3] RAISG (2019). Amazonia 2019: Protected Areas and Indigenous Territories. https://www.amazoniasocioambiental.org/en/maps/#!/areas
[4] Smith, NigelJ.H(2002). Amazon Sweet Sea: Land, Life, and Water at the River's Mouth(s.I.): University of Texas Press.pp1-2
[5] Lawrence, Deborah and Karen Vandecar. (2015). Effects of tropical deforestation on climate and agriculture. *Nature Climate Change* 5: 27-36.
[6] Nobre, Antônio Donato (2014). O Futuro Climático da Amazônia: relatório de avaliação científica. São José dos Campos, SP: ARA: CCST-INPE: INPA.

(iv) Develop a proposal of an instrument of planning for the Amazon Watershed, strategic guidelines and an investment plan for the Amazon Basin, taking into consideration the approved Strategic Action Program (SAP) of ACTO.

The consulting firm is expected to identify synergies and tradeoffs, with a particular focus on economic tradeoffs, through an integrated multi-sectoral (nexus) approach to policies and investments in the Amazon Basin. More specifically, the project will produce an assessment of the multi-sectoral synergies, conflicts and infrastructure investment needs arising from national policies of interest in the eight countries in the basin that have the potential for multi-sectoral consequences and sensitivity to climate change. The project will assess the consistency, linkages, and economic implications of these policies at national, regional and global scales. The estimated timeframe for the performance of such service is 24 months and the start of services is expected for the third quarter of 2020.

Selection process #RG-T3489-P001

# TERMS OF REFERENCE

## Development of a Regional Hydrological Platform and a Multi-Sector Nexus Model for the Amazon Basin

Regional (Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela)

*Funding – TC #: ATN/LA-17501-RG*

*Project #: RG-T3489*

*https://www.iadb.org/en/project/RG-T3489*

Technical Cooperation: Integrated Management of Transboundary Water Resources In Latin America



## 1. Background and Justification

**1.1.** The Amazon Basin is a place of immense natural and cultural wealth. Formed more than 30 million years ago,[1] this massive basin has been inhabited by indigenous peoples for more than 11,000 years.[2] The political-administrative boundaries of the basin span approximately 7.4 million km$^2$ and stretch across the territory of eight countries: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela[3]; about 5.5 million km$^2$ of this area is forested.

**1.2.** The Amazon is the greatest repository of biodiversity in the world, home to around 10% of all the world's known species of plants and animals. It contains nearly half of all trees found in the world's tropical forest regions[4], perhaps 16,000 species in total[5]. In fact, in just two hectares of this basin, more species of trees can be found than in all North America[6], and on just one of these trees, there may be as many species of ants as in all of England[7]. It is a source of enormous cultural diversity, too. More than thirty-five million people live in this expanse. This includes nearly one million people from around 420 indigenous groups, with their own cultural identities and territorial management practices[8].

---

1 Burnham, Robyn J, and Kirk R. Johnson. (2004). South American paleobotany and the origins of neotropical rainforests. *Phil. Trans. R. Soc. London. B* 359(1450): 1595-1610.

2 Roosevelt, A.C. *et al*. (1996). Paleoindian cave dwellers in the Amazon: the peopling of the Americas. *Science* 272(5260): 373-384.

3 RAISG (2019). Amazonia 2019: Protected Areas and Indigenous Territories. https://www.amazoniasocioambiental.org/en/maps/#!/areas

4 Crowther, T.W. *et al* (2015). Mapping tree density at a global scale. *Nature* 525:201-205.

5 Steege, Hans *et al.* (2013). Hyperdominance in the Amazonian tree flora. *Science* 342(6156).

6 https//www.livescience.com/55387-how-many-trees-in-amazon.html

7 https/www.ran.org/fac sheet rainforest animals/ (ADD ED WILSON REFERENCE)

8 https://www.survivalinternational.org/about/amazontribes

**1.3.** The Amazon Basin plays a critical role in global water and biogeochemical cycles. Its rivers hold one fifth of all the fresh water of the planet; the average drainage volume of the basin exceeds 6.5 km3/year, which represents over 70 percent of the freshwater discharge in Latin America and approximately 20 percent of the planet's freshwater discharge. The Amazon River is the largest tributary to the world's oceans.9 The forest itself helps to regulate climate and rainfall patterns at local and regional scales, providing favorable conditions for agricultural production and food security across the continent and beyond10. Daily, the evapotranspiration process transfers 20 billion tons of water from soil to the atmosphere in the Brazilian Amazon and 22 billion in the entire basin. Around 70% of the South American GDP is under the zone of influence of the rain produced by the Amazon11.

**1.4.** The Amazon is also a major source of renewable energy. In the case of Brazil, close to 30 percent of hydropower depend of watersheds in forested areas in the Brazilian Amazon12. During high-water months of the year, the Amazon and its tributaries rise and flood surrounding forests for months at a time. The annual flood cycle provides for a floodplain pulsed agriculture practiced for millennia. There are also a vast number of important fish species. Those forest and fish need to be managed sustainably, which local communities have done. There are some studies that indicate that the Amazon is also a critical buffer against climate change. It absorbs about 20% to 25% of the 2.4 billion metric tons of carbon forests removed from the atmosphere every year.13 The entire Amazon stores nearly 100 billion metric tons of carbon—about a decade's worth of global emissions.

**1.5.** For many years, Amazon countries demonstrated perseverance and courage to preserve its natural and cultural wealth. In total, about 45% of the Amazon has been designated as indigenous territories and protected areas14. Between 2002 and 2009, Brazil led the world in the creation of protected areas (including demarcated indigenous lands), expanding its protected area network by more than 700,000 km2 in less than a decade.15 The protection of indigenous lands also helped to protect forests.16 Average deforestation rates inside legally-recognized indigenous lands are 2-3 times lower than

---

9 Smith, NigelJ.H(2002). Amazon Sweet Sea: Land, Life, and Water at the River's Mouth(s.I.): University of Texas Press.pp1-2

10 Lawrence, Deborah and Karen Vandecar. (2015). Effects of tropical deforestation on climate and agriculture. *Nature Climate Change* 5: 27-36.

11 Nobre, Antônio Donato (2014). O Futuro Climático da Amazônia: relatório de avaliação científica. São José dos Campos, SP: ARA: CCST-INPE: INPA.

12 Opperman, J., J. Hartmann, J. Raepple, H. Angarita, P. Beames, E. Chapin, R. Geressu, G. Grill, J. Harou, A. Hurford, D. Kammen, R. Kelman, E. Martin, T. Martins, R. Peters, C. Rogéliz, and R. Shirley. 2017. The Power of Rivers: A Business Case. The Nature Conservancy: Washington, D.C.

13 https://www.sciencemag.org/news/2015/03/amazon-rainforest-ability-soak-carbon-dioxide-falling

14 RAISG (2019)

15 Soares-Filho, Britaldo *et al.* (2010). Role of Brazilian Amazon protected areas in climate change mitigation. *Proceedings of the National Academy of Sciences* 107(24): 10821-10826.

16 Blackman, Allen and Peter Veit (2018). Titled Amazonian indigenous communities cut forest carbon emissions. *Ecological Economics* 153: 56-67.

in similar protected areas outside17. Amazonian indigenous territories contain more than one third of the region's aboveground carbon.18 In the Brazilian Amazon, protected natural areas alone (not including indigenous land) are responsible for conserving 36,4 billion tCO2eq., or 34% of the total carbon stock.19

**1.6.** Thanks in part to the demarcation and enforcement of indigenous territories and protected areas and also on more effective law enforcement against illegal deforestation and fires, deforestation began to decline, especially in Brazil.20 The reduction of deforestation between 2004 and 2012 allowed Brazil to reduce emissions more than any other country on Earth.21 Brazil's agricultural exports continued to grow during this period of reduced deforestation: with rising yields it was clearly possible to increase agricultural production and exports without any new deforestation. Indeed, most deforestation occurs in low-productive activities such as forest clearing for cattle ranches that are often soon abandoned.

**1.7.** In recent years, though, the expansion of low-productivity agriculture and mining has begun to overwhelm the basin, driving deforestation and violations of the land and resource rights of indigenous peoples and local communities. Cattle ranching continues to drive the bulk of deforestation, but mining and infrastructure are growing threats. Nearly 70% of protected areas and indigenous territories in the Amazon are now threatened by roads, mining, oil and gas development, dams, or deforestation.22 Another important stressor over the eco-hydrological functionality of the Amazon basin is the increasing occurrence of fires which are resulting on forest fragmentation. The very large rise in Amazon fires and deforestation during 2019 confirms the profound damages and dangers caused by human activity, including illegal logging, forest clearing, and the spread of pasturelands and croplands into protected areas. To address this situation, what is needed is a systematic, long- term strategy for resource management to ensure a shift to sustainable development for the Amazon System.

**1.8.** There have been an estimated 87,000 fires in Brazil during 2019, up more than 90% compared with one year ago.23 More than 45,000 of these fires have been in the Brazilian Amazon. Between January and July 2019, 4,699 km2 were razed in the Brazilian Amazon, nearly double the 2,810 km2 lost during the same period in 2018.24

---

17 Ding, Helen *et al.* (2016). Climate benefits, tenure costs: the economic case for securing indigenous land rights in the Amazon. World Resources Institute.

18 Walker, Wayne *et al*. (2014). Forest carbon in Amazonia: the unrecognized contribution of indigenous territories and protected natural areas. *Carbon Management* 5:5-6.

19 Young, Carlos Eduardo Frickmann and Medeiros, Rodrigo. Quanto vale o verde: a importância econômica das unidades de conservação brasileiras.Rio de Janeiro: Conservação Internacional, 2018, v. 1.

20 Boucher, Doug *et al*. (2013). Brazil's success in reducing deforestation. *Tropical Conservation Science* 6(3) 426-445.

21 https://www.climateadvisers.com/who-cut-the-most-brazils-forest-protection-has-achieved-twice-us-emissions-reductions/

22 https://news.mongabay.com/2019/06/amazon-infrastructure-puts-68-of-indigenous-lands-protected-areas-at-risk-report/

23 INPE Programa Queimadas. http://queimadas.dgi.inpe.br/queimadas/portal-static/situacao-atual/

24 INPE TerraBrasilis. http://terrabrasilis.dpi.inpe.br/app/dashboard/alerts/legal/amazon/aggregated/#

An area of forest the size of Luxemburg was lost the month of July alone. The deforestation rates of destruction reflect a staggering increase of illegal economic activity which calls for a revision of governance and enforcement schedules.

**1.9.** Deforestation is not only an environmental problem; it also has severe social impacts. Indeed, statistical evidence shows that homicides increase with deforestation25 due to the violent process of land squatting and grabbing causing displacement of traditional communities and the spread of diseases26caused by migration.

**1.10.** And things may get worse. As deforestation increases and climate change progresses, the impacts of drought will be intensified, increasing the risk of fire.27 These fires threaten the ability of the forest to act as a carbon sink, further exacerbating the climate crisis.28 Between the impacts of deforestation and climate change, tree species diversity in the Amazon could decrease by almost 40% by 2050.29

**1.11.** Climate change, deforestation, water population, and other impacts, threatens the survival of the entire ecosystem, by endangering biodiversity and changing the water cycle vital for the survival of the rainforest. Moreover, global warming endangers the Amazon basin by threatening a catastrophic decline of rainfall within the Amazon basin and in downwind areas, jeopardizing energy security30 and food security.

## 2. Objectives

**2.1.** Given the description above, the Amazon Basin constitutes an interdependent hydrological, ecological, social, cultural, geopolitical and economic system. The Amazon has to be managed as the system that it clearly is –to avoid irreparable vegetation and biodiversity loss, to safeguard the enormous amount of carbon and biodiversity in those forests and the wellbeing of the people who live there and depend on the forest. The Amazon is also closely interwoven with the South America climate system, so its survival is critical for that as well. What transpires in the Amazon in one country affects the Amazon in all countries and even productive areas outside the Amazon. What happens in the Amazon affects the entire world and what happens globally impinges directly on the health and survival of the Amazon.

[25] SANT´ANNA, André Albuquerque (2017). Land inequality and deforestation in the Brazilian Amazon. Environment and Development Economics, Volume 22, Issue 1 February 2017, pp. 1-2. 5. DOI: https://doi.org/10.1017/S1355770X1600022X.

[26] Confalonieri, U. E., Margonari, C., & Quintão, A. F. (2014). Environmental change and the dynamics of parasitic diseases in the Amazon. Acta tropica, 129, 33-41.

[27] Aragao, Luiz Edardo O.C. *et al*. (2008). Interactions between rainfall, deforestation, and fires during recent years in the Brazilian Amazonia. *Phil Trans. R. Soc. B. 363: 1779-1785*

[28] Aragao, Luiz E. O. C. *et al* (2018). 21st century drought-related fires counteract the decline of Amazon deforestation carbon emissions. *Nature Communications* 9(536)

[29] Gomes, Vitor H. F. *et al*. (2019). Amazonian tree species threatened by deforestation and climate change. *Nature Climate Change* 9: 547-553.

[30] Stickler, Claudia M. *et al.* (2013). Dependence of hydropower energy generation on forests in the Amazon Basin at local and regional scales. *Proc Natl Acad Sci* 110(23): 9601-9606.

**2.2.** It is important that these interactions occurring at different spatial and temporal scales are captured in the analysis proposed in this work. Driven by this, the overarching objective of this work is the development of an integrated modeling tool that allows the exploration of different physical (e.g., climate, land use) and socioeconomic (e.g., population, economic activities, policy implementation) scenarios in the entire Amazon basin. There is a need for quantitative (modeling) tools to support the conceptualization and analysis of scenarios to visualize different regional results taking into account the economic, environmental, social and institutional dynamics, among others, of the region.

**2.3.** Some specific objectives that this project seeks to achieve are as follows:

(i) Develop a modeling tool (or suite of integrated modeling tools), which includes an analysis of environmental functions / ecosystem services/ nature's contributions to people, and overall global drivers such as SDGs and NDCs.
(ii) Carry out a diagnosis of regional scope and identification of information gaps on key development aspects of the basin such as : (i) the quantity and quality of water, (ii) water balance; (iii) infrastructure for provision of basic services; (iv) land, water and biodiversity conservation.
(iii) Identify the scope of specific needs and associated investments that are required in the different areas, however conceptualized using an integrated (nexus) approach.
(iv) Develop a proposal of an instrument of planning for the Amazon Watershed, strategic guidelines and an investment plan for the Amazon Basin, taking into consideration the approved Strategic Action Program (SAP) of ACTO.

## 3. Scope of Services

**3.1.** The consulting firm is expected to identify synergies and tradeoffs, with a particular focus on economic tradeoffs, through an integrated multi-sectoral (nexus) approach to policies and investments in the Amazon Basin. More specifically, the project will produce an assessment of the multi-sectoral synergies, conflicts and infrastructure investment needs arising from national policies of interest in the eight countries in the basin that have the potential for multi-sectoral consequences and sensitivity to climate change. The project will assess the consistency, linkages, and economic implications of these policies at national, regional and global scales. The estimated timeframe for the performance of such service is 24 months and the start of services is expected for the third quarter of 2020.

## 4. Key Activities

**4.1.** Task 1 – Mapping and Engagement with Stakeholders

A scoping mission will be carried out to establish a dialog with ACTO, IDB and in-country counterparts aimed at defining specific questions and concerns, and to delineate the scope of the model specifications, the in-country institutions and staff that will work jointly with the project team, and the expected outputs of the model.

Deliverables: Modeling work plan, and setting the institutional arrangement for the project

**4.2.** Task 2 – Workshop(s) for Scenario Definition

A regional workshop with participation of stakeholders from the eight Amazon basin countries, as well as other selected counterparts, will be conducted to establish the number and scope of scenarios to be initially developed and simulated for multi-sector nexus model. This workshop (or workshops if more than one is conducted) will help to arrive at a baseline (typically, a business-as-usual) scenario for the Amazon, and a number of other scenarios that consider variations in physical and socioeconomic conditions, as well as a planning horizon (e.g., 2050), and desired model outputs. In the definition of scenarios, it is important to consider their compatibility with other national, regional and global scenario platform, e.g., SGD, IPCC (NDC, SSP), IPBES and others.

Deliverables: Technical Note describing the workshop agenda, participants and outcomes, particularly the definition of the baseline and selected scenarios.

**4.3.** Task 3 – Hydrology and Water Resources Management Model Development

This task entails the development of a hydrology and water resources management simulation model for the Amazon basin that computes the spatial and temporal distribution of water quantity (hydrologic water balance and flow rates) and water quality.

The simulation model should be based on a software platform that integrates climate, topography, soil type and land use, water resources infrastructure and operations to manage water quantity and quality. The hydrologic cycle components to be simulated should include precipitation, evapotranspiration, runoff, streamflow, infiltration and groundwater flow, as well as storage components in the different basin compartments. Infrastructure and operations capabilities should include main dams and reservoirs, pumping systems, hydropower generation and irrigation systems, as well as green infrastructure and nature-based solutions for water resources management. Preferably, this task will take advantage of the IDB's HydroBID system. In any case, proposed software platforms must be peer-reviewed and documented in the published literature.

The developed models will be either already calibrated for the Amazon basin, or if not, calibrated and validated with existing data; no additional data will be collected as part of this project. Such data may include local sources as well as global ones such as remote sensing and data residing in global organizations.

Note: For this task, the natural recharge of the aquifer needs to be considered explicitly. Also, this task should include the Biotic Pump Theory or Theory of the Atmospheric Rivers that has been most studied in the Brazilian Amazon region.

Deliverables: Technical Note describing the hydrology and water resources management model development, parameterization, calibration and validation.

**4.4.** Task 4 – Nexus Model Development and Simulation of Scenarios

This task entails the development of the multi-sector nexus model and its application to the simulation of the scenarios identified in Task 2.

The simulation model should be based on a software platform that integrates climate, socioeconomics, land, energy and water in a coupled way computationally. This implies that model simulations solve for all of these components simultaneously, rather than having the output from one model (e.g., climate, water) as input to another model (e.g., land/agriculture, energy, socioeconomics). Examples of these software platforms are Integrated Assessment Models (IAMs), and models of coupled food-energy-water systems (coupled FEWS). Proposed software platforms must be peer-reviewed and documented in the published literature.

The developed models will be either already calibrated for the Amazon basin, or if not, calibrated and validated with existing data; no additional data will be collected as part of this project. Such data may include local sources as well as global ones such as remote sensing and data residing in global organizations.

The developed multi-sector model will be used to simulate the scenarios defined above (per Task 2) and generate results as specified in the stakeholder workshop(s).

Deliverables: Technical Note describing the model development, parameterization, calibration/validation, and simulation of the baseline and selected scenarios.

**4.5.** Task 5 - Water Quality Analysis

Given the importance of water quality for the Amazon ecosystem, as well as for all socioeconomic activities (water and sanitation services, food production, power generation), water quality throughout the basin will be assessed quantitatively using a water quality index (WQI) formulation, rather than simulating a multitude of water quality parameters). The WQI will be used to comparatively evaluate the freshwater quality implications of the policies and climate change impacts specified in Tasks 2 and 3. Developing and using a single WQI will require we work with stakeholders to identify the most relevant water quality parameters (e.g., total phosphorus, total nitrogen, dissolved oxygen); identify metrics (i.e., model outputs in specific sectors) relevant to these parameters, and approaches to converting these metrics into measures of the selected water quality parameters; normalize performance across quality parameters to a common scale (i.e., 0-100); and aggregate normalized quality parameters into a single WQI. Based on the model results, a “hot-spot” analysis for the main polluted areas/tranches across the Amazon Basin-Region will be carried out. Including the identification of areas to prioritize for environmental sanitation investment programs which could positively impact the water quality conditions in the basin.

Deliverables: Technical Note to summarize water quality analysis, including sub-basin level sectoral freshwater quality impacts for the simulated scenarios, and methods or

algorithms used to produce water quality results (WQI).

Note: For this study, the progress of the diagnosis of water quality developed by ACTO and ANA-Brasil should be taken into account.

**4.6.** Task 6 – Planning for the Amazon Watershed and Investment Needs Analysis

Based on the results from previous activities, this task comprises the definition of a set of planning alternatives for the Amazon Basin, following existing strategic guidelines for the Amazon region, and particularly articulated with the Strategic Action Program (SAP) of the Amazon Basin developed by ACTO. In addition, a set of metrics from the scenarios developed in Task 2, 3, 5 and 6 will be developed to articulate sectoral investment implications of climate change and the policies and measures explored in the scenarios. Metrics for investment needs in the energy, water and land sectors will be defined in consultation with ACTO, IDB and other selected stakeholders. Established methods to estimate infrastructure investments in the energy, water, and land sectors will be used, such as those used in IDB operations.

Deliverables: Technical Note to summarize the strategic guidelines, investment needs analysis, including sub-national level sectoral investment needs for the simulated scenarios, and methods or algorithms used to produce investment analysis results. In addition, recommendations for a medium- and long-term horizon of planning for the Amazon Basin will be suggested aligned to the SAP of ACTO.

**4.7.** Task 7. Recommendations of additional studies, actions and arrangements for the integrated management of the Amazon Basin

This task will analyze and synthesize principal recommendations to be made to ACTO for the technical strengthening of the institution, regarding the need of additional studies to be undertaken in the future for improving the knowledge of the Amazon Basin in the area of water security and Nexus planning. Suggestions of actions and technical-institutional arrangements will also be made for improving the role of ACTO at the regional level, enhancing the implementation of Task 7.

Deliverables. Technical note highlighting additional studies, actions, and proposal of institutional arrangements for improving the role of ACTO at the regional level.

**4.8.** Task 8 – Visualization Dashboard

In this task, a visualization dashboard will be produced which can be used to explore and understand the results produced in Tasks 2 through 6. The desired characteristics of this visualization dashboard will be consulted with IDB, ACTO and other selected stakeholders.

Deliverables: Visualization dashboard capability and documentation.

**4.9.** Task 9 - Final Reporting

Upon completion of Tasks 1 through 9, a final report will be produce to summarize the effort and conduct a final meeting with IDB, ACTO and other selected stakeholders to discuss results and methods for moving forward on incorporating nexus-thinking into future planning and management activities in the Amazon basin.

Deliverables: Final project report and final meeting presentation.

## 5. Deliverables and Project Schedule

**5.1.** The table below summarizes the deliverables and schedule for this project. Due dates are measured from start of contract.

| Project Activity | Deliverables | Due Date |
|---|---|---|
| Task 1: *Mapping and Engagement with Stakeholders* | Modeling work plan | 2 mo |
| Task 2: *Workshop(s) for Scenario Definition* | Technical Note | 4 mo |
| Task 3: *Hydrology and Water Resources Management Model Development* | Technical Note | 8 mo |
| Task 4: *Nexus Model Development and Simulation of Scenarios* | Technical Note | 12 mo |
| Task 5: *Water Quality Analysis* | Technical Note | 14 mo |
| Task 6: *Planning for the Amazon watershed and Investment Needs Analysis* | Technical Note | 18 mo |
| Task 7 *Recommendations of additional studies, actions and arrangements* | Technical Note | 18-20 mo |
| Task 8: *Visualization Dashboard* | Visualization dashboard capability and documentation | 18-22 mo |
| Task 9: *Final Reporting* | Final Project Report and Meeting Presentation | 18-24 mo |

## 6. Acceptance Criteria

**6.1.** The work will start upon receipt of a formal Notice to Proceed by the IDB. Draft deliverables will be delivered to the IDB within 30 calendar days of the proposed deliverable due dates. The contractor assumes that the IDB will review and prepare written comments within fifteen (15) calendar days of submittal. Upon receipt of comments from the IDB to such drafts, the contractor will submit the final version within fifteen (15) calendar days of receipt of such comments.

**6.2.** The contractor will submit a more detailed work plan and schedule within thirty (30) calendar days after the receipt of the Notice to Proceed.

## 7. Supervision and Reporting

**7.1.** The coordination of the Project will be made by the IADB and ACTO and the execution will be made by the IADB. Likewise, the coordination between IDB AND ACTO will be through a coordinator based in ACTO's office located in Brasilia, Brazil. The coordination will coordinate with Focal Points of ACTO in its Member Countries in order to arrange the full participation of countries as needed.

**7.2.** To support IADB in project monitoring and quality control, a technical committee will be established with personal of ACTO c in order to guide conceptual, technical, and logistic decisions about the consultancy. This committee will also support the IADB to evaluate the progress in the development of the project.

## 8. Schedule of Payments

**8.1.** Payment terms will be based on project milestones or deliverables. The Bank does not expect to make advance payments under consulting contracts unless a significant amount of travel is required. The Bank wishes to receive the most competitive cost proposal for the services described herein.

**8.2.** The IDB Official Exchange Rate indicated in the RFP will be applied for necessary conversions of local currency payments.

| **Payment Schedule** | |
|---|---|
| ***Deliverable*** | **%** |
| 1. *Deliverable – Task 1* | 5% |
| 2. *Deliverable – Task 2* | 10% |
| 3. *Deliverable – Task 3* | 10% |
| *4. Deliverable – Task 4* | 10% |
| *5. Deliverable – Task 5* | 10% |
| *6. Deliverable – Task 6* | 10% |
| *7. Deliverable – Task 7* | 10% |
| *8. Deliverable – Task 8* | 10% |
| *9. Deliverable – Task 9* | 15% |
| **TOTAL** | 100% |