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Who we are

The Nature Conservancy (TNC) is environmental conservation organization dedicated to protecting lands and waters on which all life depends. Guided by science, TNC creates innovative local solutions to the world's key challenges so that nature and people can thrive together. In Brazil, where it has been operating for 35 years, TNC's work focuses on solving the complex conservation challenges of the Amazon, Cerrado and Atlantic Forest from a systemic approach, focusing on implementation generation of impact, to mitigate climate change and biodiversity loss. TNC Brasil works in cooperation with TNC Global, an organization that works in 76 countries, using a collaborative which involves approach, communities, governments, the private sector and civil society.







Why should we act to conserve the Araguaia River Basin?

Climate change and pressure from human activities are putting conservation of freshwaters in Brazil at risk, and thus the survival of animal species and prosperity of people. Several researchers consider the Araguaia River to be one of the last large free-flowing tropical rivers and one of the most threatened in the world among those of similar size (Grill at al., 2019; Latrubesse et al., 2019; Martins et al., 2021). On the other hand, the existing impacts, related to damming on its tributaries, the degradation of its waters due to deforestation, pollution and siltation, in addition to overfishing and introduction of exotic species, have compromised the dynamics of the Basin's ecological processes. Added to these impacts are the potential pressures from dams and waterways in planning, an increase in the human population, unplanned agricultural expansion and the still little-studied effects of climate change in the region. This entire scenario indicates the urgency of perceiving the Araguaia region as a national priority for environmental conservation.



Because of its geographic positioning, the Araguaia Basin is a large aquatic territory connecting the Cerrado and Amazon biomes, fulfilling an important role in maintaining the water flow in Brazil, both for being a water source for the Amazon Basin and for other regions of Brazil. This transition between biomes also ensures the existence of a unique biodiversity in the region, which includes an important wealth of fish (including sedentary, restricted and medium and long-distance migrants), dolphins, otters, turtles and caymans, as well as molluscs, crustaceans and insects of importance for the functioning of ecosystems and public health.



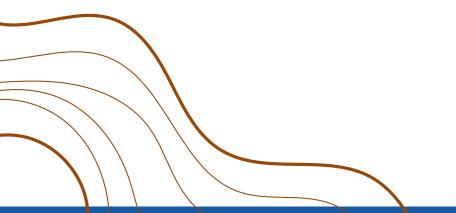


Although all species depend directly or indirectly on the water resources of the Araguaia River and its tributaries, the aquatic fauna deserves to be highlighted because of its unique importance in the country, although is threatened by strong human pressure. Therefore, for the freshwaters of the Araguaia River Basin to continue contributing to the freshwater ecosystem of the Amazon Basin, it is necessary to sustain free-flowing rivers connected to floodplains and wetlands.

Considering the global importance of conserving aquatic biodiversity and maintaining it for people, TNC has placed freshwater conservation at the forefront of its 2030 vision. Based on conservation planning principles (Conservation by Design 2.0), our efforts aim to keep the Araguaia Basin connected and resilient for biodiversity and freshwater ecosystems, helping



societies thrive, supporting the development of more sustainable economic activities, collaborating with indigenous peoples and traditional communities in sustaining their livelihoods, in addition to contributing to local and regional climate regulation.





The Araguaia River

The Araguaia is the main river in the Araguaia-Tocantins hydrographic basin both in terms of its drainage area (approximately 380,000 km²) and its average discharge (6,000 distributed across four states: Goiás, Mato Grosso, Pará and Tocantins. Its main drainage area is completely inserted in the Cerrado domain, until it flows into the Tocantins River, in its northern portion already located in the Amazon biome. The Araguaia river runs approximately 2,100 km until the confluence with the Tocantins River. After covering 570 km since its headwaters, it divides into two arms: Araguaia and Javaés, forming the largest river island in the world, Ilha do Bananal, which is designated a Ramsar site and UNESCO Biosphere Reserve (Figure 1).

The territory of the Basin is also of great importance for local communities, whose subsistence depends on fishing resources, as well as for the economy of the States, based on livestock and agricultural production of grain commodities that are dependent on the use of groundwater.

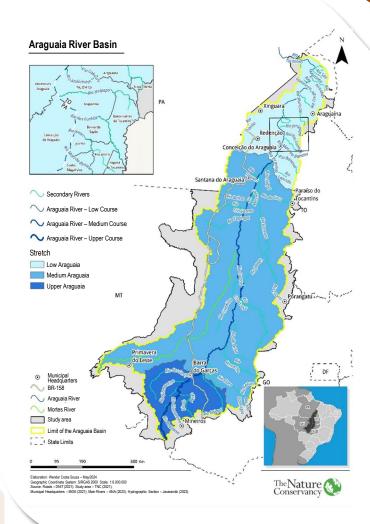


Figure 1 – Location of the Araguaia River Basin and main fluviometric stations.



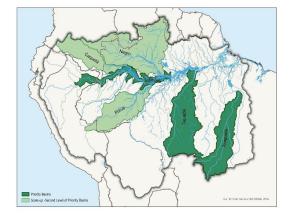


The Araguaia River Basin is a priority for TNC Brasil and also for TNC América Latina, considering the strategic planning process for the Amazon Basin

TNC developed a plan for the Amazon Basin, considering all the countries that are part of the Basin. 68% of the Amazon Basin is in Brazilian territory. Therefore, during 2023, a freshwater strategy for the Amazon Basin was established, which follows the following principles:

- Maintain ecological integrity in target freshwater ecosystems as outlined in the TNC freshwater framework
- Recognize the inherent connections and codependences between nature and people in freshwater ecosystems.
- Promote transboundary collaboration with the aim of maintaining freshwater system connectivity and promoting a systemic approach
- Incorporate gender, diversity, equity and inclusion in all our conservation work; Ensure the active and inclusive participation of indigenous peoples and local communities, strengthening territorial rights and access to resources
- Align our work with local, regional and global conservation agendas to achieve broader impact by promoting collaboration with different stakeholders
- Ensure the active and inclusive participation of indigenous peoples and local communities, strengthening territorial rights and access to resources

- Through the implementation of this strategy, generate sustainable and inclusive well-being and economic opportunities for people and diverse cultures, while promoting the active participation of local communities in freshwater conservation
- In Brazil, this process led to the prioritization of 6 hydrographic basins: Solimões, Tapajós and Araguaia, where TNC will act directly, implementing its conservation strategies, and Rio Negro, Purus and Caquetá/Japurá Basins, where we will act indirectly, through influence on public policies and chain action and with partners.



The final version of the Strategic Freshwater Conservation Plan for the Amazon Basin is available here. For more details, contact Silvia Benitez



How can we know which areas to prioritize for the conservation in the Araguaia Basin?

Our objective was to identify the set of rivers, streams and their hydrographic basins that constitute representative ecological processes of the Araguaia River Basin, evaluating the severity and sources of impacts, which served as a starting point for the dialogue with interested parties to review and refine priority areas for the development of conservation and management actions.

In addition to the representativeness of ecological systems, additional information on migratory routes, critical habitats, rare, threatened and endemic species should be used when available, to assess the extent to which the results capture these elements and areas should be added when necessary. This way a freshwater portfolio to be conserved is created. The aim is not to identify protected areas, but rather the set of areas that represent the variety of habitats and ecological processes throughout the basin that are priorities for conservation and management actions.

For this objective, the planning method for environmental conservation used was the Conservation Blueprint (Groves, 2003), which consists of prioritizing areas (Planning Units), based on representativeness of aquatic environments, its condition of ecological integrity and connectivity between units (Tellez et al. 2011; Petry et al. 2018).

The objective is to identify a set of relevant, with ecological integrity and functionally connected areas, which must be considered in regional planning, to ensure the conservation of biodiversity and fundamental aquatic ecosystems related to the Araguaia River (TNC, 2019).

At the end of the analyses, the map of priority areas is the "Conservation Plan*," because it guides investment and planning for the conservation and management of freshwater resources. This model can be used in different ways, depending on the short-term priorities of governments and other interested parties, but in all cases it is a long-term vision for the ecological sustainability of the territory drained by the Basin. Furthermore, the Conservation Plan can also inform the development and evaluation of potential future development scenarios and support the evaluation of results and inform critical decisions that will influence sustainability, such as the selection of sites for hydroelectric dams, as already undertaken in the conservation planning for the Tapajós Basin (TNC, 2019).

The Conservation Plan for the Araguaia Basin from complementary received subsidies analyzes of biodiversity, socio-cultural aspects demands and water governance (according to the flowchart presented on page 9) through three participatory workshops that enabled the contribution of biodiversity and water resources management experts, as well as representatives from the public and private sectors and local communities, both to identify environmental characteristics and to propose conservation strategies.



How did we arrive at the Conservation plan for Araguaia?

STARTING POINT BASIN ATLAS

Current condition indicators

Pressure/stressor degree indicators

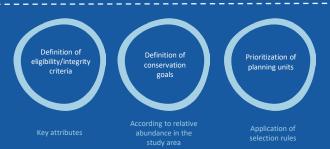
01.

CLASSIFICATION



02.

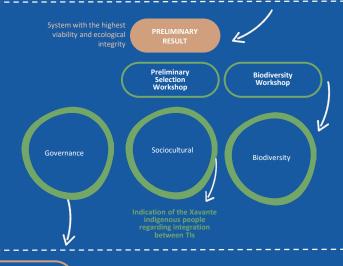
PRIORITIZATION STEP



03.

9

COMPLEMENTATION



Governance and validation workshop

SELECTION

DEFINITION OF ACTIONS AND STRATEGIES

CONSERVATION
PLAN FOR
THE BASIN



Step 1

Classification:



The classification makes it possible to reach, at the end of the process, a set of priority areas that ensure the representation of the diversity of ecological ecosystems present in the basin. For conservation planning in the Araguaia Basin, the level of ecological systems was adopted (Higgins et al. 2005) as Planning Unit (UP). These units are then grouped by statistical methods into "types of classes," according to their physical characteristics in relation to a series of environmental parameters.

Step 2

Prioritization:



Criteria are established for the prioritization of Planning Units, including representativeness targets for each type of ecological system and assessment of the degree of ecological integrity of the UPs, based on indicators of the presence and absence of human impacts. For this planning, participants defined the need to select a greater proportion of headwater UPs, as it is understood that they are fundamental environments for the conservation of downstream areas.



Step 3

Complementation:

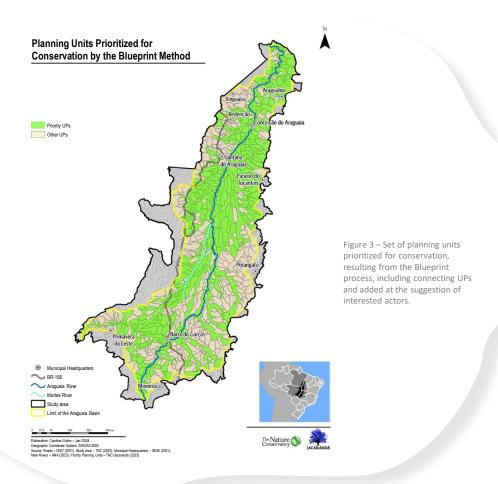


In order to ensure longitudinal hydrologic connectivity between the selected units, and include areas identified as important for biodiversity, adjustments and additions of Priority Units were made to the set of UPs obtained in the previous step. This complementation sought to meet three objectives:

- **1.** Connect selected UPs that were hydrologically isolated from the connected network.
- **2.** Add UPs considered relevant and with unique characteristics for the environmental conservation of the basin, as recommended by the groups participating in the workshops.
- **3.** Add relevant UPs for the protection of threatened or endemic species not registered in the already prioritized set, including the integration of UPs between indigenous territories.



Araguaia basin prioritization areas for Conservation



The Conservation Plan for the Araguaia River Basin includes the prioritization of 334 planning units, 84 of which are located in the Low Araguaia, 191 in the Middle Araguaia and 58 in the Upper Araguaia region, in addition to the unit corresponding to the main river channel itself. The total of UPs selected corresponds to approximately 60% of the basin area, as shown in Figure 3.

In relation to the degree of ecological integrity, a concentration of the most

intact UPs was observed in the middle Araguaia, in the flooded grasslands region (Figure 4). This region concentrates a set of adjacent UPs of very high ecological integrity, which may be related to the difficulty of use and occupation due to waterlogged land and seasonal flooding, but mainly due to the protection of the territory afforded by the presence of the Araguaia National Park and from different Indigenous Lands.





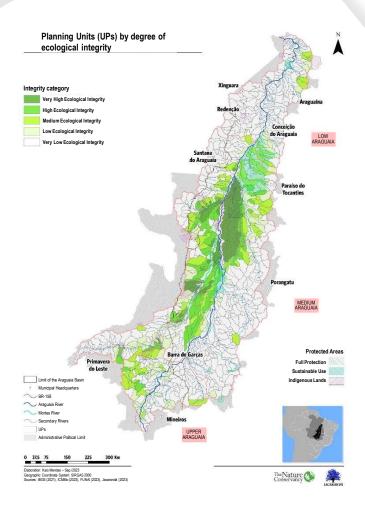


Figure 4- Map of UPs by degree of ecological integrity

However, the analyzes pointed to potential risks of significant impacts that may not have been perceived by the integrity indicators used, such as intensive rice cultivation activities, with changes in the regimes and natural channels of rivers, in the region of the Tocantins municipalities of Pium, Lagoa da Confusão, Formoso do Araguaia and Dueré.

The Environmental Protection Area (APA) of Ilha do Bananal/Cantão is also highlighted because it contributes to the maintenance of high and medium integrity of UPs, just as Indigenous Lands

(TIs) have proven to be important for the conservation of ecological integrity in high and medium levels on the path between the TIs that extend from the region between Primavera do Leste and Barra do Garças to the APA Meandros do Araguaia, along the Mortes River. On the other hand, it is worth highlighting the notable shortage of ecologically intact UPs, in the Pará and Goiás portions of the basin, highlighting the need for coordination with the states of Pará and Goiás for conservation actions in the Araguaia.

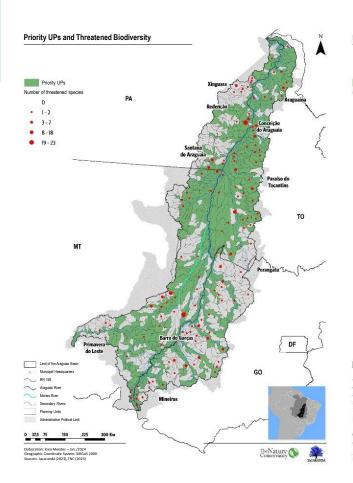


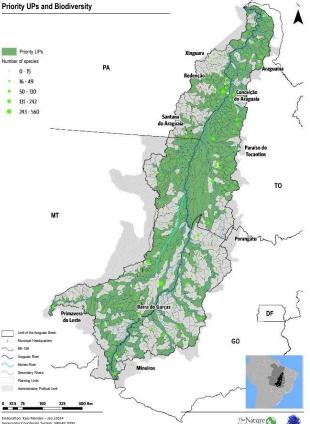
Aquatic Biodiversity

With respect to biodiversity, the Tocantins-Araguaia Basin is a region of high biological importance for several groups of fauna and flora organisms, however local biodiversity has been under great pressure due deforestation of natural environments for conversion into agricultural areas. The biodiversity survey of the Araguaia River Basin, which considers the analysis of the occurrence of species of amphibians, birds, mammals, reptiles and fish, among other fauna groups, pointed out the main channel of the Araguaia River, the Javaés River and

the Mortes River as areas of greater species richness, and the presence of threatened species, for a large part of the groups evaluated. These areas are located mainly in the middle Araguaia River, where the main conservation units of the basin are distributed (Parque Estadual do Araguaia – MT, APA dos Meandros do Rio Araguaia, Parque Nacional do Araguaia, Parque Estadual do Cantão and APA da Ilha do Bananal) (Figure 5).

Figure 5: UPs prioritized in relation to total recorded biodiversity and threatened species.







The data pointed to the Lower Araguaia River as an area with great wealth of aquatic species, however in these areas there are a reduced number of Integral Protection Units (Parque Estadual da Serra dos Martírios/Andorinhas) and Sustainable Use Units (APA Lagoa de Santa Isabel and APA de São Geraldo do Araguaia), and which have small extensions, which represents a threat to biodiversity.

Although the headwaters of the Upper Araguaia River Basin have not been identified as areas of high taxonomic richness, it is worth highlighting that these areas contain the sources of the river's main tributaries. Just as the Lower Araguaia River, this region is also not covered by the presence of many conservation units, which also indicates a threat to the quality of the rivers and consequently to all biodiversity dependent on the basin.

The biodiversity survey also highlighted a large gap in biological knowledge in the basin, identified by the lack of information in the compiled literature and by consultation with researchers and experts working in the region. For that matter, incentives for basic research must be promoted, in order to reduce knowledge bias in the selection of priority areas in the basin.

One of the challenges for the conservation of the basin will be integration between States, whether in the standardization of legislation applicable to the protection of water and fishing resources, in the rigor

in enforcing the Forest Code, or in policies to encourage more sustainable production and socio-environmental safeguards.

It is essential that there is a productive dialogue between the state departments of tourism, agriculture and the environment.

The recognition of water as a key component of human development makes it necessary to integrate economic, social and hydrological information to orient the implementation of water resources management policy instruments. All states in the Araguaia Basin have a significant legal framework related to water resources management, however the effective implementation of planned actions cannot be observed. It was also observed that all states have water resources plans and concessions in place. Charging for the use of water resources is incipient and the classification of water bodies is non-existent.

In this sense, the sectoral water intensity indicator is important as it aims to represent the dependence between water use and income generation by each user sector. Because the agricultural sector is an important water user in the basin, Figure 6 presents the water intensity indicator by municipality in this sector, showing how many liters are needed to produce R\$ 1.00 of Gross Value Added (GVA).

Using this indicator, it is possible to identify the regions of the basin with the highest demand for water per real of added value generated by the agricultural sector. It is observed that the municipalities located in the middle and those in the upper Araguaia with а large share agriculture, are those with the highest water consumption per real generated, indicating the sector's dependence on irrigation to generate added value.

Water intensity of the agricultural sector - Year 2020 Water intensity of the agricultural sector – Year 2020 (liters/R\$) 343.42 - 1178.69 211.62 - 343.41 115.31 - 211.61 58.03 - 115.30 2.16 - 58.02 BR-158 Araguaia Rive Mortes River Study area The Nature

Figure 6. Water use and water intensity by the agricultural sector

Therefore, the regionalized analysis of water intensity indicates the importance of implementing policies for the rational use of water and the adoption of economic instruments, such as charging for water use, for effective management of water resources.

In some regions, such as to the west of Primavera do Leste (MT) and in the Goiás and Pará portions of the basin, planning units were prioritized in a highly anthropic situation, either due to the loss of native vegetation or the impact of activities such as intensive agriculture, pastures poorly managed, mining and damming of small watercourses for various purposes. In regions, the importance of these restoration actions stands out, especially headwaters and Permanent in Preservation Areas (APPs according to the national Forest Code) that contribute to improving water availability, thus reducing the pressure of high demand on the water balance.

Targeting strategies related to rural properties will be fundamental in conducting a conservation plan for the Araguaia Basin, considering the region's propensity for agribusiness. Compliance with the Forest Code must be a central item in these strategies, which must be sought not only with coercive actions (also necessary, through strengthening the inspection capacity of state environmental agencies), but also with economic incentives and targeted educational actions to the different types of rural landowners.



Deforestation and fires in native vegetation are pressures closely associated with agricultural expansion and the way agricultural areas and pastures are managed in the region. It is observed, according to data from MapBiomas, that in the last five years deforestation has been concentrated in the north and northwest portions of the basin (Figure 7).

It is, therefore, urgent to mobilize the states of Pará, Tocantins and Mato Grosso to contain illegal deforestation and verify compliance with mitigation and compensation measures in cases of legalized vegetation removal.

Regarding the impacts of fires, it is important to remember that Cerrado has dynamics intrinsically related to fire.

However, the frequency, period and duration of vegetation fires have been altered, and often intensified due to human actions and climate change.

The maps presented indicate that a significant fraction of the Araguaia Basin is undergoing changes in the natural fire regime (Figure 7), threatening mainly the central region, where flooded grasslands and Indigenous Lands are concentrated, in addition to invaluable biodiversity. In this sense, an integrated fire management strategy is necessary, which must be shared between States and Municipalities, and which includes the strengthening of forestry brigades, intensification of inspection and guidance to local communities, such as indigenous populations, on the adequate fire management under current conditions and predicted climate changes.

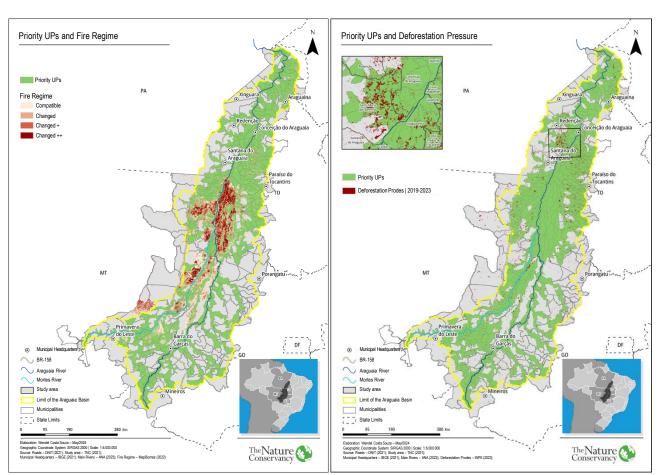


Figure 7. Deforestation and conversion of native vegetation in the last 5 years and changes in the fire pattern along the Araguaia River Basin

Local

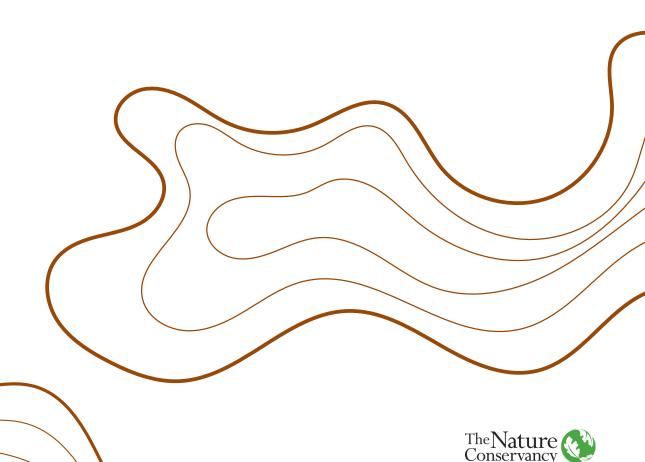
- Mid-Araguaia, municipalities of Barra do Garças, Luiz Alves, Conceição do Araguaia
- Indigenous Lands
- Pantanal do Araguaia Barra do Garças to São Felix
- Formoso River Basin
- Upper Mortes River
- Vermelho River, Peixe River, Água Limpa Stream
- Municipalities of Caseara, Cocalinho, São Felix, Pindaíba, among others
- Cantão and Ilha do Bananal
- Upper Taquari
- Garças River, Mortes River, Araguaia

Highlighted challenge

- Unregulated tourism
- Land and cultural conflicts, impacts of projects on TIs
- Pressure on murundus grasslands, land conflicts
- Need to strengthen water resources management
- Small Hydroelectric Power Plants (PCHs) projects without adequate consultation and discussion process
- Deforestation of headwaters
- Water pollution from pesticides and lack of sanitation
- Fires, pressure from unplanned agricultural expansion, lack of action by the environmental agency

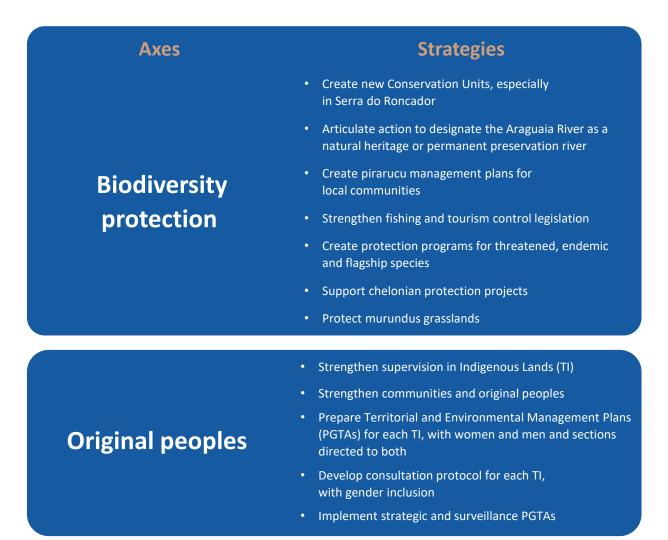
Brasil

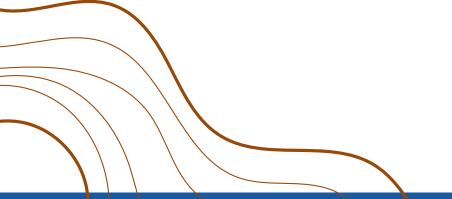
- Project to implement a large cellulose industry
- Silting



Recommendations

52 recommended actions were listed for the conservation of the Araguaia River Basin. These actions were organized into themes: Protection of Biodiversity, Original Peoples, Governance, Sustainable Production, Environmental Quality, and Research and Monitoring.







Research and monitoring

- Implement water quality monitoring in the Mortes River
- Implement surface and groundwater monitoring network in the basin
- Finance flow monitoring and studies, especially in areas with irrigated agriculture
- Improve hydrometeorological monitoring network
- Promote basic research, especially regarding the hydrological dynamics of the basin and biodiversity

Sustainable production

- Create a working group to monitor licensing processes to ensure socio-environmental safeguards, especially regarding hydroelectric projects, waterways and potentially polluting industries or those with high water demand
- Require assessment of cumulative and synergistic impacts in the basin (Integrated Assessment) especially for hydroelectric developments
- Create pirarucu management plans for local communities
- Implement payment strategies for environmental services for rural landowners
- Orient and encourage sustainable tourism, especially for traditional communities as an alternative source of income
- Create incentives/subsidies for more sustainable irrigation within the Safra Plan
- Create incentives/subsidies for the recovery of degraded pastures within the Safra Plan
- Review irrigation policies
- Train rural producers to handle and manage water resources (terraces, level crops, dams)
- Promote public policies to encourage the National Technical Assistance and Rural Extension Policy (PNATR)
- Promote implementation of ILPF systems (integration, crops, livestock, forestry) with soil conservation management practices



Prepare water resources plan for the basin and sub-basins

- Implement payment strategies for environmental services for rural landowners
- Plan and implement a recovery plan for degraded areas at the headwaters of the Garças River
- Promote the planning of tourist and recreational use of beaches on larger rivers
- Invest in sanitation, with inspection of concessions
- Implement septic tanks and create a solution for waste in TIs
- Raise awareness and monitor compliance with the Forest Code

Create Araguaia River Hydrographic Basin Committee

- Demand from States the implementation of the instruments of the National Water Resources Policy
- Strengthen existing Basin Committees
- Strengthen governance and participation of communities and original peoples

Propose improvements to the municipality's codes of conduct

- Restructure grant management systems with efficiency and transparency
- Support the decentralization of environmental agencies
- Implement charging for water use
- Regulatory maintenance of ecological flows by the states

Environmental quality

Governance





Complete report and Reference materials

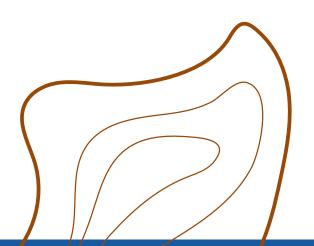
Contact us to access the complete Araguaia Blueprint Report. It describes the methodology in detail, the bibliographic review, the entire process carried out and maps drawn up.

This process was built by several hands. Meet everyone involved in the project below, who will be directly and indirectly engaged in implementing the recommended actions.

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Environmental Consultant	Danilo Rezende Passos
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