# XINGU PROJECT - INTEGRATING LAND USE PLANNING AND WATER GOVERNANCE IN AMAZONIA: TOWARDS IMPROVED FRESHWATER SECURITY IN THE AGRICULTURAL FRONTIER OF MATO GROSSO

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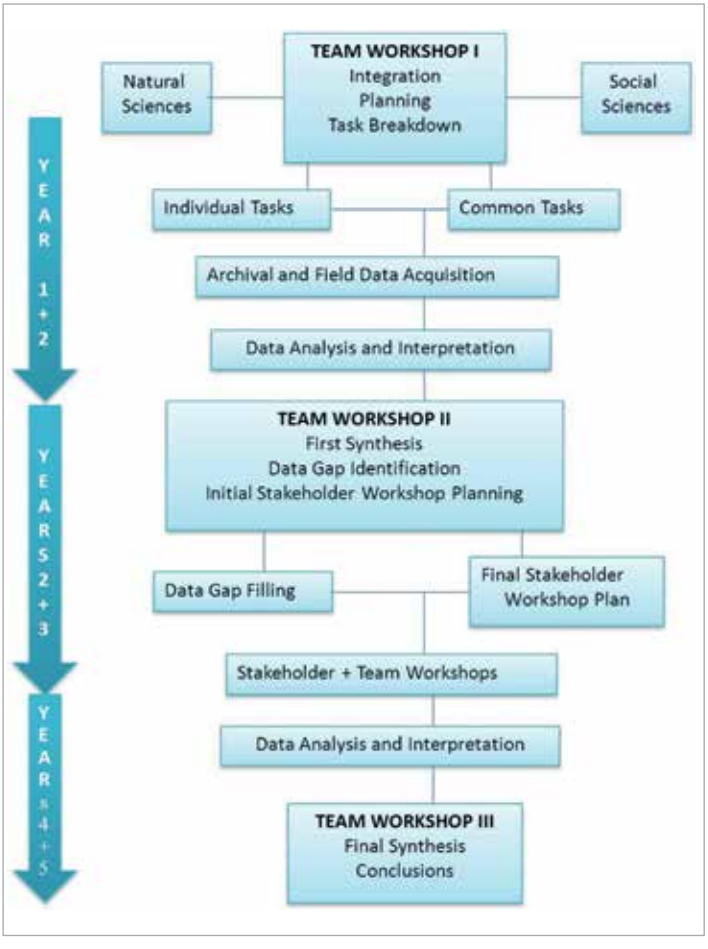


*Figure 1. The flowchart shows the activities timeline for the project*

Freshwater resources comprise a fundamental connection between human society and ecosystem functions. Within watersheds with significant agroecosystem components, strategies for sustainable water allocation between urban and agricultural needs while maintaining ecological flow requirements represents an unresolved tension that is growing due to increasing population pressures and global climate change. While there is still much to understand regarding global change issues and their impacts on freshwater security, there is a concurrent need to improve frameworks, related to water governance to ensure adequate provisioning of water among competing but not always equally valid demands. It is only through the development and successful application of water governance frameworks, considering biophysical drivers, upstream/downstream connections, and trends and uncertainties in freshwater resources due to local pressures and global change, that we may improve the adaptive capacity of socio-ecological systems and water-based ecosystem services. This project has assembled a team of natural and social scientists in order to co-evaluate freshwater security issues within an area of global significance that is undergoing rapid change, both demographically and related to water use and freshwater vulnerability.

## SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

The team developing an interdisciplinary framework to bridge the gaps between natural and social science to examine the overarching general question of: What approaches to water resource governance, land management, and information transfer among regions and among water use sectors will improve the sustainability and equity of water resources within socio-environmental systems, and ensure the well-being of ecosystems and humans? The Upper Xingu basin in Mato Grosso, Brazil provides a test bed for evaluating strategies for integrating water governance and land use planning with research to evaluate land-use impacts on water quantity and water quality in upstream and downstream regions that differ in water use sectors (farmers versus urban users). The main goal of this project is to identify how impacts from land conversion, cropland expansion and intensification of both crop and animal production interact to affect regional evapotranspiration, rainfall generation, river flooding and water quality and stream habitats. This will allow us to identify thresholds of change that will endanger agricultural production, livelihoods of non-agricultural settlers and the region's new urban population and infrastructure. The research will survey the effects of this on (1) soybean farmers, (2) cattle ranchers, (3) small-scale farm families, (4) rural non-agriculturists, including fishers, and (5) urban residents, to map their roles as stakeholders. And also conduct current water use surveys among the different stakeholder groups, accompanied by questions on desired aspects for future freshwater security, to identify targets for desirable outcomes of water governance strategies. These targets, together with the information on land use drivers, water quantity and quality and predicted scenarios for global changes will be incorporated into a fully integrated and interactive geospatially oriented socio-ecological model, that can serve as framework for future water governance that enhances Freshwater security in such systems.

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