

LAND USE CHANGE EFFECTS ON HYDROLOGICAL REGIME IN THE XINGU WATERSHED - BRAZIL

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OVERVIEW

The Xingu Watershed (509.000km²), located at the agricultural frontier area of Eastern Amazon is divided into areas of extensive native forests, and areas with differing levels and types of agricultural activities. This watershed has suffered intense deforestation over the last four decades, with expansion of grain cropland and cattle ranching at the southern region of the basin. As of 2004, government policies increased the discipline of environmental legislation which has since partially reduced the advance of deforestation.

AIM		
Model the relation between land use and water discharge of the Xingu watershed using the SWAT model, analysing the impacts of future land use scenarios.		
Datasets		
Type	Source (date)	Description
DEM	SRTM	SRTM 3 arc-seconds for global coverage (90 meters)
Weather	INMET (1970 - 2015)	Daily temperature (min., max.), solar radiation, humidity, wind speed
Rainfall	TRMM product 3B42(1998-2016)	Daily TRMM radar estimates for a 0,25 grid
Land Use	TerraClass project - INPE	Land use map 1:250,000
Soil	EMPRAPA, RADAMBRASIL and pedotransfer functions	Soil map 1:250,000 and horizon specific soil properties for each soil type
Streamflow	ANA (1998 – 2015)	Daily and monthly streamflow

SIMULATIONS: Simulations are currently being performed on Iriri River sub-basin.

Iriri River sub-basin	
Area [km ²]	142.000 km ²
Dominant natural vegetation	93.88 % Forest
Dominant soils type	87.88% Acrisols/Lixisols
No of sub-basins in the model	17
No of HRUs	314
Thresholds	2% L and use, 2% Soil, 1% Slope
Climate	Am after Köppen Tropical monsoon climate with 3 months dry season
Annual rainfall [mm]	2000
Mean temperature [°C]	24
Mean slope [%]	2.6
Evapotranspiration method	Hargreaves
Channel routing	Muskingum
Gauging stations used for streamflow (Q) calibration	3 (Pedra do O, Cajueiro and Laranjeiras)
Calibration method	ParaSol

SWAT parameters used for sensitivity analysis	
Model File	Parameter
*.gw	ALPHA_BF, GW_DELAY, GWQMN, GW_REVAP, REVAPMN
*.hru	ESCO, EPCO, CANMX, hru, OV_N, hru
*.rte	CH_N2, CH_K, ALPHA_BNK
*.mgt	CN2, PHU_PLT, BIOMIX,
*.bsn	SURLAG
*.sol	SOL_AWC, SOL_K, SOL_BD
*.plant.dat	BIO_E, BLAI, DLAI, T_OPT, T_BASE, ALAI_MIN, GSI, FRGRW1, LAIMX1, FRGRW2, LAIMX2

- Further Work:**
- More investigation into the water balance components.
 - Model to the entire Xingu watershed.
 - Improves model performance (calibration and validation using others gauging stations).
 - Calibration and validation the sediment load.
 - Scenarios (Storylines and Management).

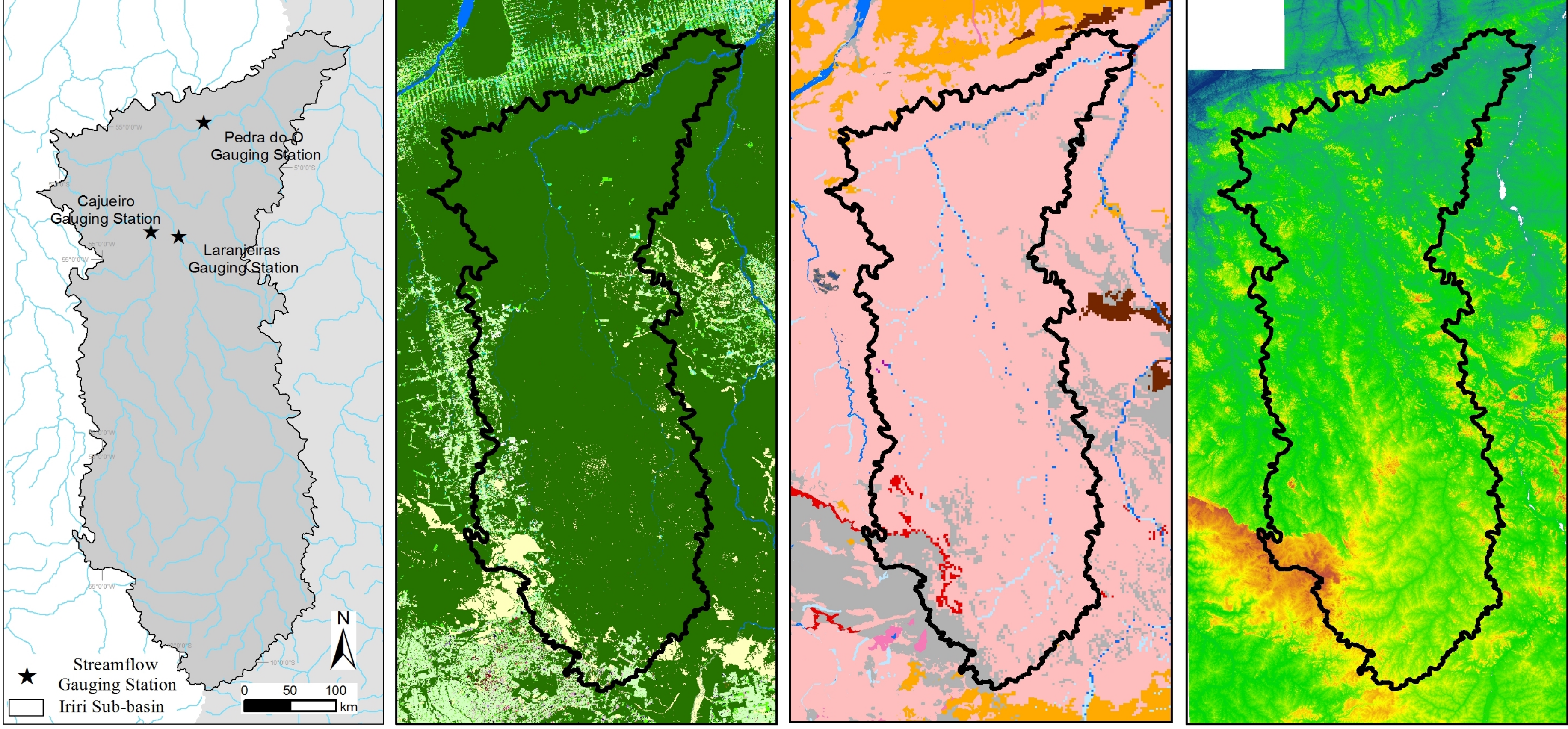
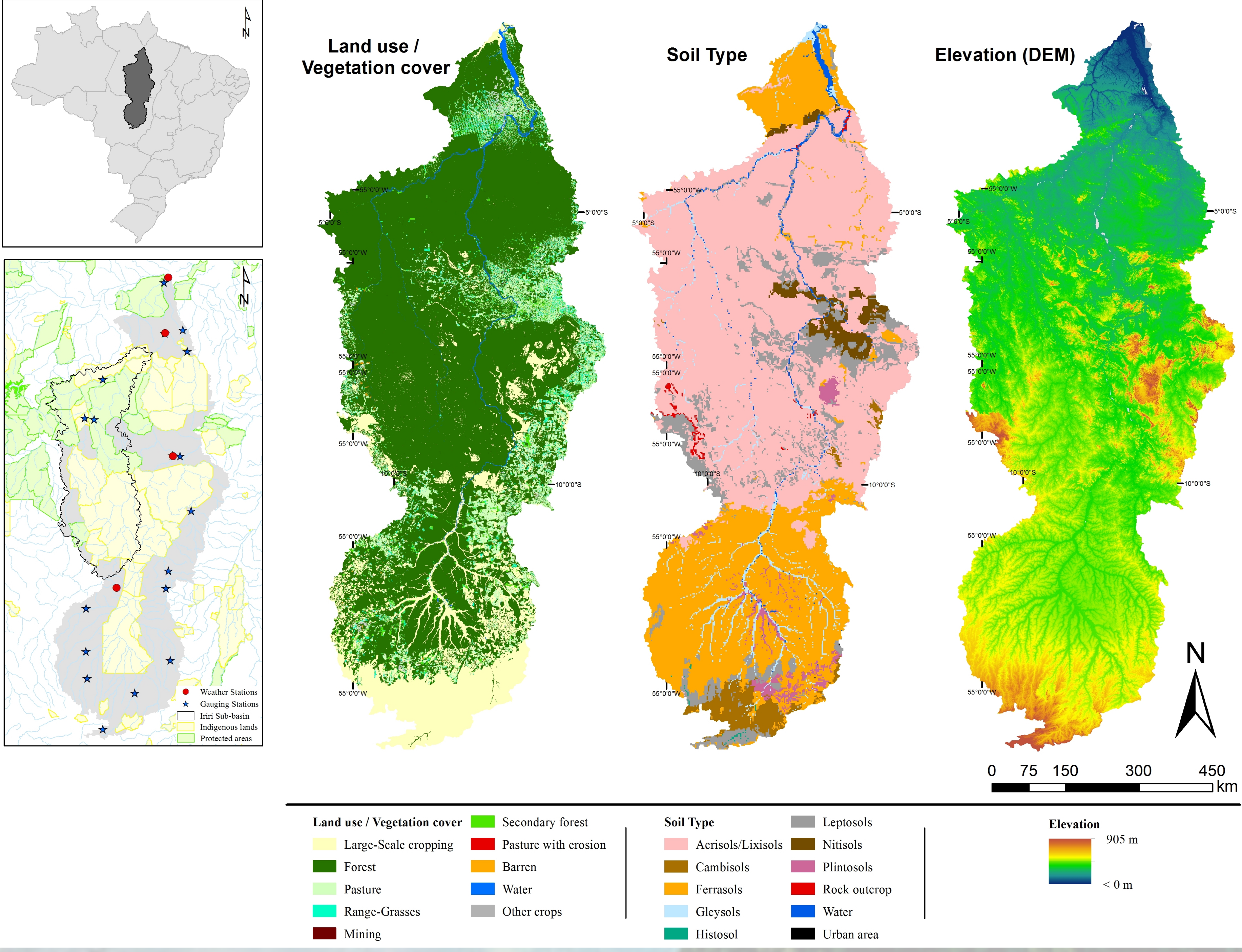


Illustration of model results for three gauging Station in Iriri Sub-basin

