

Mapping potential impacts of dams and reservoirs in South America

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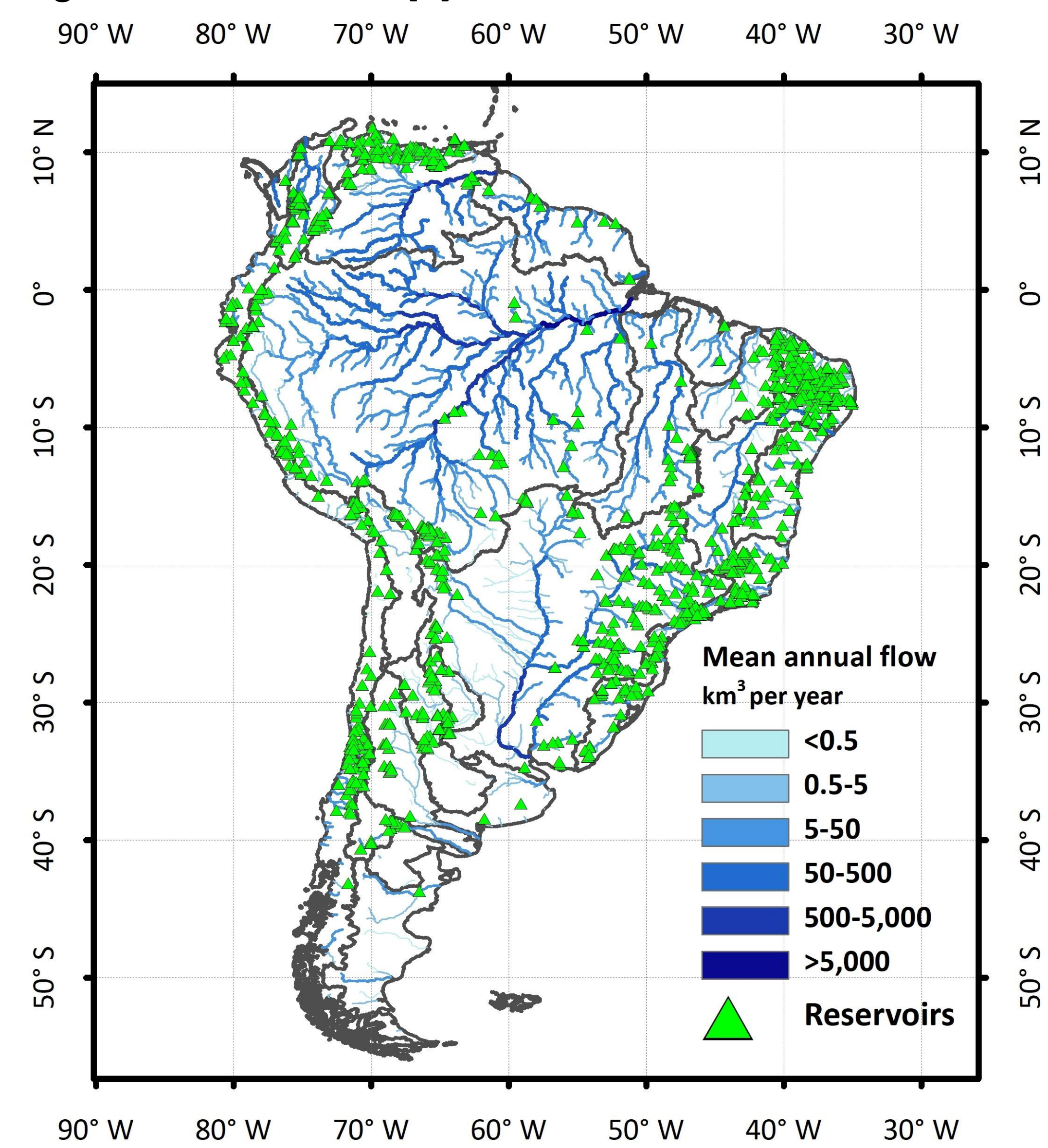
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Summary

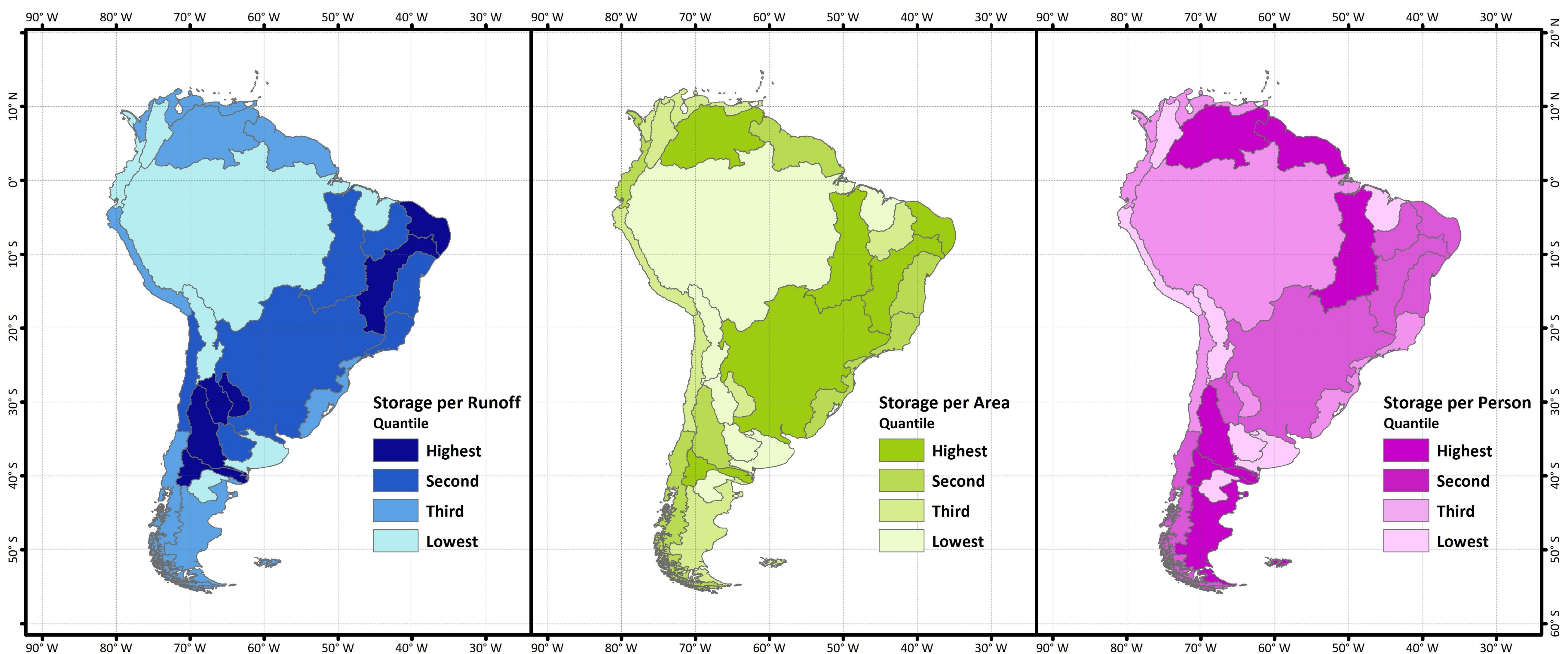
- *Providing reliable estimates of the potential impacts of hydraulic infrastructure in the river systems of South America at a basin scale, is necessary in order to improve the management of water resources in the region.*
- *Despite having the world's highest availability of water resources, water distribution across the continent is uneven (some regions even experience severe water scarcity).*
- *Dams and reservoirs play an important role in water resource management and provide valuable and necessary human services. However, they are associated with several environmental consequences.*
- *We present a continental-scale analysis of reservoir distribution on the continent, both from a geographical, hydrological, and human perspective. First, we compiled a list of hydrological characteristics such as mean annual flow, reservoir water storage, runoff, catchment areas, and population. Then, at the basin scale, we conducted an analysis of the dams' potential impacts.*
- *With this study, we expect to provide valuable insights to researchers and water resource managers about the current and future potential impacts of dams and reservoirs in South America.*

Data and Methods

- The topological model for this study comprises 4,661 catchments which cover the continental area of South America. The HydroSHEDS dataset [1] was used to delineate the catchments and the streams.
- Dams and reservoirs information was taken from the 'Database of Georeferenced Dams in South America' DDSA [2].
- Historical monthly streamflow time-series were obtained from the forcing of the PCR-GLOBWB [3] model into the ISIMP project [4]. Five global climate models were considered: GFDL, HadGEM2, IPSL, MIROC, NorESM1. Also, runoff information was corrected using UNH/GRDC dataset [5].
- Population data was derived from the GRUMP project [6].
- The irrigated areas were derived from the 'Global Map of Irrigated Areas' dataset [7].



Results



Conclusions and Future Perspectives

- The potential impacts of reservoirs vary significantly across basins due to the uneven distribution of dams and reservoirs in the region.
- The region with the highest potential for hydrological impacts is the Rio Colorado basin in Argentina, where storage from reservoirs can be almost 3.5 times the region's mean annual runoff.
- The hydrological region with the highest ratio of water storage is "La Plata", accounting for approximately 35% of the continent's total water storage.
- In average, the dams in the continent can store 9,700 m³ of water per person.
- The effects of reservoir storage on the water availability of the continent's basins will be the focus of the research group's future investigation.

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