



ICG2022-289, updated on 08 Jun 2023

<https://doi.org/10.5194/icg2022-289>

10th International Conference on Geomorphology

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Landscape and rice culture of the São Gonçalo Channel Plain (Rio Grande do Sul - Brazil)

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The coastal region of the state of Rio Grande do Sul is markedly delineated by lake and lagoon landscapes resulting from the regression and transgression movements of the South Atlantic Ocean, which occurred during the Pleistocene and Holocene. This process resulted in the Patos Lagoon and Mirim Lagoon, connected by the São Gonçalo Channel, whose flow directly interferes with their dynamics, especially in Mirim Lagoon. This channel presents flow reversion in the function of the relative levels of these water bodies, whose main mouth is located in an estuarine environment. During the summer, when the Mirim Lagoon is deficient and its water level is low, the São Gonçalo Channel transports brackish waters from the Patos Lagoon. These waters penetrate further or further into the Mirim Lagoon, according to the hydrological conditions, making it more brackish. Although the flow is predominantly in the Mirim-Patos direction (about 80%) in dry periods, it can be inverted, which allows saline water to enter the channel and the Mirim Lagoon itself. The construction of a lock dam has generated changes both in this dynamic and São Gonçalo Channel landscape. The construction was done to avoid saltwater intrusion from the Patos Lagoon into the Mirim Lagoon so that the water resources upstream could be used for irrigation of rice production, benefiting large and medium landowners who practice this activity in the region. From 1977, the year the dam started operating, there was an expansion of large-scale irrigated rice farming on the Channel's plain, advancing to its margin, even though it is a Permanent Protection Area. The supervised classification of Landsat images from 1973, before the dam, 1993, and 2018, after the dam, shows the expansion of rice farming, mainly in the municipality of Capão do Leão (RS/Brazil), northwest of the channel. The São Gonçalo Channel plain also encompasses the municipalities of Pelotas, Rio Grande, and Arroio Grande, all with a significant increase in the area devoted to rice farming. In 1994, the area harvested for rice more than doubled (84,400 hectares) compared to 1974 (34,970 hectares). The impacts of the implementation of the dam are in appearance and also in essence since together with the rice crops there are landscape transformations, among which are those that refer to the dynamics of the river channel on the São Gonçalo Channel plain.