USING ECOLOGICAL RESTORATION OF RIPARIAN FORESTS, DEGRADED FOREST FRAGMENTS AND ECONOMICALLY EXPLOITED NATURAL FORESTS TO SCIENTIFICALLY TEST THE PREMISES OF THE NEW BRAZILIAN FOREST CODE, BASED ON THE ECOLOGY OF REFERENCE ECOSYSTEMS

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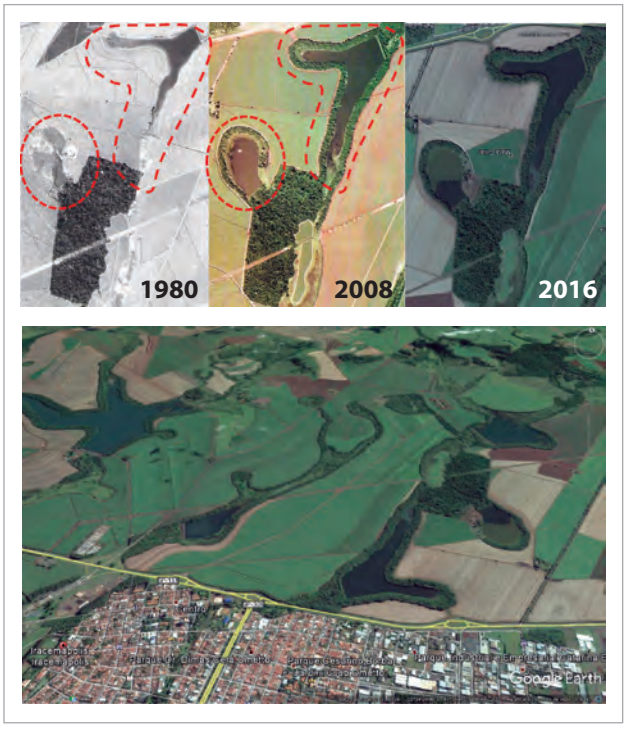

Figure 1. 2016 – Iracemápolis, SP: Forest restoration seen in the Regional context, including a water supply dam.

Ecological restoration has been considered one of the main strategies for combining biodiversity conservation and ecosystem services with agricultural production in Brazil. However, there are still many bottlenecks to be overcome. This research project is designed to investigate the challenges to restore forests in disturbed landscapes. The objectives are to test management practices on forest fragments in order to enhance their role in biodiversity conservation and to provide forest products and ecosystem services; to test methods for restoring riparian forests, aiming to meet the current demand for scientific support related to the recent changes in the Brazilian Forest Code; to test methods for restoring the Legal Reserve allied with the production of native timber and non-timber forest products; to conduct long-term monitoring of the vegetation in permanent plots deployed in reference ecosystems to different threatened biomes: the Atlantic Forest, the Cerrado and the Amazon, in order to understand forest dynamics and support restoration initiatives; and to test methods for evaluating and monitoring natural and restored areas to define efficient indicators of ecological sustainability and economic viability in order to produce consistent protocols. Altogether, our results may provide scientific support for economically viable tropical forest restoration initiatives. Furthermore, we expect to influence new and current public policies related to this issue.

SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

We achieved important scientific advances related to the structure and diversity of forest fragments in agricultural landscapes and also to case-by-case management needs. We found that frequent disturbances and area history can lead fragments to have a different vegetation, which can result in higher levels of community divergence in forests and landscapes. As a result of the differentiation, secondary forests can reach a high level of beta diversity. Local management actions were implemented to enrich forests with threatened species, and landscape management actions were implemented in order to understand how forest cover, proximity to other fragments, size and shape can be related to the floristic data. Among the enrichment methods tested, seedling plantation resulted in higher survival rates compared to direct seeding. Through this type of approach, we aim to enhance the role of fragments in conserving regional flora diversity and in creating more diverse habitats for local fauna. Studies on forest structure, ecological processes and soil attributes in restored riparian forests in agricultural matrix are in progress. Restored riparian forests are growing well, except for some areas that had to be replanted due to a severe drought. Several forest inventories evaluated stem and wood quality, measured eco-physiological traits, assessed natural regeneration, harvested Eucalyptus and calculated economic returns. Now, the restoration areas move into the next stage, after the first rotation of Eucalyptus. We are testing these different methods to combine nature conservation and forest restoration with the production of native timber and non-timber products. Sampling is in progress in the Atlantic Forest, Cerrado and Amazonian domains using permanent plots in continuous and fragmented areas. Partial results suggest that adaptive management efforts are needed to assist long-term biodiversity persistence in highly fragmented agricultural landscapes. Frequent fires were the main factor affecting negatively biodiversity and our results also support the importance of soil gradient for maintaining species composition. Restoration monitoring covered several different ecological aspects, including fauna and vegetation structure and diversity and how they are connected; landscape analysis, as well as changes in soil and water during secondary succession. We collaborate with the "Pact for the Restoration of the Atlantic Forest" and our results have contributed to the design of an online system for monitoring. We generated practical knowledge on how young restoration forests are structured, which can already be applied on the ground. Restored forests play an important role together with forest remnants for nature conservation, even increasing biodiversity at the landscape level.

MAIN PUBLICATIONS

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