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“Resilience of agricultural systems against crises”

## The Contribution of Innovative Agricultural Systems to Sustainable Water Reservoir Use in NE-Brazil

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### Abstract

The construction of the Itaparica dam and reservoir induced changes concerning the agricultural production systems in the micro-region Itaparica, Sao Francisco river basin. Traditional systems – mainly a combination of dryland farming in the river flood plains and livestock farming in the adjacent dryer areas – were replaced by irrigation agriculture. Even though wide areas with irrigation infrastructure were established the sandy soils of many areas are not suitable for irrigation farming. Lack of adequate arable land causes a shortage of income opportunities for local farmers.

Thus large share of many household incomes is derived by compensatory payments from the dam operator. Persistent problems are inappropriate farming practices in irrigation, inaccurate use of agrochemicals and overstocking of livestock. As a consequence soil salinization, overgrazing, erosion, and contamination and eutrophication of the reservoir increase and threaten local peoples' livelihoods.

The joint research project INNOVATE aims at innovative coupling nutrient cycles to counteract erosion, soil degradation, and emission of greenhouse gases. The agriculture-related sub-projects “Terrestrial Production” and “Economy” will do research with the implementation of a sustainable and productive agriculture with closed nutrient cycles. This can contribute to reduce the above mentioned negative impacts, ensure food supply, and additionally provide an important income source for the local population. Biochar, lake sediments, and manure combined with micro-catchments and multipurpose leguminous perennial food crops and feeds, shall improve soil quality and water storage capacity. The combination of local and fast-growing trees to the crop areas meets the needs for firewood and forage for the dry season and reduces the pressure on natural vegetation, conserving its biodiversity. The results will be assimilated in a model system quantifying soil organic matter dynamics. Economic analyses on farm level monitor the profitability of these systems and facilitate recommendations for extension service and policy makers to sustainably establish them.

Field trials for soil amendment and micro-catchment will be installed on dryer areas next to the main irrigation areas, while surveys and measurements on livestock systems and socio-economic data will be assessed on farm level by structured questionnaires, participatory methods, and structured observations and measurements.

**Keywords:** Agriculture, micro-catchment, soil-amendment, reservoir