

Water quality dynamics with irrigation development in Walawe catchment, Sri Lanka

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Agriculture is one of the main economic activities and is always on the increase due to the increasing population. To meet the demand, countries have to expand the agricultural land area. Implementation of the large-scale irrigation systems is a part of this process. One of the significant adverse impacts of large-scale irrigation systems is the destruction of biodiversity.

Udawalawe Left Bank Extension Area (ULBEA) (15,000 ha), in which the research project 'Expansion without Extinction' is carried out consisted ancient small tank cascade irrigation system. The area was covered with dry zone scrub forest. As an integral part of this project several water quality parameters of the selected tanks ULBEA have been monitored since 2001 and this includes pre and post rehabilitation water quality data in the tanks. The objective of this is to compare those water quality parameters six months before and after the rehabilitation of three tanks, Wedi wewa, Andiyangama wewa and Andara wewa.

Wedi wewa has been affected mostly by the rehabilitation and Andiyangama was not affected significantly (ANOVA). Average pH reduction from 8.34 to 7.65 in Wedi wewa is significant ($p=0.026$). Electric conductivity has been almost doubled in Andiyangama (from 282.4 to 423.17 $\mu\text{S}/\text{cm}$) due to the run off from the land around which was being cleared for new settlements and agriculture. This was expected to become low once the area is stabilized. The reduction of the Dissolved Oxygen (DO) is significant in Wedi wewa (from 6.57 ± 1.21 to 4.41 ± 0.91 mg/l) and shows the lowest average value after the rehabilitation process. Secchi depth which indicates the water clarity is also low in Wedi wewa where it has been significantly increased in Andara wewa. Low water clarity, and DO in Wedi wewa may have a negative impact on aquatic biodiversity in the tank. Most of the nutrient levels in Wedi wewa have been elevated after the rehabilitation though they are reduced in the other tanks. Around the Andiyangama and Andara tanks the agriculture in newly cleared land was not yet started in the time period covered by the report. But in the same period both agriculture and livestock farming had been started and intensified. The capacities and the depths of the Andiyangama and Andara tanks are higher than Wedi wewa. This also contributes to the lower amounts of nutrients in those two tanks. However, still the water in these tanks is suitable for agricultural purposes when considering the evaluated parameters. Once the agriculture is fully started an elevation of the N and P based nutrient content in the tanks could be anticipated.