

Application of eDNA for aquatic biomonitoring at the Kariba Dam Rehabilitation Project (KDRP) – Case Study

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ABSTRACT: Environmental DNA (eDNA) refers to DNA deposited in the environment via excretion, skin shedding, mucous secretions and saliva among other means. eDNA thus can be collected in environmental samples such as water and sediment and used to identify the organisms that it originated from. eDNA in water is broken down by environmental processes over a period of days to weeks. It can travel some distance from the point at which it was released from the organism, particularly in running water. eDNA approach gives better results in species detection than traditional methods. The technique's high sensitivity applies especially when a species occurs at a low density.

Zambezi River Authority's Kariba Dam Rehabilitation Project (KDRP) took 10 samples from the lake reservoir (upstream) and downstream of the project works and have them analysed for eDNA. The results demonstrated results that could not be established by the traditional aquatic biomonitoring methods preceding the eDNA approach and present a well-established and reliable baseline and database of mammals, fish and vertebrates. The steps taken to extract, amplify, sequence, and analyse the eDNA ensured validity with the assistance of an internationally accredited and suitable laboratory.

Various taxa were detected and average taxon richness established along with most abundant sequences on the hierarchy of orders, families and genera. Commercial DNA extraction kits with a protocol modified to increase DNA yields were used to extract DNA from respective filters and DNA was purified to remove PCR inhibitors using a commercial purification kit. The DNA yields were as expected. All PCRs were performed in the presence of a negative control sample and a 100% success on PCR reactions was recorded.