

Assessing Biological responses and causes of multiple stressors on the river Nile, Egypt

Alaa G. M. Osman

This is the projects that I would like to share it with the Germans for getting funds to implement it.

Like other bio-monitoring studies, this project is planned and implemented to address the relation of biological responses to possibly influential environmental parameters and to determine causal relationships between exposure and effects. However, the experimental design of the this project is rather unique in that, it comprised (1) a comparatively long duration (three-five years), (2) the step-by-step scaled approach from the laboratory to field condition, as well as (3) the simultaneous application of Multi-Biomarker approach. Most of the previous bio-monitoring studies were focused primarily on biochemical biomarkers, whereas the current project also included a series of cellular, individual and population-level indicators (Multi-Biomarker approach) in two fish species along the whole course of the river Nile. The selected multi-Biomarker approach of this project provides basic information about the usefulness of biomarkers for a retrospective risk assessment. The overall goal of this proposal is to assess the effects of multiple stressors on the river Nile systems and identify the possible causes of these effects on fishes using multi-biomarker approach. Understanding causal relationships and the mechanistic processes linking environmental stressors and effects on fishes is important in the effective management and restoration of freshwater ecosystem. In addition, this project will focus on the question of whether biomarkers are useful tools in the field for the establishment of cause-effect relationships.

Main objectives of this study

The main objectives of the current project consists of four integrated components which are related and are sequentially dependent on each other: (1) characterization of the river Nile which includes; measuring contaminant levels in the sediment, water, and fish, determining if the selected fishes are impaired or damaged, and assessing the basic status of the food supply and habitat associated with the selected fish, (2) evaluation of the effects of the detected multiple stressors on the river Nile system, (3) identifying the possible causes of these effects on freshwater fishes using multiple lines of evidence (Multi-biomarker approach), and (4) understanding causal relationships and the mechanistic processes linking environmental stressors and effects on fish.

The performances of such long duration project needs a big fund and will equipped laboratories especially for the very sensitive molecular biology and gene expressions tests. Such requirements are not available for in Egypt. So I am planning to make the sampling and the first analysis steps only in Egypt and continue with the rest of analysis and experiments in Germany.