

# Variables Determining the Response of Invertebrate Species to Toxicants

## A Case Study on the River Meuse

### ACADEMISCH PROEFSCHRIFT

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# Chapter I

## GENERAL INTRODUCTION

A **century ago** the large **rivers** in Europe were **still** characterized by a high faunal biodiversity. Especially benthic communities were **rich** in invertebrate species, but nowadays **many** populations have **virtually** collapsed in several **rivers**. Concomitantly, few ubiquitous species are blooming. Also the fish fauna has **much** declined, notably the migratory species have been eradicated in **many** river systems. Today, ecological recovery and rehabilitation of aquatic ecosystems have become major objectives of **many** governments. For some **rivers**, like the Rhine, international rehabilitation programmes have been established which **aimed** at restoring water quality so that formerly existing species **may** return, safeguarding river water as a source of drinking water, and reducing pollution of the river sediment (IKSR, 1987). Although a few typical riverine **insects** returned to the Rhine recovery proceeds slowly, while in other **rivers**, where no **such** rehabilitation schemes are in operation, recovery has not even **commenced**.

In order to restore the original biodiversity of disturbed **rivers** it is essential to know how species can **benefit** from improving environmental conditions and which environmental requirements are to be fulfilled. However, **decisions** on measures are hampered by a **lack** of knowledge on the autecology and the sensitivity to toxicants of **many** aquatic macrofauna species. This information is crucial, because most large **rivers** harbour habitats that are modified in **many** respects and at the **same** time **many** different water quality parameters indicate deteriorated conditions for aquatic life.

The **lack** of information on the specific requirements of macrofauna species to **many** environmental factors hampers the interpretation of data on the distribution of aquatic invertebrates severely. This scientific problem confronts also the water management with a dilemma: is there perspective for massive nature development programmes recreating **interconnected** habitats or is water quality to be further improved by reducing the **input** of toxicants and nutrients? Van Urk et al. (1993) observed that a decrease in concentrations of insecticides in the River Rhine coincided with the reappearance of the caddisfly *Hydropsyche contubernalis*, whereas Neumann (1990) suggested that the recolonization of this species was due to increasing oxygen **levels**. This example clearly demonstrates that