Introduction

For sustainable development, the challenge for the Mekong countries is how to develop and improve economic conditions while maintaining the biodiversity and ecological health of the river. Assessing and monitoring surface water quality are essential activities that will help to prevent increasing water pollution and to protect aquatic life and human health. Bioassessment provides one the best tools for monitoring and assessing the ecological health of rivers, and benthic macroinvertebrates are the group of organisms used most frequently to measure pollution in running water (Hellawell, 1986; Abel, 1966; Metcafe, 1989; Rosenberg & Resh, 1993 and references therein). The term benthic macroinvertebrates refers organisms that inhabit the bottom substrates of any freshwater habitat for at least part of their life cycle. Macroinvertebrates have a body length of more than 0.5 mm, and will be retained by a net with a 200 μm mesh. The advantages of benthic macroinvertebrates were summarised in Rosenberg & Resh (1993). First, they have high diversity, high abundance and wide distribution; so they can be affected by environmental disturbance in different types of aquatic systems. Second, they are diverse in form and have a wide range of sensitivity to many kinds of anthropogenic changes and stresses. Third, their sedentary nature and long life facilitates both analysis of spatial and temporal changes caused by environmental perturbations in aquatic systems and bioaccumulation studies. In this regards, benthic macroinvertebrates provide a means for continuous monitoring, because they respond to both short- and long-term changes to the water they inhabit. Their size is big enough to be observed by the naked eye or with the aid of a hand lens. In addition, sampling techniques and methods of data analysis are well established and their taxonomy is well defined (Humphrey & Dastine, 1994).

Reliable biomonitoring demands accurate and consistent identification of invertebrates to a taxonomic level that is practical, particularly in the field. The keys in this study were constructed to aid the identification of benthic macroinvertebrates of the Mekong River and its tributaries in the four MRC member countries (Cambodia, Lao PDR, Thailand, and Viet Nam). Zooplankton or microscopic forms are not considered. These keys were devised by consulting all available keys to North American, British and Asian invertebrate faunas. In addition, the many publications on genera and species that comprise the biota of the region (such as crabs, shrimps, aquatic insects and molluscs) provided essential supplementary information.

Chapter 1 of this book, contains a key of benthic macroinvertebrates to the higher taxonomic levels of phylum, class, and order. The subsequent chapters provide information on the general structure and function of each phylum, followed by a key to family, genus or species level. In the case of the phylum Mollusca, gastropods (snails) are separated from pelecypods (bivalves). Likewise, arthropods are so diverse that the crustaceans and aquatic and semiaquatic insects were separated and given their own chapters. These are then followed by keys to order, family, genus or species level. Illustrations of important morphologic characters are provided to help aid identification. Most figures were illustrated from archived

specimens at Khon Kaen University, or from loaned specimens. Any unavailable specimens or characteristics were redrawn from available publications.

For most of the benthic macroinvertebrates groups, the keys stop at family level. However, keys to generic or specific level are given for some groups, such as freshwater crabs and shrimps, and some insect orders (Ephemeroptera, Plecoptera, Hemiptera, and some families of Trichoptera and Diptera).

An index is included for locating taxa in the text and keys and for those taxa that are illustrated. A glossary is provided to help explain some of the terminology used in the keys.