1. Physiological studies are an important tool to detect and understand early biotic responses to acidification effects in aquatic ecosystems. The knowledge on sublethal or subdeleterious physiological responses is in particular needed to predict in how far acid input has to be lowered to prevent or to overcome ecosystem damage.

2. The ionic regulation in aquatic organisms seems to be one of the most sensitive physiological mechanisms. It is generally accepted that Ca (e.g. via water hardness) plays a crucial role interfering with the ion regulation of organisms during acid and Al stress. But there is still a need for research on other possibly sensitive mechanisms, such as respiration, endocrinology and reproduction, as well as behaviour. Comparative approaches are recommended in this respect for the assessment of the physiological mechanisms responsible for tolerance and sensitivity. Chronic exposure to artificial acidification may sensitize organisms to more severe stresses, which is important for the analysis and interpretation of episodic acidity events.

3. There is a critical need for better understanding of the aluminium dynamics in natural ecosystems and of the role of Al speciation for its toxicity, especially on the interference with organic substances, such as humic and fulvic acids. Moreover, the study of the mobilisation of Al in organisms and of the complexation of Al at the water-animal interface (mucus) must supplement data on its toxicity.

4. More ecophysiological research on aquatic plants, such as macrophytes, mosses, algae as well as on bacteria, in acidified waters is needed.

5. It is necessary to utilize experimental conditions which are representative of ecologically relevant conditions and to undertake in parallel experiments in the laboratory and in the field.

6. A community and ecosystem approach is strongly recommended. The biotic responses of one species to acid and Al stress may have substantial influence on the whole community, e.g. via the food chain. Long-term physiological and ecological studies are therefore needed, based on a multidisciplinary approach between analytical chemists, physiologists and ecologists.