Animals as indicators of alterations of the environment – a survey

Abstract. Microorganisms, lower and higher plants, and animals (as single individuals, populations or as more or less complex communities) may in manifold ways, serve as indicators of natural and/or anthropogenic alterations of the environment, next to tests of most important physical and chemical factors of air, water and soil. Due to their far-reaching relationships animals are more depending than autotrophic plants on the conditions of habitat, including food and other living compounds of ecosystems. Therefore they are also responding to influences which cause alterations on other organisms. – Further, animals are generally very mobile; metazoans possess sense organs and nervous systems and all of them display behaviour. By this, they register not only alterations of air, water, soil, and food, but also of optic, acoustic, olfactoric, and – partly – of electromagnetic patterns of stimulations of their surroundings. They respond to manipulations of the structure and function of landscape, on the decrease of their living space, on noise molestations etc. For animals with special demands on space and structure of their habitat changes of vital conditions will cause a decrease of fertility and/or an increase of emigration, and result in both, a decline of population density, and after all a decline of species numbers. – Substantial pollutions, caused not only by industry and traffic, but also by agriculture and forestry, e.g. by excessive use of fertilizers or lime-depositing, and pesticides, will have the same effect. Toxic substances are often accumulated within food chains. This causes grave damages of health and even death, particularly in vertebrates. – Thus animals will respond to a lot of influences and alterations esp. made by mankind. This is of fundamental interest. However for indication of a single stress factor less specialized responses are of rather considerable disadvantage. Investigations in full details are necessary in order to reach certain conclusions. In a rising manner this has already been done with marine, fresh-water and terrestrial animal species of various systematic and trophic groups.

In a short survey the suitability of bioindication by animals is represented. Thereby it was differentiated at first between sensitive (or reactive) and accumulative bioindicators and secondly between aquatic and terrestrial species (or communities) or rather between indicators of toxic elements and dangerous organic substances.

Keywords: bioindication by animals; accumulative and sensitive indicators; marine, fresh-water and terrestrial species and/or communities.