It has been widely reported that heavy metal contamination in water is a very common fact in these days due to ongoing higher levels of industrialization and urbanization and these pollutants can modify the allozyme/isozyme and RAPD profiles of the aquatic organisms. Here it was undertaken to measure genetic polymorphism at the protein and DNA level of an aquatic animal, the fish *Labeo bata*, which constitute an important group of fishes with intense potential for commercial aquaculture for the edible fishes and an aquatic plant, *Lemna minor*, which is a well known important model system for its high adaptability against different environmental stresses. To know the level of heavy metal pollution in aquatic environment, random collection of water samples from the waterbodies of the different parts, surrounding the Kolkata metropolis was done firstly. After that the collected water samples were subjected to determine the concentrations of the six heavy metals viz. Cadmium, Chromium, Copper, Iron, Lead and Zinc by atomic absorption spectrophotometry (AAS). After getting the results of AAS three particular sites were selected viz. Naihati (site 1), Bypass (site 2) and Khardah (site 3) as the work areas and three particular heavy metals viz. Cadmium, Copper and Zinc were considered for consecutive experiments on the mentioned model systems. Within these three sites ‘site 1’ was the minimally exposed area to the metal pollutants and ‘site 2’ and ‘site 3’ were highly polluted areas due to heavy vehicular traffic, tannery, paper mills, anthropogenic garbage etc. From these three sites the model organisms were collected and the AAS was done on liver and kidney tissues of the fish and leaf tissue of the duckweed to know the level of accumulation of the three heavy metals in the bodies of the inhabitants. To explore the effects of heavy metals either singly or in combination at the molecular level the non-denaturing polyacrylamide gel electrophoresis for the isozymic studies using the protein samples extracted from liver, kidney and leaf tissues of the model organisms and RAPD-PCR of the genomic DNA isolated from the same models followed by agarose gel electrophoresis were performed and the polymorphisms at the molecular level (Protein and DNA) were characterized. These studies have shown that exposure to heavy metals can select or counter select for particular alleles present in a particular locus. On the basis of the results of RAPD polymorphism two UPGMA dendrograms were constructed for two particular model organisms through which the proper level of adaptive divergence in the same species of three different populations in response to heavy metal stress was informed.