Macroalgae as Biomonitor of Heavy Metal Availability in Coastal Lagoons from the Subtropical Pacific of Mexico

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Despite the fact that a relatively rich algal flora exists along the broad range of coastal environments in Mexico (Abbott and Hollenberg, 1976; Servere-Zaragoza et al., 1993), their viability as biomonitor of trace metals has not been studied. Macroalgae have been known to concentrate heavy metals to levels several times those found in the surrounding waters. This is due to their accumulation of metals by active and passive processes responding essentially to metals present in solution (Bryan, 1969; Seeliger and Edwards, 1977; Leal et al., 1997).

Spatial or temporal trends in contamination provided by data on metal levels in macroalgae may not correspond to those found in other biomonitor species such as mollusks and barnacles. Consequently, a biomonitoring program of metal contamination is more complete when barnacles and bivalve results are considered together with macroalgae data. A project was initiated to establish levels of trace metals, pesticides and petroleum hydrocarbons in a range of marine organisms from the subtropical Pacific coast of Mexico. Attention was given to bivalves, barnacles and macroalgae, which are known to be among the most effective and widely used biomonitor of pollution (Rainbow and Phillips, 1993). In a previous work (Pérez-Osuna et al., 1999) regional variations of heavy metal concentrations in tissues of barnacles from the subtropical Pacific coast of Mexico were determined and reported. This work reports on concentrations only of trace metals in the macroalgae and is the first study of its kind to be conducted in the area.

MATERIALS AND METHODS

The study area includes twelve locations (Table 1). With the exception of Puerto Vallarta and Mónaco Beach the rest are classified (Larkford, 1977) as coastal lagoons. These ecosystems constitute important fishery areas and play key roles as nursery grounds for commercially relevant species of shrimp and fish. In Table 1 is shown a summary of the main activities developed in each location and the associated drainage basin.

After 0.5-1.0 kg of fresh algae were handpicked from the intertidal regions of the twelve different locations along the Pacific subtropical coast of Mexico (Table 1) in April 1996. Samples were stored in polyethylene bags and kept at 4°C during transport. In the laboratory, any epiphytes, sediments and adhering animals were removed with seawater for each collection site. The samples were then dried for 7...