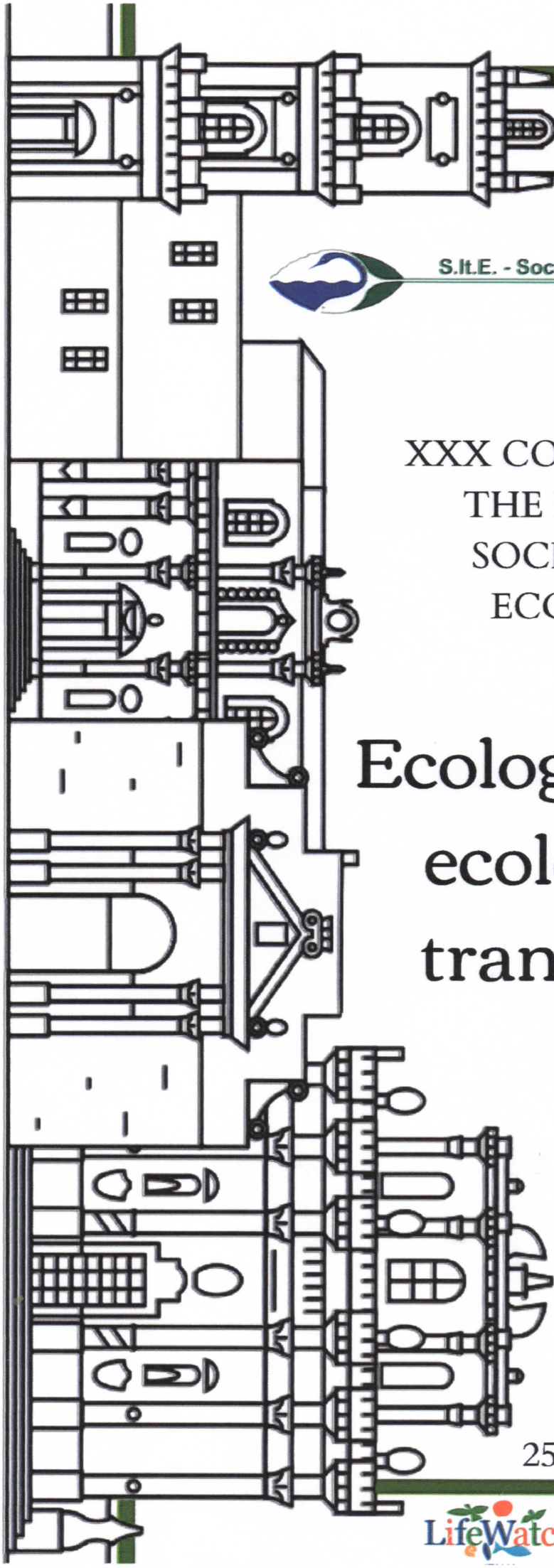

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Use of lichens to evaluate the impact of post- earthquake reconstruction activities on air quality: a case study from the city of L'Aquila (P)

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Lichens are a symbiotic association of fungi and algae that are a widely used as bioindicators of air quality because of their ability to absorb chemical pollutants into their thallus. As few lichen species can tolerate high levels of pollution, the absence or presence of certain species in a given area can be related to its air quality. In this study, we used the Lichen Biodiversity Index (LBI), an index based on the diversity of lichens living on trees, to assess the effects on air quality of the urban reconstruction activities occurring in the city of L'Aquila, ten years after the 2009 earthquake that largely destroyed the city center. Sampling was conducted in eight sites selected following an urbanization gradient, from the city center (where most of the area is still under reconstruction and closed to traffic) to suburban areas (where reconstruction is minimal). We tested if values of the LBI index varied with distance to the city center as a consequence of the presence of air pollutants produced by reconstruction works. We also used an Energy Dispersive X-ray Spectrometry (EDS) to detect the main pollutants accumulated in the sampled lichens. We found that the LBI increased from the city center towards suburban areas. The EDS analysis revealed a massive presence of pollutants related to demolition and reconstruction activities, such as aluminum and silicon (used in the manufacture of concrete), in the more central areas. These results suggest that LBI can be a useful tool to monitor air quality even on a small scale and in urban environments subject to building demolition and reconstruction, and that EDS could represent a good preliminary analysis to assess the level of air alteration caused by these activities.