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## POLLUTION AND PRESERVATION



James I. Drever

The topic of urban geochemistry brings up the whole issue of the livability of cities and in particular the adaptation of historic cities to modern ways of living. Old towns and cities present problems for modern lifestyles. In addition to the problems of pollution discussed in this issue,

there are fundamental questions concerning the adaptation of old cities to today's lifestyles—I'm thinking of motor vehicles as well as the basics of electricity and plumbing. What value do we place on the preservation of old buildings? This question has had different answers at different times. After the Second World War, urban planners in Britain saw the bomb damage as a glorious opportunity to sweep away the impractical old buildings and erect modern city centers of concrete and glass. In Germany, on the other hand, much more emphasis was given to preservation of what had survived and rebuilding of what had not. Attitudes today in most countries favor preservation, but ideas as to what is worth preserving differ widely.

Why do we want to preserve old buildings, and old cultural artifacts in general? Several reasons come to mind: there is the motive of attracting tourists and the money they bring, there is the intellectual motive—our need to understand all aspects of the way of life of our ancestors—and then there is an intuitive emotional feeling that history should somehow be preserved. Even though we agree on the general goal, conflicts can arise: what, for example, should we do with a ruined building or a shattered ceramic? Should we restore it to its original form, introducing new materials as necessary, or should we leave it as is? As scientists trying to unravel history, our instinct is leave artifacts as untouched as possible, with the thought that future scientists, using techniques that have yet to be discovered, will be able to extract information from the artifacts, information that may be erased by our restoration efforts. This brings up another conflict: the public, who ultimately pay the bills, want to see originals and not reproductions, and they want to see them in a comprehensible form—a restored ceramic is much more comprehensible than a pile of shards. Some approaches to preservation are widely accepted, such as removing original statues on churches from exposure to urban pollution, displaying them indoors, and placing replicas on the buildings; some approaches are perhaps more grudgingly accepted, such as the excellent reproductions of the cave paintings of Lascaux. Manuscripts and textiles are more problematic. People are not willing to accept replicas, and



Eze, iconic perched village in southern France

exposure to light and the uncontrolled environmental conditions that inevitably accompany public display are potentially harmful.

Mineralogists, geochemists, and petrologists can play an important role in the preservation of cultural artifacts. Statues can be moved indoors but buildings cannot, and building stones are discoloring and deteriorating under the urban atmosphere. Preservation and restoration strategies require an understanding of processes such as the cohesion between grains, the effects of cycles in environmental conditions, and the colonization by microbes. Techniques to clean and preserve building stones need to be based on a mechanistic understanding of processes at mineral surfaces: this is an area where we could be doing more.

Returning to the topic of old towns, I have always been impressed by the preservation of many hill towns in Italy and southern France. These towns (or at least many of them) have been maintained as sustainable economic communities and not just "theme parks" for tourists, although income from tourism and second homes are commonly essential for economic viability. Modern amenities such as electricity, water, and sewers have been introduced without too much disturbance of the character of the towns. Motor vehicles are more problematic. Our modern lifestyles generally require some use of the automobile. Excluding vehicles from town centers is fine for tourists but a potentially serious inconvenience for residents. Many towns have restricted vehicular access to residents only, which seems a reasonable compromise, as does charging vehicles for access to the central city. There is also a growing awareness, as exemplified by the articles in this issue, that cities based on transportation by personal cars may not be viable in the long term. We need to recognize the problems created by exhaust emissions and the vast areas paved over for roads and parking. Too many automobiles do not make for livable cities and also cause other problems for the planet.

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