

## ARTIFACTS AND FEATURES SITE FORMATION

This article is one of an occasional series discussing matters archaeological, especially with reference to the Maturango Museum. Today we will talk about a topic which greatly influences archaeological results, but is seldom discussed on its own: site formation. Site formation is the totality of processes which affect how a location where people once did something becomes an archaeological site. Since the processes occur after the location was used, they are also sometimes called “post-depositional” processes. These processes influence how the archaeologist interprets the data from a site.

Let’s conduct a thought experiment. Suppose some people live at a particular location for a while – a season, a few years, or several lifetimes. Eventually they leave, for one reason or another. What happens between the time they leave and the time an archaeologist arrives?

First, the site is exposed to geological and meteorological processes. Sand may blow over the site and bury it; alternatively, wind may scour away the surface layer, exposing deeper layers and causing artifacts from different layers to become mingled. Water may cut an arroyo through the site, or may deposit alluvium on top of it – Gatecliff Shelter in Nevada, excavated by D. H. Thomas in the 1970s, contained over 20 feet of alluvium, alternating with occupation layers! Hillsides may slide down and cover the site, such as the famous Ozette Site in on the Olympic Peninsula in Washington (although in that case the landslide occurred while the village was occupied). Sites in volcanic areas such as Coso can be buried by volcanic activity. This is known to have happened in the Flagstaff, Arizona, area about A.D. 1065, when the volcano now known as Sunset Crater erupted; few sites prior to this can be found today, because they are under a deep layer of volcanic cinders. Near the seashore, the sea level may rise or fall - it has risen about 150 meters since the Last Glacial Maximum - submerging any Paleoindian sites along the ancient shoreline.

Second, the site undergoes changes due to biological processes. In wetter areas tree roots will grow through a site, since trees love the decaying organic matter where humans have been. A bigger problem is burrowing critters, who can cause thorough mixing of artifacts between layers. Stratigraphic location of small artifacts is always problematic for this reason, although small animals are not likely to move large stones. The only area in California where burrowing animals is not a problem is the Channel Islands, since no burrowing animals live there (except the ones recently introduced). Mixing caused by animals or plants is called “bioturbation” and must be constantly taken into account in interpretation. For this reason, the sketches of archaeological excavations always show the location of any burrow holes made by animals..

Third, the site is affected by the set of physical and chemical changes we group under the heading of decomposition or deterioration. Rock walls fall down if not maintained. Perishable items decay, particularly in moist climates, which is why most archaeological specimens of food remains, cordage, basketry, wood, cloth, and leather were recovered from dry caves. Acid soils cause bones, including human bones, to decay relatively rapidly. This is why archaeological collections tend to contain a disproportionate number of stone and ceramic items – the perishable items decayed.

Fourth, sites may have been recycled, either in antiquity or more recently. In the Southwest, ancient people building a pueblo would scavenge shaped stone blocks from any nearby abandoned building; the heavy pine roof beams from kivas and surface rooms were likewise recycled. Why laboriously cut down a tree (with a stone axe) if there is a perfectly good one nearby? Implements of ground stone, such as manos and metates, were reused, as were flaked stone tools such as projectile points. Pottery was recycled as well: sherds were ground up to make temper for pottery manufacture, and sherds were also reused as tools such as scrapers or palates. In recent times, of course, sites have been subjected to pot-hunting, for private collections and for the antiquities market (and, yes, for early museum collections). Homolovi Ruins State Park near Winslow, Arizona, is an extensive late Puebloan site which shows vividly the effects of pot-hunting in the years before it became a state park.

This recycling of wood implies that one must be very careful about using dates derived by radiocarbon or dendrochronology (tree-ring dating). If the wood was recycled, the date could be hundreds of years older than the site itself. In the desert, where wood decays very slowly, a difference of 1,000 years has been confirmed on occasion. This is the "old wood" problem, and requires constant caution in evaluating dates. Similarly, a broken obsidian dart point may have been discarded and subsequently resharpened into an arrow point hundreds of years later; obsidian hydration dates on the base of the point and on the tip will give radically different dates.

The final category of effects is human damage, either accidental or deliberate. Agriculture causes inadvertent damage to the surface layer, while construction projects go deeper. The Dolores Archaeological Project, in the 1970s, was a large-scale salvage effort to collect data from sites which would be flooded by construction of a dam and reservoir. And, of course, vandalism can affect any site, as can be seen at many sites on public lands today.

In summary, an archaeological site is the end result of a long and complex set of processes, and one of the major challenges for the archaeologist is disentangling them. When we dig a site, how much of the lay-out was due to the original occupants, and how much to site formation processes? Major archaeological projects typically employ specialists to help answer this, such as geologists, hydrologists, and soil scientists. In addition, archaeologists are taught to be skeptical about what they uncover, and continually weigh the evidence - was this stratigraphy due to an ancient person or to a recent burrowing critter? Is the radiocarbon affected by the old wood problem? And so on. Fortunately, today site formation is a recognized aspect of archaeology, and journal articles and books are published on it, to exchange lessons learned and debate interpretations.