

# Appendix: Archaeobotanical and Palaeoenvironmental Observations

Janelle Stevenson and Peter Bellwood

Flotation was tried on several Batanes sites, but was rarely successful owing to a general lack of charcoal in the seasonally wet and dry soil conditions. For instance, it was carried out at Sunget and Mavuyok a Ahchip during the first season of fieldwork on Batan in 2002. Abundant charred plant material was recovered from the latter site, a protected cave with deposits of very recent date, but Sunget by comparison had only a small amount. Unfortunately, expertise to identify the recovered botanical samples was not available and this line of research eventually lapsed.

Sediments for phytolith analysis were also collected in 2002 from Sunget, Mavuyok a Ahchip and Dios Dipun, with excellent recovery from the last two caves. However, both assemblages were overwhelmed by non-diagnostic grass phytoliths. The Sunget phytolith samples came from the ancient subsoil, beneath the Iraya ash, which had lost its original topsoil layer at some point in the past. As a consequence, the sediments were phytolith poor.

## *Palaeoenvironmental investigations*

Depositional sites outside the archaeological context, such as natural lakes and swamps, can contain important information on how landscapes have changed over time as a result of climate change, large-scale natural events (e.g. volcanic eruptions) and human disturbance. These sites contain fossil pollen, spores and charcoal laid down stratigraphically over time. The pollen and spores are derived from plants in the surrounding landscape and are indicators of how the vegetation has changed. Charcoal tells us how important fire has been in shaping these past landscapes (Bennett and Willis 2001). However, coherent records from swamps and lakes can only be constructed if the sediments that have accumulated, sometimes over tens of thousands of years, remain largely undisturbed by human activities and other natural forces.

A programme of environmental research in the Batanes was planned in 2002 to investigate (1) how perturbations of climate during the last ten to twenty thousand years might have affected the environment of the islands; (2) how quickly and to what degree Neolithic people changed the Batanes environment; and (3) how the eruption of Mount Iraya at AD 500 affected the landscape, and the story of its subsequent recovery.

In 2002 we carried out reconnaissance for suitable sites in Batan, Sabtang and Ivuhos. It soon became apparent that the steep topography and the lack of any permanent, natural and undisturbed bodies of water in Batanes were going to present problems. We identified a natural body of water behind the coastal dunes near Savidug on Sabtang Island, but unfortunately this shallow sedimentary deposit had been disturbed recently by cattle and people. In 2007, it was completely dry and full of buffalo wallows.

As the lake sediments from Savidug proved to be unsuitable for analysis, the decision was made to investigate the potential of less traditional sites for palaeoenvironmental research. We therefore collected material using a simple soil auger from several valley fills on Batan Island, and from a low-lying point behind a sand dune in the north of Ivuhos Island. These sites were not considered ideal for fossil pollen analysis, as pollen is best preserved in either waterlogged sediments or

sediments that are permanently dry. Under conditions of repeated wetting and drying the pollen decomposes (Bennett and Willis 2001). On returning to Australia these samples for pollen analysis were processed, but, as suspected, pollen was not preserved.

Further attempts were made in 2004 (Itbayat) and 2007 (Sabtang) to locate suitable sites for palynological coring. However, in each case the 'potential' sites returned modern basal dates. The conclusion was drawn from this latter work that accelerated land clearance, dam construction and the introduction of water buffalo in recent times had led to increased sedimentation, rendering it extremely difficult to locate suitable research locations. Since 2007, the palaeoenvironmental research of Janelle Stevenson in the northern Philippines has shifted to northern Luzon and the Central Cordillera. The results of this have been and will continue to be published elsewhere (e.g. Stevenson et al. 2010).