Reconstructions of Quaternary river behaviour and landscape evolution are not solely of interest to the geomorphologist and the geologist because the alluvial sequences and landforms of many environments are also of considerable archaeological value (see Butzer 1982; Gladfelter 1985; Needham and Macklin 1992). Information on the nature of ancient river environments is of particular relevance to archaeology because alluvial settings were frequently the focus of major early human settlements and, in certain cases, such as the Nile, Tigris-Euphrates, and Indus, the effective management of floodplain resources on a large scale proved crucial to the rise of irrigation agriculture and urban civilization (see Renfrew and Bahn 1991). The archaeological significance of river environments derives partly from the fact that the water- and soil-based resources of alluvial floodplains are of central importance to many human societies (Gilbertson et al. 1992). This is of particular importance in the Mediterranean basin because parts of the region were host to some of the earliest known examples of floodwater farming (Evehari et al. 1982), direct river channel management and elementary flood control (Biswas 1970), and inter-basin water transfers (Vita-Finzi 1978). More generally, river behaviour is of direct relevance to much archaeological research because patterns of river erosion and sediment deposition may not only have influenced the ways in which the riverine environment and the surrounding area were used by prehistoric and more recent populations, but fluvial processes will often control the actual preservation and subsequent exposure of the archaeological record (cf. Waters 1988).

As many of the papers in this volume demonstrate, the river systems of the Mediterranean region have provided diverse and dynamic settings for both hunter-gatherer and sedentary peoples throughout the human occupation of the region. For much of the Palaeolithic, for example, the waxing and waning of Pleistocene climate forced repeated changes in catchment vegetation and river flood regimes offering a changing environment and resource base for hunter-gatherer communities. During the Holocene, particularly since the advent of Neolithic cultures and the spread of agricultural activities, basin-wide modifications to vegetation cover and catchment water balances have tended to increase runoff rates, soil erosion and suspended sediment yields – perhaps even rendering many of the Holocene river systems more susceptible to change during climatic perturbations such as the Little Ice Age. Recent research has suggested that the cultivation of catchment slopes was not always associated with accelerated soil loss because another important human modification of Mediterranean river basins – the introduction of terracing on slopes – served to check soil movement downslope to valley floors (see Butzer 1982; Pope and van Andel 1984). Stone-walled terraces have been a conspicuous feature of Mediterranean valley sides for many millennia and a number of studies have reported a close correspondence between the degree of maintenance of terrace structures and the rate of transfer of sediment from the slope to the channel system (e.g. Wise et al. 1982; van Andel et al. 1986).

It has often been stated that much of our knowledge of the history of human relationships with the environment has resulted from close, long-standing links between the disciplines of archaeology and geography (cf. Renfrew 1983; Goudie 1989). Much of this joint research activity has taken place outside of the Mediterranean region in both the Old and New Worlds, but it is true that some of the earliest and best known examples of archaeological research in alluvial settings come from the Mediterranean basin (cf. Vita-Finzi 1969; 1978). The continuation of this close relationship in the context of alluvial settings is evident in all six of the papers in this part of the volume and such collaboration may come about in several ways. In the following sample of papers some of the studies of alluvial history were commissioned by archaeologists seeking information on the history of a nearby stream which seemed to be important for site or survey interpretation. Often approaches are made in the other direction, with geomorphologists – in search of both dating control and evidence for episodes of landscape stability – seeking guidance on the age of artefacts such as flints, potsherds or building structures which may be buried within or scattered upon alluvial materials.

It has been estimated that approximately one third of the world’s population presently live within floodplain environments. It is therefore of great importance that both contemporary floodplain processes and the history of human settlement and use of river depositional environments are fully researched and understood. The advantages of riverine settings for human occupation are numerous and include such basic requirements as access to water and food resources as well as the opportunities
presented by fording points, level ground and the presence of fertile alluvial soils. River valleys also provide natural routeways through the steepland terrain of the Mediterranean region and the navigable middle and lower reaches of many rivers offered attractive possibilities for contact and trade with the coastal zone and beyond. Conversely, it is also important to appreciate the potential hazards of such locations including, for example, high magnitude floods and the dangers of salinization and overdependence on seasonal irrigation waters in semi-arid environments. Buzer (1982) outlines the factors behind the formation of the malarial coastal lowlands of the Mediterranean region which began to form around 2000 years ago. Increases in the frequency of overbank flows following anthropogenic catchment disturbance created extensive tracts of less productive, waterlogged land in areas of formerly high agricultural productivity. It has been suggested that this deterioration of lowland alluvial terrain and the coeval increase in epidemic disease contributed to the decline of the great classical civilizations.

From the examples discussed above and in the papers that follow, it is clear that the nature of the river environment - including both water quality and as quantity factors and their variation over time is of fundamental importance to the well-being of many economies. Indeed, the realisation of the potential of Mediterranean floodplains can justifiably be regarded as a major achievement of past and present communities. The relationship between past river behaviour and the archaeological record of human activity may be observed across a range of spatial and temporal scales - the following papers explore parts of the archaeological timescale from Middle Palaeolithic to Medieval times and, depending on the objectives of the particular research, the spatial dimension varies from the catchment or river basin scale down to the reach scale.

In the next chapter Macklin and Passmore describe the alluvial sedimentary sequence in the Guadalope River basin of northern Spain where they have identified eleven alluvial units and river terraces which represent a complex sequence of cut and fill events during the middle and late Quaternary. The Guadalope is a major tributary of the Ebro (the largest river in Spain to flow into the Mediterranean Sea) and the alluvial sequence relates to changes in climate (mainly precipitation regime) and progressive Pleistocene incision forced by long-term regional tectonic uplift. The authors also discuss some of the wider problems involved in achieving age control for alluvial sequences and argue that direct sediment-based dating techniques such as luminescence offer many advantages over methods such as radiocarbon which have been used to age 'bracket' episodes of alluviation. Provisional dating of a major aggradational episode to a cold but wet phase of the last interglacial complex points to the importance of changes in the annual total and seasonality of precipitation as the major control on basin sediment and water yields.

Middle and Upper Palaeolithic artefacts have been recovered from two of the alluvial units (T7 and T9) in the Guadalope sequence and lithic materials (mainly flint and chert) are also present on the surface of some of the river terraces demonstrating human presence in the valley during various stages of the Palaeolithic. Two sites are described where lithic artefacts have been found stratified within alluvial materials. A Levavalois core within the T7 alluvial unit indicates a last interglacial age for this alluviation and this find is in good agreement with the IRSL date of 115,000 (± 17,000) years BP obtained on fine sediments from the morphologically older T6 unit. A much larger assemblage of lithic fragments (debitage debris) stratified within the younger T9 alluvial unit provides little chronological control (as these artefacts alone are not diagnostic of a particular industry or tool technology) and age control for this phase of alluviation is provided by a date of 28,000 (± 4000) years BP indicating an Upper Palaeolithic age for the human activity which produced the worked flint flakes. Whilst all occurrences of worked flint and other artefacts discarded upon alluvial surfaces (which may be buried by later alluvial materials) provide evidence of human presence, not all of these are useful for dating purposes.

The impact of glacial activity on Quaternary river environments in the Mediterranean has not received a great deal of attention. However, in the Voidsomaris River basin of northwestern Greece the ice age legacy is particularly prominent. An extensive area of glaciated terrain is present in the catchment headwaters and terraced glacioluvial sediments form an important Upper Palaeolithic landscape. Woodward, Lewin and Macklin (Chapter 11) argue that glacial activity was an important process in landscape modification in parts of the Mediterranean region. This glacial influence extended well beyond ice margins by effecting major changes in river discharge regimes and fluvial depositional environments. Moreover, from an archaeological viewpoint, there is also a growing body of evidence to suggest that, in marginal upland (Alpine Mediterranean) environments, such as the Lower Vikos Gorge of the Voidsomaris River basin, glacial activity may also have influenced the timing of Palaeolithic settlement. Evidence for Palaeolithic settlement before c. 20,000 BP is widespread in Epirus and is also present in the lower reaches of the Voidsomaris River on the Konitsa Plain. However, the rockshelters of the Lower Vikos Gorge show evidence of occupation only after the Last Glacial Maximum even though the rockshelters were present and available for use (cf. Bailey 1992). The oldest radiocarbon dates from the Kithi rockshelter suggest that the earliest occupation began around 16,000 years BP. It seems clear that, within the gorge (upstream of the Konitsa Plain), the cold stage braided river environment did not present a favourable habitation area until after the beginning of incision following the Last Glacial Maximum. The authors suggest that, as far as the archaeological record of the close of the last cold stage is concerned, more information is needed from sites at intermediate altitude in the upland interior of the Mediterranean zone.

Remaining in continental Greece, this time to the east of the Pindus Mountains, the chapter by van Andel, Gallis
and Toufexis (Chapter 12) describes the results of recent research into the alluvial palaeoenvironments associated with Neolithic settlement on the plain of Thessaly. This work has focused on the Neolithic mounds and associated Holocene river deposits and soils of the Peneios River floodplain in the northeast Trikala basin and, largely on the basis of stratigraphic observations from a detailed programme of sediment coring, they conclude that floodplain (rather than dryland) farming was the norm in this region in early Neolithic times. It seems likely that particular floodplain sites were selected and farmed as they allowed post-flood cultivation of recently deposited fine-grained alluvium. Van Andel and his co-workers make use of evidence from floodplain soils and are able to demonstrate a close relationship between sediment-charged flood events and riparian farming activities during the Neolithic. The collective reliance of such settlements upon the annual flood regime of the Peneios River provides a good example of the typically close relationship between human well-being and river behaviour.

Chapter 13 by Barker and Hunt outlines some of the results from one of the largest archaeological surveys yet conducted in the Mediterranean basin which was linked to an investigation of the Holocene alluvial record in the Biferno Valley in eastern Italy. Attention is focused on Neolithic to Roman times and the Holocene alluvial sequence embraces at least seven sedimentary units which range in age from Neolithic/Brone Age to after the middle of the 20th century. Dating control is largely based on the archaeological evidence (mostly pottery found within the alluvial units) supplemented by pollen and plant macrofossil data. Much of the palaeoenvironmental evidence points to phases of woodland clearance and more intensive cultivation as the mechanisms responsible for initiating increases in runoff and sediment delivery and episodes of channel aggradation. More generally, Barker and Hunt stress the need to design appropriate integrated methodologies which demand close collaboration between archaeologists and geomorphologists at all stages of project planning and implementation. This study records a close correspondence between major phases of Holocene stream aggradation in the Biferno Valley and the disturbance of catchment slopes through the expansion and intensification of agricultural activities. Indeed, by way of a modern analogue for earlier episodes of catchment disturbance, they note the dramatic increase in rates of soil erosion over the last two decades following the introduction of damaging techniques such as deep ploughing.

In Chapter 14 Provansal also makes use of archaeological survey data and relates this information to geological evidence for marked changes in sediment yield over the Holocene Period at the river basin scale. In contrast to the other papers in this part of the volume, rather than using the alluvial deposits of the valley floor to reconstruct changes in river behaviour, Provansal utilises the Holocene sedimentary record of a Mediterranean lagoon and delta system at the mouth of the Arc River in Provence, southern France. By combining geomorphological fieldwork in the river basin and geological investigations in the delta with the archaeological record, it has proved possible to relate patterns of land use change and varying settlement densities with the nature and rate of sedimentation at the basin outlet. The rate of delivery of fine sediment to the catchment outlet is determined by radiocarbon dating of core sequences and sediment properties are used to infer particular catchment sources (cf. Walling and Woodward 1992). Provansal concludes that human-induced topsoil disturbance provided the main source of fluvial suspended sediment which promoted delta build up. The delivery of fine sediment to the basin outlet was enhanced during phases of increased precipitation and runoff and it was only when such episodes coincided with periods of soil disturbance that net delta growth took place. Two main periods of deltaic sedimentation took place during the Holocene. The first of these commenced during prehistory up to the Versilian transgression when infilling of marshy littoral plains began. The second major phase began at the end of the Middle Ages when a combination of intensive agricultural densities with the net climatic deterioration of the Little Ice Age produced highly favourable conditions for increased sediment supply and delta growth. Sedimentary horizons showing high concentrations of weathered (degraded) clay minerals are interpreted as indicating phases of topsoil erosion from the catchment slopes as these clay minerals are found in the upper part of soil profiles.

In the final chapter of this section, Hunt and Gilbertson present evidence for rapid changes in late Holocene river behaviour following episodes of forest clearance in the Ficca Valley in Tuscany, Italy. Three phases of coarse sediment deposition have been related to increases in hillslope runoff and sediment supply following land use changes. Hunt and Gilbertson make use of pollen, mollusc and plant macrofossil evidence and suggest that deliberate land management strategies within the Ficca Valley, particularly woodland clearance, were important for triggering episodes of slope erosion and river aggradation. The alluvial response was rapid, and it has been demonstrated that these changes took place within a relatively brief interval after the fifteenth century AD. The authors observe that late Holocene episodes of stream channel aggradation in the Ficca Valley are out of phase with known climatic episodes recorded in southern Europe over the last millennium and conclude that climate change is not likely to have been responsible for major changes in river behaviour. Furthermore, the palaeobotanical evidence for deforestation and accelerated soil erosion is in good agreement with the archaeological and historical records of land use intensification. In common with research conducted further south in the Biferno Valley in the Molise region, a positive relationship has been identified between phases of woodland clearance and alluviation.

Chapters 13 and 15 underscore the important role of palaeoecological analyses in the reconstruction of Quaternary river environments in contexts which favour the preservation of organic remains. Fine-grained channel fills often contain rich assemblages of pollen and plant macrofossil remains which provide valuable evidence to
supplement and refine lithological and stratigraphical observations. Interestingly, the papers by Hunt and Gilbertson and Provansal both point to the significance of riparian vegetation for trapping sediment eroded from upslope and thus checking sediment delivery to the fluvial system.

It is beyond the scope of this brief introduction and the following series of papers to provide an exhaustive review of all aspects of human–river environment interactions in the Mediterranean region. The main objectives of this part of the volume are to present a sample of recent research activity in Mediterranean alluvial archaeology, to illustrate the use of a range of field approaches in contrasting Mediterranean river depositional environments over a variety of timescales and, most importantly, to highlight some of the potential impacts of human activity on river behaviour and vice versa. It is hoped that continued close cooperation between geomorphologists and archaeologists will further enrich our understanding of the history of the Mediterranean landscape and promote greater awareness of appropriate and sustainable land management strategies to minimise the undesirable effects of human activity.

REFERENCES


