This study focuses on the spatial and temporal sediment dynamics of the mountainous Bügdüz catchment. This 264 km² large catchment is located in the western part of the territory of the classical city of Sagalassos, Taurus Mountain range, SW Turkey. Previous sedimentological studies have shown that a peak in human activity in the 900 BCE-600 CE period caused intense sedimentation in the upland areas, while in more recent periods sediment dynamics seem to be more restricted. Therefore, we used a sediment fingerprinting technique to elucidate the sediment sources and to gain information about the connectivity between the various parts of the catchment. Hundred-fifty cores were taken within the alluvial plain, and numerous topsoil samples were taken over the entire catchment. On the fine fraction (<63µm) aqua regia extractions were conduct and several major and elements were measured. To get an idea of the spatial variability within the catchment sub-recent valley sediment samples were analysed. The geochemical signals of these deposits indicate an important input of proximate sediment sources and a limited coupling between the upstream and downstream regions. On the other hand there are certain down core variations, suggesting the activation of different source areas through time and possibly a better linkage between the different regions during periods of intense human impact. We suggest that the rise and demise in intensity of human activity and spatial patterns of settlement and land use did have a profound impact on sediment dynamics, yielding a decoupling of the sub-areas with decreasing human impact.