Unrevealing patterns of abundance and distribution of Amazonian species is still an overwhelming task that requires integration of multiple disciplines. This work is based on background information gathered from previous reconstructions of geological history of the lower Amazon drainage basin in order to analyze biodiversity patterns within the context of landscape transformation. A highly dynamic geological scenario is depicted for this area during the Plio-Pleistocene and Holocene, which was dominated by the development of a large paleovalley as a consequence of tectonic reactivation. This paleovalley filled with sediments transported by a north-northwest orientated paleo-Tocantins River. The paleodrainage became abandoned as the main river course was deviated to the northeast, initiating the separation of Marajó Island from the mainland. Geology had a direct impact on the modern physiognomy, with open vegetation, represented by *cerrados* and savanna woodlands, dominating in areas with Holocene sedimentation, while closed forests prevail in older Quaternary and, probably also, Pliocene terrains. Data from fossil and modern mammalian groups confirm the connection of Marajó Island to the mainland during the Last Glacial Maximum, when open vegetation seems to have dominated. Tectonic subsidence was responsible for maintaining this vegetation pattern on the eastern side of the Marajó Island, keeping it as a habitat favorable for the maintenance of savanna adapted faunal elements. Based on this kind of information, this work attempts to highlight the importance of integrating studies combining geological and biological events as the key to understand biodiversity patterns in Amazonia, expecting to open new lines of research dealing with the comprehension of ecology, species and genetic diversity, biogeography, evolutionary scenarios, and speciation mechanisms.