Influence of environmental changes followed by huge eruption on human activities in the lower Lempa River, El Salvador, Central America

*Shigeru Kitamura[1]

1. Faculty of Social Welfare, Hirosaki Gakuin University

Not only destructive volcanic disaster but also environmental change caused by volcanic eruption can influence human activities. Sometimes it is difficult to understand human response, however, in the case that it occurred in the area unaffected by destructive volcanic phenomena. Geomorphological and sedimentological approach is valuable for clarifying environmental change and considering the human response for the change.
In the lower Lempa River, Usulutan, El Salvador, including the area surrounding a lagoon called Jiquilisco Bay, there are many archaeological sites in the Preclassic Period (ca. B.C. 2500 - A.D.250) and the Early Classic Period (ca. A.D. 250-600), except in a coastal sandbar called San Juan del Gozo Peninsula which extends ca. 40 km to the southeast enclosing Jiquilisco Bay. Ceramic pottery for salt production has been discovered in some sites, so that, this area is considered to have been a big center of salt production. On the other hand, because archaeological sites in the Late Classic Period (ca. A.D.600-900) are quite few in the area, considerable population decrease is assumed to have occur before the Late Classic Period. While gigantic eruption occurred in the 4th to 6th century during the Early Classic period at Ilopango Caldera which located ca. 50 km northwest of the Lempa River Delta has been considered to affect this area, destructive phenomena such as pyroclastic flow did not reach to the area, although only the moderate influence by the deposition of fall-out fine ash called “TBJ” (ca. 30 cm thick) was supposed. Recently, the present coastal sandbar was clarified to be formed after the eruption on the basis of the stratigraphic relationship among the geomorphological units and the TBJ tephra, and Jiquilisco Bay was smaller than the present before the eruption, enclosed by old sandbar that was located inland and remains as linearly ranging small islands inside of the present lagoon. This fact suggests that environmental change by the formation of offshore sandbar would give any influence on human activities. In this study, organic fine-grained sediment under the mangrove forest was collected by hand auger in the coast of Jiquilisco Bay to demonstrate environmental change in the lagoon. Organic material and intercalated sandy sediment were sampled from the boring core for radiocarbon dating and chemical analysis, respectively, to clarify depositional date at the sampling level in the core.
In the northern coast of Jiquilisco Bay, 1.9 to more than 3.3 m organic fine-grained sediment is accumulated intercalating ca. 13 cm to 56 cm fine sand layer in the middle. The bottom of the organic fine-grained sediment exhibits radiocarbon dates as ca. 2,000 to 3,500 yrBP. The intercalated fine sand layer contains volcanic glass at the bottom, and the chemical composition of the volcanic glass was illustrated to be coincident with that of the TBJ tephra by electron microprove analysis (JEOL JXA-8800RL in Dep. Earth & Environmental Sci., Hirosaki Univ.). The radiocarbon dates as the 5th to 6th and the 9th to 11th centuries were obtained almost just bellow the bottom and almost just above the top of the fine sand layer, respectively. In the southern coast of Jiquilisco Bay along San Juan del Gozo Peninsula, 1.9 to 2.5 m organic fine-grained sediments are accumulated, but no fine sand layer is found to be intercalated. The bottom of the organic fine-grained sediments exhibits the radiocarbon dates of the 8th to 10th century. These data indicate that mangrove forest in the north coast was already formed around 2,000 yrBP at the latest, and had been devastated for several hundred years since the Ilopango eruption. It also suggests that the present coastal sandbar had been formed in the 8th to 10th century, and since then

mangrove forest has rehabited in the north area of the lagoon and has also habited in the southern area offshore of the old sandbar.
Devastation of mangrove forest was possible to be caused by the inflow and outflow of sandy sediment for several hundred years after the eruption as well as the ash fall at the eruption, because mangrove trees can live only in the height between average sea level and mean high-tide level and is so vulnerable to such the change of surface level by the deposition and erosion of sand. Salt production needs a great amount of wood, so that, it was probable to be terminated by the devastation of mangrove forest in Jiquilisco Bay for the several hundred years, if the people had exhausted wood of forest in land and have been dependent on mangrove forest as the fuel resource until the Early Classic Period.

Keywords: TBJ tephra, Ilopango Caldera, Jiquilisco, mangrove, salt production

