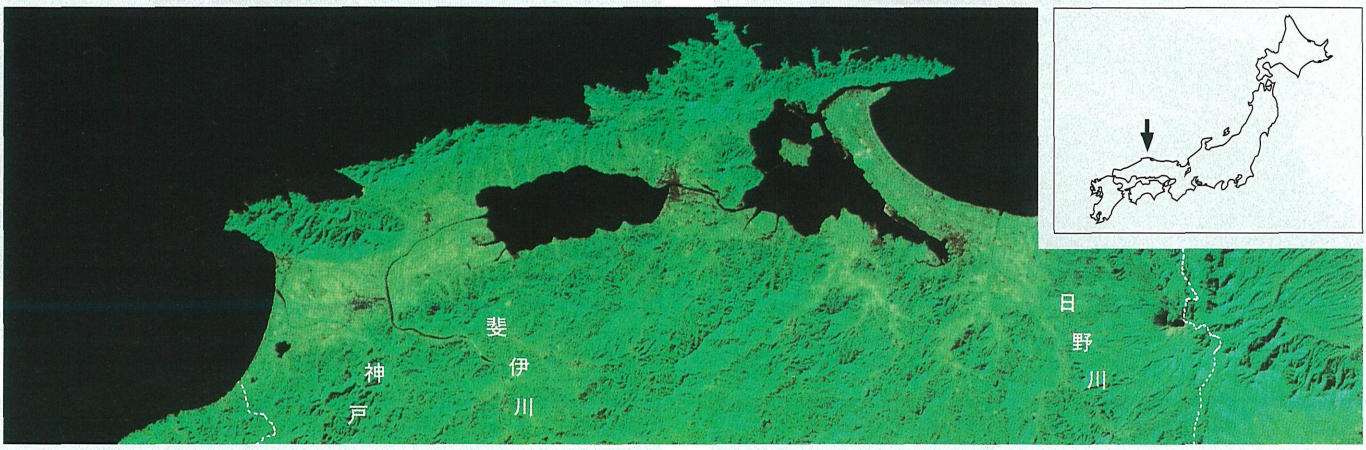


# IMPROVING LAGOONAL ENVIRONMENTS FOR FUTURE GENERATIONS

— A CASE STUDY OF LAKES NAKAUMI AND SHINJI, JAPAN — \*

T. Tokuoka\*\*, K. Takayasu\*\*, H. Kunii \*\*, F. Takehiro\*\* and Y. Sampei\*\*\*

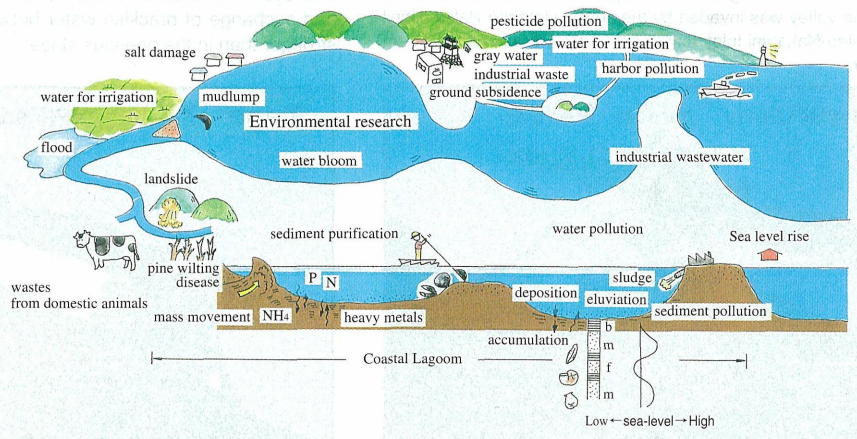


## The purpose of the Research Center for Coastal Lagoon Environments

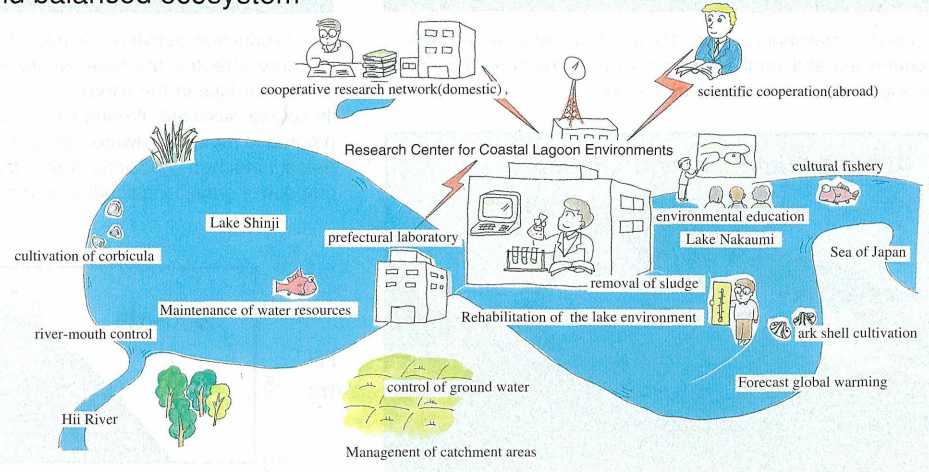
The Center of Shimane University was established in 1992, and mainly studies the history of natural, cultural, and social environments of Lakes Nakaumi and Shinji, and their surrounding areas, to develop new ideas for the wise use of natural resources while maintaining a sound ecological balance. The main topics are (1) Natural environmental changes and sea-level changes in coastal lagoon areas, (2) Biodiversity and environmental changes in coastal lagoon area, and (3) synthetic studies on geographical, cultural, and social environments of lagoons and their hinterlands.



## Facing problems



## Programs for wise use and balanced ecosystem



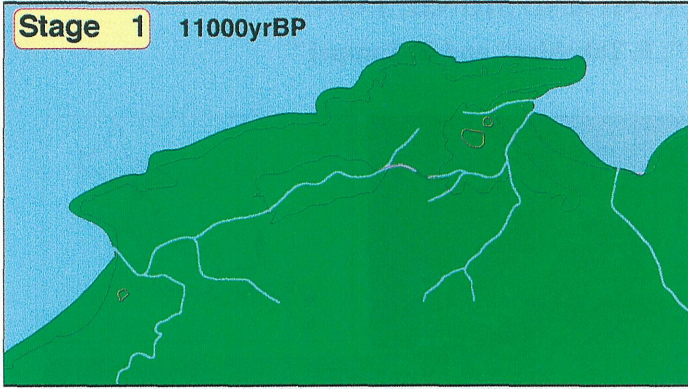
\*Presented originally at the poster session of THE IGBP-LOICZ OPEN SCIENCE MEETING, October 10-13, 1997, held in the Netherlands, and revised.

\*\*Research Center for Coastal Lagoon Environments, Shimane University, Matsue 690-8504, Japan

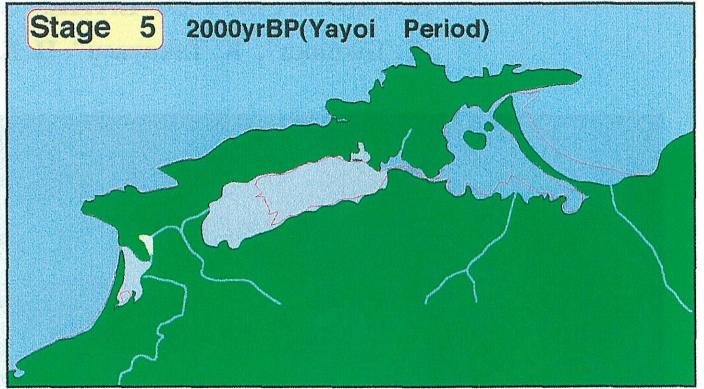
\*\*\*Department of Geoscience, Faculty of Science & Technology, Shimane University, Matsue, 690-8504, Japan

**STUDY OF THE PAST**

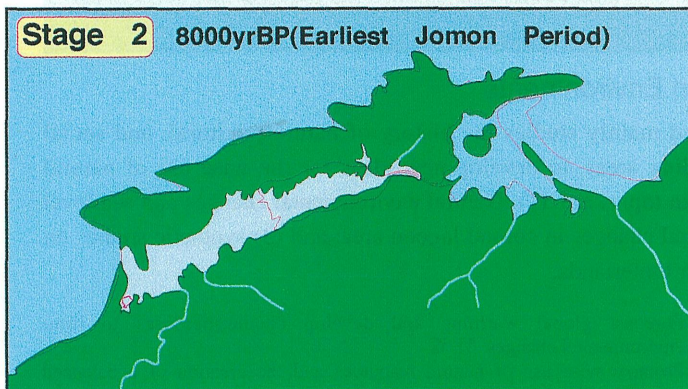
Coastal lagoons are very sensitive to sea level changes. Their environment can easily be changed by falling or rising sea level. Such changes are recorded in the bottom sediments, and the paleogeography is reconstructed in Stages 1 to 7.



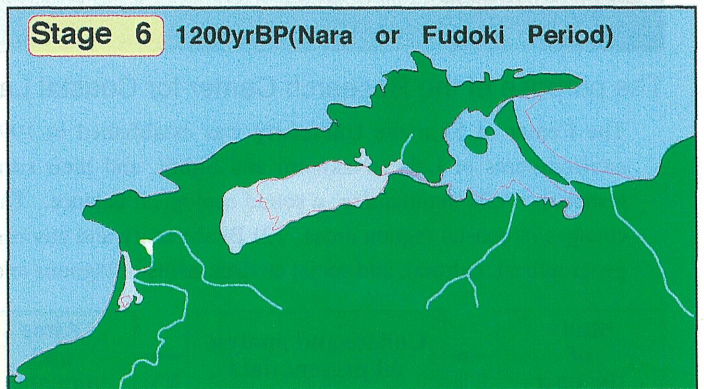
The sea level ascended gradually, reaching a level about -45m lower than present day.



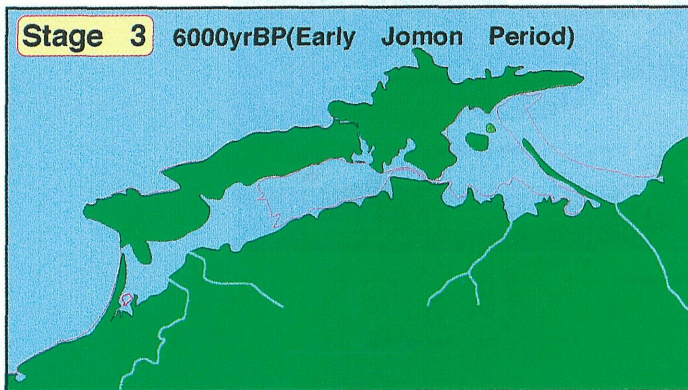
Sea level fell about 2 or 3 meters, and the western inlet was separated into two lagoons by a transgressive delta of the Hii River. Brackish conditions in Lake Shinji appeared for the first time, and a connection to Lake Nakaumi was maintained by a channel.



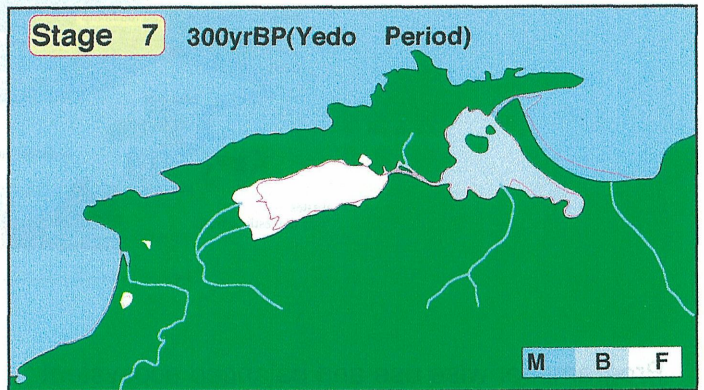
Worldwide transgression ( Jomon Transgression in Japan ) occurred, and the sea level ascended rapidly. The valley was invaded by the sea to yield the Paleo-Shinji Inlet in the west and the Paleo-Nakaumi Inlet in the east. They were separated from each other by a N-S barrier.



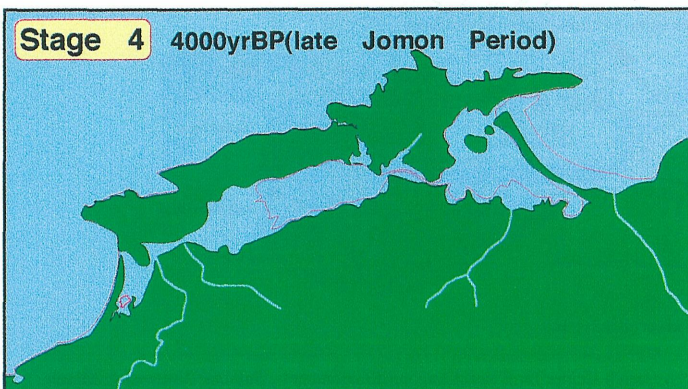
The sea level ascended slightly to no more than one meter above present, and exchange of brackish water between Lakes Shinji and Nakaumi became stronger than in the previous stage.



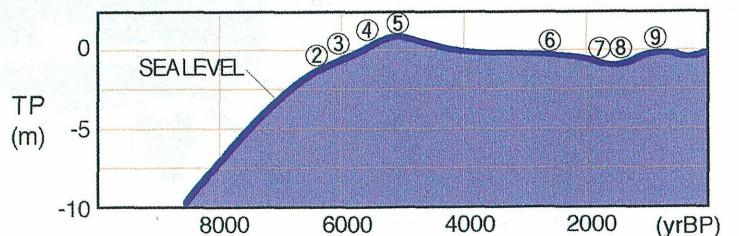
The sea level reached a maximum height, about 1.5m higher than present. Both inlets were connected and ideal conditions for fisheries prevailed. Sand bars began to develop on the seaward side of the inlets.



Iron production activities, especially 16th and 17th Century onward, have strongly affected the lake environment. Lake Shinji was changed to a freshwater lake in the middle of the 17th Century, and the Hii River changed its course eastward, flowing into Lake Shinji. At the same time the delta fan prograded rapidly eastwards, forming the eastern part of the Izumo Plain. The present brackish conditions of both lakes was formed artificially mainly, for the purpose of preventing flooding by the Hii River.



Sand bars continued to develop, but exchange of water with the open sea was maintained.



Holocene sea level changes in Lakes Nakaumi and Shinji area. The numerals with circle indicate direct evidences of sea level at the historic sites.

Diversified human activities around the coastal lagoons during the Holocene Period

In the areas around Lakes Nakaumi and Shinji, many archaeological sites since the Holocene ( Jomon Transgression in Japan ) have been discovered. The activities of our ancestors are recognized as multi-sided usings of the lakes as fishery grounds, fishery ports and transportation bases. The surrounding lowland areas had provided convenient conditions for human activities especially for rice cultivation. These had made possible the prosperity of Paleo-Izumo, one of the most famous archaeologic sites in Japan.

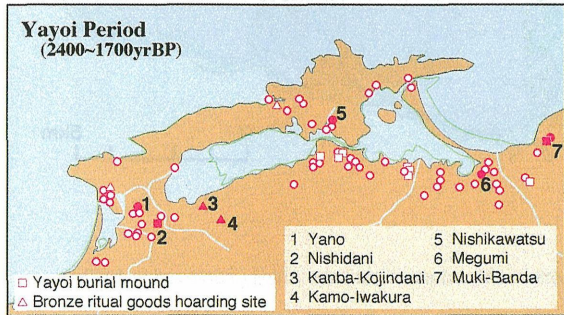
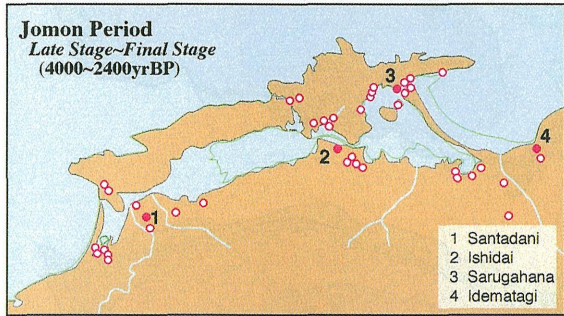
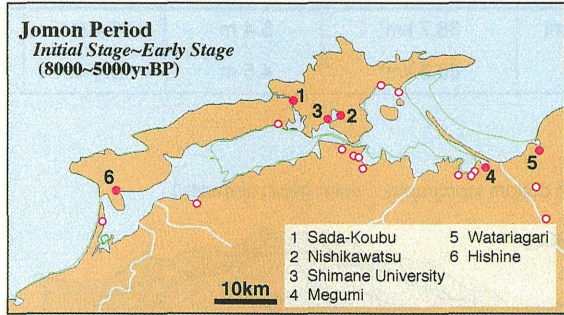
Oars and handle of fish spear of the Jomon Period ( 5000-5500 yr. B. P.) excavated at the Shimane University campus



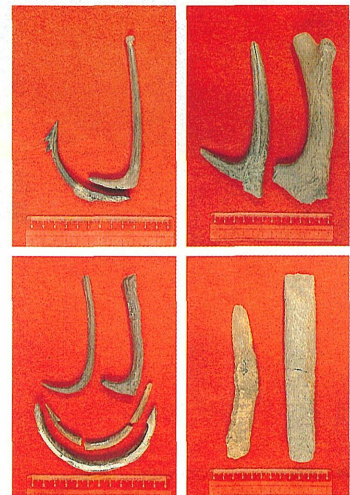
Dugout canoe of the Jomon Period ( 5500-6000 yr. B. P.) excavated at the Shimane University campus



Shell stratum of the Jomon Period ( ca. 5,500 yr.B.P.) excavated at the Sada-Koubu Shellmound site



Fishing gears of the Yayoi Period excavated at the Nisikawatsu site



Hand net (56cm in length)



Stone net sinker