

Human-environment interaction and climate in the Japanese Archipelago

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To reconstruct the relationship between humans and their environment in the Japanese Archipelago, several chronological charts were compiled based on a collective work by interdisciplinary research groups.

Japan is one among 34 global biodiversity hotspots (Conservation International 2012). The Japanese Archipelago extends over 3000 km from north to south, and includes subarctic, cool temperate, warm temperate and subtropical climatic zones. There is evidence that these diverse climatic zones existed even during the global environmental changes that have taken place over the past 100 ka (Tsukada 1983). Under the influence of climatic change and human activities, the distribution of individual species of plants and animals in the Japanese Archipelago has constantly changed. Populations have repeatedly divided, expanded

and diminished in response to changes in the availability of suitable habitat. Where suitable habitat was unavailable, the species became extinct.

The knowledge and skills that humans have developed seem to harbor the idea that biological resources should be used in a sustainable way, and the desire to harvest without fear of exhausting the limited resources. Throughout the period of human habitation, the Japanese Archipelago has been blessed with a warm climate and abundant rainfall, and consequently abundant bio-resources. But were those resources overused and exhausted in the past? To answer these questions, we initiated

a project to investigate: 1) How subsistence and economic systems were maintained in the past, and how and why they ended, and 2) the underlying social system (social structure, economic foundation, system of spatial organization, technical system, perception of nature) and how it evolved after the collapse of the subsistence and economic systems.

Research methods and structure

To elucidate the historical process of change in human-nature relationships in Japan, we used regional pollen records, archeological remains and historical documents. In addition, we examined the historical and economic

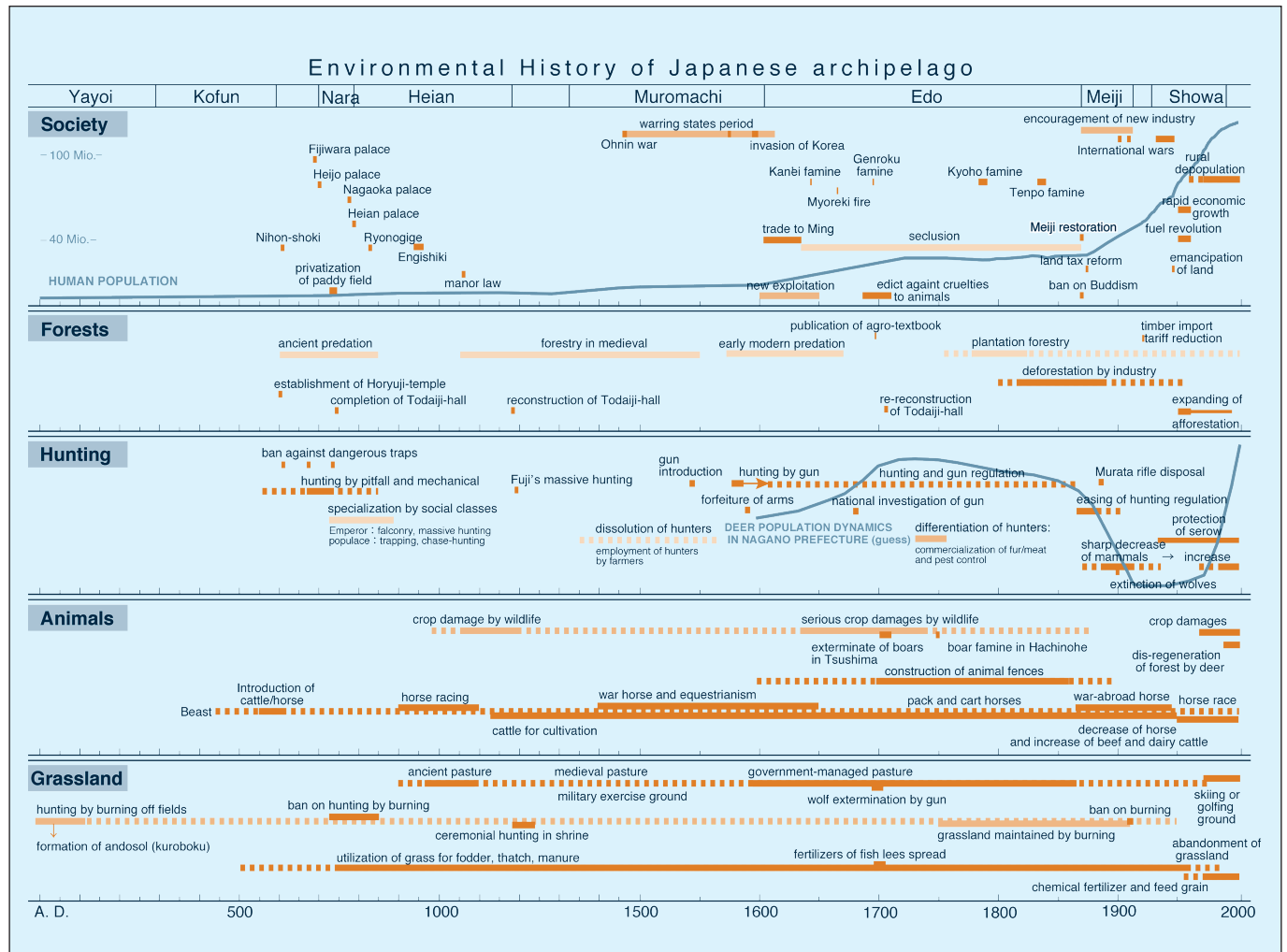


Figure 1: Chronological chart of the Japanese Archipelago during 0-2000 AD. The periods of governance and their names are given at the top of the figure.

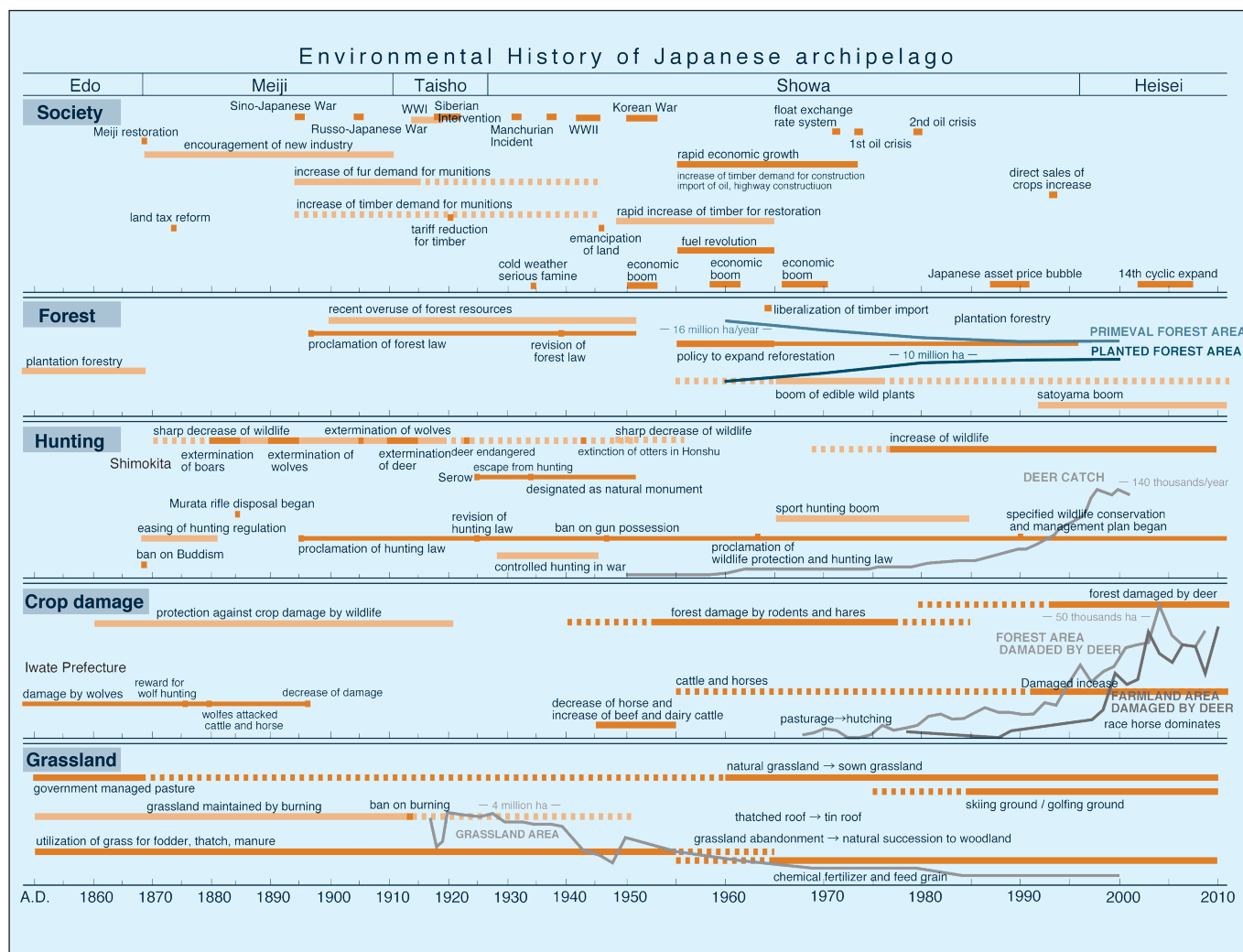


Figure 2: Chronological chart of the Japanese Archipelago during 1850-2010 AD. The periods of governance and their names are given at the top of the figure.

background, in particular knowledge and skills concerning the environment, to study their relation to the disappearance or thriving of plants and animals that were closely related to human subsistence. The project was subdivided into several working groups:

- 1) To reconstruct and analyze ancient vegetation and changes in the distribution of plant and animal species based on fossil records (Sasaki and Takahara 2011; Sasaki and Takahara 2012), DNA from living organisms, and historical documents (Kawase et al. 2010; Tsujino et al. 2010),
- 2) To reconstruct regional human diets by analyzing stable isotopes on human and faunal bones (Kusaka et al. 2010),
- 3) To reconstruct the past human-nature relations and analyze the regional social systems.
- 4) To synthesize the evidence and ideas from the project, and propose policy and guidelines for better human-environment interaction.

Compiled chronological charts

A series of chronological charts of environmental history for each region were

compiled from epoch-making events on environmental issues and policy changes on resource managements (Fig. 1 and 2). The charts were completed by adding data of estimated vegetation changes (based on pollen analysis) and population change (based on historical demography). In total, more than 6000 chronological data were compiled in a time-sequence database. High-resolution climatic data are still missing in the compilation, but will be implemented at a later stage. The chronological charts revealed that the multi-layered governance (e.g. community, local government, national government, international organization) either sustainably managed their bio-resources or collapsed.

“Wise use” of what, by whom, for whom

The expression “wise use” was defined as the knowledge and skills needed to use the bio-resources and ecosystem services in sustainable ways. Examples of “wise use” and “unwise use” from each region were sorted out and categorized by identifying which multi-layered

governance took an initiative role. Our results showed that governance at the community level always played a critical part in the sustainable use of the ecosystem services, whereas regional governance covering wider areas sometimes led to their collapse. This is an important lesson from the past, showing that the community level or local layer of governance driven by the people who suffer most from the degradation of the ecosystem service should be given priority over larger-scale governance. Also, in cases showing sustainability or recovery from a collapse, collaboration between the local communities and regional to national governances was critical.

Selected references

Full reference list online under:
http://www.pages-igbp.org/products/newsletters/ref2012_2.pdf

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