

# Conservation and management of rice field biodiversity

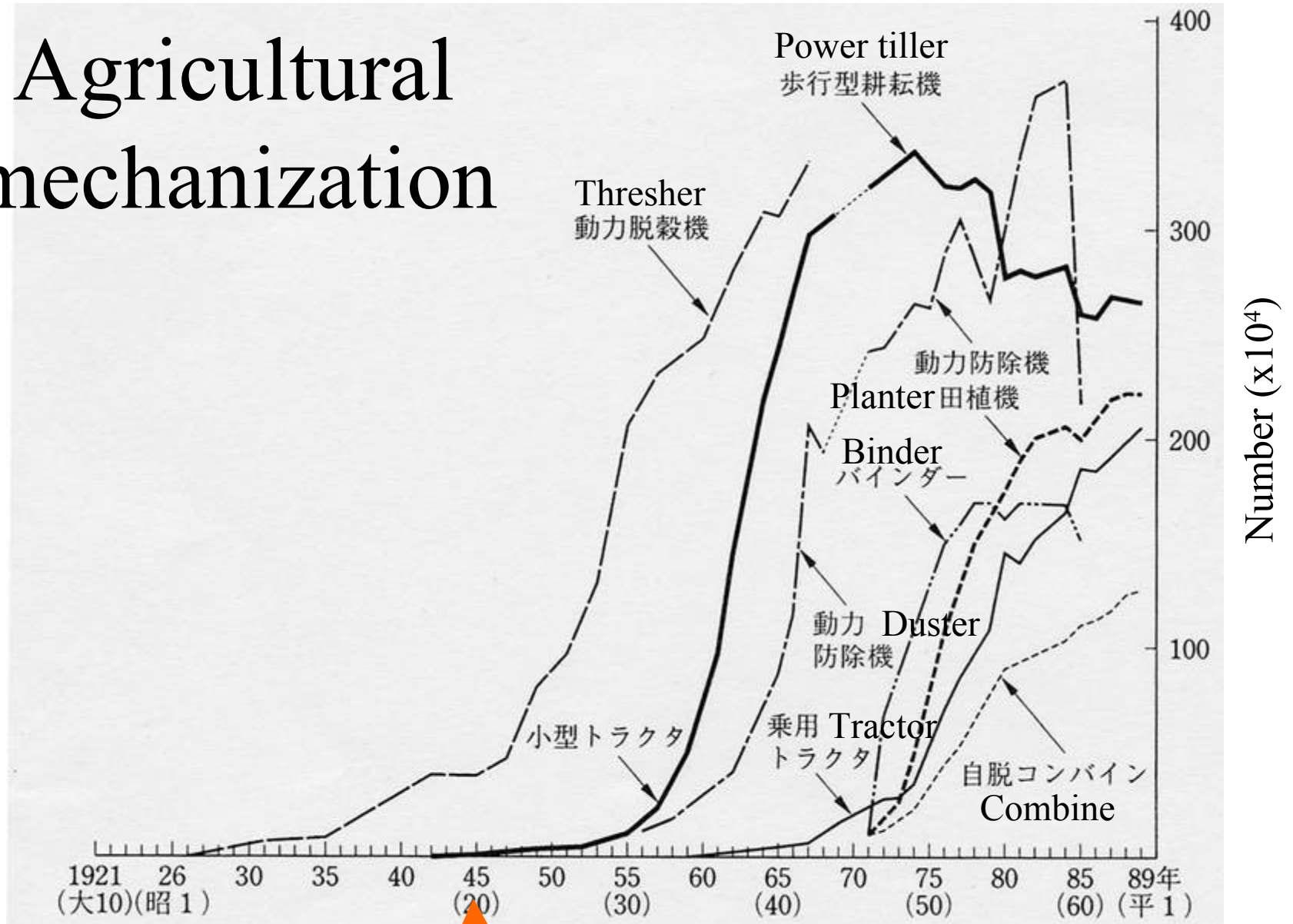
A photograph of a rice paddy field. The foreground is dominated by dark, muddy water and mud, with some small green plants growing in the shallow water. The middle ground shows a series of terraced or stepped rice fields, with water reflecting the sky. The background is filled with lush green trees and vegetation, suggesting a rural or natural setting. The overall scene is a typical view of a rice paddy field during a wet season or after a rain.

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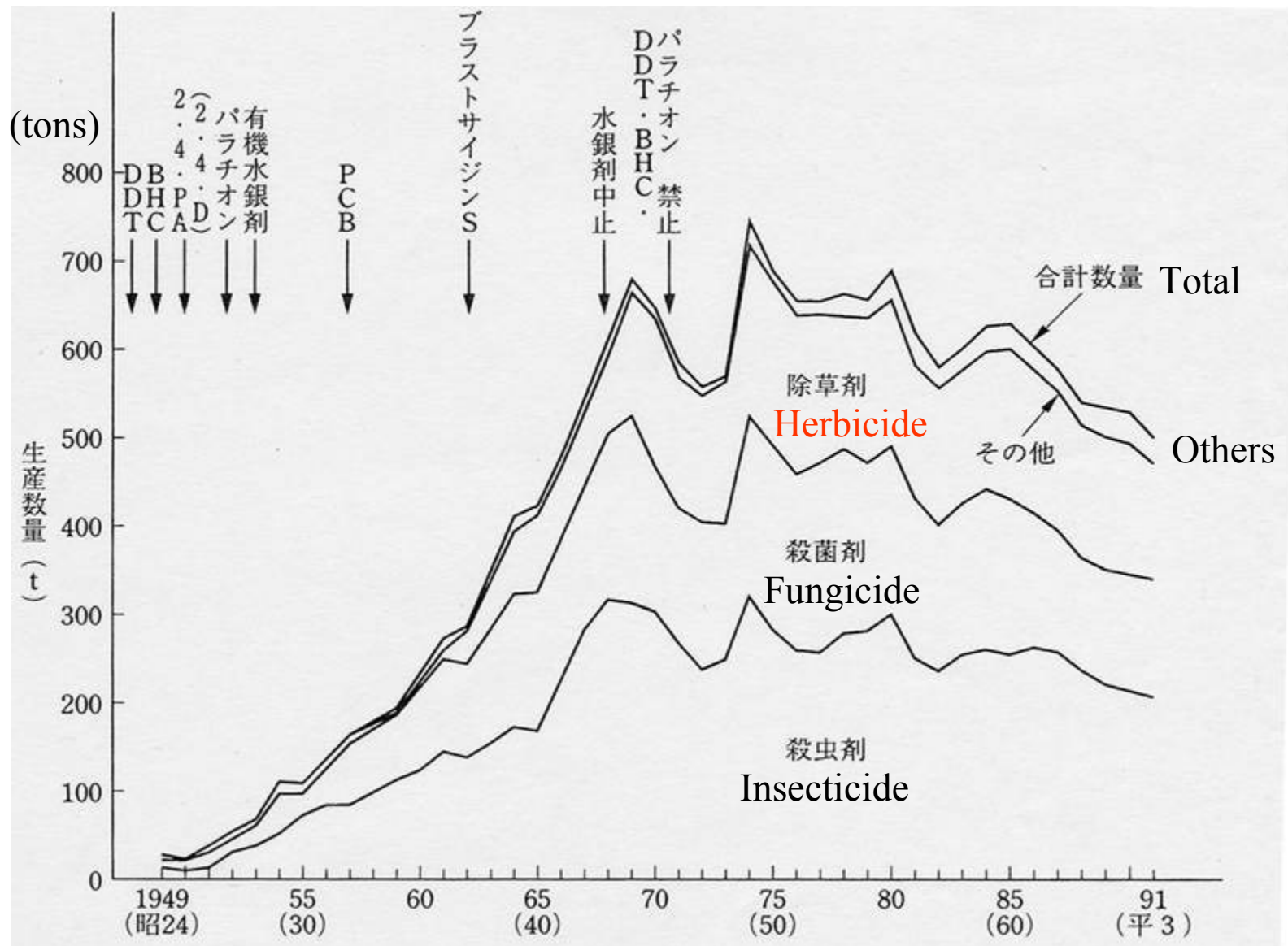


Rice farming in 1950s

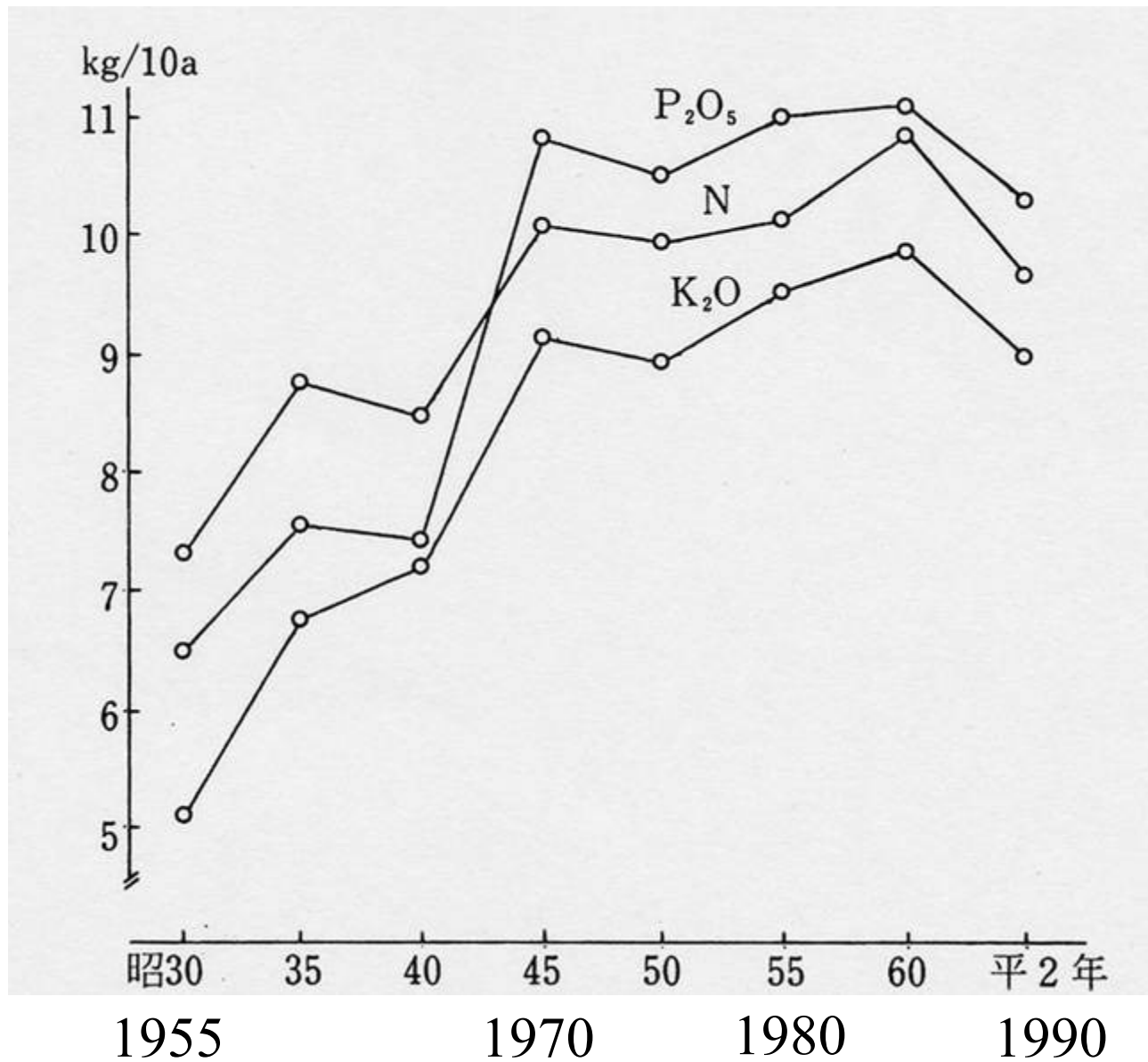
# Agricultural mechanization



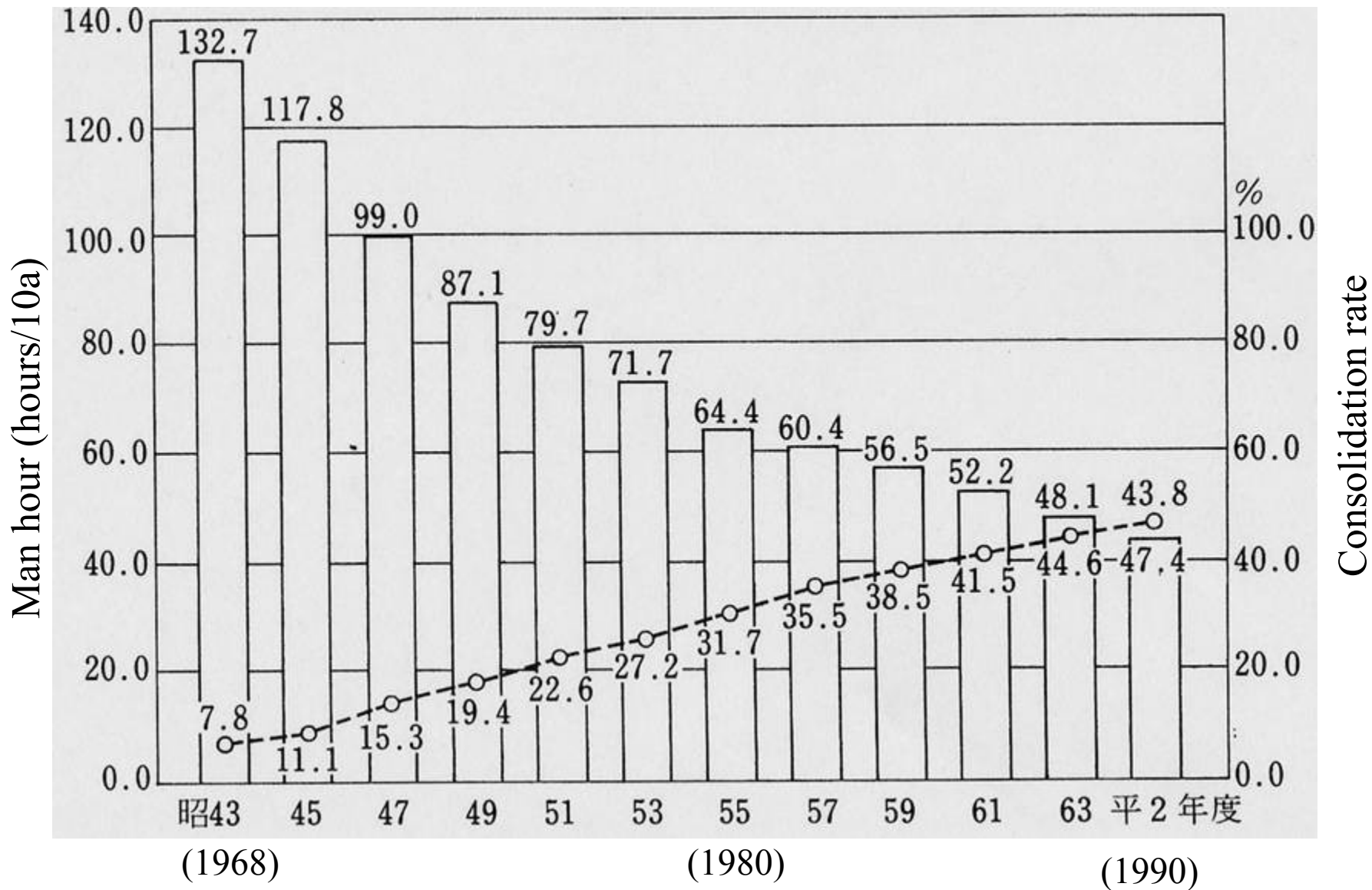
1945



# Agricultural chemical production



Chemical fertilizer application



Farmland consolidation rate  
and man hours for rice cultivation

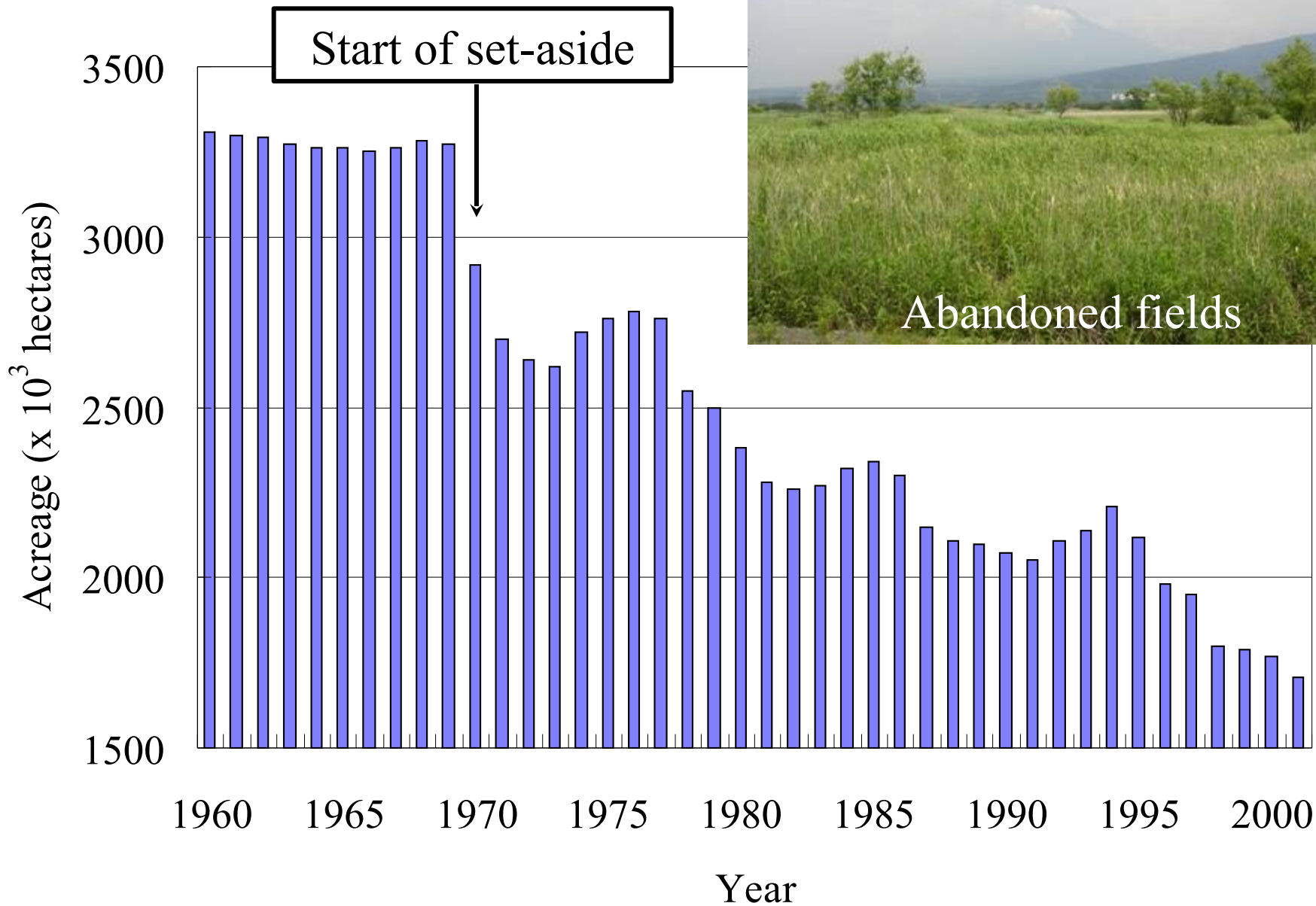


1975



2002

Farm land consolidation



Planted acreage of rice fields



# Threatened rice field weeds

Species*	Red List category
<i>Marsilea quadrifolia</i>	Vulnerable
<i>Salvinia natans</i>	Vulnerable
<i>Azolla japonica</i>	Vulnerable
<i>Hypericum oliganthum</i>	Endangered
<i>Myriophyllum ussuriense</i>	Near threatened
<i>Veronica undulata</i>	Near threatened
<i>Utricularia australis</i>	Vulnerable
<i>Sagittaria aginashi</i>	Near threatened
<i>Blyxa echinosperma</i>	Vulnerable
<i>Monochoria korsakowii</i>	Vulnerable

\*Regarded as harmful weeds all over Japan by Kasahara (1951)

**Nakaikemi**



**Osaka**

**Tokyo**

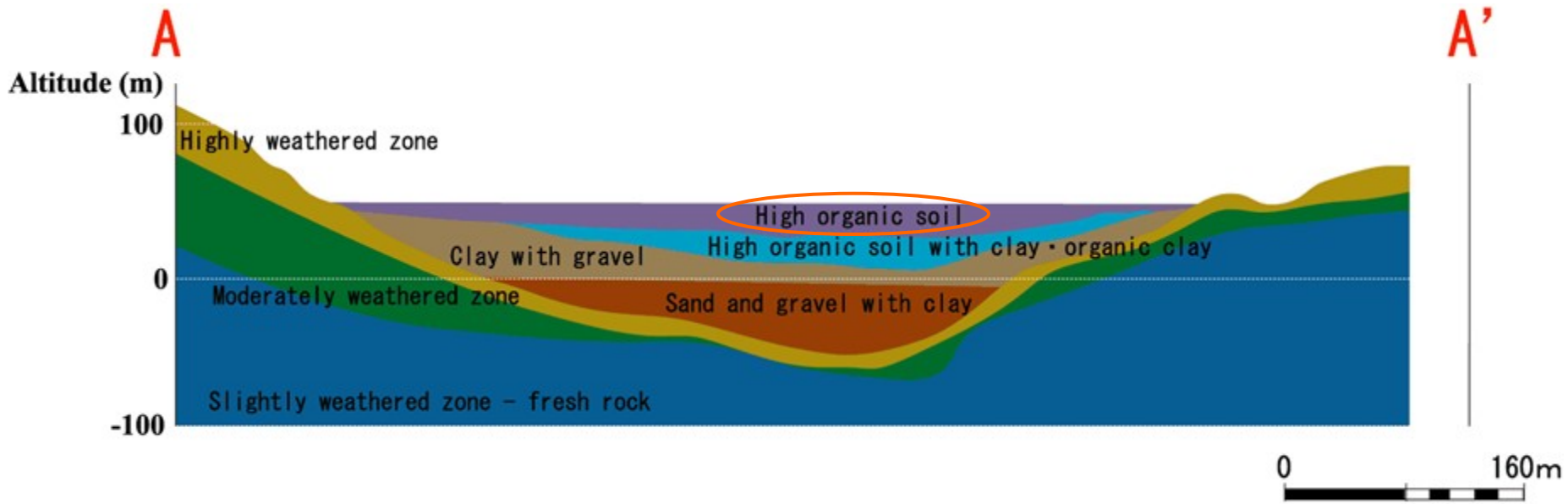
Location of Nakaikemi



Nakaikemi

1995

Nakaikemi and its surroundings



Cross section of Nakaikei



Field boat



Paddy sandals

Farming tools for deep fields



1963



1975



1997

## Changes in Nakaikemi

# Traditional ditch and rice field





*Isoetes japonica*



*Marsilea quadrifolia*



*Azolla japonica*



*Monochoria korsakowii*

# Threatened weeds





June 1998

One year after abandonment



*Isoetes & Azolla*



June 1997



May 1998



May 2000



May 2002

Vegetation changes of abandoned fields

Sept. 1997

Not plowed

Plowed

Effect of plowing





1997



2000

Nakaike and study site



# Study site

April 1998



May 2002



Ditch dredging



Plowing



Hand weeding



Mowing

# Management tasks by local farmers



# Rice field weeds (June 2002)



**May**



**June**



**July**



**August**

Seasonal changes of a plowed field





*Marsilea quadrifolia*



Plowed field (June 2002)



Removal and recovery of vegetation

July 2001



Re-cultivation

Doble Plowing  
(April & June)



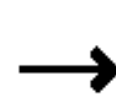
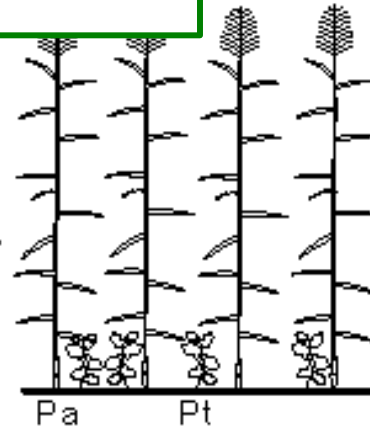
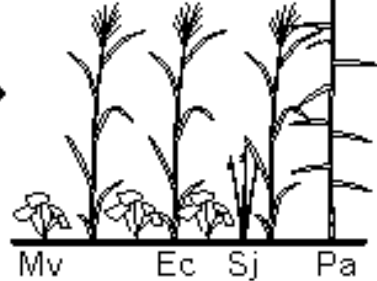
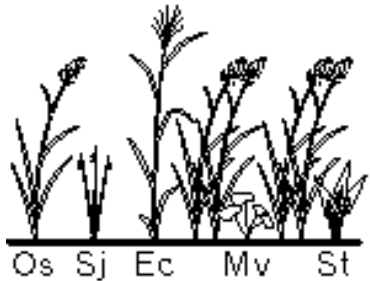
Single Plowing  
(April)



Effect of cultivation and plowing

Cultivated field

Abandoned field



Near-natural  
vegetation

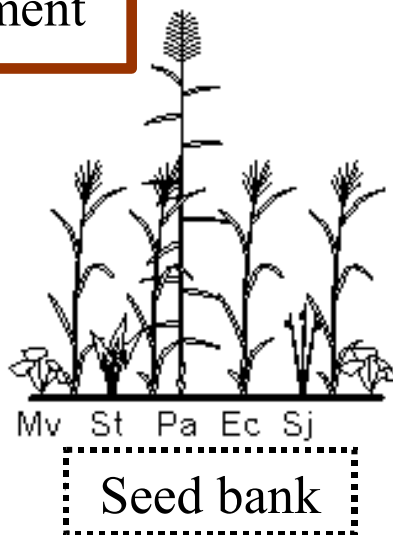
Abandonment

Plowing

Vegetation  
cleared

Field  
plowed

Re-  
cultivation



Fallow field

Vegetation dynamics on rice field

# Acknowledgements

- 
- Takashi Fujii, Manabu Nakamoto, Yoriko Ohtakara, Hiroaki Sekioka, Hiroshi Terai and Miho Uyama
  - Farmers of Kashimagari, Tsuruga City

# The LNG Plant and Nakaikemi

- 1992: Offer for LNG plant from Tsuruga City
- 1993 – 1994: EIA
- 1996: Submission of EIS
- 1997 – 1999: Land management experiment and monitoring
- 2000 – 2004: Management and monitoring
- 2002: Cancellation of LNG plant
- March 2005: Donation to Tsuruga City