

June 21, 2013  
農学国際特論 I

# 農業生産・基盤整備

## Production Technologies (2)

-Production system, Infrastructure, Irrigation-

東京大学 大学院農学生命科学研究科

農学国際専攻 国際情報農学研究室 溝口 勝

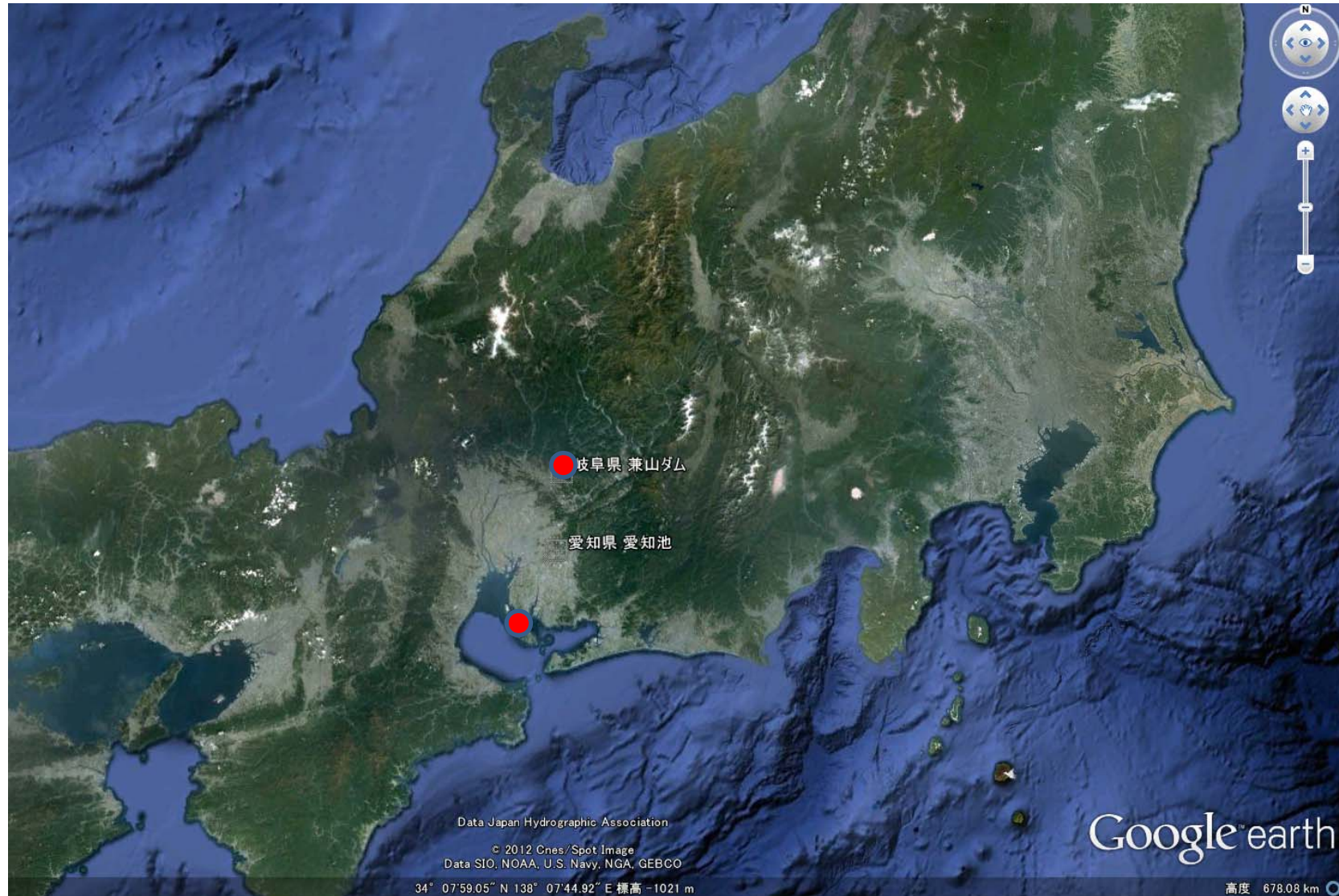
Masaru Mizoguchi,

Lab. of International Agro-Informatics, Graduate school of  
Agricultural and Life Sciences, The University of Tokyo

What is this?



# TOYOTA is leading Japan ?



## Before the Project

### 1) Frequent droughts

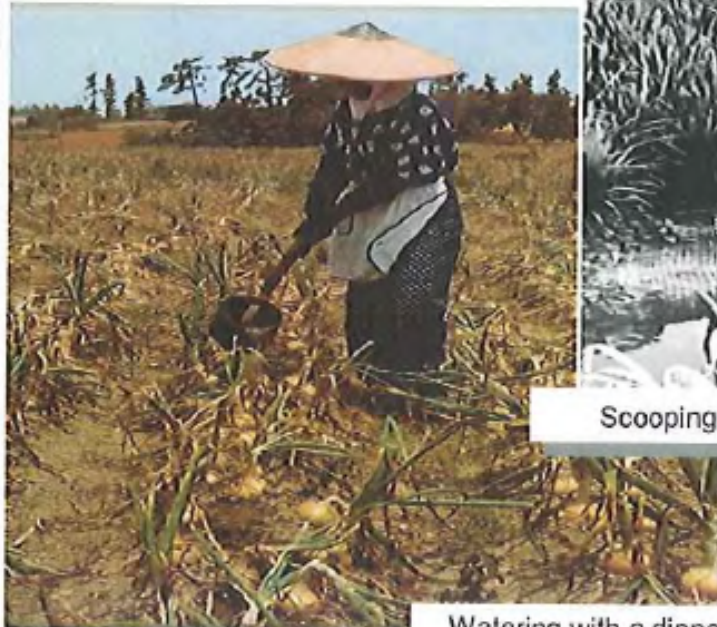
With no perennial river to draw water from, farmers would depend on unpredictable rainfall and numerous ponds.



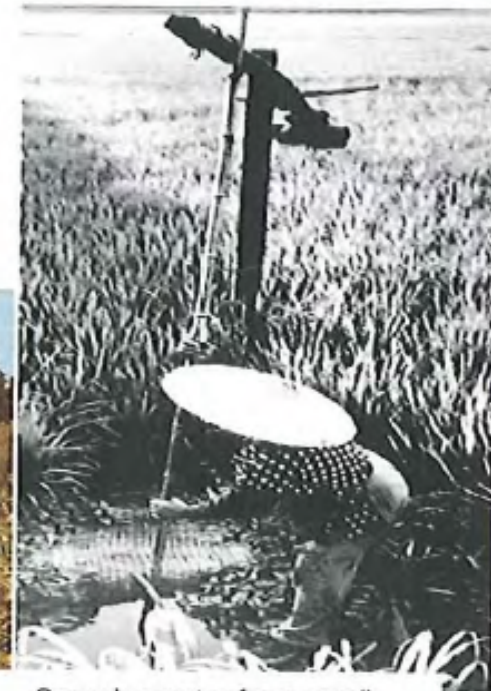
13,000 ponds in 33,000 ha of the project area



Watching on the night

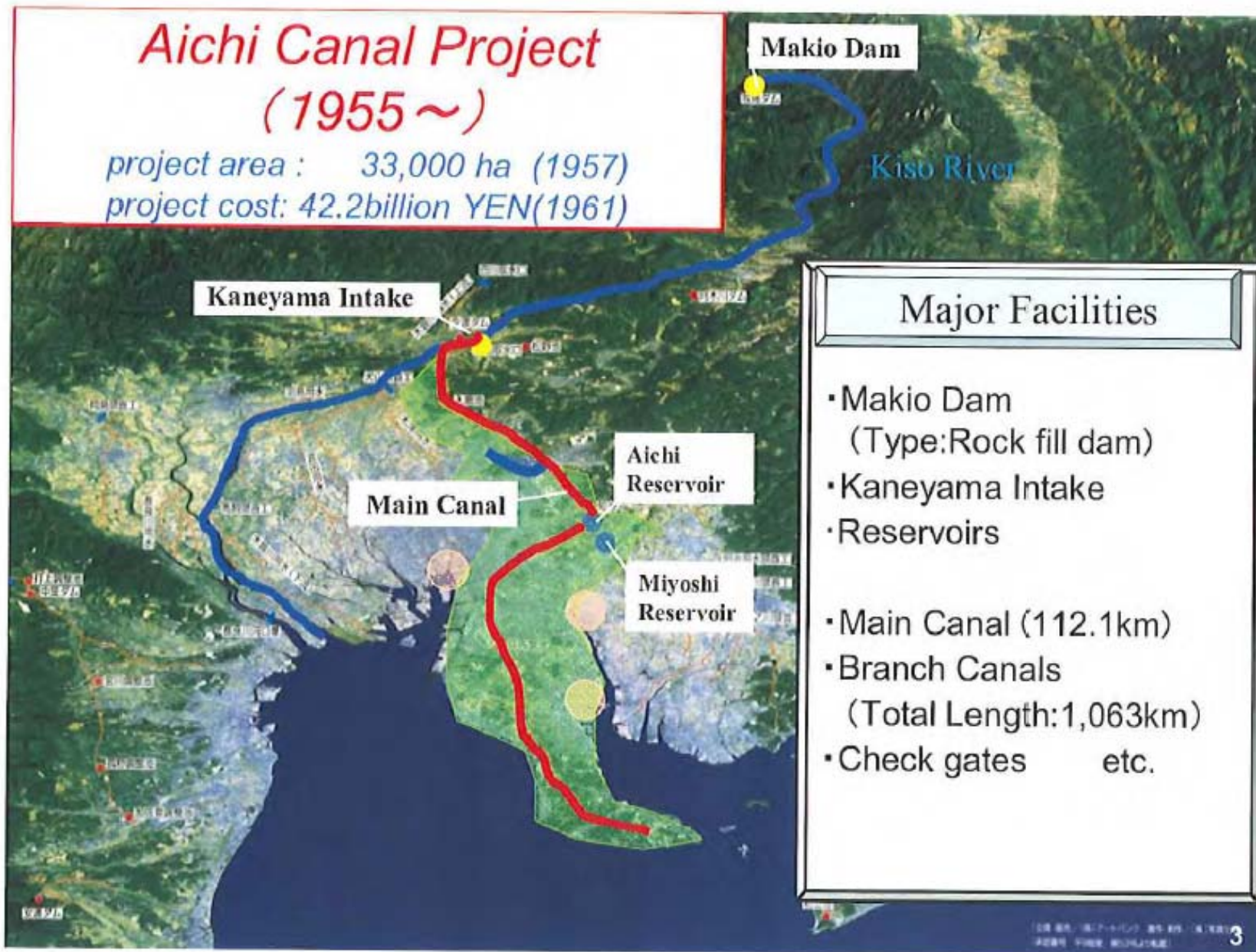


Watering with a dipper



Scooping water from a well

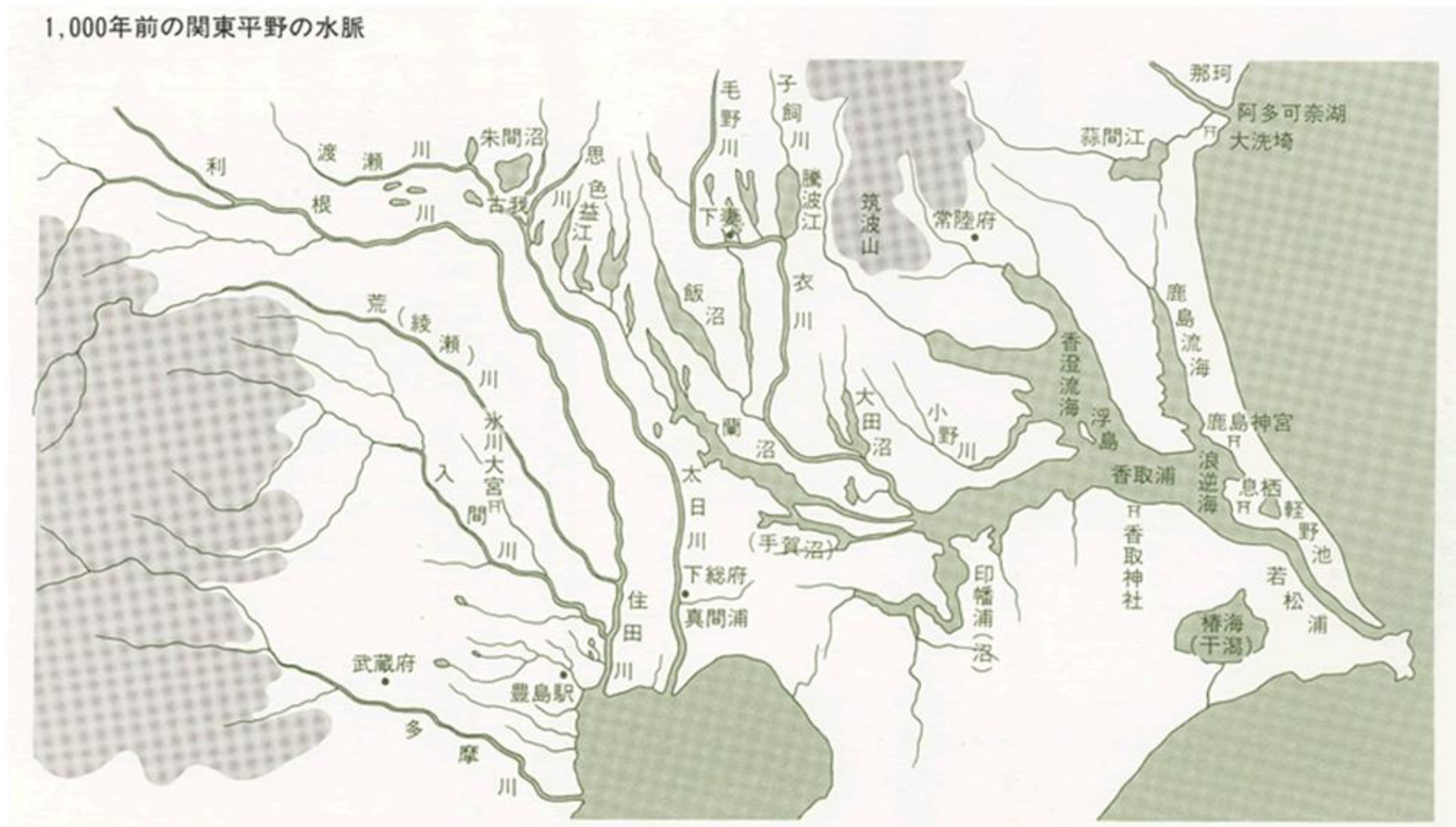
Why & how did this area develop?



After the web page of 愛知用水総合管理所

# Project-X

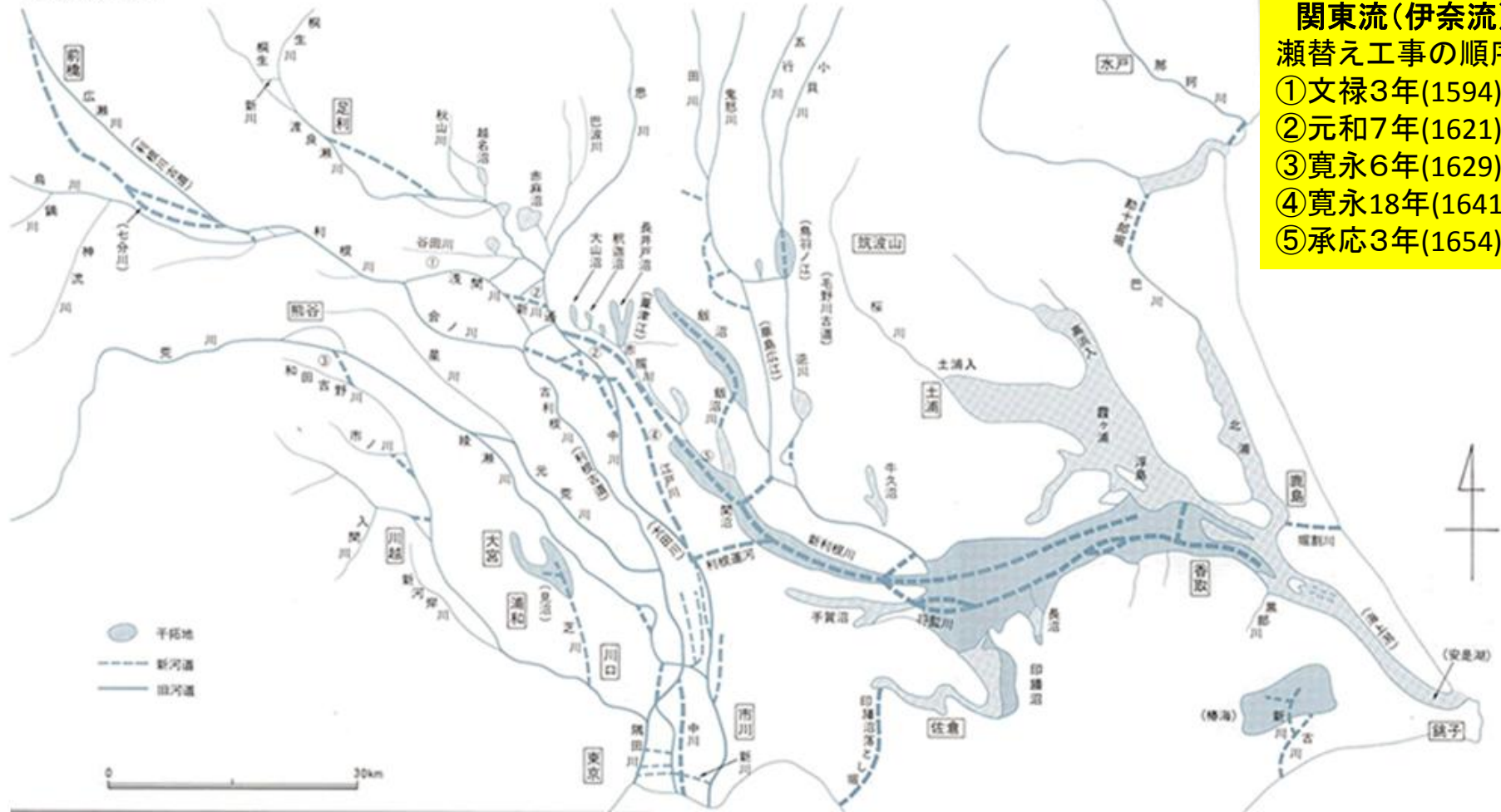
# Kanto Plain of 1000 before





# History of the Tone River water system

利根川水系の変遷



**関東流(伊奈流)**  
 瀬替え工事の順序  
 ①文禄3年(1594)  
 ②元和7年(1621)  
 ③寛永6年(1629)  
 ④寛永18年(1641)  
 ⑤承応3年(1654)

# The foundations of water and soil

## 水土の礎(Sui-do no Ishizue)



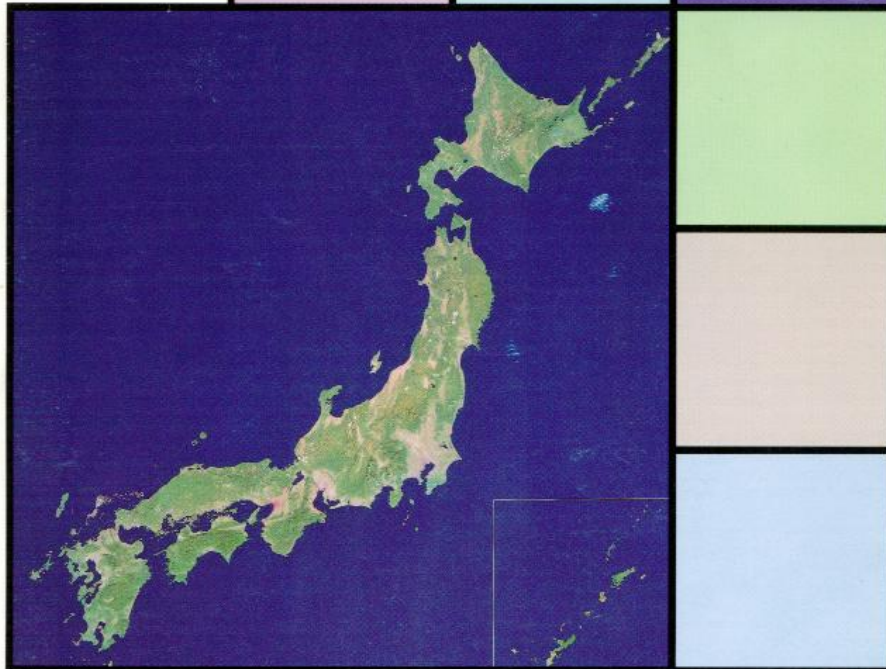
<http://suido-ishizue.jp/>

# IRRIGATION AND DRAINAGE IN JAPAN

3rd  
Edition



JAPANESE  
SOCIETY OF  
IRRIGATION,  
DRAINAGE  
AND  
RECLAMATION  
ENGINEERING



## Chapter 1 Land Improvement Project Systems and JSIDRE

1-1 Main characteristics of Japanese land improvement projects

## Chapter 4 Land Improvement Projects

4-1 Land Improvement Law

- (1) Outline of Land Improvement Law
  - (2) Purposes and benefits of land improvement projects
- 4-2 Menu of land improvement projects-

4-3 Long-term plan-

4-4 How to proceed with a project

- (1) Projects findings
  - (2) Preliminary survey
  - (3) General implementation plan
  - (4) Application
- 4-5 Characteristics of the way to proceed with a project in japan
- (1) Menu method
  - (2) Main body of a project related to its scale
  - (3) Subsidies
  - (4) Standardization of engineering
  - (5) Method of judging the effects of projects

## Chapter 5 Related Organizations

5-4 Land Improvement District

- (1) Origin
- (2) Organization
- (3) Functions
- (4) Finance

## Chapter 6 International Cooperation

6-1 International academic societies

(1) International Commission of Irrigation and Drainage(ICID)

6-2 Official Development Assistance (ODA)

(A) JICA Japan International Cooperation Agency)

(B) Overseas Economic Cooperation Fund (OECF)

6-3 Japanese embassies and international organizations

6-4 Agricultural Development Consulting Association (ADCA)

6-5 Tropical Agriculture Research Center

6-6 Others

## Chapter 8 Miscellaneous

8-1 Agricultural machinery

8-2 Irrigation projects for non-paddy crops

8-3 Earth works in reclamation projects-

8-4 Projects of reclamation from sea or lake bottom-

8-5 Disaster prevention projects

8-6 Projects related to water and soil pollution

8-7 Community sewerage systems and other infrastructures

8-8 Concept of irrigation water requirement for paddy

8-9 Water management under a paddy irrigation system

(1) On-farm water management

(2) On-plot water management

8-10 Water rights: progress of urbanization and diversion of water rights

8-11 Standard plot size and its development for paddy field land consolidation projects

8-12 Sophistication of irrigation and drainage facilities

8-13 Drainage projects

# Contents (1)

## Chapter 1 Land Improvement Project Systems and JSIDRE

1-1 Main characteristics of Japanese land improvement projects

## Chapter 4 Land Improvement Projects 土地改良事業

4-1 Land Improvement Law 土地改良法

4-2 Menu of land improvement projects-

4-3 Long-term plan

4-4 How to proceed with a project

4-5 Characteristics of the way to proceed with a project in Japan

# Contents (2)

## Chapter 5 Related Organizations

5-4 Land Improvement District 土地改良区

## Chapter 6 International Cooperation

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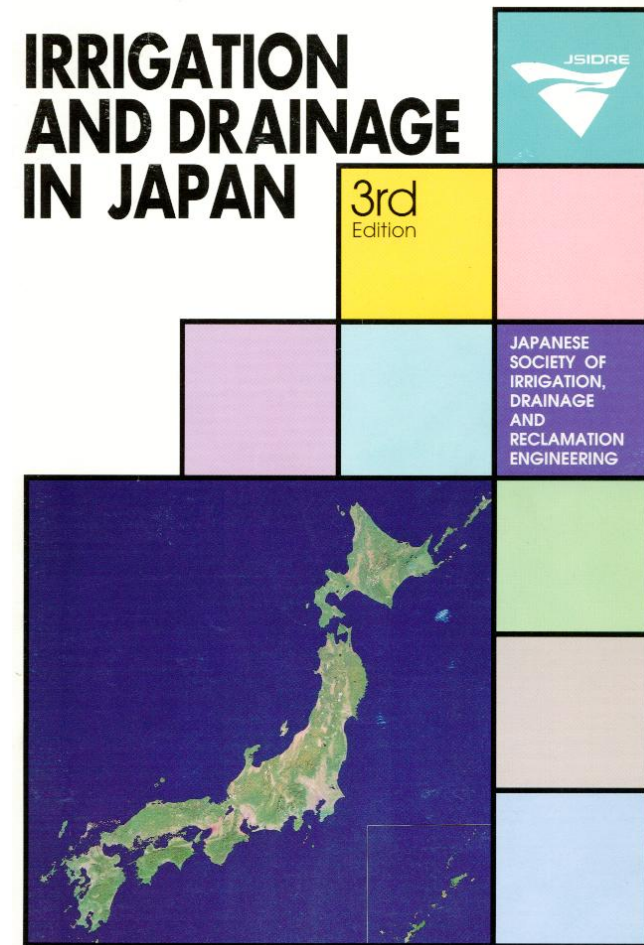
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# IRRIGATION AND DRAINAGE IN JAPAN

- Land Improvement Projects
- Related Organizations
- International Cooperation
- Miscellaneous



JSIDRE (1995)

# Definition of Japanese land improvement projects

- MAFF(Ministry of Agriculture Forestry and Fisheries) is responsible for projects to cultivate virgin land, develop agricultural land, consolidate agricultural land plots or construct irrigation and drainage facilities
  - including reservoirs, barrages, pump stations, canals, etc. for improving agricultural productivity
  - constructing infrastructures in rural areas as community roads, domestic water supply systems, sewerage systems
- Such projects are called
  - (土地改良事業)“Tochi Kairyo Project Systems“= “Land Improvement Project Systems”
  - (農業基盤整備事業)“Nogyo Kiban Seibi Project Systems“= “Agricultural Infrastructure Improvement Systems”
  - (農業土木事業) "Nogyo Doboku Project Systems" = "Agricultural Civil Engineering Project Systems"



# Land Improvement Project (1)

## (土地改良事業)

- Land improvement projects are carried out under a law called the Land Improvement Law.
- This law was initially enacted and enforced in 1949.

### Purposes and Benefits:

- (1) increase land and labor productivities
- (2) increase total agricultural production
- (3) improve the agricultural structure by diversification

# Land Improvement Project (2)

## Menu of land improvement:

1. Irrigation and drainage
2. Agricultural land consolidation (圃場整備事業)
3. Farm and rural roads
4. Comprehensive development of non-paddy agricultural land
5. Comprehensive development of rural areas
6. Disaster protection
7. Reclamation of agricultural land (開拓)
8. Reclamation from sea or lake bottom (干拓)

# Characteristics of Land Improvement Project in Japan

- Various menus are provided in term of contents and benefits of facilities
- The main body to implement a land improvement project is either the national government, a prefecture, or a Land Improvement District
- The costs of land improvement projects are paid by the beneficiaries
  - Part of the costs is paid by the farmers who are the direct beneficiaries
- Facilities to be constructed by projects of the same type have to be standardized throughout the country
- "Cost Benefit Ratio" (BC Ratio) is used as the criterion to judge the economical feasibility of land improvement projects

# Water rights

progress of urbanization and diversion of water rights

- The economic growth and progress of urbanization have caused diversion of a large number of paddy fields into housing, office or factory land lots.
  - As a result, it was thought best to divert some of the water for irrigation to water for the newly born cities.
  - In Japan an approval from the Ministry of Construction has to be obtained under the River Law to divert water rights.
- Diversion for irrigation prior to 1896 when the River Law was enforced was considered a traditional water right (慣行水利権), already approved at the time of enforcement.
  - The water rights of irrigation groups with a long history have been legally recognized.
  - In view of the definition under the River Law that river water is a public asset, irrigation groups are prohibited to directly sell their water rights to cities

# Land Consolidation Project



# Standard Plot Size (標準区画)

- Plot Size:
- From around 1965 to recent years, a plot of 0.3 ha (3反区画) has been considered a standard size for paddy land consolidation projects.
- Basic size is 100 meter long and 30 meter wide. With a farm ditch, farm drain and farm road along the shorter side.
- Recently, land consolidation projects have started to make plots of at least 0.5 ha in order to use farming machinery more effectively and also in order to improve capital and labor productivities.

# Standard Paddy Field Layout after Consolidation

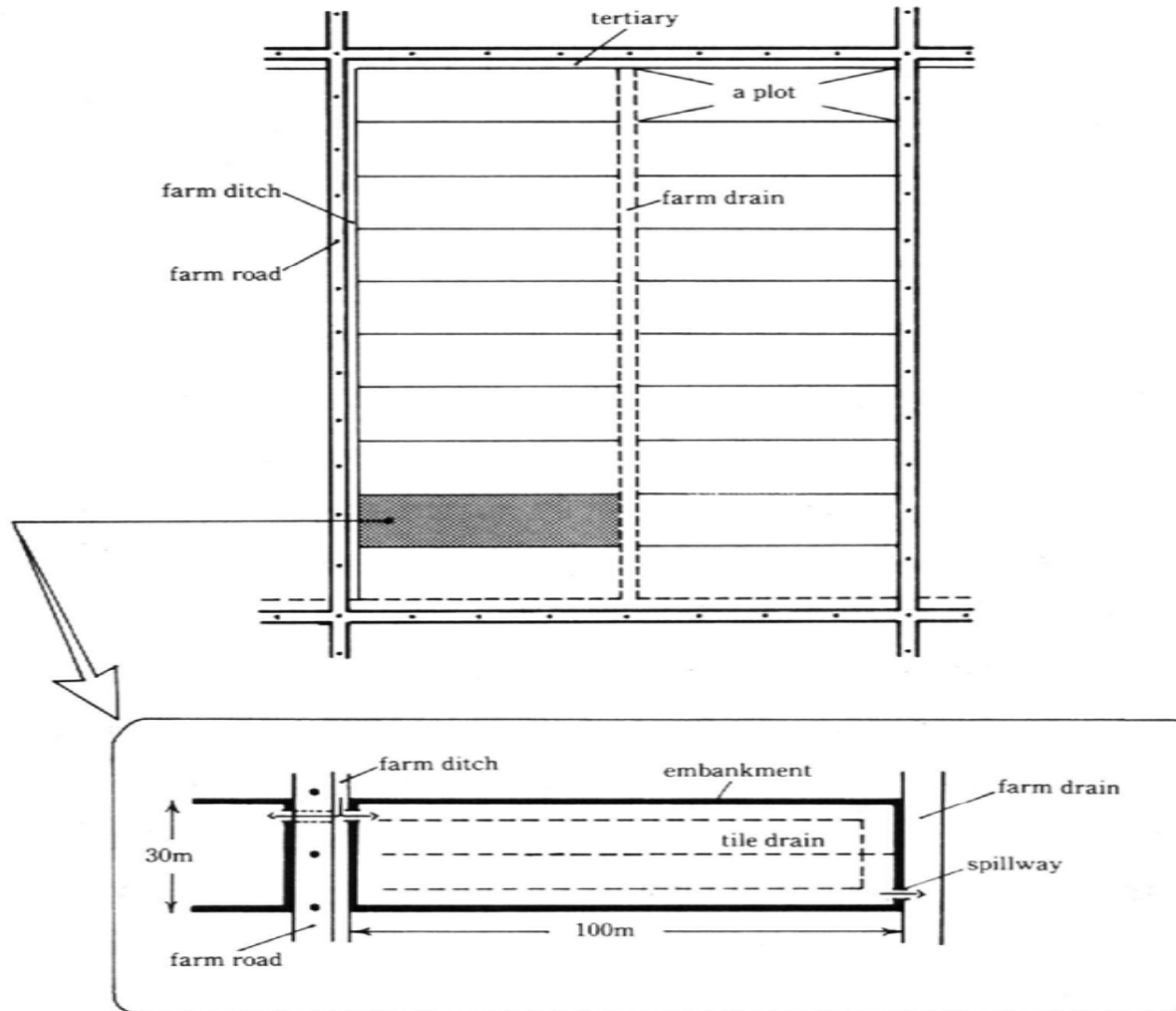


Figure 7 Standard paddy field layout after consolidation.

# Conclusions

- Agricultural Infrastructure Improvements are public work projects 農業基盤整備は公共事業
  - Application projects 申請事業
  - Need Consensus building 合意形成
  - Take a long time 時間がかかる
- The Spirit of Agricultural Engineering 農業土木の神髄
  - Comprehensive agricultural development technology 総合的な農業開発技術
  - Management of soil and water 水土の管理
  - Improvement of QOL supported by the technology 生活の質の向上
  - Interaction between urban and rural areas 都市と農村の交流



# Project-Z for Fukushima

Agricultural Infrastructure has been accomplished by unknown Challengers!



# References 参考文献

- [http://www.water.go.jp/chubu/aityosui/a\(jyouhou-sub\)/06\(english\)/a\\_06.html](http://www.water.go.jp/chubu/aityosui/a(jyouhou-sub)/06(english)/a_06.html)
- [IRRIGATION AND DRAINAGE IN JAPAN \(3rd Edition\), International Affairs Commission of The Japanese Society of Irrigation, Drainage and Reclamation Engineering \(1995\)](#)
- [IRRIGATION AND DRAINAGE IN JAPAN PICTRAL\(3rd Edition\), International Affairs Commission of The Japanese Society of Irrigation, Drainage and Reclamation Engineering \(1995\)](#)

# Homework

## レポート課題

- Summarize today's lecture within 200 words **and** write your impression of the lecture.
- Deadline: June 26
- To: [report@iai.ga.a.u-tokyo.ac.jp](mailto:report@iai.ga.a.u-tokyo.ac.jp)
- Subject: your name (8)Mizo
- 本日の講義を400字以内に要約し、講義の感想を書きなさい。