

Role of District-level Organization in Decentralized
Arrangement of Irrigation Management
- Lessons from Water Users Association of
Farmers in Japan and Egypt -

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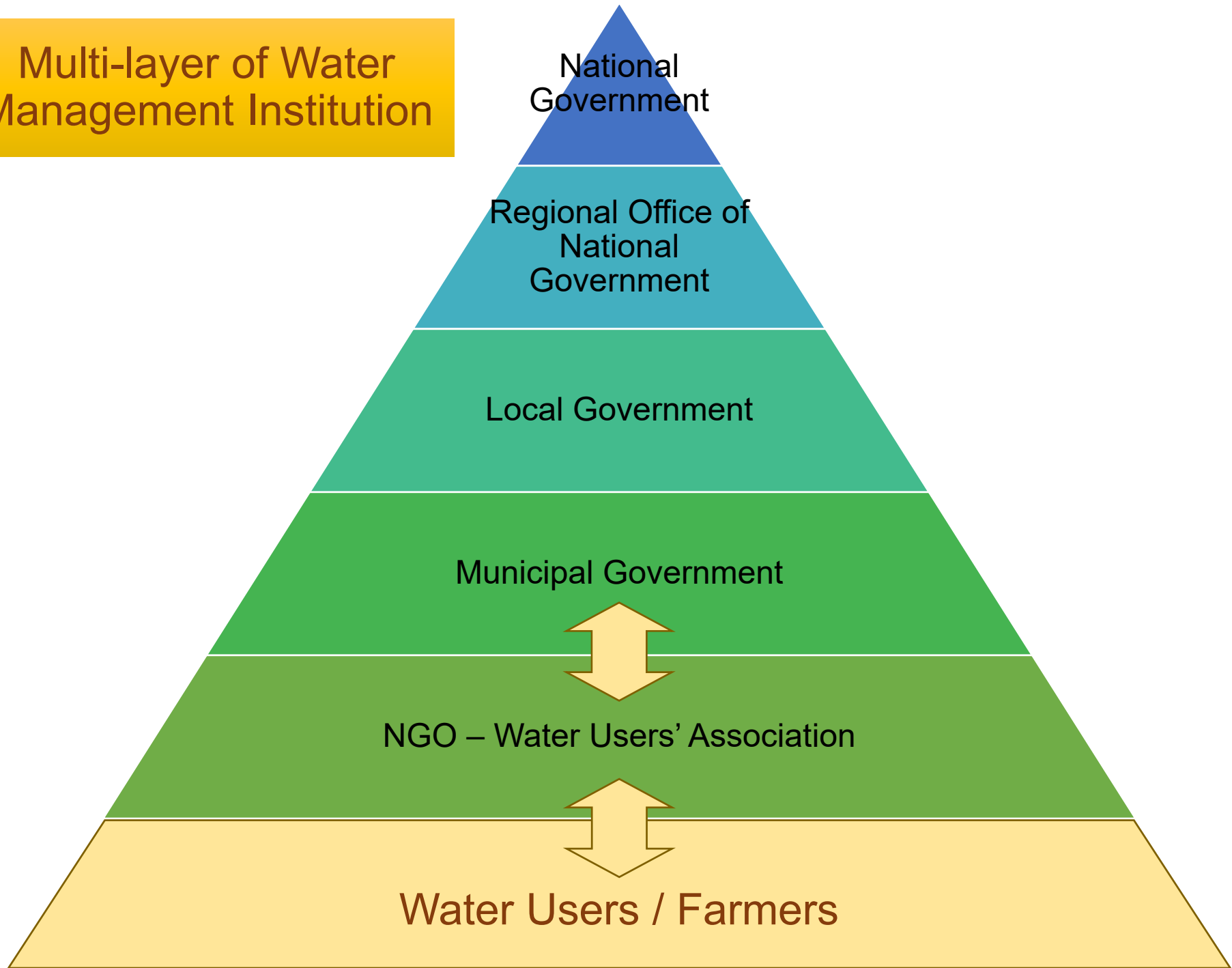
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Topics

- Outline of irrigation management in Japan
- **LID- *Land Improvement District*** in decentralized arrangement of irrigation management in Japan
- Irrigation Improvement Project in the Nile Delta of Egypt
- Role and importance of district level management organization
- Summary - Conclusion

Multi-layer of Water Management Institution



Outline of Irrigation Management in Japan



Agriculture in Japan

- Not only TOYOTA, HONDA, SONY, PANASONIC, CANON, etc., but also beautiful farmland and well-organized irrigation system, in Japan
- Farmland area (2018)
 - Total 4.44 Mha : 13% of total land area of Japan
 - 54 % : paddy rice field (2.40 Mha)
- Irrigation
 - Paddy rice fields : 100% irrigated
 - Other upland crops (wheat, vegetable, fruits): 20% irrigated
- Historical development
 - From 5-6th Century
 - In 17th Century, framework of the present system was established

Paddy Irrigation in Japan

- Water demand in only summer season
 - ▣ Around 120 days
 - ▣ Heavy rain and drought simultaneously in summer
- Much water use
 - ▣ Water requirement 20-25 mm/day, one third is compensated by rainfall
 - ▣ Water supply source: 88% from rivers
 - ▣ Total diversion for agriculture: 58 billion m³/year
 - 66 % of the developed water resources 82 billion m³
 - 55 billion m³ (95%) : for paddy irrigation
- Reuse of drainage water or return flow
- Historically developed
 - ▣ Preferential use of low river flow
 - ▣ Managed by historically developed farmers' organizations

Irrigation and drainage system

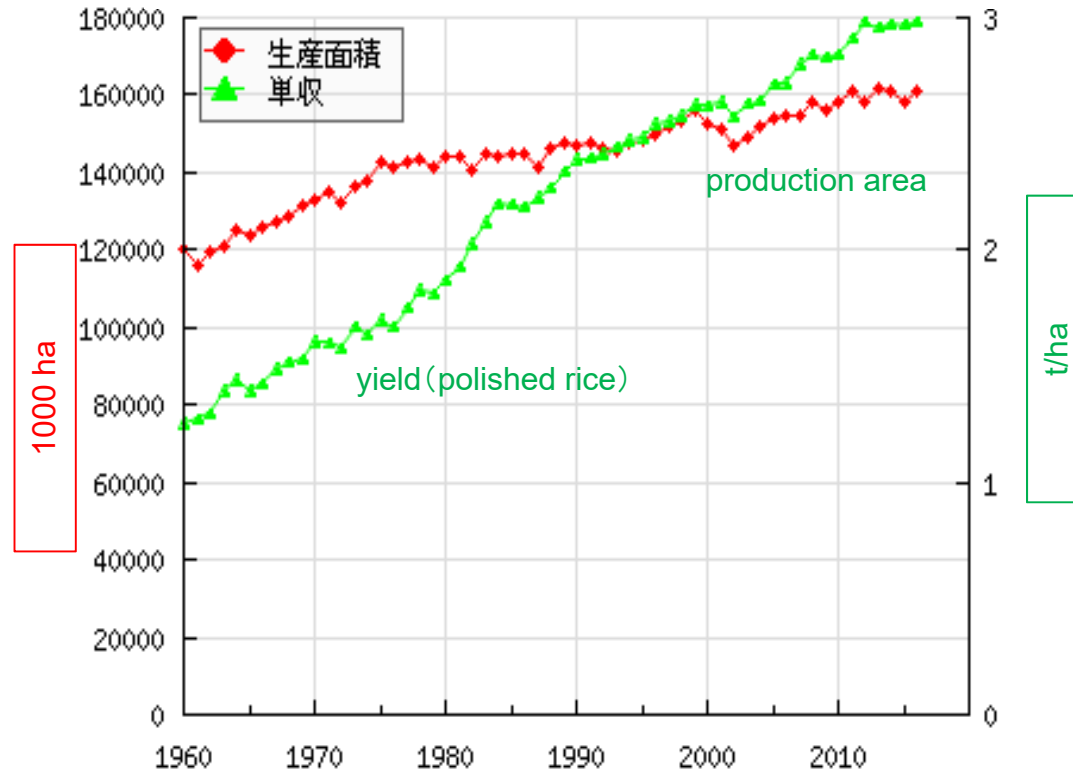


- Relatively small scale
- Historically developed
 - ▣ Modernized rapidly after World War II
 - ▣ With farmland consolidation
- Construction project is carried out mainly by the national and local governments with farmers' applications
- Operation and maintenance is carried out mainly by organizations of beneficial farmers



Paddy Field in the World

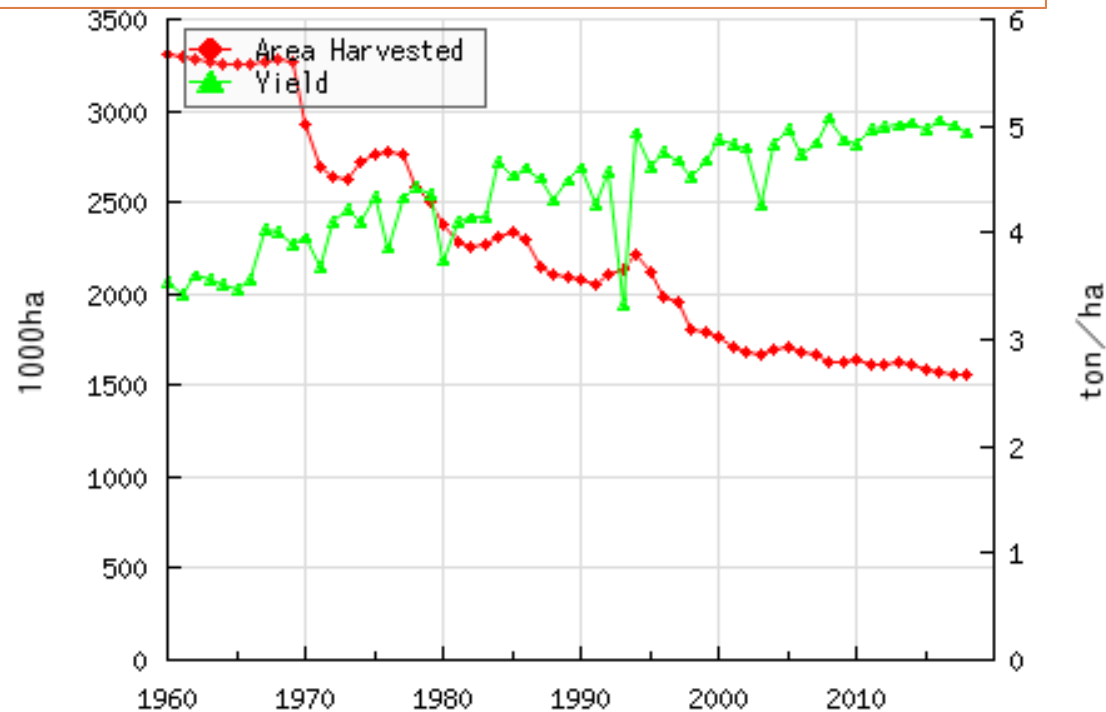
Changed in production area and yield (polished rice)



Sources: USDA: PS&D Online July 2016; USBC: International Data Base, August 2006. (after Ito S., Kyushu University)

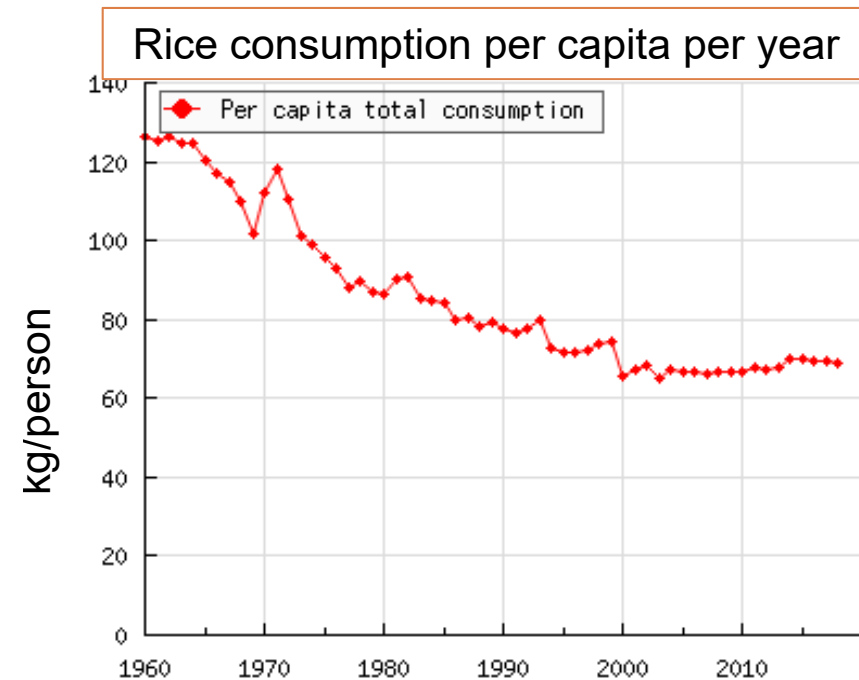
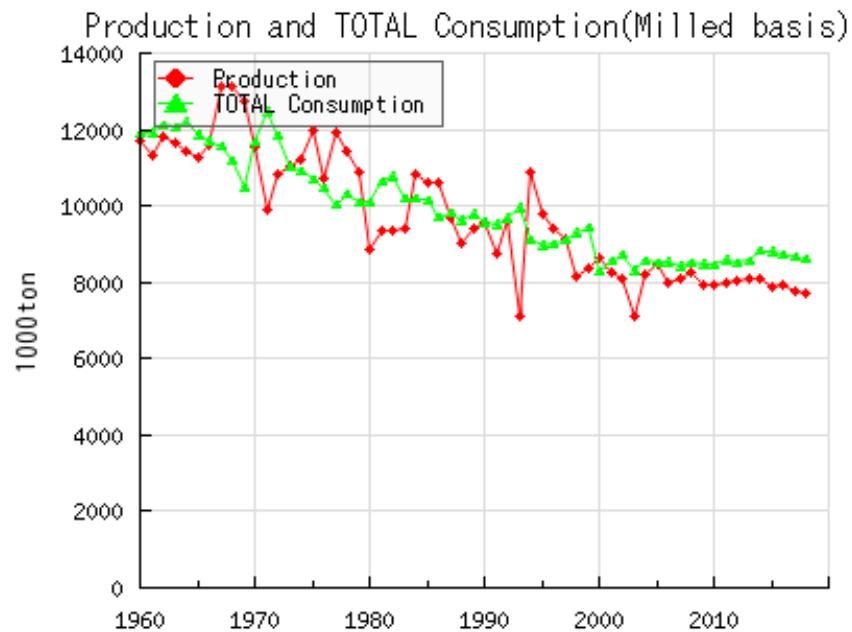
Paddy Area in Japan

Changed in production area and yield (milled basis)



Sources: USDA: PS&D Online July 2016; USBC: International Data Base, August 2006. (after Ito S., Kyushu University)

Rice Production and Consumption in Japan

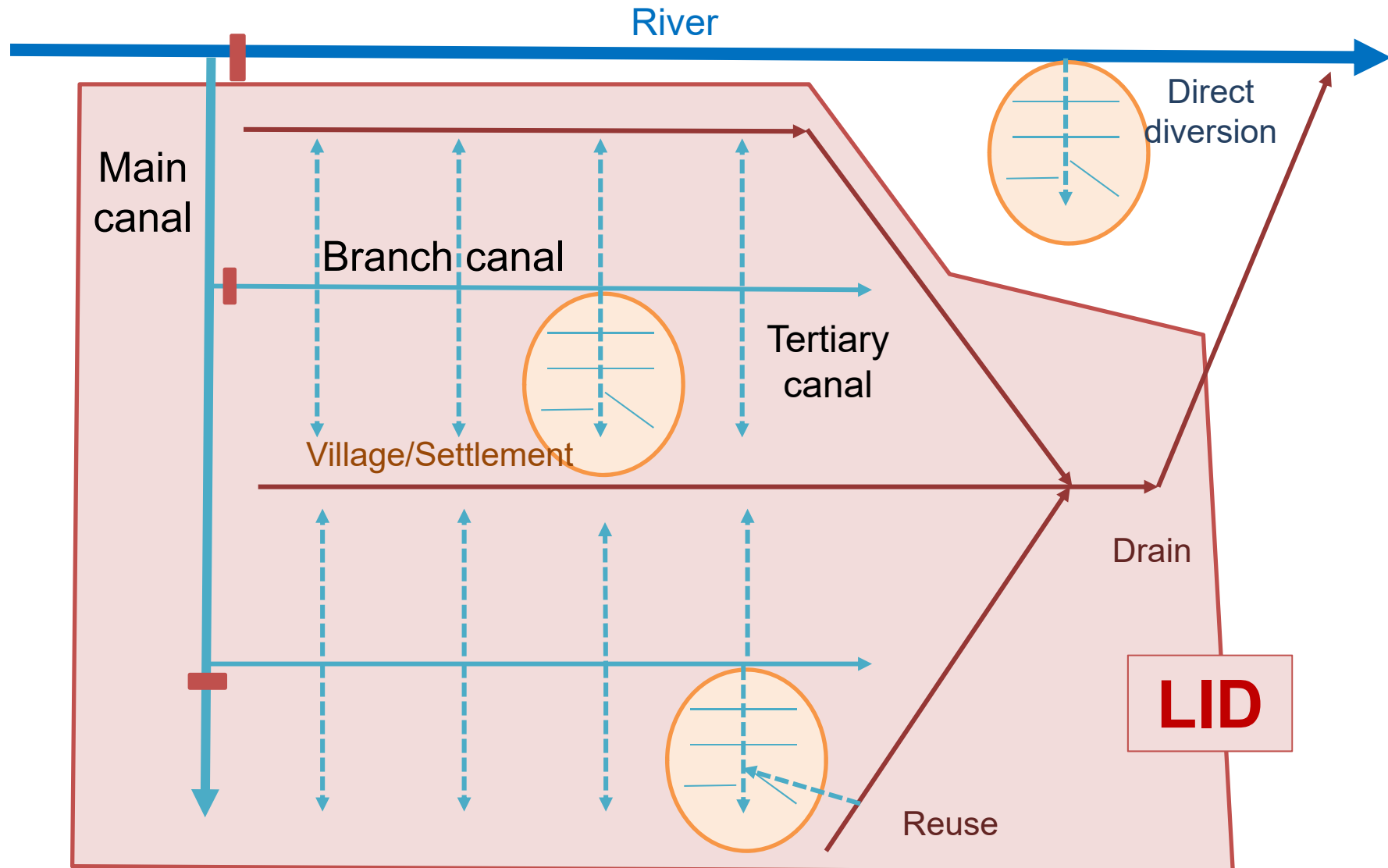


Sources: USDA: PS&D Online July 2016; USBC: International Data Base, August 2006. (after Ito S., Kyushu University)

LID- Land Improvement District in decentralized arrangement of irrigation management in Japan



Water Distribution and LID- Land Improvement District



LID – Land Improvement Districts

- The irrigated paddy areas in Japan are institutionally divided into Land Improvement Districts (**LIDs**).
- **LIDs** are non-governmental entities legalized in accordance with the Land Improvement Act of 1949
- Two types of **LID**
 - Land Consolidation **LID**
 - Water Management **LID**
- Total number of **LIDs** : 4,455 in 2018
 - 3.53 million beneficiary members (farmers)
 - for 2.51million ha.
 - LID command size: from less than 100 ha to 10,000 ha.

LID – Land Improvement Districts (continued)

- Most of the **LIDs** had been existing before the Land Improvement Act of 1949, and were re-organized or renamed to **LID**.
- **LID** holds a hierarchical structure with water users associations of farmers at bottom layer, which are based on rural community, or traditional village.
- Most of farmers' associations were historically established 200-400 years ago, with cooperative and autonomous O&M practices on irrigation facilities.

Functions of LID

- The functions of water management **LID** are:
 - to execute smaller scale facility construction or rehabilitation project,
 - to allocate and distribute water among users; tertiary level farmers' associations,
 - to maintain irrigation and drainage facilities above tertiary level, and
 - to voluntarily preserve eco-environmental system, including ecology of aquatic systems.

Products of LID

■ Products

- stable water supply, including settlement of conflict among users
- higher water use efficiency
- effective measures for water shortage in drought or dry spell

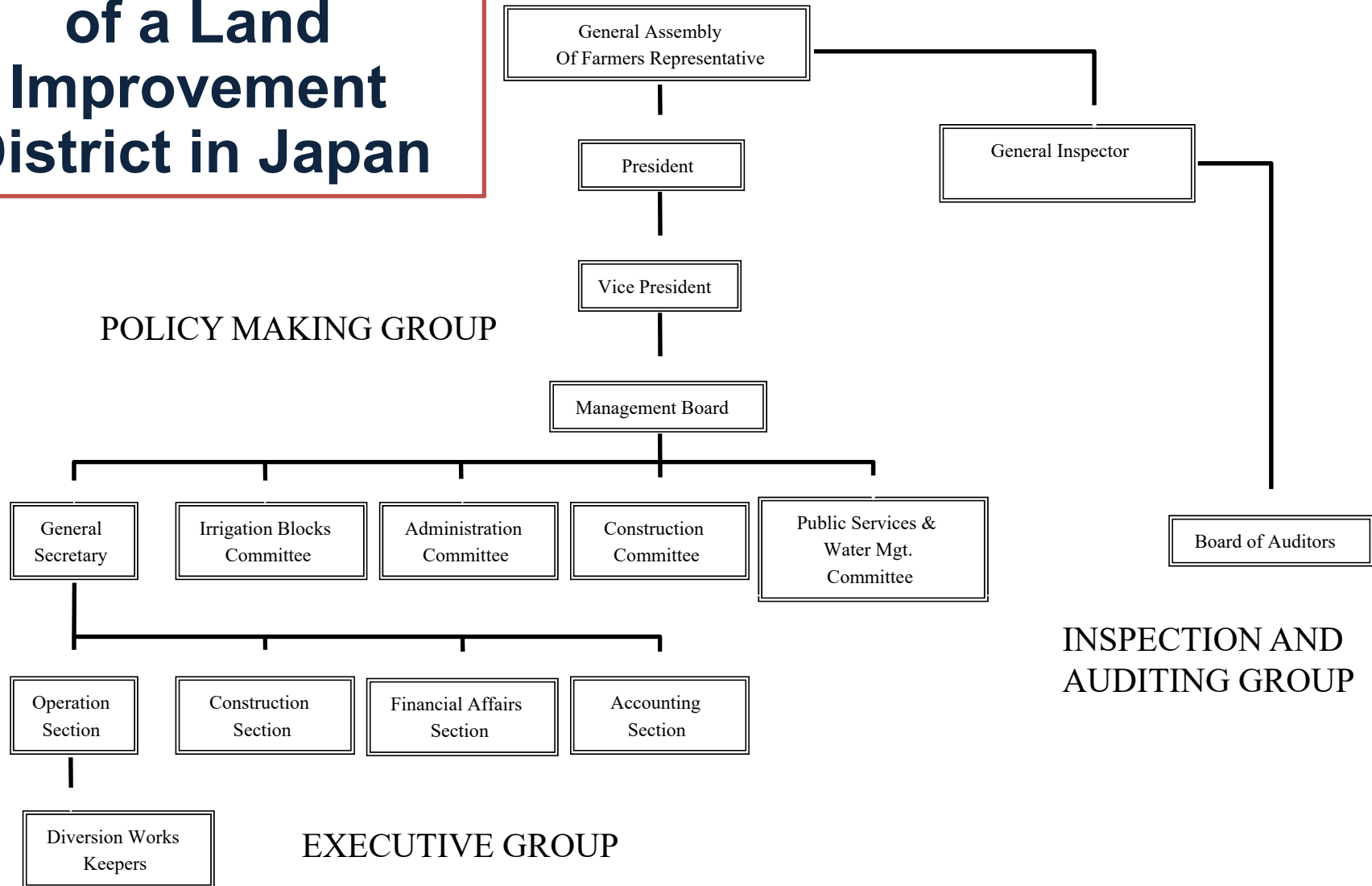
O&M of Irrigation Facilities by LIDs

- Construction of irrigation facilities is carried mainly by the national or local governments, and by **LID** for small scale facilities.
- The O&M of the constructed facilities is basically carried out by **LID**,
 - even in the case that the government constructs the facility,
 - in this case, the **LID** is usually entrusted with O&M by the governments,
 - or the ownership of the facility is transferred to the LID.
 - National or local governments carry out the management of larger facilities, including larger reservoirs and diversion works.

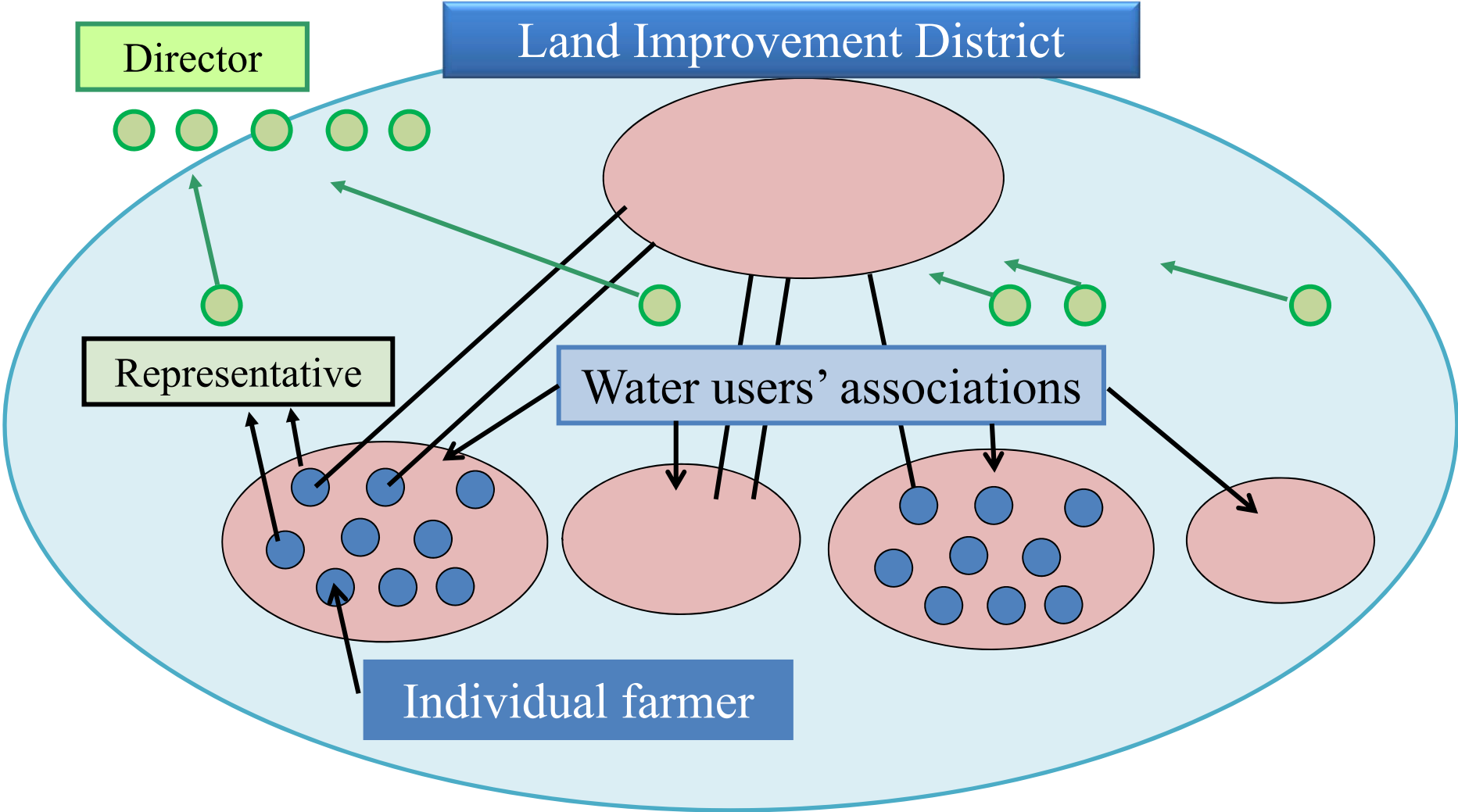
O&M of Irrigation Facilities by LIDs

- In the O&M of irrigation facilities, LID responsibility is limited to control structures and canals above tertiary level.
 - Farmers' associations/groups and individuals actually manage and control all facilities at tertiary and on-farm levels.

Typical structure of a Land Improvement District in Japan

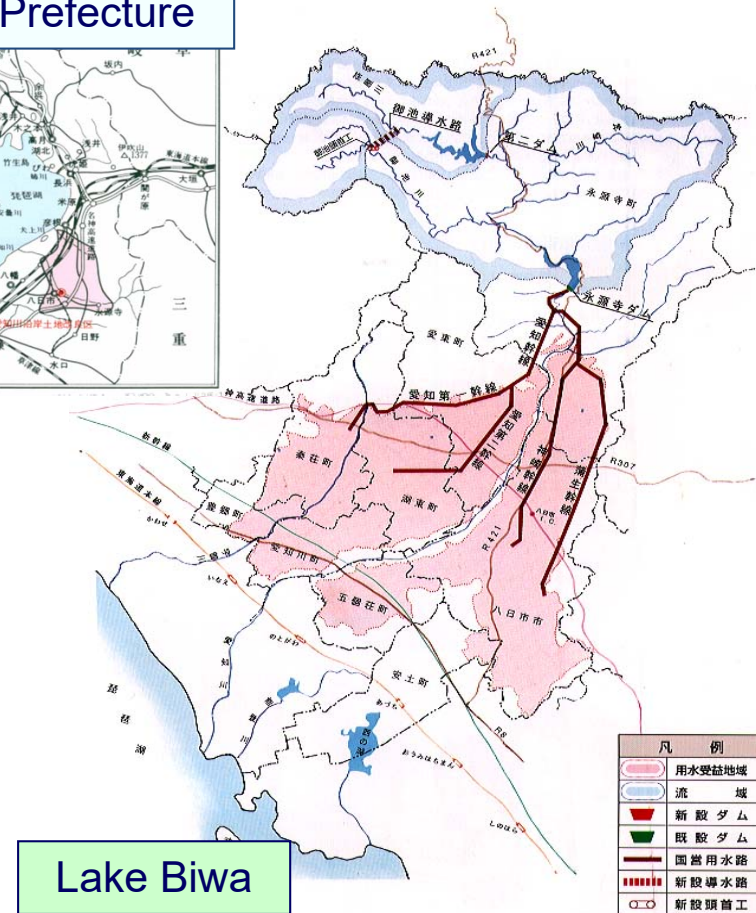


LID - Summary



A Case of the Echi River LID

- National Irrigation Project
- 1952-1983
- Eigenji Dam
- Other irrigation facilities
- Irrigated area 8,000 ha
- Member farmer 10,000
- Phase II : 1993-



Lake Biwa

The Echi River LID

- LID operates and maintain the irrigation facilities above tertiary level.
 - Tertiary and field level facilities are managed by community level water users' association and farmers groups.
 - The dam – reservoir is operated and maintained by Shiga Prefecture government.
- LID works in close communication with local governments and federation of LIDs.
 - Regional office of Shiga Prefecture
 - Local communities: one city and eight towns
 - the prefecture level federation of LIDs.

The Echi River LID

- **In the Echi River Basin of Shiga Prefecture**
 - Farmland Area about 7653ha (2001)
 - Paddy: 7441ha, Upland: 146ha, orchard: 66ha
 - Average annual precipitation about 1400mm
 - Water source; Echi River and other supplementary sources
 - National irrigation project Phase I (1952-83)
 - National irrigation project Phase II (1993-2007)
 - New national irrigation project (plan 2014~)
- **Problems on land and water management**
 - Complex system and unstable water supply
 - Control of agricultural drainage for conservation of water quality of Lake Biwa
 - Re-organization of water management due to changes in agricultural production

Hydraulic Structures of the Echi River LID



Water management practices of WUA



Dam-Reservoir Clean-up Campaign by the Echi River LID



Problems and Perspectives of the Echi River LID

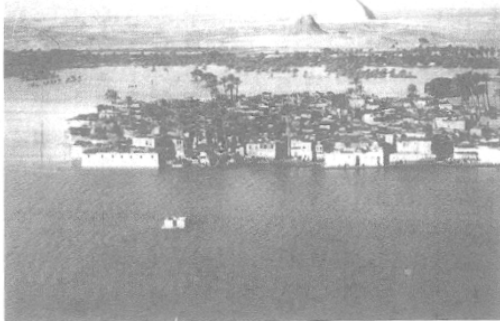
- Area conditions of topography and hydrology
 - Fan terrace > Gravity irrigation
 - Complex small-scale topography > Independent small-scale irrigation system
 - Higher permeability > Dynamics of groundwater
- Dispersed and diffused water system
- Construction of wide-scale canal network with large reservoir
 - Connecting the dispersed systems
 - Revival of groundwater use
 - Management organization for hierarchical structure of canal system
- Necessity for “Regional Water Management”
- Reorganization of management system
 - Management with regional hydrological system
 - Change of the role of LID
 - Participation of stakeholders
- “Cooperation” in the next stage



Irrigation Improvement Project in the Nile Delta of Egypt



Nile Valley and Delta of Egypt



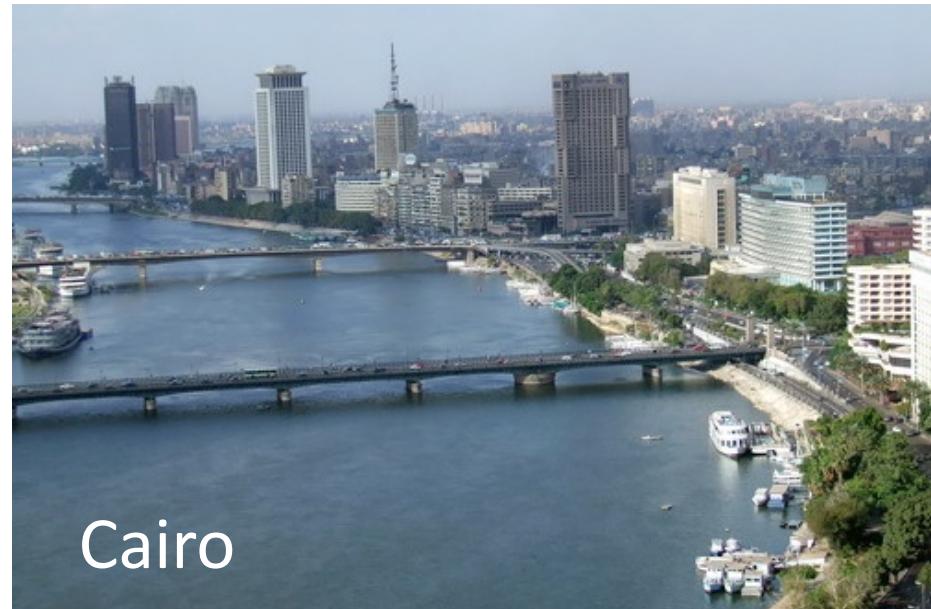
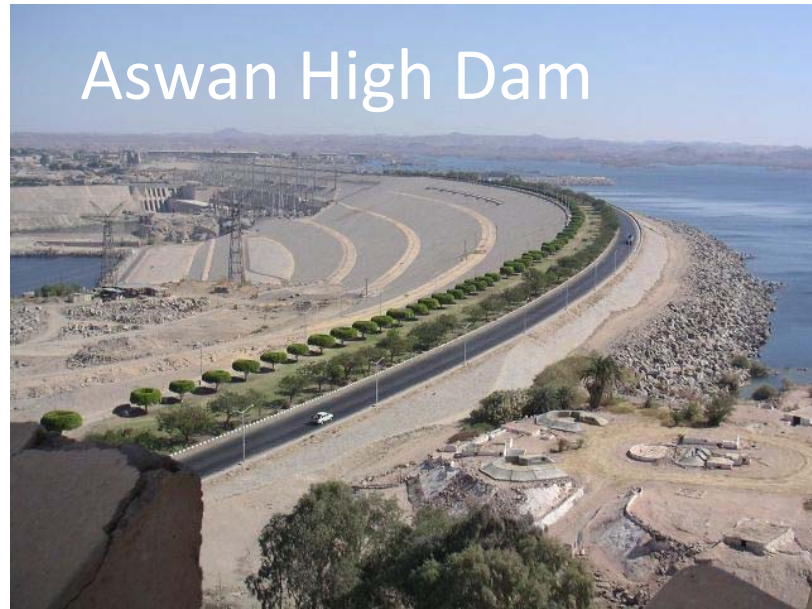
Bu Hiroshi KATOH



Sub-surface drain

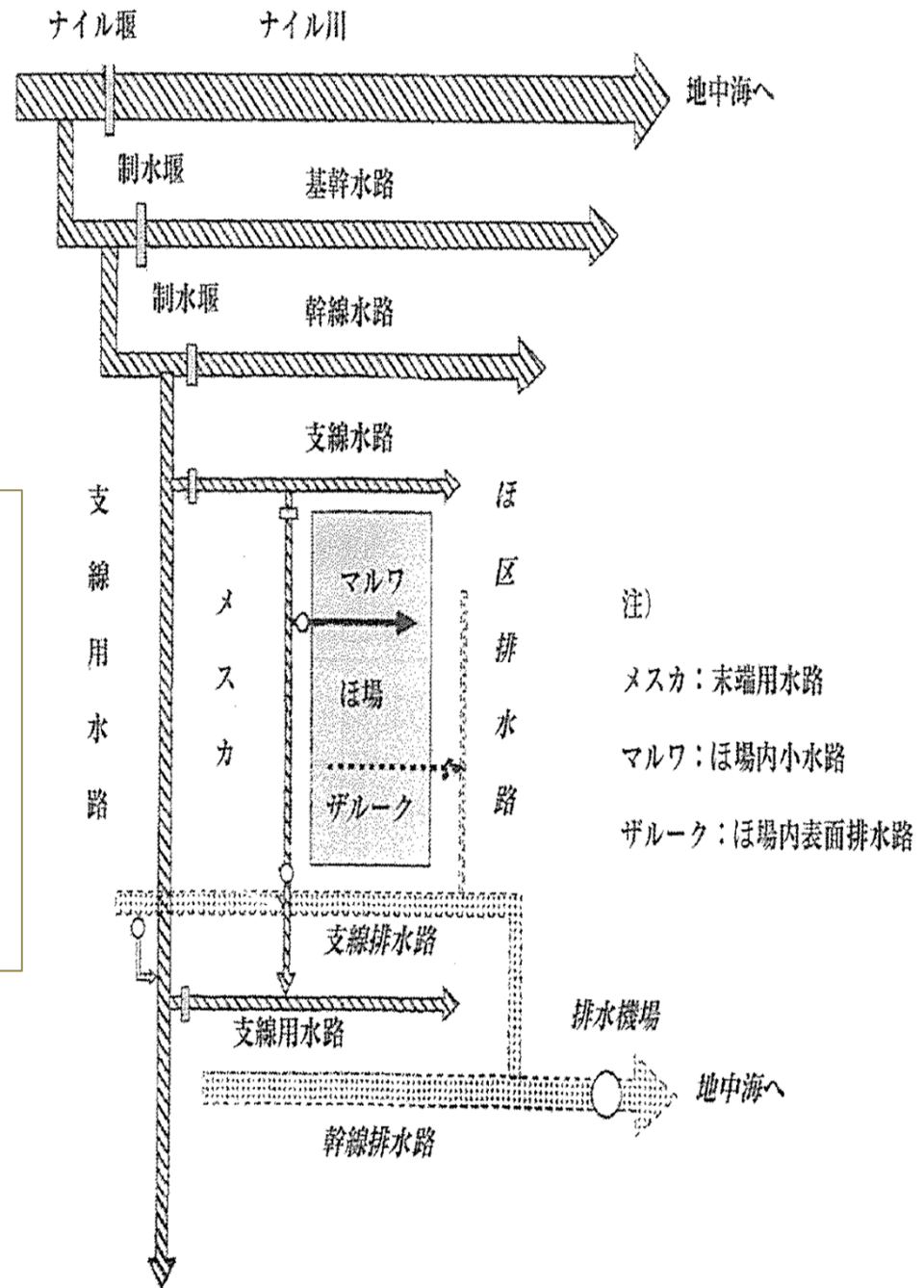
- 2.9M ha of irrigated areas
- No effective rainfall
- Long history of use of the Nile water with more than 5000 years
- “Sustainable” basin irrigation
 - Changes in the long history
 - Influences of variable discharge
- Modernization form 19C
 - Diversion and perennial irrigation
 - Construction of the Aswan High Dam and artificial regulated river flow
- Changes of flood damage and expansion of soil salinity
- Reconstruction of hydrological regime and farmland conditions
- Long-term water management vision of NWRC

The Nile River in Egypt

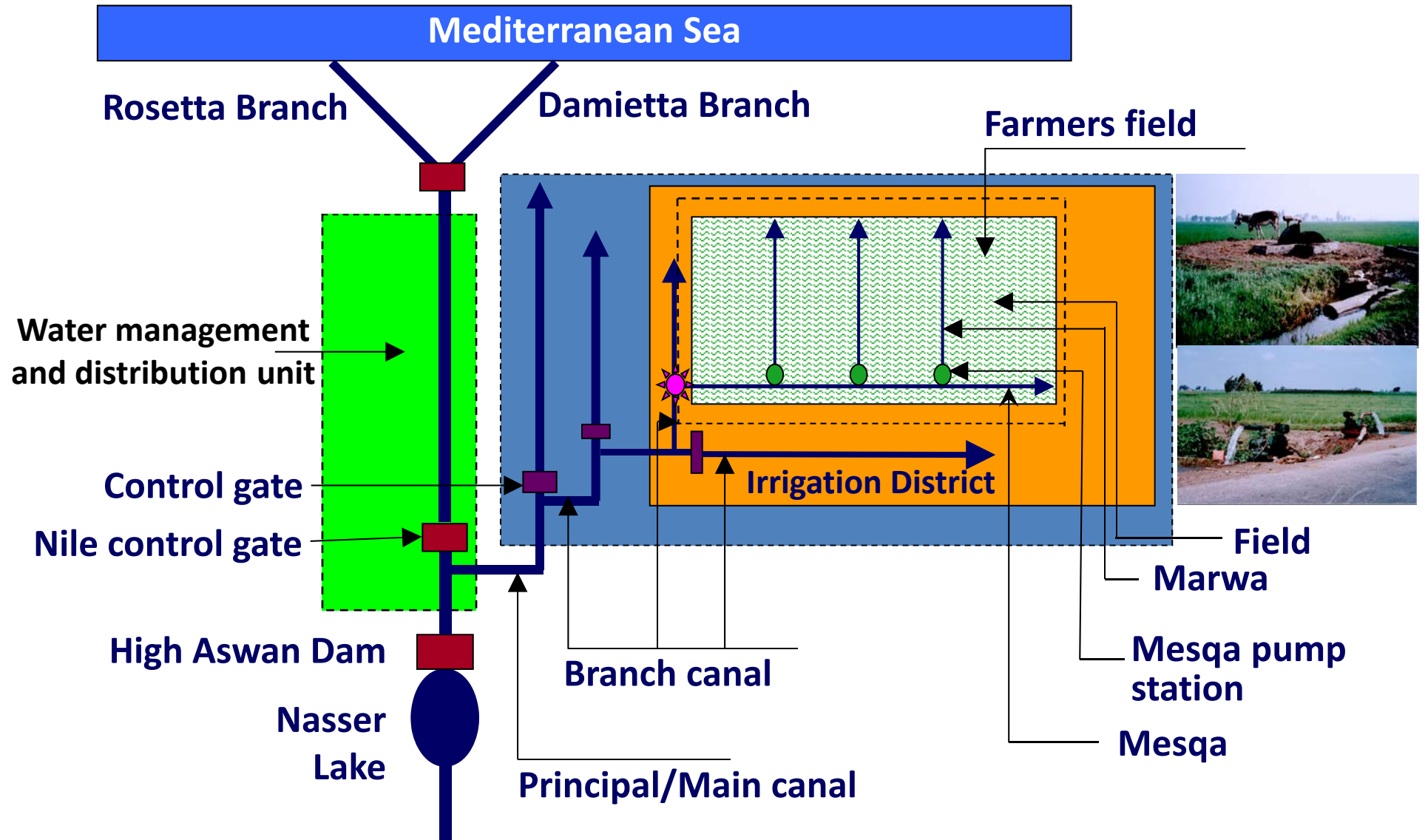


General framework of irrigation system in the Nile Delta

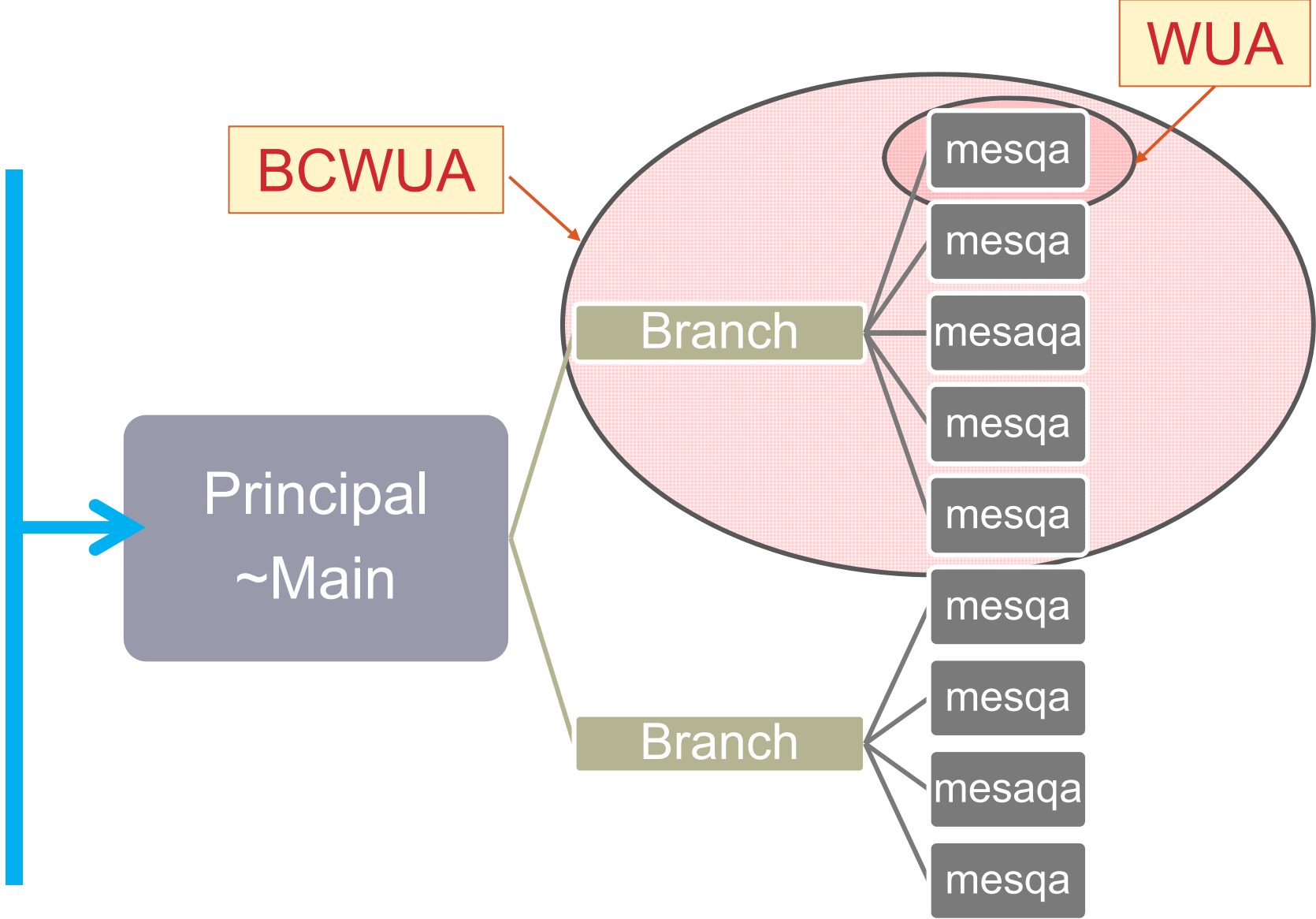
- Main and branch canal : Nation
- Mesqa: farmers
- Mesqa level WUA
- Branch Canal WUA



Schematic Irrigation System Layout in the Nile Delta



PARTICIPATION OF FARMERS ON WATER MANAGEMENT OF DISTRICT LEVEL – BRACH CANAL LEVEL



Framework of irrigation management organizations in the Nile Delta

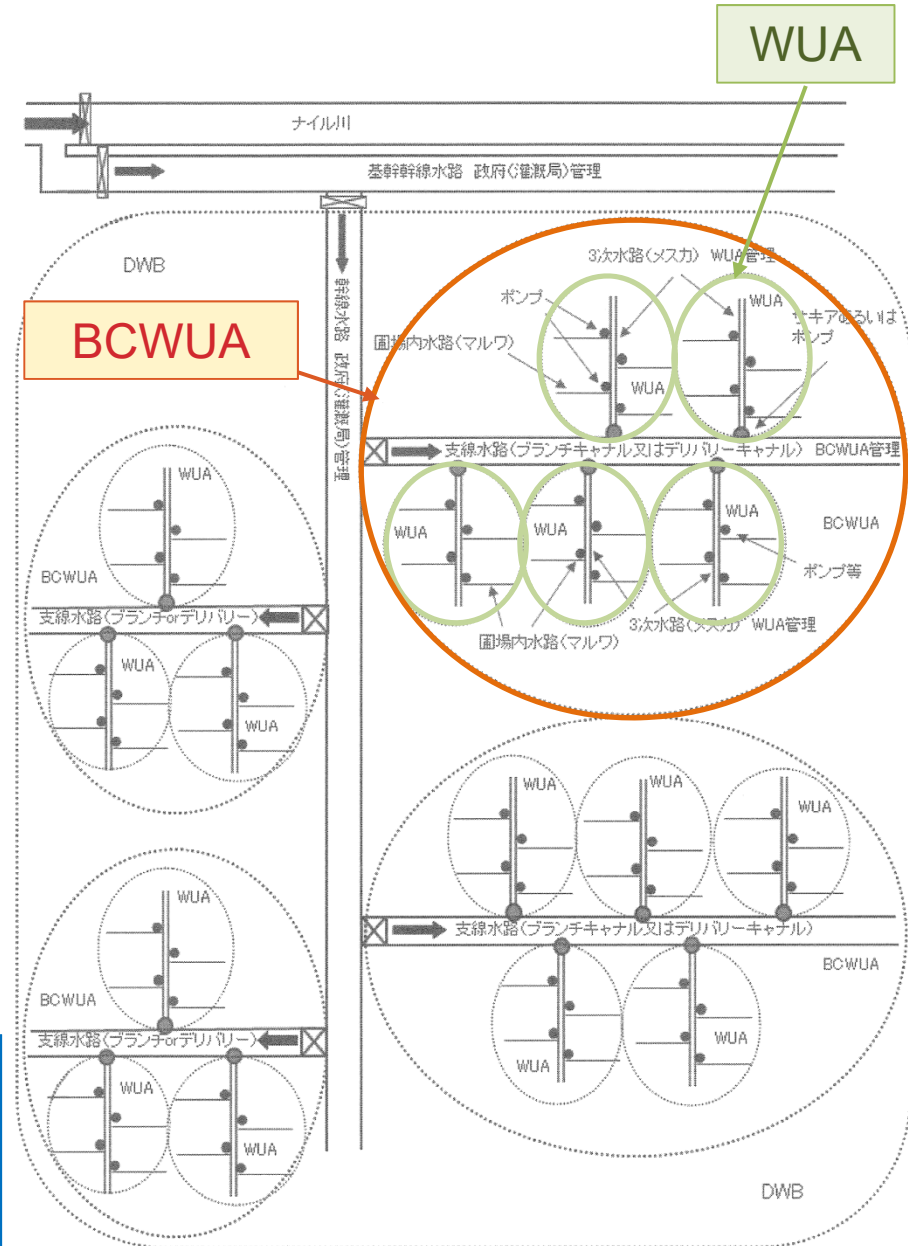


表-1 階層別水利組合の設立目標(国家水資源計画による)

階層別水利組合	現状 (2006年)	計画の目標 (2017年)
灌漑区レベル(DWB)	3	204
支線水路レベル(BCWUA)	718	4,000
メスカレベル(WUA, WUU)	5,459	80,000

【各層の農民水利組織の説明】

WUA: Water Users' Association: 3次水路(メスカ)レベルの農民水利組織
 BCWUA: Branch Canal Water Users' Association: WUAを束ねる支線水路レベルの農民水利組織
 DWB: District Water Board: BCWUAを束ねるDistrictレベルの農民水利組織

IIP/Irrigation Improvement project (1994-2006)

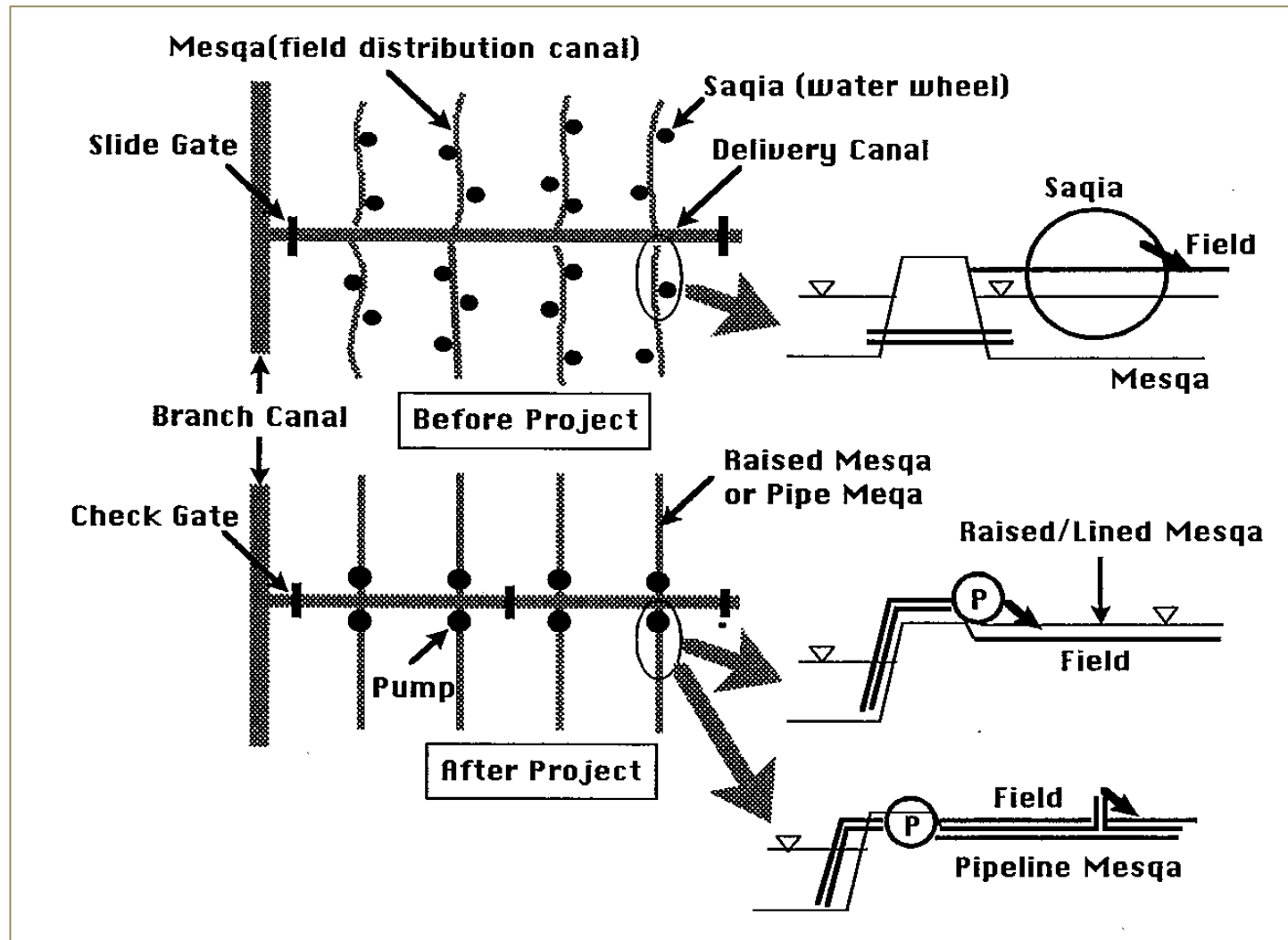
■ Objectives

- Increase the agricultural production.
- Improve the long-term sustainability of irrigation
- Strengthen the institutional planning and implementation

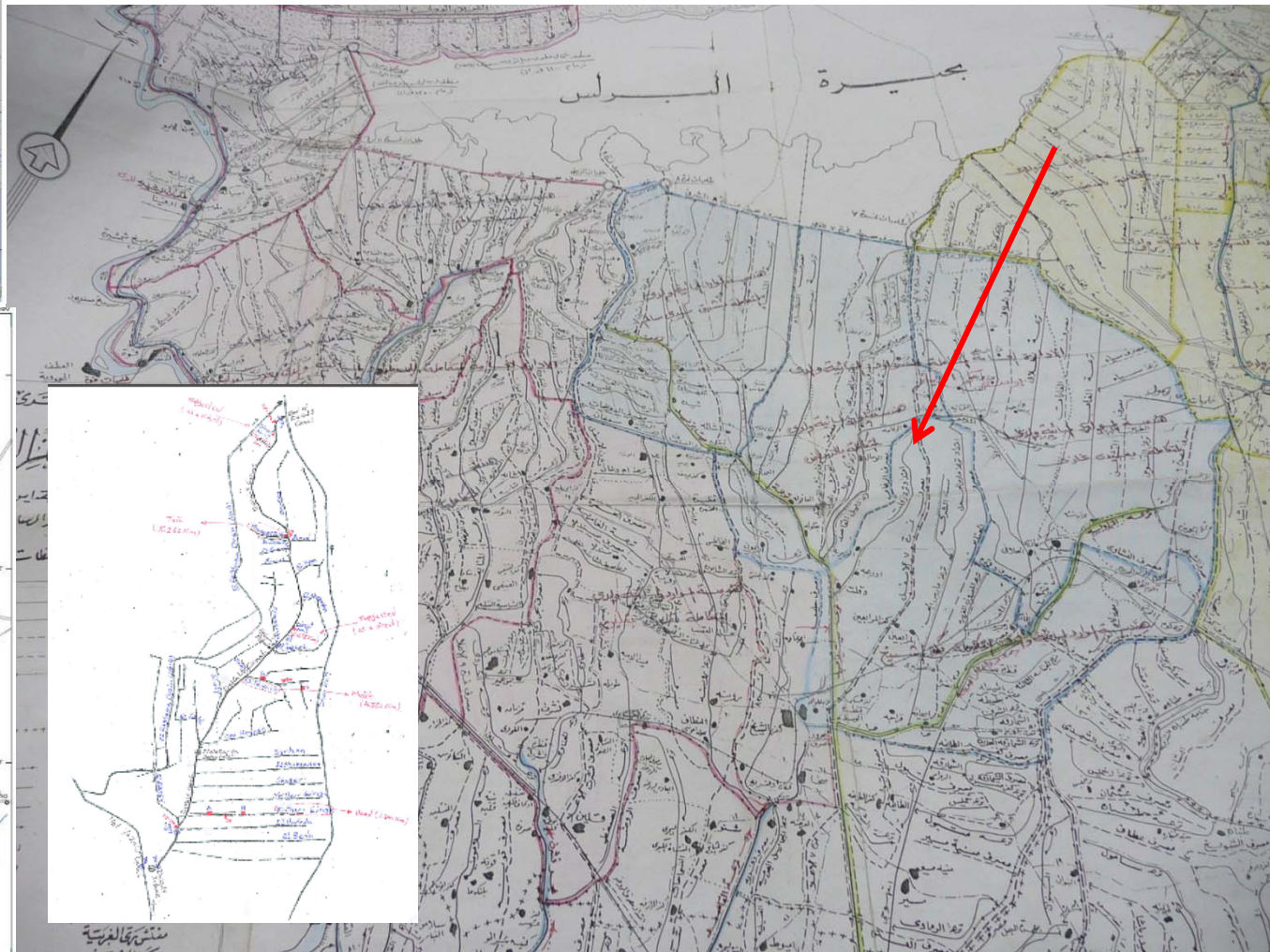
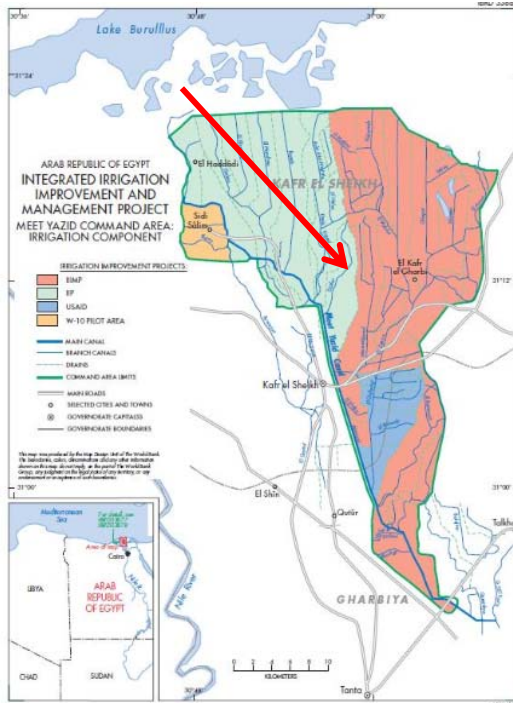
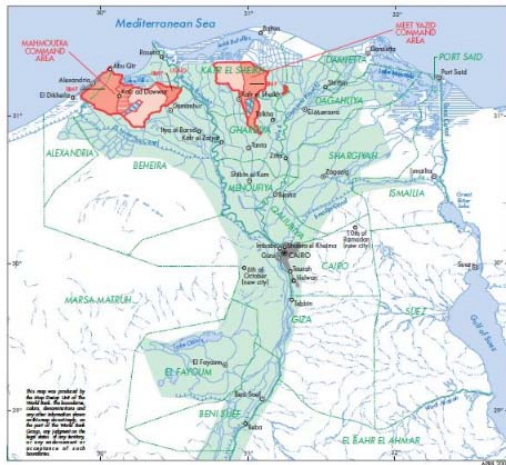
■ Achievement

- Improvement of Main and Branch Canals
- Rehabilitation of tertiary canals
- Establishment of IAS (Irrigation Advisory Service)
- Assistance for institution establishment
- Environmental Assessment
- Establishment of field application plan

Mesqa Improvement in the IIP (Irrigation Improvement project)

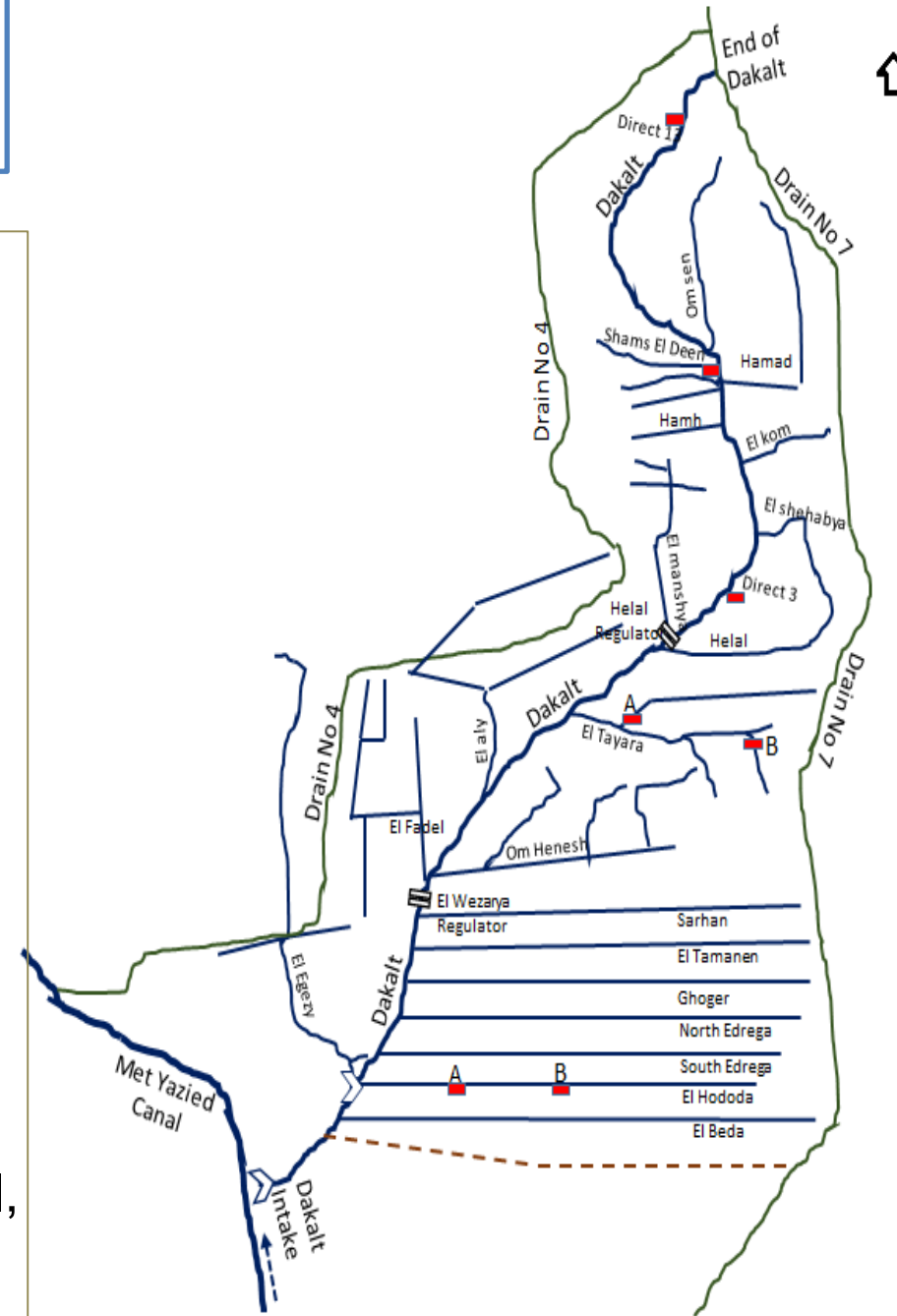


Dakalt Branch Canal



Dakalt Branch Canal in the Nile Delta

- Diversion from the Meet Yazieid main Canal
- L:11km, 24 Mesqas
- Beneficial area: 2650ha, 2000 farmhouses
- Summer crops: rice, cotton, maize
- Winter crops: berseem, wheat
- IIP1 Plan: 1994-98, Implementation: 1998-2000
- Branch Canal WUA is not functioning.
- Continuous flow of the branch canal is not realized.
- Inequity of water distribution (canal, masqas)



Delta Barrage



Diversion to the
Dakalt Branch Canal

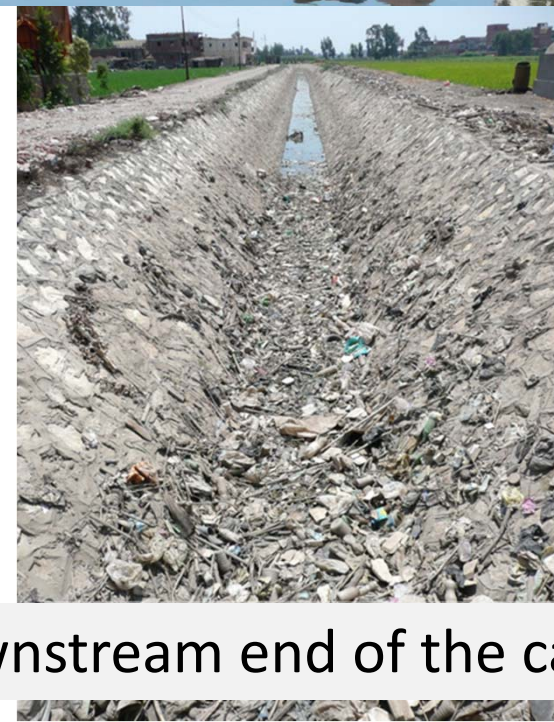


Meet Yazieid Main Canal



Dakalt Branch Canal





Downstream end of the canal



Role and importance of district level management organization

- Lessons from the cases of Japan and Egypt -



Role and importance of district level management organization

- Community-level farmers' WUA
 - O/M of tertiary and on-farm level facilities
 - Important role of voluntary and autonomous O/M
 - Relatively clear incentives for farmers
 - Inadequate technical, human, and financial resources
 - Difficulty for settling conflict with other associations
 - Function without official legalization

Role and importance of district level management organization

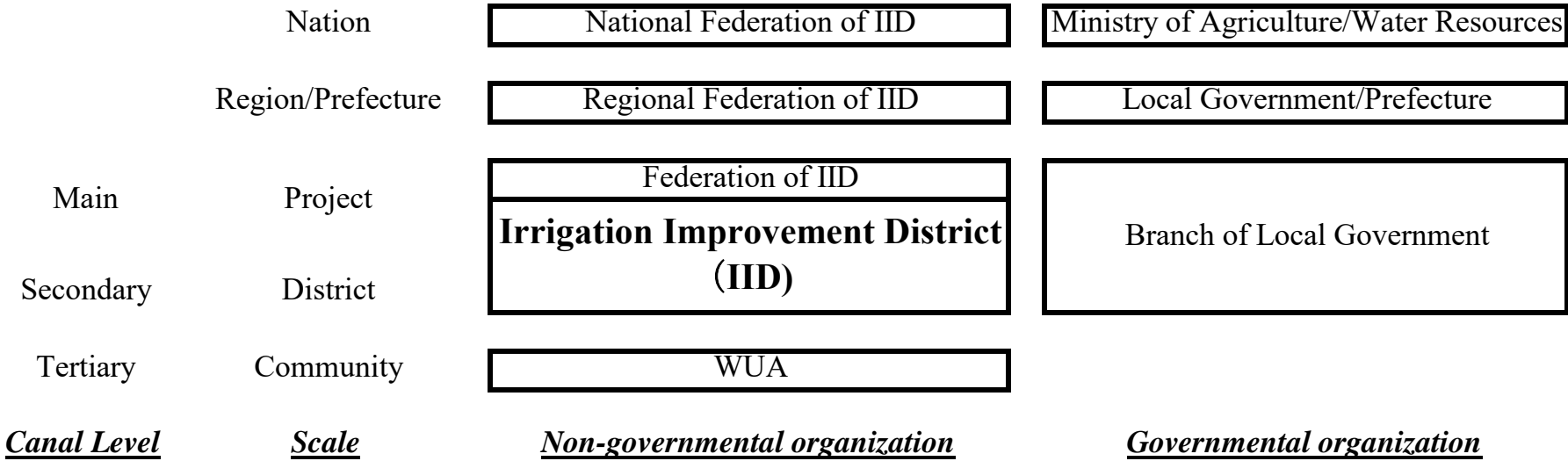
- District level management organization
 - ▣ District level : above tertiary level which can be operated by community-based farmers' association
 - ▣ Well function as bottom-up inter-WUA organization
 - ▣ Responsible organization for O/M of irrigation system
 - ▣ Necessity for employment of full-time staff including engineers and accountant
 - ▣ To be authorized legally
 - ▣ Liaison with governmental organization

Requirements for district level organization

Elements

- ▣ Relationship with governmental organization
- ▣ Relationship with WUA in lower level
- ▣ Decision making system and organization structure
- ▣ Federation
- ▣ Accountability to public

An example of decentralized arrangement of irrigation management institutions



IID: Irrigation Improvement District

Summary

- The district-level non-governmental irrigation management organization can replace similar governmental organization.
- Such institutional restructuring or decentralization can lead to effective irrigation management and appropriate operation of systems.
- Tertiary level association is indispensable to operation and maintenance of irrigation facilities, and it could function even if it is not legally authorized.
- The well-organized cooperation of non-governmental organization with governmental organization is required to secure and enhance the performance of the non-governmental organization.

Recent movement of LIDs in Japan

- ❑ Progress of consolidation of LIDs for efficient administrative works.
- ❑ Development
 - ❑ from irrigation management
 - ❑ to regional land and water management.
 - ❑ Based on long experiences for land and water management.
 - ❑ MI-DO-RI Net as nickname of LID.
 - ❑ MIDORI : Water, land and village (local community)

Cooperation in Local Water Management

- Cooperation in local water management is the base for agriculture, land and culture.
- Stable agricultural production and rural life is the base for stable society.
- Efficient water use in agricultural sector is the base for water for economic development
- Efficient water use in agricultural sector and integrated regional water management is the base for conservation of regional environment.
- Cooperation is means and end of better water management.
- Management of regional resources with others and in the community is a part of the well-being of people.