

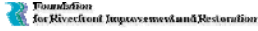


Monitoring of Key Functions in River Environment Restoration

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Roles and activities of Foundation for Riverfront Improvement and Restoration (RFC)

- Established in 1987 by River Bureau and City Bureau in Ministry of Land, Infrastructure and Transportation (MLIT).
- Roles :
 - To promote research, develop technologies
 - To spread out its achievement
 with regard to riverfront improvement, utilization and conservation
- Major activities:

Nature-Oriented River Works



Restoring to Natural Rivers

Navigation in River




Popularizing Technology and Publication






History of river environment restoration in Japan


- Example (1) Sumida River, Tokyo, JAPAN



Before (70's-80's)




After (now)




History of river environment restoration in Japan


- Example (2) Tama River, Tokyo, JAPAN



Before (70's)



After (now)

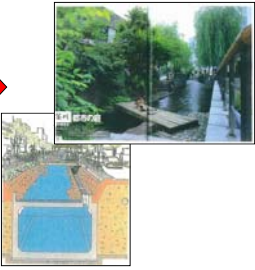


History of river environment restoration in Japan

- Example (3) Kama River, Utsunomiya, JAPAN



Before (70's-80's)



After (now)



History of river environment restoration in Japan

- Example (4) Batch River, Kitakyushu, JAPAN

Before (80's)

After (now)

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History of river environment restoration in Japan

- Transition of policy or events for river environment

Year	Items	Contents
1958	Beginning of survey of water quality	Improvement for water contamination
1965	Establishment of procedures of occupancy of the river zone	Ensuring of open spaces
1981	Establishment of general plans for rivers and watersheds environment management	Improvement of hydrophilic nature
1987	Establishment of the Foundation for Riverfront Improvement and Restoration	Riverfront improvement, preservation, research
1990	Beginning of Nature-Oriented River work	Focusing on ecosystems
1995	National Biodiversity Strategy has started	Focusing on biodiversity
1997	Amendment to River Law (establishment of basic policy for river improvement and river improvement)	Concern about environment issue
2002	Natural Restoration Project has started	Requesting of nature regeneration
2003	Natural Restoration Law	Concern about natural restoration
2006	Establishment of Asia River Restoration Network (ARRN)	Sharing of experiences and knowledge

History of river environment restoration in Japan

- Historical solution for river environment restoration

- Continuous survey of water quality
- Developing sewerage systems and WTP
- Promotion of accessibility between rivers and urban
- Implementing nature oriented river work
- Regeneration project of nature
- Improvement of relationship between river and human, community and nature
- Developing national and international network for river restoration to share experiences and knowledge

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Important factors for river environment restoration

- Three Basic Environmental Functions of Rivers

- 1) **Disturbance**
 - Fundamental function of river-flow to preserve natural environment of rivers.
 - Variation of flow discharge
 - Erosion, transportation and sedimentation of riverbed-materials, suspended solid and wash loads
- 2) **Continuity**
 - Flow
 - Sediment
 - Materials (Nitrogen, Phosphorus, Silica, Fe, etc.)
 - Migratory fish
- 3) **Diversity of Riverbed Configuration**
 - shallow, pools, meandering, depth, velocity, riffle, flat shallow, sand ripples, dune

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Important factors for river environment restoration

- Nature-Oriented River Works (from 1990 in Japan)

Nature-Oriented River Works is crucial approach to preserve three basic functions and conserve and restore beautiful natural environments for human life.

- 1) Preserve diversity of river configuration
- 2) Preserve the continuity
- 3) Preserve habitats, especially for species particular to river environment
(e.g. suitable area for some plants grown in highly disturbed area)
- 4) Preserve hydrological cycle
(Do not affect gushing spring and underground water flow)
- 5) Communicating and consulting with local residents and NPO

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Important factors for river environment restoration

- Definition of "Nature-Oriented River Works "

"Nature-oriented river management" refers to river management performed with the aim of conserving or creating natural river habitats and diverse river landscape, taking natural river system processes into account and giving consideration to harmony with community life and local history and culture.

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Important factors for river environment restoration

- Survey and monitoring for Nature-Oriented River Works

National Census of River Environment

Information on habitat of biota and surrounding environment is systematically surveyed every 5-year as "National Census of River Environment".

- 1) Location: 109 rivers administrated by MLIT
- 2) Frequency: every 5-year from 1990,
- 3) Items
 - Fishes and shellfishes,
 - Benthos, Plants, Birds
 - Amphibians, Reptiles, and Mammals
 - Land insects
 - General material
 - Use of open space etc.

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Important factors for river environment restoration

- Survey and monitoring for Nature-Oriented River Works

River Environment Map

By integrating the research data into GIS, it becomes possible to draw up river environment information maps.

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Important factors for river environment restoration

- Other factors

- 1) Communicating and consulting with local residents and NPO in the planning stage
- 2) Modifying river management plan whenever the monitoring results indicate different response
- 3) Promoting environmental education for children and adults
- 4) Basic research of river environments, especially relations between index species and physical conditions of rivers
- 5) Developing local community, national and international network for river restoration to share and exchange experiences and knowledge etc.

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Introduction of Asian River Restoration Network (ARRN)

- Background

- River restoration is a new technology: Compared with flood control and water utilization
- Applicable technologies : Required to accumulate experiences and knowledge
- Asia Monsoon region has specific characteristics

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- Huge seasonal changes of rainfall
- Growth of rice cultivation on river plains
- Various organisms in paddy fields
- Rapid concentration of the population into urban areas

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Introduction of Asian River Restoration Network (ARRN)

- Establishment of ARRN

Why is network for river and waterfront focusing on Asia are necessary?

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Discussion between countries in similar geological and meteorological condition will provide more improved technology for rich river environment restoration

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ARRN (Asian River Restoration Network) was established in November 2006.

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Introduction of Asian River Restoration Network (ARRN)

- Establishment of ARRN

Dr. H. S. Woo (Korea), Dr. W. K. Liao (China), Dr. Takemura (Japan)

International Forum on Waterfront and Watershed Restoration

Establishment Ceremony and International Forum on Waterfront and Watershed Restoration in Tokyo, JAPAN (November 2006)

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Introduction of Asian River Restoration Network (ARRN)

- **Outline of ARRN Activities**

Public relations

- Activities involving exchanging and sharing information through the newsletter and on the web-site

Technological support

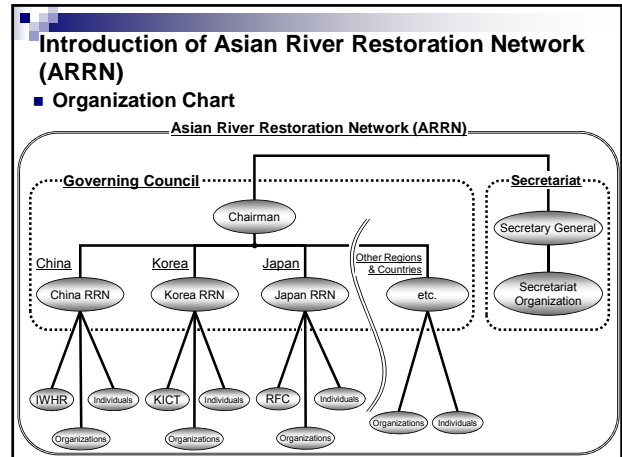
- To hold workshops, forums with a view to sharing latest waterfront environment improvement projects
- To draw up or revise guidelines for the restoration
- To dispatch lecturers mutually on participating countries

Research and studies

- To conduct joint studies to be undertaken by participating countries
- Support the provision of information with a view to studies

Publication

- To translate and publish books on the restoration of rivers and watershed



Introduction of Asian River Restoration Network (ARRN)

- **ARRN Website (<http://www.a-rr.net>)**

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Introduction of Asian River Restoration Network (ARRN)

- **JRRN Website (<http://www.a-rr.net/jp/>)**

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Introduction of Asian River Restoration Network (ARRN)

- **Progress and Future Activities of ARRN**

- Updating and expansion of the Website
- Development of Data-Base: Projects, Researchers, Engineers through Website
- Editing and publication of River Restoration Guide line
- Organization of International forums and small-scale international forums
- Activities related to network formation in domestic working groups
- Publication of the results of international forums
- Improving communication by means of newsletters, etc

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Conclusion

The followings should be emphasized to succeed in promoting river environment restoration.

- Conducting continuous monitoring and research of physical and ecological factors over long period, documenting the whole process and results, and sharing them among relevant people are necessary.
- Nature-Oriented River Works is crucial approach to achieve harmony with good water environment.
- Discussion between Asian countries in similar geological and meteorological condition will provide more improved technology for rich river environment restoration.

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