To establish contact between people and rivers

# Japan RiverFront research Center (RFC)

## Characteristics of the Japan Riverfront Research Center (RFC)

- Advanced comprehensive research studies that usher in a new era
- Collaborative efforts, interaction, and cooperation with a wide spectrum of experts including experts in interdisciplinary fields
- Support for planning and consensus forming in collaboration with communities
- Provision of information to civil activities including NPOs
- Provision of information on leading-edge technologies both to Japan and abroad

Tadashi Miyamura
President

## Restart toward the future of the 21st century

Aiming at co-existence with nature, human, and communities

In April 2012, we restarted as the Japan Riverfront Research Center. Taking over the Foundation for Riverfront Improvement and Restoration established in 1987, the new center will provide services that are highly public in nature, aiming at preservation and improvement of the environment globally as well as in Japan.
We will conduct surveys, research, and technological development on (i) management methods for basin water cycle systems which will contribute to realize a low-carbon society, (ii) methods to preserve and improve natural environment in basins blessed with ecosystem services, and (iii) methods to develop flexible and robust basins.
The new center will conduct these advanced studies through our networks of administrative bodies, experts, private enterprises, NPOs, etc. We will prepare various appropriate, impartial manuals and schemes. Furthermore, we will share with you our products of our long-range in-house research projects and latest information on developed and accumulated technologies.
We renew our pledge to promote these tasks with the foundation of the new center.

## Mission of RFC

Mission of RFC is to research and develop technologies in an advanced and comprehensive way to solve many regional and global problems on water and waterfront including climate change, depletion of resources, and deterioration of the global environment, aiming at realizing a sustainable, vigorous basin society. RFC is also suggesting social systems and technologies that meet social needs in future.
RFC is focusing on research and development on water and waterfront listed below.

**Survey, research and technological development**

1. Basic assignments of the environment and ecological systems
   - Elucidation of mechanism on environment and ecological systems
   - Impact of climate change to environment and ecological systems, community development etc.

2. Management of basin water cycle systems, aiming at realization of a low-carbon society
   - Development of environmentally sound water cycle systems which integrate surface water and sub-surface water
   - Development of material circulation systems to support ecological systems etc.

3. Development of flexible and robust basins with active involvement of stakeholders
   - Development of flexible and robust basins with active involvement of stakeholders
   - Community development utilizing its character and resources etc.

4. Building basin societies blessed with ecosystem services
   - Development of planning and maintenance methods to preserve, restore, and promote ecosystem services
   - Preservation and restoration of natural environment in rivers and coastal areas etc.

5. Promoting shared awareness and consensus forming
   - Development of tools for "visualization"
   - Development of databases on waterfront etc.

**Contribution to society**

6. Application of research achievements and developed technologies
   - Information dissemination
   - Nature-oriented river management Support Center
   - Publication etc.

7. Dissemination of research achievements to abroad
   - Technology dissemination to abroad
   - Information dissemination/assimilation
   - Asia River Restoration Network (ARRN) etc.

## 1. Research on basic assignments of the environment and ecological systems

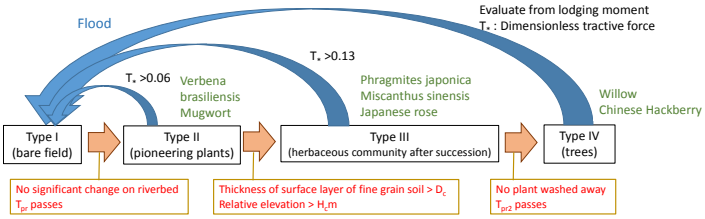
We promote research on basic assignments of the environment and ecological systems of water and waterfront as follows.

- Survey methods for ecological systems and physical environment of water and waterfront such as National Census on River Environment
- Relationship between biodiversity and physical environment
- Environmental goal to preserve and restore water and waterfront
- Influence and countermeasures against climate change
- Analysis and assessment of ecosystem services
- Economical value of water and waterfront

### A model to estimate fluctuation of ecosystem in the Gokase river

#### [ex.] A prediction model on physical and vegetational change

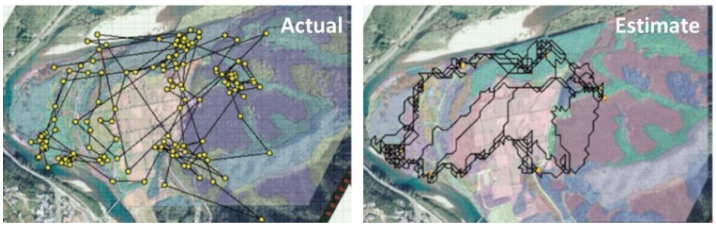
We evaluated influence of trees to the flood flow by applying a "prediction model on physical and vegetational change," which comprises (i) a physical model to estimate changes (both time and space) of shapes of river channel and of riverbed materials, and (ii) a vegetational response model to estimate vegetational grow, succession, and destruction.




**Prediction model on physical and vegetational change**

#### [ex.] A prediction model on mammals' activities

We predicted avoidance behavior of mammals caused by noise and vibration from construction sites, excavation of river channel, removal of trees, etc., by utilizing a "prediction model on mammals' activities," which can predict mammals' actions (migration pathway) in response to fluctuation estimate of vegetational environment.




**Migration pathways of racoon dogs**

## 2. Management of basin water cycle systems, aiming at realization of a low-carbon society

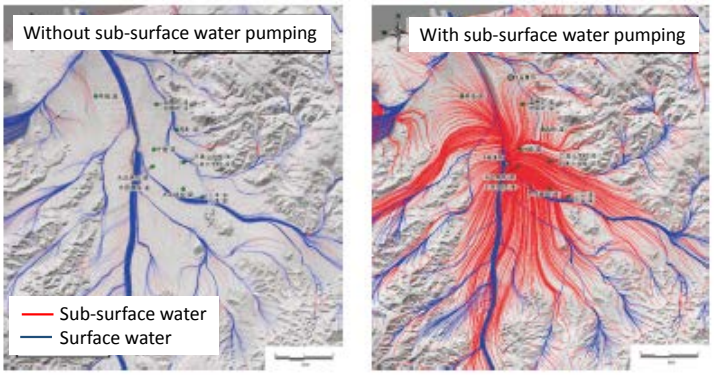
From perspective of rebuilding a basin water cycle system aiming at realization of a low-carbon society, which is a global issue, we conduct research on an environmentally sound water cycle system integrated surface water and sub-surface water as follows.

- Technology to understand dynamics of a water cycle system integrated surface water and sub-surface water
- Technology to understand dynamics of material circulation within a water cycle system
- Prediction of influence of various impacts on a water cycle system
- Effect on an ecosystem due to changes in a water cycle system
- Water use in low-carbon society with integral management of surface water and sub-surface water
- Fostering an environmentally sound water cycle making best use of the function of existing institutions

### Understanding of dynamics of a water cycle system integrated surface water and sub-surface water

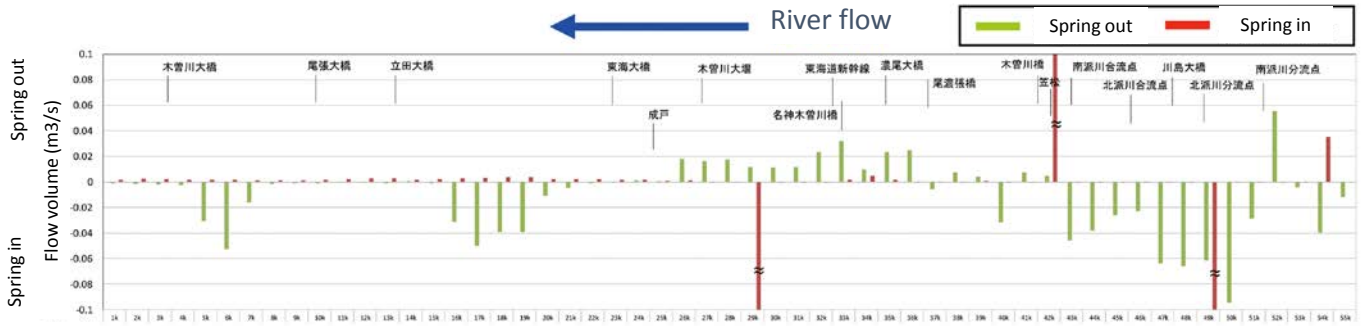
#### [ex.] Analysis of integrated surface water and sub-surface water (the Sendai river)

Influence of water use to a basin water cycle is estimated by tracing sub-surface water particle, grasping area of sub-surface flow, and comprising between with/without sub-surface water pumping.



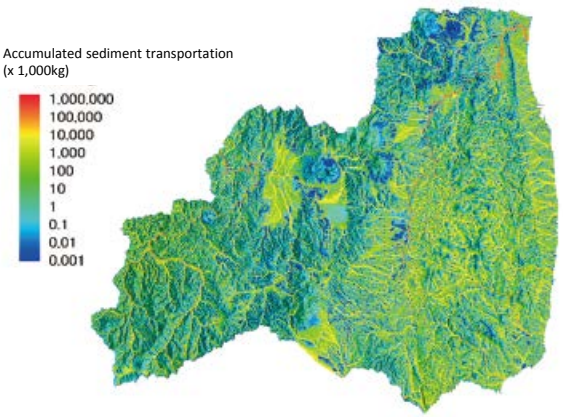

#### [ex.] Analysis of water volume, spring in and out through riverbed (the Kiso river)

Influence of water, which springs in and out through riverbed to river flow, is estimated by accumulating volume of water every 1 km along the river.




#### [ex.] Analysis on amount of sediment transport (the Abukuma river)

Volume of sediment transport (volume of erosion and sedimentation, accumulated volume of sediment transport etc.) is estimated by analysis of water and material circulation. And sections where these riverbed are easily changeable and need to be carefully maintenance are grasped.

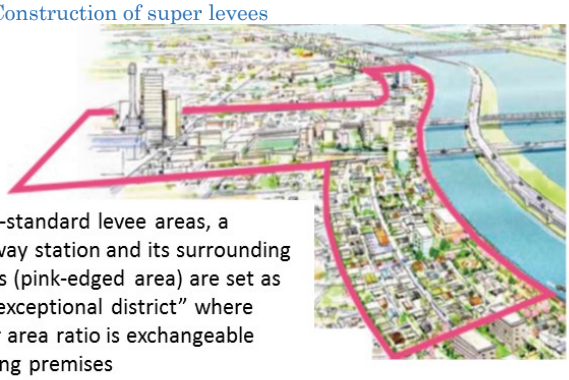


## 3. Development of flexible and robust basins with active involvement of stakeholders

We conduct research on basin-wide development of flexible and robust basins and communities, which are able to avoid serious damages from floods and high tide aggravated by climate change, tsunamis caused by great earthquakes, etc. as follows.

- Development and maintenance methods which are making the best use of private sector and the flood resistant town and basin structure, integrated community development, land use and disaster-prevention facilities of river and seashore.
- Social design, which (i) creates good landscape and prospering area by making the best use of historical cultural resources and tourist attractions, and (ii) creates diversified attractions and values of water and waterfront, such as revitalization of area, health, education, welfare, and river transportation, in cooperation with residents and companies.

[ex.] Construction of super levees




**A scheme to promote construction of super levees in collaboration with community development**

[ex.] Promotion of waterfront utilization


**A promenade on the Dotombori river, Osaka "Tombori Riverwalk"**

## 4. Building basin societies blessed with ecosystem services

From the perspective of creation of rich ecological networks making best use of multifunctional ecosystem services which water and waterfront has, we conduct research on establishing basin societies enjoying ecosystem services as follows.

- Methods to preserve and promote ecosystem services of water and waterfront
- Methods to make various plans for water and waterfront to preserve and restore the habitation and habitat of creatures
- Understanding and assessment of the dynamics of sediments which are an important part of the physical environment
- Preservation and restoration of the continuity of water and waterfront
- Nature restoration in river
- Nature-oriented river management
- Vegetation management
- Measures for introduced species

[ex.] Nature restoration in river


**Restoration of a gravel shore of the Tama river, Tokyo**

[ex.] Nature-oriented river management


**Nature-oriented river management in the Bachi river, Kitakyushu**

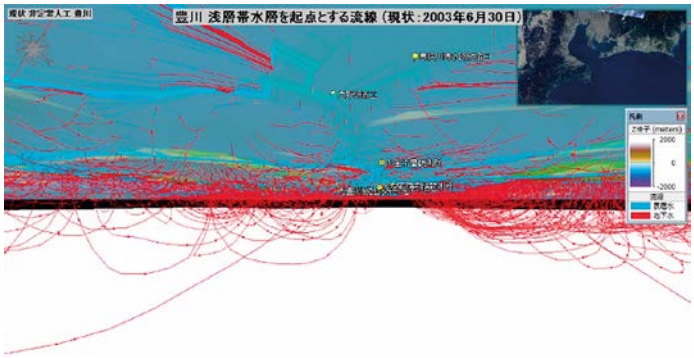
## 5. Promoting shared awareness and consensus forming

We conduct research on visualization to promote shared awareness and consensus forming among various stakeholders as follows.

- Technologies to visualize sub-surface water, physical and ecological changes of water and waterfront
- A database to share basic information to support shared awareness

[ex.] Visualization of mechanism of water cycle system

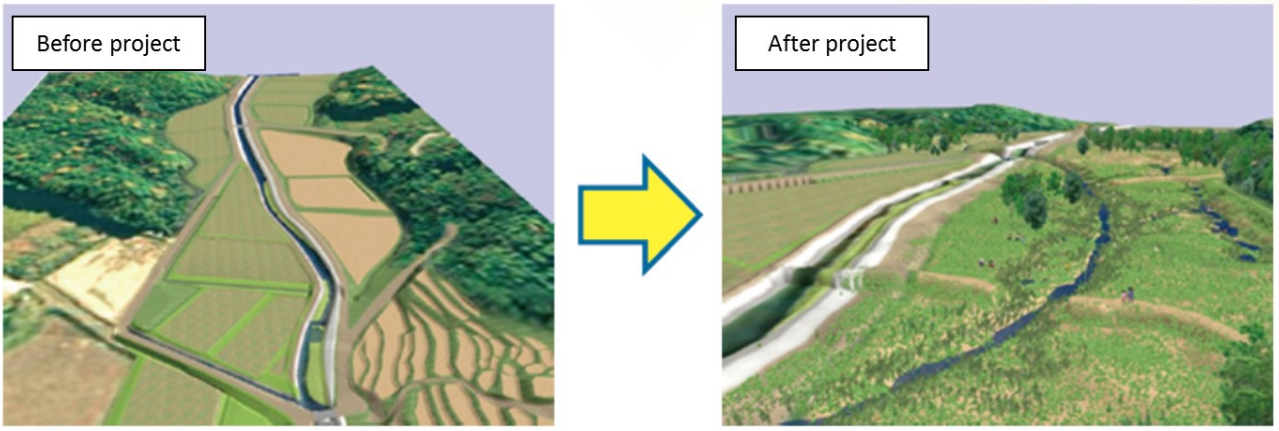
We conduct research to create a "visualizing" method which helps non-specialists easily understand a water cycle system integrated sub-surface water and surface water, for water resources management in the future.



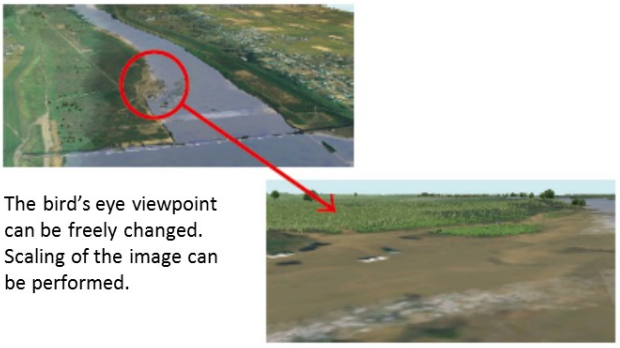

**3-D animation of a water cycle system integrated sub-surface water and surface water (view from underground)**

[ex.] RFC Viewer

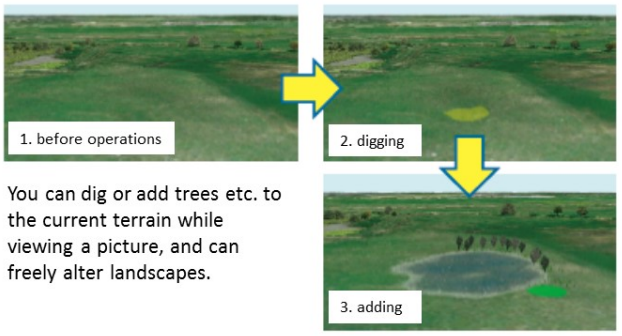
We utilize Computer Graphics technologies to develop a "visualizing" tool for river channel design, which can be easily used for planning and designing of waterfront and landscape full of nature, such as nature-oriented river management.




Images before and after a river improvement project are shared among communities in the nearby area.



The bird's eye viewpoint can be freely changed. Scaling of the image can be performed.




You can dig or add trees etc. to the current terrain while viewing a picture, and can freely alter landscapes.

## 6. Application of research achievements and developed technologies

### Research Achievements

Research achievements are compiled into technical standards, manuals, guidance, case studies, and research reports, and disclosed and offered on the Internet or as a publication for the public. We also hold symposiums, seminars, or workshops where you can gain a deeper understanding of our research results.

### Nature-oriented River Management Support Center

In response to the requests of residents, NPOs, and local governments, the Nature-oriented River Management Support Center offers on-site technical guidance, technical data, workshops, and technical advice, so that nature-oriented river management can be appropriately implemented.


**Publication of technical standards, guidance and others on waterfront**

**On-site technical guidance**

## 7. Dissemination of research achievements to abroad

### Dissemination of research achievements and developed technologies to abroad

We conduct research to solve problems on water and waterfront in foreign countries in collaboration with the institutions concerned.
We accept research students from foreign countries, and disseminate technologies developed from research projects.

### Sending information to abroad, assimilation of technologies from abroad

We send our personnel to fora and seminars on requests from foreign countries.
We actively participate in international societies and seminars to share our research achievements.
We invite lecturers from foreign countries to fora and seminars to promote exchange of opinions and information.

### Asian River Restoration Network (ARRN) / Japan River Restoration Network (JRRN)

ARRN contributes to promote river restoration in Asia by offering and exchanging information on advanced practices of river and waterfront restoration in the world, especially in Asia. JRRN offers information obtained to contribute river restoration in Japan.
These activities are operated as a collaborative study by RFC and CTI Engineering Co, LTD., Research Center for Sustainable Communities.

**Technology exchange meetings**


**JRRN website**

## Organization Chart


- Nature-oriented River Management Support Center
- Costal Information Station
  *( http://www.kaigan-info.jp )*
- Japan River Restoration Network( JRRN )
  *( http://www.a-rr.net/jp/ )*

front(left): Nihonbashi River
front(right): Bibi River
back(left): Cleanup in Kugenuma Seacoast
back(right): Yoshino River

# Japan RiverFront research Center (RFC)

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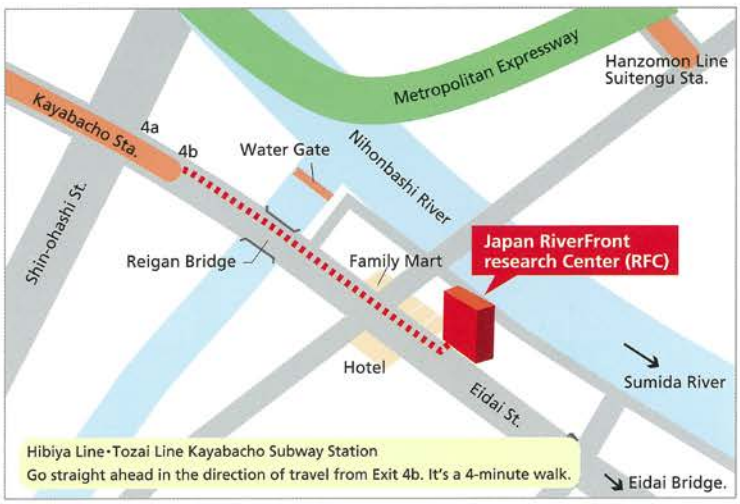


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