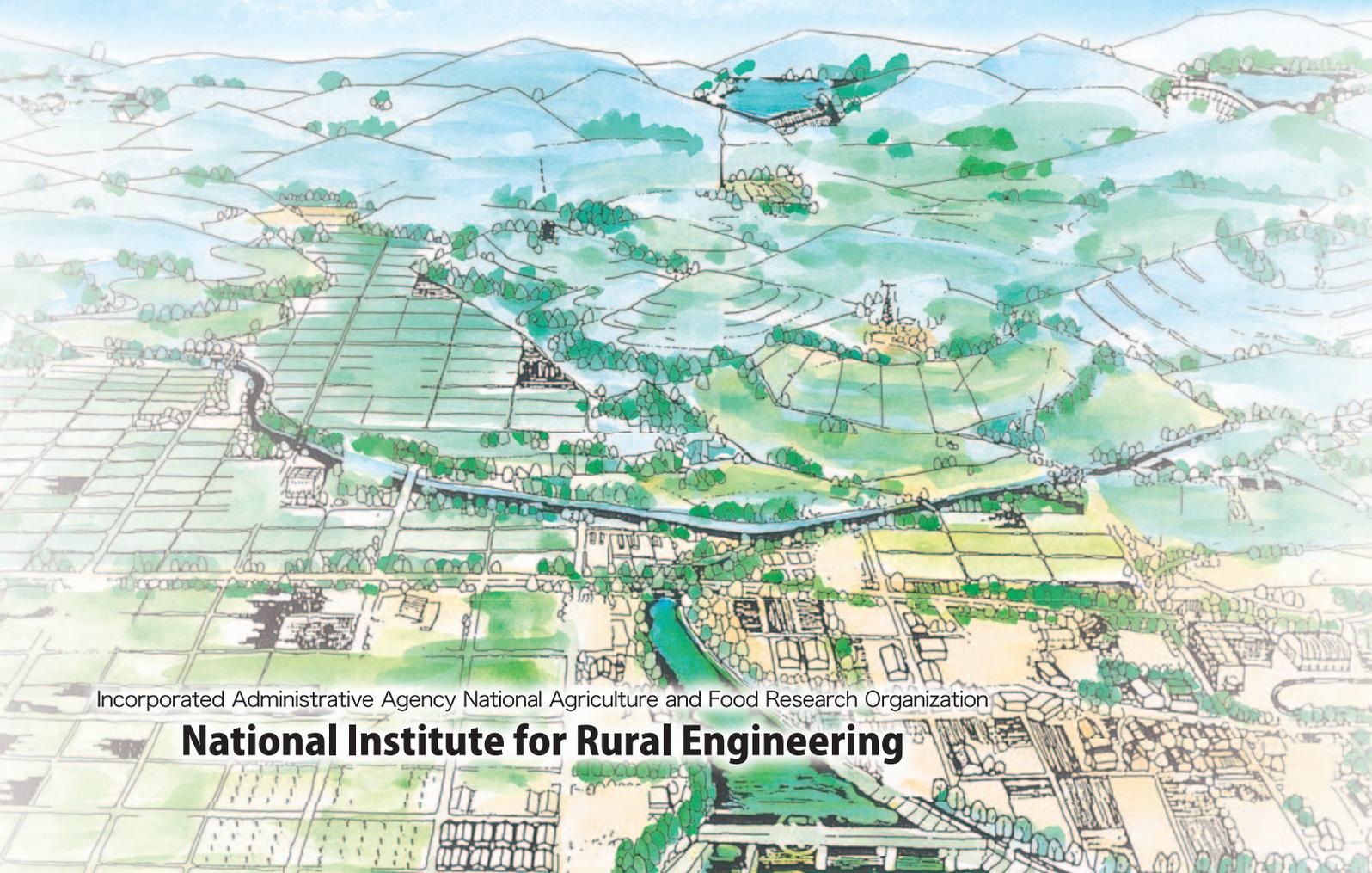


# Directory

Making the most of soil and water  
to build prosperous rural areas



Incorporated Administrative Agency National Agriculture and Food Research Organization

**National Institute for Rural Engineering**

## Mission of National Institute for Rural Engineering (NIRE)

NIRE is a research institute of NARO (National Agriculture and Food Research Organization). Its specific mission is to achieve the policy objectives of “Development of Rural Communities” based on the philosophy and goals of NARO. NIRE plays a central research role for the purpose of achieving the mid-term objective: “Realizing Beautiful Country, Rich Environment, and Affluent National Life,” and addresses the following research activities:

- 1 Research and development for utilization of local resources in rural communities.**
- 2 Research and development to build a rich environment and to improve multifunctionality.**
- 3 Research and development to improve agricultural productivity and sustained development**

NIRE collaborates closely with agriculture-related research institutions, as well as MAFF and the administrative departments of local governments, which are responsible for agricultural and rural development, and with local organizations working in land improvement districts. Through this collaboration, NIRE supports a broad spectrum of research from basic to applied, provides training to upgrade the proficiency of agricultural engineers, and conducts international exchange programs and technical cooperation.

The work of NIRE covers testing, research, studies, analyses, and appraisals concerning technologies relating to agricultural engineering, in addition to training programs, and other operations related to the above.

# Main Research Themes

## 1 Research and development for utilization of local resources in rural communities.

Development of system maintenance technology for cyclic utilization of organic natural resources. Development of various technologies, such as technologies related to agricultural water utilization facilities in terms of function diagnosis, maintenance, and renewal; technologies to develop high-production lands capable of sustainable use; and disaster prevention/mitigation technologies for agricultural facilities to enhance regional disaster prevention capabilities. Development of local management techniques to vitalize rural areas through interchanges between cities and farm villages.

## 2 Research and development to build a rich environment and to improve multifunctionality.

Development of maintenance engineering technology to ensure a healthy water cycle system in rural areas. Development of management engineering which utilizes the local resources of the rich farm village environment.

## 3 Research and development to improve agricultural productivity and sustained development

In order to contribute to strengthening of agricultural competitive power, development of the infrastructure maintenance technology for alternating land usage between paddy field and dry field. Development of wind-resistant structures for farmsteads and of combined climate control technology.

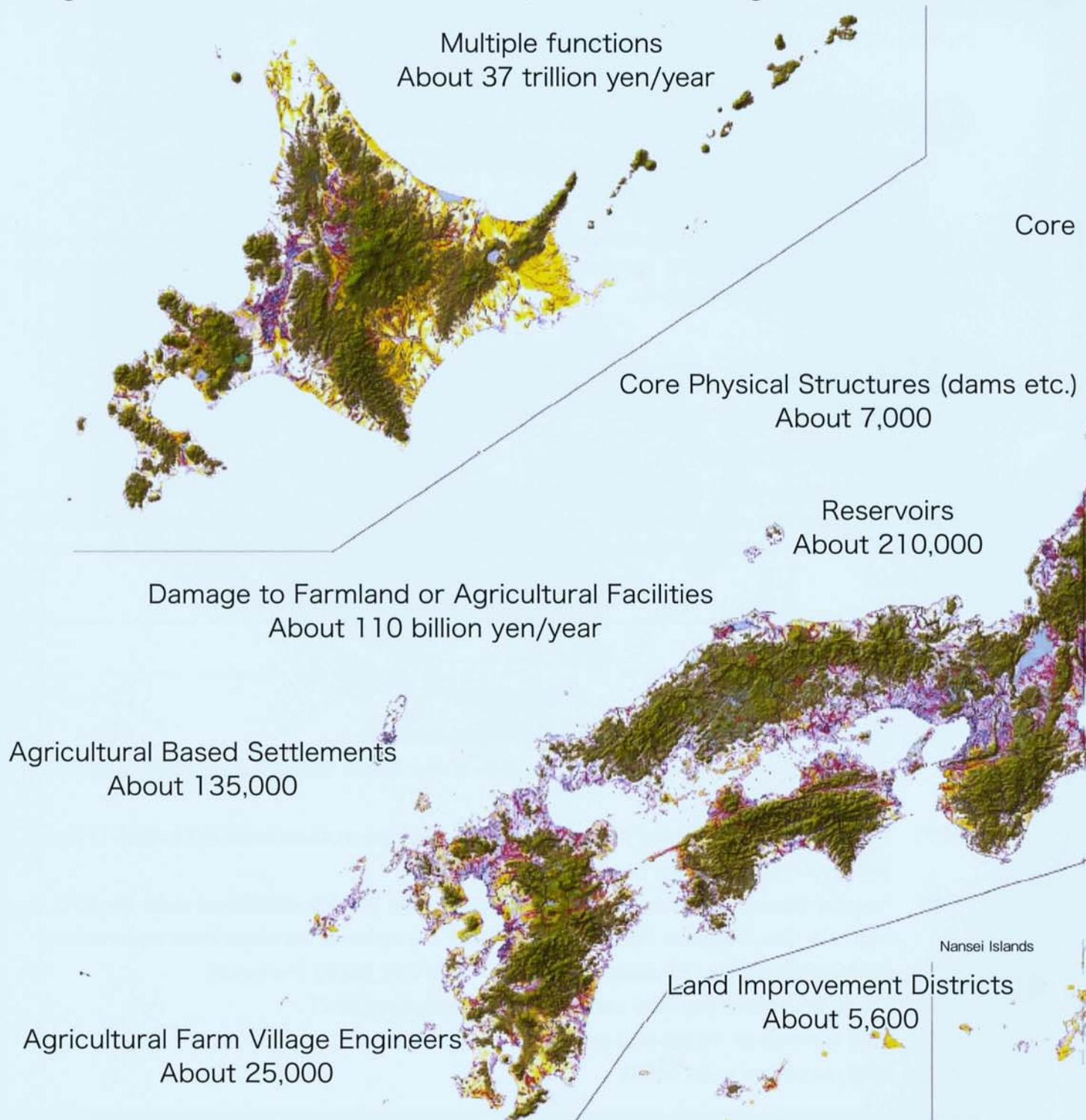
### History

- 1950 Inauguration of Agricultural Department-of-Public-Works  
Inauguration of the land reclamation section of the Kyushu National Agricultural Experiment Stations
- 1959 Inauguration of Experimental Study Laboratory of Construction Department of Farmland Office of Ministry of Agriculture and Forestry
- 1961 National Research Institute of Agricultural Engineering (NRIAE) established under the MAF in Hiratsuka City, Kanagawa Prefecture to take over and combine the above three organizations.
- 1977 NRIAE relocated from Hiratsuka to Tsukuba Science City, Ibaraki Prefecture
- 1988 NRIAE reorganized into NIRE under MAFF (the reorganized MAF)
- 2001 NIRE becomes an incorporated administrative agency
- 2006 NIRE reorganized under NARO

# The Scope of NIRE Activities

Farm villages are entities having local resources, such as the farmland and water for agricultural use, which is the base for a stable supply of food, rich nature, beautiful scenery, original traditional culture, and biodiversity. Viewed as national assets, they are expected to fulfill a variety of roles such as a place of agricultural output, a place for people to live, and a place for preserving natural ecology.

Among various affairs NARO administrates, NIRE takes charge of the domain related



to farm villages and conducts research to enable preservation and maintenance of regional resources for future years so that farm villages can fulfill their role fully and appropriately.



Amount of Water used in Agriculture  
About 55,700 million m<sup>3</sup>/year

Agricultural Irrigation/  
Drainage Canals  
About 45,000km

Farmland  
About 4,690,000 ha

Ogasawara  
Islands

※The various numbers used here are rounded off figures that have been verified by the Farm Village Engineering Research Institute as of March 2007 and are based on articles, such as "Food, Agriculture and Farm Village White Paper," and "World Agricultural-and-Forestry-Industries Census and Agricultural Settlement Investigation."

### Area of Investigation of NARO (Medium Term Goals)

- |          |   |
|----------|---|
| <b>1</b> | Trend analysis of food, agriculture, and farm villages and prediction/evaluation of agricultural technology development |
| <b>2</b> | Research and development for agricultural productivity improvement and sustainable development                          |
| <b>3</b> | Research and development of innovative manufacturing techniques for next-generation agriculture                         |
| <b>4</b> | Research and development of quality agricultural products and food corresponding to needs                               |
| <b>5</b> | Research and development to ensure the safety of agricultural products and food   |
| <b>6</b> | Research and development for practical use of the local resources in a farm village                                     |
| <b>7</b> | Research and development to build a rich environment and to improve multifunctionality.                                 |

- For 6 and 7 NIRE is the central researcher.
- For 2 NIRE is in charge of the engineering field.

### Legend

<table border="1"> <tr><td style="background-color: black; color: white;">3,000m</td></tr> <tr><td style="background-color: #808080;">2,000</td></tr> <tr><td style="background-color: #6aa84f;">1,000</td></tr> <tr><td style="background-color: #4daf4a;">500</td></tr> <tr><td style="background-color: #2ca02c;">200</td></tr> <tr><td style="background-color: white;">0</td></tr> </table>	3,000m	2,000	1,000	500	200	0	<table border="1"> <tr><td style="background-color: #808080;">Farmland etc.</td></tr> <tr><td style="background-color: #90ee90;">Paddy field</td></tr> <tr><td style="background-color: #ffff00;">Dry field</td></tr> <tr><td style="background-color: #cccccc;">City area</td></tr> </table>	Farmland etc.	Paddy field	Dry field	City area	<table border="1"> <tr><td style="border-bottom: 1px solid red;">Core agricultural facilities etc.</td></tr> <tr><td style="border-bottom: 1px solid red;">Irrigation canal</td></tr> <tr><td style="border-bottom: 1px solid blue;">Drainage canal</td></tr> <tr><td style="text-align: center;">● Agricultural dam, head works, pumping station etc.</td></tr> <tr><td style="text-align: center;">● Drainage pumping station etc.</td></tr> <tr><td style="text-align: center;">● Small reservoir</td></tr> </table>	Core agricultural facilities etc.	Irrigation canal	Drainage canal	● Agricultural dam, head works, pumping station etc.	● Drainage pumping station etc.	● Small reservoir
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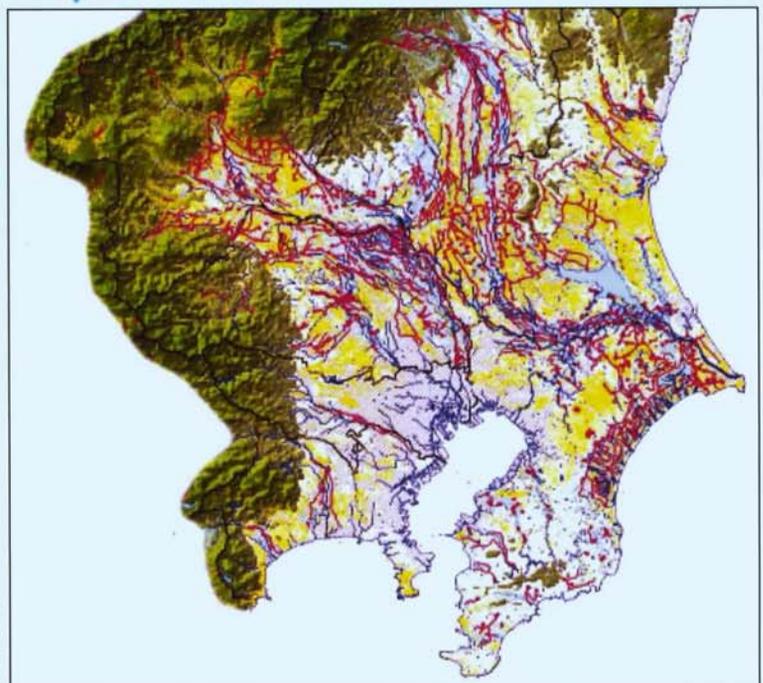


Image : GeoScience

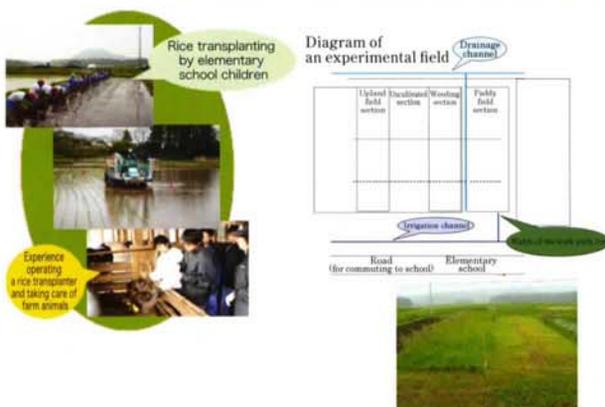
## Development of technologies will contribute

Farm villages are found in various locations from mountainous areas to city suburbs. In consideration of diversification of matters which farm villages encounter, such as promotion of city-village coexistence/convection, prevention/mitigation of disasters, preservation of local resources, and accelerating agricultural structural reforms, problem-solving based research is conducted in a cross-cutting and dynamic manner.

- 1** Development of techniques to support activities which promote interchange between cities and farm villages and ensure the culture of a farm village is passed down to the next generation. Development of model for circulative use systems of biomass resources and technical development to reduce the life cycle cost of irrigation infrastructure are done.
- 2** Development of prevention technology for disasters such as landslides in rural areas and flooding of farmland by heavy rain, development of technological countermeasures and evaluating the effects of global warming on agricultural land, water supplies, and irrigation infrastructure.
- 3** Technical development related to the promotion and management of multipurpose paddy fields which are the core of agricultural output. Multipurpose means fields capable of growing both rice and upland crops. Technical development of the structure and climate control of an efficient greenhouse in which production and environment are harmonized.

### Agricultural Hands-On Experience For Children and Urban-Rural Interchange Research

Research Team for Urban-Rural Interchange



Development of techniques to provide children and students with agricultural and farm village experiences and to deepen the recognition of the relation between food and agriculture. Research on city-village exchange activities, focusing on how unused farmland can be utilized and what effects hands-on experience may bring about

### Research of Traditional Farm Village Culture

Research Team for Urban-Rural Interchange

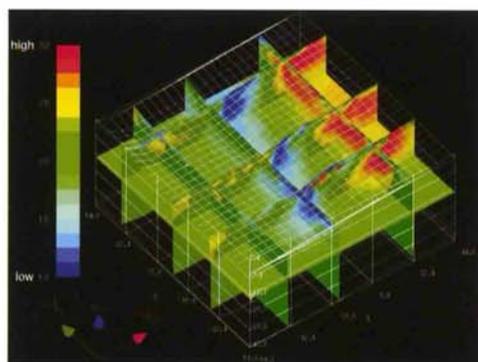
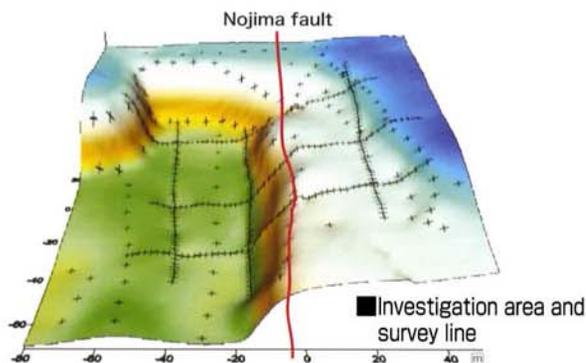


The basis for farm villages in Japan has been a farm culture centering on cooperative rice cultivation in which everyone helps each other. To design a rural society with a bright future, research that supports traditional culture is undertaken.

# directly to rural development and diversification.

## Three-dimensional Electrical Prospecting

Research Team of Disaster Reduction

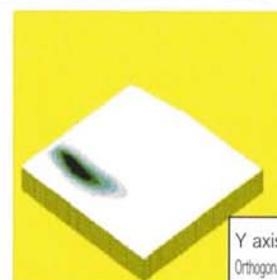
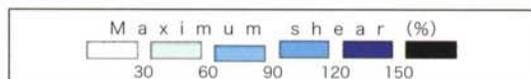
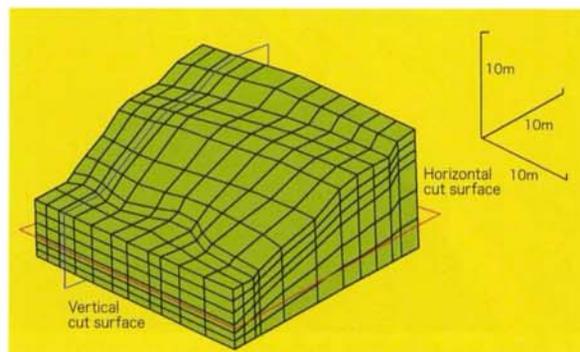


■ Electrical resistivity distribution determined from data of 6 survey lines

Development of a laborsaving survey method to investigate subsurface geological structures that may cause disasters.

## Research on How to Assess Slope Stability of Landslides

Research Team of Disaster Reduction



■ Maximum shearing distortion at the time of collapse (three-dimensional analysis of a landslide)

Slope stability analysis is carried out to improve planning techniques to mitigate landslides in farmlands.

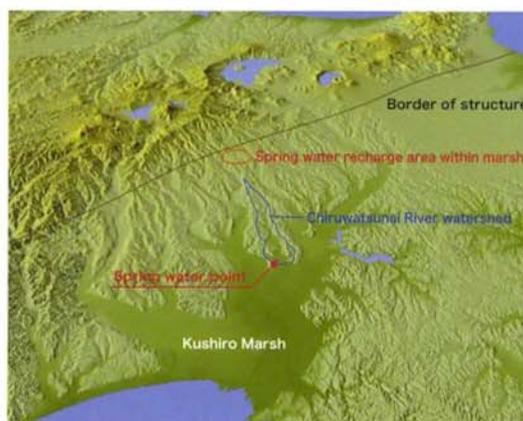
## Evaluating the effect of global warming and researching technological responses

Research Team for Global Warming and Environment

We forecast and evaluate the effects of the climate change that accompanies global warming on agricultural land, water supply and land improvement facilities. We are developing technologies for alleviating these effects and preserving agricultural production infrastructure as well as agricultural land management and local resource utilization methods for controlling greenhouse gas emissions.



■ Evaluating the effects of global warming on drainage in low-lying areas



■ Analyzing regional water cycle components and evaluating potential groundwater resources

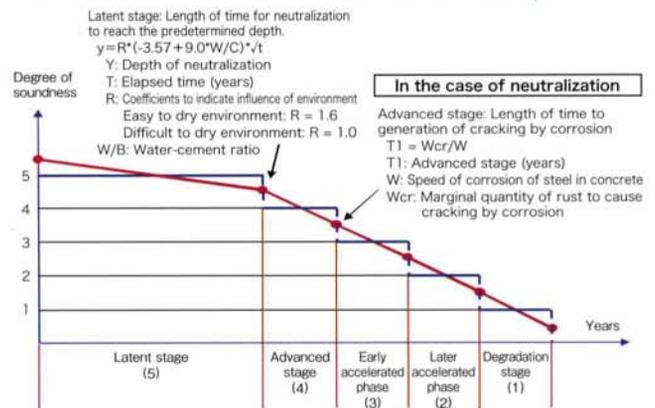
## Research on conservation and management of regional resources

Research Team for Conservation and Management of Regional Resources



■Management Activities for Agricultural Irrigation Canals

The participation of various stakeholders in the maintenance activities is important to maintain local resources in a good state for the future. Practical techniques which support local activities are developed.

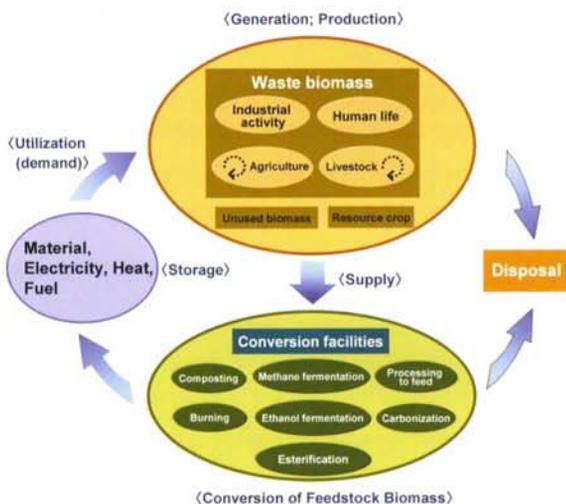


■(Example) Determine a degradation prediction formula for concrete to create a lifecycle cost valuation model

An agricultural irrigation canal deteriorates with the progress of time. A valuation model forecasting the deterioration of a canal and calculating the lifecycle cost is being developed in order to carry out suitable management of canals.

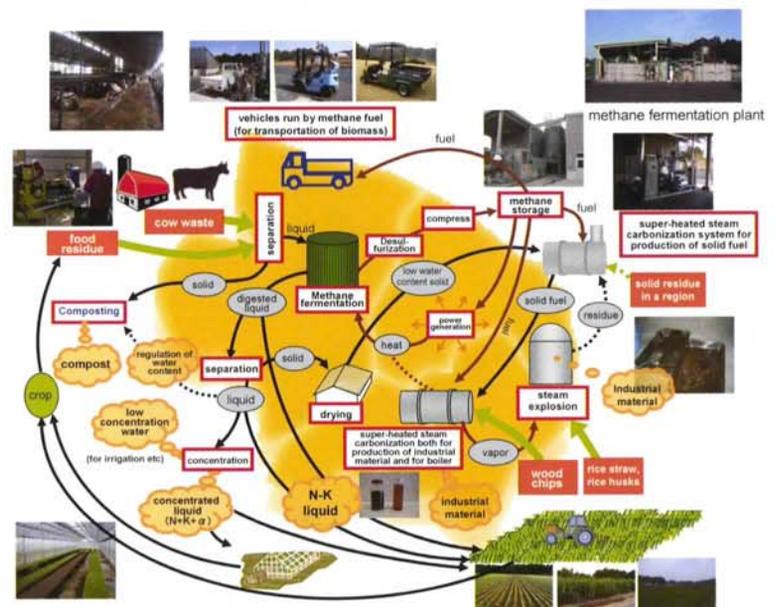
## Research on circulative use systems of the biomass resources in rural areas

Research Team for Biomass Recycling System



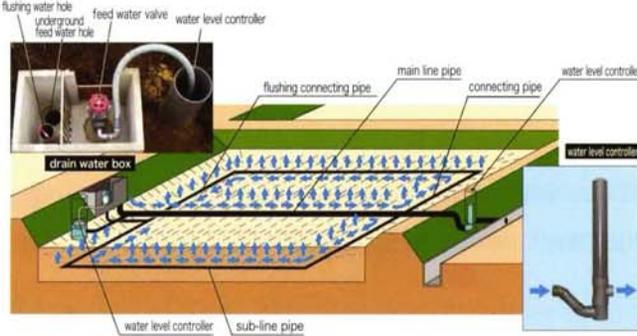
A prototype of a cascade use system for biomass has been designed for a suburban agricultural and livestock industry area. The model is under verification in Katori City, Chiba. 98% methane fuel, organic fertilizer and industrial materials have been produced through the combination of such processes as methane fermentation, gas refining, concentration of digested liquids, pyrolysis, cogeneration and composting. This research involves the establishment of plant operation methods that meet the demand for these products, with minimum life cycle costs, savings on the use of fossil fuel energy, and low environmental impact. Research cooperation is pursued with private companies, universities, institutes and national and local governments to get fruitful outputs and contribute to actual projects.

A biomass use system consists mainly of production, collection, transportation, conversion, storage, use of converted material/energy and disposal. Various types of biomass use systems based on local characteristics have been evaluated from the viewpoints of sustainability, cost, environment, and social aspects. The stable demand of converted material/energy which replaces the material/energy derived from fossil resources is essential.



**Development of an Underground Irrigation System (FOEAS)**

Research Team for Multi-use Paddy Field



Development of a system which aims at drainage, underground irrigation, and water level regulation by an optimal arrangement of pipe drains and installation of a water level management apparatus. Development of an underdrain boring machine is able to deal with various types of soils etc.

**Development of a GPS Leveler**

Research Team for Multi-use Paddy Field



Technology to facilitate surface drainage of a converted field by slightly sloping the field utilizing GPS. Development of technology to manage such things as agricultural chemicals, fertilization amount, and run history.

**Development of Chip Pavement Technology**

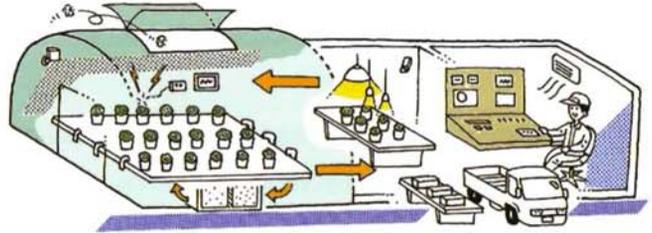
Research Team for Multi-use Paddy Field



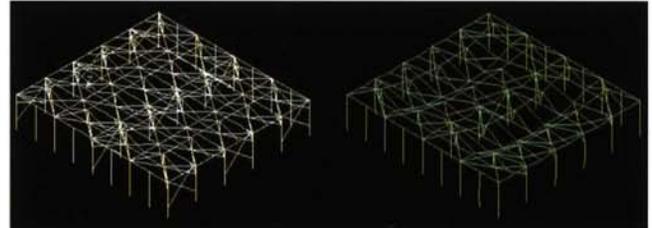
Development of an environment-friendly soil-hardening agent. Technology using chips or soil pavement to suppress rainwater from permeating the soil and the rise of road surface temperature. Research which prevents leakage of water and luxuriant growth of weeds.

**Controlled Environment Agriculture is Friendly to the Environment and People.**

Research Team for Controlled Environment Agriculture



■ Pipehouse damaged by strong wind ■ Greenhouse damaged by snow load



■ Deformation of a greenhouse under snow load

The determination of greenhouse structural designs to minimize damage due to natural disasters such as typhoons and heavy snow.

**Greenhouse Climate Control Technology**

Research Team for Controlled Environment Agriculture



■ Control of high pressure fog cooling ■ CFD analysis of greenhouse temperature distribution in the summer

Research on climate control technology for year round utilization of greenhouses includes climate control evaluation, wind tunnel experimentation, and computational fluid dynamics (CFD) simulation. These research techniques are also used to evaluate greenhouse natural ventilation and evaporative cooling systems.

# Department of Rural Planning

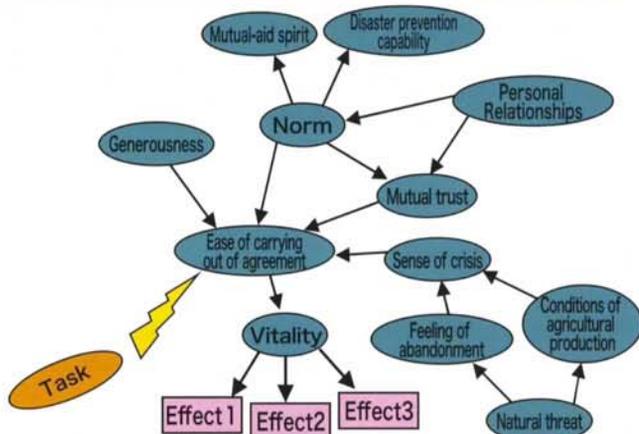
## Development of local management techniques to improve the vitality of a rural area

Reduction in population; aging and the merger of cities, towns and villages; diversification of life-style, etc. are progressing. To be self-supporting, and in order to realize a farm village with vitality, local management techniques are developed from a multifaceted approach.

- 1 Our research is to develop ways of planning for rural development, such as developing local resource management systems supported by a variety of participants, land use planning for sustainable land management, etc.
- 2 Development of revitalization methods for rural villages using community networks and rural design workshops.
- 3 Development of economic evaluation methods for public agricultural projects and farm village promotion measures emphasizing local resource preservation and mutual interaction between people in cities and farm villages.

### Using Social Capital to Develop a Local Resource Management System

Laboratory for Regional Planning



We focus on using social capital in local communities to develop local resource management systems.

### Improvement of Workshop Methods

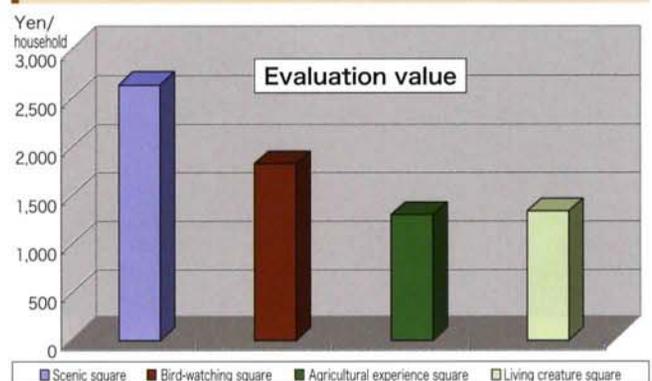
Laboratory of Community Progress



Gaming and information edit techniques are utilized to improve workshop methods.

### Development of an Economic Evaluation Method

Laboratory of Project Evaluation



Measurement of the economic value of public projects which promote mutual interaction of people in cities and farm villages

# Department of Rural Environment

## Development of evaluation techniques based on environmental science and maintenance engineering

Development of evaluation techniques for rural environments, such as an ecosystem, a landscape, and water quality; and the development of maintenance, conservation, and management engineering for creating superior rural environments. The following are our three areas of focus:

- 1** Clarification of natural/social structure of farm villages and changes in management status and development of techniques to evaluate the influence on the rural environment of areas such as ecosystems and the landscape.
- 2** Development of participatory methods for rural improvement planning, maintenance, and management for conservation of the landscape in rural areas. Development of conservation technology for the ecosystem network around paddy fields taking into consideration the genetic diversity of the living things and their habitat.
- 3** Clarification of the dynamics of nutrients and heavy metals. Development of technology for load reduction from paddy fields, using a recycling irrigation system and water-purifying unit with wood charcoal.

### Research on the Changes Taking Place in Rural Management

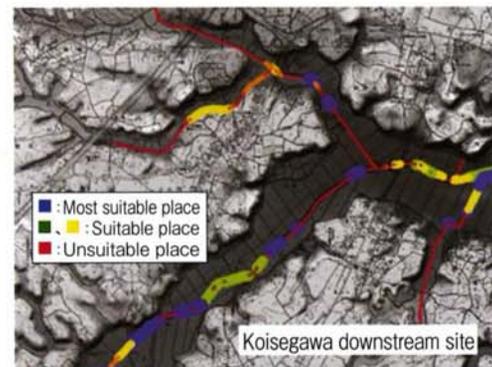
Laboratory of Landscape Management



Changes in the management situation and land use based on analysis of past landscape scenes using GIS.

### Research Example of Evaluation of Suitable Habitat for Fish

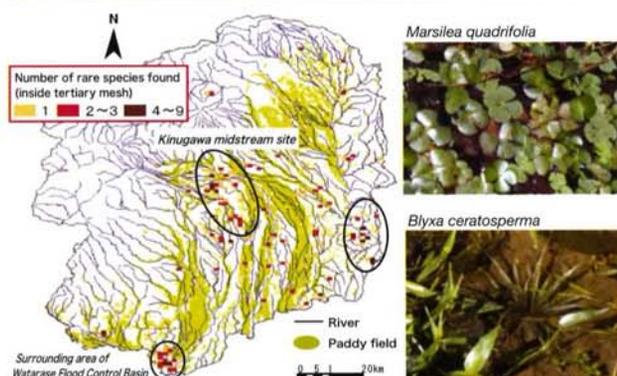
Laboratory of Ecological Engineering



Development of evaluation techniques to determine preferable habitat and migration routes for fish.

### An Example of a Distribution Map of a Endangered Plants in Paddy Fields

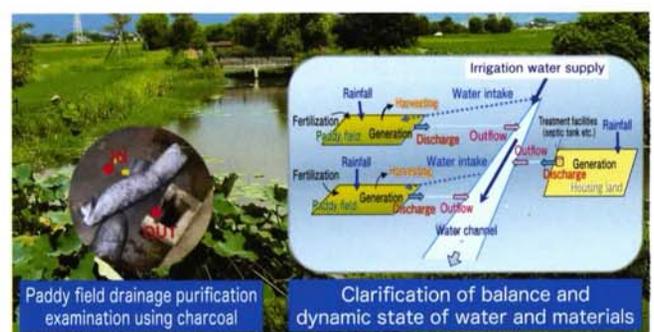
Laboratory of Environmental Evaluation



The locations of hot spots and characteristic distribution pattern are analyzed by GIS.

### Modeling of Material Dynamics and Water-purifying Technology

Laboratory of Water Environment Conservation



Construction of a model for environmental assessment. Examination of the purification of paddy field drainage by charcoal etc.

# Department of Land and Water Resources

## Development of conservation and maintenance and techniques to develop sustainable and

In agriculture and rural areas, land and water resources are indispensable, and it is very important to maintain a sound water cycle system and to create sustainable and highly productive farmland. Conservation and maintenance techniques for a sound water cycle system for farmland and the techniques to develop sustainable and highly productive farmland, which enable efficient multi-functionality of farmland and agricultural water in a rural area, are studied from the comprehensive perspective of farmland and agricultural water resources.

- 1 For maintenance of a sound water cycle system, a dynamic model of water flow with colloid and /or dissolved mater and an assessment technique using the model are developed.
- 2 For maintenance and development of sustainable multi-functionality of water and land resources, hydrological and water use assessment techniques for the functionality and management techniques of water and land resources are developed.
- 3 For sustainable and highly productive agriculture, advancement of GIS/satellite data utilization technologies and development of environmentally sound farmland creation technologies are promoted.

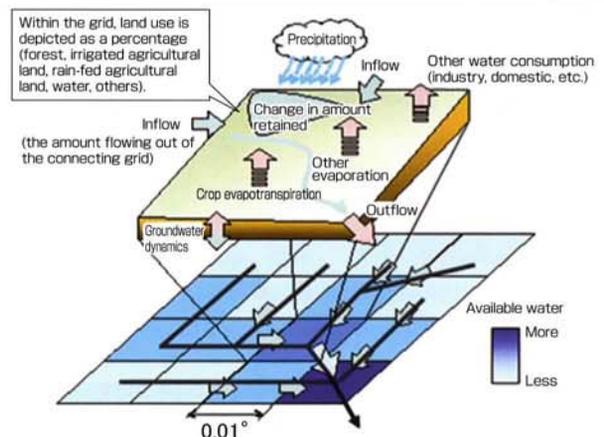
### Hydrological Observation and Modeling of Runoff Mechanism

Laboratory of Hydrology and Water Resources

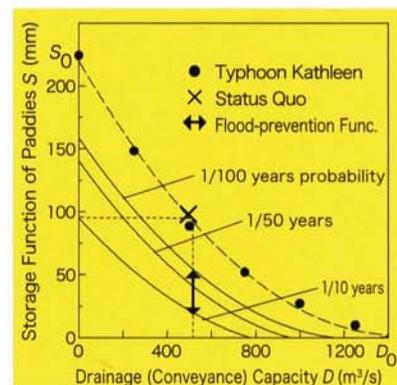


■Hydrological observation

We perform hydrological observation of flow, precipitation and other factors to evaluate the characteristics of the water cycle in watersheds, developing a dynamic distributed hydrological model that takes into account various agricultural water uses. In addition, low-lying rice cultivating regions including irrigation and drainage channels have not only the ability to control runoff in response to precipitation, but also the ability to retain floodwater during abnormal floods. Then, we quantify the ability of paddy areas to alleviate floods and carry out an economic evaluation for using paddies as flood retarding basins.



■Dynamics of a distributed hydrological model



■Quantifying functions of flood prevention of paddies

# techniques for a sound water cycle system, highly productive farmland

## Research into methods of agricultural water management

Laboratory of Agricultural Water Management



Water distribution by operating a division work

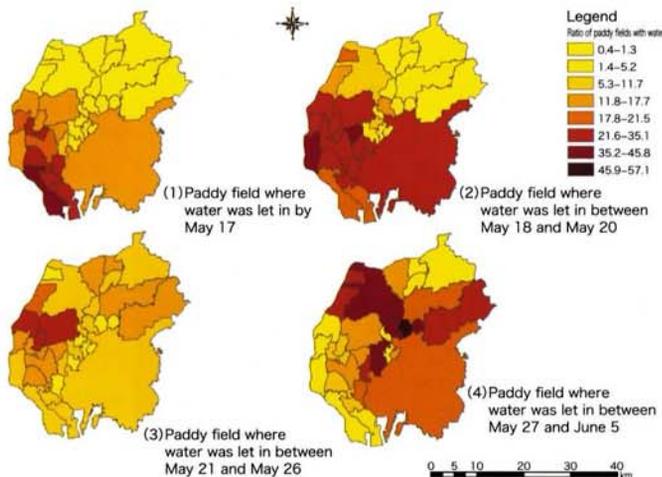


Participatory irrigation management (example in Cambodia)

Coordinating supply and demand of agricultural water and rationalizing water distribution are required to improve the productivity of the agriculture. So we are researching participatory irrigation management and agricultural water management that makes use of information systems.

## Research of Land Resource Information Use Technology

Laboratory of Rural Land Resources



The paddy field irrigation rate for cities, towns and villages

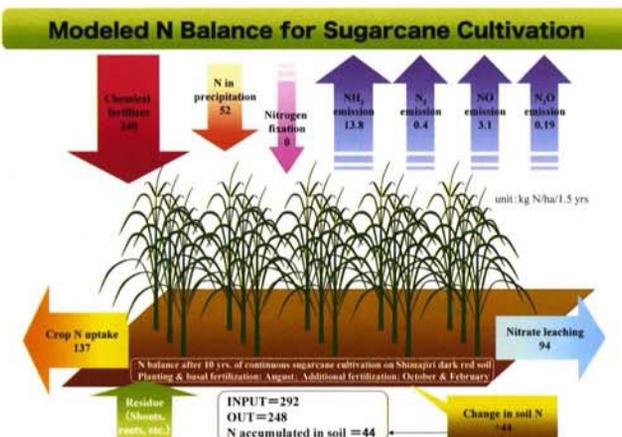


Distribution map of paddy field irrigation rate

Using synthetic aperture radar data, photo sensor data, and land use data, irrigation time is measured with high precision over a wide area of paddy fields, and a map is created.

## Development Farmland Maintenance Technology

Laboratory of Farmland Engineering



We are developing soil and water management technologies in farmland to promote sustainable agriculture and to accelerate creation of a recycling society with a low impact on environment in rural areas. Soil management technology in conjunction with biomass resources can improve agricultural productivity and control leached nitrate-nitrogen in farmland.



Application of pyrolyzed biomass improves sugarcane growth.

# Department of Geotechnical and Hydraulic Engineering

## Improvement in safety of irrigation infrastructure, and development of maintenance control and

Development of diagnosis, evaluation, design, maintenance control, and updating technology for irrigation infrastructure by experimentation, numerical simulation, and field survey.

Development of disaster prevention technology for farmland and the agriculture infrastructure.

- 1** Development of techniques to diagnose, evaluate, design and verify hydraulic functions and the function for water supplies, in order to be able to use a design based on the performance of agricultural irrigation facilities. Development of techniques to manage improvement in regional water requirement function and to reduce labor needs.
- 2** Development of techniques to diagnose and monitor the structure of facilities, in order to extend the life-span of the irrigation infrastructure. Development of techniques to predict the performance of a structure, repair/reinforcement construction methods for infrastructure, and environmental harmony type low cost repair technology.
- 3** Development of evaluation/strengthening technology of the disaster prevention function which farmland and the infrastructure for agriculture have. Development of techniques to supervise the safety of infrastructure and predict disasters. Development of design methods which raise the safety performance at the time of an earthquake or a heavy rain, and countermeasure construction methods.

### Research of Maintenance Control Technology to Reduce Labor

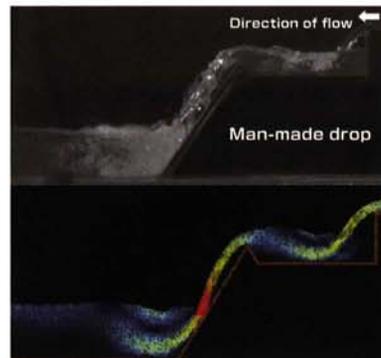
Laboratory of Hydraulic Engineering for Water Resources Structures



■ Equipment that prevents inflow of floating trash in the sluice gate of head works

### Researching performance examination technology for irrigation facilities

Laboratory of Hydraulic Engineering for Canal Systems



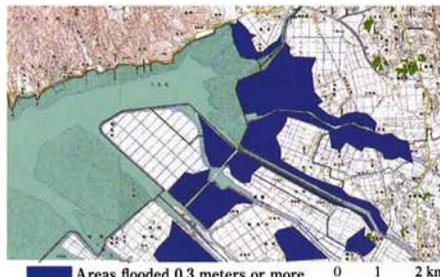
■ Example analysis of rapid flow using a numerical simulation (Top: Hydraulic model test, Bottom: Results of numerical analysis)

### Research technology for prevention of disasters in coastal regions

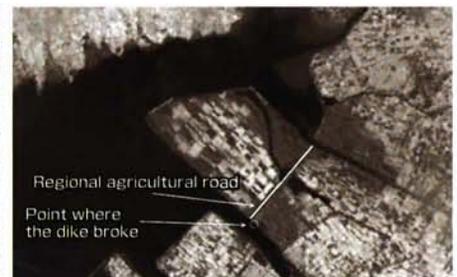
Laboratory of Coastal Engineering



■ A dike destroyed by storm surge



■ Numerical simulation of flooded region(Left) and satellite image of damaged farmland(Right)



# updating technology

## Functional Diagnostic Technology of Water Facilities

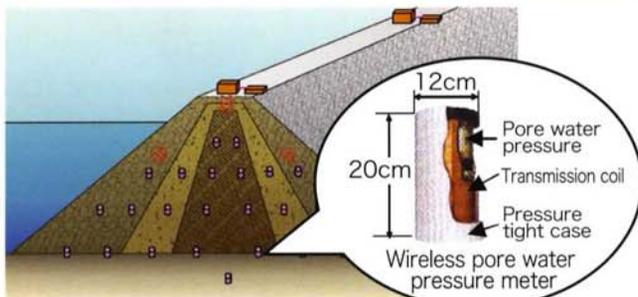
Laboratory of Facilities Engineering



■ Quality assessment of the durability of canal repair material by a water jet abrasion test

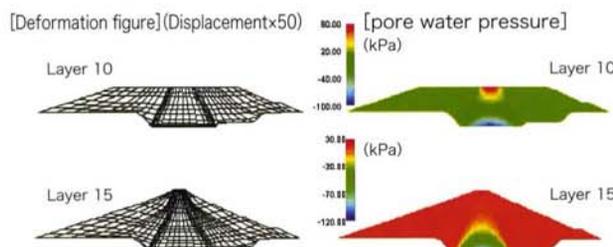
## Research on Safety Management of a Dam

Laboratory of Engineering Analysis



■ Management by a wireless pore water pressure meter  
Development of the world's first wireless pore pressure meter by joint public-private research.

Research on techniques to observe the action of a dam and manage safety.



■ Prediction of action by FEM analysis

Development of saturation-unsaturation elasticity-plasticity consolidation analyzing method by FEM for investigating the dynamic characteristics of the ground or rock used as the material of a fill dam, carrying out numerical modeling of them, and predicting the performance of a fill dam.

Research on development of numerical-analysis techniques for predicting the safety of a dam.

## Safety Assessment of a Small earth dam and Pipeline

Laboratory of Soil Mechanics



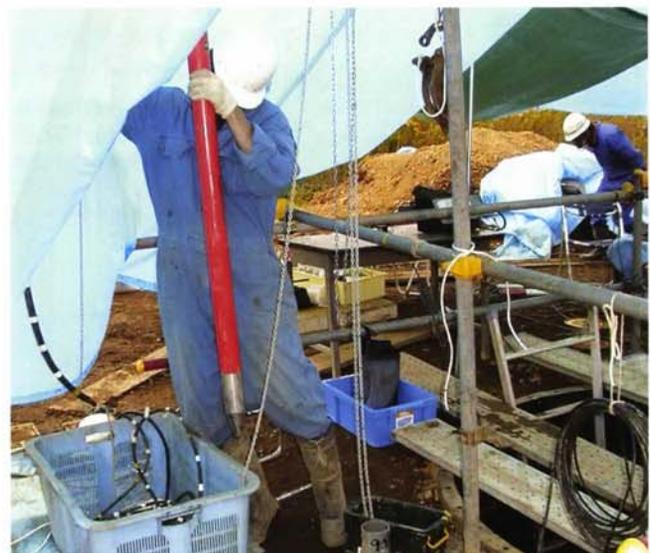
Development of "over flowallowable reservoir construction method" which is highly stable in a locally severe rain or flood. Research on the development and improvement of earthquake-proof repair technology for a small earth dam with the development of a large-sized sandbag.



Doing actual examination and numerical analysis of a large diameter pipeline's action. Research on pipeline design / construction technology for a "shallow Burying Coustruction Method for Pipelines" which has excellent durability in case of an earthquake.

## Investigation Technology of the Basic Foundation

Laboratory of Engineering Geology



■ Clarification of osmotic phenomenon using underground radar between boreholes

# Technology Transfer Center

The Technology Transfer Center fulfills the role of a think tank to facilitate effective utilization and dissemination of scientific/public high-value test/research results and intellectual property accumulated since the foundation of NIRE. This center also undertakes the role of being a family doctor type window to provide technical assistance to administrative worksites and organizes various training programs, such as continuing training for engineers for the purpose of disseminating research results.

At the Technology Transfer Center, under the Center Chief, Professor having broad and advanced knowledge and experience are installed. With the Transfer Promotion Section and Technical Training Section working together, coordination between (1) research function and (2) technical training function is strengthened, and the level and effectiveness of related technology development and technology transfer to administrative worksites etc. are enhanced.

Specifically, as an administration support type research institution, the Technology Transfer Center promotes the following: 1) dissemination of research results; 2) utilization of intellectual property; 3) technical assistance to administrative worksites; 4) continuing education for engineers, and 5) joint research and overseas research.

## 1 Disseminating Research Results

NIRE, as a key station in the technology of Agriculture Rural Development, reports the results of research in "Research Topics" every year. These results are part of the basis for the national technical standards concerning Agriculture Rural Development.

Technology Transfer Center promotes dissemination of study results in concrete terms through practical uses of new technology explanation meeting for agriculture rural development promoted by the Ministry of Agriculture, Forestry and Fisheries(MAFF) and directors meetings at Regional Agricultural Administration Offices.

### Practical uses of new technology explanation meeting for Agriculture Rural Development



■ Keynote lecture



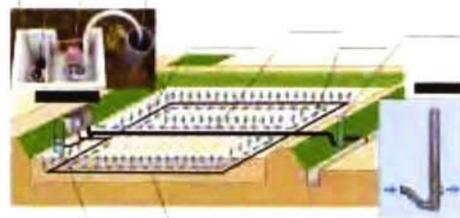
■ Poster session



■ Technical consultation

## 2 Patent Information

The new technologies which NIRE develops are registered as patent right or program copyright and disseminated through TLO (Agriculture, Forestry and Fisheries Technical Information Society) and PR to Rural Development Bureaus and all prefectures. They are offered through general public presentation and NIRE news, H.P., study groups, etc.



### Patent example

■ Subsurface water level control system [FOEAS]  
Patent NO. 3671373,  
NO. 3756157,  
NO. 3702329



■ Method of burying pipes under shallow cover using geo-textile  
Patent NO. 3314191

## 3 Technical Assistance

An important mission of the research institute is to provide solutions to technical challenges in agriculture rural development, which cannot be easily done by any other organization due to requirements for highly sophisticated technical know-how.

Everyday on-site technical guidance is given and funded research as technical support is carried out. Wide-ranging technical support is offered, regarding adequate project planning techniques, design methods, water resource/facility management methods etc. and participation in various committees set up by the government and others is done. The following are recent areas for which funded research has been done by specific entities: dams, reservoirs and adjustment reservoirs, head works, irrigation canals and drainage canals, pipelines, underground dams, and landslides. In addition subjects in connection with overall communities, such as control of maintenance of institutions, water quality and groundwater problems, local maintenance, scenic preservation, personnel training, agreement formation, are also addressed.

## 4 Continuing Education

Technical training cooperates with the Rural Development Bureau and the Regional Agricultural Administration Offices, and aims to improve the technical capabilities of rural development engineer on the basis of clear division of roles. The training program is developed from the perspective of introducing leading edge technology for practical applications in the field with a participatory type of curriculum which includes lectures, experiments, training, local training, discussion, presentation, etc.

For planning and operation, efforts are being made to improve training content in response to social/on-site needs through various activities, such as examining training courses and curriculum based on the results of trainee surveys and advice from relevant organizations and experts, measuring training effectiveness, introducing a trainee commendation system, and securing high CPD units certified by the Continuing Professional Development Organization for Rural Development Engineers.

### ●Rural Engineering Training Courses (For administrative engineers)

These courses are for people employed by national and local governments and nonprofit foundations in work related to rural engineering.

- ①Basic Techniques: 2 months / twice yearly
- ②Intermediate Techniques: 2 weeks / twice yearly
- ③Specialized Techniques: 2 weeks / 9 courses yearly

### ●Rural Engineering Training Courses (For general engineers): 10 days / 1 course yearly

This course is for people employed by national and local governments, other organizations, and engineers of the private sector, in work related to rural engineering.

◎NIRE also performs rural engineering training under commission from other organizations.



■Hydraulic model experiment in a laboratory



■Rural planning workshop on-site



■Case study presentation debate by trainees

## 5 Joint Research and Overseas Research

To implement research liaison and coordination is done internationally with other countries and domestically with prefectures, etc. and liaison and coordination is done as well for individual exchanges with outside institutions. There is a system for inquiring about collaboration with an outside examination research institution in NIRE. The annual number of joint research subjects fluctuates between 20 to 30, and plays a part in the cooperative public-private new technology development work which MAFF is advancing. While participating in international research meetings and accepting foreign researchers, it is striving also to dispatch abroad and accept trainees from overseas positively for the technology transfer performed through JICA.



■Holding of a Japan-South Korea joint seminar

## Disaster Technical Assistance (Coordinator for Disaster Prevention Research)

NIRE was specified as a designated public corporation for disaster management based on the Disaster Countermeasures Basic Act in 2001. In fiscal 2001, NIRE installed the Director for Disaster Prevention Research to undertake the role of the disaster technical assistance window (title name changed to Coordinator for Disaster Prevention Research from fiscal 2006). When a disaster related the irrigation infrastructure of farm land occurs, according to the request from the authorities concerned, the staff are dispatched to a stricken area, and disaster investigation, emergency measures, restoration, etc. are supported. Technical assistance for disaster restoration measures in the 1st interim goal period(2001~2005 fiscal year) was twenty five cases, and one hundred four staff were dispatched to stricken areas.

[latest disaster support example]



■ Danger diagnosis of the reservoir stricken by the Noto Hanto Earthquake in 2007

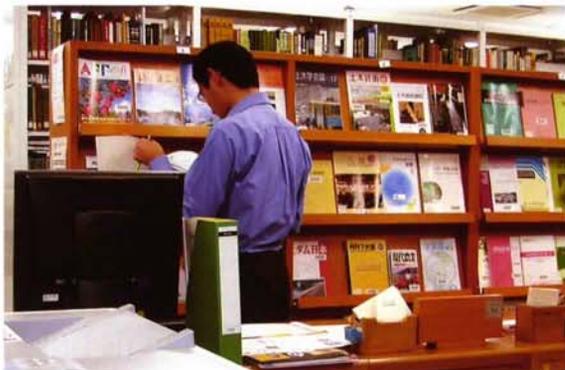
## Information Provision and Public Relations (Information and Public Relations Section)

Information and Public Relations Section is performing research support, such as collection of books, articles and other data and maintenance and optimization of the network environment. It makes efforts to disseminate the results of research by broadly communicating them in a timely manner to administrative bodies and related organizations. At the same time, public relations activities are being conducted through press releases, websites, public relations magazines etc.

Information and Public Relations Section functions as the window for visitors to NIRE and responds to various inquiries from the outside.

◎Main publications

- NIRE Bulletin.....1-time issue / year
- NIRE Technical Report.....1-time issue / year
- NIRE Annual Report.....1-time issue / year
- Research Results Report .....1-time issue / year
- NIRE News.....6-time issue / year



## Model Work and Farm Management (Technology Support Team)

Model building and farm management are indispensable tasks in the conduct of research. To determine the hydraulic function of a farm irrigation facility, it is important to conduct experiments using a detailed scale model. Such a model is remade over and over in accordance with the course of experiment. These tasks require high accuracy and superior techniques, therefore, they are addressed by skilled expert staff of NIRE.



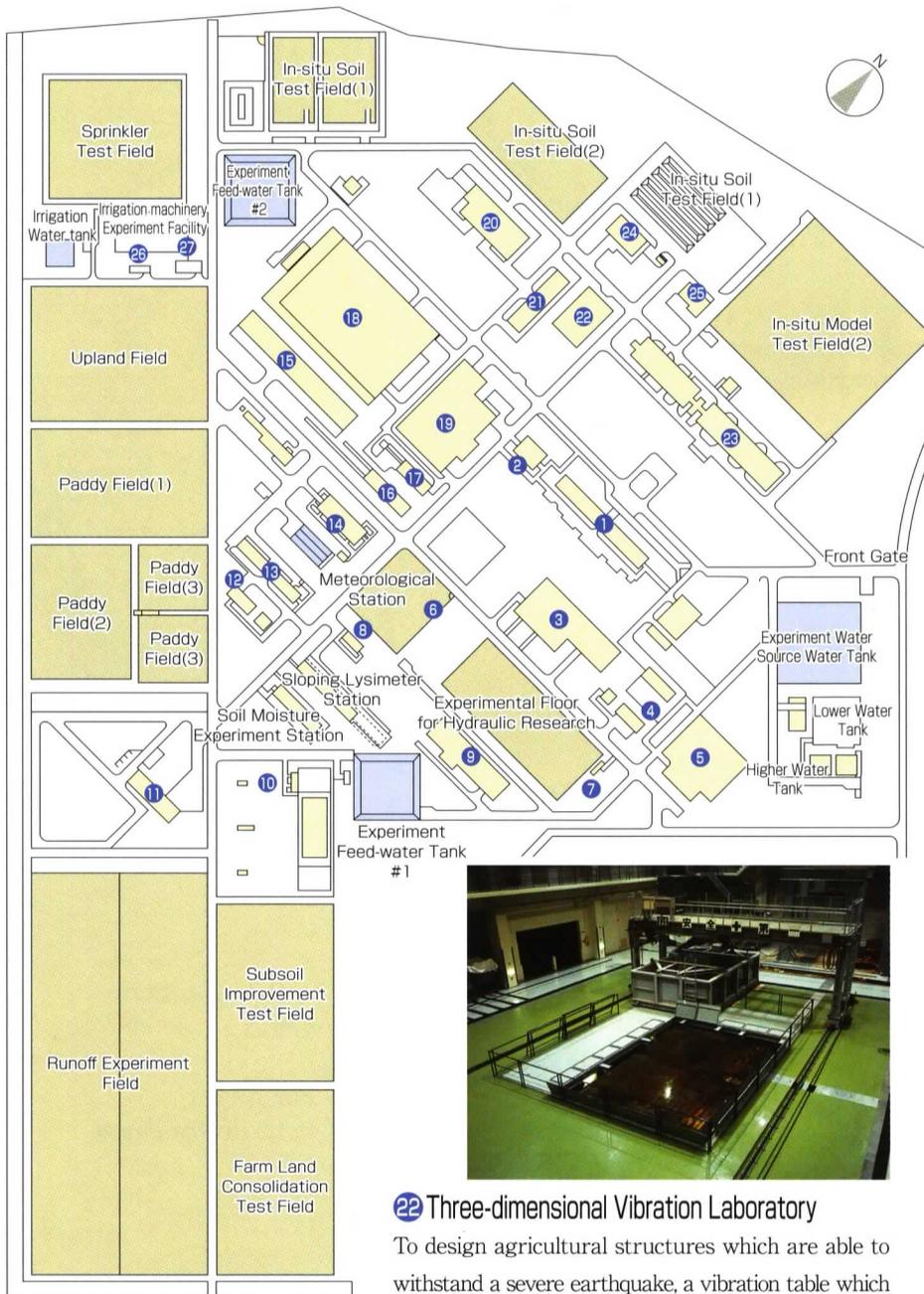
■ Model of dam flood sluice

There are various types of experimental fields (total area 125,540 m<sup>2</sup>) on the premise for basic research on farmland and core agricultural structures. For management of these fields, expert staff is assigned to manage and maintain the specific environment necessary for research activities.



■ Examination of sloping farm development using a laser leveler

# Layout of Laboratories and Facilities



- ① Main Building for Research
- ② Research Center for Disaster Prevention
- ③ Canal Works Laboratory No.2
- ④ Scale Model Workshop
- ⑤ Dams Laboratory
- ⑥ Meteorological Observatory
- ⑦ Head Works Laboratory No.2
- ⑧ Variable Slope Lysimeters
- ⑨ Head Works Laboratory No. 1
- ⑩ Groundwater Laboratory
- ⑪ Radiation Technique Laboratory
- ⑫ Paddy Field Laboratory
- ⑬ Rural Resource Research Center
- ⑭ Paddy Field Irrigation Laboratory
- ⑮ Laboratory for Open Channel Flow with Wave Generator and Wind Tunnel
- ⑯ Wave Laboratory for Preliminary Testing
- ⑰ Multi-phase Flow Laboratory
- ⑱ Laboratory for Planar Two-dimensional Flows with Tide and Sea Waves
- ⑲ Laboratory for Sea Waves with Fan-shaped Water Tank
- ⑳ Controlled Environment Agriculture Center
- ㉑ Twin-span Glasshouse
- ㉒ Three-dimensional Vibration Laboratory
- ㉓ Construction Engineering Laboratory
- ㉔ Fill Dam Vibration Laboratory
- ㉕ Soil Mechanics Model Test Laboratory
- ㉖ Crop Environment Control Laboratory
- ㉗ Upland Field Irrigation Laboratory



㉒ Three-dimensional Vibration Laboratory

To design agricultural structures which are able to withstand a severe earthquake, a vibration table which can simulate the actual shake of an earthquake is used.



⑤ Dams Laboratory

Researches effluent function of flood spillway to protect a dam from a flood.



⑱ Laboratory for Horizontal Two-dimensional Flow with Tide and Sea Wave

Examines behavior of planar water flows, such as tides, waves, and river flow.

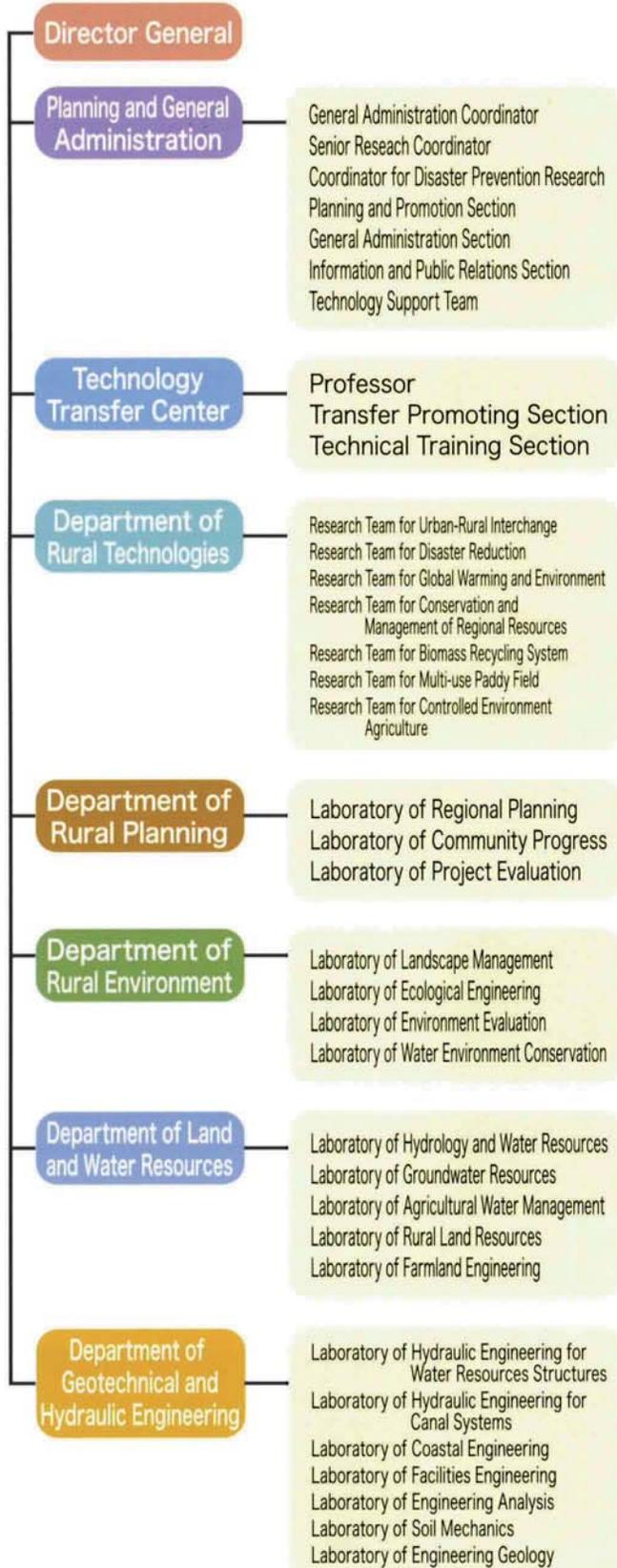


Large-sized Wind Tunnel

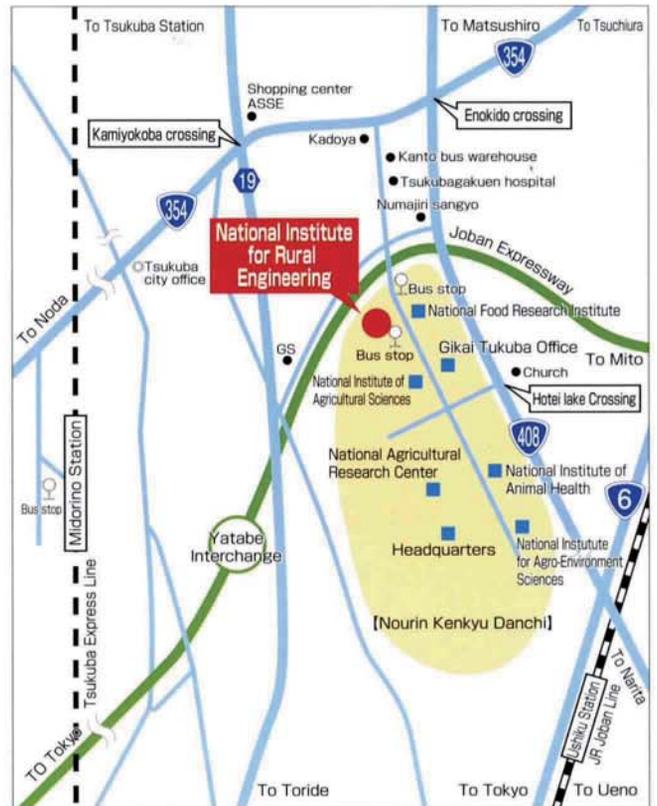
(⑲ Laboratory for Sea Waves with Fan-shaped Water Tank)

Measures airflow conditions and mechanical characteristics by setting agricultural equipment models inside.

## Organization



## Transportation



### ① By Train

Ushiku Station on JR Joban Line  
Midorino Station on Tsukuba Express Line

### ② By Local Bus

Kanto Tetsudo Bus  
(from west entrance of Ushiku Station)  
Bus to Tsukuba Univ. Chuo  
Bus to Yatabe Shako  
Bus to Tsukuba Univ. Hospital  
Get off at the National Institute for Rural Engineering bus stop  
(takes about 25 minutes)

### ③ By long-distance bus

Take the Tsukubayama bus from the Yaesu South entrance of Tokyo Station, and get off at the Norin Danchi Chuo stop.

### ③ By car

Take the Joban Expressway to the Yatabe Interchange



Incorporated Administrative Agency National Agriculture and Food Research Organization

**National Institute for Rural Engineering**

(NIRE)



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