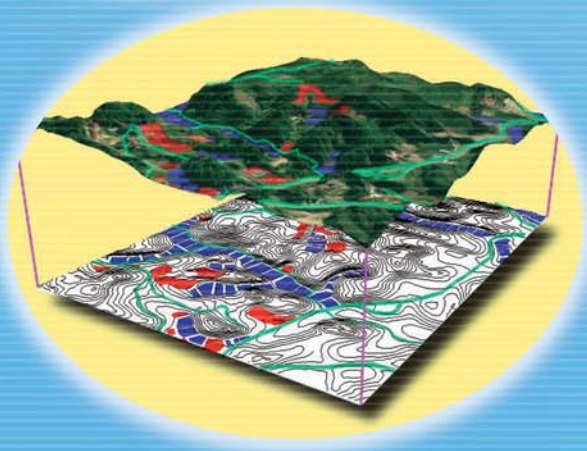
Making the most of soil and water to build prosperous rural areas

National Institute for Rural Engineering



NARO

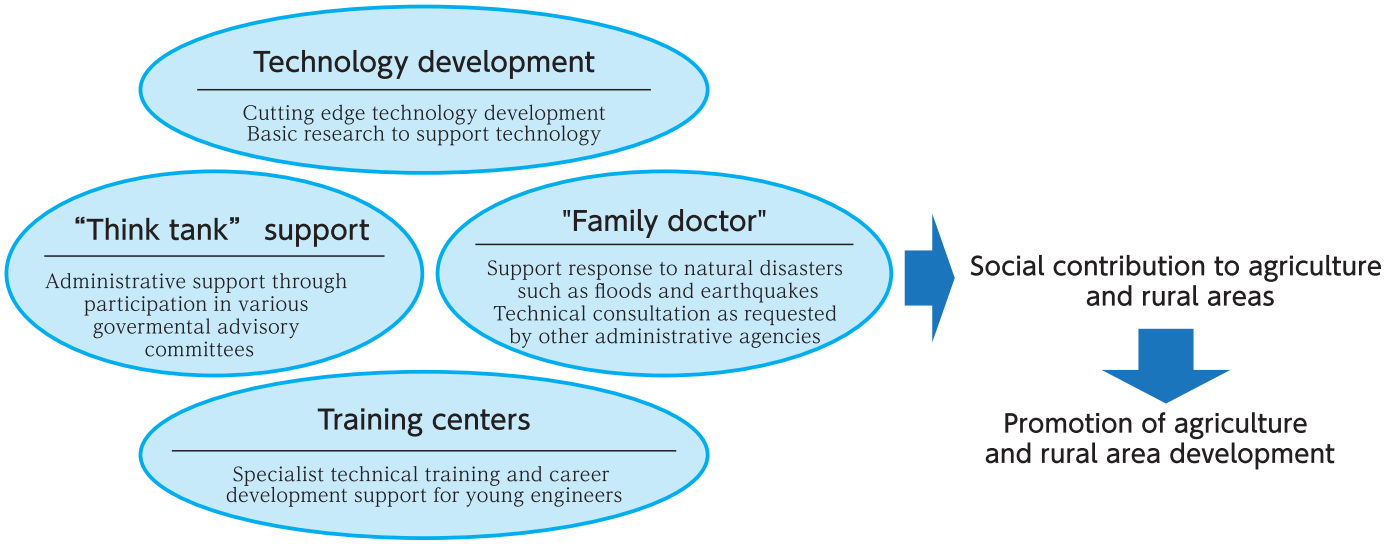
National Agriculture and Food Research Organization

The Role of the National Institute for Rural Engineering (NIRE) and its Research Activities

What is NIRE?

NIRE is one of several institutes that belong to the National Agriculture and Food Research Organization, an incorporated administrative agency. Our focus is the development of technology that contributes to the achievement of a policy of “rural promotion” through prudent management of agricultural water and soil. Moreover, we provide technical assistance with hazard and disaster countermeasures for farmland and agricultural facilities.

NIRE's broad range of activities



Technical development objectives relevant to our mission

From April, 2011, in cooperation with other agencies, we will focus on the following 11 objectives as part of the five-year medium term plan of the National Agriculture and Food Research Organization (NARO).

(1) Research on stable supply of food

①Development of highly productive rotation system of paddy rice and upland crop in paddy field

②Development of a low-cost structure design and environment control for safe, energy- saving, and optimized greenhouse production

(2) Research concerning global problems

③Assessment and adaptation technologies for climate change on water/land resources

④Development of region-specific biomass utilization systems

(3) Research on regional resource management

⑤Development of verification and management technologies for agricultural water supply system

⑥Development of a performance deterioration diagnosis method and performance-based design for irrigation facilities

⑦Development of disaster prevention technology for farmlands and foundation using a high performance, low cost probe system

⑧Development of prevention technology for risk reduction of disasters related to irrigation facilities

⑨Development of a risk assessment method and operational ways for irrigation and drainage according to changes in agriculture

⑩Development of agricultural land management technologies for enhanced and sustainable agricultural production

⑪Development of technologies for utilizing and managing renewable energy and regional resources

(4) Research on response to the Fukushima nuclear accident

⑫Development of decontamination technologies for high levels of radiation-contaminated soil and investigation of the radioactive substance runoff from farmland soil

Implementation system of the third Period

In order to meet the needs of society, we have arranged the medium term plan into 11 research projects. In each project, specialists from five fields cooperate to achieve a comprehensive execution of their project and the medium term plan as a whole.

NIRE Organization and Division Keywords

Director General

Department of Planning and General Administration

General Administration Coordinator
Senior Research Coordinator
Coordinator for Disaster Prevention Research
Planning and Promotion Section
General Administration Section
Information and Public Relations Section
Technology Support Team

Technology Transfer Center

Academic
Transfer Promoting Section
Technical Training Section

● To focus on the NIRE contribution to society, since March, 2011, we have implemented a "Research Division" system that emphasizes keeping a stable food supply, preventing or reducing effects of disasters such as earthquakes and floods in rural areas, renewing and invigorating agriculture, and rural area development.

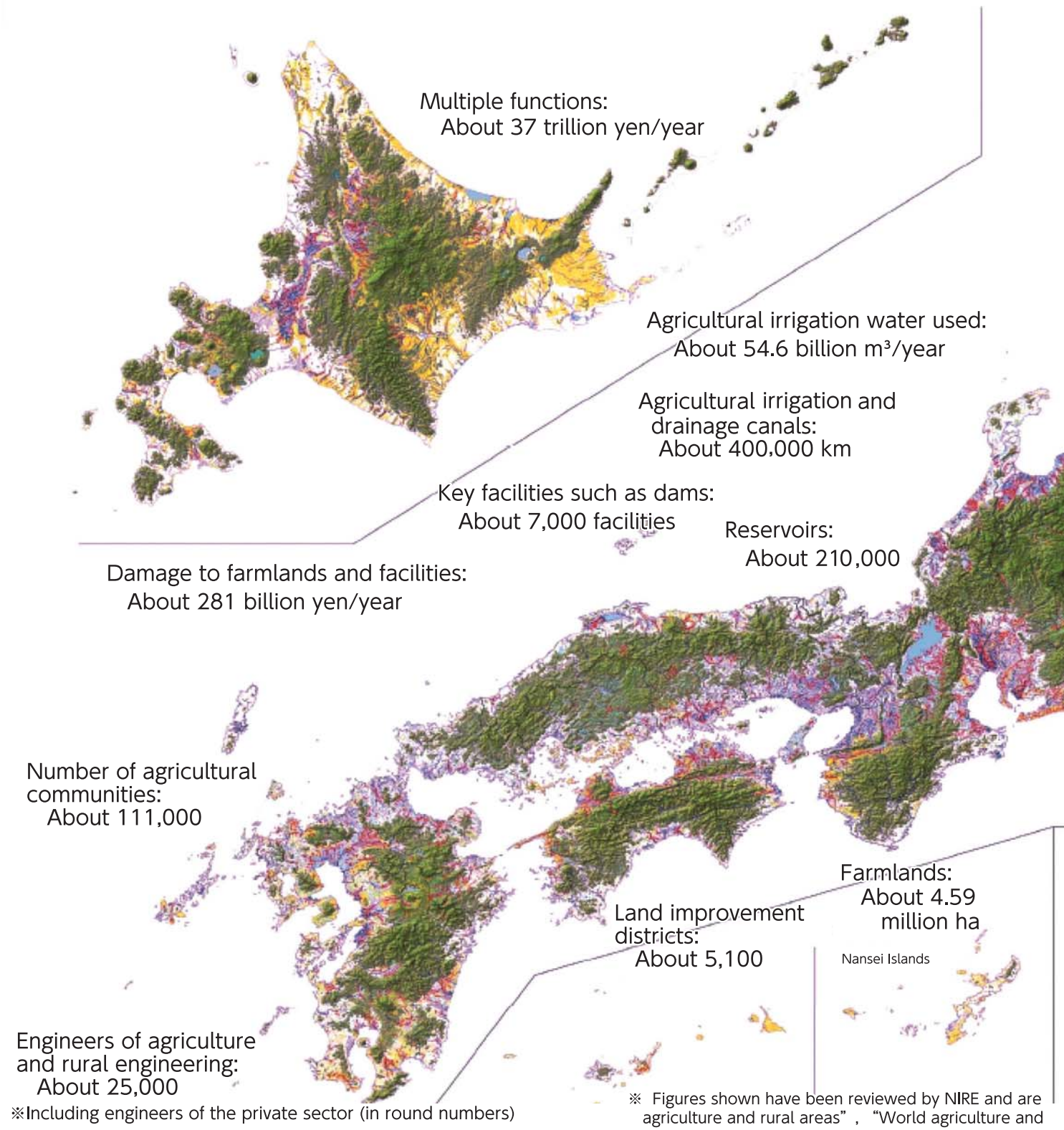
Research Division	Division Keywords
Agricultural Environment Engineering Research Division Advanced Paddy Field Management Farmland Soil and Water Management Irrigation Management Controlled Environment Agriculture	farmland consolidation, irrigation water management, controlled environment systems, greenhouse environment control, paddy rice and upland crop rotation in paddy field, enhancement of agricultural productivity, high-quality products
Facilities and Geotechnical Engineering Research Division Facilities Engineering Soil Mechanics Engineering Analysis Facilities Maintenance and Management Disaster Prevention	agricultural dams, reservoirs, pipelines, open channels, earthquakes, heavy rain disasters, technologies for prevention and reduction of disasters, performance verification, technologies for maintenance, management and renewal, landslides
Hydraulic Engineering Research Division Hydraulic Structures Design and Management Canal Systems Coastal Hydraulic Engineering Hydrology and Water Resources Management Water Environment	irrigation systems, diagnosis of hydraulic function and performance verification, control of irrigation and drainage, storm surge, tidal wave (tsunami), drainage of low-lying farmland, agricultural water use, basin-wide water allocation and management, conservation of water quality
Renewable Resources Engineering Research Division Biomass Recycling System Renewable Energy Systems Water Resources Engineering Ecological Engineering	biomass utilization, reduction of environmental load, small hydropower generation, renewable energy, climate change adaptation, hydrologic cycle, eco-friendly techniques, biological diversity
Rural Development and Planning Research Division Regional Planning Project Evaluation Resources Evaluation Resources Information Technology	village cooperation, teamwork power of rural areas, effective farmland use, cost benefit analysis, influence assessment, resource utilization, GIS, land resource management

NIRE's history

1950	Inauguration of the Department of Agricultural Engineering of the National Institute of Agricultural Science Inauguration of the Shore Reclamation Department of the Kyushu Agriculture Experiment Station
1959	Inauguration of the Experiment and Training section of the Construction Department of the Farmland Bureau of the Ministry of Agriculture and Forestry (MAF)
1961	National Research Institute of Agricultural Engineering (NRIAE) established in Hiratsuka City, Kanagawa Prefecture under the MAF to oversee and combine the above three institutions
1977	NRIAE relocated from Hiratsuka City to Tsukuba Science City, Ibaraki Prefecture
1988	NRIAE reorganized into the National Institute for Rural Engineering (NIRE), under the Ministry of Agriculture, Forestry and Fisheries (MAFF)
2001	NIRE became an incorporated administrative agency
2006	NIRE reorganized under the NARO

NIRE Scope of Activities

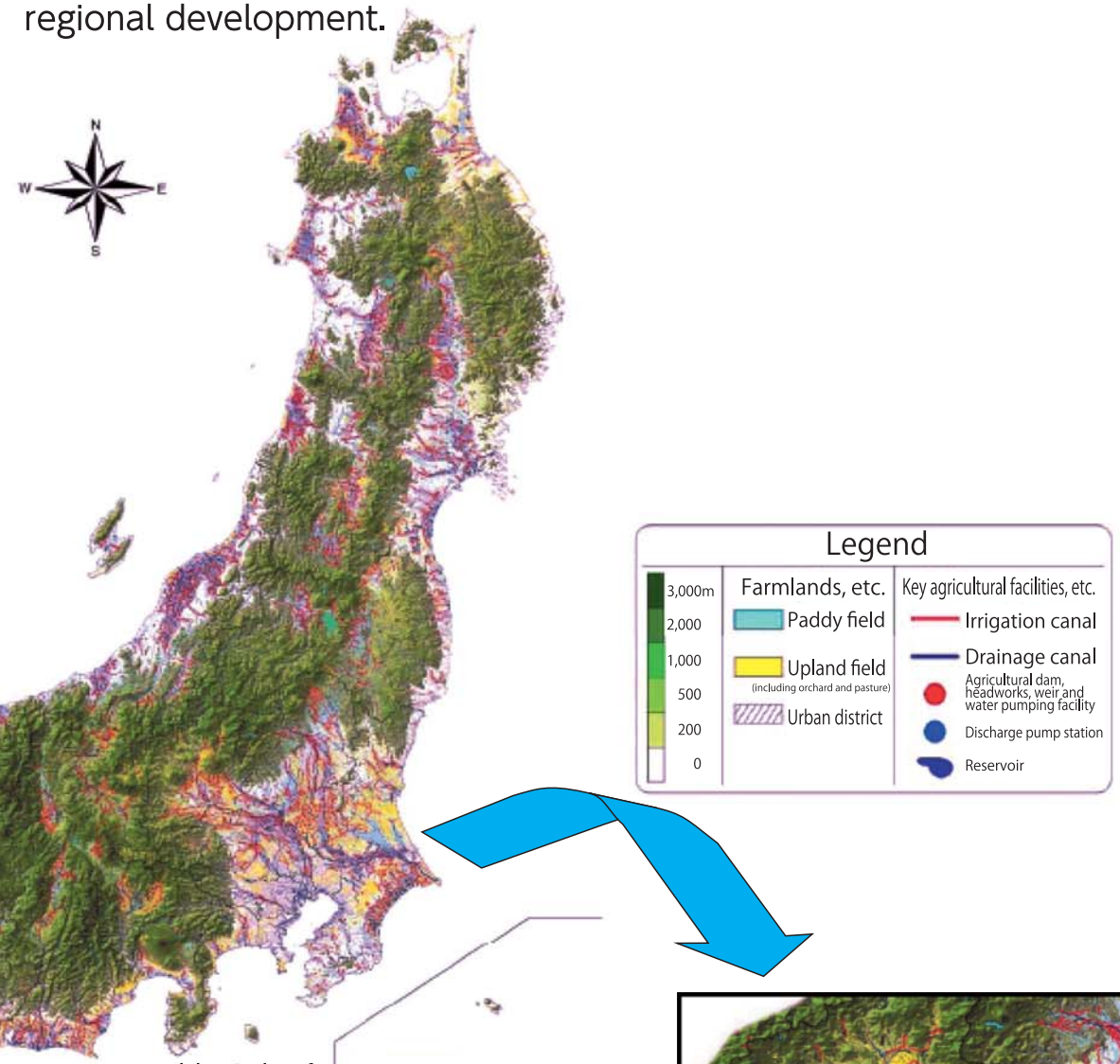
Rural areas are entities having regional resources, such as farmland and scenery, rich nature, biodiversity, and original traditional culture. Viewed as agricultural production, a place for people to live, and a place for preserving Among various affairs NARO administrates, NIRE takes charge of the domain maintenance of regional resources for future years to contribute a balanced



※Including engineers of the private sector (in round numbers)

※ Figures shown have been reviewed by NIRE and are agriculture and rural areas" , "World agriculture and

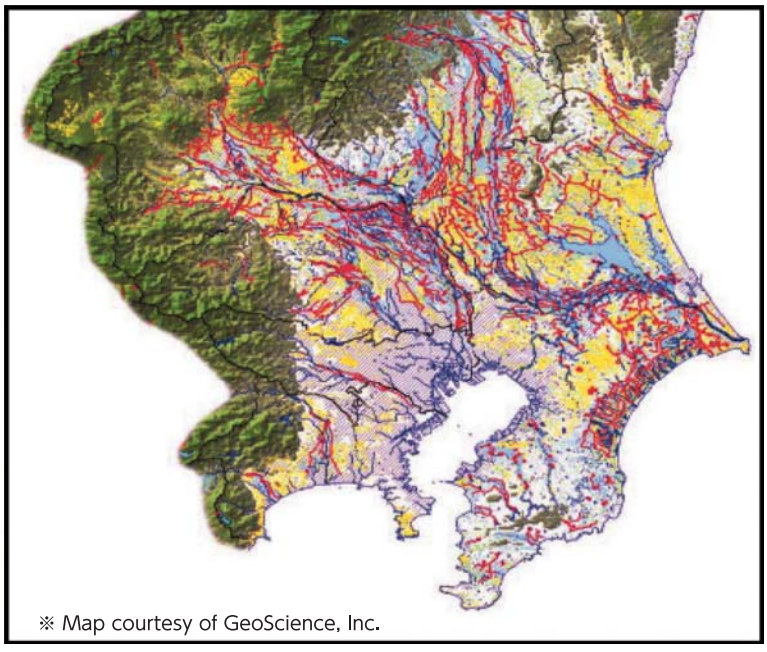
agricultural water, which are the base for a stable supply of food, beautiful national assets, they are expected to fulfill a variety of roles such as a place of natural ecology.
related to rural areas and conducts research to enable preservation and regional development.



Total length of coastal farmlands: About 1,780 km

Ogasawara Islands

based on references such as "White paper on food, forestry census, survey on agricultural communities", etc.



※ Map courtesy of GeoScience, Inc.

Agricultural Environment Engineering Research Division

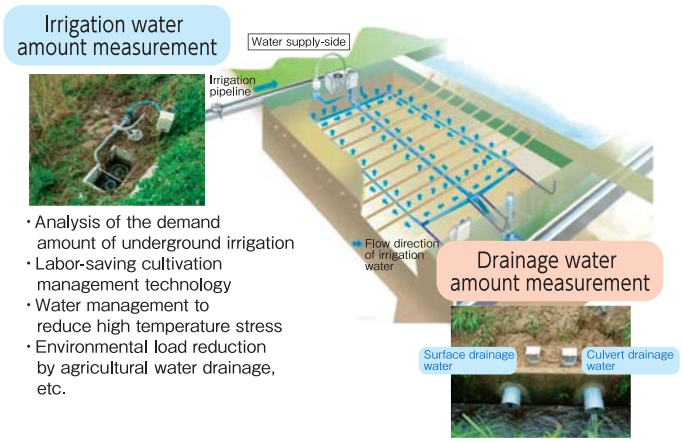
Technology for management for sustanable production of

We develop technology for improvement and efficient use of agricultural production infrastructure including 2.5 million ha of paddy field, 2.1 million ha of upland fields, and 50,000 ha of greenhouses. The results contribute to the enhancement of agricultural productivity and sustainability.

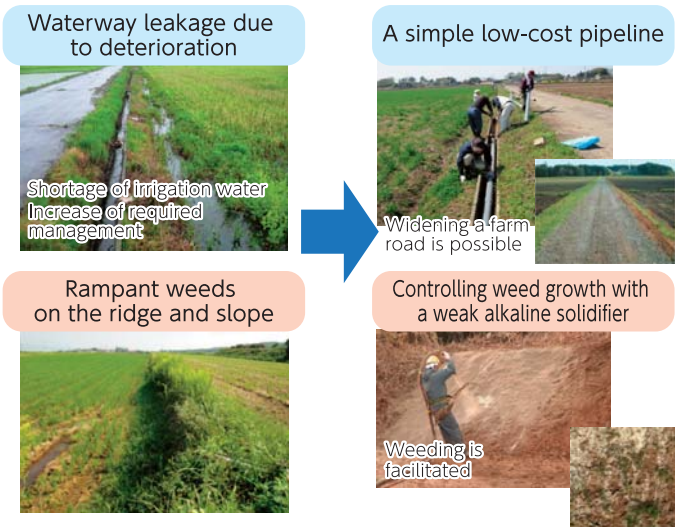
1. We develop technology for the improvement and management of irrigation and drainage to promote paddy rice and upland crop rotation in paddy fields.
2. We develop technology for soil and water management to produce various crops and high-quality agricultural products, sustainably in farmlands.
3. We develop technology for irrigation water management to meet variations in demand for irrigation water.
4. We develop technology for design, control, and energy-savings in low-cost agricultural structures to produce reliably high-quality agricultural products.

Consolidation technology of paddy rice and upland crop rotation for intensive use of paddy field

Advanced Paddy Field Management



■Promoting the use of the underground water level control system



■Labor-saving farmland management technology

■Technology for low-cost drainage improvement according to the scale of management

The "underground water-level control system" prevents moisture inhibition and drought and is becoming more popular as a productivity-enhancing technology suitable for paddy rice and upland crop rotation. We analyze the demand amount of underground irrigation in response to the spread of the technology to various farming situations. Moreover, to increase the production of wheat and soybeans in paddy field, the improvement of water drainage is essential. For this purpose, we develop a low-cost drainage improvement technology that farmers can implement on their own. Furthermore, to achieve labor-saving farmland management, we are developing weed control using a weak alkaline solidifier on ridge and slopes, and methods to convert irrigation canals to simple pipelines.

# of agricultural lands and structures high-quality products

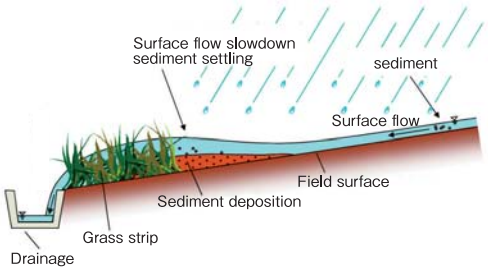
Technology for soil moisture control and environmental load reduction in farmlands

Farmland Soil and Water Management

Field soil sensor

Soil sensor installation

■Soil moisture and EC monitoring technology by electromagnetic wave



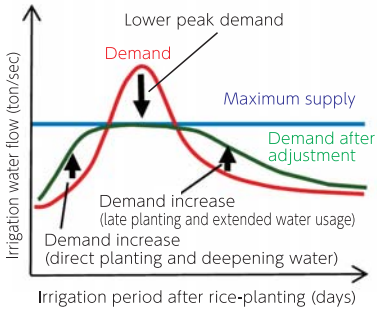
■Grass strip practice to reduce sediment run off from farmland

We develop technology for soil moisture control to produce various crops and high-quality agricultural products. In addition, we develop technology for reduction of environmental load substances, such as nutrient and sediments from farmlands to conserve water environment.

Management of irrigation water

Irrigation Management

■Observation of irrigation water supply and demand



■Countermeasures against heat-damage to ripening rice

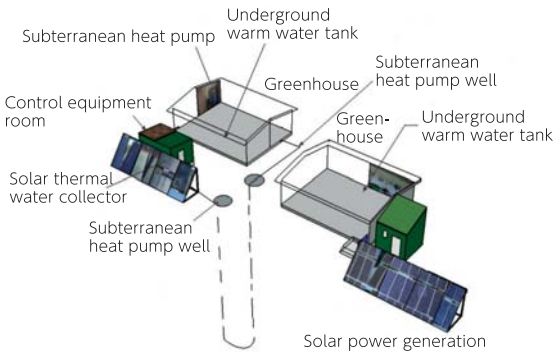
The demand for irrigation water is diversifying and recently new demands such as irrigation water usage to cope with climate change are emerging. We develop irrigation management methods to adjust the gap between the demand and the supply of irrigation water and to increase the efficiency of irrigation water usage, thus improving agricultural productivity.

Technology of design, control, and energy-saving in agricultural facilities

Controlled Environment Agriculture

■Gathering data on greenhouses damaged by disasters for structural analysis

■Fog cooling for summer temperature control



■Autonomous greenhouse using natural energy

Greenhouses, which are relatively light and simple structures, are often affected by strong winds and heavy snowfall. Study of greenhouse structures to resist such meteorological disasters is one of our research topics. In order to utilize greenhouses throughout the year, environmental control studies such as the effects of natural and forced ventilation, and fog evaporative cooling, in addition to experiments using a wind tunnel and simulation by CFD are being conducted. Sustainable food and energy production systems using greenhouses are unique and new research topics in agricultural structures.

Facilities and Geotechnical Engineering Research Division

Technology of maintenance disaster prevention and reduction,

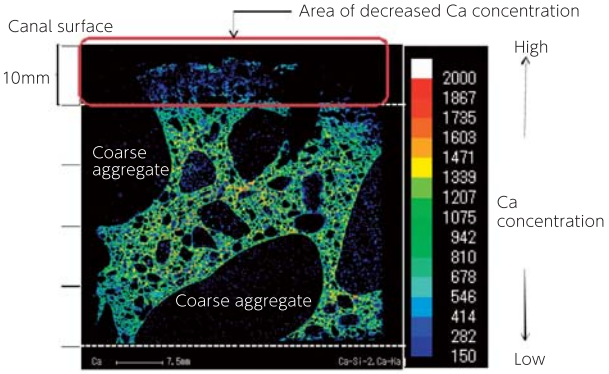
We contribute to rural development by enhancing safety against natural disasters such as earthquakes, heavy rains, and landslides. We develop disaster prevention and performance diagnostic technologies for agricultural facilities such as 400,000 km of irrigation canals, 210,000 irrigation ponds, and 7,000 irrigation high dams in Japan. We also develop management and repairing methods to decrease life cycle costs of the facilities.

1. To assure the continuing safety of irrigation facilities, we develop methods for safety diagnosis and assessment of infrastructure and facilities; we also develop technology emphasizing practical application on-site, using techniques such as facilities testing and numerical simulation.
2. To predict, diagnose, and evaluate the structural performance of irrigation facilities, we develop performance test methodology and monitoring technology that integrates on-site and maintenance management technology.
3. We elucidate degradation mechanisms in irrigation facilities, and develop low-cost repair, reinforcement, and renewable technologies of the facilities via in-situ verification tests for longer life span.
4. For conservation and protection of farmland and irrigation facilities in rural areas against natural disasters such as earthquakes, heavy rain and typhoons, we develop disaster prevention and reduction technologies, and survey and monitoring technologies of the facilities.

Quantitative diagnosis and prediction of degradation in irrigation facilities

Facilities Engineering

■Failure test of canal joint



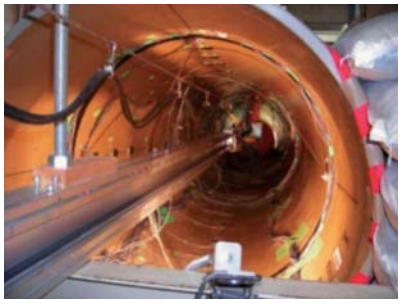
■Degradation mechanism of canal concrete through decreased Ca concentration

We develop quantitative diagnostic technologies and performance evaluation and prediction technologies for irrigation facilities to analyze the soundness of the systems and to assess the effects of decline in structural performance caused by the progression of deterioration.

Safety evaluation and high-durability reinforcement technology of small earth dams and pipelines

Soil Mechanics

■Rainfall test on a full-scale reservoir



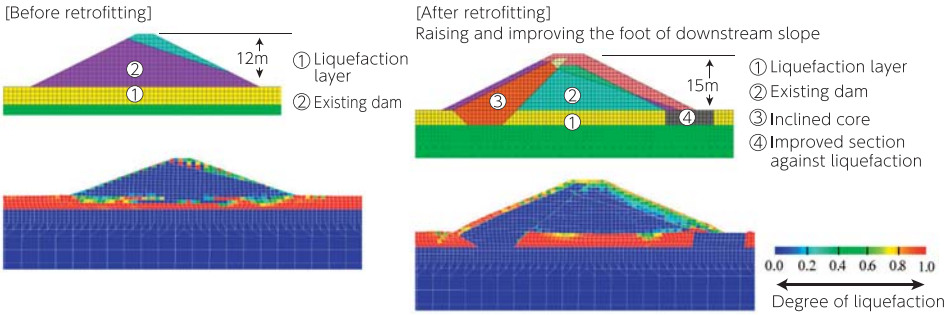
■Pipeline traffic-loading test

We develop methods for estimating and assessing the limit states of irrigation reservoirs and dams against heavy rain or earthquakes by laboratory test, in-situ experiment, and numerical simulation. Moreover, we analyze damage mechanisms in pipeline by earthquake, and develop earthquake resistant technology, evaluation technology, and technology for long-term performance.

and management, renewal, in agricultural irrigation facilities

Maintenance for structural safety of main irrigation facilities

Engineering Analysis



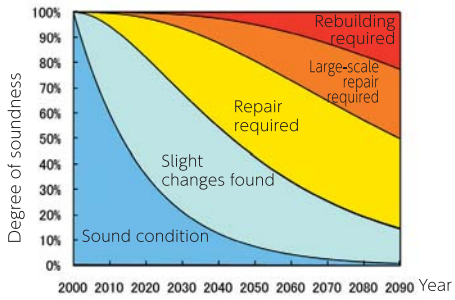
■Assessment of seismic performance in long-term using dam by liquefaction analysis of embankment

We develop inspection technologies using non-destructive monitoring methods to determine the uniformity of dam body and its foundation that have been in service for many years, and the interaction between them. We also develop evaluation systems, including numerical analysis methods, of vibration characteristics, durability and risk against earthquakes of large-scale reservoir facilities.

Maintenance and management methods for irrigation facilities

Maintenance and Management of Facilities

■Facility soundness assessment by function diagnosis

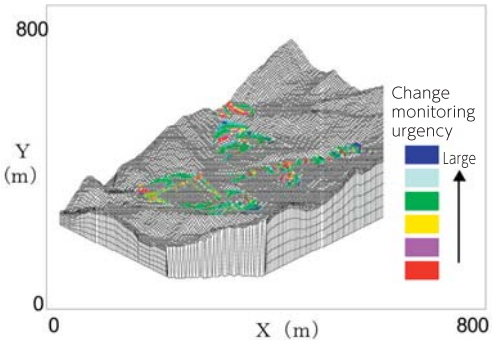


■Prediction of soundness of facility based on function diagnosis data

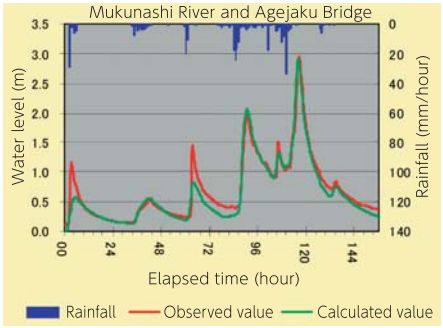
We develop appropriate renovation and maintenance management technologies for agricultural facilities using function diagnostic techniques, their techniques of function assessment, prediction, management effectiveness assessment and other stock management techniques. We also develop low-cost repair and reinforcement methods to deal with changes in function and performance of facilities.

Disaster prevention technology against landslide and reservoir overflow

Disaster Prevention



■Disaster prevention management map in slope rice paddies by simulation of underground water in shallow layers



■Flood overflow model of a reservoir for the assessment of overflow risk

We develop highly accurate risk assessment technologies such as numerical simulation models capable of predicting landslide movement in farmland for reduction of disaster in intensive large-scale landslide. We also analyze runoff characteristics around reservoir, and develop risk assessment technology to predict overflow from reservoir and management technology of whole reservoirs in watershed for flood disaster reduction.

Hydraulic Engineering Research Division

Irrigation water supply

We contribute to rural development by assuring sustainable water use in whole watershed using hydrological and hydraulic technology aiming at efficient distribution of irrigation water and labor-saving water management. We develop methods for proper distribution of irrigation water using numerical analysis and hydraulic model test. We also develop technology to protect coastal farmland from disasters.

1. To conserve and maintain diversion works, which are one of core facilities in water use, we analyze the mechanisms of hydraulic dysfunction by river bed fluctuation, and develop technologies for verification of hydraulic function, and design of the facilities.
2. To meet local irrigation water requirements and maximize the effective use of water, we develop methods of veritication, design, and management planning in water use by surveying and analyzing the actual condition of canal systems scheduled for renewal.
3. To prevent disasters in coastal areas where agricultural facilities are located, and in adjacent low-lying farmland, we develop disaster prevention technology for drainage facilities and coastal conservation facilities in anticipation of storm surges and flooding.
4. For a steady irrigation water supply, we develop water resources management techniques utilizing risk assessment methodologies for flood, drought, and so forth, and integrated hydrological modeling, among other techniques.
5. For irrigation water quality risk management, we analyze the actual conditions of contaminant transfer in the irrigation system, and develop water quality assessment models and management methods.

Technology to obtain and distribute irrigation water

Hydraulic Structures Design and Management

■Device for reducing low-frequency noise from falling water vein
Left: Water vein emitting low-frequency noise due to vibration of water screen.
Right: Water vein after installing a device for reducing low frequency noise.

We conduct research on proper hydraulic design and management of main irrigation structures such as dams, headworks, and diversion facilities. We also analyze the design and capability of water conveyance and distribution for irrigation systems using numerical analysis and hydraulic model testing. We develop techniques for hydraulic function verification, performance evaluation, and hydraulic design methods. All of these contribute to the steady supply of irrigation water.

Technology to diagnose the function of irrigation and drainage systems

Canal Systems

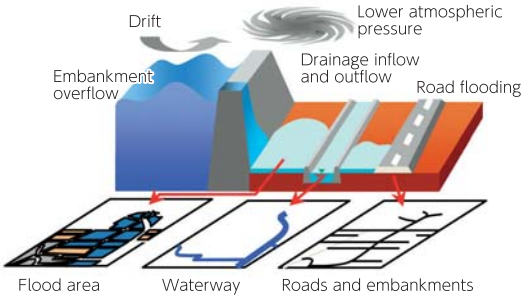
■Hydraulic model test for rapidly-varied flow in a steep chute

We carry out hydraulic studies of water conveyance, distribution and collection in agricultural canal systems. If hydraulic problems occur based on degradation or damage in canal system structures such as open channels and pipelines, we propose countermeasures to recover original function of water conveyance by hydraulic analysis. If supply and demand balance becomes poor or broken in canal systems, we implement performance diagnostics to the systems by system engineering methodology. Finally we offer some proposals to 'patients' with consideration for the temporal and spatial changes of agricultural situation and hydrological condition.

and drainage technology

Technology to protect coastal farmland from disaster

Coastal Hydraulic Engineering



■Modeling storm surge flooding in coastal farmland

■On-site survey of tsunami disaster

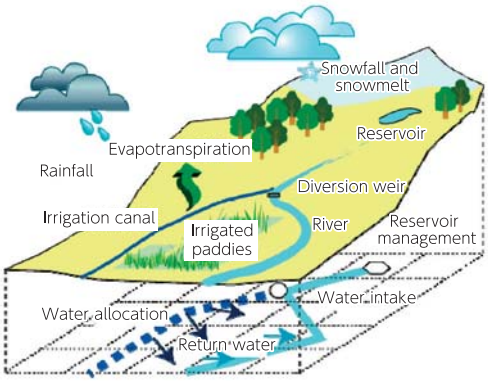
Approximately 1,780 km of Japanese coastline is managed by an agriculture sector, and coastal farmlands must be protected from storm surges and tidal waves. We investigate flood and storm surge disaster damage to coastal farmlands and assess disaster risk using computer fluid dynamics (CFD) analysis. We also develop social-economical models to predict lifetime of seacoast conservation facilities, such as sea banks and tidal wave breakwaters.

On-site hydrological observation and a water allocation and management model of irrigation-dominated basins

Hydrology and Water Resources Management

November June

■Hydro-meteorological observation systems in Tonle Sap Lake



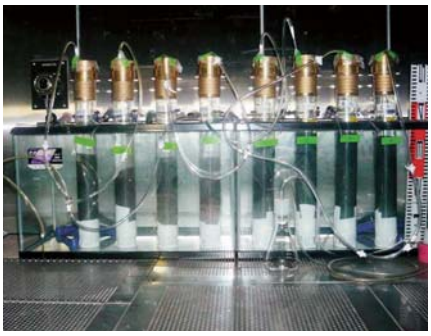
■Water allocation and management model for irrigation-dominated basins

To assess water circulation characteristics in river basins, we carry out hydrological observations of discharges/water levels and rainfall, and develop a distributed water circulation model considering various uses of agricultural water. The model is characterized by the processes of water allocation and management in large and irrigation-dominated basins. With such models, we can understand the roles of agricultural water and farmlands, and help assure a sustainable supply of irrigation water at present and in future.

Technology for water quality improvement and management in irrigation water and watershed

Water Environments

■Survey of nutrient load from farmland



■Nutrients elution test from bottom sediment

We develop technology and methodology for irrigation water quality improvement by minimizing the environmental influence of contaminants discharged from farmlands. We also examine materials metabolism in farmland and irrigation and drainage systems, and assess the inherent water purification function of agriculture. Based on such research, we suggest watershed management methods to use these functions for conservation of the water environment and we contribute to the formation of sound water environments in watershed.

Renewable Resources Engineering Research Division

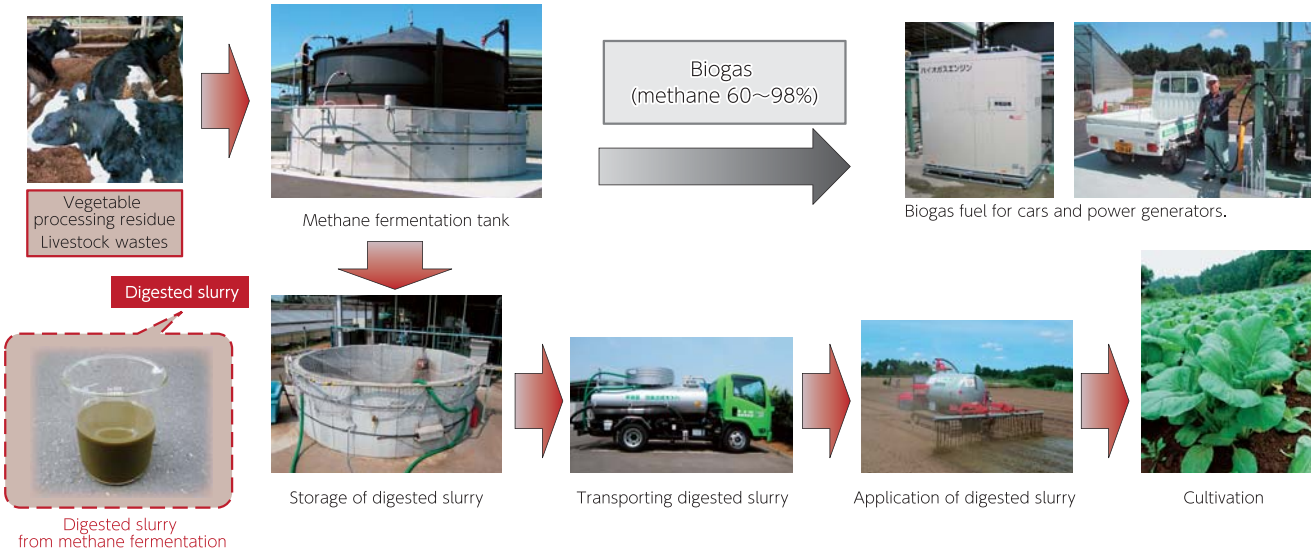
Development of assessment and and sustainable materials cycles

In rural areas, there are various resources, such as water resources that account for about 66% (54.6 billion m³ in 2007) of yearly Japanese water usage, a wealth of biological resources such as 5,668 species of living creatures, and usable biomass resources such as cattle waste (about 88 million m³/year). We assess the soundness of these resources from the user level to the global scale and we develop practical technology to contribute to forming a recycling society; countermeasures against global warming; and conservation of pastoral areas, and village lands and forests.

1. We develop technology to fully use agricultural by-products, resource crops, and biomass from livestock, etc, as we support food production in rural areas.
2. We develop methods of maintenance and management of renewable energy in irrigation facilities to reduce the use of fossil energy.
3. Working in close cooperation with research organizations in Japan and overseas, we develop highly precise assessment methodologies to examine the influence and risks of climate change on farmland and water resources, and adaptive technologies and maintenance management methods to meet these challenges.
4. We analyze required hydraulic conditions for indigenous aquatic lifeforms, and develop performance test methodologies and technologies of design and management for water use and hydraulic function important to irrigation.

Development of biomass utilization technology

Biomass Recycling System



■System using methane fermentation digested slurry as a liquid fertilizer

- The system will contribute to effective use of fertilizer resources and cost reduction.
- We assess the environmental impact on farmland, the reduction of this impact, and its safety.

We develop technologies to make full use of regional biomass resources such as agricultural by-products, energy crops, animal-derived biomass as energy and materials, while maintaining food-production capabilities. Using these methods, we are designing a regional recycling system that will eventually lead to the construction of a full-fledged biomass town.

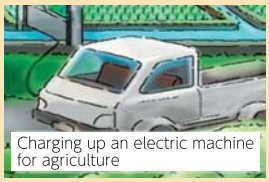
consolidation methods for viable and ecological systems in rural areas

Development of renewable energy technology

Renewable Energy Systems

- Technical development of small water wheel
- Development of water wheel installation method
- Development of hydraulic simulation methods for water wheel performance analysis

Technological development



- Energy production system is added to the irrigation system.
- Development of local production for local consumption systems of renewable energy
- Development of energy distribution systems

Systems development

Proposal for alternative regulations and policies

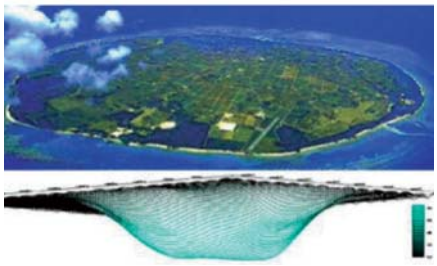
- Environment for promotion
- Relaxing administrative procedures
- Development of "energy-conscious" watershed management

Rural areas have potential hydropower energy from irrigation facilities such as irrigation canals and dams, and solar and wind power. Based on field survey data and interviews to local residents, and applying hydraulic simulation methodologies, we research and develop techniques for efficient use of natural energy, and we contribute to the realization of "local production for local consumption of renewable energy" in rural areas.

Development of assessment methods for climate change on water resources, and adaptation technologies

Water Resources Engineering

■Risk assessment and adaptation measures for flood in low-lying agricultural areas



■Estimation of amounts and/or potential of freshwater resources on remote islands, and development of conservation measures

We develop methods to predict and assess the influence of climate change on farmlands, irrigation, and land improvement facilities; also, technologies for preserving water resources and farmland, and improved utilization of regional resources based on these assessments. These activities are very useful to predict patterns of water use in the future, and to establish sound and stable water resource usage practices.

Assessment of biodiversity and development of eco-friendly techniques in irrigation facilities

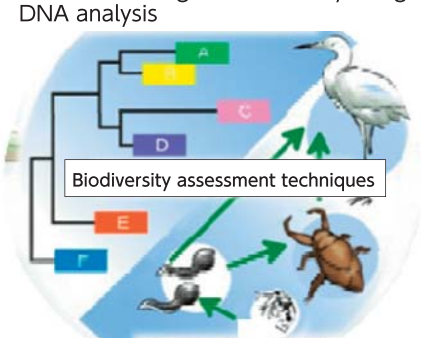
Ecological Engineering

Previously installed drop work

■Development of eco-friendly techniques

Slope-type fish ladder with cobbles installed in a drop work to enable fish to swim upstream. (Kanto Bureau of Agriculture Administration, with design cooperation from NIRE.)

Assessment of genetic diversity using DNA analysis



■Ecosystem diversity assessment with stable isotope ratio analysis

We identify functional standards for the design of water channels that meet the hydrologic conditions required for the conservation of biodiversity. We are assessing biodiversity with DNA and stable isotope ratio analysis, and we also develop eco-friendly conservation technology for the habitat and ecosystem network of fish, frogs, and so forth. Our research contributes to conservation and restoration activities in rural development projects. These activities contribute to the conservation and restoration of rural area environments in which wholesome ecosystems can be sustained.

Rural Development and Planning Research Division

Development of rural resources and rural restructuring planning

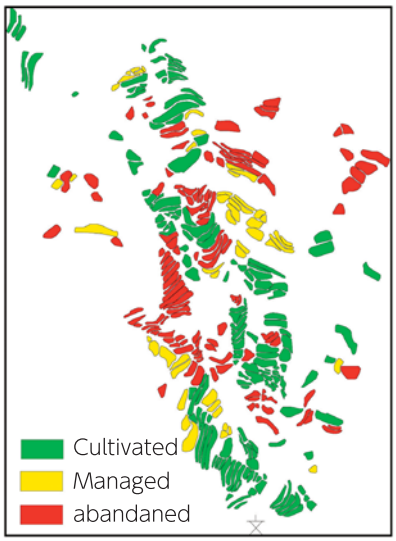
We contribute to rural development by enhancing social communities, rural heritage and regional resources, which are farmland, agricultural water systems, and agro-ecosystems. We develop consensus building methods for resident activities and resource preservation planning. We analyze social-economic effects of land improvement projects on regional environment for sustainable development.

1. We develop methods of consensus building to conserve regional resources and methods of land-use planning to promote effective land use and to re-cultivate abandoned farmlands.
2. We develop social-economic analysis methods to examine effects of rural development measures, such as land improvement projects, on regional resources and rural economy.
3. We develop evaluation methods of regional resources considering effects of land improvement projects for sustainable use of biological and cultural resources.
4. We develop information gathering and managment methods of farmland usage using geographical information systems and satellite data for effective farming and re-cultivating of abandoned farmlands.

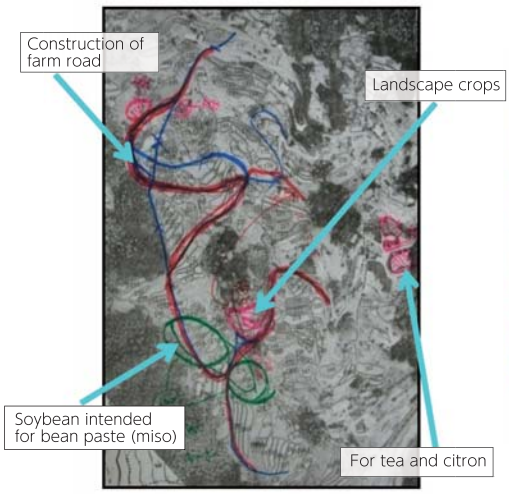
Resource management planning involving participation of diverse groups

Regional Planning

【Regional plan】



■Survey map of rice terraces (tanada) derived from "field-by-field" land surveys by local residents



■Re-cultivation plan for rice terrace (Map made by residents)

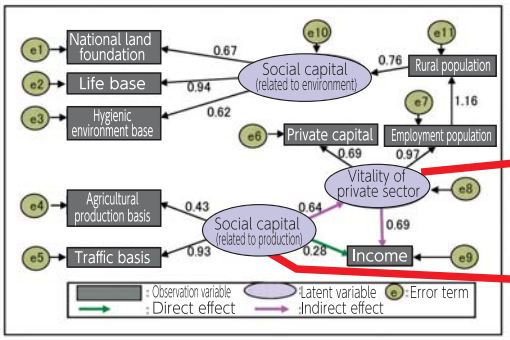
■Renewal of rice terraces by resident activities in cooperation with city-dwellers

We contribute to the development of rural areas by developing methods of consensus building for regional resource management and methods of land-use planning to promote effective land use and to re-cultivate abandoned farmlands.

management technology methodologies

Evaluation of agricultural water facilities and regional resources

Project Evaluation



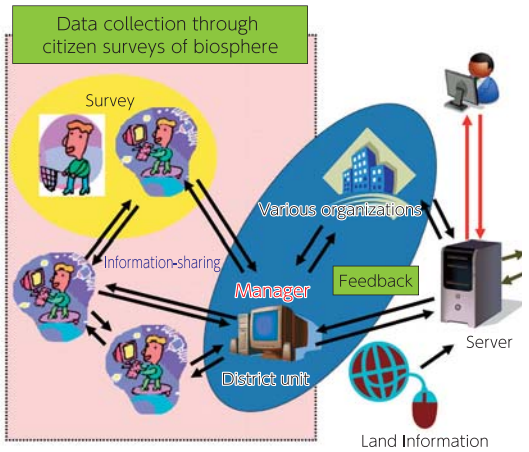
■Development of social and economic models for agricultural infrastructure

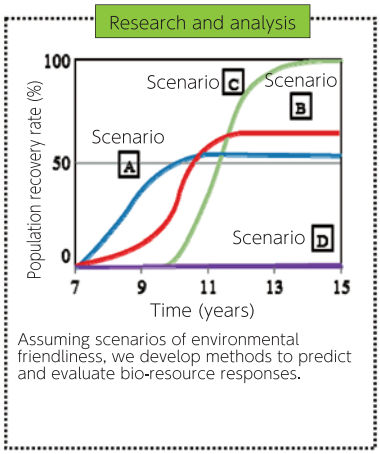
■Development of evaluation methods of resource management activities

We develop social-economic analysis methods to determine the priority of land improvement projects in view of local economic conditions. We also develop decision support methods to allow smooth consensus building for community activities.

Making sustainable use of biological and cultural resources

Resources Evaluation

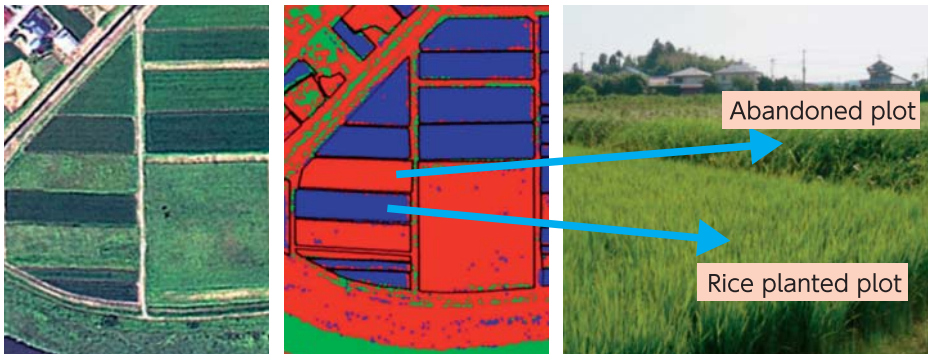




We research economic evaluation of regional resources added by land improvement projects using spatial and time-series analysis. We develop technologies for sustainable use of biological and cultural resources in rural areas.

Information technology application for efficient farmland use and landscape conservation

Resource Information Technology



■High resolution satellite image (left picture) and the processing image (middle picture)

Using geographic information systems (GIS) and high resolution satellite data, we develop labor-saving survey technology on farmland usage, and help promote the reduction of abandoned farmland.

Technology Transfer Center

By NIRE's close ties with fields disseminating advanced

For basic and high-level technology, but also advanced technological achievement, we offer training programs, on-site technical consultations, and symposiums in cooperation with academic societies. We contribute to the progress of technology that supports the development of agriculture and the promotion of rural areas.

1 Technical support to administration

■The Public conference of the technical investigation assisting recoveries from the East Japan Earthquake Disaster

■Technical consultation

We respect the partnership and collaboration with the MAFF and local administration offices to inform the outcomes of our research concerning the sustainable development of rural areas, such as efficient management of farmland and agricultural facilities.
We also provide technical instruction and assistants in response to requests from the national and local authorities by contracted research to resolve technical issues, investigations and instructions in case of disaster and accident, participation in governmental advisory committees and so forth.

2 Dissemination research outcomes

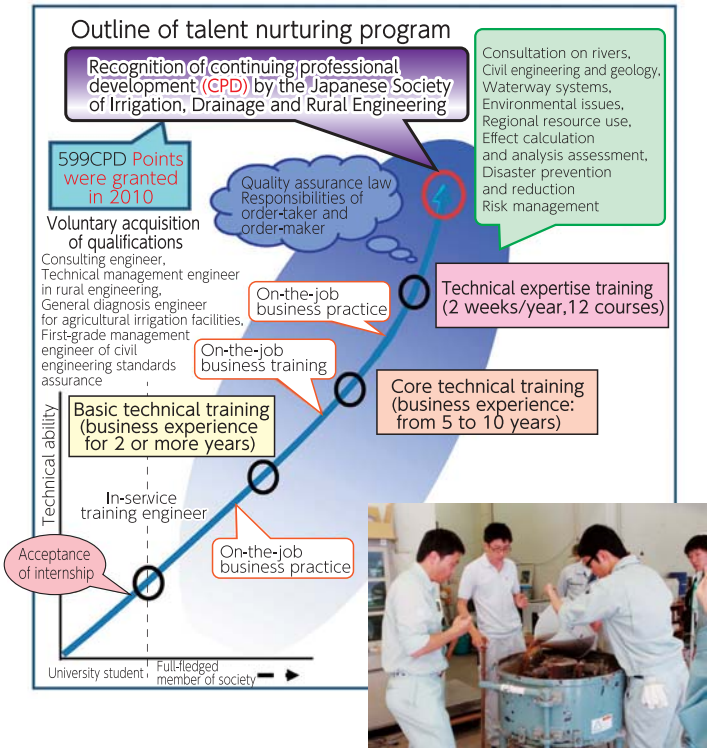
■Publications

■Poster sessions

To make research activities and outcomes widely known, we actively implement diffusion of research outcomes via official consultation with the MAFF, technical exhibitions and training workshops. We also explore further research themes through these PR activities.
We provide scientific bases for revision of design standards and technical guidelines for the Land Improvement Projects. We also publish technical leaflets explaining detailed research outcomes.
We encourage applying patents relating to the outcomes, and we also obtain patents, to contribute to published information concerning administration offices.

# of agriculture and rural areas, technology and continuing education.

3 Continuing education for engineers



We provide various training programs for rural engineering officials to enhance their technical skills. The training programs comprise rural engineering from the reorientation of natural science fundamentals to the introduction of latest research developments. The training programs are annually received by approximately 400 engineers, and total participants in the programs was over 20,000 people during the period 1956 to 2010.

The programs constitute basic courses, intermediate courses and advanced courses to assist the improvement of rural engineering skill by continuing education.

①We provide cutting edge technology

②We prepare participatory classes, laboratory tests, field surveys, discussion and oral presentation.

③We have Continuing Professional Development (CPD) programs certified by the Japan Accreditation Board for Engineering Education (JABEE).

We continue to improve the training programs by responding to social changes for rural engineering and by reflecting the feedback of participants.

4 Collaborative research

■Training of overseas engineers

We implement collaborative research with institutes, universities, and private companies to promote the practical use of research outcomes and to accelerate our research and development. We provide technical assistants for the Japan International Cooperation Agency (JICA) projects and overseas Japanese engineers.

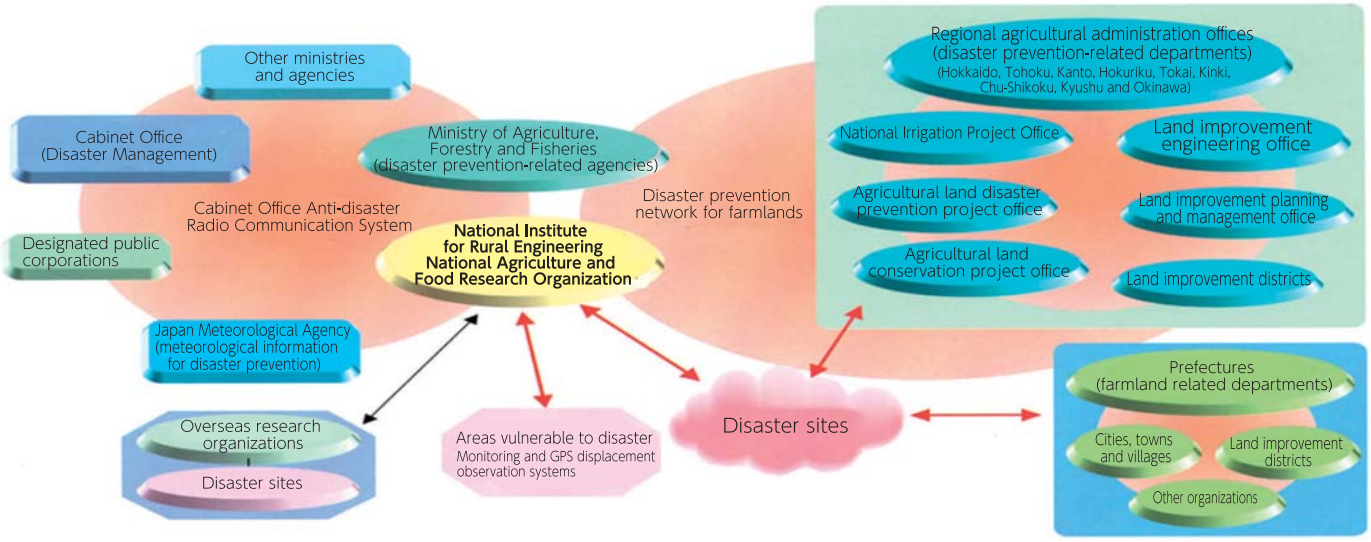
We encourage attending international academic symposium to give presentations of outcomes and to discuss and exchange with leading researchers.

We place special emphasis on partnership and collaboration with Asian research institutes to play a predominant role in Asian rural engineering.

■Japan-Korea joint seminar

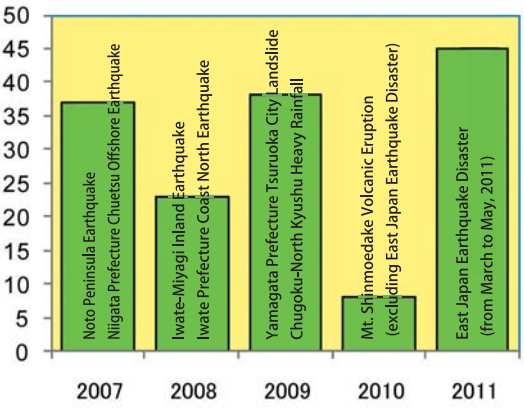
Disaster countermeasures and support (Coordinator for Disaster Prevention Research of the Dept. of Planning and General Administration)

The National Agriculture and Food Research Organization (NARO) is a Designated Public Corporation pursuant to Article 2 of the Disaster Countermeasures Basic Act.
In case of large-scale disasters such as earthquakes or typhoons, NIRE acts on the basis of an operational plan for disaster prevention pursuant to Article 39 of the Act, sets up the headquarters for technical assistance against disaster, and dispatches suitable related researchers to the disaster site in response to the authorities.



■Disaster prevention remote camera monitoring system

■GPS landslide-displacement observation system



■Staff dispatched against disasters (number of persons)

■Inspection of main pipeline damaged by the Iwate-Miyagi Inland Earthquake in 2008

■Hazard assessment of a reservoir embankment damaged by the East Japan Earthquake Disaster in 2011

Publicity and information Services (Information and Public Relation Section of the Dept. of Planning and General Administration)

Information and Public Relations Section takes charge of public relations through press releases, an e-mail magazine (in Japanese), website, and publishing of periodical issues, such as Research Topics, Bulletin of the NIRE, Technical Report of the NIRE, Annual Report of the NIRE (in Japanese), and NIRE News (in Japanese). The section is also responsible for library and network administration to support research.

●The NIRE Mail Magazine (in Japanese)

In our monthly mail magazine, we report not only up-to-date research activities, but also various events of interest. We offer, free of charge, useful information in a wide range of fields of interest to engineers, farmers, general consumers, and students.

Please visit our NIRE homepage at (http://www.naro.affrc.go.jp/nkk/).

●NIRE open house

We hold Open House in the middle of April, Science and Technology Week. The event features various experiment demonstrations, brief lectures, Stamp Rally in NIRE, poster presentation of outcomes, and giveaways.

●Our main periodicals:

Bulletin of the NIRE

Papers on completed original research.

Technical Report of the NIRE

Thesis reported promptly by intermediate result of research, urgent investigation report, and technical note, etc..

Research Topics

In this periodical, we report research topics selected by outside experts, and by the Experiment and Research Liaison Conference.

Annual Report of the NIRE

Overall report of research activities of the year.

NIRE News (in Japanese)

Informal introduction of current research activities and results.

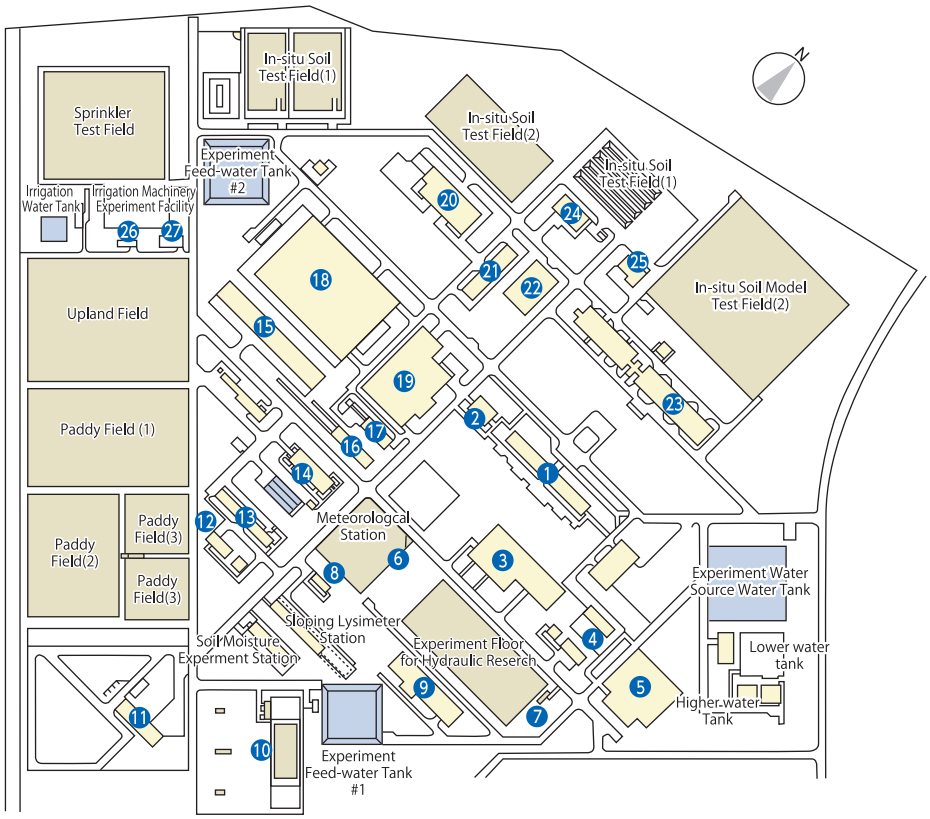
Model work and field management (Technology Support Team of the Dept. of Planning and General Administration)

Technology Support Team is responsible for farm work in test fields and model creation for structural and hydraulic experiments. The team maintains farm plots that are equipped with technical apparatus for specific experiment and test plots for structural experiment of agricultural infrastructures. The team also precisely creates a hydraulic test model scale-reduced from an actual agricultural facility and continuously modifies the model to analyze various hydraulic conditions. The team assists research with specialized experience and skills.

■Making a model of a dam spillway and effluent streambed

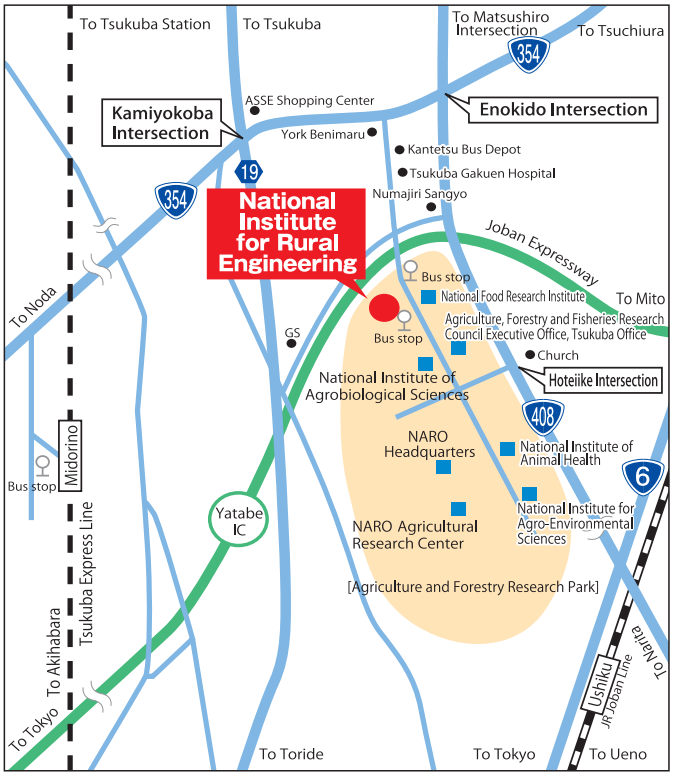
■Reclamation test of a sloped field using a laser level.

Laboratories and Facilities



1. Main Research Building
2. Research Center for Disaster prevention
3. Canal Works Laboratory No. 2
4. Scale Model Workshop
5. Dams Laboratory
6. Meteorological Observatory
7. Headworks Laboratory No. 2
8. Variable Slope Lysimeter
9. Headworks Laboratory No. 1
10. Groundwater Laboratory
11. Groundwater Resource Laboratory
12. Paddy Field Laboratory
13. Rural Resource Research Laboratory
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

Area map



[Travel guide]

① By Tsukuba Express (TX) train:
Nearest station: TX Midorino Station
Bus: In front of the station, get on Kanto Tetsudo circuit bus for Norindanchi and get off at "Noson Kogaku Kenkyusho Mae" (transit time about 13 min).

② By Tsuku Bus:
At Tsukuba Center (TX Tsukuba Station), get on Tsuku Bus for Norin Danchi and get off at "Noson Kagaku Kenkyusho Mae" . From there, a 5-minute walk (transit time about 25 min).
First departure 6:55 am, continuing every 30 minutes (32 trips/day).

③ By Joban Line train:
Nearest station: JR Ushiku Station
Bus: At West Exit of the station, take a Kanto Tetsudo bus for Tsukuba Center, or Yatabe Shako, or Tsukuba Daigaku Byoin, and get off at "Noson Kogaku Kenkyusho Mae" (transit time about 25 min).

④ By car:
Joban Expressway, exit Yatabe IC. (about 10 min from Yatabe IC).

National Agriculture and Food Research Organization
Incorporated Administrative Agency
National Institute for Rural Engineering
(NIRE)

2-1-6 Kannondai,
Tsukuba Ibaraki
305-8609
http://www.naro.affrc.go.jp/nkk/

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