



## Disaster Prevention Research Institute (DPRI), Kyoto University

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### Abstract

This article describes an outline of the Disaster Prevention Research Institute (DPRI), which was established in Kyoto University in 1951, including its mission and objectives in terms of research, education and social contributions. Brief history of DPRI, as well as that of Research Centre on Landslides (RCL), is also given in relation with domestic and international activities such as the Natural Disaster Research Council (NDRC), designated COE programs, a Leading Graduate Schools Program (GSS), the International Decade for Natural Disaster Reduction (IDNDR), UNESCO-KU-ICL UNITWIN Program, UNESCO International Hydrological Program (IHP), Science and Technology Research Partnership for Sustainable Development (SATREPS) projects, Japan-ASEAN Science, Technology and Innovation Platform (JASTIP) and the Global Alliance of Disaster Research Institutes (GADRI).

### Keywords

Center of excellence • Joint usage/research center • NDRC • GADRI • JASTIP

## Introduction

Since its inception in 1951, the Disaster Prevention Research Institute (DPRI) of Kyoto University has been pursuing principles of natural disaster reduction, establishing integrated methodologies for disaster prevention on the basis of natural and social sciences, and educating students in related fields. The research staff members of the Institute are also affiliated with the Graduate Schools of Science, Engineering and Informatics of Kyoto University. Many graduate students come to the Institute to carry out their studies under supervision of its staff members.

Currently, DPRI consists of four research groups, which include five Research Divisions and six Research Centers. It is managing the Natural Disaster Research Council, which is a research network for natural disaster risk reduction, since 2001. In March 2015, it established the Global Alliance of

Disaster Research Institutes (GADRI) as one of the actions for the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030. Kyoto University also agreed with the Implementation of the **ISDR-ICL Sendai Partnerships 2015–2025 for Global Promotion of Understanding and Reducing Landslide Disaster Risk**.

## DPRI's Mission and Objectives

Today's society becomes ever more rapidly vulnerable to natural hazards and consequent disasters due to the concentration of populations in mega-cities. Additionally, changes in the global environment threaten us with the possibility of severe typhoons, floods, landslides, sea level rise, and droughts. Considering these rapid changes of ambient conditions, and to meet urgent research requirements in a more timely manner, in 1996 the Institute reorganized itself into five research divisions and five research centers; namely, Integrated Management of Disaster Risk; Earthquake Disaster Prevention; Geo-Disasters; Fluvial and

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Marine Disasters; Atmospheric Disasters; Research Center for Disaster Environment; Research Center for Earthquake Prediction; Sakurajima Volcano Research Center; Water Resources Research Center; Research Center for Disaster Reduction Systems, and Research Centre on Landslides.

The Division of Integrated Management of Disaster Risk and the Research Center for Disaster Reduction Systems have been set up by rearranging and increasing the number of staff members who have been involved in disaster study from human, social, and planning aspects. The Research Center for Disaster Environment unifies experimentation stations and observatories located in distant places; namely, the Ujigawa Hydraulics Laboratory, the Shionomisaki Wind Effect Laboratory, the Hodaka Sedimentation Observatory, the Shirahama Oceanographic Observatory, the Ogata Wave Observatory, and the Tokushima Landslide Observatory. The Center carries out synthetic observational and experimental research projects, collaborating not only with other staff members but also with researchers outside the Institute.

Although the Institute belongs to Kyoto University, it has been open since 1996 to all researchers from other universities around the country who are concerned with investigations of disasters. Collaboration is maintained through joint research projects and research meetings. Researchers from both inside and outside of the Institute can submit proposals, which are assessed and approved through the peer-review by the Collaboration Committee, a group consisting of members from both outside and inside the Institute. The Advisory Board will advise the DPRI Director on the policy of the institute's operation. The Advisory Board is composed of two members from the Institute and several prominent professors from outside such as Deans and Institute Directors.

Its objectives are summarized as follows:

## Research

- (1) DPRI enhances international cooperative research on natural disasters, as well as cooperative research in Japan, through the Joint Usage/Research Center for natural disaster reduction research, as designated by MEXT (Japanese Government). This work will be done through the use of research facilities of DPRI, development of databases for natural disaster information, such as the Natural Disaster Resource Data (SAIGAI), and organizing reconnaissance teams for natural disaster events.
- (2) DPRI pursues the principles of natural hazard reduction through basic research focusing on the changes of modern natural disasters associated with the evolution of the natural environment and human society.

- (3) DPRI promotes practical research for disaster reduction to meet the urgent needs of society, by integrating various research fields related to disaster reduction.

## Education

- (1) DPRI welcomes young researchers and students from overseas, as well as Japanese students, in order to meet the high demand of research and educational needs for disaster reduction around the world.
- (2) DPRI fosters researchers of the next generation, by conducting seminars and preparing educational materials. This will be done through the Joint Usage/Research Center for natural disaster reduction research and with the cooperation of other related organizations in Japan and around the world.
- (3) DPRI promotes education for regional disaster mitigation planners at the working-level, as well as young researchers, through collaborations of the cooperative studies in the Joint Usage/Research Center.

## Social Contributions

- (1) DPRI transfers research results and specialized knowledge regarding disasters and disaster reduction to society, and help people understand disaster reduction methods. DPRI will also provide disaster reduction strategies to national and local governments.
- (2) DPRI promotes international cooperative research and education by establishment of a world leading Joint Usage/Research Center.

## Administration

DPRI strengthens the function of the Joint Usage/Research Center by providing well-organized support and evaluation for schedules, research and education.

## History of DPRI

Kyoto University established the Disaster Prevention Research Institute (DPRI) with three chairs (three full-professors) in April 1951. DPRI's mission was to promote science on disasters and its application. It has been adding many research sections and centers, having 34

full-professors at its restructuring in May 11, 1996 immediately after the 1995 Kobe Earthquake. DPRI's mission has been changed as to promote science on disasters and studies on comprehensive disaster prevention and mitigation. In 1997, the Japanese Ministry of Education, Science and Culture (Monbusho) had designated DPRI as a center of excellence (COE) by. In 2002, DPRI was again designated as a 21st Century COE by the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT: Monbukagakusho). In April 2003, the DPRI established Research Centre on Landslides. In April 2005, the DPRI restructured its organization with four research groups including five research divisions and six research centers.

The DPRI promotes joint research programs with other Japanese universities and research organization through the Natural Disaster Research Council (NDRC), which was established in DPRI in 2001. The NDRC's mission includes:

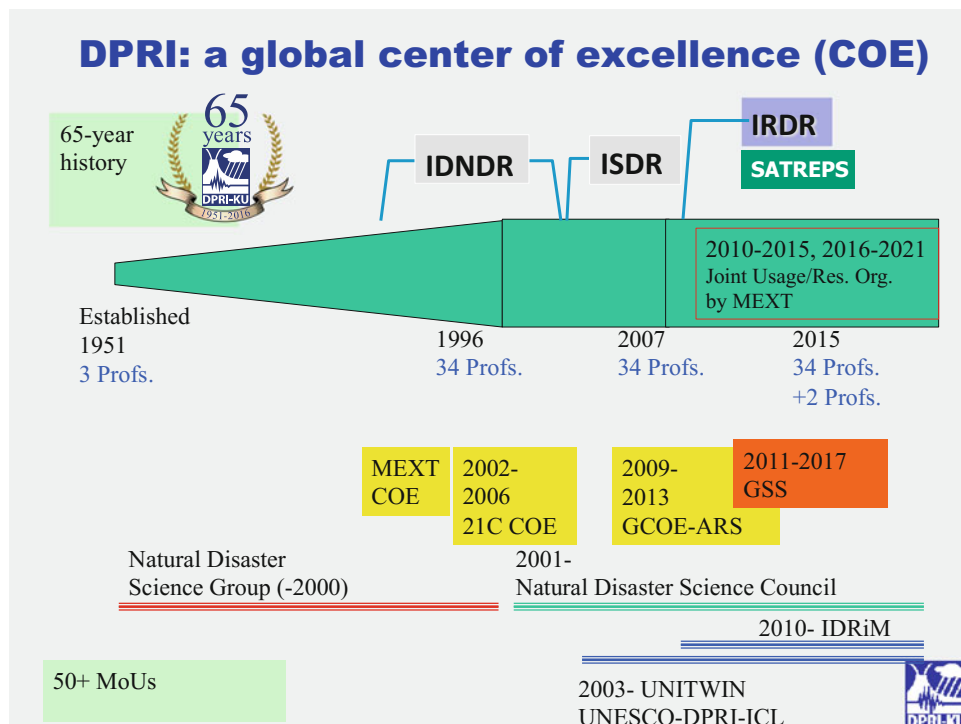
- (1) To plan scientific strategy to promote natural disaster science,
- (2) To organize the Integrated Symposium on Natural Disaster Science every year, and
- (3) To arrange research projects and teams for emergent investigation on disaster events taking place in Japan and abroad

The MEXT started a system to encourage such joint usage/research organizations since 2009. The DPRI was designated as a Joint Usage/Research Center of Excellence (2010–2015) and again renewed further six years (2016–2021).

The DPRI is also committing interdisciplinary graduate school education. It obtained a Global COE Program: Sustainability/Survivability Science for a Resilient Society Adaptable to Extreme Weather Conditions (GCOE-ARS; Takara, Asian Journal of Environment and Disaster Management, 2011). The GCOE-ARS conducted various research topics such as extreme weather, resultant meteorological and hydrological disasters (floods and droughts), landslides, and oceanographic/coastal disasters, and produced 35 doctors who took this GCOE-ARS course from Graduate Schools of Science, Engineering, Agriculture, and Global Environmental Studies in Kyoto University during its program period (2009–2013) and its follow-up period (2014–2017).

Another educational program that the DPRI is implementing is the Inter-Graduate School Program for Sustainable Development and Survivable Societies (GSS = Global Survivability Studies) for seven years (2011–2018) under the MEXT's Leading Graduate School Program. The GSS program is implemented in cooperation with nine graduate schools (25 departments) and three research institutes of Kyoto University, having more than 80 students.

The DPRI has been contributing international activities such as the International Decade of Natural Disaster Reduction (IDNDR), UNESCO's International Hydrological Programme (IHP), UNESCO-KU-ICL UNITWIN Network Programme, Integrated Research on Disaster Risk (IRDR) and Future Earth. It also contributed to the establishment of the Integrated Disaster Risk Management Society (IDRiM),



an international academic society, in October 2009. Recently, it is implementing SATREPS projects for Croatia (2008–2012), Vietnam (2011–2016), Indonesia (2013–2018), Bangladesh (2013–2018) and Mexico (2015–2020). Currently about 60 MoU's are concluded with renowned overseas universities and research organizations.

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## Research Centre on Landslides

Two thirds of the Japanese Archipelago is mountainous areas. A hundred million people are forced to live and work in mountain slopes or around slopes. Landslides cause disasters on such slopes. In 1959, Landslide Research Section was founded in the DPRI, Kyoto University and was reorganized into the Research Centre on Landslides (RCL) in April 2003. This Research Centre on Landslides is very unique because it is the only one centre specialized for landslide research in national universities supported by the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT). The Tokushima Landslide Observatory (TLO) was founded in Tokushima Prefecture, Shikoku Island, Japan in 1969 as a field of landslide monitoring and investigation in DPRI. Since then, both RCL and TLO have done landslide field and experimental studies, cooperating with the Slope Conservation Section and Mountain Hazards Section in the Research Division of Geohazards, DPRI, Kyoto University.

The RCL aims to pursue research for protecting human lives, properties, and cultural and natural heritages from landslides. RCL conducts research on the mechanisms of initiation and motion of landslides triggered by earthquakes and rainstorms. Efforts are made for the areal prediction of rapid and long-travel landslides, the Development of landslide monitoring and warning system in a global scale, and new techniques of landslide field investigation and instrumentation. Education and capacity building for landslide risk mitigation is also an important task of RCL. As the core centre of global landslide research network, RCL is coordinating international programmes.

The main topics of research and education in RCL are as follows:

- (1) Initiation and run-out mechanisms of landslides triggered by earthquakes and heavy rains;
- (2) Reliable landslide risk evaluation and hazard zonation for densely populated urban areas, cultural and natural heritage sites, and other locations of high societal value;

- (3) Development of high-precision and reliable monitoring system of landslides from a local scale to a global scale;
- (4) Field investigation and development of instrumentations for landslide research; and
- (5) Education and capacity building to reduce landslide disasters in developing countries.

The RCL had been one of the main actors of the International Consortium on Landslides (ICL) and the UNESCO-DPRI-ICL UNITWIN Programme.

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## Global Alliance of Disaster Research Institutes (GADRI)

Following the Hyogo Framework for Action (HFA), advances have been made in the application of damage reduction principles, but many challenges remain as seen by the continued increase in disaster losses. Also, the new Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR 2015–2030) with support from the Scientific and Technical Advisory Group of the United Nations Office for Disaster Risk Reduction (UNISDR), has pointed out the need to better link sustainable development and climate change efforts towards a common goal of harmonious living with nature and our planet. The Framework explicitly calls for coordinated efforts by the scientific community to deepen the understanding of disaster risks, promote evidenced-based implementation of disaster risk reduction strategies, and transfer and disseminate scientific knowledge and technologies in support of decision making processes.

Building on the momentum of these efforts, participants of the “2nd Global Summit of Research Institutes for Disaster Risk Reduction: Development of a Research Road Map for the Next Decade,” met to in March 2015 at the Disaster Prevention Research Institute (DPRI), Kyoto University to discuss how the disaster research institutes can contribute to disaster risk reduction in the next 15 years, in accordance with the goals of the Sendai Framework. One important outcome was the establishment of the Global Alliance of Disaster Research Institutes (GADRI). GADRI is a forum for sharing knowledge and promoting collaboration on topics related to disaster risk reduction and resilience to disasters. The 3rd Global Summit of Research Institutes for Disaster Risk Reduction was held at DPRI in Kyoto University Uji Campus on 19–21 March 2016.



GADRI also welcomes any landslide-related research institutes and organizations from all over the world.

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## JASTIP Disaster Prevention

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In 2015, Kyoto University has launched “Japan-ASEAN Science, Technology and Innovation Platform (JASTIP): Promotion of Sustainable Development Research” within the framework of the Collaboration Hubs for International Research Program (CHIRP) funded by the Strategic International Collaborative Research Program (SICORP) of the Japan Science and Technology Agency (JST).

Under the JASTIP project, joint research between Japan and ASEAN countries is ongoing for achieving remarkable science and technology outcomes. In addition, the joint research promotes a number of researchers in leading positions and helps train the researchers who have become subsequent leaders in the field. The research project goal is to develop a broader understanding in Japan and in the ASEAN society with the academic achievements for which the community should be proud, and to accelerate research that will be a driving force in our shared goal to attain sustainable development under a closer collaboration between Japan and the ASEAN countries. The JASTIP project promotes research that can be used to resolve shared local issues to ultimately build a sustainable society in Japan and in ASEAN countries. In addition, our aim through these activities is for Japan to “show face” and “have face be seen” in the ASEAN region, and to build an inclusive Japanese-ASEAN cooperative platform related to science, technology and innovation.

## Disaster Prevention in JASTIP

The JASTIP includes three research fields: Energy & Environment, Bioresources & Biodiversity, and Disaster prevention. The DPRI is leading this Disaster Prevention field by setting up satellite sites in ASEAN countries. The Malaysia-Japan International Institute of Technology (MJIT) located at University Technology Malaysia (UTM) Kuala Lumpur Campus is one of the satellite sites that promote JASTIP international cooperation research projects. Another satellite site has been established at Thuy Loi University in Ho Chi Minh City, Vietnam in 2016.

The main activities performed at this site are as follows:

- (1) Joint research in Malaysia and Vietnam related to heavy rain, flooding, and landslide disasters
- (2) Joint research in Thailand related to ground foundation disasters due to heavy rain, flooding, landslide disasters, and earthquakes
- (3) Joint research in Indonesia related to earthquakes, volcanoes, and landslides
- (4) Joint research in the Philippines related to earthquakes, volcanoes, landslides, and typhoons
- (5) Advanced technology development of early warning systems to reduce the risk of large-scale natural disasters, a common issue for all the involved countries
- (6) Practical implementation of the developed early warning systems
- (7) Development of curriculum for human resource cultivation programs at MJIT (including a disaster prevention curriculum at the graduate level)
- (8) Building a research network with leading universities in ASEAN countries for disaster prevention research, including Chulalongkorn University, Asian Institute of Technology, Gadjah Mada University, University of the Philippines, and Thuy Loi (Vietnam Water Resources) University
- (9) Launching the “ASEAN Disaster Prevention Joint Research and Human Resource Cultivation Program”
- (10) Establishing the ASEAN Disaster Prevention Research Cooperation Framework Concept

Many landslide issues are serious in ASEAN region, as indicated above. The JASTIP also promotes joint research into comprehensive disaster prevention useful for sustainable development and collaboration on disaster prevention projects of SATREPS (Science and Technology Research Partnerships for Sustainable Development) such as Indonesian volcanoes and Myanmar flooding.

## Master Program in MJIT

The MJIT established the Disaster Preparedness and Prevention Centre (DPPC) and started a graduate school course “Masters Disaster Risk Management” since 2016. This course is a one-year master program for practitioners working at governmental and public offices for disaster management. The DPRI dispatches several lecturers to this

course to encourage higher education in disaster risk management for Malaysia and surrounding countries. Further details of DPPC and Masters Disaster Risk Management course can be seen at:

<http://mjiit.utm.my/dppc/organization-chart/>

<http://mjiit.utm.my/dppc/masters-in-disaster-risk-management/>

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