

# Life on Digital Earth

Launched in 2004, the Digital Asia Project is a joint industry-government-academia undertaking led on the academia side by Keio University. *The Japan Journal* asked Professor Hiromichi Fukui about the work being conducted under the Project to address the environmental issues facing Asia and the world.

**T**he planet Earth is a global commons that is widely used by people all over the world, in addition to being the place where they live. Digital Earth is believed to be one of the newest ways of dealing with risks on a global scale that threaten the global environment. Digital Earth is a multi-dimensional and multi-resolution Earth configured in a virtual environment created on a computer network. It is a tool that serves as a common test lab for dealing with global environmental issues.

Digital Earth is configured based on the enormous volume of geospatial information that has been collected. This geospatial information includes maps, topographical maps, satellite images and statistics and other data. By combining these diverse types of data, Earth's natural environment, the social activities undertaken by humans and other aspects of Earth's current

situation can be made visible on the computer network on a real-time basis. Furthermore, Digital Earth can be accessed by anyone via the Internet, and it can process information entered by the people who share the virtual environment. The basic technology it utilizes is Geographical Information System(s) (GIS), similar to Google Earth. One application of Digital Earth is that if a flood occurs somewhere on Earth, the satellite images captured before and after the flood can be lined up in chronological order for comparison. By overlapping the land usage and population distribution data on the satellite images, we can see how far the flood has affected the social activities of humans.

Digital Earth became widely known when former U.S. Vice President Al Gore announced the Digital Earth Scheme in 1998 for promoting understanding on Earth. Since 1999,

the International Symposium on Digital Earth has been held biannually. At the symposium, representatives of educational and research institutions, enterprises, government bodies and NGOs gather from all over the world to discuss the latest examples of Digital Earth applications and research results. International systems are provided to further the various uses of Digital Earth.

## Digital Asia Project

Earth observation satellite data and other geospatial information have also been put to practical use in Asia. However, the mutual utilization of this data across associated organizations has not progressed, because the mechanism and network environment for information sharing have not yet matured.

The Digital Asia Project aims to improve the situation using Digital Earth. The Project has been underway since 2004 as a joint industry-government-academia undertaking in accordance with Keio University's five-year plan, in conjunction with the Japan Aerospace Exploration Agency (JAXA), the Asian Institute of Technology (AIT) of Thailand, Kyodo News and other organizations. It is one of the Academic Frontier Promotion Projects supported by the Ministry of Education, Culture, Sports, Science and Technology (MEXT).

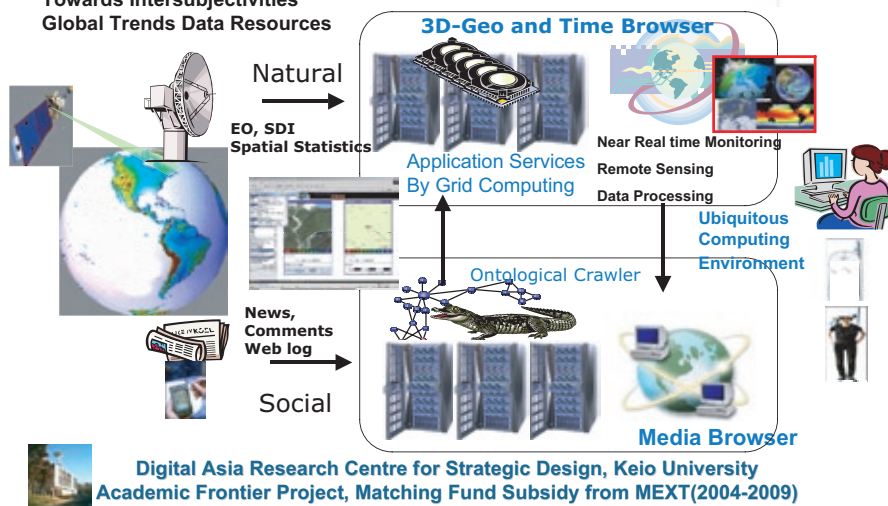
The head of the Digital Asia Project is Hiromichi Fukui, research director of the Global Security Research Institute (G-SEC) and a professor in the Faculty of Policy Management at Keio University.

"The basic concept of Digital Earth is to find out the real state of the world. By objectively grasping the actual situation on Earth and getting to know the real state of the world, we believe we can deal effectively with environmental issues on various scales, from regional to global."

The research team led by Professor Fukui determined that Digital Asia needed two apparatuses to make the real state of the world visible. The first is Geo Browser, which is a geospatial information database like Digital Earth. The second is Media Browser, which extracts people's di-

## Digital Asia : Gateway for Global Security

Measuring the Real State of the World  
Decoding the Earth and Human Evolution  
Towards Intersubjectivities  
Global Trends Data Resources





Field servers that Professor Fukui's research team has installed around Imja Glacial Lake (above). Images of Imja Glacial Lake photographed by the field servers between May 9 and 12, 2008. The ice on the surface is clearly melting (from left to right).

verse ideas regarding the Asian region from the latest world news, and displays them in visible form. It is planned that the extracted news data will be combined and ranked, so that the Asian viewpoints and trends can be perused. The Digital Asia Project aims to utilize the systems for global environmental conservation and disaster management, thereby promoting sustainable development in Asia.

### Real-time Monitoring of Himalayan GLOFs

The test project chosen for investigating how Digital Asia can be used to counteract global warming is Glacial Lake Outburst Floods (GLOF) in the Himalayas. Himalayan glaciers abound in ice gorges near to Antarctica and the Arctic Circle. In the Himalayas, many glaciers have melted and retreated, and the number and scale of glacial lakes, formed when glaciers melt and the water is trapped, have expanded rapidly. As such, the risk of outburst floods caused by the collapse of these glacial lakes has increased in recent years. Since the snow and glaciers in the Himalayas are the water sources of major rivers in neighboring Asian countries, the issues facing Himalayan glaciers also form an integral part of the water issues for the wider surrounding Asian region.

The research team led by Professor Fukui chose Imja Glacial Lake, lo-

cated at the foot of Mt. Everest at an altitude of 5,000 m, as the test ground. Imja Glacial Lake currently measures about 2 km in length and 560 m in width, with a depth of as much as 100 m. It is still expanding. According to a survey by the International Center for Integrated Mountain Development (ICIMOD) in Nepal, there are as many as 200 glacial lakes in the entire Himalayan region with a high probability of a future outburst, just like Imja Glacial Lake. To establish an Alert System linked to the real-time glacier monitoring system, the research team installed two units of field servers (above-ground environmental monitoring devices) near Imja Glacial Lake. The field servers, which are operated by solar cells, collect the temperature, humidity, water level and various other data, along with photographic images of Imja Glacial Lake that are taken by built-in digital cameras at set intervals. The groundbreaking aspect of the system is that the field servers are connected to the Internet via a radio relay station. This enables the conditions of the glacial lake to be checked almost on a real-time basis. It is the first such attempt in the world. By accessing the website of the Digital Asia Project, anyone can observe the changing situation of Imja Glacial Lake and actually experience the global warming phenomena. Also worth noting is the system for directly sending an alert to registered e-mail

addresses on personal computers and mobile phones when the water level rises above the alert level, as part of the GLOF Alert System of Imja Glacial Lake. The system is already undergoing testing.

In the near future, the research team led by Professor Fukui plans to begin studies of civil engineering methods for reducing risk by draining water from Imja Glacial Lake and lowering its water level, in addition to configuring the Alert System.

“In the future, a comprehensive project that addresses not only disaster prevention but also the water resource measures for the entire Himalayan mountains will be essential,” says Professor Fukui. With this in the background, Professor Fukui has proposed the establishment of an International Rescue Base in Japan. “It would be a comprehensive facility dedicated to environmental issues and disaster prevention, equipped with information and telecommunication infrastructures like Digital Asia, and with the capacity to supply the necessary staff and equipment at times of disaster. It is the present-day version of the Thunderbird station.” Starting with GLOF in the Himalayas as the first step, Professor Fukui is promoting utilization of the systems of Digital Asia in order to address various issues in the whole Asian region, including the Middle East. 

Junko Nakanishi, *The Japan Journal*