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Bugahyeon-ro 150, Seodaemun-gu, Seoul, Republic of Korea

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Introduction to RainbirdGEO

Rainbird GEO

Who we are

Issues

Repeated disasters due to late detection and inefficient dissemination of urgent climate risk information

Needs

Innovative solutions for substantial early warning of the climate risks to the last-mile population

RainbirdGEO establishes the world's first mobile early warning system that can rapidly disseminate climate risk information from geostationary satellites.

By democratizing the climate risk solutions with global strategic partnerships, **RainbirdGEO aims to foster resilience and sustainability on a global scale,** contributing to a more secure future for all.

Mission and Vision

Our Mission

To improve climate risk management capabilities in developing countries in Asia-Pacific and Africa

Our Vision

A leading contributor to climate risk prevention and solution

History

2017

RainbirdGEO was founded in September 2017

2018

Partnership with Ministry of Water Resources and Meteorology (MOWRAM) in Cambodia

2019

SAMSUNG Tomorrow Solution

- 1st Prize for Idea

2020

Partnership with SEJOONG INFORMATION TECHNOLOGY

2021

Korea Meteorological Administration/Korea Meteorological Institute R&D Project

- S" Level (1st rank) for the Promising Private Weather Service Technology Development Program
- Export Support for International Meteorological Project ('21. 03 ~ '22. 10)

Partnership with CKSTACK

RainbirdGEO Mobile App Pilot Test in Cambodia and Vietnam

- Pilot tests in Cambodia and Vietnam: 1st ('21. 06 ~ '21. 08), 2nd ('21. 08 ~ '21. 10), 3rd ('22. 09)

UNEP Green Climate Fund (GCF) Project

- Strengthening Climate Information and Knowledge Services for Resilience in five Island Countries of the Pacific Ocean ('21.10 ~ '26.09)

Partnership with Korea Center for Carbon Trade Standards (KCCTS)

Sopoong Ventures

- Selected for Impact Climate Accelerating Program and received seed investment

2023

Partnership with Save the Children

- Improving Climate Change Response Capacity and Awareness of Indonesian Children and Residents

2024

2024 APAC Cleantech 25

- Selected as one of the Top 25 promising companies in Asia

Partnership with Goodneighbors Global Impact Foundation

On July 7th, 2024, at the Sheraton Towers in Singapore, Dr. Yong-Sang Choi (CEO of RainbirdGEO) received a plaque from Mr. Richard Youngman (CEO of the Cleantech Group)

Introduction to RainbirdGEO

CEO/CTO

Yong-Sang Choi

- Professor of Climate Physics, Ewha Womans University
- Director, Center for Climate/Environment Change Prediction Research (CCCPR)
- Policy Advisory Member, Korea Meteorological Administration
- Visiting Professor, NASA JPL (2016-2017)
- Postdoctoral Research Associate, MIT (2008-2010)

Team Members

Rainbird GEO

Executives	Specialist	Business Operations	System Development	Administrative Support	Overseas	Research Team
Yong-Sang Choi Seokjoon Cho	Hannah Myoung Younju Jang	Dasom An Daeun Yi Seongbin Cho	Sungjin Hong Junyeop Lee Jeongmin Lee	Suna Jin	Lonh Nrak (Cambodia)	Climate System Laboratory, Center for Climate/Environment Change Prediction Research (15 Researchers)

Rainbird + GEO = Rainbird GEO

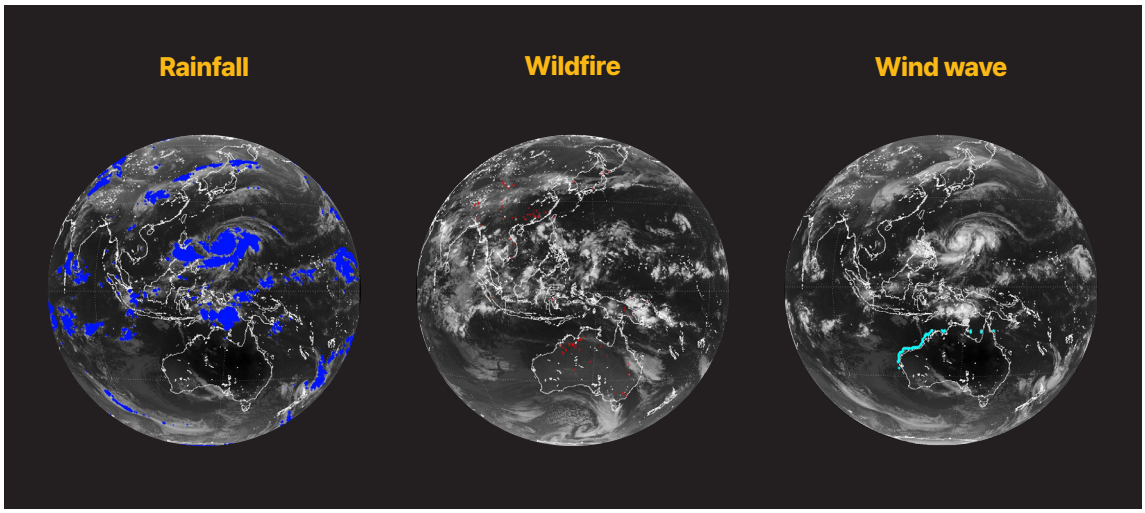
Company Name	RainbirdGEO
CEO / CTO	Yong-Sang Choi
Year of Establishment	September 2017
Official Contact Information	+82-2-3277-4660
Website	https://rainbirdgeo.com
E-Mail	support@rainbirdgeo.com
Company Location	Room 253 Industry Cooperation Building, Ewha Womans University, Bugahyeon-ro 150, Seodaemun-gu, Seoul, Republic of Korea

Technical Overview

RainbirdGEO offers a new solution to climate change response through geostationary satellite algorithms.

RainbirdGEO's technologies have been developed in close collaboration with the Center for Climate/Environment Change Prediction Research (CCCPR) and the Climate System Laboratory (CSL) at Ewha Womans University, led by Professor Yong-Sang Choi. The climate risk prediction algorithms developed by RainbirdGEO, based on Korean and European geostationary satellites (GK2A and Meteosat, respectively), monitor and predict various climate risks in real-time across the Asia-Pacific and Africa regions.

The RainbirdGEO algorithms have achieved a very high detection rate (over 86%) for storms, showing significantly more accurate data compared to existing weather services. With our cutting-edge satellite data, it is now possible to detect wildfires and air pollution, and also analyze the risks of floods, landslides, and wind waves.



Currently, RainbirdGEO's solution for climate change adaptation is being used by Green Climate Fund (GCF) for its project 'Enhancing Climate Information and Knowledge Services for Resilience in 5 Island Countries of the Pacific Ocean ('21.10 ~ '26.09)'.

Project Title: Enhancing Climate Information and Knowledge Services for Resilience in 5 Island Countries of the Pacific Ocean

Source: https://www.greenclimate.fund/project/fp147

UN environment
United Nations Environment Programme

GREEN CLIMATE FUND

Key Technologies in 6 Areas

01

Early Detection Technology for Thunderstorms

In tropical atmospheres, it is hard to predict when or where thunderstorms will develop. However, this is only possible through geostationary satellites. RainbirdGEO has developed algorithms to detect fast-developing tropical thunderstorms in their early stages by analyzing high-resolution observations from geostationary meteorological satellites. This is called satellite-based nowcasting technology. To prevent damage caused by heavy rainfall (e.g., floods and landslides), RainbirdGEO's early detection technology for thunderstorms aims at predicting these events at least 2 hours in advance. With the recent development of AI technology, we are improving the prediction lead time and accuracy.

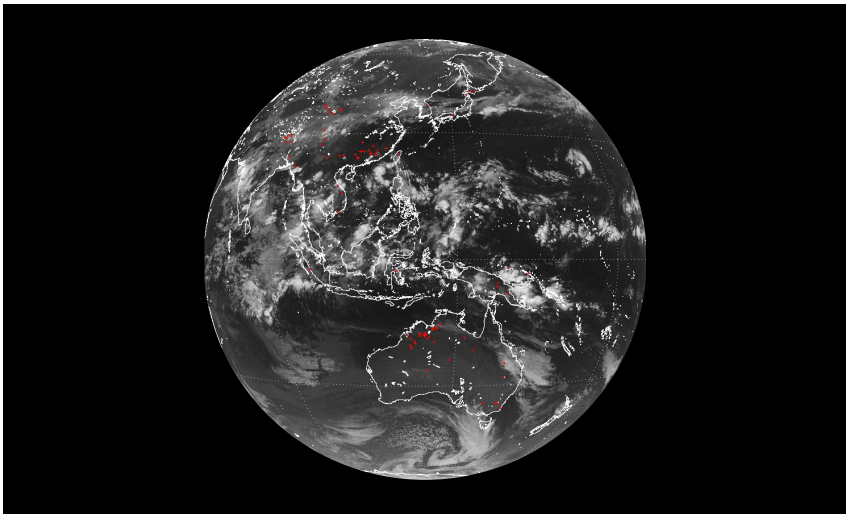
02

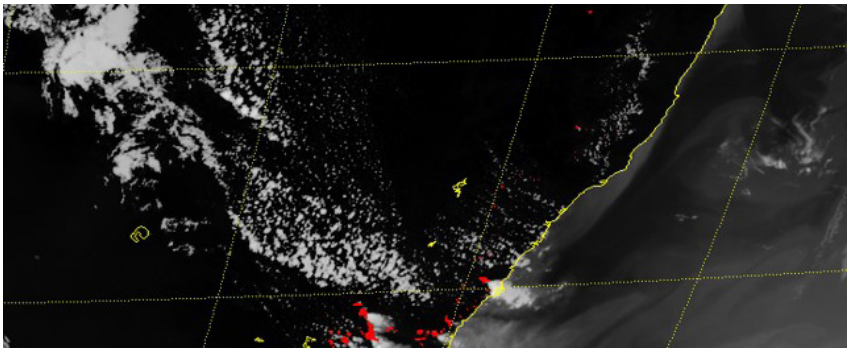
Risk Detection Technology for Flash Floods, Wind Waves, and Landslides

Flash floods, wind waves, and landslides are the representative natural disasters that occur immediately after thunderstorms. RainbirdGEO's technology enables the detection of climate risks so that we can prepare for situations where significant damages are expected. It combines signals of thunderstorms from geostationary satellites with various local climate data and geographic information to determine the risks of flash floods, wind waves, and landslides in real-time.

03

Wildfire Detection Technology





Wildfires are a typical natural disaster prevalent in dry seasons. Today, we are witnessing wildfires breaking out across the world (for Indonesia, about 3,000 events per year).

The geostationary satellite can detect wildfires occurring around the world 24 hours a day in real-time. When a wildfire occurs, heat and flames are captured by imaging sensors of geostationary satellites to detect the early stage of the fire. On a scale of greater than a hundred meters in radius, data on wildfires can be immediately detected by the satellite. RainbirdGEO's technology improves the efficiency of wildfire surveillance, enabling rapid initial extinguishment and early evacuation.

Having tracked more than 100 wildfires across Southeast Asia and Australia in the past, the GK2A is superior in accuracy compared to the MODIS and VIIRS satellites operated by NASA (Accuracy comparison results: 77% for GK2A, 34% for MODIS, 59% for VIIRS). The reason for this is that NASA's satellite images are captured twice a day, while geostationary satellite images are constantly captured, allowing for frequent monitoring of fast-spreading wildfire-hit areas.

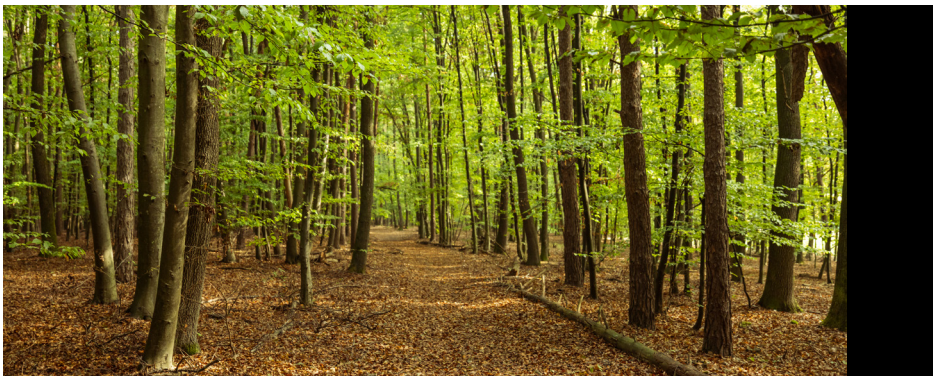
04

Air Pollution Monitoring Technology

RainbirdGEO is currently developing technology that raises alarms in the event of air pollution caused by various fine dust and chemicals. This technology utilizes data on air pollution detected by geostationary satellites, making it especially useful for most developing countries where air pollution is severe during dry seasons but there is no observation equipment for air quality on the Earth's surface. The developed technology helps in preventing damage to outdoor facilities and respiratory diseases caused by air pollution. Aerosol optical depth, calculated by geostationary satellites using reflected light from solar radiation, can alert regions with high concentrations of air pollutants. This system is practical on days with no or few clouds and can only be detected during the day. However, it is easily applicable in tropical regions during dry seasons as there are few cloudy days.

05

Vegetation and Greenhouse Gas Analysis Technology



RainbirdGEO can estimate carbon sinks and greenhouse gas emissions by analyzing the vegetation index and greenhouse gas concentrations observed by satellites. We comprehensively analyze the vegetation index produced by NASA's OCO satellite in the US and various satellites from Europe, Japan, and South Korea, and process this information into useful data. There are various types of vegetation indices, such as NDVI and EVI, suitable for measuring drought levels. If clouds obscure Earth, the vegetation index and greenhouse gas concentration for that date cannot be measured, so global data is provided once every 16 days by removing the influence of clouds.

06

Energy Prediction and Estimation Technology

RainbirdGEO is developing technology to predict high-resolution solar irradiance and photovoltaic power generation using advanced satellite data. By utilizing geostationary satellite data, it introduces the concept of effective cloud fraction, incorporating variables such as aerosols, yellow dust, and optical thickness for real-time estimates. Additionally, by applying artificial intelligence to forecast the movement of these cloud fractions, it enhances the accuracy of predicting photovoltaic outputs. This technology is planned to be implemented in the Korea Power Exchange system.

Regarding energy usage estimation, RainbirdGEO can analyze the annual energy consumption of administrative regions and specific areas, as well as the duration of power outages during disasters. By analyzing nighttime luminance observed via satellites, RainbirdGEO evaluates the disaster recovery resilience of cities worldwide. The NASA VIIRS satellite, primarily used for this purpose, measures nighttime luminance using a visible panchromatic channel. This satellite data accumulates clear weather pixels over 16 days to provide nighttime luminance data filled in at daily intervals. By utilizing such world-class satellite data, significant effects can be expected in estimating long-term energy usage, and detailed analysis can be conducted to estimate damage caused by disasters.

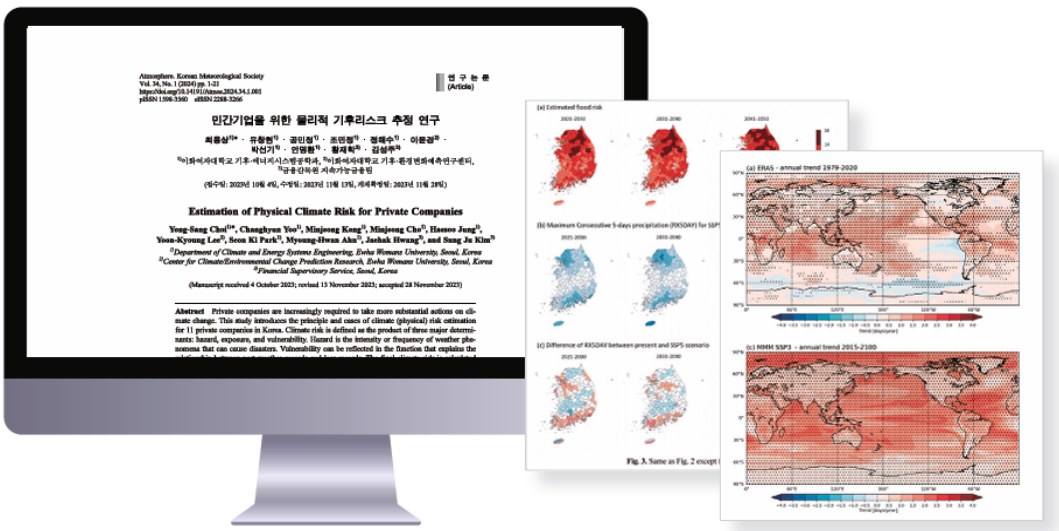
Multi-Hazard Mobile Early Warning Application

RainbirdGEO develops mobile apps that provide real-time alerts on climate risks predicted through GK2A and Meteosat geostationary satellites. With the app, users can receive alerts on climate risks, make direct reports with photos or comments, and search for nearby hospitals, shelters, and emergency contacts. Additionally, users can communicate with others and share alerts on climate risks via various SNS channels. A free trial version of the mobile app, 'Rainbird', is available for users in Asia-Pacific, Africa, and Europe regions on both iOS and Android platforms.

Climate Finance Supporting Software as a Service

As physical climate risks increase worldwide, companies are likely to suffer for negative financial impacts on physical assets. Additionally, environmental regulations aimed at reducing greenhouse gas emissions, such as carbon emission limits, impose additional costs on companies for transitioning to a low-carbon economy. Rainbird Fin predicts future climate risks, including both physical and transition risks across supply chains, based on various scenarios.

RainbirdGEO's software analyzes losses to companies and their supply chains caused by various climate-related disasters, applies these to future scenarios to estimate loss amounts, and enables proactive responses to climate change. It also estimates carbon emissions from companies and their supply chains (including Scope 3) to prepare for transition risks. Through this, we assist companies in managing their operations by supporting climate disclosure responses and providing critical information for investor decision-making.



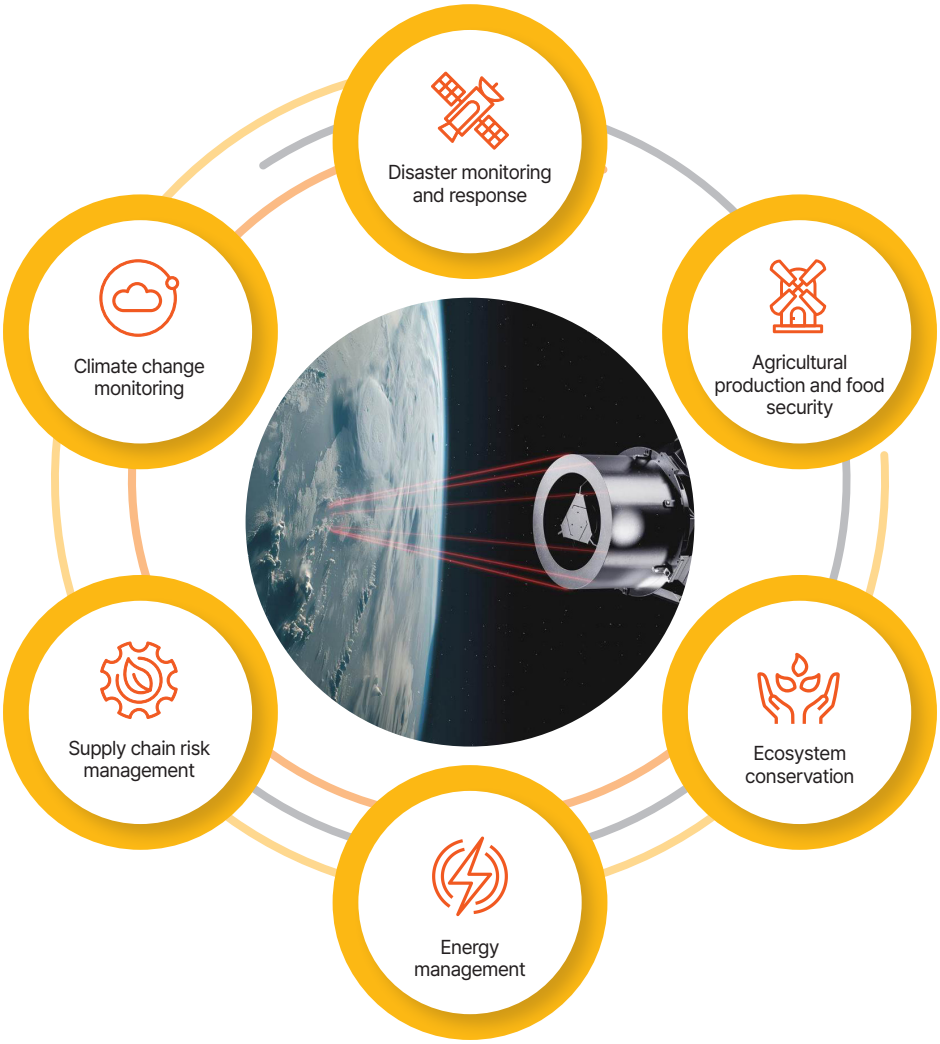
RainbirdGEO analyzes climate risks in collaboration with top researchers at Ewha Womans University.
Choi, Y-S et al., 2023: Estimation of Physical Climate Risk for Private Companies. *Atmosphere*, 34, 1-21.

NongHyup Financial Group
Shinhan Financial Group
BNK Financial Group
Hana Financial Group
KB Financial Group
WOORI FINANCIAL GROUP

CubeSat Imager for Climate Risk Detection

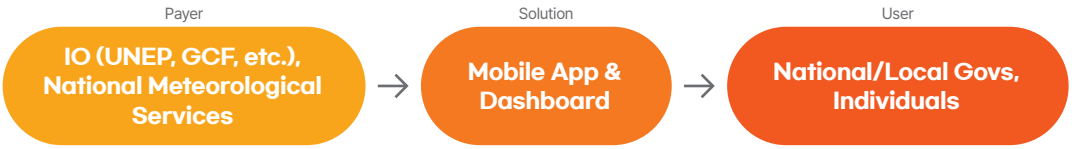
To proactively reduce the loss caused by rapid climate change, it is necessary to utilize private satellites for more precise observation of the Earth. By deploying clusters of commercial CubeSat in low orbit, it is possible to collect detailed atmospheric and surface information of targeted areas at relatively lower cost than conventional satellites, enabling climate risk analysis. By integrating this information with the satellite technologies of RainbirdGEO, governments and nations can monitor and respond to disasters quickly and effectively. Additionally, various sectors, including industry, can prepare for climate risks and reduce damage. Ultimately, this protects lives and strengthens the social and economic resilience.

RainbirdGEO, through close collaboration with commercial satellite developers, is leading the entire process from the development of CubeSat to their launch, the collection and analysis of ground observation data, and the monitoring and management of climate risks. These efforts lay the foundation for protecting our society and lives from the disasters caused by climate change and for responding more robustly.



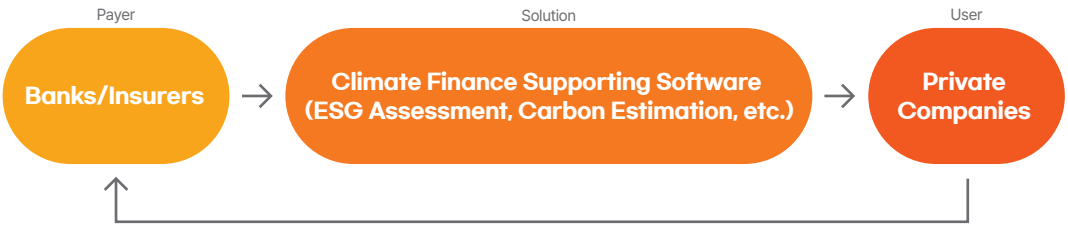
Business Models

Rainbird Alert



Payer	User's Country	Objective	Duration
Korea Meteorological Institute (KMI)	Cambodia	Project for improving disaster management governance capacity in Cambodia by using integrated meteorological solution based on geostationary satellite	21.03.30. ~ 21.10.31.
		Project for improving climate risk management governance capacity in Cambodia by using integrated meteorological solution based on geostationary satellite	22.04.01. ~ 22.10.31.
UNEP-GCF-APCC-EWHA	Marshall Islands, Palau, Tuvalu, Niue, Cook Islands	Enhancing climate information and knowledge services for resilience in 5 island countries of the Pacific Ocean	22.12.27. ~ 26.09.10.
Save the Children	Indonesia	Community-led climate change adaptation project in the Bandung district of Indonesia	23.10.01. ~ 25.10.01.
Asian Development Bank (ADB)	Cambodia	Strengthening women's resilience to heat stress in Asia and the Pacific	24.09.09. ~26.01.31.
Korea Environmental Industry & Technology Institute (KEITI)	Nepal	Nepal satellite-based landslide early warning and damage detection system planning	24.03.11. ~ 24.11.31.

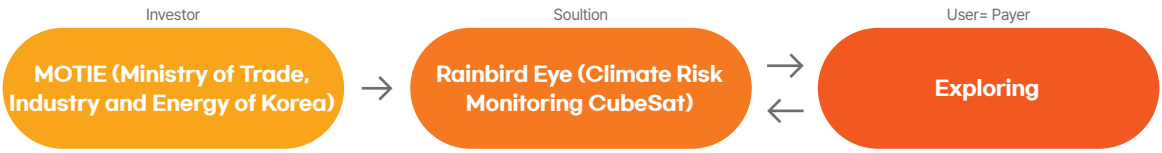
Rainbird Fin



Payer	Objective	Duration
YOLK	Selection of SolarCow installation sites in Ethiopia based on analysis of optimal and at-risk coffee growing areas due to climate change	23.03.01. ~ 23.05.31.

Payer	Objective	Duration
Shinhan Financial Group, IGIS Asset Management, Kiwoom Securities, WOORI Financial Group, B.N.K Financial Group, DGB Financial Group, JB Financial Group, KB Financial Group, NongHyup Financial Group, Korea Rental, Hana Financial Group	Development of a K-taxonomy application system to support various financial practices related to corporate green economy activities	23.03.01. ~ 23.08.31.
Korea Meteorological Institute (KMI)	Development of a specialized climate risk management system for reinsurance companies	23.06.29. ~ 23.11.28.
KoreanRE	Korean climate risk management model development research project for reinsurance company (with Ewha Womans Uni.v, Korea Univ. Postech)	23.09.11. ~ 24.08.31.
KB Financial Group, Woori Financial Group, Shinhan Financial Group, NH NongHyup Financial Group, Hana Financial Group, B.N.K Financial Group	ESG curriculum in the financial sector	23.09.01. ~ 24.08.31.
Hana Financial Group	ESG consulting support project for small and medium-sized businesses	23.12.15. ~ 24.04.30.
Financial Firm, Insurance Firm, Capital Firm, Securities Firm	KTSS (K-Taxonomy Supporting System) software launch	24.09.01. ~
Korea Power Exchange (KPX)	Development of ultra-short-term solar power generation forecasting system based on a real-time cloud motion vector analysis	24.04.26. ~ 26.04.25.

Rainbird Eye



Payer	User	Objective	Duration
Ministry of Trade, Industry and Energy/ Korea Planning & Evaluation Institute of Industrial Technology (KEIT)	Domestic and international climate- and weather-related institutions and companies, financial/insurance companies, and industrial sectors	Development of a micro-satellite optical module for producing high-resolution climate and weather information to respond to climate risks	24.07.01. ~ 27.12.31.

Ongoing Activities

The following projects use technology to receive real-time multi-hazard (flood/landslide/wildfire) risk information from geostationary satellites and transmit it directly to local residents via mobile devices. They address the challenges of predicting tropical weather-induced disaster risks in developing countries that used to rely on Numerical Weather Prediction, significantly enhance the usability of satellite information, integrate local community data (shelters/hospitals) for community-based disaster management, and support decision-making by meteorological and disaster management agencies with additional risk information.

『Enhancing Climate Information and Knowledge Services for Resilience in 5 Island Countries of the Pacific Ocean』 supported by UNEP·GCF

This project aims to enhance climate change response and disaster risk management in five Pacific Island countries (Palau, Niue, the Marshall Islands, Tuvalu, and Cook Island). The primary objectives are to increase the generation and use of climate information, strengthen adaptive capacity to climate risk, and raise awareness of climate threats and risk reduction processes. To achieve these goals, the project will focus on four key outcomes: Strengthening the delivery model for climate information services, improving climate and ocean observation, monitoring and forecasting, and enhancing community preparedness and response capabilities.

RainbirdGEO is specifically responsible for the activity, "Strengthen communication systems to reach the last mile." This involves developing a mobile-based early warning system tailored for use and application exclusively in Pacific Island countries as a concrete measure to enhance climate information and early warning systems in these communities. Additionally, RainbirdGEO will analyze output data obtained from Korean geostationary satellite (GK2A) to develop algorithms that predict extreme weather conditions and provide alerts for the Pacific islands. Furthermore, customized algorithms and early warning systems will be developed to reflect each country's specific weather conditions and mobile environments, enabling Pacific Island communities to respond more effectively to climate change and disasters.



Meetings with the Palau government, women's groups, and telecommunication company

Ongoing Activities

『Strengthening Women's Resilience to Heat Stress in Asia and the Pacific』supported by Asian Development Bank

This project aims to enhance the capacity of selected developing member countries (DMCs) to understand gender-specific heat stress impacts and develop equitable heat adaptation strategies. Implemented by the Asian Development Bank (ADB), the project focuses on increasing knowledge, providing technical expertise, and facilitating knowledge transfer. Key objectives include developing heat risk awareness, identifying vulnerabilities, and introducing satellite-based mobile early warning systems.

RainbirdGEO conducts diagnostics and capacity needs assessments and designs a prototype heat wave early warning system tailored for women in Cambodia. Additionally, they provide capacity-building programs, including field testing, to empower Cambodian women to respond to climate change and extreme heat waves. This project aims to strengthen gender resilience to heatwaves in Cambodia by providing strategies, lessons learned, and policy recommendations for utilizing the mobile-based heat wave early warning system, striving to expand the sustainable system. Subsequently, we plan to extend the mobile-based early warning system not only in Cambodia but also in other Pacific countries.

(Top) Meetings with the Cambodian Ministry of Water Resources and Meteorology (MoWRAM) and other government
(Bottom) Pictures of conducting a demand survey for app design among students

Ongoing Activities

『Community-led Climate Change Adaptation in Bandung District in West Java Province』 supported by Save the Children

This project aims to enhance the climate resilience of children and communities in Bandung, Indonesia, to reduce the risks and negative impacts of climate change. It will create a safe and protective environment by providing sufficient climate risk information and understanding, enabling appropriate responses to save lives and protect livelihoods. Additionally, the project will conduct capacity-building activities to improve the adaptive capacity of children and vulnerable groups, thereby enhancing their quality of life and well-being. It will also support the integration of climate change adaptation into governance systems for systematic institutionalization and scalability.

RainbirdGEO develops a multi-hazard early warning system exclusively for Save the Children to achieve this goal. Additionally, it provides disaster information focused on illustrations and icons for children and vulnerable groups to enhance effective utilization and climate change adaptation abilities. This project supports Indonesian residents in leading disaster response and climate change adaptation by displaying customized weather information analyzed from GK2A data, along with meteorological information and precipitation forecasts from the Indonesian government.



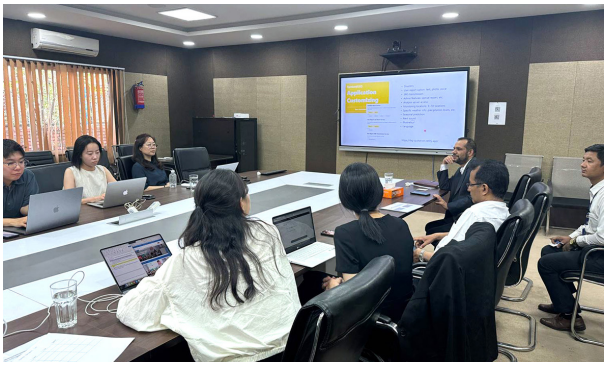

Disaster response training and survey for an early warning system targeting children, women's groups, and other community members in Bandung, Indonesia

Ongoing Activities

『Nepal Satellite-Based Landslide Early Warning and Damage Detection System Planning』 supported by Korea Environmental Industry & Technology Institute (KEITI)

This project aims to develop a Green Climate Fund (GCF) program to enhance the climate change response capabilities of developing countries. The Korea Environmental Industry & Technology Institute (KEITI) supports the development of GCF programs by selecting promising companies in weather, climate, and environmental sectors. In this process, KEITI provides financial support as well as technical and educational programs to help these companies effectively develop the GCF program.

RainbirdGEO has been selected and supported by KEITI for GCF project development targeting Nepal. We aim to design and implement a 'Satellite-Based Landslide Early Warning and Damage Detection System in Nepal' utilizing Korea's advanced satellite, GK2A, to establish an early warning system for landslides and a damage detection system. Through this project, we aim to overcome the limitations of ground observation equipment and enhance the landslide disaster management capabilities of the recipient country, we plan to achieve this through an innovative combination of sustainable satellite technology and artificial intelligence, with potential expansion to neighboring countries.



(Top) Meetings with disaster management agencies of the Nepal government
(Bottom) Field investigation and aerial view of the project site

RainbirdGEO's Partnerships

Official Contracting Authorities

UN environment programme

GREEN CLIMATE FUND

ADB ASIAN DEVELOPMENT BANK

Save the Children

APCC APEC CLIMATE CENTER

ក្រសួងធនធានទឹក និងឧតុនិយម MINISTRY OF WATER RESOUCES AND METEOROLOGY

Korea Meteorological Administration

KMI Korea Meteorological Institute

KEITI

EWHA WOMANS UNIVERSITY

sopoong

Good Neighbors Global Impact Foundation

Green Idea Lab

MangLub Social Enterprise

sejoong 세중정보기술

SOLETOP

씨케이스택 CKSTACK CORPORATION

SELAB SPACE ENVIRONMENT LABORATORY

KCCTS Korea Center for Carbon Trade Standards

SIA