




The Republic of Korea's Adaptation Communication

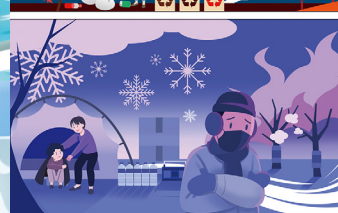
A Report to the United Nations
Framework Convention on Climate Change

The Government of
the Republic of Korea







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Acknowledgement

The cover illustration comprises the winning entries in the '2022 Climate Change Adaptation Illustration Contest,' which is hosted by the Ministry of Environment in collaboration with KEI KACCC to raise awareness and understanding of adaptation to climate change and to increase public engagement. The illustrations used on the cover are 17 award-winning entries, selected from a total of 535 submissions received in 2022 across both the general and children's categories, including Grand Prize, Excellence, and Encouragement awards.

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Foreword

The Republic of Korea (ROK), as a signatory to the Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC), recognizes the significant challenge posed by climate change and its far-reaching implications. The ROK is fully aware of its responsibility as a member of the international community to respond and adapt to the adverse impacts of climate change. In pursuit of this goal, we are committed to achieving the Global Goal on Adaptation (GGA) and advancing sustainable development to safeguard humanity and all forms of life on earth from the consequences of climate change.

Mitigation is the most effective form of adaptation to climate change. Yet the ROK recognizes that despite our efforts to reduce greenhouse gas emissions, residual risks associated with climate change persist. For this reason, the ROK has been at the forefront of efforts to adapt to climate change, having established the National Climate Change Adaptation Plan in five years since 2010.

This submission serves as the first Adaptation Communication from the ROK, tracking our sustained efforts and actions towards adaptation, as required by Article 7, Paragraphs 10 and 11 of the Paris Agreement and Decision 9/CMA.1. The aim of this communication is to increase the visibility and profile of adaptation, reflect the adaptation efforts of the ROK for mutual learning, provide input for the Global Stocktake, and ultimately contribute to global efforts towards climate change adaptation.

The Korean Context

The ROK is a peninsular country between 124 and 132 degrees east longitude and 33 and 43 degrees north latitude, located to east of the Eurasian Continent and northwest of the North Pacific. Three-quarters of the national land is mountainous terrain, with the east region presenting high elevation and the west region exhibiting low elevation. It is surrounded by the sea on three sides, with the east coast characterized by deep waters and a fairly uniform coastline, while the west and south coasts are shallow and intricate, dotted with numerous islands.

The ROK lies within the temperate climate zone and has four distinct seasons: spring, summer, fall, and winter. Spring and fall are typically characterized by clear and dry weather, while summer is humid due to the influence of the North Pacific High. Winter is dry and cold, influenced by continental anticyclones. Over the past 109 years (1912-2020), Korea's average temperature per month has ranged from 3.8°C to 29.8°C, with an average annual temperature of 12.8°C. The average annual precipitation is 1,246.6mm, of which approximately 50 to 60% occurs during the summer monsoon season, leading to heavy rainfall and typhoons that can cause flooding. In contrast, the remaining seasons pose the risk of drought.

Climate Change Impacts, Vulnerabilities, and Risks in Korea

Climate Change Impacts

The ROK is experiencing a rate of warming more rapid than the global average, which has resulted in a number of adverse impacts. Over the past 109 years (1912-2020), the average annual temperature in Korea has increased by approximately 1.6°C, surpassing the global average of 1.09°C. Furthermore, the sea-level temperature has risen by 1.23°C over the last 50 years (1968-2017), which is 2.6 times greater than the global average of 0.48°C. The sea level has also increased by 2.97mm annually over the past 30 years (1989-2018), surpassing the global average annual rise of 1.7mm. The escalation in the frequency and intensity of heavy rains, heat waves, abnormally warm days in winter, and cold waves has resulted in significant property losses and casualties.

In the past 10 years (2011-2021), natural disasters in relation to climate change have led to economic losses of 3.7 trillion won (equivalent to approximately 3.1 billion US dollars), with recovery expenses estimated to be roughly two to three times this amount. Table 1 below provides an overview of the impacts of climate change on major sectors in the ROK.

Table 1. Overview of Climate Change Impacts on the Major Sectors in the ROK

Sector	Major Impacts
Water Resources	• Increase in summer rainfall and a rise in the frequency of extreme rainfall events in the past 30 years • Increase in frequency and intensity of droughts with substantial regional disparity
Ecosystems and Forests	• Increase in the length of the growth cycle of plants by approximately 0.42 days per year

Sector	Major impacts
Ecosystems and Forests	• The northern margins of southern butterfly species shifted northward by approximately 1.6 km every year in the last 60 years, while the southern margins of northern butterfly species shifted southward • Decrease in the distribution of subalpine coniferous tree species
Agriculture	• The northern margins of arable land shifted northward • Increase in over-wintering and exotic pests • Changes in the distribution and pattern of weed growth
Oceans and Fisheries	• Increase in sea-level temperature(0.025°C/year) and decrease in PH of seawater (0.019/10 years) • Increase in risk of disasters in coastal areas, such as flooding and tsunamis due to sea-level rise • Increase in risk of changing spatial distribution of fish species and the mass destruction of aquaculture organisms due to higher sea-level temperature • Increase in the occurrence of hazardous species, such as harmful algae, toxic plankton, and jellyfish
Industry and Energy	• Significant impacts on the transportation industry through 'pot-holes' and/or 'blow-up' phenomena of pavement structures due to heat waves and heavy rain • Adverse effects on the leisure and tourism industry caused by typhoons and floods
Health	• Increase in mortality rate due to heat waves • Higher prevalence of mosquito-borne infectious diseases and food poisoning caused by norovirus
Human Settlements and Welfare	• Cities experiencing adverse impacts of climate change while also contributing to the worsening of climate change through the emission of greenhouse gases • Rural areas experiencing the higher impacts of climate change due to the decline in population, aging, income reduction, and insufficient infrastructure

Due to climate change, a gradual increase in average annual temperature and precipitation level in the ROK is expected. Applying different climate change scenarios including, RCP2.6, RCP4.5, RCP6.0, and RCP8.5, it is projected that the average annual temperature in Korea will increase by 1.8 to 4.7°C by the end of the 21st century, compared to current levels. Furthermore, the average annual precipitation is projected to increase by 5.5 to 13.1% in the same period. It is anticipated that the area of Korea with a subtropical climate, which is currently limited to the southern coastline, will expand, leading to an increase in high-temperature indices like heat waves and tropical nights, as well as a decrease in low-temperature indices.

Scientific Assessment of Climate Change

The ROK is taking proactive measures to address the impacts of climate change through its adaptation policies grounded in the best available scientific knowledge. One of these measures is the regular publication of the Korean Climate Change Assessment Report, which provides decision-makers with comprehensive insights by compiling and summarizing domestic and international research findings. The latest edition, *the Korean Climate Change Assessment Report 2020,* analyzed 1,900 research papers published between 2014 and 2020, with input from 120 experts from various fields. It is comprised of two volumes: *Scientific Basis of Climate Change* and *Climate Change Impacts and Adaptation*.

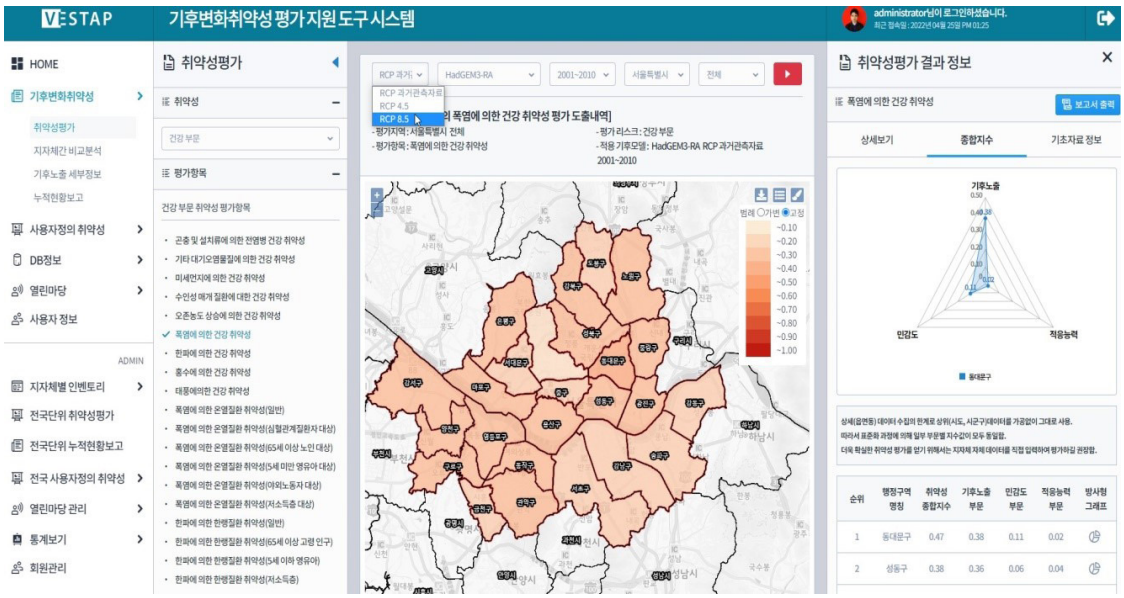
To further enhance its scientific evaluation of climate change, the ROK has developed a Korean model of integrated impact evaluation of climate change called MOTIVE (Korean Model Of inTegrated Impact and Vulnerability Evaluation of Climate Change). Based on the interrelationships between the sectors, this model assesses the integrated impacts of climate change across the seven sectors of health, water, agriculture, forestry, ecosystem, ocean, and fisheries.

Additionally, the ROK has begun developing a new model, *the Integrated Impact Assessment Platform for Climate Change Adaptation*, which will advance its assessments and bolster decision-supporting services for climate change adaptation. The development of the model is set to continue from 2022 through the next seven years.

In 2019, the ROK conducted a National Climate Change Risk Assessment to establish the third National Climate Change Adaptation Plan (NCCAP). This assessment analyzed the impacts of climate change, identified potential risks, and categorized them into 84 significant risks across the six sectors of water, ecosystems, land and coastal areas, agriculture and fisheries, health, and industry and energy. The third NCCAP was established in December 2020, following the development of measures to mitigate the identified risks.

To support sub-national governments in establishing plans to adapt to climate change, a Web-based Vulnerability Assessment Tool to Build Climate Change Adaptation Plan (VESTAP) has been developed and provided to decision makers of the sub-national governments. VESTAP provides sub-national governments (regional and local governments including Si/Gun/Gu and Eup/Myen/Dong) with vulnerability assessment results covering 57 items across the seven sectors of health, land/coast, agriculture, and livestock, forest/ecosystem, marine/fisheries, water and industry/energy. Additionally, it provides local climate, topographic, administrative, social, and economic information to support decision-making and strengthen the adaptive capacity of the sub-national governments.

Figure 1. Example of VESTAP Results



* This figure is an example of the VESTAP results showing the expected health vulnerability due to heatwaves in Seoul.

Adaptation Governance

The ROK acknowledges climate change as a significant threat to society and has been committed to establishing comprehensive governance to adapt to its effects.

Legal Framework

With the enactment of *the Framework Act on Low Carbon, Green Growth* in 2010, the ROK has established the first legal framework for climate change adaptation. Currently, the ROK is comprehensively pursuing adaptation plans under *the Framework Act on Carbon Neutrality and Green Growth for Coping with Climate Crisis (The Framework Act),* enacted in 2021 and enforced in 2022. This law requires the central government to monitor and predict climate change, establish and implement national climate change adaptation plans, and regularly review the progress of these plans. Moreover, the law requires sub-national governments and public institutions to develop and implement adaptation plans and provides a legal basis for establishing and operating adaptation-supporting institutions. Additionally, several laws, including *the Enforcement Decree of the Creation and Management of Forest Resources Act*, have incorporated provisions related to climate change adaptation, indicating a gradual shift towards mainstreaming adaptation into the legal system.

Policies

The Master Plan on Carbon Neutrality and Green Growth, developed under *the National Carbon Neutrality and Green Growth Strategy*, provides the primary guidelines for the ROK to respond to climate change by 2050.

Regarding climate change adaptation, the ROK has established a separate NCCAP under the Framework Act. The plan is formulated and implemented every five years, considering the uncertainties of climate change.

Institutional Arrangements

The Presidential Commission on Carbon Neutrality and Green Growth (The Commission) is the steering body responsible for deliberating and making decisions on critical matters related to climate change response, including adaptation.

As the overarching agency responsible for climate change adaptation, the Ministry of Environment (ME) collaborates with involved ministries to formulate the NCCAP every five years and is accountable for overseeing annual progress and conducting comprehensive evaluations. In 2022, the ME established a dedicated division for adaptation, the Climate Adaptation Division, to strengthen oversight and coordinate overall adaptation efforts to address the impacts of climate change.

A total of 17 ministries1 have been involved in establishing of the NCCAP. Each ministry is responsible for formulating and implementing action plans for the Plan and submitting progress reports.

The regional governments of the 17 metropolitan cities and provinces (Gwangyeoksi/Do) and the local governments of 226 cities, counties, and districts (Si/Gun/Gu) are also responsible for formulating and implementing their adaptation plans every five years.

62 public institutions responsible for critical social infrastructure are required to establish and implement agency-level adaptation plans every five years.

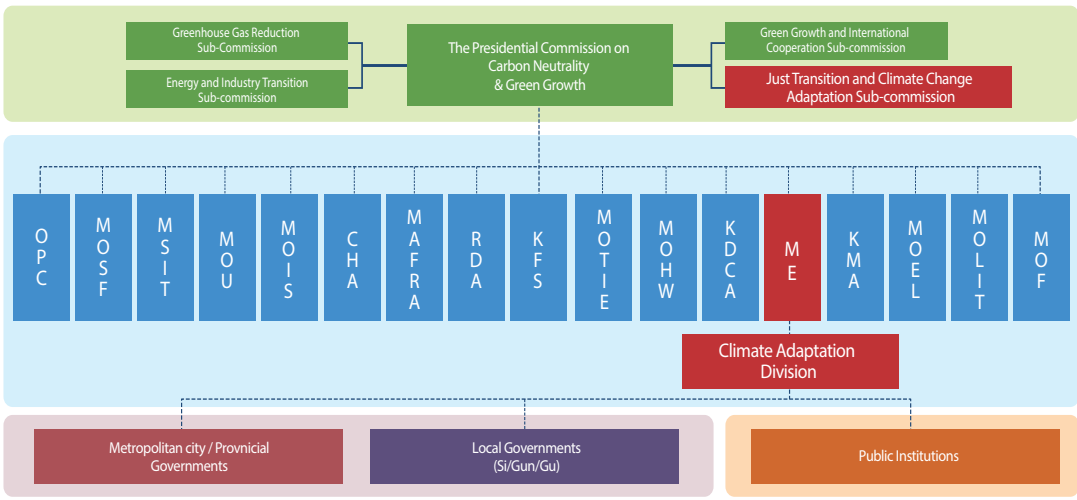
1 Office for Government Policy Coordination(OPC); Ministry of Strategy and Finance(MOSF); Ministry of Science and ICT(MSIT); Ministry of Unification(MOU); Ministry of the Interior and Safety(MOIS); Cultural Heritage Administration(CHA); Ministry of Agriculture, Food and Rural Affairs(MAFRA); Rural Development Administration(RDA); Korea Forest Service(KFS); Ministry of Trade, Industry and Energy(MOTIE); Ministry of Health and Welfare(MOHW); Korea Disease Control and Prevention Agency(KDCA); Ministry of Environment(ME); Korea Meteorological Administration(KMA); Ministry of Employment and Labor(MOEL); Ministry of Land, Infrastructure and Transport(MOLIT); and Ministry of Oceans and Fisheries(MOF)

Adaptation Plan for Major Infrastructures

The public institutions responsible for critical social infrastructures have demonstrated their commitment to climate change adaptation by voluntarily participating in the ME's support program since 2016. However, in 2021, with the enactment of the Framework Act, the establishment and implementation of adaptation plans by public institutions were mandated. It is noteworthy that the ROK is among the few countries that have enacted legislation to ensure the adaptation of significant infrastructures. The designated institutions include those responsible for transportation (roads, railways, airports, and ports), energy (power generation, power transmission, heating, and oil and gas storage), water management (dams, reservoirs, and water supply), environmental management (sewage and waste treatment), national parks, industrial complexes, and rental housing.

Industry and citizens are recognized as significant actors in climate change adaptation by the government, which provides support for their adaptation efforts. Additionally, the ME has developed support programs specifically for vulnerable groups, including the elderly and low-income individuals, who are particularly vulnerable to the impacts of climate change. The governing structure of institutions for adaptation to climate change in the ROK, including central and local governments, as well as public institutions mandated to adapt to climate change, is illustrated in Figure 2.

Figure 2. Governing Structure of Institutions for Adaptation in the ROK



Adaptation-supporting Institutions

Since 2009, the ME has designated adaptation-supporting institutions to support research, policies, and projects related to climate change adaptation. The Korea Adaptation Center for Climate Change (KACCC) was established at the Korea Environment Institute (KEI) in 2009, and an additional center was designated at the National Institute of Environmental Research (NIER) in 2021.

Adaptation-supporting Institutions In the ROK

The Korea Adaptation Center for Climate Change, established on July 1, 2009, under the Korea Environment Institute (KEI KACCC), is a specialized research institution dedicated to climate change adaptation policies. Through systematic research on climate change adaptation, the Center aims to promote the establishment and implementation of the NCCAP, build international and domestic partnerships, support policies and projects to enhance climate resilience across all sectors of society, develop scientific monitoring and assessment tools of climate change, and promote public education and awareness campaigns. As one of the longest-standing institutions in the world dedicated solely to adaptation, KEI KACCC is at the forefront of climate adaptation research and policy development.

The Framework Act, enacted in 2021, expanded the scope of adaptation efforts in the ROK. As part of these efforts, an additional institution to support adaptation was established at the National Institute of Environmental Research (NIER).

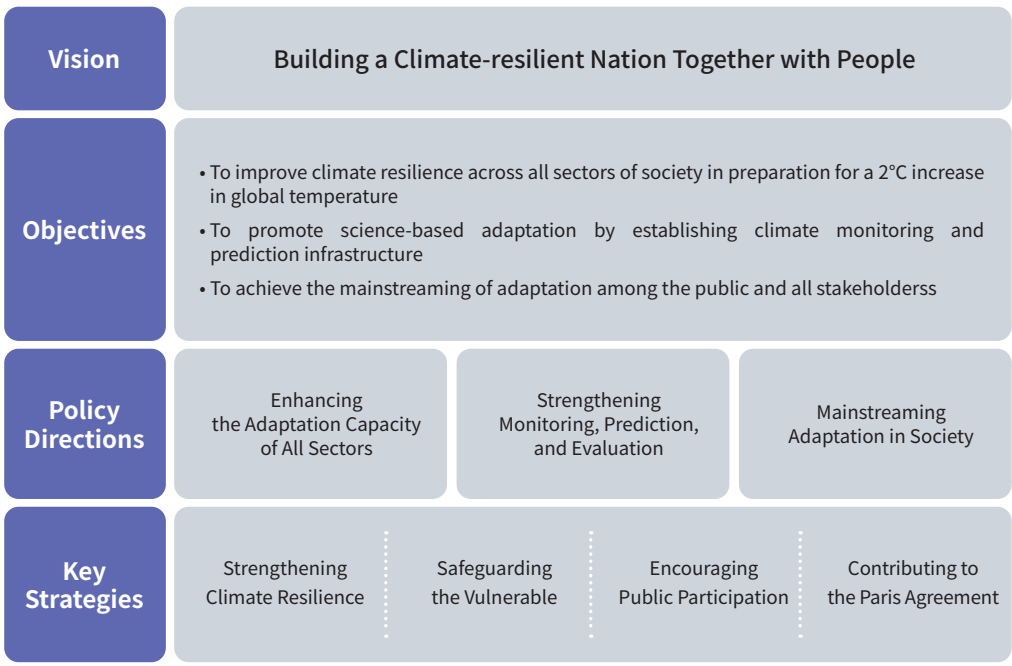
National Adaptation Plan

The NCCAP, which stands for National Climate Change Adaptation Plan, serves as Korea's National Adaptation Plan. It is a 5-year rolling plan that outlines plans for adapting to climate change in the ROK considering the uncertainties of climate change. The first NCCAP (2011-2015) was formulated in 2010, marking the ROK's initial efforts to establish a foundation for climate change adaptation. Presently, the ROK is implementing the third NCCAP.

The Third National Climate Change Adaptation Plan

The third NCCAP is a comprehensive plan with the vision of *Building a Climate-resilient Nation, Together with People* between 2021 and 2025. As shown in Figure 3, the Plan encompasses a range of initiatives designed to enhance the country's resilience to climate change impacts.

Figure 4. The Planning Process of the Third NCCAP

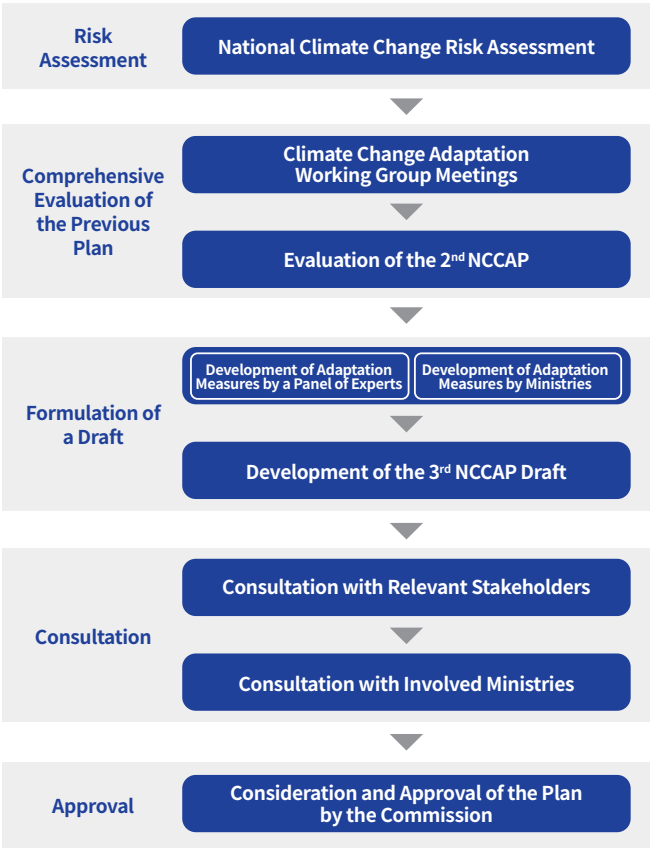


Planning Process of the Third National Climate Change Adaptation Plan

The third NCCAP in the ROK has been systematically established based on the experience of the previous adaptation plans. The planning process involved the following steps, as illustrated in Figure 4:

1. Conducting a National Climate Change Risk Assessment;
2. Undertaking a comprehensive evaluation of the second NCCAP;
3. Drafting the third NCCAP;
4. Consulting with key stakeholders and relevant ministries to gather their opinions; and
5. Deliberating and obtaining approval by the Commission.

Figure 4. The Planning Process of the Third NCCAP



The third NCCAP in the ROK builds upon the achievements of its predecessor. The second NCCAP resulted in several accomplishments, including the enhancement of the implementation capacity of the NCCAP, the consolidation of mainstreaming adaptation across all sectors of society, the active contribution to the international community of adaptation, and the establishment of a foundation for future adaptation. A detailed account of the significant achievements of the second NCCAP is provided in Table 2.

Table 2. Achievement of the Second NCCAP

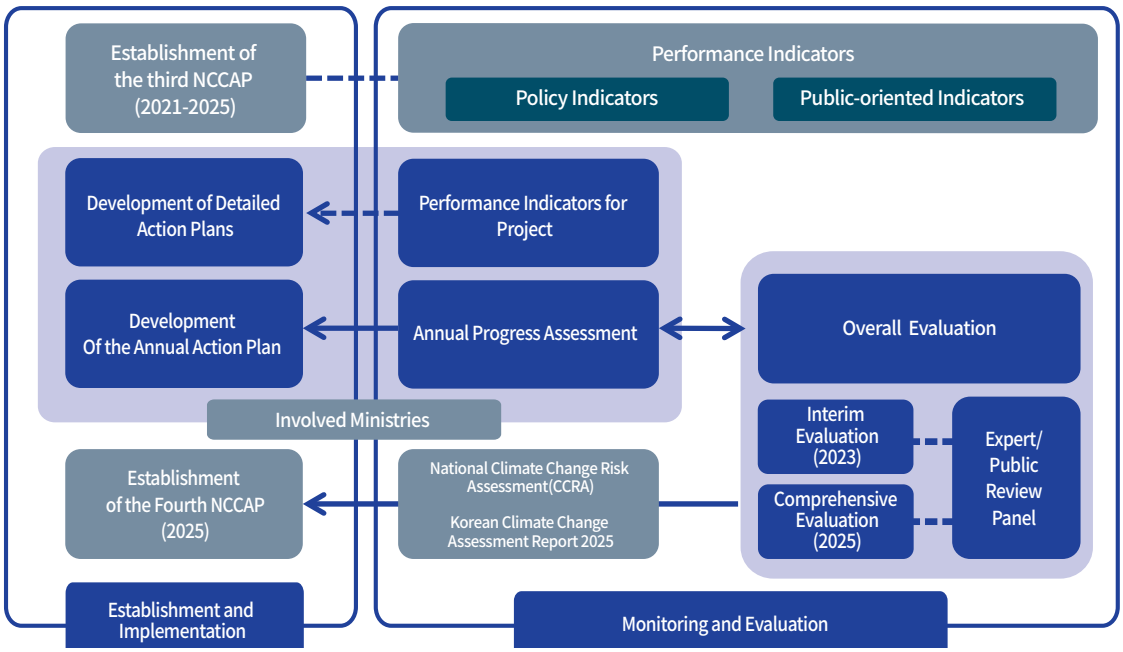
Policy Direction	Achievements
Risk Management Based on Science	• Enhanced climate monitoring and prediction, and adaptation information service • Enhanced science-based adaptation measures • Improved monitoring of climate change impacts
Safe Society	• Strengthened safeguard of the vulnerable to climate change • Enhanced management of vulnerable areas and infrastructures • Improved disaster management systems
Enhanced Support for Business	• Enhanced foundation of adaptation for businesses • Expanded adaptation infrastructures for climate change • Improved management of climate change impacts and support for industries to adap
Sustainable Management of Ecosystem	• Enhanced management of natural habitats and ecosystems • Strengthened discovery, conservation, and management systems of biological resources • Improved risk management of ecosystems
Strengthened Foundations for Implementation	• Enhanced effectiveness of adaptation policies across all sectors • Enhanced resilience to climate change based on regional demands and features • Enhanced awareness of adaptation and strengthened partnerships for adaptation

Features of the Third National Climate Change Adaptation Plan

The third NCCAP incorporates a comprehensive framework that connects policy establishment, implementation, monitoring, and evaluation systems. Once the plan is established, each ministry formulates an action plan for the following year. The ministry then implements the annual action plan and conducts a self-assessment of the progress. The ME prepares a comprehensive outcome report on the self-assessments and submits it to the Commission for consideration. Upon approval, the report is released to the public while developing the action plan for the subsequent year.

Moreover, the ME conducts interim and comprehensive evaluations of the plan in the third and fifth years, respectively. The conclusions drawn from these evaluations will be considered while implementing the plan and establishing the fourth NCCAP. The comprehensive framework the third NCCAP is depicted in Figure 5.

Figure 5. Comprehensive Framework of the Third NCCAP



The third NCCAP in the ROK is distinguished from its predecessors by several unique features. The plan emphasizes the importance of strengthening the scientific basis, developing adaptation measures tailored to risks, formulating adaptation policies for various stakeholders, and engaging citizens in the monitoring and evaluation process. Notably, the ROK is taking a public-oriented approach by selecting and managing public-oriented projects separately. Additionally, the government is operating the Public Review Panel to allow citizens to participate in the policy evaluation process.

The Government of Korea acknowledges that climate change adaptation should be based on the best available science, led by the state, and socially inclusive, and should also consider traditional and local knowledge systems where appropriate. This recognition is also reflected in the policies and plans that the government is currently pursuing.

Details of the Third National Climate Change Adaptation Plan

The third NCCAP was established and has been implemented by the 15 ministries focusing on three policy directions: 1) enhancing the adaptation capacity of all sectors, 2) strengthening monitoring, prediction, and evaluation, and 3) mainstreaming adaptation in society.

The first policy direction is geared towards enhancing the adaptation capacity of all sectors of society by addressing a total of 84 climate risk items through 6 specific policy objectives. These include enhancing water management based on future climate risks, maintaining and promoting healthy ecosystems, enhancing nationwide capacity for climate change adaptation, creating a sustainable environment for agricultural and fisheries production, establishing a system to prevent health damage caused by climate change, and strengthening adaptation capacity in the industry and energy sectors. This direction is addressed through 18 programs and 141 projects in 6 sectors.

The second policy direction is to strengthen monitoring, prediction, and evaluation to reduce climate uncertainty and updating information for climate risk management using vulnerability and risk assessment tools. This direction consists of 3 policy objectives,

including establishing a comprehensive monitoring system, advancing climate change scenario development and prediction, and advancing evaluation tools and information dissemination. This direction is being addressed through 9 programs and 40 projects in 3 sectors.

The third policy direction targets mainstreaming adaptation in society by enhancing the adaptive capacity of all actors, including the national and sub-national governments, businesses, and civil society. The objectives under this direction include strengthening the adaptation system to climate change, strengthening the foundation of climate resilience, and building partnerships and raising awareness for climate change adaptation. This direction is being addressed through 9 programs and 54 projects in 3 sectors.

Table 3 presents a comprehensive summary of the policy directions, objectives, and programs that are encompassed under the third NCCAP.

Table 3. Details of the Third NCCAP

Direction	Objective	Program
Enhancing Adaptation Capacity of All Sectors	Enhancing water management based on future climate risks	• Improving flood management against climate change
		• Improving drought responsiveness and diversifying water resources
		• Establishing a resilient water environment in response to climate change
	Maintaining and promoting healthy ecosystems	• Enhancing ecosystem monitoring and management systems
		• Maintaining healthy ecosystems through conservation and restoration
		• Strengthening management of ecological hazards and disasters caused by climate change

Direction	Objective	Program
Enhancing Adaptation Capacity of All Sectors	Enhancing nationwide capacity for climate change adaptation	• Strengthening the foundation for responding to territorial and coastal disasters
		• Strengthening the foundation for local-centered management of climate resilience
		• Improving adaptation capacity for infrastructures and buildings
	Creating a sustainable environment for agricultural and fisheries production	• Providing impact information on climate change
		• Strengthening the production environment of agriculture and fisheries to adapt to climate change
		• Ensuring a safe environment for agriculture and fisheries
	Establishing a system to prevent health damage caused by climate change	• Establishing a monitoring and evaluation system for climate change impacts on health
		• Strengthening response to infectious diseases related to climate change
		• Protecting the health of the vulnerable to climate change
	Strengthening adaptation capacity in the industry and energy sectors	• Strengthening adaptation capacity of industries
		• Addressing vulnerabilities of power facilities to climate change
		• Improving energy efficiency and diversification of energy sources
Strengthening Monitoring, Prediction, and Evaluation	Establishing a comprehensive monitoring system	• Diversifying climate change monitoring information sources
		• Strengthening the ability to monitor greenhouse gases

Direction	Objective	Program
Strengthening Monitoring, Prediction, and Evaluation	Establishing a comprehensive monitoring system	• Improving the ability to respond to climate-induced disasters through monitoring
	Advancing climate change scenario development and prediction	• Developing and utilizing new climate change scenarios
		• Advancing technologies for climate change prediction
		• Establishing efficient systems for utilizing ocean climate prediction information
	Advancing evaluation tools and information dissemination	• Advancing methodologies for assessing climate change risks
		• Advancing tools to evaluate impacts and vulnerabilities of climate change
		• Establishing a management system for adaptation information and enhancing information dissemination
Mainstreaming Adaptation in Society	Strengthening the adaptation system to climate change	• Improving the capacity for implementation
		• Enhancing the mainstreaming of adaptation in society
		• Establishing and strengthening a dedicated system for adaptation to climate change
Mainstreaming Adaptation in Society	Strengthening the foundation of climate resilience	• Promoting climate resilience projects tailored to the local context
		• Enhancing the safeguard of the vulnerable to climate change
		• Developing technologies and industries to adapt to climate change
	Building partnerships and raising awareness for climate change adaptation	• Contributing to the Paris Agreement
		• Promoting domestic and international cooperation on adaptation to climate change
		• Promoting awareness and understanding of adaptation

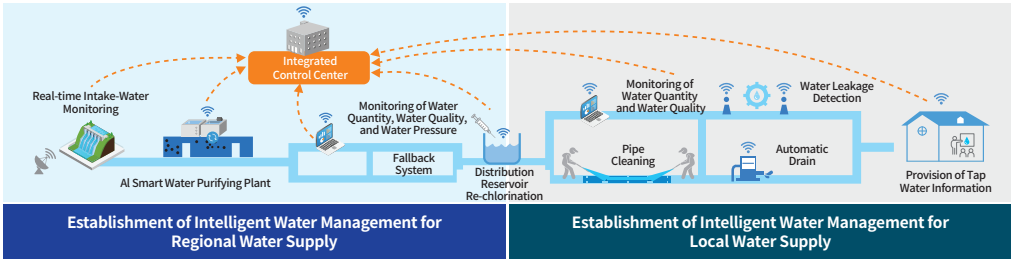
The third NCCAP is structured as follows: The first policy direction, *Enhancing the Adaptation Capacity of All Sectors*, encompasses 6 objectives. The first objective, *Water Management Based on Future Climate Risks*, comprises 3 programs, namely *Sustainable Flood Management against Climate Change, Strengthening Water Security by Enhancing Drought Responsiveness and Diversifying Water Resources, and Creating a Sound Water Environment in Response to Climate Change*. The first program includes the following projects: *1) Expanding flood Management infrastructure, 2) Strengthening collaboration among relevant agencies to improve flood forecasting accuracy, and 3) Strengthening the joint management of the rivers flowing through the South and North Korea*.

The following cases are among the significant projects implemented under the third NCCAP in 2021. These projects were selected as best practices based on the 2021 annual progress assessment.

AI and ICT-based Real-time Automatic Water Supply Management Systems

The ME is in the process of developing a real-time automatic water supply management system that utilizes AI and ICT. The primary objective of this system is to proactively prevent accidents in regional and local water supply systems while enabling swift and effective responses to incidents. To achieve this goal, the ME has established a collaborative framework that involves various stakeholders, including sub-national governments, academic institutions, and private companies. Presently, the ME is actively promoting the development of an intelligent management system for regional water supply and the construction of a monitoring infrastructure for 161 local governments across the nation. Figure 6 portrays the holistic process from monitoring drinking water quality to delivering tap water information to consumers via the intelligent management system.

Figure 6. Overview of Intelligent Water Supply Management System



Raising Public Awareness of Droughts

The ME has undertaken several measures to elevate public consciousness regarding the challenges posed by droughts. These efforts have included the establishment and operation of the National Drought Information Service (NDIS), as well as the enhancement of local government support systems. Additionally, the ministry has developed an environmental impact assessment system designed to enable a better understanding of the effects of droughts. In addition, various educational programs have been implemented, including an online education program and an offline drought information center, targeted at educating the public. Figure 7 presents the cases of the ME's efforts on public awareness regarding drought.

Figure 7. Cases of Raising Public Awareness of Droughts

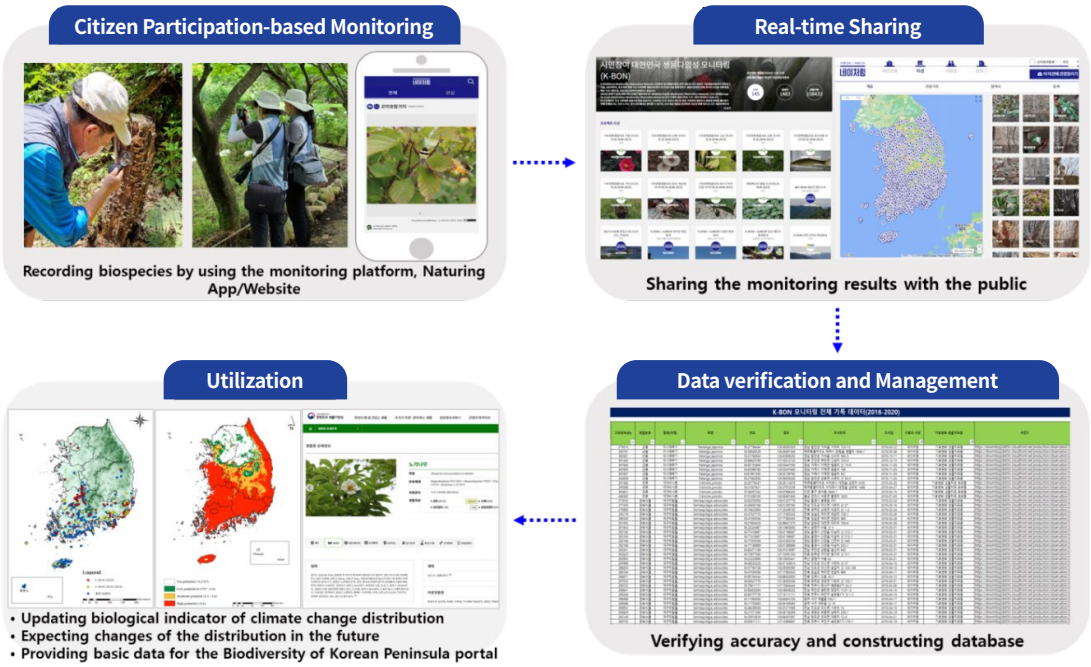
In-person Training Program for Teachers on Drought

Online Droughts Education Program using VR

K-BON: A Citizen-led Effort to Monitor Climate-sensitive Species

The National Institute of Biological Resources (NIBR) has implemented a nationwide initiative, the Citizen Participation-based Biodiversity Monitoring Network (K-BON), aimed at monitoring climate-sensitive species. In addition, the institute has established the K-BON Junior program, which seeks to cultivate a new generation of citizen specialists in the field. Thanks to the collection of extensive and varied data, including 202,507 records of occurrence information, as well as photos, videos, and sounds, NIBR has been able to construct and regularly update distribution maps for climate change indicators and other candidate species. Figure 8 illustrates the K-BON process.

Figure 8. Process of K-BON



Strengthening Cooperation to Enhance the Accuracy of Flood Forecasting

The Korea Meteorological Administration (KMA) has provided hydro-meteorological information and weather education to water management agencies for flood forecasting and dam operation decision-making. Rainfall data, including numerical weather prediction models and short-term forecasts, were produced and provided on a watershed basis for 38 dams and 511 agricultural water usage areas. In addition, KMA also established and conducted training programs for flood and weather forecast personnel to promote mutual understanding and cooperation. To enhance the disaster response capabilities of related agencies, the KMA, the Flood Control Offices (FCOs), and the Korea Water Resources Corporation (K-Water) have held joint meetings on an ongoing basis for advanced sharing of weather and flood information and forecasting. Furthermore, the KMA, the ME, the FCOs, and K-Water have strengthened their organic cooperation through the Policy Coordination Committee established in 2021, enabling joint flood response measures between weather and water management agencies. Additionally, the KMA has installed weather observation equipments at the water management

agency observation points (Bugwi in Jinan-Gun, Osu in Sunchang-Gun) that previously only monitored rainfall, enabling monitoring the weather observation as well.

Monitoring and Evaluation

Considering monitoring and evaluation from the establishment stage, the third NCCAP has formulated a comprehensive array of performance indicators. These indicators encompass 20 policy-related indicators that cover 12 different areas, and 16 public-oriented indicators that cover 8 areas as presented in Table 4.

Table 4. Performance Indicators

① Policy-related Indicators

Area	Indicator	Target	
		2020	2025
Water Management	Number of flood forecasting center	65	218
	National Drought Information Service (NDIS)		To be established
Ecosystem	Establishment of the integrated platform for climate change information on ecosystems		To be established
	Restoration areas of the National Ecological Network	465ha	1,000ha
Terrestrial and Coastal areas	Number of the public rental housing units renovated in the resilient way		225,000
	Number of points covered by a coastal erosion survey	250	300
Agriculture and Fisheries	Number of disaster-resistant facility standards distributed	68	75
	Number of crop species identified to shift cultivation areas due to climate change	17	25

Area	Indicator	Target	
		2020	2025
Health	Health impact assessment of climate change	Legal foundation established	1st assessment
	Number of platforms joined for sharing information on infectious diseases	1	4
Industry and Energy	Number of manuals on adaptation for vulnerable industries		10
	Number of apartment units with a smart power grid	150,000	5 million
Monitoring	Number of satellite-monitored climate change data sets	29	96
Forecast	Downscaled Projections for South Korea	RCP AR5-based	SSP AR6-based
Assessment	Publication of the Korean Climate Change Assessment Report	RCP AR5-based	SSP AR6-based
	Development of climate change impact assessment system		To be developed
Implementation	Development of adaptation plans by the public institutions responsible for social infrastructures		To be mandated
	Operation of the monitoring panel overseeing sub-national governments' implementation		100%
Resilience	Number of standard models for adaptive infrastructure		5
Cooperation	Operation of a council for adaptation research institutions	Established	Regular meetings (Twice a year)

② Public-oriented Indicators

Area	Indicator	Target	
		2020	2025
Floods	Flash flood forecast system		To be established
	Number of hot spots for drainage maintenance	114	180
Droughts	Number of annual users of the National Drought Information Portal	110,000	400,000
	Number of locations with a smart water supply management system		209
Species Outbreaks	Database for potential pest or disease species outbreak		To be established
	Guidelines for eco-friendly pest control		To be developed
Forest Disaster	Advanced landslide forecasting system	Forecast with one hour lead time	Forecast with shorter lead time
	Wildfire risk map considering climate change		To be developed
Food Security	Number of climate-resistant crop species developed	288	363
	Number of farms with the tailored early warning system	29	110
Health	Development of a health management application considering climate change		To be developed
	Public briefings on behavioral guidelines for facilities used by vulnerable populations		1,000
Safeguarding of Vulnerable Populations	Development of methods for selecting climate risk hot spots		To be developed
	Number of local governments with adaptive infrastructure to climate change		10 per year
Public Participation	Number of living lab projects		20
	Establishments of a citizen-participation platform for sharing disaster information		To be established

The third NCCAP has a comprehensive system for monitoring and evaluation. First, an annual progress assessment is conducted. Each ministry submits the annual progress report of implementation for the previous year to the ME. The ME reviews the submissions, and drafts an overall progress report, which is submitted to the Commission for consideration. The reviewed results are then circulated to each ministry and reflected in the following year's action plan.

The annual progress assessment is conducted through two tracks: 1) self-assessment; and 2) best practice. Each ministry submits the results of its self-assessment and best practices of the implemented projects, including the outcomes of the 49 public-oriented projects, to the ME.

In the self-assessment track, the ME integrates the self-assessment results of all ministries and, with the help of experts in each sector, derives the comprehensive progress outcomes. In the best practice track, the Expert Review Panel reviews and selects the best practices of each ministry. At the same time, the Citizen Review Panel assesses 49 public-oriented projects and selects the best cases. The ME compiles these results and prepares an annual overall progress report and submits it to the Commission for consideration. Figure 9 outlines the comprehensive process for conducting the annual progress assessment of the third NCCAP.

Figure 9. The Process of Annual Progress Assessment

The third NCCAP undergoes interim and comprehensive evaluations. The interim evaluation, conducted in the third year of the Plan, examines the intermediate outcomes of the adaptation measures and reflects the results in future implementation. The comprehensive evaluation, conducted in the fifth year of the Plan, assesses the overall outcomes of the adaptation measures and incorporates the results into the formulation of the next NCCAP.

Public Review Panel for the Third NCCAP

The Public Review Panel, established and operated by the ME in collaboration with KEI KACCC, is a crucial initiative in climate change adaptation. Each year, a group of 50-panel members is recruited and provided with education on climate change adaptation aiming to be engaged in assessing 49 public-oriented projects. The key benefits of this initiative are that it enhances public understanding of adaptation policies and provides opportunities for public participation in the adaptation monitoring process, promoting transparency and accountability in decision-making in the long term.

Public Review Panel for the Year 2022

Sub-National Adaptation Plans

In compliance with the Framework Act, it is mandated that each sub-national government develop and implement a sub-national climate change adaptation plan tailored to its respective region in response to the impact of climate change.

At present, the Third Regional Climate Change Adaptation Plan (2022-2026) is being implemented by 17 metropolitan cities and provinces since the establishment of the First

Regional Climate Change Adaptation Plan (2012-2016) in 2012. To monitor and assess the progress, each metropolitan city and provincial government conducts an annual self-assessment on the progress of implementation throughout the previous year. This report is submitted to the ME by April of the following year. The ME reviews and compiles the results and submits them to the Commission for further review. The results are then incorporated into the action plans of the metropolitan city and provincial governments for the following year.

The 226 city/county/district local governments are developing and implementing the Second Local Climate Change Adaptation Plan (2018-2026). Since 2015, it has been mandatory for local governments to establish a climate change adaptation plan. Local governments have established and implemented adaptation plans according to their local conditions since founding the First Local Climate Change Adaptation Plan. Since 2018, the implementation of Local Climate Change Adaptation Plans has been monitored and assessed on an annual basis.

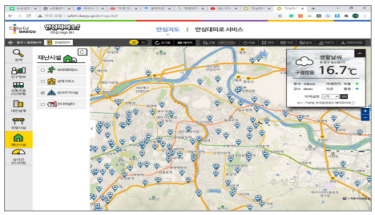
The subsequent cases are notable projects executed by the sub-national governments in 2021. These projects were recognized as exemplary practices based on the 2021 annual progress assessment.

Cooling Daegu: A Comprehensive Plan to Mitigate Heat Wave Damages

Daegu Metropolitan City, one of the hottest cities in the ROK, has implemented a comprehensive medium- to long-term plan (2020-2024) aimed at mitigating the impacts of climate change by responding to heatwaves and the urban heat island effect.

As an implementation of this plan, the city has launched "Ansim Hai So," a disaster management platform application, and installed heatwave response facilities, including cooling fog at bus stops and cooling and heating facilities at transit stations. Moreover, the city has encouraged citizen-led initiatives, such as the utilization of sunshades, to increase awareness and promote community involvement in mitigating the adverse effects of climate change. Figure 10 showcases the practical initiatives implemented to minimize the damage caused by heat waves in Daegu Metropolitan City.

Figure 10. Various Approaches by Daegu to Mitigate Heat Wave Damage



Screenshot of Ansim Hai So

Cooling Fog Facilities

Free Rental Sunshades

Climate-Smart Agriculture in Action: Chungcheongbuk-do's Pepper Farming Pilot Project

The Chungcheongbuk-do provincial government has designed an innovative open-field pepper farming technology package that is tailored to respond to different abnormal climate factors, including drought and frost, by providing detailed weather information. The technology was successfully implemented as a pilot project across 5.74 hectares of land on 25 farms. To promote its wider adoption, the government has disseminated climate change response technologies such as simple shading, automatic irrigation systems, and soil moisture tension sensors, and provided on-site technical support to the farmers. As a result, pepper production in the region saw a significant rise of 20%. Figure 11 displays the field cases of the pilot project undertaken by Chungcheongbuk-do.

Figure 11. Chungcheongbuk-do's Pepper Farming Pilot Project

Simple Shading Facility

Automatic Irrigation System

On-site Technical Instruction

International Cooperation on Adaptation

The ROK actively shares its experience in national adaptation plan formulation and implementation with the international community. Until 2019, with the international organizations, the ROK provided international training programs on national adaptation planning for policymakers in developing countries through the National Adaptation Plan-Global Support Programme (NAP-GSP). Since 2021, in collaboration with the UNFCCC secretariat and other international organizations and institutes, the ROK has established the 'Climate Action and Support Transparency Training (CASTT) -Adaptation Academy' to hold an annual international training program aimed at strengthening the reporting capacity of developing countries on climate change adaptation.

The ROK has actively supported international efforts to address climate change by contributing to the Green Climate Fund (GCF) as a host country, and the Global Green Growth Institute (GGGI). In 2022, the ROK established the Green New Deal Trust Fund in GGGI and pledged to contribute KRW 6 billion (equivalent to approximately USD 4.6 million US dollars) annually for five years to expand support for climate change responses, including adaptation, as well as for related sectors such as water management, sanitation, and agriculture.

Furthermore, a new commitment to the Adaptation Fund was announced by the ROK, increasing its pledge to KRW 3.6 billion (equivalent to approximately USD 3.1 million US dollars) from 2023 to 2025 at the high-level dialogue on climate finance for adaptation at the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change.

In recent years, the ROK has substantially increased its Official Development Assistance (ODA) for climate and environmental initiatives, with a significant focus on adaptation to climate change. The ROK government unveiled its “Green ODA Promotion Strategy” in 2021, which aims to increase the proportion of climate and environmental ODA above the average of the OECD Development Assistance Committee (DAC) by 2025.

The ROK reaffirms its unwavering commitment to collaborating with the international community in achieving the Global Goal on Adaptation, and stands ready to continue sharing its knowledge, experience, and resources on adaptation with interested Parties and communities.

❶ Chameleon by Junho, Won

Won uses a chameleon as a metaphor for human adaptability in the face of climate change and other challenges. The image portrays the ability of humans to adjust and thrive in changing environments, much like the chameleon changes its color to blend in with its surroundings.

❷ Float Tube Car by Jeongwoo, Choi

Choi depicts a float tube car that can travel in heavy rain, allowing for fishing in all weather conditions. The painting suggests that, with the help of technology, the effects of climate change can be reframed from a source of fear and disaster to an opportunity for joy and unexpected pleasure.

❸ Valuable Rainwater by Soobin, Seok

Seok offers a vision for addressing drought and water scarcity resulting from climate change through the development of rainwater storage and utilization technology. The painting depicts a sequence of rainwater storage, water purification, and additional storage systems, illustrating a potential solution for managing water resources in a sustainable and resilient manner.

❹ Innovative Technology for Responding to Heavy Rainfall by Jungan, Lee

Lee portrays an innovative use of recycled plastic to create air capsules that can protect drivers and vehicles during heavy rainfall. The artwork emphasizes the potential of eco-friendly technology to address the challenges posed by climate change, and highlights the importance of sustainable materials in achieving this goal.

❺ Tropical Fruits Grown in the Republic of Korea by Jiwon, Choi

Choi highlights the potential of global warming to create new opportunities for agricultural growth in the Republic of Korea. The artwork suggests that warmer temperatures may enable the cultivation of crops that were previously imported, such as tropical fruits.

❻ Cooling Planet by Minwoo, Kim

Kim introduces several measures for mitigating urban heat. The artwork suggests using cooling paint on rooftops, planting trees along streets, installing shades and spraying coolers on sidewalks to create a more pleasant and sustainable urban environment.

❼ Worsening climate change amidst the indifference of the public by Hara, Kim

Kim expresses concern that the urgency of responding to climate change may be overlooked amidst the distractions and busyness of daily life. Through the artwork, Kim urges viewers to recognize the gravity of climate change and to take action to address it.

❽ White Paper on Adaptation by Jonggil, Hwang

Hwang depicts a range of efforts and measures to adapt to the challenges of climate change in urban environments. These include cool roofs, shelters for cold snap, flood warning system using AI and electronic vehicles.

❾ Turning Challenges into Opportunities by Yejin, Kim

Kim's painting explores the opportunities that can arise from the challenges of climate change, such as the development of new technologies and innovative approaches to crop cultivation and warning systems.

❿ From the Past to the Future by Minkyu, Park

Park emphasizes the gravity of climate change and its devastating impact on the natural environment by juxtaposing two contrasting images: one portrays a bright and vibrant scene of blue skies, green grass, and trees, while the other depicts a gloomy picture of a gray sky filled with clouds and black smoke.

⓫ Let's Adapt to Climate Change by Heerim, Seo

Seo's painting portrays the actions that individuals can take in their daily lives to combat climate change, such as using public transportation, conserving electricity, and sharing information to prepare for heat waves.

⓬ You & Me, Our Glaciers by Taewoo, Kim

Kim's painting highlights the connection between the melting glaciers at the North Pole and the impact on the city through a decalcomania composition. The artwork portrays a polar bear sitting on melting ice due to global warming, and a person struggling to endure heavy rain.

⓭ Four Seasons under Climate Change by Hayan, Kim

Kim depicts the impact of climate change on the four seasons, showing how spring and autumn have become relatively shorter, while summer and winter have become more extended. The artwork also proposes practical measures for adapting to climate change, such as installing shades on pavements, using solar panels on rooftops, and recycling plastic.

⓮ A Whole New World by Jeongseo, Kim

Kim's artwork portrays the social changes that have been brought by climate change. The painting features various sustainable energy sources, including solar panels, hydropower, and wind power, which have facilitated electricity generation. Additionally, the artist highlights the growing use of electric vehicles and charging stations, as well as the cultivation of tropical fruits.

⓯ Floating City by Kangyul, Lee

Lee's painting portrays efforts to adapt to climate change by constructing a floating city using recycled materials, preparing for the anticipated rise in sea levels. Additionally, the image of coastal garbage being removed highlights the responsibility of human beings to take care of nature and preserve it for future generations.

⓰ Eco-Friendly Paper Made of Sugarcane by Junhyeok, Choi

Choi's artwork proposes a sustainable approach to use resources by showcasing the production of eco-friendly paper made from sugarcane as a viable alternative to traditional paper made from softwood trees.

⓱ Missing the Old Days by Hayun, Jung

Jung's artwork evokes a profound sentiment of loss for the disappearing habitats of humans and animal or plant species. The artist's use of an old, faded photograph expresses a sense of nostalgic reminiscence, effectively capturing a deep sense of sadness and sorrow.

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