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# Research on Monitoring and Evaluation System for Climate Change Adaption Policy in Korea

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# Foreword

Korea has been promoting climate change adaptation policies since 2011 to prevent and reduce damages caused by climate change and build a climate-resilient society. Adaptation policies are being implemented through the five-year cycle "National Climate Change Adaptation Plan" and "Detailed Implementation Plan for National Climate Change Adaptation Plan" at national and local government levels. In order to enhance policy effectiveness in the implementation of adaptation policies, 'Monitoring and Evaluation' (M&E) efforts are being carried out, and evaluation results are reflected through detailed implementation plans. This 'Monitoring and Evaluation' system is comprehensive and benefits from several years of practice, but it also has limitations in evaluating the performance of its plans. The OECD notes that Korea systematically implements climate change adaptation policies, and based on a survey on the operation of climate change adaptation policies in OECD member countries, it has recognized that most of its member countries have difficulties in evaluating performance of the implementation of adaptation plans. The OECD proposed to conduct joint research to share Korea's climate change adaptation policy implementation experience over the past ten years with the international community and to improve the evaluation system of adaptation policy implementation in Korea. In accordance with the proposal of the OECD, KEI conducted this research to improve the 'Monitoring and Evaluation' system of Korea's climate change adaptation policy and to share Korea's experience on implementing climate change adaptation with the international community. Through this research, it is hoped that institutional improvement measures for areas where Korea's adaptation system is lacking will be developed and that the excellence of Korea's adaptation policy will be known to the international community.

Lee, Chang Hoon,

President,

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# Executive Summary

## 1. Introduction

ㅇ The goal of this study is to review the evaluation system and experience in Korea. It presents an overview of the establishment and implementation of climate change adaptation policies (Chapter 2), the institutional status for monitoring and evaluation of adaptation policies (Chapter 3), and the use of indicators used for evaluating climate change implementation by the national and local governments (Chapter 4). It concludes with policy suggestions (Chapter 5) on the direction for the improvement of measuring progress for Korea's climate change adaptation policy.

## 2. Adaptation Policy Context

❑ Roles and responsibilities

ㅇ The Ministry of Environment (MoE) in ROK is the ministry in charge of the country's climate change adaptation policy. It is responsible for decision-making and public affairs regarding the overall climate change adaptation policy covered by the Framework Act.

ㅇ 17 metropolitan/provincial governments (metropolitan cities/provinces) and 226 basic local governments (si/gun/gu) establish and implement Local Adaptation Plans (LAPs) for a five-year plan period in accordance with the Framework Act. In addition to this, they must implement a “local climate change response project” to prevent the adverse effects of climate change.

❑ Adaptation policies in Korea

ㅇ With the enactment of the 『Framework Act on Carbon Neutrality and Green Growth For Coping With Climate Crisis』 (Act No. 18469, Framework Act), the establishment of National Adaptation Strategy (NAS), National Adaptation Plan (NAP), and LAP and progress check were made legally mandatory. In addition,

the legal basis for the implementation of local climate change adaptation projects, establishment of adaptation plans for public organizations, and the designation and evaluation of a national center for climate change adaptation were prepared.

- ㅇ According to the enforcement of the Framework Act, the establishment of a new NAS (2022-2041) is in progress and will be completed and published before March 2023. Based on ongoing discussion, the concept of building a foundation to protect the vulnerable during the climate crisis will be greatly strengthened in the newly established NAS. Specific adaptation measures for the economically vulnerable, the elderly living alone, outdoor workers, children, services and consultations for the vulnerable, and a project to create a healthy village are being discussed.

❑ Basis for adaptation plan

- ㅇ The ROK government prepares and provides the detailed climate change scenarios in South Korea up to 2100 with a 1 km horizontal resolution that can be used for climate change adaptation planning and risk assessment. The global climate change scenario (approximately 135 km horizontal resolution) of Coupled Model Intercomparison Project (CMIP) used in Intergovernmental Panel on Climate Change (IPCC) is detailed as a regional climate change scenario of 12.5-25 km in East Asia through CORDEX-EA, and is processed into 1 km grid climate data through a statistical detailing technique. Detailed South Korean climate change scenarios are provided for both RCPs and SSPs climate change scenarios, and the data is open to the public through the Korea Meteorological Administration's climate information portal (http://www.climate.go.kr/).

## 3. Measuring Progress in Implementing Adaptation Policies

❑ Evaluation for NAP

- ㅇ Implementation evaluations are conducted every year, and the results are used to prepare an action plan for the following year. The evaluation is conducted based on indicators and consists of self-evaluation by organizations implementing detailed adaptation plans, expert evaluation, public evaluation, and group evaluation.

❑ Evaluation for LAP

- Implementation evaluation of the detailed implementation plan of local governments is carried out in the stages of “establishment of self-evaluation plan”, “interim inspection”, “self-evaluation,” and “feedback of evaluation results”. Implementation evaluation includes procedures such as interim inspection of progress status, conducting self-evaluations and writing evaluation results, holding evaluation report meetings, and submitting evaluation results together with an implementation plan for the next year.

## 4. Adaptation Indicators for Measuring Progress in Implementation

❑ Indicators for the establishment of the National Climate Change Adaptation Plan

- The most recent national climate change adaptation plan was established jointly by 17 relevant ministries and consists of six sub-sections of three major policies. The plan was established as a core strategy to enhance climate resilience, protect the vulnerable, revitalize citizen participation, and respond to the new climate regime. In the 3rd national climate change adaptation plan, key indicators of the adaptation plan were set to check and evaluate the plan implementation process. 20 policy indicators and 16 indicators of public perception were set for each sector, and the performance of measures is checked through systematic implementation monitoring every year.

❑ Indicators for evaluating the National Climate Change Adaptation Plan

- Significant improvements in the evaluation system for the 3rd adaptation plan's detailed implementation can be confirmed through the composition of evaluation items. In evaluating the detailed implementation plan's application for the second adaptation plan, the evaluation results were derived only by examining whether the budget had been expended and the target performance had been achieved for each project. However, in the evaluation of the implementation of the 3rd adaptation plan, an evaluation system was prepared to evaluate the details of each stage of the project implementation in the order of project preparation, implementation, and performance.

## 5. Conclusions and the Way Forward

- Through strong institutional coordination, Korea ensures that all relevant actors are involved in the design, implementation, and review of adaptation policies.
- The risk list and the Korea Climate Change Assessment Report have been continuously updated and advanced based on up-to-date scientific data.
- To assess whether implemented adaptation actions have contributed to reducing climate risk, it is critical to use the identified risks as a baseline against which adaptation progress can be measured. However, it remains unclear how these serve as a basis for establishing objectives and targets, and to review progress.
- While Korea has developed a good understanding of whether actions have been implemented, it is also critical to know how changes have been brought about. There remain gaps in understanding about which elements drove improvement in some situations.
- Developing a robust and comprehensive list of indicators can help monitor and review progress towards adaptation objectives.
- It is important as the new climate risk assessment is being prepared to ensure that the review of progress is linked to it in order to provide a clear understanding of the adaptation gap.

Keywords: Climate Change Adaptation Policies, Evaluation System, NAP, and LAP

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# Abbreviations and Acronyms

| | |
|---|---|
| AR5 | Intergovernmental Panel on Climate Change 5th Assessment Report |
| CMIP | Coupled Model Intercomparison Project |
| CORDEX | Coordinated Regional Climate Downscaling Experiment |
| IPCC | Intergovernmental Panel on Climate Change |
| KACCC | Korea Adaptation Center for Climate Change |
| KCCAR | Korea Climate Change Assessment Report |
| KEI | Korea Environment Institute |
| LAPs | Local Adaptation Plans |
| MoE | Ministry of Environment |
| NAP | National Climate Change Adaptation Plan |
| NAP | National Adaptation Plan |
| NAS | National Adaptation Strategy |
| OECD | Organisation for Economic Co-operation and Development |
| RCP | Representative Concentration Pathway |
| ROK | Republic of Korea |
| SSP | Shared Socio-economic Pathway |

# 1 Introduction

The Republic of Korea (ROK) is an East Asian country with a total population of about 51.8 million and a nominal GDP per capita of USD 34,994. 90% of the total population is located in densely populated cities, which account for about 17% of the total land area. The country, of which about 70% of the total topography is mountainous, is surrounded by the sea on three sides.

Climate change is already causing continuous adverse effects through slow-onset processes (e.g. change in season length and sea temperature rise) and extreme climatic events (e.g. heatwaves, floods, droughts, and cold waves). The average annual temperature for the past 30 years (1991-2020) has been approximately 13.7℃, the annual accumulated precipitation is approximately 1,315.5mm, and the four seasons are distinct. In summer, it is warm and humid, including the rainy season, and in winter, the climate is cold and dry due to the influence of the northwest monsoon.

Korea has been developing and implementing climate change adaptation policies for more than a decade, building on the 2010 Framework Act on Low Carbon, Green Growth (Act No. 9931) and the revised 2021 Framework Act on Carbon Neutrality and Green Growth for Coping with Climate Crisis (Act No. 18469). The Framework Act also provides the legal basis for monitoring and reviewing the progress in implementing adaptation policies. This process contributes to sharing the experiences of various implementing actors in charge of adaptation policies, and informing decision-making. The review of adaptation efforts through measuring progress can improve the management of adaptation policies, enhance the soundness and transparency of resource input for adaptation, and strengthen policy implementation and effectiveness.

This case study reviews the evaluation system and experience in Korea. It presents an overview of the establishment and implementation of climate change adaptation policies (Chapter 2), the institutional status for monitoring and evaluation of

adaptation policies (Chapter 3), and the use of indicators used for evaluating climate change implementation by the national and local governments (Chapter 4). It concludes with policy suggestions (Chapter 5) on the direction for the improvement of measuring progress for Korea's climate change adaptation policy.

# 2 Adaptation Policy Context

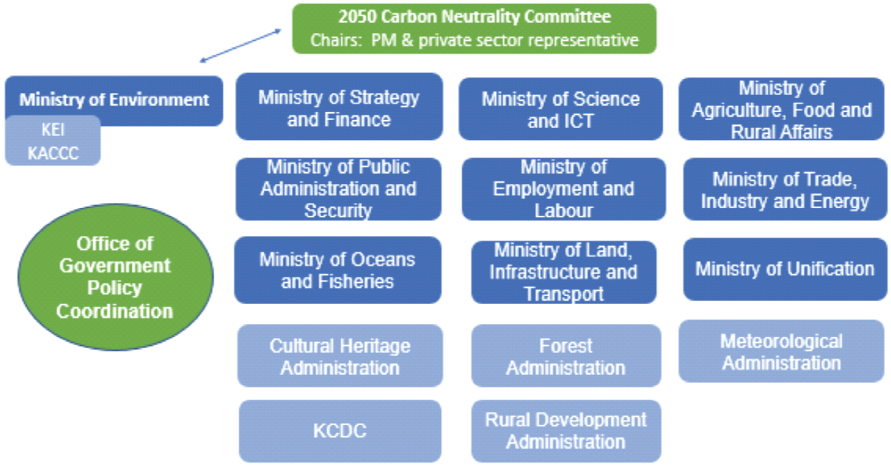
## 2.1 Roles and responsibilities

### 2.1.1 Main actors for adaptation policies

The 2010 Framework Act institutionalized the roles and responsibilities of different Ministries and agencies for the design, implementation, and monitoring and evaluation of adaptation policies in Korea. The Ministry of Environment (MoE) is the ministry responsible for decision-making and public affairs. It is supported by analysis from the Korea Adaptation Center for Climate Change (KACCC) of the Korea Environmental Institute (KEI) and the National Institute of Environmental Research (NIER) for the monitoring of climate impacts. The MoE is in charge of developing the National Adaptation Strategy (NAS) for a 20-year planning period and National Adaptation Plans (NAPs) for a five-year planning period. The MoE operates an adaptation consultative body that involves all central administrative agencies participating in the establishment of adaptation plans participate, and carries out major decisions related to the NAS (National Adaptation Strategy) and NAP (National Adaptation Plan).

The 'Presidential Commission on Carbon Neutrality and Green Growth', an inter-ministerial body set up by the 2010 Framework Act as part of the Presidential office, plays a deliberation and decision-making role for establishing climate policies and inspecting their implementation status. The core part of its activities covers mitigation, but it is also in charge of adaptation policies. The committee, comprising between 50 to 100 members, is chaired by the Prime Minister and private experts appointed by the President. The committee takes adaptation-related decisions in close consultation with the MoE.

Figure 1. National institutional framework for climate change adaptation in Korea




Note: 1) Main bodies in charge of adaptation policy design and implementation.
2) Green: coordinating and decision-making bodies, Dark blue: Ministries, Light blue: agencies.
Source: Authors.

Most of the central administrative agencies develop their own sectoral adaptation plans (SAP) and a total of 15 central ministries (Figure 1) contribute to implementing specific adaptation projects through participation in detailed implementation plans. The Office for Government Policy Coordination and the Ministry of Economy and Finance carry out tasks related to financial operation for consultation between ministries and the implementation of adaptation measures.

Adaptation policies are also developed and implemented at a local level, in accordance with the Framework Act. To date, there are 17 metropolitan/provincial governments (metropolitan cities/provinces) and 226 basic local governments (si/gun/gu) that establish and implement five-year LAPs (Local Adaptation Plan). They must also carry out a "local climate change response project" to prevent adverse effects from climate change.

As of 2022, public organizations[1)] that operate and manage major social infrastructure must establish and implement climate change adaptation plans every five years and

1) Such as K-water, highways, and electricity.

review implementation results every year. A growing number of public organizations (28 in 2018, 34 in 2020, and 39 in 2021) had already voluntarily established adaptation plans (out of 250 public organizations). The government provides support for building capacity (e.g. guidelines for setting up adaptation measures, development of scientific risk assessment tools, and integration of adaptation information and services) to accompany the establishment of adaptation plans by public organizations.

Although there are no legal requirements for establishing an adaptation plan in the private sector, interest in climate change adaptation is increasing due to climate risk management (e.g. Task Force on Climate-Related Financial Disclosures) and mandatory disclosure of ESG including climate risk (scheduled from 2030). In the industrial sector, the 'Industry Adaptation Partnership' was launched with associations representing each industry (materials, capital goods, professional services, transportation, automobiles, consumer goods and clothing, consumer services, financial insurance, IT equipment and services, and food and tobacco) to prepare adaptation manuals for each industry, assess climate change impacts, and develop adaptation technologies.

### 2.1.2 National and local centers for adaptation policies

The Framework Act has enabled the establishment of the Korea Adaptation Center for Climate Change (KACCC)[2] under the MoE to support policy development and implementation since 2009. The KACCC, comprising about 30 experts, is currently appointed by the Korea Environment Institute (KEI) and the National Institute of Environment Research (NIER). The major policy research fields of KACCC at KEI are related to the establishment and implementation of climate change adaptation plans for state and local governments, public institutions, and private companies. In addition, it develops climate change risk assessment tools (MOTIVE, VESTAP, and CRAS), supports domestic cooperation and education, raises awareness for mainstreaming adaptation, participates in IPCC WG2 and UNFCCC climate change adaptation negotiations, and strengthens overseas networks through educational programmes for developing countries.

Each metropolitan city/province may have regional research institutes in accordance with the Act on the Establishment and Operation of Local Government-funded Research Institutes. These regional research institutes conduct research and reviews,

2) https://kaccc.kei.re.kr/, Accessed 31 December 2022.

and advise on matters related to the establishment and implementation of local climate change adaptation plans.

## 2.2 Adaptation policies in Korea

### 2.2.1 Legal framework

The 2010 Framework Act on Low Carbon, Green Growth (Act No. 9931) provides the legal basis for climate change adaptation policies in Korea. It mandates the establishment and implementation of a climate change adaptation plan (Article 48). It was revised in 2021 as part of the Framework Act on Carbon Neutrality and Green Growth For Coping With Climate Crisis (Act No. 18469). This new law, which also covers both mitigation and adaptation, encompasses the 2050 carbon neutrality goal and mid-term goals, and outlines policy measures in the context of a just transition to protect vulnerable people. Key articles of the laws are presented in Table 1.

Table 1. Legal basis for adaptation in Korea

| | Climate change adaptation provisions |
|---|---|
| 2010 Framework Act on Low Carbon, Green Growth (Act No. 9931) | Article 48 (Assessment of Impacts of Climate Change and Implementation of Measures for Adaptation)<br>(1) The Government shall improve the ability to observe, forecast, provide information on, and utilize weather phenomena and analyze and assess potentials continuously to secure new and renewable energy sources, such as solar power, wind power, and tidal power, for each area and for each region to establish and operate a meteorological information management system for such purposes.<br>(2) The Government shall implement policy measures for survey and research, the development of technology, the support for related specialized institutions, and the establishment of domestic and overseas cooperative systems to improve the accuracy of monitoring and forecast of climate change and to research and analyze the status of changes in biomass and water resources, as well as the impacts of climate change, such as impacts on citizens' health.<br>(3) The Government shall, in consultation with the head of a relevant administrative agency, research and assess impacts of climate change |

Table 1. (continued)

| | Climate change adaptation provisions |
|---|---|
| 2010 Framework Act on Low Carbon, Green Growth (Act No. 9931) | on the ecosystem, biodiversity, atmosphere, water resources, water quality, public health, agricultural produce, fishery products, foodstuffs, forests, oceans, industries, and the prevention of disasters and weakness therein and shall announce results therefrom to the public.<br>(4) The Government shall exert itself preferentially for preventive management to reduce damage that may be caused by climate change and shall establish and implement measures for adaptation to mitigate the impacts of climate change or for cope with health problems and natural disasters, as prescribed by Presidential Decree.<br>(5) The Government may provide citizens and business entities, who conduct activities in compliance with measures for adaptation, with technical and financial support as may be necessary. |
| 2021 Framework Act on Carbon Neutrality and Green Growth For Coping With Climate Crisis | Article 37 (Monitoring and Prediction of Climate Crisis)<br>Article 38 (Formulation and Implementation of National Climate Crisis Adaptation Measures)<br>Article 39 (Inspection of Implementation Progress of Climate Crisis Adaptation Measures)<br>Article 40 (Formulation and Implementation of Regional Adaptation Measures for Climate Crisis)<br>Article 41 (Public Institutions' Adaptation Measures for Climate Crisis)<br>Article 42 (Implementation of Regional Climate Crisis Response Projects)<br>Article 43 (Water Management for Coping with Climate Crisis)<br>Article 44 (Management of Green Homeland)<br>Article 45 (Promotion of Conversion of Agriculture, Forestry, and Fisheries)<br>Article 46 (Designation and Evaluation of Korea Adaptation Center for Climate Change) |

Note: Relevant articles related to adaptation.
Sources: KLT, "Framework Act on Carbon Neutrality and Green Growth For Coping With Climate Crisis" (Act No. 18469, Framework Act), "Framework Act on Low Carbon, Green Growth" (Act No. 9931), Accessed 31 December 2022.

The Framework Act requires the establishment of regular NAS, NAP, and LAP and progress assessments of their implementation. It also provides the legal basis for the implementation of local climate change adaptation projects, the establishment of adaptation plans for public organizations, and the designation and evaluation of a national center for climate change adaptation.

### 2.2.2 National adaptation strategy and plans

Korea's adaptation policy cycle is structured around the development of a long-term strategy, NAS for a 20-year planning period and NAPs for a five-year planning period. The NAS is informed by regular climate change assessment reports (Figure 2).

Korea is currently developing its new NAS for 2022-2041. It builds on the first and second ones, adopted respectively in 2016 and 2019[3] that set out a vision for adaptation as well as key areas for action. While the long-term vision related to the first NAS was focused on keeping the society safe in a changing climate, the second NAS was more specific than the first, as it included a temperature goal of 'preparing for 2℃ warming by mainstreaming climate change adaptation.' It outlined a set of actions to enhance adaptation in the five major sectors, strengthening climate change monitoring and forecasting, as well as adaptation evaluation, and mainstream climate change adaptation across all sectors and actors.

The new NAS (2022-2041) will be published by March 2023 and will have a focus on protecting the vulnerable population in the climate crisis. Specific adaptation measures for the economically vulnerable, the elderly living alone, outdoor workers, and children, services and consultations for the vulnerable, and a project to create a healthy village are being discussed.

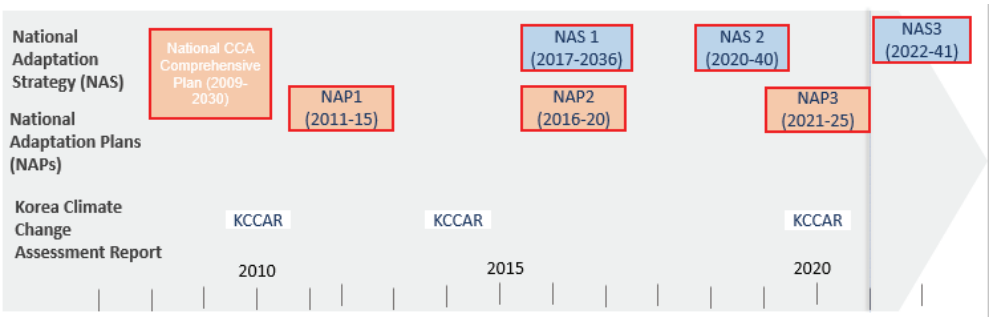
In addition to the NAS, Korea has developed a series of NAPs:

- The 'Comprehensive National Climate Change Adaptation Plan (2009-2030)' was adopted in 2008. The plan consisted of 29 measures and 57 detailed projects across 11 sectors (ecosystem, water management, health, disaster, adaptive industry/energy, infrastructure, etc.). It focused on the short-term (~2012) goal of 'enhancing comprehensive and systematic climate change adaptation capacity' and the long-term (~2030) goal of 'reducing climate change risks and realizing opportunities.'
- The '1st National Climate Change Adaptation Plan (2011-2015)' was adopted in 2010. It prioritizes tasks being promoted by participating ministries, taking current adaptation issues by sector into consideration.

3) Korea Ministry concerned (2016), 1st NAS (2017-2036), the 1st Basic Plan for Climate Change Response (2017-2036); Korea Ministries concerned (2019), 2nd NAS (2020-2040), the 2nd Basic Plan for Climate Change Response (2020-2040).

- The '2nd National Climate Change Adaptation Plan (2016-2020)' was adopted in 2015. It was established with the initiative of ministries and experts participating based on a survey about climate change risk assessment.
- The '3rd National Climate Change Adaptation Plan (2021-2025)' was adopted in 2020. It was established in the form of participation by all adaptation actors including youth and civil society through expanded governance. The plan was established based on the scientific information-based national climate change risk list (84 risk items in six categories) and the '2020 Korea Climate Change Assessment Report (KCCAR)' was jointly published by the Ministry of Environment and the Korea Meteorological Administration (Lee et al., 2022).

Figure 2. Key policy documents for adaptation




Source: Authors.

### 2.2.3 Adaptation plans of local and public institutions

In accordance with the Framework Act, all local governments across the country are establishing and implementing five-year LAPs. In 2021, regional governments across the country established the 3rd LAP based on NAS and the 3rd NAP, and beginning in 2022, the 3rd LAP of the basic local governments is currently being established. The LAP of each local government is being established based on the LAP establishment guidelines developed by the MoE and the support of a risk assessment tool that has been provided and continuously developed by the MoE. LAP establishment is completed through the review and approval of the MoE and KACCC, and detailed projects included in LAP are managed through the web-based LAP implementation check system (http://lap.kei.re.kr) developed in 2020.

For the past ten years, the MoE has supported the establishment of adaptation plans for public institutions and has continued basic research. In accordance with the Framework Act, the establishment of adaptation plans for public institutions was made compulsory, and in April 2022, the MoE enacted the 'Notification of Organizations Subject to Establishment of Public Institutions Climate Crisis Adaptation Measures.' According to the same notice, 62 institutions that manage major infrastructure were selected as target institutions for establishing adaptation measures. Guidelines for establishing a climate crisis adaptation plan containing the principles and main content were prepared (June. 2022), and training on the establishment of an adaptation plan was provided for those in charge of setting up the plan (February, 2022).

## 2.3 Basis for adaptation plan

### 2.3.1 Climate change risk assessment

The 'Korea Climate Change Assessment Report,' carried out by the MoE and the Korea Meteorological Administration, provides on a regular basis the scientific basis for establishing an adaptation plan (2010, 2014, and 2020). Divided into 'Climate Change Scientific Evidence' (Working Group 1) and 'Climate Change Impact and Adaptation' (Working Group 2), the latest report was authored by 120 experts who analyzed research results of a total of 1,900 domestic/foreign papers and various national reports, and compiled research trends and prospects for climate change

in Korea. Based on expert opinions, the reliability of findings was then categorized into three levels: firm agreement, intermediate agreement, or limited agreement.

Korea is building a national list of climate change risks that informs adaptation plans. In 2015, a total of 87 risk lists in seven major categories were identified from expert opinions and used for the 2nd NAP. In 2019, the national climate change risks list was updated to include a total of 93 risks in seven major sectors through the creation of a causal relationship map, analysis of articles, and matrix analysis through expert forums. (Song and Lee, 2022). The list informed the 3rd NAP.

### 2.3.2 Tool and model for climate risk assessment

The Korean government prepares and provides detailed climate change scenarios for Korea up until 2100, with 1 km horizontal resolution that can be used for climate change adaptation planning and risk assessment. The global climate change scenario (approximately 135 km horizontal resolution) of CMIP used in IPCC is detailed as a regional climate change scenario of 12.5-25 km in East Asia through CORDEX-EA, and is processed into 1 km grid climate data through a statistical detailing technique. Detailed Korean climate change scenarios are provided for both RCPs and SSPs climate change scenarios, and the data are open to the public through the Korea Meteorological Administration's climate information portal.[4)]

The MoE is developing and operating VESTAP,[5)] an indicator-based rapid risk assessment tool, to support LAP establishment. VESTAP has an index database to evaluate hazard, exposure, and vulnerability, and by setting weights based on expert AHP, it derives risk priority information to be evaluated by local government. Currently, assessment results for a total of 57 risks out of the national climate change risk list are provided. The MoE and KACCC are continuously conducting research to expand the risks subject to assessment and improve indicators and weights.

The MoE developed the MOTIVE system,[6)] which consists of models that quantitatively predict future climate change impacts by various sectors through R&D. The MOTIVE System consists of seven models including health, water

4) http://www.climate.go.kr/, Accessed 31 December 2022.
5) http://vestap.kei.re.kr/, Accessed 31 December 2022.
6) http://motive.kei.re.kr/, Accessed 31 December 2022.

management, agriculture, forestry, ecology, marine, and fishery sectors. In addition, an integrated assessment module based on inter-sectoral linkage scenarios, an economic evaluation model based on impact prediction results, and a future spatial planning model are included. The MOTIVE system provides a web GIS-based display system that allows decision makers and stakeholders participating in adaptation policies to easily view and use models results.

# 3 Measuring Progress in Implementing Adaptation Policies

## 3.1 Framework for adaptation measurement

### 3.1.1 *Framework Act(2021)*

The Framework Act(2021), namely article 39, provides the legal basis for the evaluation of the implementation of adaptation policies by each implementing entity (Table 2). It requires the implementation status of the adaptation plan to be monitored annually and the development of a result report which demonstrates implementation performance, best practices and areas for improvement, and is disclosed after deliberation by the committee.

The Framework Act(2021) also stipulates the implementation evaluation of local governments and public institutions. Through Article 40, the head of each local government inspects the progress of the adaptation plan every year, prepares a report on the result, and submits it to the Minister of Environment after deliberation by the local committee. After that, the Minister of Environment is required to synthesize the information contained in all 17 local reports and report it to the Presidential Commission on Carbon Neutrality and Green Growth. Article 41 stipulates that public institutions must annually prepare performance results and submit the results to the Minister of Environment, the heads of related central administrative agencies, and the heads of the competent local governments.

At the time of the establishment of the 1st and 2nd NAPs, the Framework Act on Low Carbon, Green Growth did not require compulsory evaluation of the implementation of adaptation plans. However, only the authority to check the performance of the plan and to request related data was specified by the Ministry of Environment. In addition, specific procedures and methods for performance evaluation were prepared (see following sections).

Table 2. Framework Act(2021) for adaptation measurement

| Area | Statutory text |
|---|---|
| NAP | Article 39 (Inspection of Implementation Progress of Climate Crisis Adaptation Measures)<br>(1) The Government shall annually inspect the implementation progress of climate crisis adaptation measures and detailed action plans for climate crisis adaptation measures each year, and shall prepare a report on the inspection results and disclose it after deliberation by the Committee.<br>(2) A report on the results under paragraph (1) shall include sectoral major adaptation measures and their performance records, major excellent cases on adaptation measures, and matters having poor performance and requiring improvement found in the inspection results under paragraph (1).<br>(3) If deemed necessary for preparing a report on the results under paragraph (1), the Government may request the head of the relevant central administrative agency to submit related information or data, and the head of the relevant central administrative agency shall comply with such request, unless there is a compelling reason not to do so.<br>(4) Where any matters have poor performance or require improvement under paragraph (2), the head of the relevant central administrative agency shall reflect such details in policies, etc. of the relevant agency<br>(5) Matters necessary for the methods, procedures, etc. for inspection under paragraph (1) shall be prescribed by Presidential Decree. |
| LAP | Article 40 (Formulation and Implementation of Regional Adaptation Measures for Climate Crisis)<br>(1) A Mayor/Do Governor and the head of a Si/Gun/Gu shall formulate and implement measures to adapt to climate crisis in districts under their respective jurisdictions (hereinafter referred to as “regional adaptation measures for climate crisis”) every five years, in consideration of the climate crisis adaptation measures, regional characteristics, etc.<br>(2) In order to formulate or modify regional adaptation measures for climate crisis, a Mayor/Do Governor and the head of a Si/Gun/Gu shall submit them to the Local Committee for deliberation: Provided that the deliberation may be omitted where minor matters prescribed by Presidential Decree are modified.<br>(3) Where regional adaptation measures for climate crisis are formulated or modified, a Mayors/Do shall submit them to the Minister of Environment, the head of a Si/Gun/Gu shall submit them to the Minister of Environment and the competent Mayors/Do Governors, respectively, and the Minister of Environment shall compile the submitted regional adaptation measures for climate crisis and report it to the Committee. |

Table 2. (continued)

| Area | Statutory text |
|---|---|
| LAP | (4) A Mayor/Do Governor and the head of a Si/Gun/Gu shall inspect the implementation progress of regional adaptation measures for climate crisis, prepare a report on the inspection results, and submit it for deliberation by the Local Committee; and the Mayor/Do governor shall submit it to the Minister of Environment, the head of a Si/Gun/Gu shall submit it to the Minister of Environment and the Mayor/Do Governor, respectively, and the Minister of Environment shall report a compilation of them to the Committee.<br>(5) Matters necessary for the formulation, implementation, modification, inspection, etc. of regional adaptation measures for climate crisis under paragraphs (1) through (4) shall be prescribed by Presidential Decree. |
| Public Institutions' Adaptation Plan | Article 41 (Public Institutions' Adaptation Measures for Climate Crisis)<br>(1) An institution prescribed by Presidential Decree, such as public institutions that have and manage the facilities vulnerable to climate crisis (hereinafter referred to as "vulnerable institutions") shall formulate and implement public institutions' measures for adaptation to climate crisis every five years in consideration of the climate crisis adaptation measures, characteristics of the competent facilities, etc. (hereinafter referred to as "public institutions' adaptation measures for climate crisis"), and shall prepare performance records every year.<br>(2) Where the head of a vulnerable institution has formulated public institutions' adaptation measures for climate crisis or prepared performance records, he or she shall submit the results thereof to the Minister of Environment, the head of the relevant central administrative agency, and the head of the competent local government.<br>(3) Matters necessary for the formulation and implementation of public institutions' adaptation measures for climate crisis, preparation of performance records thereof, etc. under paragraph (1) shall be prescribed by Presidential Decree. |

Note: Selected articles relevant for adaptation measurement.

Sources: KLT, "Framework Act on Carbon Neutrality and Green Growth For Coping With Climate Crisis" (Act No. 18469, Framework Act), "Framework Act on Low Carbon, Green Growth" (Act No. 9931), Accessed 31 December 2022.

### 3.1.2 *Framework of 3rd NAP*

The 3rd NAP (2021-2025) introduces a monitoring and evaluation system that is structured around a public evaluation group as part of which all implementing parties (i.e. central government, metropolitan and local governments, experts, civil society, youth, and industry representatives) participate to monitor and evaluate the implementation status. The evaluation of the performance, based on policy indicators and public perception indicators, is brought together in:

- An annual review of the detailed implementation plan and a joint performance evaluation of the relevant ministries including the performance evaluation committee. The results of the performance evaluation are used to prepare an improved action plan for the next year.
- A mid-term interim evaluation is planned for the second half of 2023.
- A comprehensive review is planned in 2025 to inform the establishment of the 4th NAP (2026-2030). It will be complemented by updated scientific evidence with the 2025 Korea Climate Change Assessment Report.

### 3.1.3 *Framework of LAP*

Local governments also measure progress in implementing their policies, following the guidelines for the establishment of LAPs and the implementation evaluation provided by the MoE. The guidelines encourage local governments to diagnose and inform future adaptation policies based on an annual self-evaluation and take into account different characteristics of each local government. The department in charge of adaptation plans compares the performance of implementation with the plan goals and budget of detailed implementation projects, prepares an evaluation result, and notifies and takes action.

The MoE and KACCC developed a web-based LAP implementation evaluation system through which each local government can upload the project content of the detailed implementation plan and report the implementation evaluation result. The LAP implementation support staff of the MoE and KACCC can check the progress of each local government through the system and check the results of simple statistical analysis.

## 3.2 Evaluation for NAP

There was no implementation evaluation system in place for the 1st NAP, which was in the early stages of establishing and implementing climate change adaptation policies. From the 2nd NAP onwards, an implementation evaluation system for detailed implementation plans was prepared, and an implementation evaluation was conducted for the entire detailed implementation plan.

An overview of the implementation evaluation system for each period of Korea's climate change adaptation plan is as follows (Table 3).

Table 3. Overview of implementation evaluation system

| Plans | Overall | All detailed implementation plans | Critical plans |
|---|---|---|---|
| **1st NAP** | | n.a. | n.a. |
| Type of evaluation (What is evaluated?) | Plan achievements and limitations | - | - |
| Evaluation frequency | Ahead of the establishment of the 2nd NAP | - | - |
| Characteristic (How is progress evaluated?) | Qualitative (Expert) | - | - |
| **2nd NAP** | | | |
| Type of evaluation (What is evaluated?) | - | All projects in the detailed Implementation Plan | 100 critical projects in the detailed Implementation Plan |
| Evaluation frequency | 2018 (interim), 2020 (comprehensive) | Every year since 2016 | Every year since 2016 |
| Characteristic (How is progress evaluated?) | Qualitative (expert) + Quantitative (based on indicators) | Qualitative + Quantitative | Qualitative (expert) + Quantitative |
| **3rd NAP** | | | |
| Type of evaluation (What is evaluated?) | - | All projects in the detailed Implementation Plan | Projects for public perception |
| Evaluation frequency | 2023 (interim), 2025 (comprehensive) | Every year since 2021 | Every year since 2021 |
| Characteristic (How is progress evaluated?) | Qualitative (expert) + Quantitative | Qualitative (expert) + Quantitative | Qualitative (expert) + Quantitative |

Source: Authors.

### 3.2.1 *2nd NAP*

Implementation evaluation was carried out for the detailed implementation plan for the 2nd NAP. Implementation evaluation is divided into annual evaluation conducted annually, interim comprehensive evaluation conducted in the third year of the five-year planning period, and comprehensive evaluation conducted in the fifth year, the final year.

Annual evaluation is divided into performance evaluation of the projects in the entire detailed implementation plan and evaluation of the critical projects in the major detailed implementation plans set. The performance evaluation of the entire detailed implementation plan evaluates the level of achievement of the budget and progress on the indicators set at the time of planning. The project evaluation results are classified as good/normal/insufficient, and the feedback process such as establishing a supplementary plan for insufficient projects was performed at the implementing agency. The evaluation of critical tasks was conducted according to the results of self-evaluation and qualitative/quantitative evaluation using an evaluation group of experts in each field.

The interim comprehensive evaluation was conducted in 2018, when the third year of implementation of the plan arrived, it was carried out by assembling an expert evaluation team for each field, and setting qualitative evaluation items and quantitative evaluation indicators. After that, a comprehensive evaluation was conducted in 2020, the final year of implementation. In the comprehensive evaluation, qualitative evaluation indicators were added to the indicators used in the intermediate comprehensive evaluation, and performance and limitations were derived for the 2nd NAP overall.

### 3.2.2 *3rd NAP*

Implementation evaluation was conducted for the entire detailed implementation plan for the first year (2021) of the 3rd NAP in 2022. The direction of evaluation was 1) multi-faceted evaluation for effective implementation, 2) securing objectivity and fairness through expert review, and 3) increasing policy acceptability through participation in a public evaluation group. Each department conducted a self-evaluation based on autonomy and responsibility, and both the expert review committee for each sector and the national evaluation group reviewed simultaneously to enhance credibility.

All ministries that have a sectoral adaptation plan undertake self-evaluation based on a template. The self-evaluation is carried out according to the allocation of preparation, implementation, and performance by item compared to the original implementation plan. Preparation items confirm readiness for implementation of the plan, and 20 points out of 100 are given, including the reflection of the evaluation results from the previous year and changes in internal and external conditions. Implementation items evaluate the adequacy of the implementation process at 40 points, and consist of 20 points for project site monitoring, inter-ministerial collaboration, policy communication, and 20 points for the fidelity of implementation schedule and budget execution. For the performance items, the performance goal and policy effect are allocated 40 points, the ratio of the actual goal achievement to the target value in the project plan is 20 points, and the adaptive capacity according to the project implementation, and the policy effectiveness is 20 points. If there is a contribution to the achievement of bringing adaptation into the mainstream through the establishment of a horizontal cooperative organizational system including relevant ministries and stakeholders, up to 5 additional points can be given. Four grades are given according to the evaluation score, with 90 or more being very good, 80 or more being good, 70 or more being average, and less than 70 being insufficient.

| Box 1 | Expert committee evaluation and the public group |
|---|---|

The expert evaluation committee is made up of each sector (12 tasks, 36 fields) with experts participating in the establishment of the 3rd NAP and experts recommended by relevant ministries. Based on the results of self-assessment submitted by each department, the committee prepares an evaluation report focusing on policy recommendations on key performances and supplementary matters for each sector.

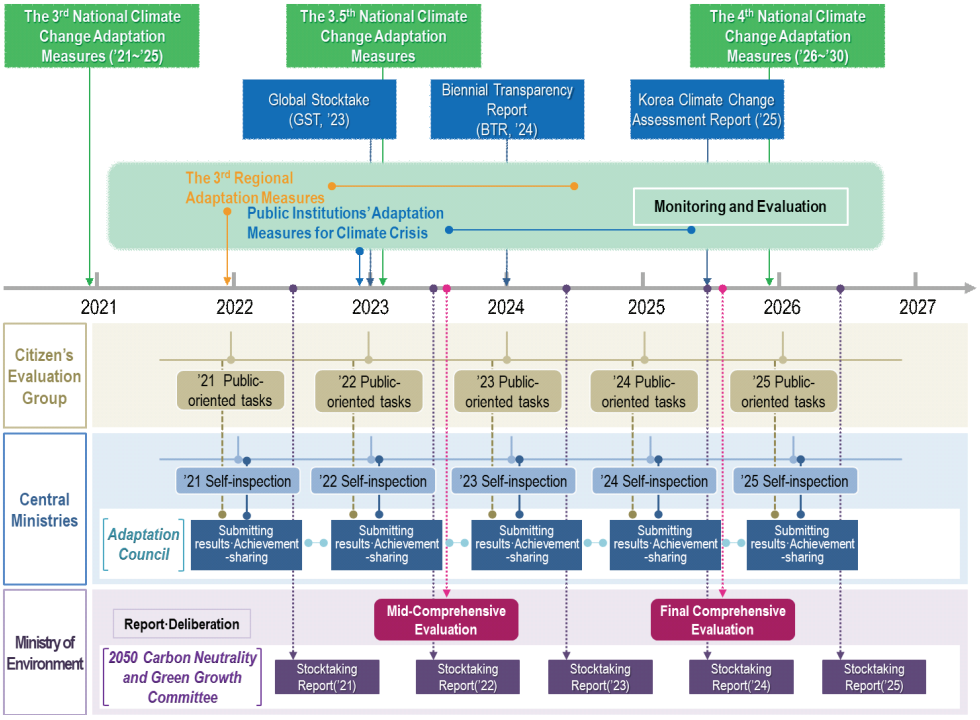
Source: Authors.

In addition, the committee selects best practices suitable for each case from among all implementation projects and projects of public perception. Among the candidates for best practices recommended by the relevant ministries, the expert review

committee evaluates them and selects approximately three best practices. Among 49 representative projects of the public perception type, ten best case candidates are selected at the initial comprehensive examination stage by the expert review committee and the public evaluation group. After that, the final three best practices of the public perception type are selected through the second-stage voting by the national evaluation group.

Schematic of the 3rd NAP implementation evaluation procedure as described above over time is as follows (Figure 3).

Figure 3. Schematic of the 3rd NAP implementation evaluation procedure over time




Source: Authors.

## 3.3 Measuring progress of LAP implementation

A summary of the implementation evaluation system for each period of the detailed implementation plan of the climate change adaptation plan by local governments is as follows (Table 4).

Table 4. A summary of the evaluation system for the LAPs

| Plans | Overall | Whole project included in detailed implementation plans | Critical plans included in detailed implementation plans |
|---|---|---|---|
| **1st LAP** | × | ○ | × |
| Type of evaluation | - | All projects in the detailed implementation plan | - |
| Evaluation time | - | Every year since 2013 | - |
| Characteristics | - | Qualitative (self), Quantitative | - |
| **2nd LAP** | ○ | ○ | × |
| Type of evaluation | Achievements and limitations the 1st LAP | All projects in the detailed implementation plan | - |
| Evaluation time | Time for establishing the 2nd LAP | Every year since establishment | - |
| Characteristics | Qualitative (expert, self) | Qualitative (self), Quantitative | - |
| **3rd LAP** | Expected | Expected | × |
| Type of evaluation | Achievements and limitations of the 2nd LAP | All projects in the detailed implementation plan | - |
| Evaluation time | Time for establishing the 3rd LAP | Every year since establishment | - |
| Characteristics | Qualitative (expert, self) | Qualitative (expert, self) | - |

Note: Selected articles relevant for adaptation measurement.
Source: Authors.

According to the MoE's guidelines for implementation evaluation of local governments, implementation evaluation is carried out annually for each year of the detailed implementation plan target period (five years) established by the local government. Implementation evaluation of the detailed implementation plan of local governments is carried out in the stages of "establishment of self-evaluation plan", "interim inspection", "self-evaluation", and "feedback of evaluation results". Implementation evaluation includes procedures such as interim inspection of progress status, conducting self-evaluation and writing evaluation results, holding evaluation report meetings, and submitting evaluation results and an implementation plan for the next year.

Interim inspection is a process to improve the efficiency of achieving the original performance goal through appropriate measures and management by monitoring the execution performance of detailed projects by sector and changes in circumstances (projects, budgets, performance indicators, etc.). The self-evaluation is a process for comprehensively diagnosing and evaluating the achievement of performance goals, execution results, project performance, and deficiencies and supplements for the detailed project implementation results by sector in the current year, and reflects the results in the implementation plan for the next year.

Quantitative and qualitative indicators are used to evaluate the implementation of detailed implementation plans of local governments. The final evaluation result is divided into four levels: very good (more than 90%), good (more than 80%), average (more than 65%), and insufficient (less than 65%). The final evaluation grade is determined by overlapping the two index evaluation grades (Figure 4).

Figure 4. Scoring grid for adaptation measuring for LAP

〈Achieve the goal〉

| | | | | |
|---|---|---|---|---|
| **Very good** (20) | 12.5 | 15 | 17.5 | 20 |
| **Good** (15) | 10 | 12.5 | 15 | 17.5 |
| **Average** (10) | 7.5 | 10 | 12.5 | 15 |
| **Insufficient** (5) | 5 | 7.5 | 10 | 12.5 |
| **Division** | **Insufficient** (5) | **Average** (10) | **Good** (15) | **Very good** (20) |

〈Budget execution〉

Source: Authors.

The implementation evaluation guidelines for local governments specify that the heads of local governments collect opinions from stakeholders such as local residents, councils, NGOs, field experts, and related organizations, and actively reflect necessary matters during the evaluation process of the adaptation plan. To this end, it is emphasized that measures should be devised to actively induce the participation of various parties, such as organizing and operating a resident evaluation group or implementation monitoring group.

# 4 Adaptation Indicators for Measuring Progress in Implementation

## 4.1 Overview of indicators for Korea's climate change adaptation plans

In Korea, a climate change adaptation plan is established to achieve the goals after setting major goals and indicators taking climate impacts and various current issues into consideration. In this section, indicators set according to the hierarchy of the plan and the time of establishment are presented.

### 4.1.1 Indicators for National Climate Change Adaptation Plan

In establishing and implementing the three adaptation plans so far, indicators to set quantitative/qualitative targets were used in each plan, and detailed implementation plans were established to achieve the goals.

#### (1) Indicators for the establishment of the 1st NAP

The 1st NAP was established jointly by 13 related ministries and consisted of 87 major tasks in ten fields. In the NAP, quantitative goals for each sector or project using indicators were not prepared, but qualitative goals were set for each sector and efforts were made to achieve them. After the initial establishment, a revised plan for the first adaptation plan reflecting the new IPCC climate change scenario (2012) was established. In the revised plan, as the goals were revised by sector, the implementation tasks were changed to 67 in nine major sectors. The goals of the 1st NAP were set for each sector and the establishment of health protection measures for the vulnerable to climate change (health sector), the establishment and expansion of a water management system adaptive to climate change (water management sector), and reinforcement of stable food production base (agricultural and fisheries sector) were included.

### (2) Indicators for the establishment of the 2nd NAP

The 2nd NAP was jointly established with 20 relevant ministries and consisted of 16 major tasks in four policy areas and four tasks based on one implementation area. In this plan, key indicators of the adaptation plan were developed to check and evaluate the plan implementation process. Performance indicators for each sector included the four policy sectors and one implementation base were set at the planning stage to increase the effectiveness of the plan implementation. Representative quantitative indicators include the establishment rate of regional climate change mediator monitoring base centers (%), the development of climate change response varieties (cumulative cases) and the establishment of the Korean Peninsula biogenetic resource database (cumulative cases). Qualitative indicators include the institutionalization of accreditation for adaptive education programs.

### (3) Indicators for the establishment of the 3rd NAP

The 3rd NAPwas established jointly by 17 relevant ministries and consists of six sub-sections of three major policies. The plan was established as a core strategy to enhance climate resilience, protect the vulnerable, revitalize citizen participation, and respond to the new climate regime. In the 3rd NAP, key indicators of the adaptation plan were set to check and evaluate the plan implementation process. 20 policy indicators and 16 indicators of public perception were set for each sector, and the performance of measures is checked through systematic implementation monitoring every year. A total of 36 indicators are made up of qualitative and quantitative items, and the details are as follows (Table 5 and Table 6).

Table 5. Policy indicators for the 3rd NAP

| Area | Indicator | Current | Goal (2025) |
|---|---|---|---|
| Water management | Expansion of flood forecasting points (number of locations) | 65 places | 218 places |
| | Establishment of a national drought information system (INDIS) | - | Build |
| Ecology | National ecosystem climate change information management integration platform | - | Build |
| | Restoration of the core ecological area of the Korean Peninsula (area) | 456 ha | 1,000 ha |
| Inland/coastal area | Public rental housing green remodelling (number of households) | - | 225,000 units |
| | Expansion of coastal erosion surveys (branches) | 250 points | 300 points |
| Agriculture/ fishery | Dissemination of disaster-resistant facility standards (number of standards) | 68 types | 75 types |
| | Prediction of changes in cultivation area (number of crops) | 17 types | 25 types |
| Health | Climate Health Impact Assessment | Establish a legal basis | 1st evaluation |
| | Participation in infectious disease information sharing platforms | One | Four |
| Industry/ energy | Manual for adaptation to industries vulnerable to climate change (cases) | - | Ten cases |
| | Building smart power grid for apartments (number of households) | 150,000 | 5,000,000 |
| Observation | Climate change satellite monitoring information | 29 variables of weather and ocean | 96 variables of weather, ocean, and environment |
| Prediction | Detailed scenario production for Korea | AR5-based | AR6-based |
| Assessment | Publication of Korea climate change assessment report | AR5-based | AR6-based |
| Policy promotion | Climate change adaptation assessment system | - | Enforcement |
| | Establishment of adaptation plan for public institutions | - | Obligatory |

Table 5. (continued)

| Area | Indicator | Current | Goal (2025) |
|---|---|---|---|
| Policy promotion | Operation of a monitoring group for the implementation of local government's adaptation plan | - | 100% of cities |
| Climate resilience | Adaptive infrastructure standard pilots (units) | - | Five units |
| Cooperation network | Operation of an adaptation research institute consultative body | Composition | Twice a year |

Note: List of 20 policy indicators.
Source: Authors.

Table 6. Public perception indicators for the 3rd NAP

| Area | Indicator | Current | Goal (2025) |
|---|---|---|---|
| Flood | Flash flood forecasting system | - | Bbuild |
| | Designation of priority management areas for sewerage maintenance | 114 places | 180 places |
| Drought | Number of national drought information portal users (yearly) | 110,000 | 400,000 |
| | Establishment of a smart water supply management system (place) | - | 209 places |
| Biogenesis | Establishment of a database of genus occurrence and possible species | - | Establish |
| | Eco-friendly control guidelines | - | Establish |
| Forest disaster | Advancement of the landslide prediction system | Forecast with 1 hour lead time | Short-term forecast |
| | Climate change forest fire risk map | - | Produce |
| Food security | Development of climate-adapted varieties (species) | 288 species | 363 species |
| | Farm-tailored early warning system (municipality) | 29 | 110 |
| Health protection | Health management platform to cope with climate change (mobile app) | - | Operate |
| | Training on facilities for the vulnerable | - | 1,000 times |

Table 6. (continued)

| Area | Indicator | Current | Goal (2025) |
|---|---|---|---|
| Protection of the vulnerable | Prepare a plan to select a climate risk hot spot | - | Establish |
| | Establishment of adaptive infrastructure (local government) | - | Ten places per year |
| Public participation | Citizen's life lab (Living Lab) project (units) | - | 20 units |
| | Disaster information citizen participation platform | - | Establish |

Note: List of 16 public perception indicators.
Source: Authors.

### 4.1.2 Indicators for establishing detailed implementation plans for a NAP

In Korea, in order to improve the implementation level and expected effect of the NAP, an expanded plan with detailed content is established, which is called a detailed implementation plan. The purpose of the detailed implementation plan is the smooth implementation of the NAP, which is a high-level plan, and the relevant ministries that established it.

Like the NAP, detailed implementation plans are established every five years, and after the completion of the first (2011-2015) and second (2016-2020), the third detailed implementation plan (2021-2025) is in progress. While there was originally no indicator system utilized when the first plan was created, a plan establishment indicator system was created for the second detailed implementation plan. As such, the indicator systems for the second and third plans are presented below.

#### (1) Indicators for the establishment of the second detailed implementation plan

The second detailed implementation plan consists of 341 projects including 100 critical projects. It was implemented in order to achieve the goals of the 2nd NAP. All 341 projects included in the second detailed implementation plan have indicators related to the establishment of each project, and the indicators are in quantitative or qualitative form.

The indicators for the establishment of the second detailed implementation plan consist of 108 qualitative and 257 quantitative indicators. Since there are projects that have both

quantitative and qualitative performance indicators for each detailed implementation plan, the number of indicators is larger than the total number of 341 projects.

Since the indicators for establishing detailed implementation plans were prepared with consideration for the final goals of the NAP and the nature of the projects, the characteristics and levels of indicators differ between plans. As quantitative indicators, the progress rate (%) of the project, the quantity calculated according to the project execution results (places, volumes, cases, etc.), and the proportion (%) according to the results of questionnaire and statistical analysis are used. It was used as a way to review the amount of change.

Representative qualitative indicators include whether the legal system has been improved, whether plans or guidelines have been prepared, and whether a system for review and evaluation has been established. It was used in such a way that the level of implementation and effectiveness of the plan could be confirmed depending on whether the goal was achieved.

### (2) Indicators for the establishment of the third detailed implementation plan

The 3rd detailed implementation plan consists of a total of 286 projects and is being implemented as part of 12 major tasks in 36 key areas. Of those, 49 projects were chosen concerning one of the primary objectives of the 3rd NAP, which is well known by the general public, and the separate implementation assessment is underway. Evaluation items for these projects are also separately organized and managed. The third detailed implementation plan includes a total of 396 indicators for the establishment of 286 projects, with the possibility of one project having multiple relevant indicators. These indicators are a mixture of both quantitative and qualitative measures. The respective indicators were set by the implementing body based on the type of project and the characteristics of the relevant ministries.

Since the indicators for establishing detailed implementation plans were prepared with consideration for the final goals of the NAP and the nature of the projects, the characteristics and levels of indicators differ between plans (Table 7).

Table 7. Examples of indicators for the establishment of detailed implementation plans for the 3rd NAP

| Type | Detailed implementation plans general project indicators | Indicators of the projects for the public perception |
|---|---|---|
| Indicator example (quantitative/ qualitative) | Establishment of regional stations for climate change adaptation measures (number of establishments) | Climate change adaptation impact assessment system |
| | Operation of pilot projects (number of implementations) | Establishment of adaptive infrastructure (local government) (number of establishments) |
| | Diagnosing mainstreaming of climate change adaptation | Establishment of a standard model for urban climate change vulnerability reduction projects (number of models) |
| | Consulting to support the establishment of adaptation strategies for industries vulnerable to climate change (number of consultations) | Number of civic life lab (Living Lab) projects (cumulative) (number of projects) |

Source: Authors.

As quantitative indicators, the progress rate (%) of the project, the quantity calculated according to the project execution results (places, volumes, cases, etc.), and the proportion (%) according to the results of questionnaire and statistical analysis are used. These indicators were used to review the amount of change resulting from the implementation of the plan. Representative qualitative indicators include whether the legal system has been improved, whether plans or guidelines have been prepared, and whether a system for review and evaluation has been established. It was used in such a way that the level of implementation and effectiveness of the plan could be confirmed depending on whether the goal was achieved.

## 4.2 Evaluation indicators assessing implementation of all projects in the detailed implementation plan for the NAP

The evaluation of the implementation of the detailed implementation plan for the NAP in Korea is classified in various ways, depending on the purpose. This section intends to explain the implementation monitoring method and evaluation indicators for all projects in the detailed implementation plan. In addition, since the monitoring

indicator differs for each time point of the establishment of the NAP, it is described based on the time the plan was established. The indicators vary due to the timing of the implementation of measures, because the gaps observed in the past measures have been addressed by implementing the subsequent plan. This can be regarded as the result of attempts to better accommodate to climate change. At the time of the implementation of the 1st NAP and detailed implementation plan, there were no implementation monitoring methods and procedures.

### 4.2.1 Evaluation indicators for the implementation of all projects in the detailed implementation plan for the 2nd NAP

When the detailed implementation plan of the 2nd NAP began, an implementation monitoring framework for the plan was established. All projects included in the detailed implementation plan are subject to annual implementation monitoring, and in principle, monitoring is continued until the task is completed.

Evaluation was conducted by the relevant ministries, which are responsible for the implementation of each project, in accordance with the prescribed form and items, and the results were collected by the Ministry of Environment (Table 8 and Table 9).

- The first item, “Efforts for Implementation (Quantitative)”, was calculated by comparing the actual execution budget with the planned budget for each detailed task. Based on the calculated budget execution rate, an execution rate of more than 90% was deemed excellent, between 70% and 90% was deemed average, and below 70% was deemed insufficient.
- The second item is “Goal Achievement Effort (quantitative/qualitative)”, which evaluates the extent to which the performance goals for each detailed implementation plan have been achieved. In the case of quantitative indicators, the actual achievement level compared to the originally planned performance goal was derived as a ratio, and the results were evaluated as excellent, average, and poor. In the case of a project with a performance goal set as a qualitative indicator, qualitatively excellent, average, and poor were evaluated according to the actual implementation level, and the supporting data for the evaluation result was presented together.

Table 8. Evaluation indicators for implementation of all projects in the detailed Implementation plan for the 2nd NAP

| Evaluation item | Evaluation indicators and criteria | Evaluation scale | Note |
|---|---|---|---|
| Implementation efforts (quantitative) | · [Budget Execution Rate] Whether the budget was faithfully executed according to the original plan<br>· Budget execution rate (%) = Performance budget/Planned budget | · Good (more than 90%)<br>· Normal (more than 70% and less than 90%)<br>· Insufficient (less than 70%) | · Normal implementation<br>· Delayed<br>· Not implemented |
| Efforts to achieve goals (quantitative/ qualitative) | · [Performance Goal Attainment] The actual achievement compared to the performance target<br>· Goal achievement rate (%) = Performance/Goal<br>· Policy and institutional goals = degree of effort to achieve the goal | · Good (100% or more)<br>· Normal (from more than 80% to less than 100%)<br>· Insufficient (less than 80%) | |

Source: Authors.

Table 9. Evaluation result grade criteria for implementation of all projects in the detailed implementation plan for the 2nd NAP

| Execution / Goal Achievement | Good | Normal | Insufficient |
|---|---|---|---|
| Good | Normal implementation | Normal implementation | Delayed |
| Normal | Normal implementation | Delayed | Delayed |
| Insufficient | Delayed | Delayed | Not implemented |

Source: Authors.

The results of the self-evaluation conducted in this way were collected by the MoE, comprehensively reviewed by the KACCC, and then the final inspection results were derived. For the final inspection, a method of synthesizing the evaluation results of the two evaluation items was adopted, and the final result was derived according to the combination of each evaluation result.

### 4.2.2 Evaluation indicators for implementation of all projects in the detailed implementation plan for the 3rd NAP

The detailed implementation plan for the 3rd NAP consists of a total of 286 tasks, and a framework for monitoring the implementation of each project has been established. All projects are subject to annual performance monitoring, and in principle, monitoring continues until the task is completed.

First, relevant ministries, who are responsible for establishing detailed implementation plans, prepare a self-evaluation report for each of their assigned tasks. Each ministry self-evaluates the level of performance of individual projects in a standardized format, reporting on six items in four areas (Table 10).

Table 10. Evaluation indicators for implementation of all projects in the detailed implementation plan for the 3rd NAP

| Evaluation items (points) | | Evaluation criteria (points) | Details of evaluation |
|---|---|---|---|
| Preparation | 1. Readiness for implementation of the plan (20) | 1-1. Degree of reflection of evaluation results from the previous year and changes in internal and external conditions (20) | - Review and reflect the evaluation results from the previous year<br>- Consider changes in internal and external social conditions and link business plans |
| Implementation | 2. Adequacy of the implementation process (40) | 2-1. Project monitoring, inter-ministerial collaboration and policy communication (20) | - On-site inspection by project (on/offline) and collaboration/policy communication (private/public) |
| | | 2-2. Fidelity of implementation schedule and budget execution (20) | - Degree of project promotion and budget execution according to the implementation plan for each project |

Table 10. (continued)

| Evaluation items (points) | | Evaluation criteria (points) | Details of evaluation |
|---|---|---|---|
| Result | 3. Performance goals and policy effects (40) | 3-1. Achievement of performance goals (20) | - Ratio of actual goal achievement to goal of the project plan |
| | | 3-2. Policy effectiveness (20) | - Enhancement of capacity to adapt to climate change and awareness of stakeholders and the general public according to project implementation |
| Extra points | 4. Establishment of mainstreaming foundation (5) | 4-1. Establishment of the basis for mainstreaming related to the implementation of detailed implementation plans (5) | - Achievement of mainstreaming by establishing a horizontal cooperative organizational system including relevant ministries and stakeholders |

Source: Authors.

An evaluation system with a total of 100 points is used, and the final result is presented by assigning a grade according to the score obtained. The reason for presenting the performance evaluation results in grades is to improve the readability of results for 286 tasks and to increase the efficiency of presenting directions for future implementation by grade.

Significant improvements in the evaluation system of the detailed implementation plan for the third adaptation plan can be confirmed through the evaluation items. In the evaluation of the detailed implementation plan for the 2nd NAP, the results were derived only from whether the budget was executed and whether the target performance was achieved for each project. However, in the evaluation of the implementation of the third adaptation plan, a system was prepared to evaluate the details of each stage of the project implementation in the order of project preparation, implementation, and performance.

Evaluation results of the first year detailed an implementation plan for the third

adaptation plan according to the improved evaluation framework, it was confirmed that 91.9% of projects were evaluated as good or higher (79.9% very good, 12% excellent) level.

Table 11. Infrastructure levels of countries by income

| Area | Project title | Very good | Good | Normal | Insuffi-cient | Total |
|---|---|---|---|---|---|---|
| Improvement of climate risk adaptability | Water management considering future climate risks | 27 | 5 | 3 | - | 35 |
| | Maintaining sound ecosystem | 45 | 7 | 3 | - | 55 |
| | Enhancing the adaptability of the entire country | 14 | 5 | - | - | 19 |
| | Establishment of a sustainable agricultural and fishery environment | 25 | 6 | 1 | - | 32 |
| | Establishment of a health damage prevention system | 11 | 2 | 2 | - | 15 |
| | Strengthening adaptive capacity in the industrial and energy sectors | 11 | 2 | 1 | - | 14 |
| Strengthening of systems for monitoring and prediction | Establishment of a comprehensive monitoring system | 14 | - | - | - | 14 |
| | Scenario production and forecasting advancement | 12 | - | - | - | 12 |
| | Strengthening the provision of evaluation tools and information | 12 | 1 | - | - | 13 |
| Mainstreaming of adaptation | Reinforcement of the climate adaptation implementation system | 8 | 1 | 4 | - | 13 |
| | Establishment of a foundation for improving climate resilience | 15 | - | 2 | - | 17 |
| | Establishment of a climate adaptation cooperation system and raising awareness | 13 | 2 | 2 | - | 17 |

Source: Authors.

## 4.3 Evaluation indicators for implementation of critical projects in detailed implementation plans for NAP

As mentioned in Section 3.2, the evaluation of the implementation of the detailed implementation plan for the NAP is classified in various ways depending on the purpose. This chapter describes the performance evaluation method and indicators for the critical project. As described above, since the monitoring indicator is different for each time point of establishment of an adaptation plan, it will be described based on the time point of establishment of the plan. Since the detailed implementation plan for the 1st NAP did not include the critical projects, the case of the detailed implementation plan for the 1st NAP is excluded.

### 4.3.1 Evaluation indicators for implementation of critical projects in the detailed implementation plan for the 2nd NAP

Among the 341 projects of the detailed implementation plan for the second adaptation plan, the projects that met the goals of the second adaptation plan and required separate management were classified as 'critical projects', and a separate implementation evaluation procedure was prepared and implemented. For critical projects, two evaluations are carried out: the implementation evaluation of all tasks and a more in-depth evaluation of the implementation. Evaluation of critical projects is carried out in the order of external evaluation performed by field experts following the self-assessment by the relevant ministries. According to the expert evaluation, the self-assessment was made objective and reliable, while the future direction of the project was assessed and potential areas for improvement were identified through the opinions of those relevant experts.

Four evaluation items were developed, and the detailed evaluation indicators consist of five items. In order to secure the objectivity in evaluating each item, the ministries involved submitted related evidence together. The climate change adaptation expert organization formed an expert group for each project and performed an objective evaluation of each project.

The evaluation method for each detailed item was qualitative, but guidelines to support the evaluation were presented in order to ensure a minimum level of objectivity. The guidelines were prepared as a method of presenting evaluation methods by condition, and the final evaluation scale was also structured in a way so that it could be linked.

| Box 2 | Criteria for evaluating critical projects in the detailed implementation plan for second national climate change adaptation measures (example) |
|---|---|

<Criteria for points rating>

Judging the degree of improvement in climate adaptation capacity and awareness and participation of stakeholders and the general public resulting from the implementation of tasks and projects

① Degree of positive repercussions from climate adaptation

Excellent: Awareness and participation such as climate adaptation capacity and stakeholders in the relevant field has greatly improved.

Excellent: The overall level of awareness and participation such as climate adaptation capacity and stakeholders in the relevant field has improved.

Moderate: Awareness/participation level such as climate adaptation capacity and stakeholders in the relevant field has slightly improved.

Insufficient: The level of awareness and participation such as climate adaptation capacity and stakeholders in the relevant field is similar.

Low level: Awareness/participation in the field such as climate adaptation capacity and stakeholders has decreased.

Source: Authors.

For the evaluation items of plan adequacy, the degree of reflection according to the evaluation results of the previous year for the relevant task and the degree of response at the task level to changes in the internal and external environment were evaluated. Implementation fidelity evaluation items in the "execution" area were evaluated by field experts using the self-evaluation results prepared in the performance evaluation of all projects.

Policy effectiveness evaluation items in the "performance" area evaluated the degree of positive impact on the climate change adaptation area in implementing the task. Efforts for cooperation and communication in the "additional points" area were evaluated as an item to evaluate communication efforts such as collaboration with related organizations or internal and external public relations, and external

efforts to implement policies were evaluated.

The indicators “plan”, “execution”, and “performance” consist of an evaluation score of 100 points, with 25 points as the maximum, while the evaluation items in the “additional point” area were set at five points. Based on the above evaluation indicators and scores, the implementation level of critical projects was evaluated (Table 12).

Table 12. Evaluation indicators for the implementation of critical projects in detailed implementation plans for the 2nd NAP

| Area | Evaluation item | Evaluation indicator | Evaluation criteria | Rating scale |
|---|---|---|---|---|
| Plan | Adequacy of the plan | 1-1. Acceptance of evaluation results (25) | - The degree of action and reflection of evaluation results of the previous year | · Very good (25)<br>· Good (20)<br>· Normal (15)<br>· Insufficient (10)<br>· Poor (5) |
| Execution | Fidelity of implementation | 2-1. Implementation content faithfulness (25) | - The degree of implementation of the project content compared to the plan | |
| | | 2-2. Implementation efforts (25) | - The degree of implementation of the budget compared to the plan<br>- The degree of actual achievement compared to the performance goal | |
| Performance | Effectiveness of the project | 3-1. Policy effectiveness (25) | - The degree of positive repercussions from climate adaptation | |
| Additional points | Cooperation and Communication efforts | 4-1. Cooperation and Communication efforts (5) | - The level of effort to establish a cooperative system with related organizations (work cooperation, information exchange, education, etc.)<br>- The degree of effort to spread and communicate policies, such as policy promotion | · Good (5)<br>· Normal (3)<br>· Insufficient (1) |

Source: Authors.

### 4.3.2 Evaluation indicators for implementation of critical projects in the detailed implementation plan for the 3rd NAP

In the third detailed implementation plan for the NAP, 49 projects are classified as tangible projects for public perception and are being evaluated using an expert review committee and a public evaluation group. Best practices are selected according to the evaluation results (Table 13).

The evaluation items used by the public evaluation group to select best practices consist of three evaluation items in two areas.

The first evaluation area is “communication and cooperation”, and it consists of two items: “Promotion of tasks” and “Building the basis for mainstreaming”.

① Task promotion: This is an evaluation item for task inspection (on-site inspection, etc.) and collaboration and policy communication. This is an item that evaluates various methods of inspection efforts and collaboration and communication efforts for each subject.

② Establishing the basis for mainstreaming: This is an evaluation item for establishing governance related to the implementation of detailed implementation plans. This item evaluates efforts to achieve mainstreaming through the establishment of a horizontal collaboration basis including relevant ministries and stakeholders.

The second evaluation area is “project performance”, and “performance achievement” is the evaluation item. As detailed criteria, it consists of performance goal achievement and policy effectiveness verification.

Table 13. Evaluation indicators for implementation of tangible projects for the public perception in the detailed implementation plan as part of the 3rd NAP

| Evaluation items (points) | | Evaluation criteria (points) | Details of evaluation |
|---|---|---|---|
| Communication and cooperation | 1. Project implementation (25 points) | 1-1. Inspection of projects (on-site inspection, etc.) and communication and collaboration/policy (25 points) | Inspection of projects (on-site inspection and online response, etc.) and collaboration and policy communication efforts (publicity, etc.) |
| | 2. Establishment of the basis for mainstreaming (25 points) | 2-1. Building governance for the detailed implementation plan (25 points) | Achieving mainstreaming by establishing a foundation for horizontal collaboration including relevant ministries and stakeholders |
| Project performance | 3. Achievement level (50 points) | 3-1. Achievement of performance goals (25) | The ratio of actual goal achievement compared to the goal of the project plan |
| | | 3-2. Policy Effectiveness (25) | Improving the ability to adapt to climate change according to the project implementation and raising the awareness of stakeholders and the general public |

Source: Authors.

As of 2022, a total of seven projects have been selected as best practices according to the results of the evaluation of tangible projects for public perception in the detailed implementation plan for the 3rd NAP (Table 14).

Table 14. Best case selection result from the detailed implementation plan for the 3rd NAP (2022)

| |
|---|
| · Reinforcement of the collaboration system with related organizations to improve the accuracy of flood forecasting (Meteorological Administration Hydrology and Meteorological Team) |
| · Promotion of online content to stimulate public participation (Climate Change Monitoring Division, Korea Meteorological Administration) |
| · Development of Strategic Adaptation Technology for Vulnerable Ecosystems (National Institute of Ecology, Ministry of Environment) |
| · Expanding public participation in monitoring adaptation to climate change (National Institute of Biological Resources, Ministry of Environment) |
| · Urban climate change vulnerability reduction project and standard model preparation and diffusion (Ministry of Environment's New Climate System Response Team) |
| · Producing drought information that can be felt by the people and strengthening public relations (Water Use Planning Division, Ministry of Environment) |
| · AI/ICT-based real-time automatic water supply management system establishment (Water Use Planning Division, Ministry of Environment) |

Source: Authors.

## 4.4 Evaluation indicators for overall climate change adaptation plan

This section aims to explain the implementation evaluation methods and indicators used to evaluate the implementation of climate change adaptation measures. The evaluation indicators for a plan depend on when the adaptation plans were established, so these indicators are based on the plan's start date.

### 4.4.1 Implementation evaluation indicators for the detailed implementation plan for the 1st NAP

In 2015, when the first iteration of the NAP was implemented, a performance evaluation of the overall adaptation plan for the past five years was carried out. The evaluation was conducted qualitatively through a forum of field experts, and the main evaluation indicators consisted of the performance and limitations of each sector's implementation of measures and pending issues that need to be considered when establishing the second adaptation plan.

The overall evaluation of the 1st NAP was carried out in a timely manner, but a separate standardized evaluation structure or index was not used. The problem with this type of evaluation was recognized, and this became the basis for preparing an evaluation framework for the overall 2nd NAP. The evaluation of the overall

implementation of the second adaptation plan was set in the direction of improving the limitations derived from the evaluation of the first adaptation plan.

### 4.4.2 Implementation evaluation indicators for the overall detailed implementation plan for the 2nd NAP

The evaluation of the overall implementation of the 2nd NAP was carried out in 2020, the final year of the implementation of the 2nd NAP. For the evaluation of the second adaptation plan, an objective evaluation framework was established that supplemented the limitations of the implementation evaluation of the first adaptation plan. Four evaluation areas were set, made up of eight detailed evaluation criteria. The evaluation criteria were qualitative items and quantitative evaluation items by scale according to characteristics, and the evaluation results were used to inform the 3rd NAP.

The overall evaluation of the second adaptation measures was conducted through four discussions by forming an evaluation group of experts related to each sector.

The first evaluation area is “Evaluation of adequacy of selection of implementation projects (quantitative/qualitative)” and consists of three evaluation items.

① Evaluation of the degree of association between risk and task for each sector (quantitative evaluation based on a five-point scale): The correlation between the national climate change risk list used in the establishment of the second adaptation plan and the adaptation projects was analyzed. The fundamental purpose of a climate change adaptation plan is to establish and implement effective policies for risk reduction; since this is a matter that should form the basis for reasonable climate change adaptation, such evaluation criteria were established and the extent of the analysis was analyzed.

Table 15. Comprehensive evaluation indicators of the detailed implementation plan for the 2nd NAP – 1

| Risk | Project | Degree of association | | | | | Reason for rating |
|---|---|---|---|---|---|---|---|
| | | Low | | ↔ | | High | |
| | | 1 | 2 | 3 | 4 | 5 | |
| Increased mortality from heatwaves | 0-0-0-0 | | | | | ○ | Prediction of health damage caused by heat waves and cold waves can be used to predict the risk of death. |

Source: Authors.

② Evaluation of the suitability of the project considering the degree of risk association (quantitative evaluation based on a five-point scale): Based on the evaluation results in ①, an evaluation was performed on whether the establishment of a detailed implementation plan was appropriate.

Table 16. Comprehensive evaluation indicators of the detailed implementation plan for the 2nd NAP – 2

| Risk | Reason for rating | Appropriateness of project selection | | | | |
|---|---|---|---|---|---|---|
| | | Low | | ↔ | | High |
| | | 1 | 2 | 3 | 4 | 5 |
| Increased mortality from heatwaves | There were three tasks where it was difficult to assess relevance to risk, but overall, an appropriate task was selected. | | | | | ○ |

Source: Authors.

③ Review of the performance and limitations of each sector's projects based on the results of the performance evaluation of all projects (qualitative).

The second evaluation area is “The degree of contribution to reducing risks of projects”. The evaluation criteria were composed to create an objective basis and to use a five-point scale for quantitative evaluation. Based on the results of the evaluation of the degree of association between risks and the project and performance

results, the contribution to risk reduction due to task implementation was evaluated. The basis for the overall contribution of the project was specified, and if necessary, the objectivity of the evaluation was secured by specifying the details of the particular project. The level of contribution was finally decided by consensus by the evaluation group, so that one of the five-level scales of 'high-low' was selected and specified.

Table 17. Comprehensive evaluation indicators of the detailed implementation plan for the 2nd NAP – 3

| Risk | Degree of contribution | | | | | Reason for rating |
|---|---|---|---|---|---|---|
| | Low | | ↔ | | High | |
| | 1 | 2 | 3 | 4 | 5 | |
| Increased mortality from heatwaves | | | | | ○ | Prediction of health damage caused by heat waves and cold waves can be used to predict the risk of death. |

Source: Authors.

The third evaluation area is "Proposal for the establishment of the third national climate change adaptation measure" and consists of two evaluation criteria. Among the projects included in the second adaptation plan, a qualitative evaluation was conducted to determine what should be linked to the third adaptation plan and which should be newly included based on contemporary issues and the environment.

In the fourth evaluation area, other opinions and general reviews were used to prepare the overall performance and limitations of the second adaptation plan, and the performance and limitations for each sector were derived. The overall evaluation result was derived through an integrated discussion of all divisions with a representative of each division's evaluation group as the chairperson. The evaluation results for each division were derived according to the discussion of the evaluation group for each division, using the results of the completed evaluation area and the results of the past performance evaluation.

### 4.4.3 Implementation evaluation indicators for the overall detailed implementation plan for the 3rd NAP measures

To evaluate the overall implementation of the 3rd NAP, an annual evaluation by relevant ministries and an interim evaluation (2023) and final evaluation (2025) through an expert forum are scheduled.

According to the results of the interim evaluation scheduled for 2023, the need to revise the detailed implementation plan will be reviewed. The results of the comprehensive evaluation to be implemented in 2025 will be used as data to inform the 4th NAP.

Detailed evaluation items and methods for the comprehensive evaluation of the 3rd NAP are currently being prepared. By supplementing the evaluation method used in the 2nd NAP, a method with high objectivity and the possibility of verifying the effectiveness of the policy will be derived.

# 5 Conclusions and the Way Forward

All OECD countries have now developed national adaptation policies. However, because of a range of conceptual and methodological challenges, difficulties remain across countries in understanding to what extent the policies have been implemented and whether they actually contribute to reducing climate risk. This concluding chapter summarizes the main takeaways from the case study on Korea and highlights some good practices in measuring adaptation progress as well as challenges that remain to be met for the country to strengthen its measurement framework for adaptation.[7)]

## 5.1 Korea's legal, institutional, and policy frameworks

### 5.1.1 Korea has strong foundations for developing and reviewing adaptation policies

With over ten years of experience in adaptation policies, Korea has developed robust legal, institutional, and policy frameworks for implementing adaptation actions and for measuring progress in implementation. Korea published two National Adaptation Strategies that give long-term directions for adaptation actions, with the aim to “establish a climate change adaptation system”. The third strategy, which is under preparation, will cover the period from 2022-2041. The strategies are complemented by short-term plans: the 3rd National Climate Change Adaptation Plan (2021-2025), the one currently in place, aims “to build a climate-safe nation with the public” and is accompanied by detailed implementation plans (i.e. sectoral plans) developed by 17 ministries.

Korea was among the first OECD countries to enact adaptation measurement in law with its Framework Act on Low Carbon and Green Growth, more than a

7) This draft chapter is based on desk research.

decade ago. The 2021 Framework Act mandates the development and disclosure of a progress report on its implementation, as stipulated in Article 39. It requires the government to annually review progress in the implementation of the adaptation measures and detailed implementation plans, and to present a synthesized progress report to the Presidential Commission on Carbon Neutrality and Green Growth, an inter-ministerial body chaired by the Prime Minister. This article puts emphasis on accountability by requiring that poor performance or areas needing improvement be reflected in future policies.

Through strong institutional coordination, Korea ensures that all relevant actors are involved in the design, implementation, and review of adaptation policies. The review is driven by the Ministry of Environment, with the analytical support from the Korean Adaptation Center for Climate Change of the Korea Environment Institute. Each implementing ministry carries out their own reviews of detailed implementation plans. The Presidential Commission on Carbon Neutrality and Green Growth also plays an important role in taking adaptation-related decisions in consultation with the MoE.

The architecture for local-level design, implementation, and review of adaptation policies was also well defined in the 2010 Framework Act. As required, 17 metropolitan cities, provincial governments, and 226 local governments (si/gun/gu) have established and are implementing five-year LAPs. The 2021 Framework Act stipulates that local governments (represented by Mayor/Do Governor and the head of a si/gun/gu) shall review progress in the implementation of their LAPs and submit a report to the Local Committee for deliberation, and to the Minister of Environment. Some OECD countries, such as Japan, either mandate or encourage the development of local adaptation plans. Fewer countries require their systematic review.

Public institutions, notably the 62 institutions that manage major infrastructure, are also mandated to develop adaptation actions and to report on them, which can help inform national reporting. This approach exists in other countries such as the United Kingdom where the Adaptation Reporting Powers allow institutions to report voluntarily on their activities related to adaptation. In Korea, public institutions have been subject to compulsory reporting since 2021.

### 5.1.2. Korea's climate change risk assessments are an important basis for policy making

Korea's climate is already witnessing changes, with varying temperature and precipitation levels. Based on the 2020 Korea Climate Change Assessment Report, 84 climate risks across six key policy areas (water, ecosystems, land/coasts, agriculture and fisheries, health, and industry and energy) were identified and informed the development of The 3rd National Climate Change Adaptation Plan (2021-2025). The risk list and the Korea Climate Change Assessment Report have been continuously updated and advanced based on the most recent scientific data.

For the 2020 report, which will be updated in 2025, a series of activities were carried out in order to narrow down the list of risks. First, a list of over 100 risks was drawn up from an extensive review of academic papers, and additional analysis was then undertaken to understand causality between the cause and effects of climate impacts. This exercise can be valuable in the context of adaptation measurement to understand the attribution effect of policies. Each risk was then compared against Korea's adaptation capacity and the urgency to address it.

At the local level, an indicator-based risk assessment tool (named VESTAP) was developed to facilitate local level risk understanding of hazards, exposure, and vulnerability. It focuses on 57 risks identified at a national level and highlights risk priority information for local governments to develop their respective LAP. These can be valuable tools to connect the science with policy decisions. A number of countries developed climate information portals for this purpose. For example, Chile created a climate risk atlas that maps with granular information of current and future climate projections, specifying hazards, exposure, and sensibility for selected systems (i.e. human settlement/heatwaves, hydrology/ drought) at a municipal level.

The information is shared on the Korea Meteorological Administration's climate information portal. As in other countries where this is the case, such as Chile's risk atlas, Korea spatially maps projections of climate risk for seven sectors, which can help sectors to prepare targeted adaptation measures. This is based on models (included in the MOTIVE system) that project climate risks for seven different sectors. The comprehensive information on climate risks that Korea has developed help provide a picture of the situation today. To assess whether implemented adaptation actions have contributed to reducing climate risk, it is critical to use the identified

risks as a baseline against which adaptation progress can be measured. However, it remains unclear how these serve as a basis for establishing objectives and targets, and reviewing progress. Germany, for instance, is currently in the process of developing objectives for its new NAS. This step is unprecedented, in that each ministry will establish measurable objectives based on sectoral risks identified in the country's climate risk and impact assessment.

## 5.2 Framework, methods, and instruments for adaptation measurement in Korea

### 5.2.1 The framework for adaptation measurement is well established

Overall, Korea's legal framework has established a sound basis for undertaking comprehensive reviews across sectors at a local level. The 2021 Framework Act requires the government to annually monitor progress in the implementation of the adaptation plan and to provide a progress report to the MoE and then to the Presidential Commission on Carbon Neutrality and Green Growth. It is valuable that the results from the reviews have to be disclosed to the Ministry of Environment, but also to the Carbon Neutrality Committee to strengthen transparency and accountability. The feedback can help to ensure that the results inform future policy decisions.

The frequency, methods, and depth of the reviews depend on the elements that are reviewed (Table 18). Since the 2nd NAP, the implementation of the plan is frequently reviewed, with annual, interim (year 3), and final evaluations (year 5). For the 2nd and 3rd NAPs, all projects (i.e. adaptation actions) listed in detailed implementation plans are reviewed annually and a selection of 100 critical projects are put under greater scrutiny, as further explained below. The overall implementation of the plan is reviewed in the third implementation year, with indications of where there is a need to revise detailed implementation plans, and again at the end of the period. Together with updated scientific evidence in the Korea Climate Change Assessment Report, the final evaluation of the 3rd NAP is expected to inform the development of the forthcoming NAP (2026-2030).

Table 18. Evaluation methods for the 3rd NAP

| Type | Overall | All projects in detailed implementation plans | 100 critical projects in detailed implementation plans |
|---|---|---|---|
| Self-evaluation | Interim and final | Annually | Annually |
| Expert review | Interim and final | Annually | Annually |
| Citizen review | - | - | Annually |

Note: Frequency of reviews and type of method used.
Source: Authors.

The first step of the reviews are self-evaluations that are carried out every year by implementing ministries for all projects (i.e. adaptation actions) of the detailed implementation plans. The results of the self-assessment evaluations are then collected by the MoE, reviewed by the KACCC and synthesized by the MoE in a report, before reporting them to the Presidential Commission on Carbon Neutrality and Green Growth.

While 341 projects were reviewed in the 2nd NAP, 286 projects are being reviewed for the 3rd NAP. Based on a standardized template, ministries self-evaluate and assign scores to their performance (i.e. whether the action has been well-implemented, delayed, or not implemented). The self-evaluation carried out by ministries is based on evaluation qualitative criteria. These focus on changes compared to the evaluation results of the previous year and related to the adequacy of the implementation process, inter-ministerial collaboration, policy communication, compliance with the implementation schedule, and budget disbursement, the extent to which the target set out in plan has been achieved, adaptive capacity, policy effectiveness, and adaptation mainstreaming. As the 2nd NAP Korea has revised the criteria to include an assessment of the projects' preparation, implementation, and performance, all of the criteria are measured on a four-point scale (very good, good, normal, and insufficient).

In addition, the results of the annual self-evaluations are confirmed by an expert review group that then evaluates progress as excellent, fair, or poor. The establishment of an independent expert advisory body is a common practice in OECD countries. This additional expert review, introduced in the 2nd NAP, strengthens the self-evaluation by bringing objective recommendations from the experts for the

future direction of the project. The group comprises five experts covering nine areas of adaptation (health, agriculture, land, agriculture, water management, industry, disaster, etc.). Interestingly, the group identifies implementation practices considered as best practices to replicate them across different regions or sectors.

Finally, for a selected shortlist of projects (i.e. 100 actions from the 2nd NAP and 49 actions from the 3rd NAP) that are considered critical, Korea introduced a public evaluation group/citizen review in its 3rd NAP, which together with the expert review group, selects and reviews critical projects and identifies best practices among them. The group evaluates the implementation, how well it has been mainstreamed and progress towards achieving the project's overall goal, including an assessment of effectiveness. For the 3rd NAP, a list of four qualitative criteria are used by the expert review and the public evaluation groups concerning: the inspection of projects (such as on-site inspection), policy communication and collaboration, building governance for detailed implementation plan, and achievement of performance goals and policy effectiveness. It remains to be assessed how useable these criteria are in practice.

Allowing the general public to directly participate in the review of the implementation process is a valuable practice—although uncommon—that can help raise awareness of the need to adapt, increase acceptance for implemented adaptation projects, and provide insights on the prevailing level of awareness among citizens of the need for adaptation. In addition, it can be helpful to collect information on the risks and levels of adaptation of organizations such as utilities and public bodies. In the United Kingdom, the Adaptation Reporting Power gives authority to the government to ask organizations to report on how they are addressing current and future climate impacts based on a voluntary approach. This reporting mechanism helps raise awareness and contributes to a better understanding of progress around adaptation by organizations. France utilizes a digital monitoring tool through which the ministries responsible for implementing the NAP, state operators, agencies, and deconcentrated state services, report on their progress made in implementing operational sub-actions.

These complementary methods can strengthen the results of the evaluations. The reviews benefit from frequent input from multiple entities responsible for the implementation and relevant stakeholders. The regularity also helps implementing

the build capacity of ministries to undertake the reviews and identify where implementation is hindered, taking corrective measures accordingly and using resources earmarked for projects efficiently. However, whether these processes are too burdensome for some ministries remains to be assessed.

At the local level, Korea established an advanced measurement framework to help provide an in-depth and regionally distinguished overview of adaptation progress. As stipulated by the 2021 Framework Act, the heads of each local government annually self-review the implementation of adaptation projects laid out in their LAPs and present a report to the Local Committee and the Minister of Environment.

Reflecting the national level, local governments undertake an annual evaluation of their detailed implementation plans and an interim inspection. The annual evaluation is based on a rating (insufficient, average, good, and very good) and an assessment of progress towards performance goals, implementation results, and limitations. It also sets out corrective action and feedback on the evaluation results. The heads of local governments are encouraged to collect opinions from a large variety of stakeholders such as local residents and NGOs, and incorporate their views into the evaluation. The involvement of local stakeholders can help increase acceptance and awareness of implemented adaptation projects.

Although Korea collects abundant views and information at a local level, which are reported to the MoE every year, it is unclear how the information feeds into the national progress assessment. Going forward, Korea may benefit from more effectively leveraging its strong mandate for local progress assessments. It will be crucial to incorporate local-level data and information on adaptation progress into national level reviews to reflect regionally differentiated trends and challenges and support those communities where adaptation is insufficient.

### 5.2.2 Gaps remain in what is measured

Overall, and as in many countries, the evaluation remains geared towards assessing the level of implementation in terms of process/action rather than in terms of results, despite efforts to overcome this challenge. For the review of the detailed implementation plans, the quality of implementation of the 341 projects is appreciated by the level of budget execution rate (quantitatively) and the level of performance achievement (quantitatively and qualitatively). The critical actions have

additional criteria related to the relevance of planning, the level of implementation, policy effectiveness and cooperation and outreach.

When it comes to the implementation assessment, the budget is used to indicate whether the action associated with it has been successfully implemented: a good performance means that the budget has been fully disbursed. However, more information is needed to understand how the budget is set in the first place and whether the budget has been spent efficiently rather than completely.

While Korea has developed a good understanding of whether actions have been implemented, it is also critical to know how changes have been brought about. Using (e.g. using a theory of change approach), like the United Kingdom embedded in its adaptation measurement framework, can help facilitate for a better understanding of causality between action and risk reduction. The approach maps out a logical sequence of a policy from inputs to outputs, outcomes, and finally impact. It also considers how change is brought about and its underlying dynamics. However, there remain gaps in understanding which elements drove improvements in that particular situation. Identifying the drivers for improvement and barriers to implementation can facilitate targeted corrective action. Objectives and targets need to be clearly grounded in science.

It would also be important to better link the evaluation with the key risks identified, in order to understand how the actions enable the reduction of climate risks. The risk assessment needs to establish a comprehensive understanding of climate risk. Ultimately, the question is whether adaptation progress is assessed against identified risks, and whether the actions taken have reduced them.

### 5.2.3 Indicators underpinning adaptation measurement could be strengthened[8)]

Developing a robust and comprehensive list of indicators can help monitor and review progress towards adaptation objectives. In addition to indicators that relate to climate risks (e.g. number of buildings exposed to sea level rise), adaptation indicators can measure inputs (i.e. the resources, such as staff or money that have been engaged to implement a policy), outputs, representing the products delivered

8) Desk research does not allow us to evaluate the extent of the data availability, quality, and usefulness of these indicators.

through a policy (e.g. establishment of a national drought information system), outcomes, representing the change that is brought about by outputs (e.g. peatland in favorable condition) and policy impact, signifying the broader impact these changes have on resilience of society, ecosystems, and the economy (e.g. carbon stocks are resilient).

Korea developed a range of indicators that have evolved over the years. A short list of key indicators and a longer list currently exist, respectively reflecting the NAP and the detailed implementation plans. The types of indicators, which are a mix of quantitative and qualitative indicators, vary according to detailed implementation plans and the nature of projects.

Indicators were first introduced in the 2nd NAP to monitor and evaluate its implementation. A combination of key performance indicators were developed for each sector indicator to assess progress in their respective detailed implementation plans. For the 3rd NAP, Korea established two lists of preselected indicators to support measuring adaptation. The first one, referred to as "policy indicators" (20 indicators in the 3rd NAP), relates to the targets of the policy mainly in terms of outputs, and indicates whether the policy has been implemented with a quantified target for 2025, for example, "expansion of flood forecasting points". The second indicator list refers to "public perception indicators" (16 indicators in the 3rd NAP) to complement with information on the usefulness and relevance of policy progress such as the "number of national drought information portal users". Although developing a list of public perception indicators can be considered good practice, the list would benefit from some adjustments to avoid overlaps with the policy indicators list when the focus is on the public beneficiaries of adaptation actions (e.g. the number of people covered by the flashflood forecast system or the number of flood forecasting points are both output indicators that are closely related). The second list could, for example, be targeted more towards the number of public users to gauge the participation of the public in adaptation actions.

In addition, qualitative and quantitative indicators were established to assess the detailed implementation plans. There are 396 indicators associated with 286 projects for the 3rd detailed implementation plans. The quantitative indicators show the progress rate of a project, quantity of outputs that result from a project such as the "number of consultations undertaken to support the establishment of adaptation

strategies for industries vulnerable to climate change", and the proportion of change. Qualitative indicators refer to whether the legal system has been improved, whether plans or guidelines have been prepared, and whether a system for review and evaluation has been established. Depending on whether the project is a general one or a public-selected project, the indicators are measured by the implementing ministry and the public respectively. The indicators were set by the implementing body with consideration for the type of project and the characteristics of the relevant ministries.

There have been extensive efforts to develop a comprehensive set of indicators. To a large extent, indicators reflect progress in the inputs and outputs of each action, rather than the medium-term outcomes and long-term policy impact that these might have. Further information is also needed to understand how these are developed in the first place, and to understand what drives indicator selection. For example, to what extent does data availability drive indicator selection? How do indicators relate to policy actions in other policy areas (e.g. water management and ecosystems)? Since the indicators are often project-specific, how can they help capture a comprehensive picture of progress? Who collects the data and information (including what is the role of the national statistical office)? How can policymakers ensure that they do not provide false incentives (i.e. to report on an activity but not actually provide climate risk reduction)?

There is also scope to ensure that the indicators are more oriented towards results in terms of risk reduction so that they can adequately inform future policy making. As a comparison, the UK Climate Change Committee assigned indicators to the respective steps from inputs to impacts, including indicators that would enable the measurement of outcomes and impact, even if data is not yet available to measure them. Identifying a so-called indicator wishlist can encourage subsequent methodological development and data collection to populate them. This is closely linked to the goal setting process, and the preparation of the third strategy represents an opportunity to ensure that the goals are not conservative and are not driven by what is within reach and achievable. It will be important, as a new climate risk assessment is being prepared to ensure that the review of progress is linked to it in order to provide a clear understanding of the adaptation gap.

**Box 3 Emerging findings**

- In light of the complementary review methods, which benefit from frequent inputs from multiple entities responsible for the implementation and relevant stakeholders, it is important to strike a balance between collecting the relevant information needed for the reviews without overburdening stakeholders.
- Data and findings from local progress assessments have the potential to be leveraged into national level reviews. This would help reflect trends and challenges that are differentiated regionally and help identify communities where adaptation is lagging.
- While there is a solid understanding of the level of implementation of actions, the reviews need to present opportunities to draw lessons on factors that drove improvement, and thus, which bottlenecks hinder the adaptation progress and facilitate targeted corrective action.
- In order to assess whether improvements have been brought about, implementation progress needs to be compared against changes in climate risks. As a new climate risk assessment is being prepared, there is an opportunity to use identified risks as a baseline to assess whether implemented measures and projects have led to a reduction in specific climate risks.
- Korea has developed a range of quantitative and qualitative indicators. As the indicators predominantly reflect progress in terms of inputs and outputs of each action, the list would benefit from the development of indicators that assess medium-term outcomes and long-term policy impact in terms of risk reduction.
- Understanding and measuring the impact of implemented measures are both closely linked to the objective setting process. The preparation of the 3rd National Adaptation Strategy presents an opportunity to establish objectives and targets that are i) based on scientifically identified climate risks, ii) linked to the review of progress, ideally through establishing indicators that measure progress towards set objectives, and finally, iii) ambitious.

Source: Authors.

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# Executive Summary in Korean

국가 기후위기 적응 정책 이행 모니터링 수준 측정 및 개선방안 마련 연구

## 1. 연구 개요

### ❑ 연구 배경

ㅇ 연구 사례 국가 일반 특성

- 대한민국은 동아시아 국가로 약 100,000$km^2$의 육지 면적에, 2021년 기준 총인구는 약 5,180만 명이며, GDP는 34,994달러에 해당
- 총인구의 90%는 전체 육지 면적의 약 17%에 해당하는 도시에 밀집 거주
- 삼면이 바다로 둘러싸여 있으며, 전체 지형의 약 70%가 산악지형에 해당

ㅇ 연구 사례 국가 기후 특성

- 기후변화는 서서히 변화하는 과정(예, 계절 길이 변화, 해수온 상승 등)과 극한 기후현상(예, 폭염, 홍수, 가뭄, 한파 등)을 통해서 지속적인 악영향 발생
- 최근 30년(1991~2020년)의 연평균 기온은 약 13.7℃, 연평균 강수량은 약 1,315.5mm이며, 사계절이 뚜렷함
- 여름철은 장마를 포함하여 온난 다습하고, 겨울철은 북서 계절풍의 영향으로 한랭건조한 기후 특성을 보임

### ❑ 연구 목적 및 수행 방향

ㅇ 연구 사례 국가 기후변화 적응정책 추진 개요

- 대한민국은 2010년 제정된 「저탄소 녹색성장 기본법」에 근거한 기후변화 적응정책 수립·이행 중
- 2021년, 2050 탄소중립 사회로의 이행을 위하여 「기후위기 대응을 위한 탄소중립·녹색성장 기본법」을 제정하고, 이에 근거하여 강화된 기후변화 적응정책 수립·이행 중

ㅇ 연구 목적 및 수행 방향
- 대한민국 기후변화 적응정책 이행평가 체계 및 이행평가 경험 소개
- 기후변화 적응정책 수립 및 이행 개요, 적응정책의 이행점검에 관한 제도적 현황, 국가 및 지자체의 기후변화 적응정책 이행평가에 활용하고 있는 지표(adaptation indicator) 활용
- 대한민국 사례 검토 결과를 종합하여, 기후변화 적응정책 이행평가 개선 목적의 향후 발전 방향 정책 제언

## 2. 대한민국 기후변화 적응정책 개요

### ❑ 대한민국 기후변화 적응정책 수립 및 이행 개요

ㅇ 환경부는 국가의 기후변화 적응정책을 총괄하는 주무부처로, 관련 법에서 다루고 있는 기후변화 적응정책 전반에 대한 의사결정과 공무 수행 중
- 관련 법에 따른 대통령 소속의 '2050 탄소중립녹색성장위원회'는 적응대책의 수립과 추진상황 점검과 관련한 심의·의결 역할 수행
- 위원회의 위원장은 국무총리와 대통령이 지명한 민간전문가 2인이며, 위원회의 위원은 50명 이상 100명 이내로 구성
- 위원회 사무처는 환경부와 함께 적응정책 전반의 사항을 협의하여 의사결정

### ❑ 대한민국 기후변화 적응정책 수립 및 이행 현황

ㅇ 기후변화 적응정책 수립 개요
- 중앙행정기관은 관련 법에 따른 20년 계획기간의 기후변화대응 기본계획 및 5년 계획기간의 국가기후변화적응대책에 포함되는 부문별 적응대책의 수립·이행 주체로 참여
- '제3차 국가 기후변화 적응대책(2021-2025)'(이하, 제3차 적응대책)을 기준으로 총 15개 중앙부처(환경부, 해양수산부, 국토교통부, 농림축산식품부, 행정안전부, 과학기술정보통신부, 보건복지부, 산업통상자원부, 고용노동부, 통일부, 기상청, 문화재청, 산림청, 농촌진흥청, 질병관리청)가 제3차 적응대책 세부시행계획 참여를 통해 구체적인 적응사업 시행
- 국무조정실과 기획재정부는 부처 간 업무 협의와 적응대책 시행을 위한 재정 운영 관련 업무 수행
- 환경부는 적응계획 수립에 참여한 중앙행정기관이 모두 참여하는 적응 협의체를 운영하며, NAS 및 NAP과 관련된 주요 의사결정 수행

ㅇ 주체별 기후변화 적응정책 수립 및 이행 현황
- 국가 단위의 기후변화 적응정책
  • 기후변화대응 기본계획(계획기간 20년)
  • 국가 기후변화 적응대책(계획기간 5년)
  • 국가 기후변화 적응대책 세부시행계획(계획기간 5년)
- 지자체 단위의 기후변화 적응정책
  • 광역지자체 기후변화 적응대책 세부시행계획(계획기간 5년)
  • 기초지자체 기후변화 적응대책 세부시행계획(계획기간 5년)
- 공공기관 단위의 기후변화 적응정책
  • 공공기관별 기후변화 적응계획

ㅇ 기후변화 적응정책 수립 및 이행 지원
- 과학적 기반의 근거 제공
  • MOTIVE를 활용한 기후변화 영향 예측 정보 제공
  • VESTAP을 활용한 지자체별 기후변화 취약성 우선순위 정보 제공
- 기후변화 적응 전문기관 운영
  • 기후변화 적응 관련 근거 제도(법, 지침 등) 마련
  • 기후변화 적응 관련 과학적 근거 마련
  • 모든 수립주체별 기후변화 적응정책 수립 지원
  • 기후변화 적응정책 이행 모니터링 수행

## 3. 기후변화 적응정책 이행평가 절차

### ❑ 대한민국의 기후변화 적응정책 이행평가 개요

ㅇ 관련 법에 따른 기후변화 적응정책 이행평가
- 관련 법에 따라 기후변화 적응대책 이행평가의 근거 제공
- 관련 법 제39조를 통해 수립주체별 기후변화 적응정책의 추진상황 점검을 규정
- 적응대책 세부시행계획의 추진상황을 매년 점검하고, 이행실적, 우수사례, 부진사항 및 개선사항을 포함하는 결과 보고서를 작성하여 위원회의 심의를 거쳐 공개

### ❑ 주체별 기후변화 적응정책 이행평가 현황 및 특성

ㅇ 국가 단위의 기후변화 적응정책(제3차 국가 기후변화 적응대책)
- 정부, 광역 및 기초지자체, 전문가, 시민사회, 청년, 산업계 등 모든 이행주체가 참여하는 국민평가단을 구성하여 대표과제를 중심으로 이행상황 점검 및 평가를 수행

- 매년 상세한 시행계획이 이행되며 성과평가회를 포함하여 관계부처 합동으로 이행평가가 수행(정책 지표와 국민체감 지표를 바탕으로 관리)
- 이행평가 결과는 개선된 차년도 실행계획을 작성하는 데 활용

ㅇ 지자체 단위의 기후변화 적응정책
- 이행평가 지침을 통해 각 지자체의 이행점검 일반사항, 기준 및 방법, 행정사항을 제시
- 지자체 이행평가의 기본 원칙은 각 지자체의 특성을 반영하여 수립한 소관 적응정책을 스스로 진단하고 환류하는 자체평가 방식
- 적응대책 주관부서는 세부 이행과제들의 계획목표 및 계획예산과 이행 실적을 비교하고, 평가결과서를 작성하여 통보 및 조치
- 지자체의 자체평가결과 보고서는 국가-광역지자체-기초지자체 간 연계성을 검토하여, 지방위원회 심의를 거쳐 환경부 장관에게 제출

## 4. 기후변화 적응정책 이행평가 지표

### ❑ 국가 기후변화 적응대책 이행평가 구조

ㅇ 국가 기후변화 적응대책 수립 지표에 따른 성과 검토
- 5년 단위 계획 수립 시 목표 성과를 설정하고 이에 대한 이행 정도를 검토

ㅇ 세부시행계획의 전 과제에 대한 이행평가
- 매년 세부시행계획 전 과제에 대한 이행평가 수행
- 세부시행계획별 성과목표에 대한 달성 수준 평가 및 공통평가 항목으로 구성

ㅇ 중점관리과제에 대한 이행평가
- 매년 세부시행계획 중 중점관리과제에 대한 이행평가 수행
- 중점관리과제별 성과목표에 대한 달성 수준 평가 및 공통평가 항목으로 구성

ㅇ 국가 기후변화 적응대책 전반에 대한 이행평가
- 이행 3년 차와 5년 차에 적응대책 전반에 대한 이행평가 수행
- 기후변화 적응정책의 이행에 따라 기후변화 리스크 저감 수준 평가

### ❑ 국가 기후변화 적응대책 지표 체계

ㅇ 기후변화 적응정책 수립 지표(제3차 국가 기후변화 적응대책 및 세부시행계획)
- 3대 정책, 6개 세부 부문으로 구성되어 있으며, 기후탄력성 제고, 취약계층 보호, 시민참여 활성화, 신기후체제 대응을 핵심전략으로 수립

- 12대 추진과제와 36개 중점 분야에 따라 구분하여 이행 중
- 국민 체감형 대책을 고려한 49개 사업을 선정하여 별도의 이행평가 수행
- 제3차 적응대책에서는 대책 이행 과정을 점검하고 평가하기 위하여 적응대책 핵심지표를 설정
  - 부문별 20개의 정책 지표와 16개의 국민체감 지표를 설정
  - 매년 체계적인 이행 모니터링을 통해 대책의 성과 점검
  - 총 36개 지표는 정성적인 항목과 정량적인 항목으로 구성
- 제3차 세부시행계획은 총 286개 과제로 구성
- 제3차 세부시행계획 286개 과제의 수립 지표는 정량적 성격의 지표와 정성적 성격의 지표가 혼합되어 있으며, 과제의 종류와 소관 부처의 특성을 고려하여 설정

ㅇ 이행평가 지표(제3차 국가 기후변화 적응대책 및 세부시행계획)

- 각 과제에 대한 이행 모니터링을 위한 프레임워크 구성
- 전 과제는 매년 이행 모니터링 대상이 되며, 과제가 완료되는 시점까지 모니터링 수행

## 5. 결론 및 정책 제언

### ❑ 대한민국 기후변화 적응정책 이행 모니터링 수준 진단

ㅇ 진단 결과에 따른 대한민국 사례의 우수성

- 강력한 제도적 조정을 통해 대한민국은 모든 관련 행위자가 적응정책의 설계, 구현 및 검토에 참여
- 위험목록 및 한국 기후변화 평가보고서는 최신 과학자료를 바탕으로 지속적으로 업데이트 및 고도화 진행 중

ㅇ 향후 개선을 위한 방향 제언

- 이행된 적응 조치가 리스크 감소에 기여했는지 여부를 평가하기 위한 방법과 관련하여 추가적인 노력이 필요
- 강력하고 포괄적인 지표 목록을 개발하면 적응 목표를 향한 진행 상황을 모니터링하고 검토하는 데 도움이 될 것

주제어: 기후변화 적응정책, 이행평가 체계, 국가 기후변화 적응대책, 지자체 기후변화 적응대책 세부시행계획

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Major Publications

- Development and Pilot Implementation of a Climate Change Risk Assessment Technique(기후변화 주요 리스크 진단 기법 개발 및 시범사업)(2022)
- Development of Framework for Decision Support Integrated Impact Assessment Platform and Application Technology for Climate Change Adaptation(기후변화 적응을 위한 의사결정형 통합 영향평가 플랫폼 기반 구축 및 활용기술개발)(2022)

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