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Climate Change Adaptation and Audits: Country Case Studies

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Pierre Moscovici, First president of the French Cour des comptes.
Source: Cour des comptes

The French Cour des comptes' Annual Public Report on Public Action to Adapt to Climate Change

By Pierre Moscovici, First president of the French Cour des comptes

The French Constitution entrusts the Cour des Comptes with the task of informing the public through its public reports. The Annual Public Report (APR) is an essential vehicle for this information. The law specifies that it concerns "a major public policy issue to which the Cour des Comptes wishes to draw the attention of the public authorities and contribute to informing citizens". In its 2024 annual public report, the Cour des Comptes examined the theme of public action to adapt to climate change.

This issue concerns all areas of public action. It primarily concerns administrations of all kinds and at all levels - government departments, local authorities, national and local public establishments, public companies - but must also involve all players in society: households, businesses, the educational community, associations and the world of research. The citizen, however, is at the heart of the matter. Nothing can be done without them, let alone against them. And yet, many of the measures envisaged to respond to the effects of climate change will modify their living conditions, in their most essential aspects: food, housing, transport, leisure activities and so on.

Adapting to climate change is a complex issue. It involves adapting to extremely diverse phenomena (heatwaves, forest fires, cyclones, floods, etc.), the effects of which manifest themselves on different territorial scales and time horizons, in an otherwise changing context. These particularities make adapting to climate change a particularly suitable topic for financial jurisdictions to exercise their role as trusted third parties in relation to decision-makers and the public.

The investigations undertaken for this report involved the six thematic chambers of the Cour des Comptes and all 17 regional and territorial audit chambers. Most of them concerned policies shared by the State and local authorities. They were designed and carried out with a view to providing answers to the major questions that the French ask themselves when the theme of adapting their living environment, their surroundings and their activities comes to the fore.

The first is to know what to expect in concrete terms, and in what timeframe: they want to understand and anticipate the consequences of climate change on their everyday lives. They also want to know how the efforts required to adapt to climate change are to be identified, decided and shared between all the players involved: adaptation must not be seen only from a technical point of view, it is also a democratic issue. The complexity of adaptation and the scale of the expenditure involved, at a time when the state of public finances is increasingly worrying, finally lead them to ask how to design and implement solutions that are both appropriate and sustainable: what can be done efficiently at the lowest cost?

With this in mind, the financial jurisdictions first looked at three cross-cutting themes: the place and role of public research in adapting to climate change, the role of financial and banking institutions in adapting the economy to climate change, and the contribution of the Agence française de développement to adapting to climate change in developing countries.

The financial jurisdictions have also examined the impact of climate change on the living environment of the French people and on major public infrastructures. To this end, they examined the issue of adapting housing and urban centers, as well as integrating this issue into the State's real estate policy. Taking account of the consequences of climate change in the management of nuclear power plants, hydroelectric facilities, electricity transmission and distribution networks and railroads, in terms of both operation and investment, is also a major challenge that has given rise to specific investigations. The specific situation of the French Ministry of the Armed Forces was examined from the same angle.

Climate change also has consequences for the natural environment in which the French live and work. The financial jurisdictions have examined the way in which these effects are anticipated and dealt with in forest and coastline management, as well as in the prevention of climate-related natural disasters overseas and the protection of vulnerable people from heat waves. They also looked at how cereal crops and mountain resorts can adapt to climate change.

Four key lessons emerge from this body of work.

1 The first is the need for better knowledge of the effects of climate change, the risks to which we need to adapt and their magnitude. We absolutely must improve the data we need to make more accurate and reliable projections, and adapt the applicable standards to take account of changing risks. In these three areas (data, projections, standards), the work of the financial jurisdictions has highlighted the extent of the progress that needs to be made. For example, the tools used to survey and diagnose the condition of the 200,000 or so buildings that make up the State's real estate assets are still in the process of being deployed, and provide incomplete data for only two-thirds of them. The financial jurisdictions have also noted that weather forecasts for the French overseas territories are of poorer quality than those for mainland France, despite the fact that these territories are more exposed to risks and more vulnerable due to the concentration of the population on the coast and the high proportion of precarious housing.

2 The second key lesson concerns the need to inform citizens and decision-makers about the challenges of adaptation. Informing the public about the risks and the choices to be made, but also about the opportunities offered by adaptation measures, is the sine qua non for public support for the approach: the effective deployment of these measures must be preceded by major efforts to convince people of their necessity and their benefits. For example, financing comprehensive renovation projects, including not only changes to heating systems, but also improvements to ventilation, insulation and solar protection, not only enhances comfort for residents, but also encourages building firms to recruit skilled professionals to carry out this type of work.

3 The investigations carried out by the French financial authorities have also highlighted the need for public action to develop a coherent, coordinated strategy, in other words, to plan society's adaptation to climate change. First and foremost, adaptation objectives need to be reconciled with those of many other public policies - for example, in tourist areas such as mountains and coastlines, the desire of elected representatives and local populations to preserve their economic model for as long as possible. We also need to establish a genuine culture of planning and risk management, deploying planning instruments at the right territorial scale and, in the many areas where several players are involved, coordinating these instruments with one another. Implementing rigorous, appropriate planning is a necessary but not sufficient condition for effective action: we also need a pilot who can arbitrate and coordinate the actions of these multiple players. The State must also play its full role as strategist, setting clear objectives and defining a path to achieve them.

4 Lastly, the sixteen surveys carried out by the financial jurisdictions have highlighted the scale of the challenge of financing adaptation policies. In a tight budgetary context, this challenge can only be met by making the search for efficiency - that is, effectiveness at the lowest cost - an absolute priority. In this respect, the report warns against the risks of maladaptation inherent in the implementation of emergency measures (such as over-reliance on air conditioning, the systematic deployment of artificial snow production systems in winter sports resorts, or the regular replenishment of sand on beaches threatened by maritime erosion) that are effective in the short term but costly in the medium and long term. Research obviously has a major role to play in finding appropriate solutions and helping public players to determine the right methods and timetable for their implementation. We also need to improve our assessment of the costs of adaptation, which is still too often incomplete or non-existent. The "price truth" is indeed an essential element of arbitration in defining and implementing financially sustainable solutions. However, adaptation need not necessarily involve new public spending. There are other levers that can be used, and these involve encouraging players to act and making them more accountable.

In most of the sectors examined, there is still a great deal of progress to be made, but the urgency of adaptation is now recognized and, to varying degrees, public players have begun to organize themselves in response. For its part, the Cour des Comptes, which is involved in the ClimateScanner Initiative, has decided to support this process by producing an annual report on ecological transition, the first edition of which will be published in September 2025.

EDITORIAL

Isma Yatun, Chair of the Audit Board of the Republic of Indonesia. Source: Audit Board of the Republic of Indonesia

How Can the SAI Community Become More Active and Visible In Its Involvement In the Implementation Of Sustainable Development Goals (SDGs)?

Author: Isma Yatun, Chair of the Audit Board of the Republic of Indonesia

This editorial expresses the opinions and beliefs of the author and do not necessarily reflect the views or policies of INTOSAI. The topic was presented during Dr Isma Yatun's honorary professorship ceremony on 5 September 2024 at Nanjing Audit University.

Overview

The Sustainable Development Goals (SDGs) Report 2024 indicates that only 17% of the SDG targets remain on track as planned. The COVID-19 pandemic, global conflicts, and climate change have profoundly and significantly impacted progress towards meeting the SDGs.

Other technical factors related to mainstreaming SDGs into national policies have further exacerbated the condition. While SAIs' involvement has been essential in advancing the implementation of SDGs within individual country's level, results from monitoring and evaluating the achievement of SDG targets at the global level raise an essential question about the effectiveness of governance arrangements within the United Nations (UN) for the management of SDGs globally. A proposed governance and accountability model for the management of SDGs at the global level would see the SAI community step forward in providing assurances and comprehensive assessments regarding the UN's performance in steering the global implementation of SDGs.

Introduction

As we are currently over the halfway stage of the 15-year cycle (2015-2030), it's crucial to note that the evaluation of the 17 Sustainable Development Goals (SDGs) indicates the commitment to leaving "no one behind" is in peril. This underscores the urgent need for all of us, the SAI community, to step up our efforts in the SDG implementation journey. Given the current state of the world and the ongoing global challenges, the UN member states have encountered difficulties in meeting the obligations outlined in the 17 Goals of the 2030 Agenda. The SDGs Report 2024 indicates that only 17% of the SDG targets remain on track as planned, while almost half are making minimal progress, and progress on over one-third has stalled or even regressed (UN, 2024).

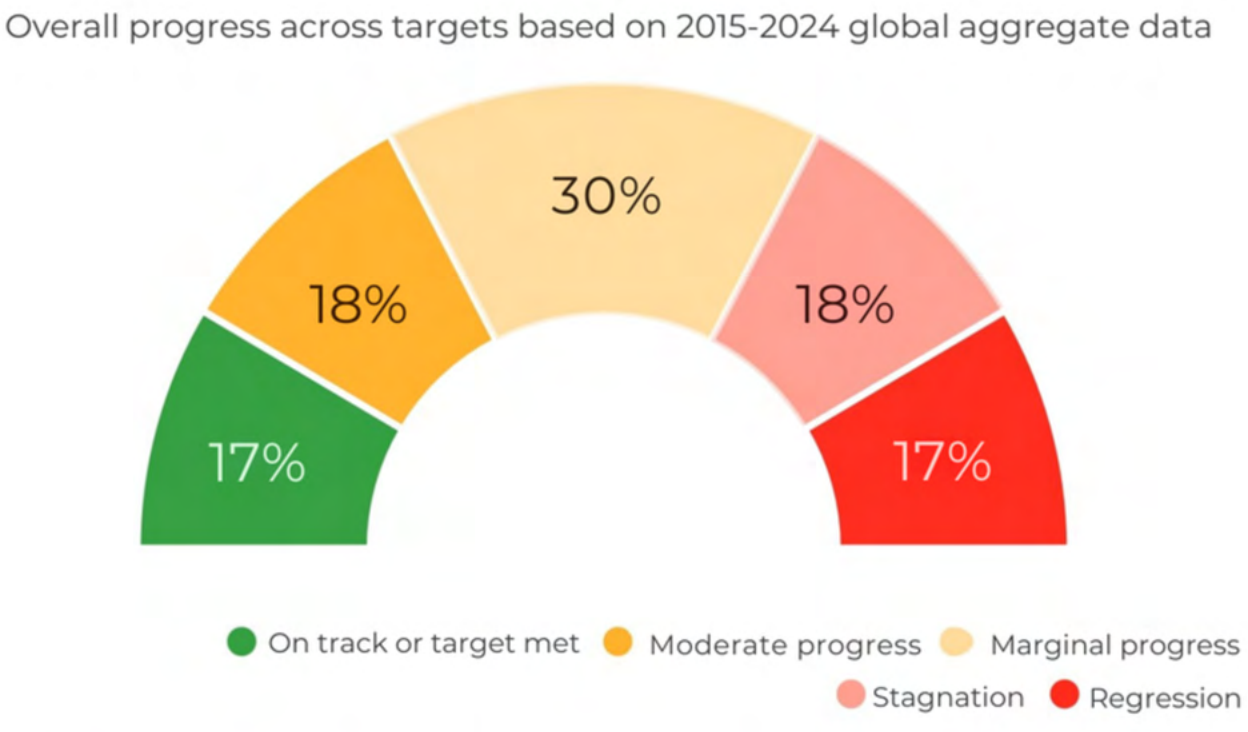

Figure 1: 2015-2024 Global Aggregate Data. Source: Audit Board of the Republic of Indonesia

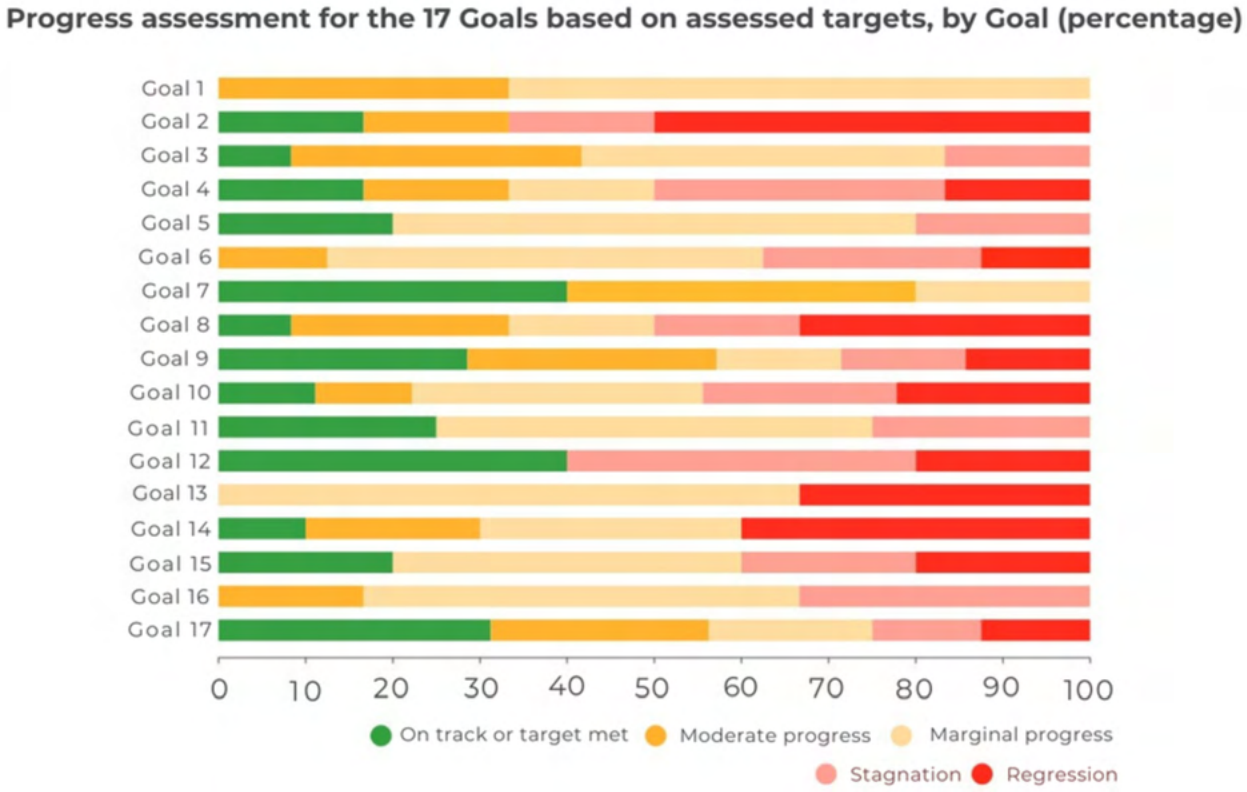

Figure 2: Progress Assessment for the 17 SDGs. Source: Audit Board of the Republic of Indonesia

Challenges in the implementation of SDGs

The COVID-19 pandemic, global conflicts, and climate change have profoundly and significantly impacted SDG progress, resulting in a low percentage of targets being on track (UN, 2024). The effects of the COVID-19 pandemic have further complicated the implementation of the SDGs, revealing and widening existing gaps (Desai, 2023). The pandemic led to significant job losses and disruptions in small businesses, further widening the gap between different socio-economic groups (Hannan et al, 2022). It also strained health systems, diverting resources and attention away from other critical health services (Chiluba et al, 2020). Global conflicts are at an all-time high, leading to millions being displaced and hindering progress on the Sustainable Development Goals (SDGs). Climate change also presents a significant barrier to achieving the SDGs, particularly for developing and least-developed countries.

It contributes to forced displacement due to natural disasters and resource scarcity. This vulnerability continues to impede poverty reduction, health, and education goals.

In addition to those factors, the implementation of SDGs still faces several challenges. Among these is the need to mainstream the SDGs into local policy, planning, and budgeting frameworks, as well as monitoring and evaluation processes (Nwogbo, 2022). Mainstreaming goes beyond integrating the SDGs into national and local development planning; it also transcends managing and designing policies to examine the plan goals' effectiveness further (Duah et al., 2020). Several factors can contribute to the challenges of effectively implementing the SDGs, including inconsistencies in data and information provided by stakeholders, insufficient awareness of the SDGs' importance, inadequate commitment and skilled human resources, ineffective bureaucracy, limited funding, and challenges in aligning activities with specific SDGs.

Roles of SAIs and SAI Community

To address such challenges, peace, solidarity, and increased international cooperation – notably strengthening the role of the SAI community – are crucial (Breuer and Leininger, 2021). The international community has called upon SAIs to contribute, within their mandates, to the success of the SDGs. SAIs, for example, can be instrumental in ensuring that national governments place these international commitments on their agendas and pursue them with transparency and accountability (Dutra, 2018). Globally, SAIs have also engaged with the SDGs in other ways beyond audits (Montero and Le Blanc, 2019). SAIs' commitment to achieving SDG targets has also manifested through their active role in various international forums and initiatives related to or incorporating aspects of SDGs.

SAIs' involvement has been essential in advancing the implementation of SDGs within their jurisdictions. By including SDGs in audit mandates, SAIs have emphasised their importance and reinforced governance and accountability mechanisms for their attainment. SDG audits by SAI have provided valuable insights into government efforts, highlighted successes and limitations, promoted accountability, and offered actionable recommendations (Le Blanc and Montero, 2020).
The positive impact of SDGs audits at a country level cannot be overlooked, albeit the results from monitoring and evaluating the achievement of SDG targets across countries and at the global level present a different perspective. This situation raises a significant question, including for the SAI community, about the effectiveness of governance arrangements within the UN for the management of SDGs globally.

Traditionally, INTOSAI has focused on enhancing the public sector auditing profession, building SAIs' capacity, and facilitating knowledge sharing among SAIs. INTOSAI's role in implementing SDGs at the global level follows a similar approach. INTOSAI directs its efforts and strategies towards bolstering individual SAIs' capacity to oversee SDG implementation in their respective jurisdictions.

The proactive stance of the SAI community in organising side events at the United Nations High-Level Political Forum (UN-HLPF) and its associated initiatives has strengthened the capacity of SAIs around the globe to oversee SDG implementation in each country. Nevertheless, their involvement in the overarching governance and accountability of SDGs implementation at a global level from the UN perspective remains peripheral. This disconnect highlights a critical gap in the global management of SDGs, where the role of the SAI community could be instrumental.

The SAI community, chiefly INTOSAI, whose strategic goals include enhancing its global value, is increasingly relevant to supporting the UN in managing the implementation of the SDGs.

Isma Yatun, Chair of the Audit Board of the Republic of Indonesia. Source: Audit Board of the Republic of Indonesia

A Proposed Role of the SAI Community

A proposed governance and accountability model for the management of SDGs at the global level would see the SAI community step forward in providing assurances and comprehensive assessments regarding the UN's performance in steering the global implementation of SDGs. In particular, INTOSAI has the potential to broaden its influence as an international organisation by extending its oversight role to include the implementation of global programs managed by the UN. Proposing the role of the SAI community to oversee governance arrangements established by the UN in the implementation of SDGs might be an avenue for enhancing the role of INTOSAI towards a successful implementation of SDGs.

The multitude of UN-managed global programs may benefit from a comprehensive external audit that takes a holistic approach and thoroughly reviews these initiatives. Presently, the audit tends to focus on the UN's individual entities' mandates rather than addressing broader and overarching issues across various UN bodies. This approach has limitations, mainly in the context of SDGs implementation, where the interconnectedness of diverse actors has yet to be fully assessed.

Introducing such a proposed model would represent a significant shift. The SAI community would become a key player in sustainable development, leveraging its expertise to enhance the effectiveness of global SDG implementation far beyond national borders. By conducting extensive audits and performance evaluations, the SAI community have the potential to enhance transparency and accountability in the UN's initiatives. It could lead to more effective and equitable progress towards the SDGs' intended outcomes. The analysis indicates that the SAI community's ability to impact global SDGs implementation is significant but has yet to be fully utilised. It presents an encouraging opportunity to fortify the governance and accountability structures essential for sustainable development.

Conclusion

The SAI community needs to develop a more robust governance framework for the implementation and management of SDGs, particularly at the global level, for the latter half of its implementation period from 2024 to 2030. Collaboration with the academic community might be required as it can significantly facilitate the effective implementation of evidence-based policymaking in the SDGs' governance framework. At the same time, such contributions could also provide valuable insights for SAI Indonesia as it assumes the chairmanship of INTOSAI from 2028 to 2031. During its chairmanship of INTOSAI, SAI Indonesia will encourage the SAI community to safeguard the achievement of the SDGs in the final year of their implementation in 2030 and to devise a phase-out strategy, including participation in shaping any global agenda post-SDGs.

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Source: Audit Office of the Republic of Cyprus

Combatting Climate Change in Cyprus - Water Resource Management: A Performance Audit Carried Out in The Framework of the INTOSAI IDI's Global Cooperative Audit of Climate Adaptations Actions

Author: Christina Meshiti, Audit Office of the Republic of Cyprus

Background

Cyprus has been facing water scarcity for years. The lack of natural surface water systems, such as lakes and rivers, has historically led to excessive exploitation of groundwater.

Over-extraction from underground water bodies, in combination with reduced rainfall, as a result of climate change, have led to the current situation, where most of Cyprus' aquifers are in poor condition. To address the need for sufficient water reserves, in the past, the government has constructed dams to collect rainwater that would otherwise flow into the sea and has developed infrastructure to transfer water to areas with less rainfall, with the Southern Conveyor Project being the most significant. However, the reduction in rainfall mentioned above impacts adversely on the quality of water collected in the dams.

In addition to the above, two unconventional sources of water are used to address the water shortage: desalinated seawater and recycled wastewater following tertiary treatment. Desalinated water is used to cover drinking water needs, whilst recycled water is used for the irrigation of agricultural crops and green areas, in accordance with good agricultural practices for the use of recycled water. Despite these efforts, water scarcity remains a major problem in Cyprus, with adverse effects on the environment, agriculture, development, and public health, which have been exacerbated in recent decades due to climate change.

Audit Objectives

The main objective of the audit, currently being carried out within the framework of the INTOSAI IDI's Global Cooperative Audit of Climate Adaptation Actions, is to assess the current situation regarding water resource management in Cyprus and to ascertain whether the actions promoted by the Republic of Cyprus for water management are adaptive to the climate crisis and have been designed and implemented in an economic, efficient and effective way.

Audit Approach

We adopted a system-oriented approach to assess the resilience of the water management system to the impacts of climate change.

Audit Criteria

The audit criteria utilized for this audit are the European Union's Water Framework Directive, which establishes the legal framework aimed at preventing and reducing pollution, promoting sustainable water use, protecting and improving the aquatic environment, and mitigating the effects of floods and droughts, along with other relevant European and national legislation.

Preliminary Study

The Audit Office of the Republic of Cyprus conducted a performance audit in 2016*(1)(2)* on water resource management in Cyprus to evaluate the national strategy and policies in the water sector, considering the economy, efficiency, and effectiveness of government entities and other statutory bodies involved in water management. In 2023-2024, we conducted a follow-up audit, with the main objective of presenting the current situation regarding water resource management in Cyprus and determining whether, eight years after the publication of our 2016 report, the relevant authorities have taken measures to adequately address the issues identified and improve the situation.

Source: Audit Office of the Republic of Cyprus

(1) Executive summary in English: https://www.audit.gov.cy/audit/audit.nsf/all/BD5DA8816D376C1CC225842E00272F24?OpenDocument
(2) Special report in Greek: https://www.audit.gov.cy/audit/audit.nsf/all/A640D760A3211AB7C2258394002909DA?OpenDocument

Additionally, in 2012, our Office published a report*(3)* on climate change adaptation in Cyprus, which included a special section on water resources.

Given the above, we have gathered information on the audit topic and the audited entity's operations, built knowledge, and established the conditions for a successful audit. To enhance our understanding of the subject matter, we also conducted a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis.

Source: Audit Office of the Republic of Cyprus

Methods/Audit Procedures Used to Gather Evidence

The audit team is using multiple methods to gather evidence, manage risk, and corroborate information from various sources, including interviews, document collection, and site visits. During the audit, we ensured that these approaches enabled the audit team to obtain evidence that addresses the audit objective and answers the audit questions. Our methodology was refined or adjusted as necessary throughout the audit process.

(3) Special Report in Greek: https://www.audit.gov.cy/audit/audit.nsf/all/4DD5CBEC38E418A9C22586FE002FFDF0?OpenDocument

Preliminary Findings

Climatic factors such as rising temperatures, changes in rainfall patterns, increased evapotranspiration, and the higher frequency and duration of droughts have affected the availability and quality of natural water resources in Cyprus, despite the measures the country has taken to adapt to climate change.

A significant percentage of rainfall (86%-90%) in Cyprus continues to be lost through evaporation, and the country has exhibited a water deficit balance even after utilizing non-conventional water resources. Cyprus' limited water resources are vulnerable to the impacts of climate change, with groundwater bodies under pressure due to excessive extraction, and seawater intrusion in coastal areas.

The sector most affected by this situation is agriculture. Irrigation needs are not always met, as water reserves (natural surface water and non-conventional sources) are prioritized for meeting the country's drinking water needs, while groundwater bodies are strained by agricultural withdrawals. Therefore, there is an urgent need to shift towards drought-resistant and / or less water demanding crops.

Drinking water needs are largely covered by the operation of desalination plants, though at significant financial and environmental costs, as these operate on conventional fuel, therefore creating an increase in greenhouse gas (GHG) emissions.

The good condition of the aquifers is a key issue, in order to ensure water supply in mountainous areas, which, due to their elevation/altitude, are mostly dependent on acquirers, as it is very difficult to transfer, to those areas, water from desalination plants.
Another key issue to consider is the need to ensure the good condition of the dams' and aquifers' protection zones, as they significantly impact water quality.
Regarding strategic planning, delays were observed in the preparation and/or updating of specific strategic and management plans.

Conclusion

Our preliminary findings highlight the urgency of implementing adaptive measures, including promoting drought-resistant crops, improving aquifer and dam protection zones, and expediting the development of comprehensive water management plans. These steps are essential for securing the availability and quality of water resources, mitigating the environmental and economic costs associated with current practices and building resilience against the ongoing and future impacts of climate change.
Moving forward, it is critical for authorities to address identified gaps and delays in strategic planning and to prioritize actions that balance economic, environmental, and social considerations.

Lighthouse on the Carita beach, Banten, Indonesia. Source: Adobe Stock Images, Leo Lintang

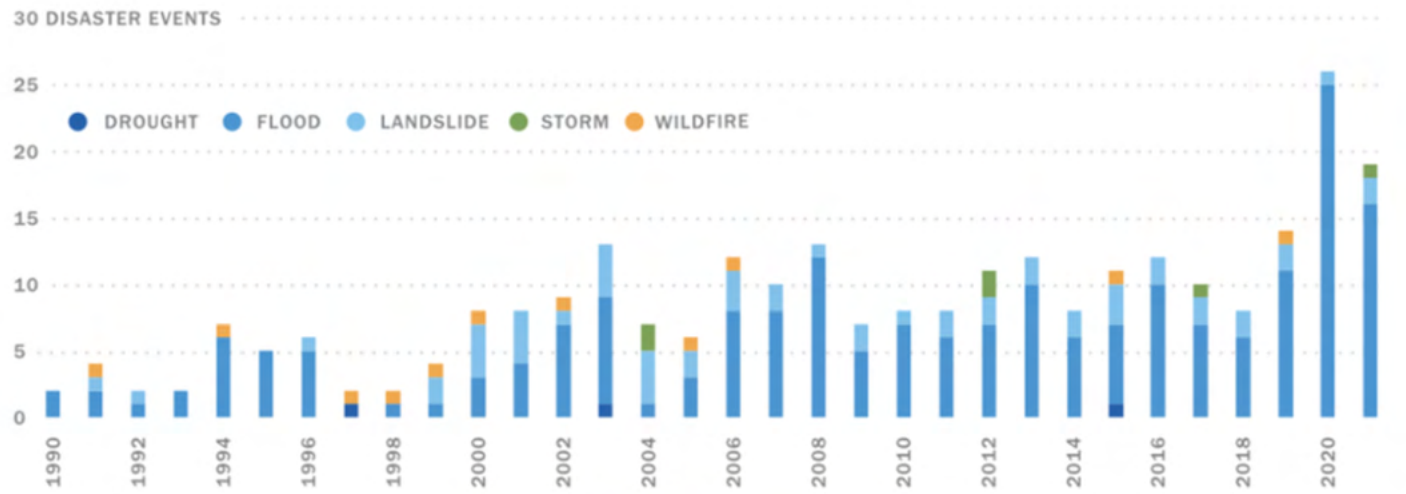
BPK Audit: A Lighthouse Guiding Indonesia in Sailing the Ocean of Climate Crisis

Authors: Ahmad Adib Susilo, Muhammad Rafi Bakri, Ratna Wulandari

Introduction

According to the State of the Climate in Asia (2023) report, the average temperature of Asian countries in 2023 rose by 0.91 degrees Celsius compared to the period from 1991-2020. This results in a rise in sea surface temperature, which further intensifies tropical cyclones and severe rainfall that leads to floods and landslides. Indonesia has encountered a total of 300 natural disasters, including 200 instances of flooding between 1990 and 2021. These events have caused harm to around 11 million individuals. Figure 1 shows that all-natural disasters that happened in Indonesia were caused by climate change.

Figure 1. Climate-related Disasters



Source: State of the Climate in Asia (2023)

If this state is left to persist, it will result in unfavourable outcomes. Nationally, climate change leads to a decrease in agricultural productivity, hence undermining food security. In the event of food insecurity, there will be an uncontrolled surge in commodity prices. This will trigger a chain reaction that impacts both the national supply and demand, leading to economic instability (Ministry of Environment and Forestry of Indonesia, 2023).

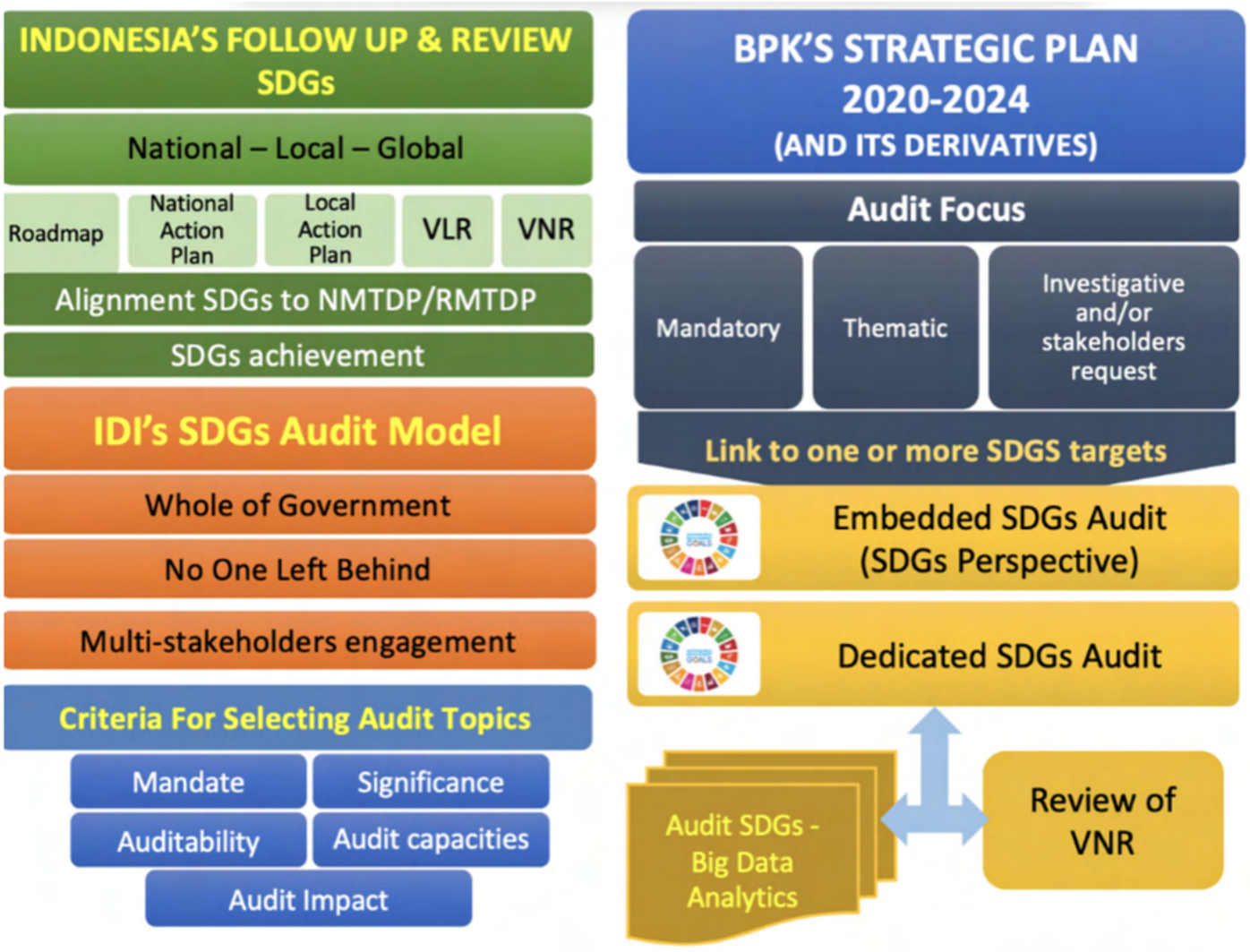
To mitigate the effects of climate change, multiple stakeholders, including the Supreme Audit Institution (SAI), must be involved. The SAI has the capability to audit government initiatives aimed at preventing or mitigating the consequences of climate change. Both financial and performance audits can be conducted to support the government in reducing the impact of climate change.

BPK's Commitment to Combating Climate Change

As an active member of INTOSAI, the Supreme Audit Institution (SAI) of Indonesia, or BPK, is committed to supporting sustainable development goals (SDGs) implementation, especially SDG 13 concerning the handling the climate change. In conducting SDG mapping, BPK refers to the implementation of INTOSAI-P 12 Value and Benefits of SAI, that the value and benefits of SAI are "making a difference to the lives of citizens". BPK aligns its audit strategy to oversee the implementation of SDGs that have been integrated into the 2020-2024 Indonesia's National Medium-Term Development Plan (NMTDP). BPK audits are expected to benefit the community, both directly and indirectly. BPK has outlined the audit plan and strategy in a BPK Strategic Plan 2020-2024.

BPK has adopted a dedicated audit strategy specifically designed to evaluate the processes and outcomes related to SDG targets. This strategy utilizes the INTOSAI Development Initiative's (IDI's) SDG Audit Model (ISAM), which enables BPK to conduct thorough audits of policies and programs that contribute to achieving nationally agreed SDG targets. Through these audits, BPK assesses the progress made toward achieving these targets. Figure 2 shows how BPK is committed to auditing climate change management.

Figure 2. BPK's Strategic Plan Related to Climate Change



Source: BPK's Report (2024)

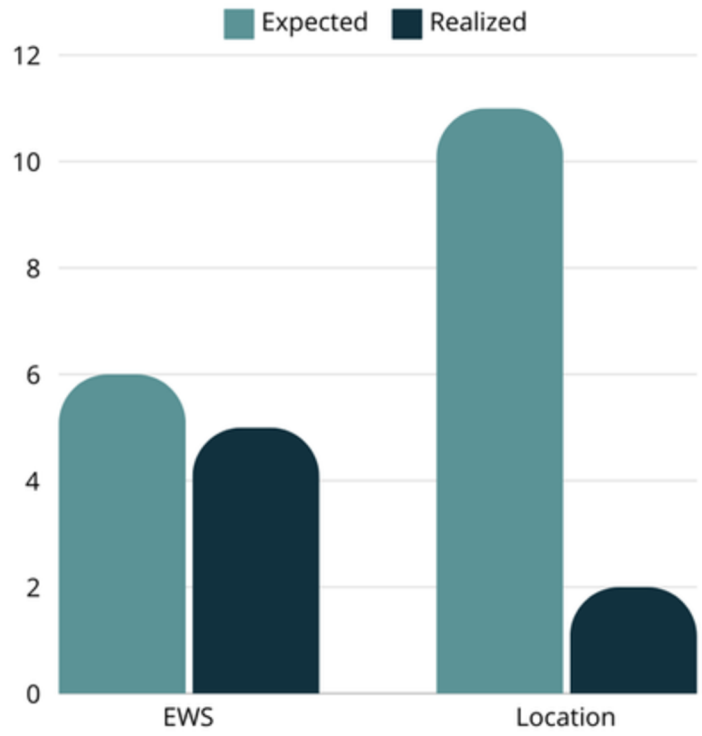
Performance Audit: Bolstering Hydrometeorological Disaster Risk Reduction Efforts

Assessing the disaster vulnerability in Indonesia is one of the responsibilities of the National Agency for Disaster Countermeasure (BNPB). BNPB publishes the Indonesian Disaster Risk Index to evaluate the possible impact of disasters in Indonesia. Regular evaluation of this risk index can serve as a monitoring and assessment tool for the successful implementation of disaster management strategies within a specific timeframe.

BNPB has implemented several schemes to establish an Early Warning System (EWS), a system designed to alert people of the occurrence of natural disasters or other indicators of natural events. Issuing an early alert to the community about a disaster involves disseminating information in a manner that is readily understandable to the community. To ensure optimal performance, the EWS must be appropriately administered holistically and inclusively, actively engaging the community and relevant stakeholders.

The review of the 2020-2024 BNPB's plan document found that the aims and realization of the EWS in 2022 and 2023 were not reached, as indicated in the Figure 3 below. In 2022, BNPB targeted the creation of 6 EWS in several regions in Indonesia. However, BNPB was only able to realize 83.3%, or only 5 services. Furthermore, BNPB targeted the establishment of EWS in 11 locations in 2023. But, BNPB was only able to build the system in 2 locations.

Figure 3. EWS Plan and Realisation



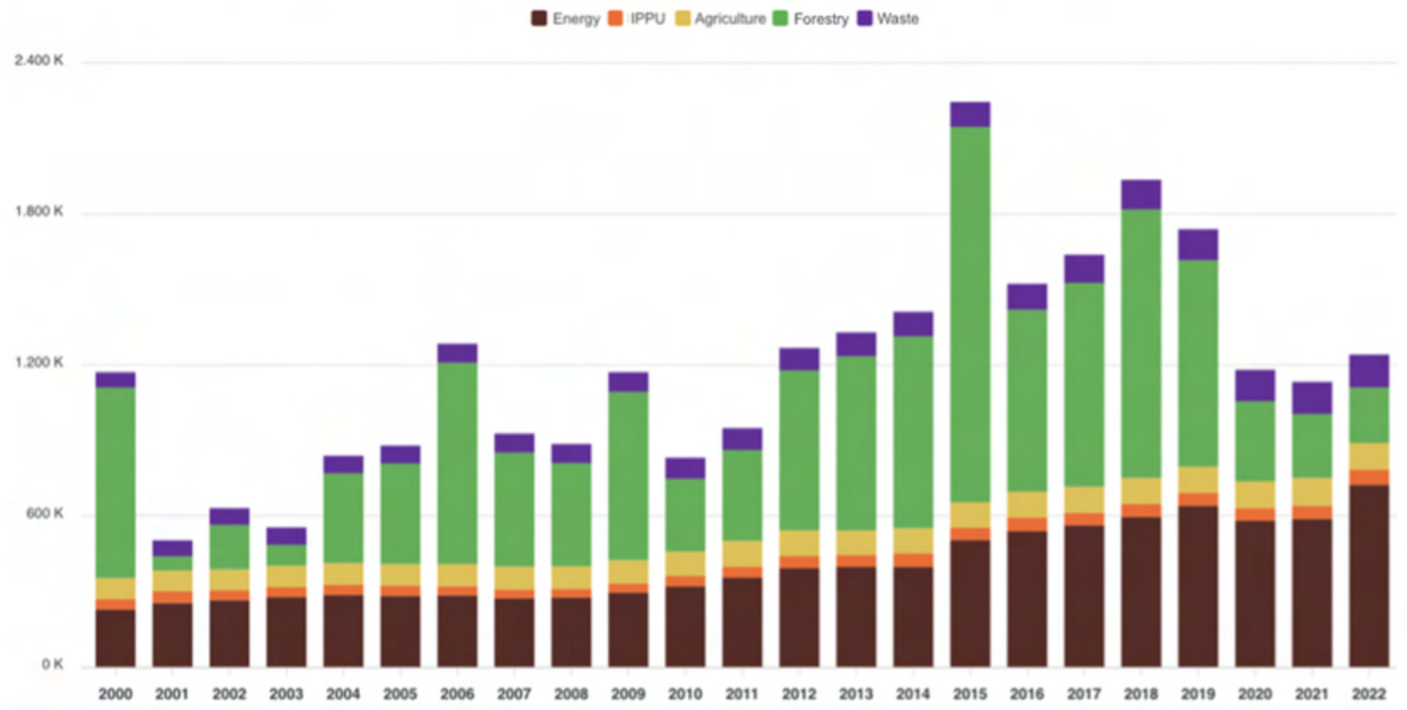
Source: BPK's Audit Report (2024)

To address this issue, BPK advises BNPB to evaluate the national risks associated with natural disasters and effectively coordinate risk assessments in all regions of Indonesia. BPK also requests that BNPB enhances its planning and budgeting controls to prevent any errors that may hinder its efficacy in mitigating hydrometeorological disasters.

Performance Audit: Climate Change Mitigation and Adaptation Initiatives in the Forestry and Other Land Use Sector

The forestry and other land use (FOLU) industry is the second-greatest contributor to greenhouse gas (GHG) emissions in Indonesia, following the energy sector. According to the BPK's Audit Report (2024), the FOLU sector accounted for 249.71 million tons of carbon dioxide (CO2E) or 21.89% of total CO2E in 2022.

Figure 4. National Greenhouse Gas Emissions 2000-2022



Source: BPK's Audit Report (2024)

Management of greenhouse gas emissions is essential to mitigate climate change. Indonesia, under the auspices of the Ministry of Environment and Forestry, has affirmed its dedication to climate change mitigation and adaptation by instituting the national priority of "Building the Environment, Increasing Disaster Resilience, and Climate Change" in the 2020-2024 NMTDP, aligning with the Paris Agreement and the Sustainable Development Goals.

BPK has performed a performance audit to evaluate the government's initiatives in climate change mitigation and adaptation within the forestry sector and other land uses from the 2021 fiscal year through the first half of 2023. This audit encompasses programs related to mitigate deforestation, rehabilitate forests and land, and finance climate change handling.

The audit results indicate that the reduction in deforestation rates has not aligned with its plans, and its impact on emission reduction remains unquantified. The Ministry of Environment and Forestry has been unable to distinguish between intentional and unintentional deforestation. The audit of deforestation is conducted using satellite image analysis of land cover, which cannot ascertain the underlying causes of changes in land cover. Furthermore, the outcomes of Forest and Land Rehabilitation (RHL) initiatives have failed to determine their impact on climate change mitigation. The outcomes of RHL planting initiatives remain low, fluctuating between 0.88% and 20.55% reforestation, with an average of 8.64%. A comprehensive comparison is presented in Table 1.

Table 1. Comparison of Realized RHL Area with Land Cover 2013-2017 (ha)

Year	RHL Realization			Land Cover in RHL Location	%
	Vegetative	Mangrove	Total		Reforestation
a	b	c	d=b+c	e	f=e/d
2013	22,015		22,015	3,145	14.29%
2014	5,415		5,415	399	7.37%
2015	18,132	481	186,613	164	0.88%
2016	20,483	497	20,980	4,312	20.55%
2017	35,357	1,175	36,532	932	2.55%
	101,402	2,153	103,555	8,952	8.64%

Source: BPK's Audit Report (2024)

Moreover, financing from non-state budget sources, like carbon markets and result-based payments, are not reliable. Forecasting funding from carbon trading is now unfeasible, as the economic potential of carbon trading in the forestry industry has not been assessed, as the revision of Government Regulation 12/2014 is still on progress. Moreover, result-based payments have not been effectively realized, utilized, or monitored since the attainment of GHG emission reductions of 577,499,160 tons of CO2E has not received.

BPK recommends that the Ministry of Environment and Forestry establish standards for measuring and evaluating deforestation reduction efforts, distinguishing between intentional and unintentional deforestation as climate change mitigation strategies, and aligning deforestation targets within the FOLU Net Sink at national and subnational levels.

In addition, BPK advises the Ministry to prepare standards for assessing the efficacy of RHL activities. It urges the Ministry of Home Affairs regarding the authority and responsibility of Forest Management Units (KPH) in maintaining RHL activity outcomes. Last, it emphasizes the need for collaboration with all stakeholders to identify and mobilize funding sources from the state budget and Non-state budget to assist climate change mitigation programs.

Conclusion

BPK is dedicated to facilitating the execution of the Sustainable Development Goals, which encompass climate change. In doing SDG mapping, BPK adheres to the principles outlined in INTOSAI-P 12 regarding the Value and advantages of SAI, which state that the value and advantages of SAI consist of "making a difference to the lives of citizens." BPK aligns its audit strategy to monitor the execution of SDGs incorporated into the 2020-2024 National Medium-Term Development Plan.

BPK has emerged as a beacon of hope in the fight against climate change, delivering recommendations with the precision of a lighthouse guiding ships through stormy seas. BPK's insightful and actionable recommendation is not just a roadmap but a transformative force, illuminating the way to timely and effective climate action. Through BPK's visionary contributions, Indonesia is poised to navigate the turbulent waters of environmental challenges with newfound clarity and resolve.

In closing, BPK must expand its climate change audits and boost its capabilities to effectively guide Indonesia's climate action programs. Strengthening these areas will ensure BPK remains a vital force in driving the nation's progress and achieving impactful climate solutions.

About the Authors

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Source: Adobe Stock Images, Kannapat

National Climate Change Action by the Government of Israel - State Audit Reports

By Dr. Revital Goldshmid and Lior Forkosh (LLM), The State Comptroller and Ombudsman of Israel (19.8.24)

The global climate crisis poses significant threats including water scarcity, extreme weather events, and impacts on agriculture, food security and human health. Israel's geographical location magnifies these risks as being a 'Hot Spot'. Various governmental bodies, such as the Ministries of Finance, Environmental Protection, Energy, Transportation, Economy, Agriculture, Defense, the Israel Defense Forces (IDF), and the Planning Administration within the Ministry of Interior, have different responsibilities for addressing climate change.

The State Comptroller's Office generated two audits within a short timeframe to assess Israel's preparedness for climate change. The findings were published in a special report in October 2021 (previous audit report), and followed up with another report in March 2024 (follow-up audit report). The objective of the follow-up audit was to evaluate the government's progress in addressing the deficiencies identified in the initial report, and to what extent the previous audit report's recommendations have been implemented. Additionally, the audit explored new aspects that were not covered in the previous report.

These audit reports are unique in several aspects. Firstly, they address a developing issue within the government work, providing decision-makers with a comprehensive, future-oriented document. Secondly, they include varied data of analyses conducted by experts on financial, physical, and geopolitical risks, highlighting the necessity of integrating these into a national risk strategy. Thirdly, the reports examine the issue at multiple levels: inter-ministerial, sectorial (public, private, and civil society), economic (energy and transportation), as well as from an international perspective. This integrated approach provides comprehensive assessment. Fourthly, they analyses organizational and functional gaps within and between government bodies, suggesting improvement in managing climate issues.

Recognizing the need for initial government measures based on existing knowledge to minimize risks to human health, the environment and infrastructure and to reduce vulnerability, the reports examined government resolutions and actions over the past 15 years, in several areas: mitigation of greenhouse gas (GHG) emissions; renewable energy targets; multi-sectorial climate change adaptation; macroeconomic and financial risks and the government policies in greening the economic system and structural and governance gaps.

Those reports also include an international layer, which contains comparative reviews of actions taken in other countries, presentation of content from international professional organizations on the report topics, analysis of global trends, actions and recommendations of countries and international organizations, Organisation for Economic Co-operation and Development (OECD) risk analysis methodology, and scientific reports. Throughout the audit process, the auditors consulted with experts, researchers, key management and professional staff actors across dozens of public entities, government ministries and their subordinate bodies, industry representatives and other stakeholders.

Audit as a Progression Process

Dialogues and discussions during the audits have encouraged progress among audited bodies, sometimes even before the final report is published. For instance, the communication between the audit managers and the heads of defense ministries and the National Security Council of Israel, during the audit process led to integrating climate change risks into the national emergency scenarios.

Furthermore, during the final stages of drafting the audit report, after distributing the draft to relevant ministries and bodies, the Ministry of Environmental Protection promoted an updated climate law proposal. The bill draft was approved by the cabinet's legislation committee in September 2023. During Environment Day in early July 2024, discussions at the legislation committee, focused on implementation of the audit report's findings. Various government representatives reported their progress in promoting actions to address climate change issues. The Ministry of Environmental Protection provided updates on the legislative progress of the Climate Law and the preparation of the National Climate Adaptation Plan. This plan includes mapping areas in Israel affected by climate change and outlining key measures to address their impacts, including 48 initiatives and approximately 200 tasks for around 30 government ministries and agencies.

This example demonstrates how audit reports can potentially influence in encouraging governmental progress without directly intervening in the legislative process.

Audit as an Analytical Tool

The audit reports and data analysis serve as information tools and frameworks for actions by audited bodies, providing knowledge resources previously unavailable to the public. Data compiled through a questionnaire distributed to all government ministries and relevant public bodies, provided comprehensive information including quantitative and comparative data analysis. For instance, the audit reports presented new quantitative data comparing climate policy budgets and governmental support for fossil fuels against allocations and utilization budgets for climate-related initiatives. This information is now public and can be used by public bodies when considering various policy alternatives.

Additionally, a survey conducted among 60 government ministries and public bodies quantitatively mapped areas of weakness and gaps in governmental action related to climate risks. The survey identifying trends such as a slight improvement (2%) in ministry-level climate risk adaptation plans and an increase (3%) in the number of public bodies performing organizational risk assessments related to climate change scenarios.

Main Gaps Identified During the Audit Process and Were Part of the Findings

In 2020, Israel recorded lowest reduction in emissions among developed countries. Several gaps were identified in the government's process of approving its national climate change adaptation plan, with insufficient progress by many public bodies. The audit reports found a need for a comprehensive national economic and fiscal assessment related to climate change and the formulation of long or medium term climate policy. Part of the difficulty in achieving progress is the absence of an integrative governmental entity for climate issues.

These findings have led the government forfeited state revenues exceeding NIS 32 billion through supports and subsidies for fossil fuels, 10.6 times the amount planned for climate investment (the decision to allocate about 3 billion NIS), and 33 times the amount actually invested (budget utilization of 988 million NIS). These gaps are shown in the chart below, reflect the government's priorities with multiple declarations of climate goals without the necessary resource allocation, alongside continued funding policies that undermine these goals.

Climate Budgets Determined in Government Decisions, Their Allocation and Utilization, Compared with Subsidies for Fossil Fuels, 2015 - 2022 (in NIS B)

Based on data from the Ministries of Finance, Environmental Protection, Transport, and Energy, adapted by the State Comptroller's Office.

Conclusions

Despite numerous statements and decisions, the government has not addressed many of the deficiencies identified in the 2021 climate change preparedness report. The follow-up report highlights key failures such as: absence of a leading governmental coordinating entity, delays in binding regulations, and insufficient government attention to climate risks and macroeconomic impacts. While there has been some progress in setting emission reduction targets and preparing the security and banking sectors, most government ministries have yet not taken adequate actions to mitigate these risks.

Recommendations

Based on Israel's experience conducting two climate audit reports within three years, there is an urgent need for decisive governmental action on climate change. Key recommendations include: establishing a dedicated governmental entity to coordinate climate efforts; advancing binding legislation with clear targets; implementing a carbon tax to internalize environmental costs; investing in infrastructure for energy diversification; developing a comprehensive national risk management strategy; promoting and budgeting an adaptation plan addressing climate change risks; and reforming budgeting practices to adequately fund climate initiatives. These actions are critical for aligning Israel's policies with international commitments to mitigate greenhouse gas emissions and ensure sustainable development in the face of global environmental challenges.

Key Impacts Following the Climate Audit Reports

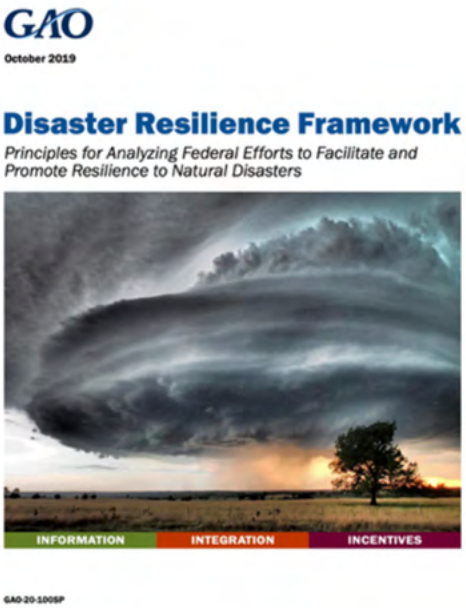
Key impacts of the reports conducted by the State Comptroller's Office includes the following:

- The Innovation Authority quintupled its investments in climate technologies, hired experts to evaluate projects, and created policy tools to classify technological projects as climate ventures.
- The carbon tax, under discussion in Israel for 15 years, is advancing for approval in the parliament, following its importance highlighted in two reports.
- The recently passed first reading of the Climate Law mandated government ministries to prepare climate risk preparedness plans with binding timelines, as recommended by the report.

The Role of SAI in Promoting Climate Change Issues

The article highlights the critical role of State Audit Institutions (SAIs) in advancing climate change issues within governmental work, emphasizing their potential to raise awareness among stakeholders and the public.

To effectively fulfill their responsibilities, SAIs should generate follow-up reports aimed at driving substantial change. The Israeli State Comptroller's follow-up audit report has significantly promote awareness of climate change issues. Therefore, SAIs should incorporate such initiatives into their strategic plans and foster international collaborations for current and future generations well-being.



Source: GAO-20-100SP, Disaster Resilience Framework, U.S. GAO

Identifying Climate Resilience Opportunities with the Disaster Resilience Framework

Authors: Shannon Brooks, Carla Rojas Paz, Holly Halifax, and Zoe Need, U.S. GAO

In every region across the globe, climate change is driving extreme weather events like heatwaves, heavy rainfall, and drought to increase and intensify, according to the Intergovernmental Panel on Climate Change.*(1)* These extreme weather events have led to natural disasters which have cost lives, displaced people, devastated economies, and racked up billions of dollars in damages.*(2)*

(1) The 2023 Intergovernmental Panel on Climate Change Sixth Assessment Report.
(2) Billion-Dollar Weather and Climate Disasters | National Centers for Environmental Information (NCEI) (noaa.gov); India: Lessons on dealing with the growing heatwaves | UNDRR; and Climate breakdown 2024: 6 months of climate chaos since COP28 - World | ReliefWeb

When natural disasters linked to extreme weather events strike, governments are responsible for responding to them and play a variety of roles to help communities recover. The reliance on the government's assistance to respond to the increasing number of natural disasters is a key source of fiscal exposure. Fiscal exposure refers to a conceptual framework for considering the wide range of responsibilities, programs, and activities that may explicitly or implicitly expose the federal government to future spending.

Governments are also responsible for understanding and managing their country's disaster risks and enhancing climate preparedness and resilience before natural disasters strike.*(3)* If governments are better prepared and enhance their country's climate resilience before natural disasters hit, they can potentially save lives, reduce disaster risks, or even better— possibly prevent disasters. If governments take action to reduce potential future losses by planning and preparing for potential climate hazards, they can also better manage and limit their fiscal exposure. Studies indicate that for every dollar invested in disaster risk reduction, governments can save 2 to 10 dollars in disaster response and recovery costs.*(4)*

Given their unique role and oversight of a wide range of policy areas and programs in the government, Supreme Audit Institutions (SAIs) are ideally placed to provide recommendations to their governments and legislatures on how to enhance climate resilience before extreme events and natural disasters unfold. These recommendations can span across diverse policy areas and programs.

While some SAIs may have already conducted audits on enhancing climate resilience and disaster preparedness, others may have not and wonder how to do so. The Government Accountability Office (GAO)'s Disaster Resilience Framework provides SAIs with a good starting point.

The Disaster Resilience Framework

The Disaster Resilience Framework provides auditors—or anyone responsible for assessing their nation's climate resilience efforts—with criteria to support analysis of governmental opportunities to facilitate and promote climate resilience with a forward-looking focus.(5)

(3) The Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) and ISSAI 5510 INTOSAI The Audit of Disaster Risk Reduction.

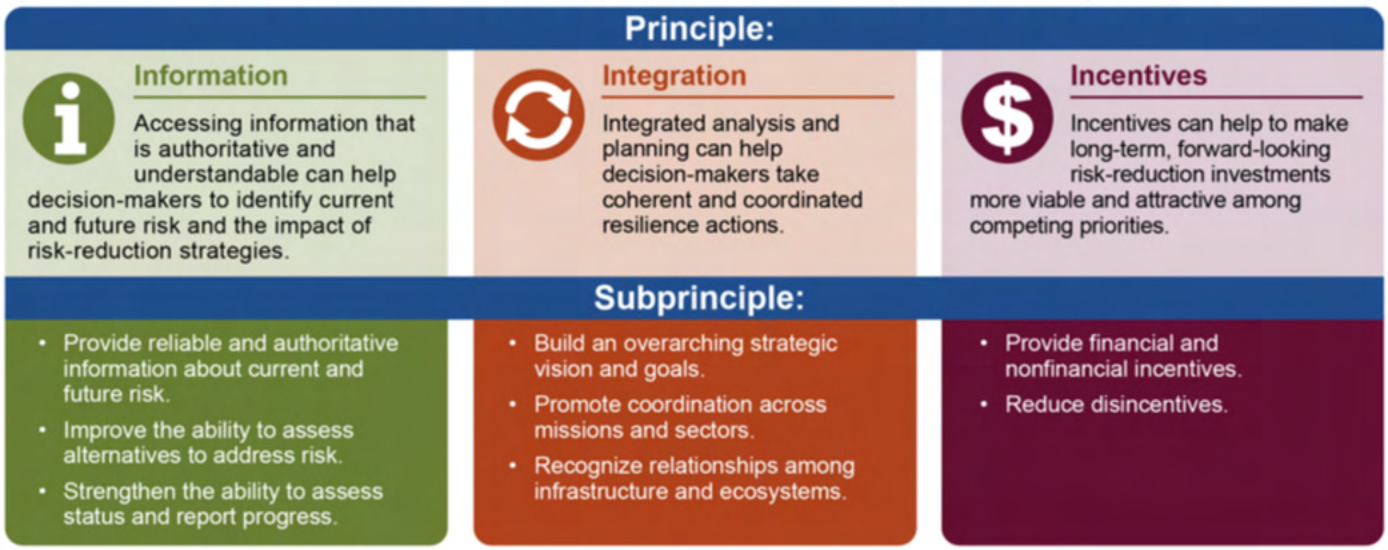
(4) See http://www.ifrc.org/Global/global-alliance-reduction.pdf and David Rogers and Vladimir Tsirkunov, The Costs and Benefits of Early Warning Systems (ISDR and World Bank, 2010), and http://www.preventionweb.net/english/hyogo/gar/2011/en/bgdocs/Rogers_&_Tsirkunov_2011

(5) Auditors can also use INTOSAI GUID 5510, which was approved in 2020 and gives auditors information and best practices for auditing government's disaster risk reductions. One of the key differences between INTOSAI GUID 5510 and GAO's Disaster Resilience Framework is that GAO's Disaster Resilience Framework consists of 3 specific guiding principles and related questions for auditors to ask.

This differs from traditional audit approaches that identify deficiencies in governmental programs or policies. Instead, the Disaster Resilience Framework can be used to identify the positive effects achievable from pursuing options to increase climate resilience, thereby reducing fiscal exposure. GAO developed the framework from existing literature on climate resilience, past GAO work, and feedback from external and internal subject matter experts.

The Disaster Resilience Framework is organized around three broad overlapping principles—Information, Integration, and Incentives. These key principles also include subprinciples and a series of corresponding questions that auditors can apply or adapt to their specific context (see Figure 1).

Figure 1: Disaster Resilience Framework Principles and Subprinciples



Source: GAO's *Disaster Resilience Framework* (GAO-21-100SP); GAO (icons).

To view the entire Disaster Resilience Framework, click here or read a related article.

Applying the Disaster Resilience Framework to Dams and Levees

In a recent audit, GAO applied the Disaster Resilience Framework to identify and analyze actions the U.S. Army Corps of Engineers (Corps) could take to enhance the climate resilience of government-funded flood risk management infrastructure (e.g., dams and levees), such as in Figure 2. The Corps is a federal agency responsible for planning, designing, and constructing much of nation's flood risk management infrastructure.

Figure 2: Breached Levee along the Missouri River, June 2011

Source: U.S. Army Corps of Engineers Omaha District photo by Eileen Williamson. | GAO-24-105496

First, GAO identified current actions the Corps is taking to enhance the climate resilience of the relevant infrastructure by reviewing government documents and interviewing key Corps' officials and subject matter experts. For example, under the Information principle, GAO explored what reliable and authoritative information on climate risks the Corps provides. It found that the Corps has recently updated some its existing climate information for planning dam and levee projects, like the web-based Sea Level Analysis Tool and the Climate Hydrology Assessment Tool.

Next, GAO identified potential future actions (or options, as GAO refers to them) the Corps could take to further enhance the climate resilience of flood risk management infrastructure by reviewing literature and interviewing Corps officials and subject matter experts. For example, using the Information principle, GAO asked interviewees what else the Corps could do to reduce the complexity of the climate risk information when planning dam and levees projects. Interviewees said the Corps could expand regional or location-specific datasets and forecasting models to help guide decision-making and investments in dam and levee projects that incorporate climate resilience, as well as update existing web-based tools with the latest forward-looking climate information.

Finally, GAO applied the Disaster Resilience Framework's to identify the gaps between the current actions and the potential future options. This "gap" is the potential positive effect from pursuing an option or a combination of options." For example, under the Information principle, GAO found that opportunities existed to enhance climate resilience because not all the existing climate information to plan dam and levee projects was updated and some of it was hard to understand or use. GAO determined that in regarding to the Information principle, the Corps could update their climate information for planning purposes.

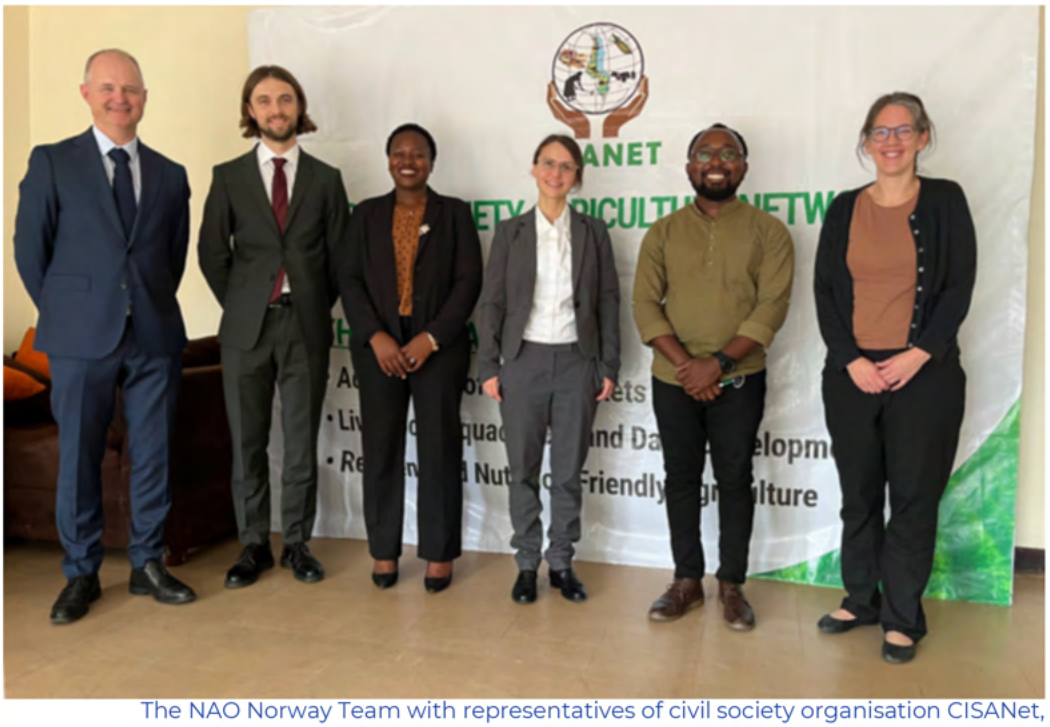
In total, GAO identified 14 options that the Corps could implement to improve climate resilience. GAO also analyzed the strengths and limitations of each option, and the Corps' legal and regulatory authority to implement each option. GAO auditors used their professional judgment to determine the most applicable Disaster Resilience Framework principle, subprinciple, and question for consideration to use for each of the 14 options.

In previous years, GAO has also applied the Disaster Resilience Framework to identify options to enhance the climate resilience of government funded roads and agricultural producers.

The Future: Government-Wide Climate Resilience

In addition to responding to costly and devastating natural disasters, governments have the responsibility to take action to enhance climate resilience measures before natural disasters happen. Given the current state of climate change and natural disasters around the globe, SAIs worldwide have a timely opportunity to support governments in these efforts.

Auditors can apply GAO's Disaster Resilience Framework or an adaptation of it to every government program. For GAO, this means considering expanding climate resilience audits to additional policy areas like health care, technology, and urban planning. Without being policy prescriptive, auditors can play a special role in helping build government-wide climate resilience and contributing to social and economic benefits.



The NAO Norway Team with representatives of civil society organisation CISANet, Lilongwe, Malawi. Source: NAO Norway

Assessing Norway's Support to Climate Change Adaptation in Developing Countries: A Performance Audit

By: Yngvild Herje Arnesen and Tom Næss, National Audit Office of Norway

Background

Climate change already has severe consequences for developing countries. Through the Paris Agreement, adopted in 2015, Norway and other industrialised countries committed to support climate change adaptation efforts in developing countries.

Norway has traditionally provided most of its climate finance to mitigation initiatives. However, at COP26 in Glasgow in 2021, Norway committed to tripling its official development assistance (ODA) for climate change adaptation before 2026. It reached this goal in 2023, providing 3.2 billion NOK to adaptation initiatives. About 40 percent of this funding went to the agricultural sector, and 60 percent went to African countries. Almost 50 percent of the funding was channelled through multilateral organisations.

Risks Related to Rapid Increase in Funding

The National Audit Office of Norway saw risks related to the rapid scaling up of financing for climate change adaptation and decided to carry out a performance audit. The risks were related to the labelling of projects as climate adaptation projects, project design, follow up on adaptation results, and to what extent the support reaches the most vulnerable groups.

As the audit team designed the audit, it took inspiration from audits carried out by the SAIs of Denmark*(1)*, Finland*(2)* and USA*(3),* IDI's Climate Change Adaptation Action programme, evaluations made by evaluation units in development agencies in Denmark*(4)*, Germany*(5)* and the Netherlands*(6),* as well as research findings.

The audit is currently being carried out, and the report is planned to be published in Q4 2025.

Audit Questions and Country Focus

The aim of the audit is to assess whether the Ministry of Foreign Affairs (MFA) and the Norwegian agency for development cooperation (Norad) manage development assistance for climate change adaptation in line with the Parliament's decisions and assumptions that the aid will increase adaptation capacity and reduce vulnerability to climate change in developing countries. There are three main audit questions.

The first audit question is about MFA's strategic management of the adaptation support. We will examine whether MFA coordinates its support and whether it has appropriate information about the projects it funds. This includes whether it reports accurately to the Norwegian parliament, including on the volume of support for adaptation using the "Rio markers" of OECD DAC*(7)*. We will also examine the follow-up of adaptation support to multilateral organisations like the Green Climate Fund (GCF) and the United Nations Environment Programme (UNEP) by the MFA.

(1) Rigsrevisionen (2021). Report on climate change assistance provided to the developing countries. Report on climate change assistance provided to the developing countries | Rigsrevisionen
(2) National Audit Office of Finland (2021). Finland's international climate finance. Steering and effectiveness. Audit report 6/2021. Finland's international climate finance - Steering and effectiveness - National Audit Office of Finland (vtv.fi)
(3) Government Accountability Office (2020). Climate Change: USAID is taking steps to increase projects' resilience, but could improve reporting of adaptation Funding. Climate Change: USAID Is Taking Steps to Increase Projects' Resilience, but Could Improve Reporting of Adaptation Funding | U.S. GAO
(4) Evaluation, Learning and Quality Department, Ministry of Foreign Affairs/Danida, Denmark (2021). Evaluation of Danish support for climate change adaptation in developing countries. Evaluation of Danish Support for Climate Change Adaptation in Developing Countries (um.dk)
(5) Noltze, M., A. Köngeter, I. Mank, K. Moull and M. Rauschenbach (2023). Evaluation of Interventions for Climate Change Adaptation. Synthesis Report, German Institute for Development Evaluation (DEval), Bonn. Evaluation of Interventions for Climate Change Adaptation. Synthesis Report | DEval - Deutsches Evaluierungsinstitut der Entwicklungszusammenarbeit gGmbH
(6) Policy and Operations Department, Ministry of Foreign Affairs of the Netherlands (2023). Evaluation of climate change adaptation in water and food security programmes. Report – Evaluation of climate change adaptation in water and food security programmes | Report | Policy and Operations Evaluation Department (IOB) (iob-evaluatie.nl)
(7) The OECD Rio Markers are policy markers used to track and assess the extent to which official development assistance (ODA) from donor countries supports environmental objectives related to the major international environmental conventions. These markers were developed in response to the Rio Earth Summit in 1992, where global commitments were made on sustainable development and environmental protection, and have later been adjusted to include a marker on climate change adaptation.

The second and third audit questions are about the planning, follow-up and results of a selection of Norwegian-funded adaptation projects in Malawi and Mozambique.

The audit team chose to focus mainly on one country, Malawi, to better be able to take the country context into account in the assessment. Malawi was the second biggest single recipient of adaptation support in the period 2015–2023.

Farmer demonstrating climate smart agriculture, Zomba, Malawi. Source: NAO Norway

Documentation from the selected projects will be analysed to assess whether they achieved results in terms of better ability to adapt to climate change, and whether MFA and Norad's planning and follow-up of the projects were conducive of good results. The audit team has carried out a field visit to Malawi to see project sites and interview relevant stakeholders.

Demo plot for climate smart agriculture, Machinga, Malawi. Source: NAO Norway

This analysis will be complemented by an assessment of a limited number of projects from Mozambique, which is also a large recipient of adaptation funding.

The main methods in the audit will be document analysis, interviews, field visits and some descriptive statistics. A reference group of researchers has been established to provide input to the work.

If you would like to learn more about the audit, please do not hesitate to contact the project team: Yngvild Herje Arnesen, YHA@riksrevisjonen.no

Railway in Seoul City. Source: Adobe Stock Images, Cozyta

The Board of Audit and Inspection of Korea and its Audit of Railroad Buckling Correlated with Rising Temperatures and Climate Change

Authors: Mr. CHOE Hyun-joon, Inspector General, Mr. KIM Sang-hye, Senior Auditor, Ms. JEON Ju-won, Auditor

1. Introduction

The Board of Audit and Inspection (BAI) conducted an audit of the Korea National Railway (KORAIL) to prepare it for possible buckling of railways that may be caused by intense heat waves, the fingerprint of global warming. It seemed worthwhile to share the audit methodologies employed in this audit with INTOSAI members and the public sector auditing community, notably as the methodologies utilized the scientific analysis of the correlation between temperatures of air and railroads, as well as the simulation of future temperature scenarios.

2. Background

Since 2000, there have been a total of six cases of train derailment or technical issues with railways in South Korea, all of which had occurred on the tracks of continuously welded rail. It was found that those calamities had been caused by an intense spike of railroad temperature, which triggered buckling of railways of welded tracks.

Against this background, it became necessary to establish a standard for installing continuously welded railroads, which takes into consideration anticipated temperature changes in the future, as to prevent railroad buckling and train derailment accidents, amongst other risks.

3. Method of Analysis and its results

A. *Analysis of forecasts of future air temperatures*

BAI analyzed data on air temperatures under the scenarios of shared socioeconomic pathway (SSP) SSP1-2.6 and SSP5-8.5*(1),* which are climate change scenarios of projected socioeconomic global changes as forecasted in the Sixth Evaluation Report of the Intergovernmental Panel on Climate Change of the United Nations to calculate recurrence intervals of temperatures, or the probabilities of actually experiencing the anticipated temperatures, under the anticipated scenarios. BAI then checked them against the current status quo.

BAI found that the probability of the air temperature reaching 40℃ or hotter (equivalent to a railroad temperature 60℃ or hotter) would be 25.1 times higher in 2040 than that of present under the SSP5-8.5 scenario, as shown in Table 1.

Table 1: Comparison of probability of air temperature reaching 40℃ or hotter (Unit: %, year, no. of multiplication)

Category	Short-term (between 2021-2040)			Mid-term (between 2041-2070)			Long-term (between 2071-2100)		
	Probability (%)*	Recurrence Interval	Multiplied by	Probability (%)	Recurrence interval	Multiplied by	Probability	Recurrence interval	Multiplied by
SSP1-2.6	7.44	13	18.3	12.4	8.1	30.5	11.7	8.5	28.7
SSP5-8.5	10.2	9.8	25.1	30.8	3.2	75.7	53.4	1.9	131

Note: Percentage of days with railway temperatures reaching 60℃ or hotter during summer (between July and September), according to the correlation between the temperatures of air and railroads analyzed by the KORAIL.
Source: Data provided by the Korea Meteorological Administration, and the analysis conducted by Kangwon National University

(1) According to the IPCC Summary for Policy Makers, SSP1-2.6 is a scenario that starts in 2015 and has low greenhouse gas emissions, and carbon dioxide (CO_2) emissions declining to net zero around or after 2050, followed by varying levels of net negative CO_2 emissions. SSP5-8.5 is a scenario that starts in 2015, and has very high greenhouse gas emissions, and CO_2 emissions that roughly double from current levels by 2050.

This analysis demonstrated that climate changes will make an impact such that the number of days where the railroad temperature reaches 60℃ or higher within the long-term scenario (2071-2100) will account for up to 30.2% of entire days of summer season, under the scenario of SSP5-8.5.

Table 2: Forecast of the number of days with railway temperature reaching 60℃ or higher during summer (between July and September) (Unit: no. of days, %)

Scenario	Short-term (between 2021-2040)			Mid-term (between 2041-2070)			Long-term (between 2071-2100)			Total (A+B+C)
	(A≥60°C) No. of days	No. of days in summer	%*	(B≥60°C) No. of days	No. of days in summer	%	(C≥60°C) No. of days	No. of days in summer	&	
SSP 1-2.6	21	1,840	1.1	50	2,760	1.8	23	2,760	0.8	94
SSP 5-8.5	18	1,840	1.0	218	2,760	7.9	835	2,760	30.2	1,071

Note: Percentage of days with railway temperatures reaching 60℃ or hotter during summer (between July and September), according to the correlation between the temperatures of air and railroads analyzed by the KORAIL.
Source: Data provided by the Korea Meteorological Administration, and the analysis conducted by Kangwon National University

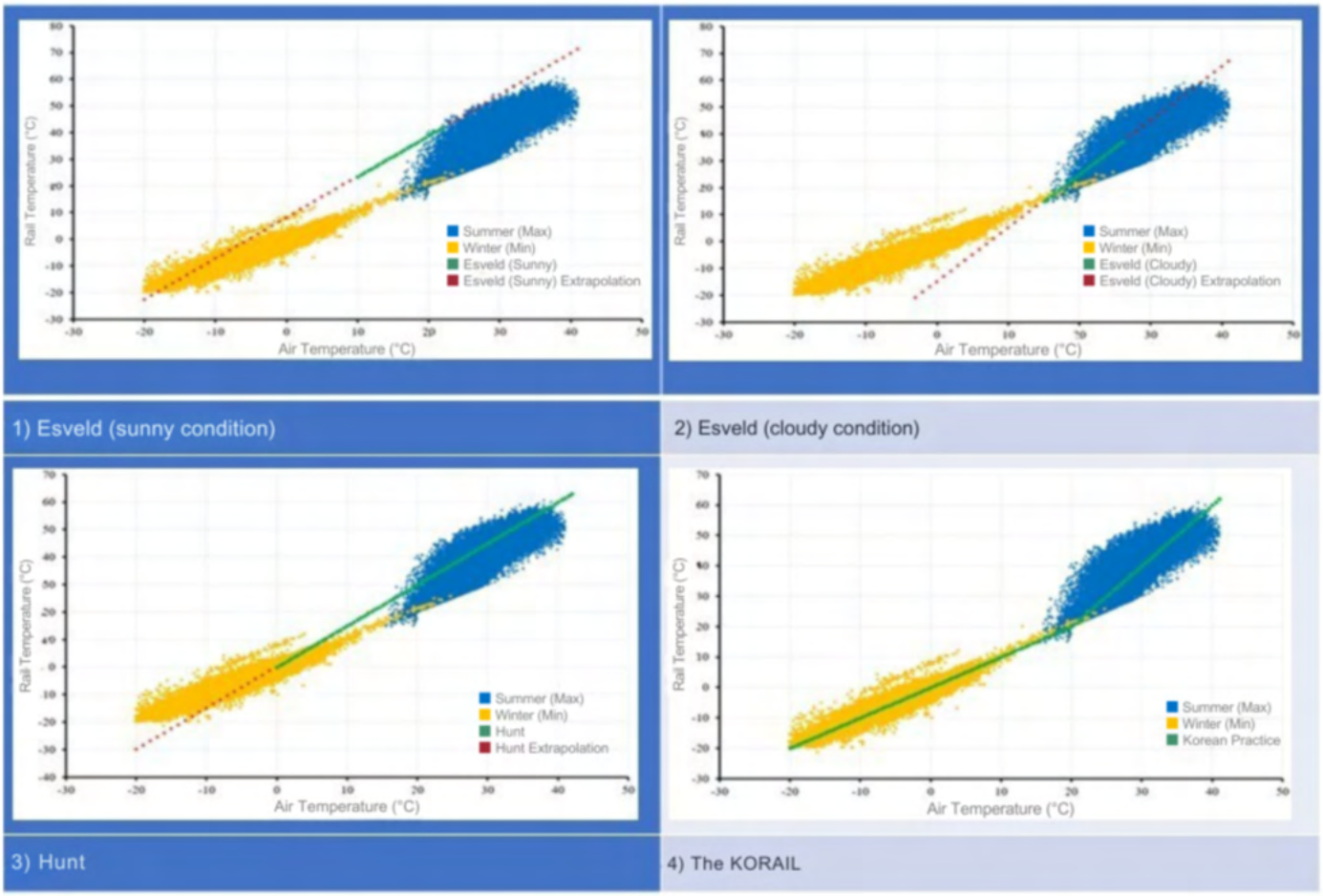
B. Analysis of the correlation between the temperatures of air and railroads in Korea

With a view to anticipating railroad temperatures of the future, BAI, as shown in Table 3, analyzed the correlation between the temperatures of air and railroads, using actual data of railroad temperatures. Then, it compared the correlation against extant four correlational equations of air temperature and railroad temperature, and found that the equation being used by KORAIL was the most reliable of the four.

Table 3: Simulation of the correlation between the temperatures of air and railroads

- Conducted by and during: Kangwon National University, April – June, 2023
- Scope of analysis: correlation between the temperatures of air and railroad
  - Methodology of analysis: Analysis of the correlation between the temperatures of air and railroad based on the data on air temperatures as well as the railroad temperature measured by railroad thermal scanner;
  - Comparison of extant correlational equations of temperatures of air and railroad, one of which was being employed by the KORAIL; and
  - Formulation of a final correlational equation of temperatures between air and railroad

Graph 1: Comparison of correlational equations of temperatures between air and railroads



Note: Actual air temperature and railroad temperatures measured are indicated in blue (summer) and yellow (winter), and each correlational equation is indicted in dotted line (green and red).
Source: Data analysis by Kangwon National University

C. Analysis of changes in railroad temperatures conducted through climate change scenarios

In close cooperation with Chungnam National University and Kangwon National University, BAI conducted simulation of converting air temperatures of the future into the range of possible future railroad temperatures, utilizing the above-explained correlational equation used by the KORAIL, as shown in Table 4.

Table 4: Simulation of changes in railroad temperatures of the future caused by climate change

- Conducted by and during: Chungnam National University, April - July
- Scope of analysis: Changes in range of temperature, mean temperature, and set temperature of railroads
- Methodology of analysis:
  - Conversion of anticipated air temperature of the future into that of railroads, considering the recurrence probability of the anticipated future air temperature under the scenario of SSP1-2.6 and 5-8.5; and
  - Analysis of the changes in mean temperature as well as set temperatures
- Limits of analysis: Railroad temperatures are to fluctuate depending on air temperature, humidity, cloud amount, etc. Nonetheless, this audit took only air temperature into consideration.

This analysis demonstrated that the current range of railroad temperatures, which is 80 ℃ (minus 20 - 60℃), will expand by at least 3℃ (during the recurrence interval of 50 years, under the scenario SSP1-2.6) or 11.7℃ at the most (during the recurrence interval of 100 years, under the scenario SSP5-8.5).

Table 5: Outlook of changes in railroad temperature under SSP scenarios (Unit: ℃)

Period		Recurrent interval of 50 years						Recurrence interval of 100 years					
		Air temperature		Railroad temperature				Air temperature		Railroad temperature			
		Highest	Lowest	Highest	Lowest	Range	Mean	Highest	Lowest	Highest	Lowest	Range	Mean
Short-term (2021-2040)	SSP 1-2.6	41	△20.4	62	△20.4	**82.4 (2.4)**	20.8 (0.8)	41.5	△21.5	63	△21.5	84.5 (4.5)	20.75 (0.75)
	SSP 5-8.5	41.4	△19.3	62.8	△19.3	82.1 (2.1)	21.75 (1.75)	41.9	△20.3	63.8	△20.3	84.1 (4.1)	21.75 (1.75)
Medium-term (2041-2070)	**SSP 1-2.6**	41.6	△20.5	63.2	△20.5	83.7 (3.7)	21.35 (1.35)	42.1	△21.5	64.2	△21.5	85.7 (5.7)	21.35 (1.35)
	SSP 5-8.5	43.4	**△18.4**	66.8	△18.4	85.2 (5.2)	24.2 (4.2)	44	△19.4	68	△19.4	87.4 (7.4)	24.3 (4.3)
Long-term (2071-2100)	SSP 1-2.6	41.5	△20	63	△20	83 (3)	21.5 (1.5)	42	△21.1	64	△21.1	85.1 (5.1)	21.45 (1.45)
	SSP 5-8.5	45.7	△17.6	71.4	△17.6	89 (9)	26.9 (6.9)	46.5	△18.7	73	△18.7	91.7 (11.7)	27.15 (7.15)

Notes: As for the anticipated values of future air temperature, the values with recurrence interval of 50 years and 100 years were applied out of those values of short-term, medium-term, and long-term outlooks, each of which covers the period that ends in 2040, 2070, and 2100, respectively. The numbers in parenthesis shows the changes in the railroad temperatures and mean temperatures, compared to that of present levels (maximum 80℃, median value 20℃).
Source: Data analyzed by Kangwon National University

D. Analysis of the probability of railroad buckling of high-speed trains, using scenarios of climate change

BAI analyzed how much the probability of railroad buckling would increase when railroad temperature rises as indicated in Table 5. The result showed that the probability of railroad buckling will reach up to 0.2% during 2071-2100 (long-term) as shown in Table 6, with railroad temperatures increasing up to 73℃ (recurrence interval of 100 years applied under the scenario of SSP5-8.5). This found that the current safety standard for railroad buckling is not sufficient enough to prepare for future climate change.

Table 6: Outlook of probability of railroad buckling under the scenario of SSP (Unit: ℃, %, No. of multiplication)

Period		Recurrence interval of 50 years		Recurrence interval of 100 years	
		Highest temperature of railroad	Probability of railroad buckling	Highest temperature of railroad	Probability of railroad buckling
Short-term (2021-2040)	SSP1-2.6	62.0	0.00022	63.0	0.000457
	SSP5-8.5	62.8	0.000395	63.8	0.000807
Medium-term (2041-2070)	SSP1-2.6	63.2	0.000527	64.2	0.00107
	SSP5-8.5	66.8	0.006	68.0	0.0126
Long-term (2071 2100)-	SSP1-2.6	63.0	0.000457	64.0	0.000928
	SSP5-8.5	71.4	0.0878	73.0	0.2

Note: When railroad temperature is 55℃ (the mean average speed of high-speed trains running on slow sections), the probability of railroad buckling is 0.0000007%.
Source: Data analyzed by Chungnam National University

4. Audit Result

BAI requested the Chairman of the Korea National Railway to reinforce the safety of its railways by establishing standards for the range and target of railroad temperatures on the tracks of continuously welded railroads, using scenarios of climate change, in order to reduce the risk of railroad buckling that may be caused by air temperature spikes. These standards will help improve transportation safety across the country by reducing risks caused by increasing temperatures, and lead to greater climate resilience.

Reforestation of a pine forest. Source: Adobe Stock Images, Sergey + Marina

Greenwashing State Forest Harvesting in Poland

Author: Iwona Zubrzycka-Wasil Senior Public Auditor Supreme Audit Office of Poland

Introduction

The Supreme Audit Office of the Republic of Poland (NIK) audited the implementation of a strategic pilotage project, Forest carbon farms, to verify its performance and if funds were spent efficiently during its implementation by the General Directorate of State Forests. The audit also looked at whether it enabled obtaining the best outcomes, and if forest divisions correctly and reliably planned and performed their activities included in the project.

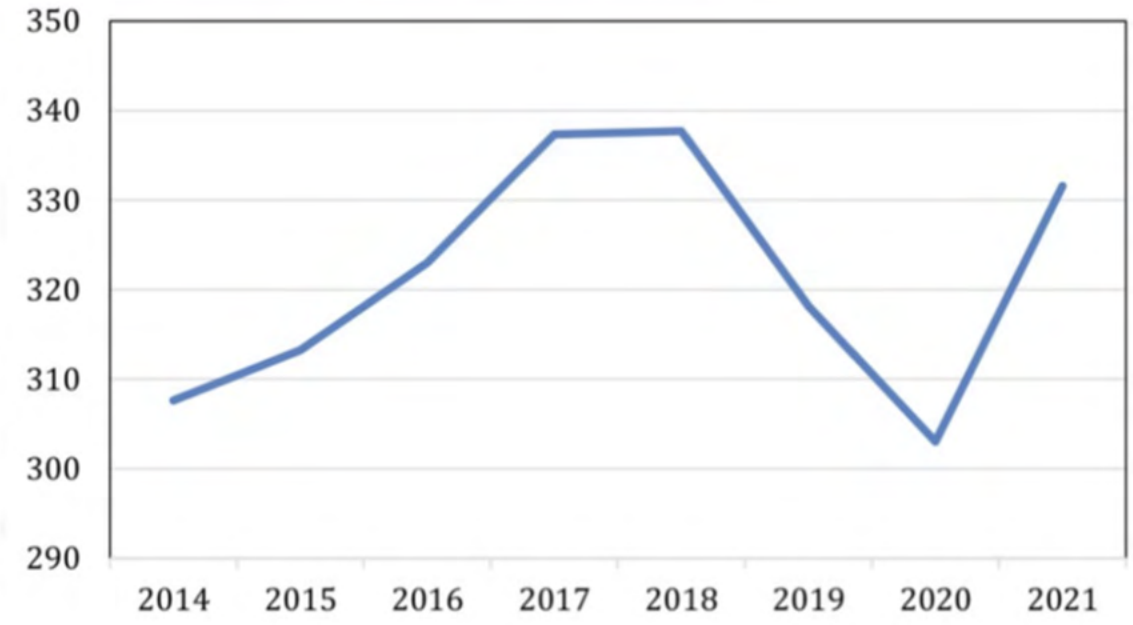
NIK audited activities of the Minister of Climate and Environment, the General Directorate of State Forests, and 12 out of 25 forest divisions that were implementing the pilotage, Forest carbon farms project (out of 429 total divisions in Poland). The audit covered the first phase of project implementation in the years 2017-2023.

The 2030 National Environmental Policy Development Strategy in the Area of the Environment and Water Management adopted in 2019, among others, provided for climate change mitigation through effective reduction of the greenhouse gas (GHG) concentrations in the atmosphere, carbon dioxide concentration reduction and sequestering carbon by forests through further implementation of the project, Forest carbon farms, which started in 2017.

Solutions and technologies aimed at carbon dioxide absorption are one of many climate change mitigation activities. Forests play a crucial role in natural carbon dioxide (CO^2) absorption from the atmosphere. In 2021, in Poland forests absorbed a total of 22,2 million tonnes of CO^2, accounting for almost 7 % of total national emissions and the value corresponded with the average EU indicator in 2019.

Graph

Annual CO2 emissions in Poland (million tonnes)



Based on Small statistical yearbooks of Poland 2017-2023, Statistics Poland

Activities undertaken in the selected 23 forest districts were supposed to contribute to the increase of CO^2 absorbed by forest ecosystems.

Forest Carbon Farms Project Activities and Expected Outcomes

The assumption of the project was to initiate its performance in the years 2017-2026 including activities additional to regular forest management. These additional activities include: increasing space of selected areas with underplanting and understory, use of additional seedlings, and reforestation by natural seeding. The remaining additional activities were aimed at capturing additional amounts of organic carbon in selected forest districts or progressive storage of cumulative carbon in the raw wood stored in woodyards for energetic purposes.

Initially, the project was intended to create a network of such woodyards in state managed forests to store huge amounts of raw wood, which remained after extreme weather events such as winds or hurricanes, more frequent due to climate change. However, NIK stated that none of the post hurricane woodyards were created and, as a result of changes regarding timber turnover regulations, the idea was abandoned.

It was also assumed that the experimental introduction of a national system of domestic CO^2 emissions trading certificates into the market as a result of additional activities in forestry, could allow the entities included in the European Union (EU) Emissions Trading System (ETS) to purchase units of captured emissions in the years 2017-2020, which would then allow them to meet emission reduction targets resulting from the EU climate regulations. However, the idea has not gained interest neither from the EU policy makers nor from the entities, and was discontinued. Also, no legal basis for this alternative to the EU ETS was ever created.

State Forests' regulation on Forest carbon farms was modified and differently defined as "additional activities". These additional activities were described as forest management activities that overlapped with standard procedures adopted in the given locations, and the circumstances or activities that were not covered by the binding forests management plan, but aimed to capturing additional amounts of CO^2 along the prognosed implementation phase.
Additionally, the purposes of the additional activities of the Forest carbon farms project were modified by obtaining additional amounts of biomass possible for acquisition for future sale and supply. This was intended to store additional amounts of carbon and reduce greenhouse gases emissions, including carbon dioxide.

NIK Assessment and Findings of the Forest Carbon Farms Project

NIK found that the two above project purposes were contradictory. The assumption that biomass, including trees planted to absorb CO^2 was to be removed later, means that it should be expected that this would result in a reduction in CO^2 absorption, which may reset the activities taken to store additional amounts of organic carbon in this biomass.

Moreover, since the utility value of trees planted in this project would be lower than that of trees planted as a result of the standard forests' management. Supposedly, the wood would not be intended for the production of furniture or other wood products, but used as fuel for energetic purposes. This would quickly result in significant increase of CO^2 emissions stored in these trees for many years.

According to the NIK audit results, the outcome of Forest carbon farms and its continuation: the development project called Carbon Forest, had no real impact on the increase of CO^2 emission reductions. Annual national average CO^2 emissions were approximately 325,6 million tonnes, while the basic project outcome was only 1,006 million ton of CO^2. Accordingly with later prognosis revaluations, in April 2023 , it had dropped to 0,929 million tonnes of CO^2.

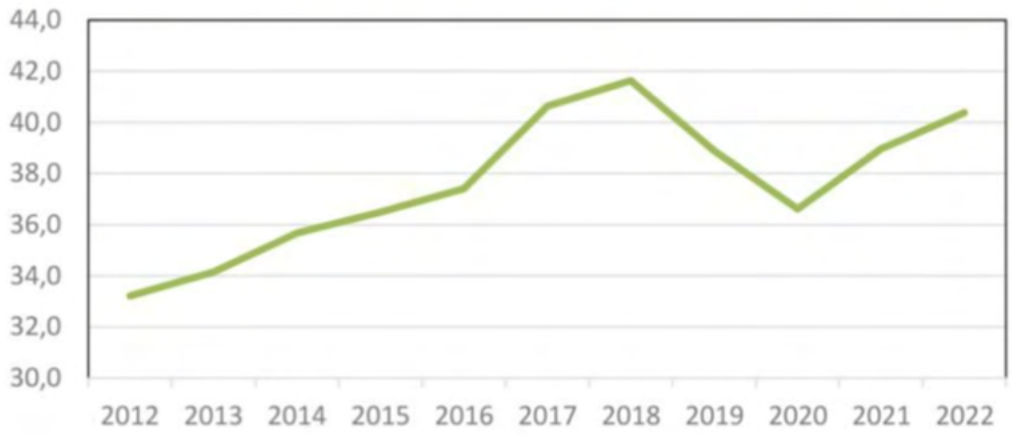
The prognosed outcome of the project planned for a 30 year implementation (2017-2046) was an additional value of captured CO^2. The value was calculated by Forests Research Institute with the use of specialised software (Canadian model CBM-CFS3). For calculations, the services used databases which included: species, age, space of forests divisions, type of treatment, area of treatment, and growing stock curve.

Implementing the current research results into the determined algorithm resulted in a smaller than planned project outcome. The amount of additionally captured CO^2 calculated with the use of the above method would not have noticeable impact on national CO^2 emissions reduction. The assumed CO^2 compensation of approximately 0,031 million tonnes annually was more than a thousand times lower than emissions of just one power plant, Bełchatów, (38 million tonnes) and less than 0,1 per mile of total national CO^2 emissions in Poland, which was 331,6 million tonnes of CO^2 in 2021.

Tree Harvesting Increases in Forests Managed by Poland State Forests

Graph

Timber harvesting in forests managed by State Forests in million cubic meters



Based on Forestry statistical yearbooks of 2017-2023 Statistics of Poland

At the same time, State Forests in every year of the project implementation increased tree harvesting. NIK found that the real purpose of the project was solely to improve the State Forests' image through greenwashing forest cutting. This was to create the illusion that the company mitigated climate change, and to distract the public opinion from robbery deforestation.

NIK stated that a more efficient activity intended to reduce CO^2 emissions would be increasing forest areas and limiting tree harvesting, especially for biomass purposes, which could further reduce final CO^2 emissions.

NIK Audit Finds Shortfalls Due to Unreliable Planning and Supervision

Aside from greenwashing the image of State Forests and of the involved entities co-financing some project activities, it only marginally contributed to real solutions resulting from excessive CO^2 emissions in Poland.

The NIK audit revealed that in 2017–2023, Forests carbon farms research project expenditures of 65,5 million PLN (approx. 15 million euro) were used inefficiently. The results of the main objective of project implementation, increasing carbon dioxide absorption by forests, had insignificant impact on increasing the rate of CO^2 emission reduction.

Despite inefficiency of the first project, in 2022 the State Forests Director took a decision on its continuation in form of a second project, Carbon Forests, with planned expenses of 398,8 million PLN (approx. 93 million euro) to be covered from State Forests own funds.

The activities carried out were, on the one hand, supposed to lead to storage of additional amounts of organic carbon in forests for CO^2 absorption. On the other hand, this stored forestry was to be used to obtain additional biomass that could be obtained and sold, which, if used for energy purposes, would result in the emission of previously absorbed CO^2.

Project Forest carbon farms was improperly prepared: expected expenses that would be incurred for its implementation were not specified. In 2023, during the NIK's audit, the expenses were estimated at PLN 78.6 million.

The missing financial plan of the Project was not conducive for the effective use of funds. The Project had limitations in the ability to effectively control expenses and focus them on achieving the main objective of the Project: the increase in the amount of CO^2 absorbed by the forest ecosystem.

The Minister responsible for the environment did not exercise reliable supervision over the planning and implementation of the Forest carbon farms project. He did not ensure sufficient influence on the preparation and implementation of the project by the Director General of the State Forests. According to the strategy of responsible development in Poland, the Ministry of the Environment was responsible for its preparation and implementation, and the Minister was responsible for supervising the State Forests and forest management in the divisions where the Project was implemented.

The Minister did not undertake any activity to obtain a reliably estimated budget of the project from the Director General of the State Forests, which limited his ability to supervise expenditures intended for its implementation.

The Minister's supervision over State Forests during the project implementation was insufficient and limited to accepting only periodic reports. The reports did not have sufficiently thorough analysis of the data, which, as NIK's audit proved, turned out to be unreliable.

In the area of nearly one third of all forest divisions included in the Carbon Farms project conducted activities that did not contribute to achieving the main purpose of the project, which was increasing the amount of CO^2 absorbed by the forest ecosystem. The forecasted additional amount of CO^2 to be absorbed over 30 years was either a negative value or equal to zero. This meant that their implementation in these divisions resulted in less CO^2 absorption compared to regular activities without the project implementation (when reductions would be higher), or it could not produce any positive additional effect of carbon dioxide absorption.

Information contained in periodic progress reports in 2019–2023 submitted by the State Forests Director General to the Minister of Climate and Environment were not consistent with the actual situation for the amount of incurred costs, the degree of implementation of individual activities, as well as the achieved results. State Forests monitored the project’s progress in an unreliable manner, and some reporting documents were prepared only during the NIK audit, including State Forests internal regulations specifying the assumptions and implementation rules.

The forest districts participating in the project performed their tasks in accordance with the adopted assumptions, prudently using allocated funds. By the end of 2022, they carried out activities in approximately 76% of the area covered by the project in 2017–2024.

Initially, forest divisions carried out their activities only on the basis of arrangements with the State Forests Director General, without information on their projected impact on the environment, including the amount of CO2 absorption, because the application enabling development of individual tasks under the Project was made available to forest districts only in September 2018.

However, in more than half of the forest districts, cases of late submission of annual progress reports were found, as well as cases of unreliable reporting of data, including understatements of incurred costs.

Conclusions

Taking into account overall responsibility for the project supervision assigned to Minister of Climate and Environment regarding its preparation and implementation, as well as the to the State Forests Director General for its performance, NIK recommended to suspend the implementation of Carbon Forests project, until the completion of the pilot research project, Carbon forest farms, and summarization of achieved results. NIK also recommended the Minister of Climate and Environment to conduct a thorough analysis of Carbon Forests project justification, taking into regard the prognosed weak results of the Carbon forest farms project.

For additional information, please visit: https://www.nik.gov.pl/aktualnosci/lesne-gospodarstwa-weglowe.html

Source: Australian National Audit Office

Lessons from SAI Australia on Auditing Climate Change Programs

Author: Australian National Audit Office

Introduction

The Australian National Audit Office's (ANAO) climate change-related audits are generally conducted under the Auditor-General's performance audit mandate. The ANAO's performance audit activities involve audits of the performance of Australian Government programs and entities with a focus on assessing economy, efficiency, effectiveness, ethics, and legislative and policy compliance. In 2023–24, the ANAO tabled 45 performance audits in the Australian Parliament, with six audits relating to climate change, energy, the environment and agriculture sectors.

The ANAO's recent performance audit activities have highlighted several lessons from auditing climate change-related programs across the Australian Government. Three key themes are explored in this paper:

- coordination of climate action across government;
- conflict management in funding climate change programs; and
- performance measurement and reporting.

Coordination of climate action across government

In Australia, the Climate Change, Energy, the Environment and Water (CCEEW) portfolio manages the range of programs that are intended to reduce the impact of climate change and improve environmental outcomes. Other Australian Government portfolios that have climate change responsibilities include:

- **Foreign Affairs and Trade:** Leads Australia's international response to climate change through multilateral negotiations, international trade and investment, and climate-related support through development assistance;
- **Attorney-General's:** Identifies climate change as a threat that has the potential to impact policing through severe weather events and interruption to essential services;
- **Defence:** Considers the national security implications of climate change in Australia and the region;
- **Agriculture, Fisheries and Forestry:** Considers the risks and opportunities climate change poses for Australia's primary industries; and
- **Home Affairs:** Coordinates efforts in responding to and recovering from natural disasters.

As of January 2024, the ANAO identified 127 programs delivered by 42 different Australian Government entities that are specifically related to climate response, and policies or programs related to climate change governance, energy, agriculture, or the environment more broadly.

Multiple entities delivering diverse programs without strategic coordination presents a risk for effective and efficient delivery of desired outcomes. The absence of a cohesive strategic framework to guide the delivery of programs to achieve Australia's climate change commitments was a key finding raised in Auditor-General Report No. 10 2023–24 Governance of climate change commitments. The audit examined the effectiveness of the Department of Climate Change, Energy, the Environment and Water's (DCCEEW) governance arrangements supporting the implementation of the Australian Government's climate change commitments. The audit noted that DCCEEW was tracking over 100 climate- and energy-related measures being delivered across government, but found that there was no single structured 'plan' or strategy that linked the activities being undertaken to the achievement of emissions reduction targets.

The ANAO made a recommendation aimed at developing a strategic approach to enable measurement of activities to the achievement of commitments, which was agreed by the department.

Conflict management in funding climate change programs

As countries accelerate their climate action to meet their domestic and international commitments, climate-related public spending has increased.*(1)* In Australia, the 2024–25 federal Budget committed $22.7 billion over the next 10 years to invest in 'maximising the economic and industrial benefits of the move to net zero' and make Australia 'a renewable energy superpower'. This is in addition to significant funding commitments from previous budgets, including:

- $24.9 billion of climate-related spending committed in the October 2022–23 Budget;
- $3 billion from 2023–24 to 2029–30 to support Australia's net zero economic transformation in the Mid-Year Economic and Fiscal Outlook 2023–24; and
- $4.6 billion in climate-related spending commitments for climate action out to 30 June 2030 in the 2023–24 federal Budget.

A significant amount of Australian Government's climate- and environment-related funding is delivered to other levels of government or to non-government organisations. Grants represent 37 per cent of total budgeted expenses for DCCEEW in 2024–25. Appropriate arrangements to manage conflicts of interest when providing government funding are important for building and maintaining public confidence in the government to manage sensitive, high-value and at times contentious climate policies and programs.

In Auditor-General Report No. 24 2023–24 Issuing, Compliance and Contracting of Australian Carbon Credit Units, the ANAO assessed the effectiveness of the Clean Energy Regulator's issuing, compliance and contracting activities related to Australian Carbon Credit Units (ACCUs). ACCUs are issued to eligible projects for carbon abatement and can be sold to the Australian Government or organisations to offset their carbon emissions.

In the audit, the ANAO found that a legislative requirement to provide ongoing ministerial updates of interests declared by Emission Reduction Assurance Committee (ERAC) members was not met. The ERAC's role includes providing independent expert advice on the appropriateness of ACCU generation methods to the responsible minister. Appropriate disclosure and management of potential conflicts is critical to maintain ERAC's independence and public confidence in the scheme. The ANAO made a recommendation to implement procedures for notifying the responsible minister of interests declared by ERAC members as required by legislation. The recommendation was agreed.

(1) See, for example, increases in public climate finance from 2013 to 2022: "Climate Finance and the USD 100 billion goal", Organisation for Economic Co-operation and Development (OECD), May 2024, https://www.oecd.org/en/topics/climathttps://www.oecd.org/en/topics/climate-finance-and-the-usd-100-billion-goal.html.

Performance measurement and reporting

Fit-for-purpose performance measurement frameworks enable an assessment of the extent to which government programs are achieving objectives. In Australia, the Public Governance, Performance and Accountability Act 2013 (PGPA Act) governs the planning, management and reporting of public sector activity. The PGPA Act recognises that performance of the public sector is more than financial, and introduced a framework for measuring and assessing non-financial performance, including requiring monitoring and evaluation of government programs.

A common finding raised by the ANAO in climate-related audits in relation to the usefulness of performance measurement frameworks is heavy reliance on project-level performance information, which does not provide insights into the progress or impact of the relevant programs on overall objectives or targets. The absence of meaningful performance information makes it more difficult for entities to effectively manage program delivery, including addressing emerging risks and issues, and for stakeholders to judge the impact and effectiveness of the public funding. It also results in a limited evidence base on which the development of new policies can be based.

This finding was raised in a number of recent audits, including:

- **Auditor-General Report No. 20 2017–18** Low Emissions Technologies for Fossil Fuels, which found that the absence of sufficient program-level performance reporting limited visibility and oversight of program achievements, and the ability for government to make decisions on the future of the programs;

- **Auditor-General Report No. 19 2021–22** Management of Threatened Species and Ecological Communities under the Environment Protection and Biodiversity Conservation Act 1999, which found that performance reporting did not indicate how listing and conservation planning activities had contributed to the desired outcomes; and

- **Auditor-General Report No. 2 2023–24** Wildlife and Habitat Bushfire Recovery Program, which noted that not all projects within the program were reporting against targets or outcomes, and as such progress data could not be compared or aggregated to provide a program-level assessment of progress.

In each of the audits, the ANAO made a recommendation for the relevant entities to establish and undertake appropriate monitoring and evaluation activities to determine the impact of their programs on achieving policy objectives.

SAI Australia's future climate audit activities

Auditing climate change impacts, risks and resilience is a fast-evolving space, and the ANAO considers it an area of focus for future audit activities.

Under the Commonwealth Climate Disclosure Policy introduced in March 2024, all Commonwealth entities and companies will be required to publicly report on their exposure to climate risks and opportunities, as well as their actions to manage them. As the public sector auditor, the ANAO is working with the Department of Finance to develop an assurance and verification regime for climate disclosures. Readiness to audit climate disclosures will be a key focus for the ANAO in 2024–25.

More broadly, the ANAO is developing a multi-year Climate Change and Environment Audit Strategy. This strategy will augment the ANAO's Annual Audit Work Program and support the ANAO to produce a coordinated body of work to audit Australian Government entities' management of climate-related risks.In addition to its primary role, the ANAO is an active member of the external public sector audit communities and participates in international and regional forums to share knowledge and promote the professional standing and influence of government auditing. In September 2024, the ANAO co-hosted the Pacific Association of Supreme Audit Institutions (PASAI) Regional Working Group on Environmental Auditing (RWGEA). The theme for this meeting of RWGEA was 'Auditing in the Blue Economy', focusing on two sub-themes: oceans and waterways; and climate change and natural disasters. During the three-day event held in Canberra, Australia, approximately 50 public sector auditors with an interest and specialisation in environmental auditing from Australia, New Zealand and the Pacific region gathered to share knowledge and develop capability in this rapidly emerging area of audit.

Pacific Association of Supreme Audit Institutions (PASAI) Regional Working Group on Environmental Auditing (RWGEA) September 2024 Meeting. Source: ANAO

Power plant in Visonta, Hungary. Source: Adobe Stock Images, Imagenist

Reducing Greenhouse Gas Emissions in Hungary in Light of the Dynamically Changing Requirements of the European Union

Author: Kornél Jakab, State Audit Office of Hungary, 2024

Introduction

The fight against climate change requires Hungary to develop a common set of principles-based targets and to operate a coherent framework for action, monitoring and feedback in order to meet national and international targets for reducing greenhouse gas emissions. This is highlighted by the analysis of the State Audit Office of Hungary (SAO) concluded in 2024, which audited the measures aimed at reducing greenhouse gas emissions and the strategic framework of Hungary in the light of the dynamically changing requirements of the European Union (EU).

Due to greenhouse gas emissions, the effects of global warming affect almost all aspects of life, the natural environment and biodiversity, all sectors of the economy, human habitats and the development of society. The estimated value of economic damages associated with climate change, including projections ranging from the costs of recovery caused by natural disasters to unrealised economic returns, are increasing.

Action is of key importance for Europe, as the continent's average temperature is rising at around twice the global average. A milestone in the fight against climate change was the Paris Agreement adopted in 2015, which set the target of reducing the average temperature rise. The European Union's Climate Law aims to ensure that climate neutrality, i.e. a balance between greenhouse gas emissions and removals, is achieved by 2050. The EU Climate Law sets intermediate, regularly revised targets to reach the 2050 target, although adapting to and meeting the changing standards of the EU represent a challenge for all Member States. As a Member State of the Union, Hungary has developed its corresponding strategic framework in line with the standards of the EU.

Harmonisation of the strategic framework and consistent monitoring may support alignment with the requirements

In its analysis focusing on the trends of years 1990-2023, the State Audit Office (SAO) of Hungary concluded that the strategic objectives of Hungary were made up of a diverse set of strategies and measures with different structures and contents, some of which were being renewed at the end of the first half of 2024. Different measurement methods were used to implement the measures and to support the back-testing of results, and no integrated monitoring system was in place. During the period analysed, Hungary did not have any comprehensive system in place to assess the implementation of climate policy action as a whole, nor to measure its effectiveness, while the Monitoring, Evaluation, Reporting (MRE) system is currently under development.

One of the first Hungarian milestones set to achieve the Union's objectives was the drafting of Act XLIV of 2020 on Climate Protection. The strategic plan documents in force at the end of the first half of 2024, affecting climate policy either directly or indirectly, were very complex, diverse, and differed in content and function. The different strategic plan documents overlap as regards their dimensional and action targets and objectives, but in some cases different sub-targets or measures were included under the same targets, which posed a risk to feasibility.

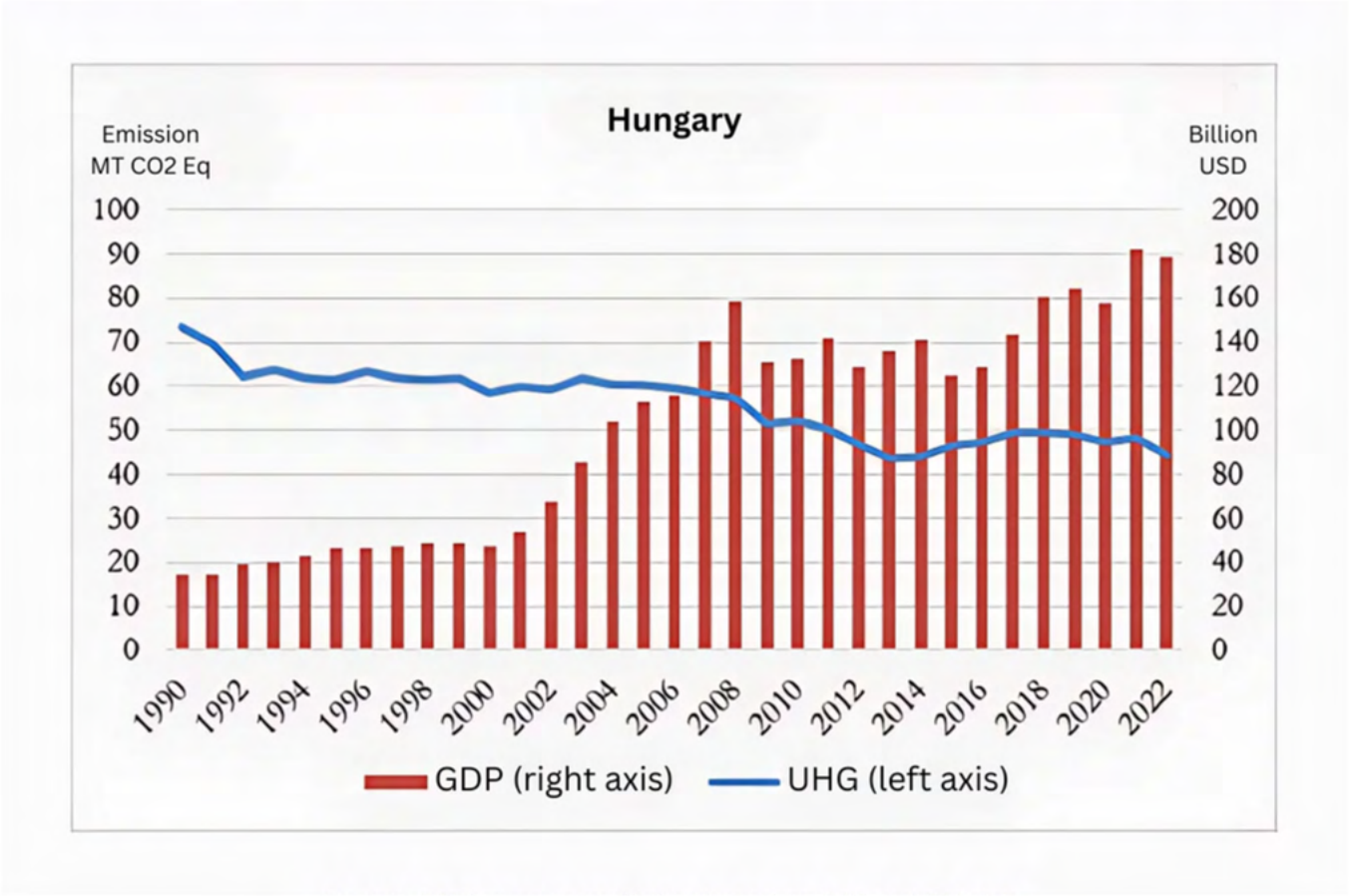
The approach to climate change adopted in the Hungarian strategic plan documents was basically bi-directional and was aimed at reducing emissions or adapting to climate change. Regarding the implementation of measures, policy governance helped the various sectoral stakeholders through its coordination role, but the analysis has shown that considerable emphasis needs to be placed on strengthening this function in the future. Similarly, improving the monitoring of implementation is essential for ensuring that the feedback-based information being processed facilitates active decision-making and iterative planning, both for the purposes of designing and implementing interventions, and for defining future strategic directions.

The analysis of the SAO has pointed out that the decision supporting tool of the Hungarian policy is the National Adaptation Geo-information System (NAGiS), which provides monitoring data, forecasts and information on climate impacts. However, the system has not been substantially improved since 2020. The National Inventory Report, which also includes greenhouse gas (GHG) emission values, was previously compiled by the National Meteorological Service and is currently compiled by HungaroMet Hungarian Meteorological Service Nonprofit Private Limited Company; however, the Report makes it difficult to differentiate between the emissions of the areas covered by the strategy and to identify the impact of the action plans' measures on the changes in emissions. In order to assess the evidence base for the design and realisation of the implementation programmes, a monitoring system that can be tracked through indicators and continuously updated would be required, thereby ensuring the monitoring and evaluation of mitigation and adaptation targets and interventions.

The relationship between economic growth and GHG emissions

In developed countries, the relationship between greenhouse gas emissions and economic growth is characterised by the fact that the decrease, the stagnation or at most a slight increase in GHG emissions has sometimes been accompanied by significant increases in the gross domestic product (GDP). The Member States of the European Union have also achieved economic growth while reducing greenhouse gas emissions. Trends in greenhouse gas emissions in Hungary show a higher decrease in the early 1990s. The reference period used for calculating the EU targets wasn’t primarily dominated by technological progress, innovation or efficiency gains, but rather by the dismantling of the formerly major emitter socialist heavy industry between 1990 and 1992. The economic progress since the 2000s has generally been accompanied by cuts in pollutant emissions, although the major decreases have been determined by the various recession-related processes (cf. figure).

The relationship between greenhouse gas emissions and economic growth in Hungary



Source: SAO's own compilation based on IMF and CM data

By 2021, compared to 1990 as the base year, emissions from the industrial sector decreased to the greatest extent, by 37.2%, while the energy sector showed a decrease of 34.3% and the agricultural sector showed a decrease of 28.6%. Absolute emissions from waste management showed a more moderate decrease of 9.1% over the same period. According to estimates on removals and emissions from the Hungarian land use, land-use change, and forestry (LULUCF) sector, it has typically been a net sink over the past decades and was able to offset 12.7% of domestic emissions in 2021. The main contributor to this was the increase in the total population of trees in forest areas. Therefore, the effort to reduce greenhouse gas emissions may also be linked to technological progress related to energy efficiency and alternative energy sources. In parallel, the European Union has a strategic goal to increase energy independence and to become more competitive in the long term through the development and deployment of clean technologies. The reduction of greenhouse gases has the potential to catalyse innovation in many respects and also to create new industries that contribute to improved competitiveness, economic growth and job creation.

In the 2021-2027 budgetary cycle, the European Union has been allocating significant sums for forward-looking technological developments aimed at reducing emissions. This means that by 2030, there is a significant potential for obtaining direct and indirect EU funding available through tenders on climate action, totalling thousands of millions of euros. The resulting investments may also have a positive impact on Hungary's competitiveness and economic growth in the long term.

Conclusion

In Hungary, during the period of regime change in the 1990s, the reduction in GHG emissions was not primarily dominated by technological development or efficiency gains in manufacturing technologies but the decline of socialist heavy industry. In the past 20 years, the periods of greater emission reduction were not forced by innovation either, but by various recessions. The effective implementation of the planned measures and interventions to achieve climate neutrality requires the coordination of the target systems of the strategic plans as well as the development of an integrated monitoring system to support implementation and back-testing.

Despite the fact that Hungary is not considered a significant GHG emitter in global terms, the country must treat the support of those innovations as a conceptual and strategic management issue, which can contribute to the achievement of climate goals. It is also important due to the fact that investments may have a positive impact on the competitiveness and economic growth of the country.

Greening work in arid desert areas in Azerbaijan of new tree seedlings being planted.
Source: Adobe Stock Images

Involvement Of Supreme Audit Institutions in Climate Performance Assessment: International and Local Experiences, Realities and Challenges

Author: Vugar Gulmammadov, Chairman of the Chamber of Accounts of the Republic of Azerbaijan

Introduction

Climate change is one of the biggest global problems of modern time. Greenhouse gas emissions, melting glaciers, forest fires, deforestation and misallocation of water resources have a negative impact on the environment, economic and social conditions.

Despite the national and international measures taken by governments to reduce the greenhouse gas emissions in the last two decades, the warming process in the climate system is still observed. According to the 2023 Report of the Intergovernmental Panel on Climate Change (IPCC), the global surface temperature in 2011-2020 is 1.1°C higher than in 1850-1900.

Although the global climate action is a shared responsibility of many stakeholders in the public and private sectors, the dominance of the former in this field up to the present is felt to be significant. Thus, national governments play an important role in climate action by allocating public resources, implementing state policies, and through various governance mechanisms to combat climate change and its consequences. Political commitment by governments, an institutional framework, good strategic management, and broad access to finance and technology can contribute to effective climate action.

Considering the use of significant financial, including state (public) resources for the implementation of this activity, SAIs conducting external public financial control can contribute to this issue via their audits.

The conducted analyzes show that the experience of conducting environmental audits by SAIs, including their involvement in climate performance assessment, has been expanding in recent years.

The assessment of climate action by SAIs aims to achieve the **outcome** – *"contributing to the improvement of accountability, effectiveness and inclusiveness of government climate change adaptation measures"* through the following three outputs:

1. High-quality audits and recommendations in various areas (disaster risk reduction, water resources management, sea level rise, implementation of climate change adaptation plans/activities etc.);
2. Timely submission of audit reports in accordance with legislation;
3. Audit impact throughout the audit process.

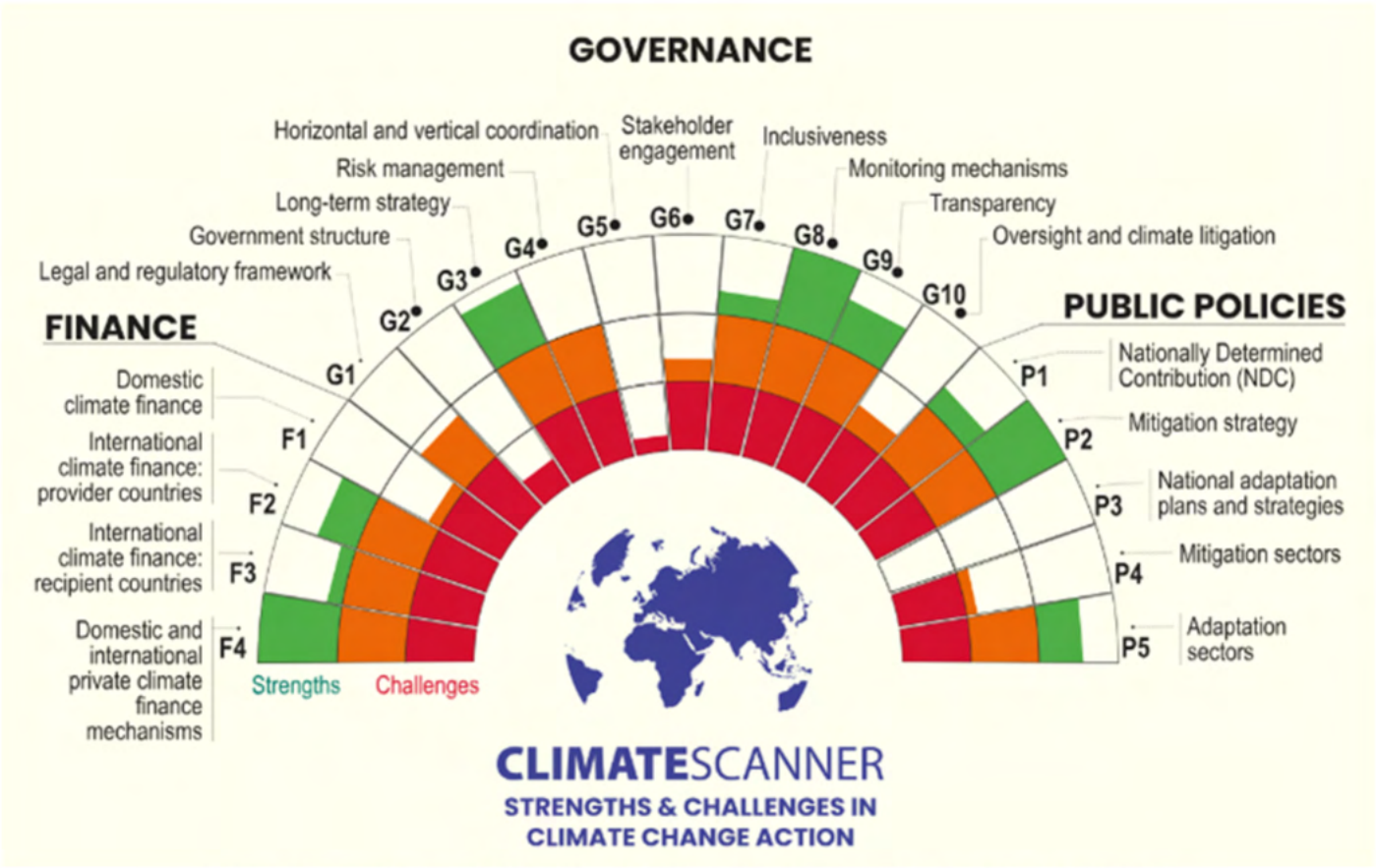
In general, although the SAI mandates differ, they all have a mission to provide independent evaluation of the management and use of public resources. Audit on management and use of resources in most cases is conducted as a component of compliance, financial and performance audits. For this reason, SAIs do not need special authority to assess the effects of funds allocated to climate action. In a number of countries, including Azerbaijan, this has been established by Law and attributed to the direct duties of SAIs.

According to INTOSAI WGEA, in the last five years, the number of environmental audits conducted by SAIs is greater than 400, and more than 50 of them are directly related to climate performance assessment. Performance audits are significantly predominant here.

Considering the topicality of the issue, SAI Brazil, current INTOSAI Chair, together with INTOSAI WGEA, experts and international organizations (UNDESA, the World Bank, UNDP, etc.) launched the ClimateScanner initiative.

The author, Vugar Gulmammadov, Chairman of the Chamber of Accounts of the Republic of Azerbaijan (right), with Bruno Dantas, Minister of the Brazilian Federal Court of Accounts. Source: Chamber of Accounts of the Republic of Azerbaijan

ClimateScanner assessment final results are expected to be announced at the 29th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change – COP29, to be held in our capital, Baku, Azerbaijan, by SAIs.



ClimateScanner. Source: SAI Brazil, INTOSAI Working Group on Environmental Auditing.

A number of fiscal diagnostic tools also encourage the active involvement of SAIs in assessing the climate action. For example, the PEFA Climate (Climate Framework) prepared by the Public Expenditure and Financial Accountability (PEFA) Secretariat also envisages the involvement of SAIs in this activity. PEFA's Climate Framework tool is a set of indicators based on the PEFA framework to gather information on the readiness of the public financial management system to support and promote the implementation of government climate change policies.

The experience of the Chamber of Accounts of the Republic of Azerbaijan in assessing the national climate activity related to climate changes

In our country, a number of important measures have been taken to achieve the goals in climate change combat, and the State Commission on Climate Change has been established. In the past, the Republic of Azerbaijan prepared its National Information and Biennial Update Reports on Climate Change and submitted to UN Framework Convention on Climate Change (UNFCCC).

In accordance with the Paris Agreement, the Republic of Azerbaijan submitted its Nationally Determined Contributions (NDC) document in 2016 and set a target of reducing greenhouse gas emissions by 35% by 2030 compared to 1990.

Climate change mitigation measures are reflected in the "Socio-economic Development Strategy of the Republic of Azerbaijan for 2022-2026", "State Programs on the Socio-Economic Development of Regions" and other documents.

Although substantial work has been done by the Azerbaijani government within the framework of the fight against climate change, the global development trends of the world economy have determined the issues of climate change as an actual problem in the Republic of Azerbaijan. The results of various assessments show that the agricultural sector, water resources sector, coastal zones and forest sector are more sensitive to climate change in Azerbaijan.

To assess the effectiveness and efficiency of the government's national climate and environmental activities, a number of audits (mainly performance audits) have been carried out by the Chamber of Accounts recently.

Assessment of efficient use of irrigation water

Due to the recent drought, the trend of depletion of fresh water resources has also been observed in Azerbaijan. According to the results of scientific studies, Azerbaijan is currently ranked 20th in the list of countries that may face water shortage in 2040. Efficient use of fresh water resources is one of the urgent and priority issues for Azerbaijan, under the circumstances that more than 75% of fresh water resources in our country are formed from sources outside the country. Nevertheless, the fact that the main part of the irrigation canals are underground caused a large amount of water loss, and the lack of necessary infrastructure for accurate measurement of the amount of water used did not allow to determine the amount of water loss.

Assessment of the efficiency of the ""Pirshaghi" wastewater treatment plant" project

Due to insufficient funding, the lack of infrastructure for drinking water supply and sewage system in the scope of the facility has made it impossible to deliver sewage water to the facility and use it for its intended purpose.

Performance audit of Forestry Development Service

The conducted audit shows that a strong legislative base has been formed to regulate forest-related issues in the country, and the Forest Code has been adopted. Alongside with the strong legal framework, the previous forestry works that are the basis of forestry activities, have not been completed, efficient use of forest areas has not been ensured, although certain measures have been taken against illegal deforestation, measures to protect and safeguard forests from the effects of other anthropogenic factors and pests have been insufficient.

Challenges

The conducted control measures have determined that there are **a number of challenges** in the government's activities related to the national climate and environment.

- The restoration of the areas liberated from occupation, the forests in those areas and the ecosystem as a whole requires a lot of resources and time. In 2021-2022, more than 3 billion dollars have been allocated to the restoration of liberated territories from the state budget which creates new challenges for the government to organize and implement the efficient use of those funds, and for Chamber of Accounts to assure the efficient use of the funds.

- As renewable energy, the production of electricity in hydropower plants requires the availability of large sources of running water. In the conditions where 75% of fresh water resources are formed outside of Azerbaijan, large water sources are mainly transboundary water. The pollution of the transboundary rivers beyond the relevant norms until they reach the territory of Azerbaijan, along with the greater negative effects on the environment, requires additional time and resources to adapt that water to be used for domestic and economic purposes.

- Azerbaijan is among the most mine-contaminated countries in the world, and it is estimated that there are more than 1.5 million unexploded mines and munitions in Azerbaijan. In the period from 08.11.2020 to 27.02.2024, 345 people became victims of 205 mine explosions. The threat of landmines has made it impossible to use the lands in the liberated territories for both residential and agricultural purposes, as well as for ecosystem restoration.

Key Factors and Opportunities

The above-mentioned issues were mostly related to the factors characterizing the impact on the country. In addition, there are other factors that affect the activity of almost every SAI in this field.

Above all, it is crucial to have a **strategic management framework** and for **public financial management (PFM)** system to consider **the climate issue** in the field of climate action. Although concepts such as climate finance, green budget, etc. are currently becoming popular in the field of public finance management, there are still few examples that can be noted as good practice in this field. **It is very important to include budget indicators,** along with specific policy goals in the strategic documents adopted in the country in the field of climate action. Also, references to these documents should be increased during the preparation of the mid-term expenditure framework (MTEF) and other strategic budget documents. This will also enable to determine the sufficiency of the budget commitments to implement the adopted strategic documents on the national climate action. At the same time, the inclusion of more institutions in the **program budget initiative** can create acceptable conditions for monitoring the costs of climate actions. Another approach is the **application of budget tagging**. Climate change budget tagging should be viewed more within the framework of budget classification. The first reference point is the Government Finance Statistics Manual (GFSM) (including the classification of the functions of government (COFOG)).

The second issue is the **variety and timeliness of climate action data.** As it is known, in some cases financial data on activities are submitted to SAIs shortly after the end of the year. It is difficult to say this about non-financial information. Of course, relatively favorable conditions are formed in the countries where the program budget is applied.

It is crucial for SAIs to **agree on key performance indicators (KPIs)** for non-financial climate action data. Timely and high-quality presentation of data also requires the integration of IT systems in the relevant field.

As the 3rd issue, we can mention the **formation of personnel potential** for climate action assessment. As it is known, audits in this field require not only knowledge on financial issues and performance audits, but also specific knowledge. Currently, there are various trainings in this field. There is a great need to proceed in this area.

Source: Adobe Stock Images, Antony Weerut

A Holistic Approach to Auditing Climate Change Matters

By Elton Camilleri, Principal Auditor – National Audit Office (Malta)

Small islands like Malta are particularly vulnerable to climate change hazards. In October 2019, the Maltese Parliament had unanimously declared a climate emergency, stressing the need to take new measures to address this environmental phenomenon*(1)*.

(1) https://www.parlament.mt/media/103056/motion-no-277-climate-change.pdf

National Audit Office (NAO) Malta adopted a multi-faceted approach to better understand the risks posed by climate change impacts and the complexities associated with auditing this subject. This approach included the undertaking of a performance audit on Climate Change Adaptation (CCA) that adopts a more horizontal approach. NAO Malta conducted preliminary meetings with stakeholders including academia, to assist in the identification of climate change risks and the development of audit criteria. Consequently, NAO Malta opted to focus on the hazards associated with flooding and sea level rise. Figure 1 presents the programme logic model associated with the ongoing performance audit.

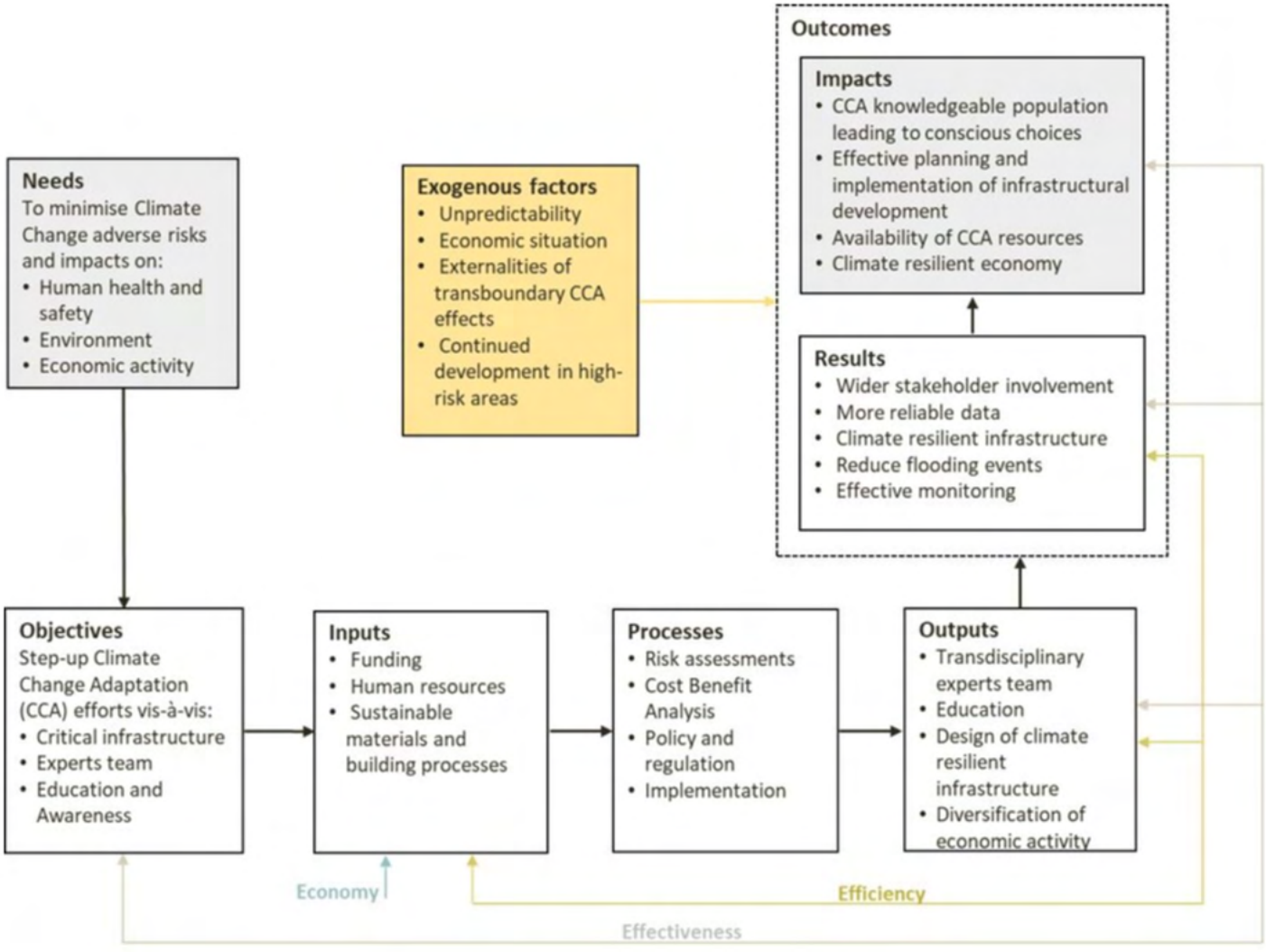


Figure 1. Source: National Audit Office of Malta.

Currently, the audit team is in the process of concluding the fieldwork phase. This relates to the implementation of relevant measures, the monitoring framework in place, as well as the estimated cost of inaction.

This multi-faceted approach for auditing climate change matters also includes the active participation in various ongoing initiatives within the International Organisation of Supreme Audit Institutions (INTOSAI) and the European Organisation of Supreme Audit Institutions (EUROSAI) Working Group on Environmental Auditing (WGEA), which include:

1. **The Climate Change Adaptation Actions training** being provided by the INTOSAI Development Initiative (IDI). Such training also includes the practical application of different auditing tools such as stakeholder analysis and the risk verification diagram.
2. The **cooperative audit** that is being carried out jointly with other Supreme Audit Institutions (SAIs) within the auspices of the INTOSAI Working Group on Environmental Auditing.*(2)* This exercise is being carried out in conjunction with the aforementioned training on CCAA and consequently facilitates the alignment of the respective audit objectives as well as the expected outcomes.
3. The **ClimateScanner initiative**, led by SAI Brazil. This web-based tool is intended to assess governmental actions vis-à-vis climate change. NAO Malta participated in the "Global Call to the ClimateScanner" and the "EUROSAI Regional Technical Workshop on ClimateScanner" held in New York and in Prague respectively.*(3)* NAO Malta is committed to set-up the required in-house training for auditors as well as auditees.
4. The **EUROSAI project group on climate change,** an opportunity for SAIs to regularly and informally discuss emerging issues for governments' approaches to climate change.
5. The **Spring and Annual Meetings of the EWGEA** that serve as a platform to share knowledge and auditing experience on the subject matter.

This emerging approach to auditing climate change is highly advantageous, enabling conclusions based on scientific evidence and robust audit methodologies. It is strengthened by knowledge sharing within the SAI community and opportunities for capacity building through training. This strategy also helps NAO Malta manage the complexities of auditing this subject, particularly in defining the audit scope and establishing sound criteria.

(2) https://idi.no/work-streams/relevant-sais/ccaa as at 25 June 2022.
(3) These meetings were organised by SAI Brazil as the INTOSAI chair in collaboration with the United Nations Department of Economic and Social Affairs and EUROSAI respectively.

Source: Adobe Stock Images, Shawn Hempel

How Can Supreme Audit Institutions Select the Right Topics for Evaluations and Performance Audits? Results from the 2024 Meeting of the INTOSAI Working Group on Evaluation of Public Policies and Programs (WGEPPP)

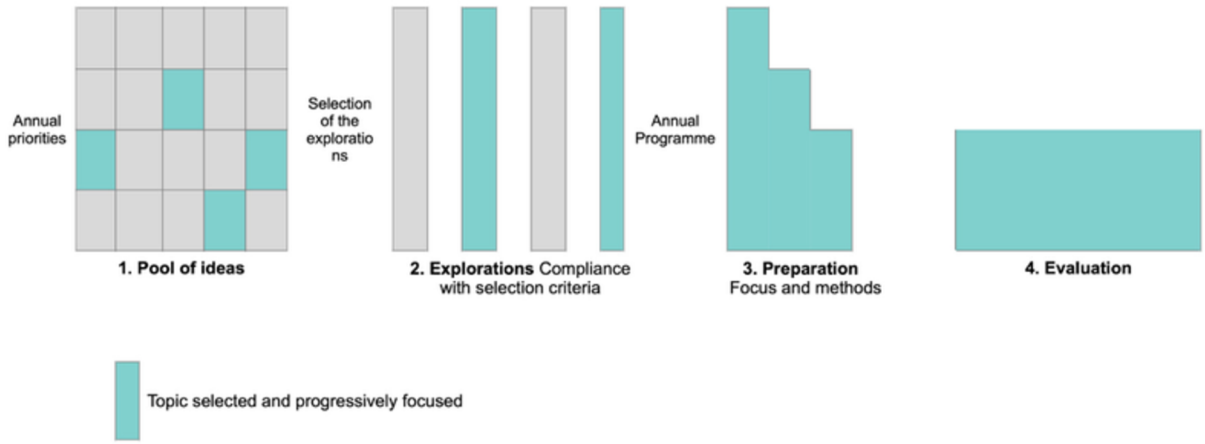
Authors: Nico Granitzer, Andrea Häuptli & Emmanuel Sangra, INTOSAI Working Group on Evaluation of Public Policies and Programs

Evaluations and performance audits require a robust selection process to ensure success. A thorough and systematic examination of potential performance audit topics allows the identification of those that present the highest risks and offer the greatest potential for improvement respectively. Furthermore, it facilitates determining the optimal timing for results to be integrated into the further development of respective public policies. Consequently, a well-considered selection of evaluation topics is more likely to influence existing public policies positively.

As Supreme Audit Institutions (SAIs), we are consequently faced with several challenges: How can we establish institutional structures and procedures to enable the identification of relevant evaluation ideas? And how can we select the evaluations and the timing that will yield the most significant impact from these ideas?

Against this background, the Working Group on Evaluation of Public Policies and Programs (WGEPPP) convened in June 2024 in Bucharest, Romania. We explored how SAIs' selection processes generally function and how these can produce optimal evaluation and performance audit topics. In addition to the workshops and discussions, a survey conducted among 22 SAIs prior to the meeting provided valuable insights into their identification and selection processes. The main conclusions are presented below.

Figure 1: Selecting and focusing of Evaluation and Performance Audit Topics at SAIs, Based on Sangra & Crémieux, 2013 *(1)*



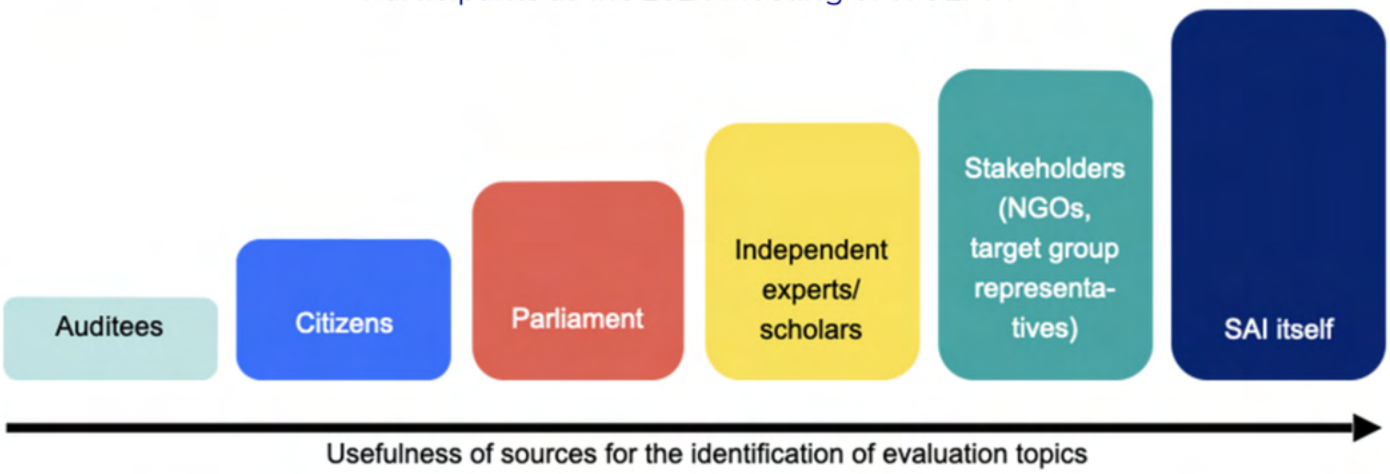
Colleagues and Stakeholders as Key Sources of Ideas for Topics

Overall, the Meeting showed that most member SAIs operate with a high degree of autonomy in identifying and selecting audit topics. 91% of the surveyed SAIs can independently choose the majority or all of their topics. The responsibility for generating audit ideas lies with the SAIs themselves. Thereby, an important prerequisite for the selection of suitable performance topics is a well-stocked pool of ideas. Figure 1 schematically illustrates the process by which topics are identified, selected, and focused.

(1) Sangra, E. & Crémieux, L. (2013). Choisir des thèmes d'évaluation aboutissant à des recommandations utiles – enseignements tirés de dix ans d'évaluation au Contrôle fédéral des finances. LEGES, 24(3), 693–709.

Internal suggestions play a particularly relevant role: 95% of responding SAIs reported that auditors can propose topics, and 68% regard these suggestions often or systematically useful, especially when they have multiple years of experience in certain policy fields. Most surveyed SAIs complete these suggestions with a risk assessment, identifying structured risks across all audited entities: such processes are in place at 81% of the responding SAIs, and 64% consider the insights gained useful for topic identification. The meeting highlighted that several SAIs increasingly use data analysis to quantify identified risks. For example, the Supreme Audit Office of Slovakia presented an extensive policy mapping, enabling them to identify deficient policy sectors through international benchmarking, such as multiple indicators regarding healthcare policies.

Figure 2: Most Useful Sources for the Identification of Evaluation Topics, As Ranked by the Participants at the 2024 Meeting of WGEPPP



The two most relevant external sources for new audit topics have been identified as stakeholders involved in public policies and experts in the respective fields. The attending SAIs employ various methods to gather information from these groups. For instance, many hold regular informal meetings (e.g., Switzerland), whilst in other SAIs, contact with those groups is formalised through Advisory Councils comprising members from professional associations or academia (as seen in Romania and India) or regular surveys (e.g., Slovakia). Additionally, 64% of the surveyed SAIs allow citizens to submit topic suggestions through mechanisms such as whistleblowing or other online messaging facilities. These suggestions are considered sometimes useful for topic identification by 77% of these SAIs. Similarly, topic suggestions from Parliament or Government are possible in 86% of the responding SAIs, yet only deemed helpful by 69%.

One important factor that was mentioned in relation to all sources is the importance of providing feedback to the submitters of ideas (colleagues, citizen etc.). SAIs should let them know to what extent their suggestions have been implemented and taken into account. This helps to maintain the motivation and commitment of contributors.

Clearly Defined Selection Criteria and Strategic Planning Processes

Based on these ideas, the selection and preparation of performance audit topics are carried out to maximise the relevance of the audit. The goal is to define the audit objectives, the corresponding focus, and the execution period.

In general, the discussion at the meeting made it clear that establishing clearly defined selection criteria is crucial. Consequently, 77% of the responding SAIs follow a strategic planning process for topic selection in accordance with ISSAI 300 requirements, and 68% impose established quality criteria for the topic selection. On the other hand, the design of this planning process and the criteria used vary greatly. Some SAIs, such as those in Spain, Brazil and the Philippines set new thematic priorities annually, while others base this on a longer-term, overarching strategy of the SAI.

Various aspects are considered in the criteria, such as the potential for change (e.g., Kenya and Bulgaria), the expected costs of the evaluation (e.g., Lithuania), political sensitivity (e.g., Philippines), or the available capacities and competencies within the SAI (e.g., European Court of Auditors). The organisational setup also varies significantly. In recent years, several SAIs have created dedicated strategy units specifically focused on the preparation of audit topics, such as in Romania, Poland, and the European Court of Auditors.

A particular challenge lies in audit areas that have seldom or never been examined. To address this, 64% of the surveyed SAIs conduct preliminary studies to gain a deeper understanding of the current developments and risks associated with the evaluation subject. This efficient approach aids in making informed decisions regarding the execution and timing of the evaluation.

Optimal Topic Selection Through Continuous Development

In conclusion, despite organisational differences and varied approaches, there are significant commonalities among SAIs at a strategic level: practically all SAIs follow a formalised process for identifying and selecting evaluation topics. The establishment of networks with stakeholders and the academic community largely plays an important role, and most SAIs have implemented a strategic planning process. Overall, however, the most essential source of topics is still seen to a large extent as being the auditors themselves. Continuous developments, such as the integration of new data analysis methods and formats for involving external actors, are an ongoing process. In doing so, the increasing relevance of these considerations and the creation of specialised departments within SAIs underscores the growing importance of how to optimally select audit topics.

Source: INTOSAI Development Initiative

PAP-APP 2018-2024: A game-changer designed to increase the impact of Supreme Audit Institutions

Author: INTOSAI Development Initiative

Supreme Audit Institutions (SAIs) aim to make a difference in the lives of citizens. For SAIs operating in challenging contexts, reaching this lofty aim is not always obvious. In 2018 the INTOSAI Development Initiative (IDI), African Organisation of English-speaking Supreme Audit Institutions (AFROSAI-E), and African Organisation of French-speaking Supreme Audit Institutions (CREFIAF), came up with a groundbreaking model to support SAIs operating in challenging contexts.

Source: INTOSAI Development Initiative

This innovative programme was conceived under the Global Call for Proposals (GCP) Tier 2 to address the specific needs of SAIs in challenging environments. The programme has made remarkable progress overcoming many challenges and offering valuable lessons for future capacity-building interventions.

A novel approach

A key feature of the "Partenariat d'Appui Accéléré par les Pairs"/Accelerated Peer Support Programme (PAP-APP) is its use of peer support and partnerships. Unlike traditional capacity-building models, PAP-APP leverages the expertise of SAIs at a higher level of organisational effectiveness and regional bodies to provide tailored support to SAIs at a lower level of organisational effectiveness.

By fostering collaboration and mutual learning, the programme is an embodiment of the INTOSAI motto, "Mutual experience benefits all." This novel approach enabled eleven SAIs in countries like the Democratic Republic of Congo, Eritrea, Guinea, Madagascar, Niger, South Sudan, Sierra Leone, Somalia, The Gambia, Togo, and Zimbabwe to implement strategic plans, strengthen operational planning, monitoring, and reporting, and deliver impactful audits through various types of support.

At its inception, the PAP-APP programme's ambitious goals raised questions about its feasibility. Tasked with addressing deep-rooted challenges in challenging contexts, the initiative's success depended on several critical factors such as: sustained donor support, effective peer partnerships, and the ability to adapt to diverse local contexts. While these challenges were significant, the programme's design—emphasising collaboration, flexibility, and strategic focus—provided a solid foundation for its eventual success. Over the years, PAP-APP showed that with the right mix of resources and commitment, meaningful progress in enhancing SAI capacities is achievable, even in the most challenging contexts.

Building strong capacities

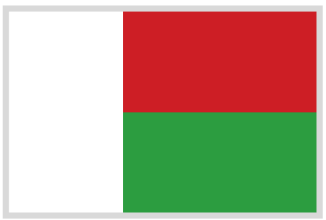
A cornerstone of PAP-APP has been its emphasis on capacity-building for both SAIs and providers of support. Over 290 providers of support to SAIs and SAI staff took part in programme capacity-building initiatives in 2024 alone. Tools such as the competency matrix and hybrid training models have been instrumental in equipping SAI staff and peers with the skills needed for complex audits and governance challenges.

Positive results from external evaluations

An independent evaluation of the programme in 2024 by Ernst & Young- Sweden lauded the programme's design and outcomes. Their report highlighted PAP-APP's role in enhancing peer-to-peer support, developing strategic management tools, and aligning with Sustainable Development Goals (SDGs). Key achievements include increased peer engagement (15 stronger SAIs offering support to the 11 PAP-APP SAIs by 2024) and significant improvements in strategic change management and audit quality.

Impact across country projects

PAP-APP's reach extends to diverse contexts, with country-specific projects delivering tangible benefits. Below are a few of the achievements:



Madagascar received dedicated funding from USAID. The project is providing support to the SAI relating to jurisdictional controls; strengthening the legal framework; improving communication; strategic management; internal governance as well as in providing digital tools and software and in promoting gender equality and diversity.

South Sudan received funding from the Norwegian Embassy in Nairobi. The National Audit Chamber Strategic Change Project strengthened financial, compliance, and performance audit capabilities to enable completion of backlogged audits.

Eritrea, with funding from the African Development Bank, experienced improved strategic planning, received resident trainer support on Financial Audit, Performance Audit, Information Systems Audit and Quality Assurance and gender inclusivity to foster long-term capacity development.

In The Gambia, Peer partnerships helped enhance audit methodologies and operational planning leading to timely and impactful audits such as the 2020 consolidated audit of government accounts.

In Zimbabwe, the programme led to strategic reviews and the development of operational plans, improving governance and accountability practices. The Swedish National Audit Office also provided technical support in collaboration with PAP-APP.

In Sierra Leone, the programme led to strengthening strategic management. This included management reviews and the development of the strategy, operational planning & monitoring process and reporting.

In Guinea and Togo, small-scale projects focused on gender-based audits and strategic management to deliver actionable insights and strengthened planning processes. In addition, Guinea has received support for the audit of public accountants' activities in relation to budgetary discipline.

In Somalia, extensive support enhanced reporting processes for financial and compliance audits alongside professional development initiatives for SAI staff.

In the Democratic Republic of Congo, a project funded by NORAD led to ICT enhancements, communications strategies, and increased audit capacities.

In Niger, despite interruptions to the support since the military takeover in July 2023, the SAI received support for strategic management, stakeholder engagement, and gender diversity and inclusiveness audits.

Challenges

Despite its successes, PAP-APP encountered many challenges including local context adaptation. Differences in political, cultural, and institutional contexts required continuous customisation of support. Amongst other interventions, training on Problem-Driven Iterative Adaptation (PDIA) and long-term peer engagement proved vital in addressing these challenges.

Also, many of the SAIs continue to face infrastructure deficits and resource constraints highlighting the need for additional donor engagement to address long-term needs.

Lessons for future programmes

PAP-APP's experience offers valuable insights for similar initiatives. As the programme ends, some key lessons learned include:

- **Flexibility in design:** Tailoring support to specific SAI needs and maintaining open communication channels fosters trust and relevance.
- **Effectiveness of peer-to-peer support.** Peer to Peer support is an effective way of addressing the capacity development needs of SAIs. However, it needs good management, funding and coordination to succeed.
- **Institutionalising best practices:** Strategic planning, monitoring, and reporting processes are foundational for an effective SAI. Embedding these processes requires sustained guidance.
- **Effective donor engagement:** Building credible partnerships and aligning funding strategies are critical for long-term sustainability. Also, continuous donor engagement and coordination are useful for raising the profile of SAIs and avoiding duplication of support to SAIs.

As PAP-APP ended in 2024, we express our gratitude to all the stakeholders, especially the Peer providers and the financial donors. The programme's legacy underscores the transformative power of peer-to-peer collaboration and the importance of adaptive strategies in capacity development. By continuing to innovate and share lessons, PAP-APP and its partners are setting a robust foundation for the future of SAIs globally.

For more information on PAP-APP, visit: Accelerated Peer-support Partnership (PAP-APP)

Source: Adobe Stock Images, Imageflow

Audit and blockchain technology

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1. Introduction

Blockchain technology originated in 2008 when an author codenamed Satoshi Nakamoto published the paper titled "Bitcoin: A Peer-To-Peer Electronic Cash System." The publication presented an innovative combination of computing-related concepts - peer-to-peer (P2P) networks, cryptography, digital signature, hash functions, and a new consensus algorithm for distributed networks.

The Bitcoin network utilizes blockchain technology to process and record transactions securely, and performs online payments without needing a trusted third party. Transactions are validated and recorded in blocks stored in ledger format at network nodes. A "block" refers to the network state stored in sequential blocks containing transactions, hence the term blockchain.

One of the limitations of Bitcoin is that its blockchain only allows the sending of monetary transactions. In 2013, Vitalik Buterin, a former member of the Bitcoin community, proposed a platform for developing decentralized applications called Ethereum. This blockchain can run the so-called “Smart Contracts”, or computational codes (programs) that run autonomously and reliably on the blockchain.

1.1 Main features of Blockchain Technology

1.1.1. Hyper transparency and auditability

Blockchain transparency allows all network participants to see the history of transactions in real-time, increasing traceability. Users can thoroughly audit transactions, which is particularly important for government applications as much information from government programs must be public.

1.1.2. Distribution and decentralization

Decentralization refers to transferring control and decision-making from a centralized entity (individual, organization, or group) to a distributed network.

The blockchain network can be used as a database integration layer, allowing shared use between organizations and external collaborators, enabling a hyper-connected government.

1.1.3. Disintermediation

Blockchain technology introduces a new paradigm: the possibility for different parties to transact without the need to trust a central intermediary. Additionally, it reduces the need to implement complex reconciliation processes between the parties and reduces costs since it is possible to use smart contracts executed automatically according to predefined rules.

1.1.4. Availability

Since all participants have a local network copy, the ledger can be accessed through other nodes if one node becomes unavailable. That is, the blockchain is a resilient network with several shared copies of data so that public services that need this information can continue operating even if some nodes are unavailable.

1.1.5. Immutability and integrity

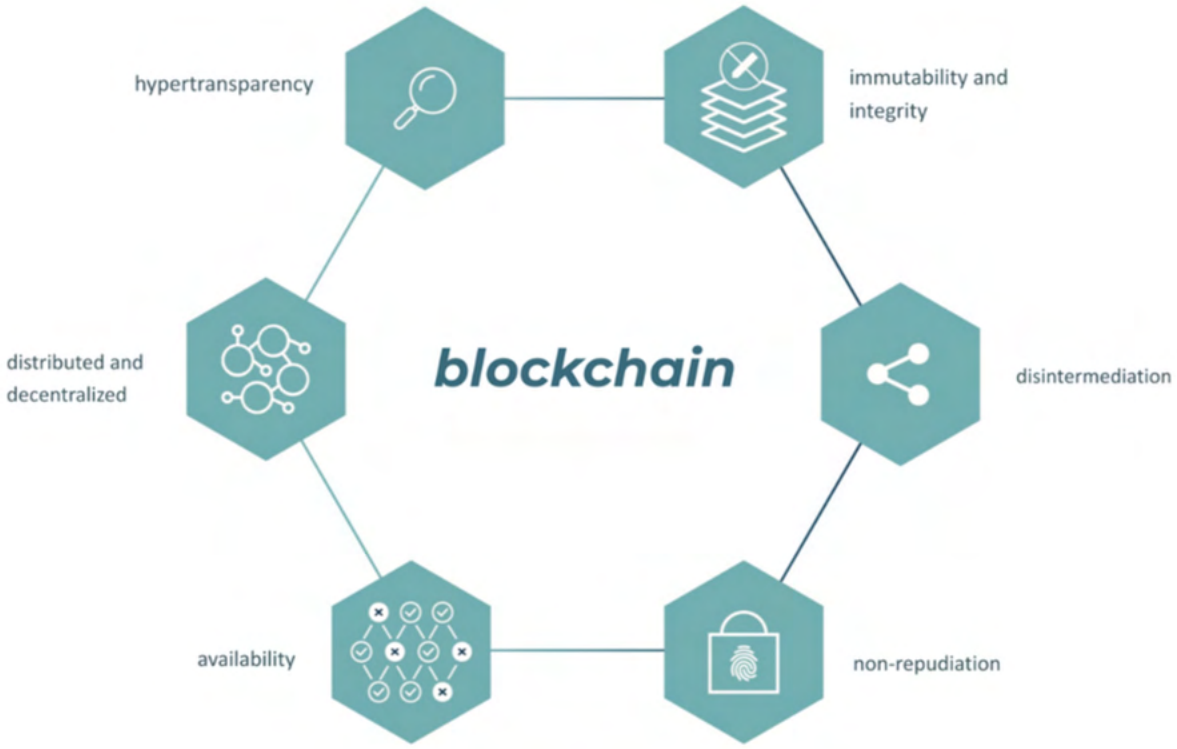
Blockchain uses cryptographic techniques to protect its records, including hash functions and digital signatures. This causes tampering to be noticed, as it is a mathematical violation of the blockchain.

This property ensures that the blockchain is an immutable record so that no entity can change past data without resulting in an alert to the network.

1.1.6. Irrefutability

One of the essential features of blockchain technologies is public key cryptography, which serves as a basis for authenticating network users. Digital signatures on transactions provide undeniable proof of who the sender of the message is (non-repudiation).

Figure 1 - Characteristics of Blockchain Technology



Source: Federal Court of Accounts of Brazil

2. Blockchain, auditing, and control

The use of blockchain technology in public and private institutions will lead to the emergence of new assurance and audit services since both internal audit and external auditors can obtain real-time reports.

Furthermore, blockchain creates significant changes in the input-processing-output of an organization's information. Thus, the information process cycle may change considerably how the auditor collects evidence, focusing more on assessing the reliability of the blockchain network than on evaluating the data itself.

The study carried out by the Federal Court of Auditors – TCU to verify how innovation in Blockchain can affect audit activity is discussed in more detail through various transformation aspects:

2.1. Continuous, real-time auditing

Distributed solutions improve the governance and transparency of public bodies, allowing immediate and unrestricted access to data for society and oversight bodies. The integration of auditing with operational processes enables continuous monitoring of public acts and expenditures. The use of blockchain reduces the time to obtain information and verify transactions. Auditors can leverage automation, analytics, and machine learning capabilities to alert management to suspicious transactions in near real-time.

2.2. Paradigm shift from sample-based auditing to data-based auditing

In an audit, one should delimit the sample to be examined and define the respective selection criterion, the period covered, and its size, and generalized conclusions from the selected sample embed a certain degree of uncertainty inherent in statistical calculations.

Blockchain can replace substantive tests based on samples since examining and testing the entire data universe within the observation period based on the ledger copy will be possible.

2.3. Automated audit

Blockchain transactions are transparent, secure, and reliable. Auditors can develop automated procedures to pull evidence directly from the blockchain, eliminating data reconciliation across multiple databases and reducing the risk of errors. This enhances the auditor's job by enabling database queries, automation of reports, and automatic detection of fraud and irregularities.

2.4. New knowledge required for the auditor

Auditors should understand blockchain-specific risks and how the audited entity is implementing controls to address those risks. Professionals must gain expertise in distributed systems, networking, security, cryptography, key management, and technology processes.

The growing use of smart contracts will also require programming language knowledge to verify that business rules are being correctly coded. Blockchain increases the amount of information available, and auditors must plan how to collect evidence following the new formats resulting from this technology.

2.5. Introduction of new types of risks and fraud

To be able to provide the necessary level of confidence, audit processes need to go further in assessing the operational effectiveness of controls related to technology and cryptography. In addition, vulnerabilities in smart contracts are new points of attention for the auditor.

2.6. Compliance by Design

The term compliance by design arises from validating controls before implementing the blockchain solution, ensuring that the rules of what is allowed inside and outside the network comply with laws and legal regulations.

Thus, there will be a greater demand for auditors and auditees to participate in the application planning stage. Instead of acting to find irregularities, smart contracts will be written with the intention that they do not occur. It is much easier to incorporate aspects of governance, risk management, and controls from the beginning of a project than to adapt them after a problem is identified.

2.7. Need to validate off-chain information

When a blockchain records digital assets such as cryptocurrencies, it provides a secure and trusted source. However, when blockchain is used to record transactions from the physical world, there is no guarantee that a transaction will take place.

Lies recorded on the blockchain remain lies, leading to the question of how the auditor can guarantee the veracity of transactions recorded on the blockchain. Therefore, it will be up to the auditor to research mechanisms to reconcile transactions recorded in blockchain and real transactions, especially concerning how network participants initiate, process, and record transactions.

2.8. New challenges and opportunities

Even in an environment where the organization's entire operation is recorded on the blockchain, auditor expertise is still required to select and perform audit tests. How the truth of transactions is found and how network governance is exercised are essential factors for the auditor to observe. Evidence collected from networks with adequate internal controls is more reliable than those with less effective controls. Audits are likely to become more information technology-oriented and more forward-looking, focusing on preventing wrongdoing, fraud, and corruption.

The use of blockchain applications by auditees increases transparent behavior by forcing them to disclose previously unrecorded transactions so that control bodies must prospect ways to maximize the value of information made available in real-time. Two possibilities are the use of analytics and artificial intelligence (AI).

3. Final considerations

Despite the enormous potential that we can envision for their applicability in control, Blockchain ecosystem technologies still present challenges to be overcome by the inspection community. Such challenges range from the need for continuous training and updating by auditors in the face of constant technological innovations in the area and regulatory adjustments that may be necessary to regulate the use of blockchain in auditing activities.

Source: INTOSAI Development Initiative

Global Summit 2024: Supreme Audit Institutions' contribution to Sustainability and Digitalisation

Author: INTOSAI Development Initiative

The Global Summit on SAI Audits Contributing to Digitalisation and Sustainability, held on November 18-19, 2024, in Tbilisi, Georgia, marked a significant milestone in the collective efforts of Supreme Audit Institutions (SAIs) worldwide towards current and emerging trends about sustainability and digitalisation. Hosted by SAI Georgia and the INTOSAI Development Initiative (IDI), the Summit welcomed a diverse group of leaders, including SAIs, international organisations, academia, and other key stakeholders.

The Summit's discussions centred on the role of SAIs in fostering accountability in the areas of Sustainable Development Goals (SDGs), climate, equality and inclusion, and digitalisation. With over 300 online participants and nearly 100 in-person attendees from 30 countries, the event underscored the importance of international collaboration and dialogue.

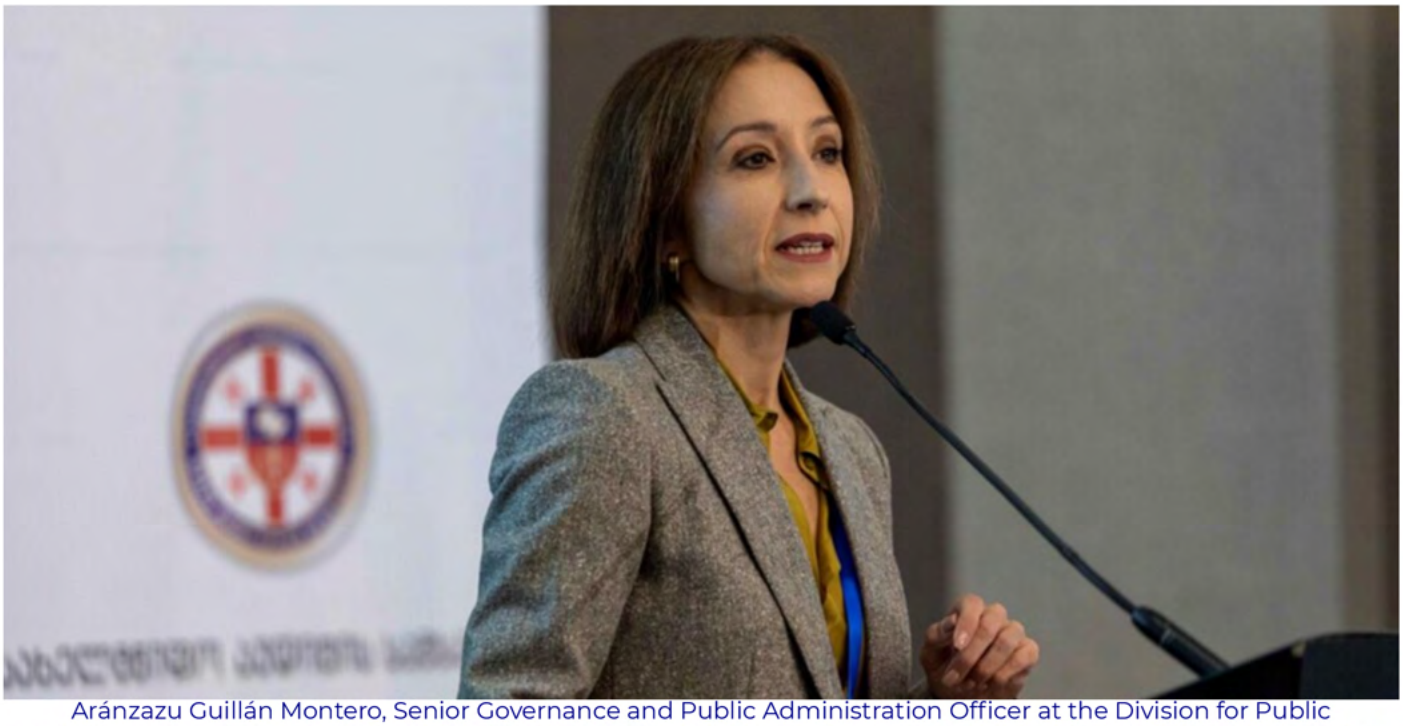
While welcoming the participants, Tsotne Kavlashvili, Auditor General of SAI Georgia, emphasised the importance of adapting to the global shifts of digitalisation and sustainability. In the same tone, Bruno Dantas, at the time chair of INTOSAI and President of SAI Brazil, stressed: "We must amplify the global voice of SAIs to address cross-border issues like digitalisation and climate change."

Tsotne Kavlashvili, Auditor General of Georgia. Source: IDI

The 2030 Agenda for Sustainable Development was part of the dialogue throughout the Summit. Speakers reflected on the SAIs' contribution to the implementation of the Sustainable Development Goals (SDGs). They discussed the role of SAIs in monitoring and evaluating progress towards the SDGs, highlighting the cooperative audits of public health systems resilience and sustainable public procurement (linked to SDG targets 3.d and 12.7, respectively).

At the Summit, IDI launched two audit frameworks linked to IDI's SDGs Audit Model (ISAM): one for auditing Leave No One Behind (LNOB) and another for auditing Policy Coherence. Together with ISAM, they will be used in the SAI SDG Auditor Initiative, to be launched in 2025, aiming to support SAIs in auditing the implementation of SDGs.

Participants were also invited to contribute to the forthcoming World Public Sector Report 2025, led by the United Nations Department of Economic and Social Affairs (UNDESA). This report is strategic for the INTOSAI community because it will focus on SAIs' audit work and their contribution to SDG progress. "Each audit, each insight, and each recommendation strengthen the SDG framework globally," stated Guillán Montero (UNDESA).



Aránzazu Guillán Montero, Senior Governance and Public Administration Officer at the Division for Public Institutions and Digital Government in the United Nations Department of Social and Economic Affairs (DPIDG /UN DESA). Source: IDI

The Summit also underscored equality, inclusion, and gender. Panel discussions highlighted the need for audit practices to be inclusive and to consider the diverse needs and perspectives of all stakeholders. “Auditing inclusion is about amplifying the voices of the most marginalised,” stated Nancy Gathungu, Auditor General of SAI Kenya. IDI Deputy Director General Archana Shirsat highlighted the critical role of audits in looking at vulnerable populations, particularly considering the principle of LNOB: “Auditors have a unique vantage point to identify gaps and ensure inclusive governance frameworks.”

During the session about inclusion, the AGs from SAI Rwanda and Maldives shared experiences in strategising for auditing equality and inclusion, emphasizing the importance of planning for audit impact. The AG from SAI Maldives and a representative from SAI Chile shared the important results of their participation in the Equal Futures Audit Changemakers, an IDI initiative.

During a break-out session on harnessing data to explore marginalisation, stakeholders from UN Women, Public Expenditure and Financial Accountability (PEFA) Secretariat, Oxford Poverty and Human Development Initiative (OPHI), and Internatinal Budget Partnership (IBP) discussed the importance and challenges of collecting reliable and disaggregated data, and advocated for stronger collaboration among SAIs, civil society organisations and the community. Gender equality was a focal point, and participants underscored the need for SAIs to adopt a gender lens in their audits to ensure that gender disparities are identified and addressed. Through doing so, they can promote gender equality in their practices and contribute to more equitable and inclusive governance.

With the current global attention to climate change, Summit discussions also highlighted the need and opportunity for SAIs to hold governments accountable for climate action. In a session focused on SAIs' audit work towards a liveable planet, speakers featured the cooperative audit of Climate Change Adaptation Actions (CCAA), and SAIs shared their experiences in auditing climate action.

Another SAI initiative related to climate action is the ClimateScanner, a tool for unified reporting that SAI Brazil spearheaded with the Working Group on Environmental Auditing (WGEA). "Data-driven tools like the ClimateScanner are transforming how we assess and improve government climate policies," said Vivi Niemenmaa, Secretary General of the INTOSAI WGEA.

Vivi Niemenmaa, Secretary General of the INTOSAI Working Group on Environmental Auditing. Source: IDI

Auditing climate adaptation actions is key in regions vulnerable to rising sea levels and extreme weather, such as Small Island Developing States (SIDS), as underscored by Hussain Niyazy, AG of SAI Maldives: "For us, climate adaptation is not a future concern; it is a daily reality that demands accountability."

The Summit highlighted the transformative impact of digitalisation on SAIs, focusing on both the opportunities and challenges it presents. Leaders shared insights into harnessing advanced technologies like AI and blockchain to streamline audits, enhance data analysis, and improve accuracy. This rapid shift, however, demands continuous skill development and significant resource investment, especially for smaller SAIs.

Experts emphasised the need for robust digital infrastructure and capacity-building initiatives to address these challenges effectively. Collaboration was a recurring theme, with calls for global partnerships to share knowledge and establish artificial intelligence (AI) audit standards. “In an age of cyber risks, SAIs must become digital watchdogs, ensuring governments protect citizens’ data,” noted Chris Dimitriadis of ISACA.

The discussions highlighted practical applications, such as Costa Rica’s paperless audits and Egypt’s AI-enabled budget oversight. They also underscored the importance of ethical AI audits. “Our role as SAIs is not only to audit technology but to ensure its ethical and equitable application,” said panellist Farahnaaz Khakoo-Mausel from SAI USA. “By addressing issues like cybersecurity and equitable digital access, the summit underscored the evolving role of SAIs in safeguarding trust in the digital age.”

The spirit of collaboration and engagement throughout the Global Summit was captured in closing remarks. Looking ahead, it is essential to continue to build on innovation, emerging issues, and stakeholder engagement to create meaningful change.

“This Summit is a testament to the power of collective wisdom. Together, we have charted a course for SAIs to drive sustainability and innovation,” said Einar Gørrissen, IDI Director General. “The path forward is clear—through collaboration, innovation, and leadership, SAIs will continue to be catalysts for global progress.”

Einar Gørrissen, Director General of the INTOSAI Development Initiative (IDI). Source: IDI

Read more about the Global Summit 2024 and view session recordings online.

This article was originally published on the INTOSAI Development Initiative's website.

Source: IDI

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