Using the e3.ge macroeconomic model to inform national climate adaptation planning in Georgia

Introduction

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Between 2019 and 2022, the Economic Analysis and Reforms Department of the Georgian Ministry of Economy and Sustainable Development (MoESD) in collaboration with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Institute of Economic Structures Research (GWS) developed the macro-econometric e3.ge model. The e3.ge model stands for "economy, energy, emissions, Georgia" and allows to develop and compare scenarios of economy-wide impacts of climate change and adaptation measures. During a 2-year period, the development of the model involved multiple trainings targeting government staff from MoESD and other ministries; the collection of secondary and primary data and information, including new analysis on past climate hazards and damages; and the piloting of the model for selected climate adaptation measures in the agriculture and tourism sectors.

In parallel, between 2021 and 2022, the International Institute for Sustainable Development (IISD) worked with project partners to explore ways of supporting the use of the model in national climate adaptation planning. A generic practitioner guide on using climate economic modelling for sustainable economic development was first developed in 2021. The guide identifies entry points and enabling factors that can support the effective use and uptake of climate economic modelling results in economic development with the ultimate objective to support climate-resilient development. These entry points and enabling factors were then explored in the context of Georgia in relation to the e3.ge model.

This case study gives an overview of the macroeconomic model developed in Georgia, the entry points and enabling factors explored to support the model application, and the lessons learned from this process.

THE MACROECONOMIC MODEL

As of December 2022, the development of the e3.ge core model is completed with possibilities for extensions. It is set up to assess adaptation measures from a macroeconomic perspective with a focus on single climate change hazards and of single adaptation measures in Georgia. It helps answer the questions: what are the economy-wide impacts of climate change and adaptation measures? How can an adaptation measure selected for one sector have an impact on other sectors of the economy in terms of gross output, employment, and CO_2 emissions? Are the economic benefits of an adaptation measure in sector X likely to be large enough to balance economic losses to sector Z? Results from the model can help determine which measures are likely to have a positive or negative macro-economic impact in the long term, and the least or the highest macroeconomic impacts (in terms of GDP and employment). Under certain conditions, this information can help build consensus around some adaptation measures across sectors and actors.

For example, MoESD applied the model to explore the macroeconomic impacts of wind erosion on Georgia's crop yields in the context of climate change and the macroeconomic impacts of investing in natural windbreaks as an adaptation measure. Results from the model indicate that for the period 2022-2050, GDP could decrease by up to 0.3% due to the impact of extreme winds on crop yields compared with a GDP increase of up to 1.4% with investments in natural windbreaks. Since most of Georgia's windbreaks need to be restored, these results may support access to climate finance for the implementation of the new 2022 law on windbreaks.

In its current form, the model can primarily be used to justify investments in high-cost adaptation measures, such as large infrastructures. Indeed, when the costs or benefits of an adaptation measure are low, its macroeconomic impact may not be visible. In addition, running the model for various climate hazards and adaptation measures to allow comparison of macroeconomic impacts makes it difficult to identify where the economy-wide effects originally come from. It also requires accessing relevant data and substantial experience in scenario development.

ENTRY POINT: USING THE MODEL TO INFORM NATIONAL CLIMATE ADAPTATION PLANNING

The model development was initiated when Georgia was at the early stage of development of its National Adaptation Plan (NAP) process. The Government recognizes that the impacts of climate change pose severe threats to the country's sustainable development now and in the future. A review of strategic documents indicates that the government's priority has been on addressing the cause of climate change (mitigation). Initiatives on climate adaptation are fragmented with no comprehensive climate adaptation policy yet. Two strategic documents released in 2021 provide guidance on national climate adaptation: the updated Nationally Determined Contribution (NDC) identifies eight high-level adaptation priorities, and the Fourth National Communication to the UNFCCC identifies more detailed adaptation measures across 13 sectors. It is expected that once the Environment and Climate Change Department's Climate Change Division under the Ministry of Environmental Protection and Agriculture (MEPA) secures finance from the Green Climate Fund (GCF) for the development of its NAP process, more attention will be given to adaptation and actions will be taken to get adaptation more systematically integrated into development planning and budgeting at national, sectoral, and sub-national levels.

During the second half of the model development period, IISD facilitated dialogues between MoESD and MEPA to explore ways of supporting the use of the model in national climate adaptation planning. **Six entry points for applying the e3.ge model to inform the NAP process were first identified** based on a review of the key national documents, including the draft proposal to the GCF for the development of the NAP, and exchanges with MoESD and MEPA. These included, using the model for:

› the appraisal and prioritization of adaptation measures in key sectors;
› the economic appraisals of adaptation options;
› awareness raising on climate adaptation;
› informing climate risk and impact assessments;
› financing climate adaptation; and
› research on climate adaptation modelling.

Two most promising entry points were then further prioritized based on a dialogue between MoESD and MEPA. These include, using the model to: (1) support the appraisal of adaptation measures and (2) raise awareness on climate change impacts and adaptation measures. At present, there are several prerequisites that are not yet entirely fulfilled in Georgia to use the model for the appraisal of adaptation measures, including: the assessment of climate risks and vulnerabilities in priority sectors and a list of priority adaptation measures at the national/sectoral level. Once this information is available, and if there is a need to build consensus and the business case among key actors for investing in high-cost adaptation measures that have been prioritized, then the e3.ge model application can be considered. To be able to run the model, access to cost-benefit data for each adaptation measure will be needed (the additional costs and benefits of investing in the adaptation measure). As such, the most immediate use of the model in the NAP process was identified as being around raising awareness on climate impacts and adaptation.

ENABLERS: LEADERSHIP, COMMUNICATIONS, INSTITUTIONAL ARRANGEMENTS

During the dialogue process between MoESD and MEPA, three factors were prioritized as essential to promote the effective use of the model in climate adaptation planning: leadership, institutional arrangements; and information and communications. These were prioritized because they were seen as essential to help increase the model's visibility and credibility, and hence its uptake in the medium and long terms.

Under 'leadership', activities were undertaken to strengthen the relationship and the dialogue between MoESD, the owner of the model, and MEPA, responsible for coordinating the NAP process and to increase MEPA's understanding and buy-in around the model. A series of meetings was organized between MoESD and MEPA to discuss the status of the NAP process, the relevance of the model, and its potential use. In total, four meetings were organized between representatives from MoESD and MEPA in November 2021 and January 2022 and between MoESD, MEPA, and other actors in March and October 2022.

Under 'information and communications', efforts were made to improve key stakeholders' understanding of the model through the organization of trainings, meetings, and the development of knowledge products. On the latter, and based on a review of key documents related to the model development, a joint knowledge product was developed between the model developers and climate adaptation practitioners and presented to key stakeholders. The process for developing this joint knowledge product served as a mean to translate the information to a different target audience – development and adaptation practitioners. The document offered an example of application of the model to clarify the key steps required for applying the model, the data and

information requirements, the assumptions, and some possible results. The briefing note helped MoESD to communicate about the model to a broader audience. For example, in March 2022, MoESD presented the model to the Climate Finance and Economic Working Group under the National Climate Platform, a mechanism established in 2021 and coordinated by MEPA to support stakeholder participation in the development and implementation of climate change policy processes.

Under 'institutional arrangements', IISD advised MoESD on a process to facilitate the use of the model so that ministries and other public institutions as well as the National Bank of Georgia, interested in using the model have clear guidance on the key steps to follow and the roles and responsibilities of the key actors involved. The proposed process involves seven steps: (1) requesting modeling support to MoESD, (2) reviewing and prioritizing requests, (3) agreeing on a workplan, (4) collecting data and information, (5) updating the reference scenario, (6) running the model, and (7) analyzing and communicating the results. The proposed role and responsibilities of key actors at the national level in using the model were also clarified and presented to key stakeholders at a national inter-ministerial workshop.

LESSONS LEARNED

The following lessons from the process and outcome of developing the e3.ge model can be highlighted and might be useful for governments and development partners interested in investing in climate economic modeling:

1. **Ensure that at least one practical entry point for applying the model is identified among key stakeholders before starting the model development to ensure its sustainability:** Identifying the most appropriate time for developing a model is important and can be tricky. If the model is developed "too early", actors may not be able to see its immediate relevance and there is a risk of losing momentum if no concrete applications are identified and implemented soon after its early development; if it is developed "too late", there is a risk that the model may not be sufficiently developed for its use and/or not sufficiently integrated in advance in budgets and project proposals. In the case of Georgia, national adaptation priorities have not yet been identified aside from the need to conduct climate risks assessments in various sectors as per the adaptation component of the country's Nationally Determined Contributions (NDC).

2. **Invest in the process of developing the model to strengthen the participation of the ministries of economy and finance in climate adaptation planning:** The process of developing the model allowed the participation of new actors – the MoESD, the Ministry of Finance (MoF) and the National Bank of Georgia (NBG) in particular - in national climate adaptation planning. It supported increased dialogue between and among these actors and MEPA on climate change impacts and climate adaptation, which is essential to strengthen a more coordinated approach to national climate adaptation planning going forward.

3. **Integrate key actors interested in using model results in activities related to the development of the model from the start:** Model developers and model users should work very closely together from the very initial stage of the model development. It can help to ensure that the model responds to stakeholders' priority needs and create buy-in and ownership among multiple actors, beyond the institution responsible for developing the model.

4. **Invest in disseminating communication materials about the model tailored to different audiences:** Modelers and policy and decision makers speak different languages. Enough resources

and time are needed to translate information about the model and its results in an easily accessible language and on an ongoing basis. In the context of the e3.ge model development, various trainings and meetings were organized to disseminate information about the model, but a lot more is still needed to improve key stakeholder's understanding of the model.

5. **Manage expectations on what a model can and cannot do:** The development of a model can generate a lot of expectations among stakeholders. These expectations may be further heightened in a context like Georgia where there is limited experience and capacities within the government both on adaptation and economic modeling and on the linkages between climate (adaptation) and economic development. It took time for different stakeholders to understand what the e3.ge model can realistically do (in its current form) and what it could do in the future with further enhancements and its limitations and additional efforts are still required to continue to improve key stakeholders' understanding. For example, limited data availability on the costs and benefits of adaptation measures reduces the model application in Georgia. Given its current focus on mitigation, the Government of Georgia is interested in applying the model to assess the macroeconomic impacts of transitioning to renewable energies.

FOR MORE INFORMATION

-   National report: Application of the e3.ge model to analyze the economy-wide impacts of climate change and adaptation

-   Discussion note: Exploring the Application of the 3e.ge Macroeconomic Model to the National Adaptation Plan (NAP) Process in Georgia. November 2021 (unedited, unpublished)

-   Briefing note: Application of the e3.ge Model to Investments in Natural Windbreaks for Adapting to the Impact of Extreme Wind

-   Concept note: Process for Using the e3.ge Model to Inform Climate Adaptation Planning in Georgia