

## *Preface*

This report presents the first comprehensive assessment of the global consequences of the land-water-energy nexus in the coming decades. It provides a global outlook to 2060 for the major impacts of nexus bottlenecks on regional biophysical and economic systems. It uses a detailed modelling framework that links The Netherlands Environmental Assessment Agency PBL's IMAGE model to the OECD's ENV-Linkages model to calculate regional and global consequences related to the nexus bottlenecks. Together, these provide a unique insight into the global and regional costs of emerging bottlenecks in the land, water and energy systems.

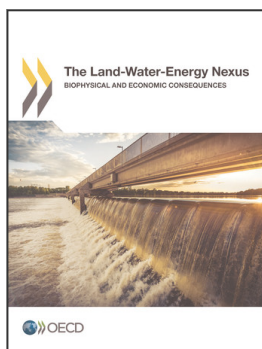
Interest in the land-water-energy (LWE) nexus in recent years has led to a growing appreciation that policies in each of these domains are inextricably linked and that to focus on just one bottleneck runs the risk of suboptimal outcomes whether in respect of effectiveness, efficiency or sustainability. A key question is the extent to which these interdependencies have repercussions at the macroeconomic and global level and thus support the urgency of promoting integrated policies for the nexus. An unambiguous positive answer cannot be drawn from the modelling evidence presented in this report. At the global level, the biophysical and economic bottleneck impacts are very moderate, and only a very small interaction effect emerges from the combined bottlenecks. In some world regions impacts of LWE nexus bottlenecks are much more severe, with implications for food security and public health exceeding the scale of macro-economic losses. This suggests that the notion of paying greater attention to the LWE nexus is better understood as an issue of hotspots and local disruptions.

Further degradation of the environment and natural capital can compromise prospects for future economic growth and human well-being. In order to assess the feedbacks from the environment on economic growth, modelling tools used for projecting future pathways of economic activity need to be able continually to assess how different environmental impacts affect various elements of the economic system. This has been the ambition of the OECD's "Costs of Inaction and Resource scarcity: Consequences for Long-term Economic growth" (CIRCLE) project. The modelling tools underlying this report contribute to this ambition by quantifying the full description of the biophysical and economic systems. This allows a much more elaborate quantitative assessment of the consequences of emerging nexus bottlenecks in the coming decades.

Significant uncertainties remain in the evaluation of the rate and geographical distribution of nexus impacts. Furthermore, some of the most severe consequences will materialise at finer spatial scales than can be investigated here. Further work on downscaling the modelling analysis to the level of water basins is therefore recommended. Nonetheless, policy-makers in countries and regions that are nexus hotspots have a lot to gain from more integrated policy approaches to assess and counter nexus challenges, building on the insights from the systems analysis presented here.



Simon Upton  
OECD Director for Environment



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