The Importance of Climate Information Services in OACPS Countries

ISDC 2025

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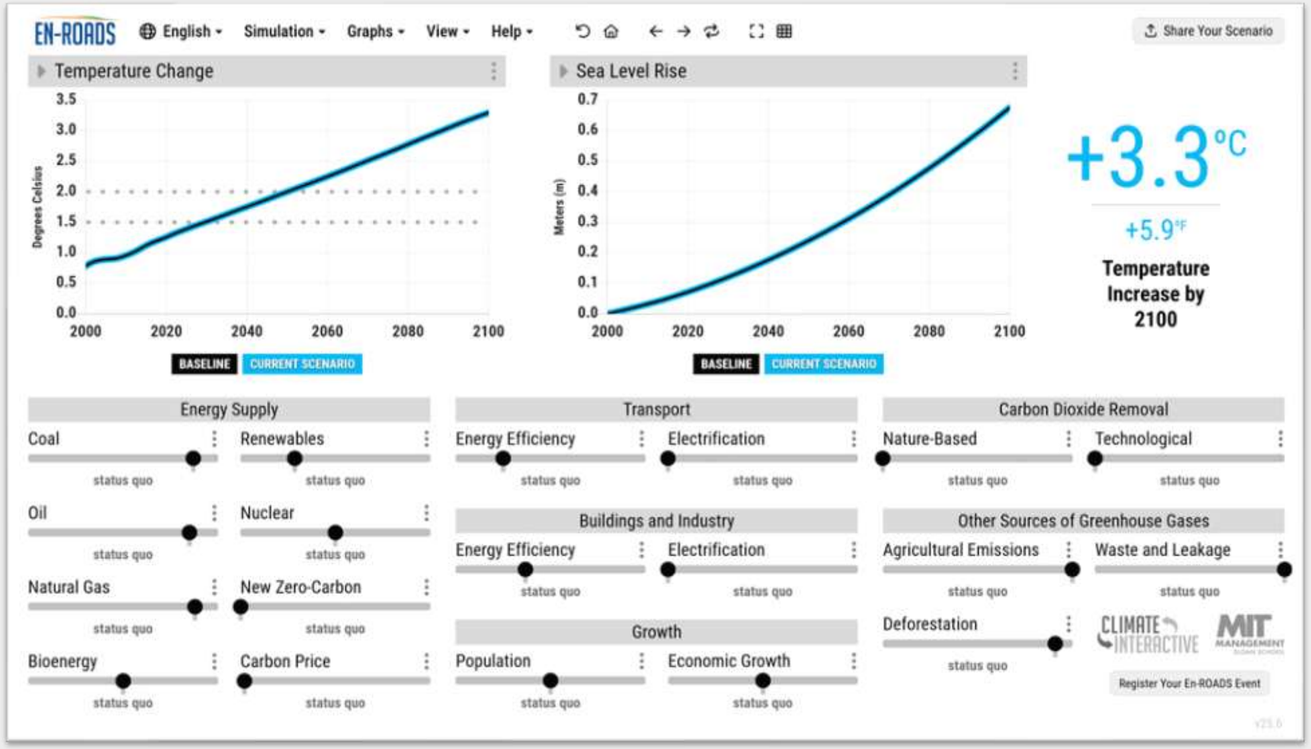
Global climate changes: rising temperatures, and rising sea levels

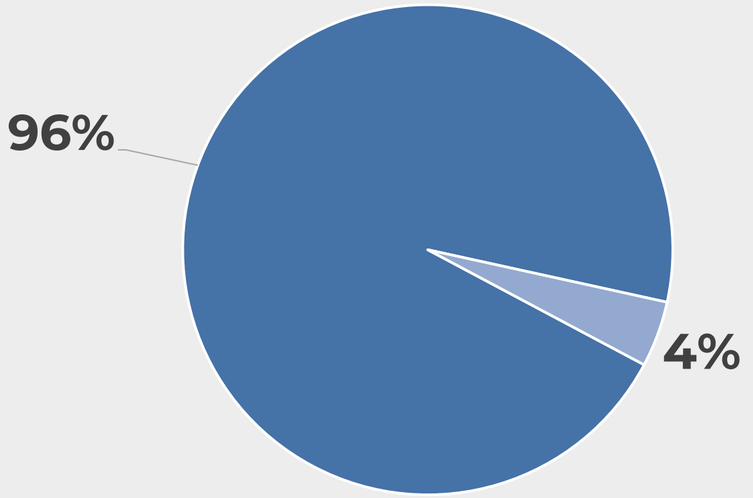
Climate-induced **local impacts** measured by the rate of decline of GDP for a country

Global Perspective

Global Climate Modeling



2023 Global GHG Emissions



GHG emissions of all world countries – JRC/IEA 2024 Report, Luxembourg, 2024, https://data.europa.eu/doi/10.2760/4002897, JRC138862.

Global Problem - Local Impacts

Global Problem

- The world faces significant climate changes
- various system dynamics (SD) models, such as En ROADS, are used for climate modeling on a global scale
- The Intergovernmental Panel on Climate Change (IPCC) provides data on climate change drivers like temperature and sea-level rise

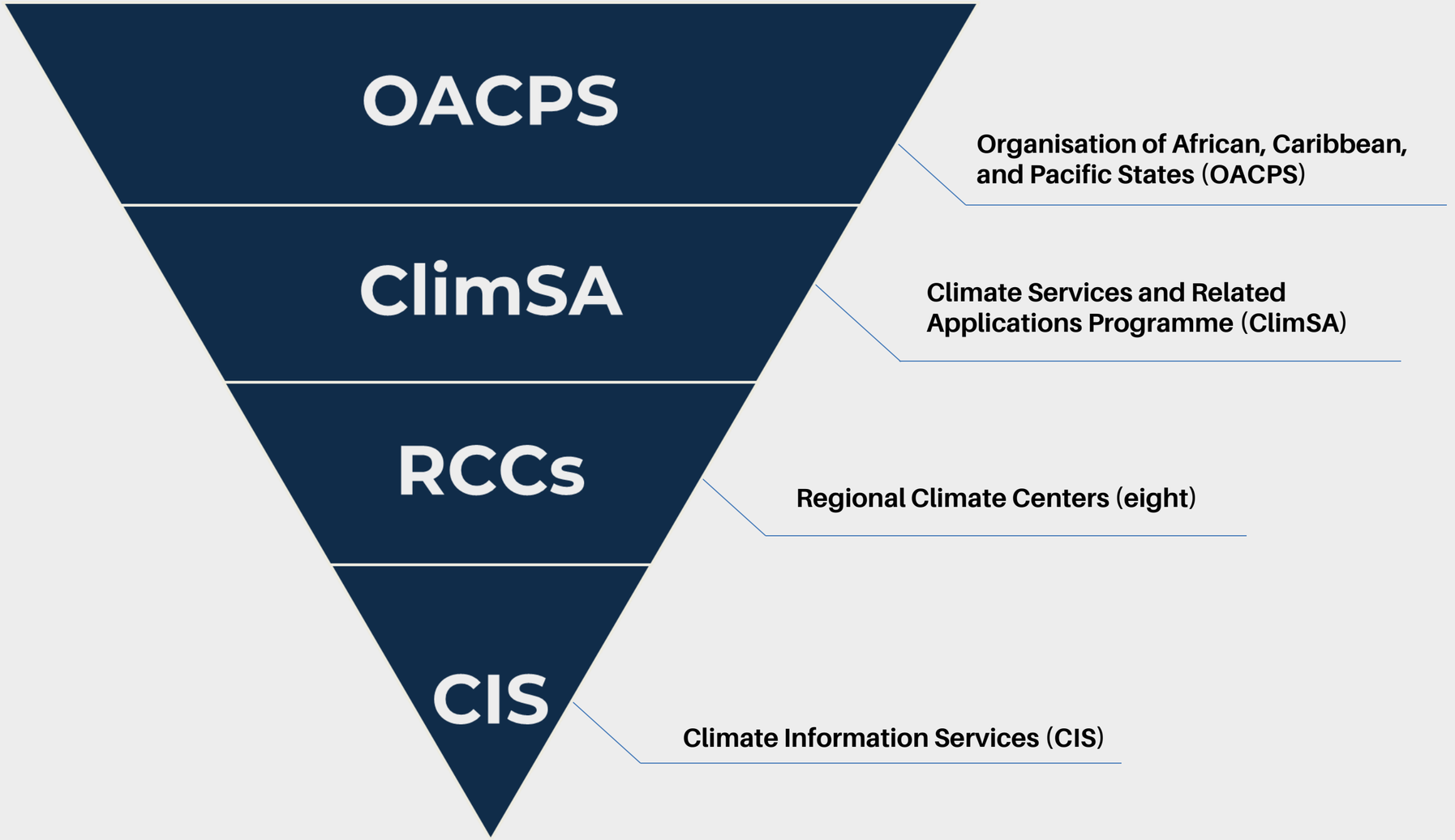
Local Impacts

- While climate change is a global phenomenon, its impacts are felt locally
- This project focuses specifically on the socio-economic benefits (SEB) of Climate Information Services (CIS) at the country level, in the context of global climate changes

Organisation of African, Caribbean, and Pacific States

- **79 countries** from Africa, the Caribbean, and the Pacific
- **Goals**:
  - Promote sustainable development
  - Reduce poverty
  - Strengthen ties with the EU
- **Focus Areas**:
  - Economic, political, and cultural cooperation
  - Unity among diverse members
  - Global challenges like climate change and trade
- Advocate for member interests internationally through dialogue and partnership

OACPS – ClimSA – RCCs - CIS



ClimSA - CIS

- A key initiative within OACPS is the **Climate Services and Related Applications Programme (ClimSA)**.
  - Goal 5 of the ClimSA programme is to enhance climate-informed decision-making through **improved Climate Information Services (CIS)** by mainstreaming CIS into the policy processes at regional and national levels.
  - This includes contributing to the **strengthened production, availability, delivery, and application of science-based climate prediction and services**.

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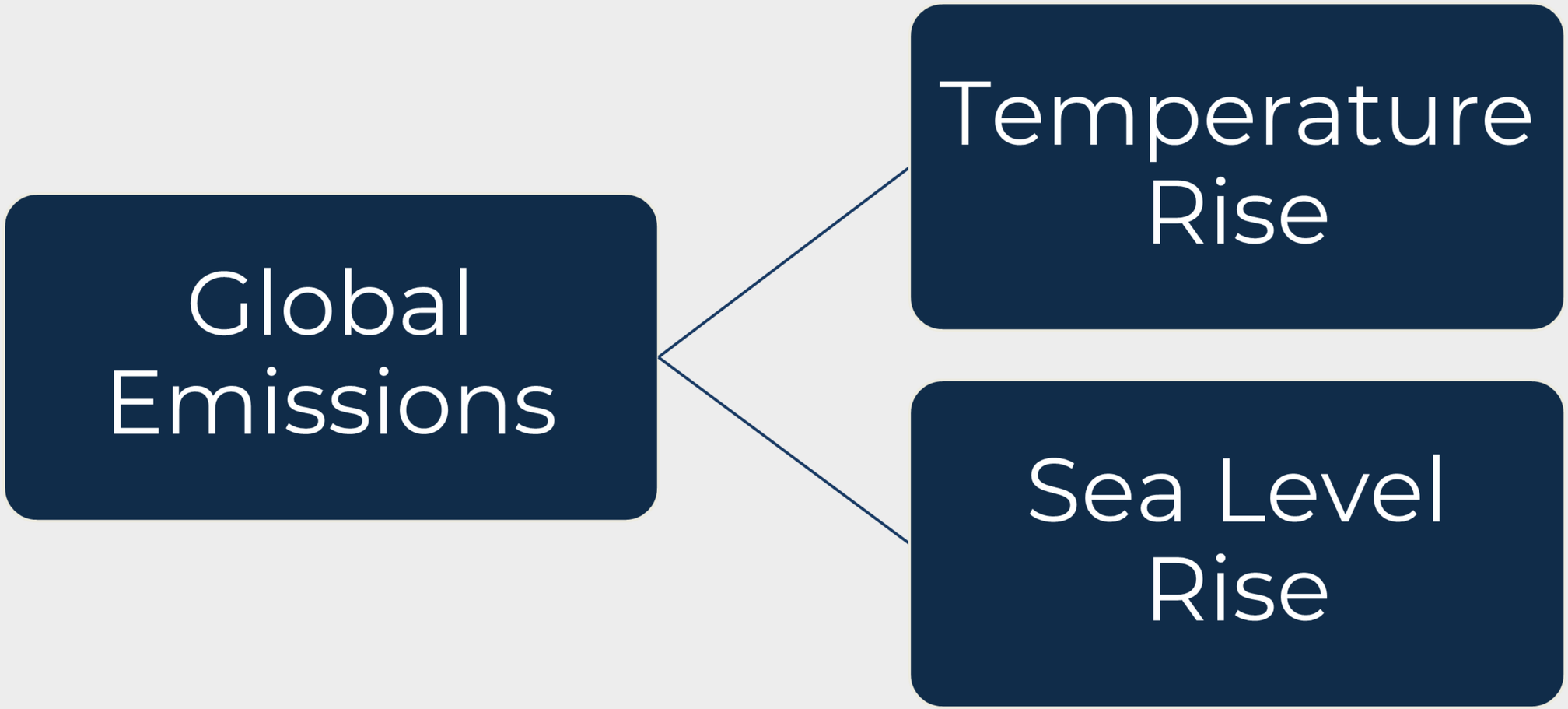
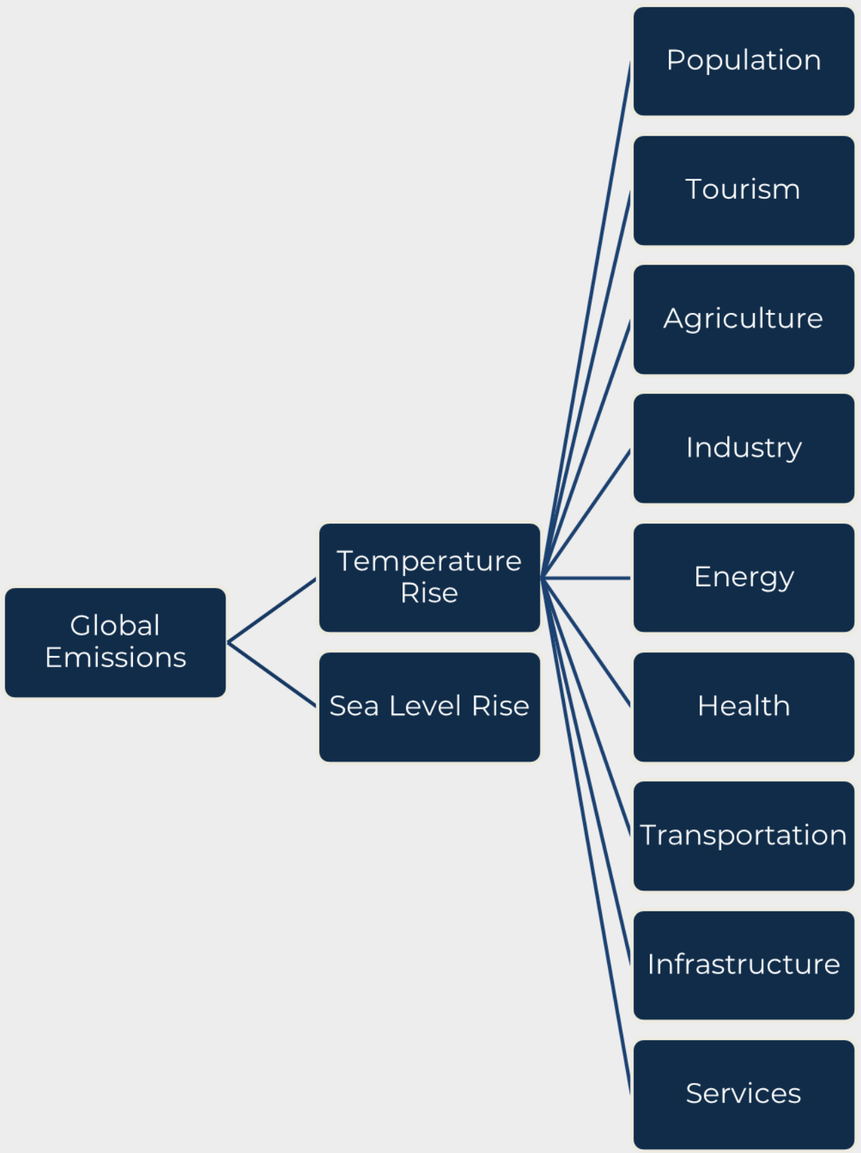
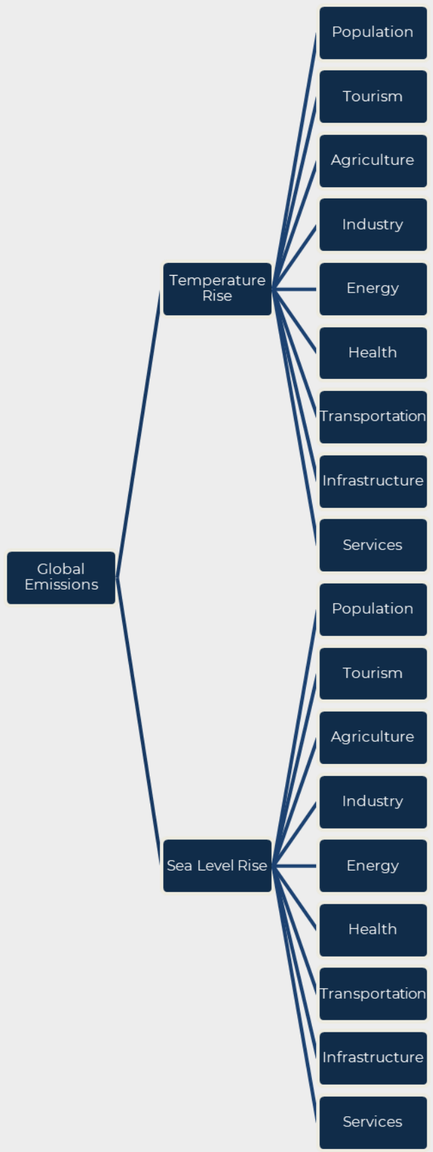




Production sectors and population are impacted by temperature rise,



… by sea level rise,

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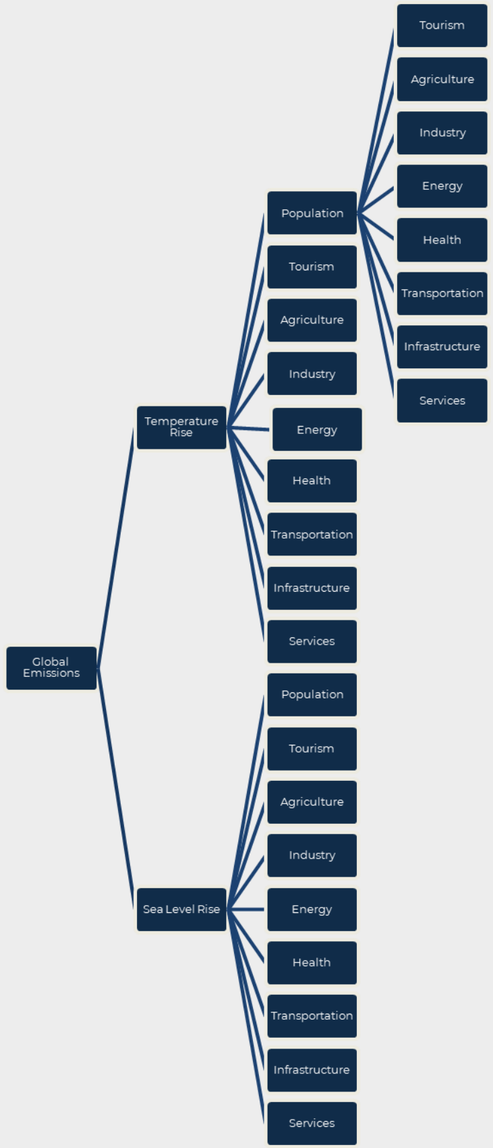

… and sectors can impact each other,

GDP

each affecting GDP

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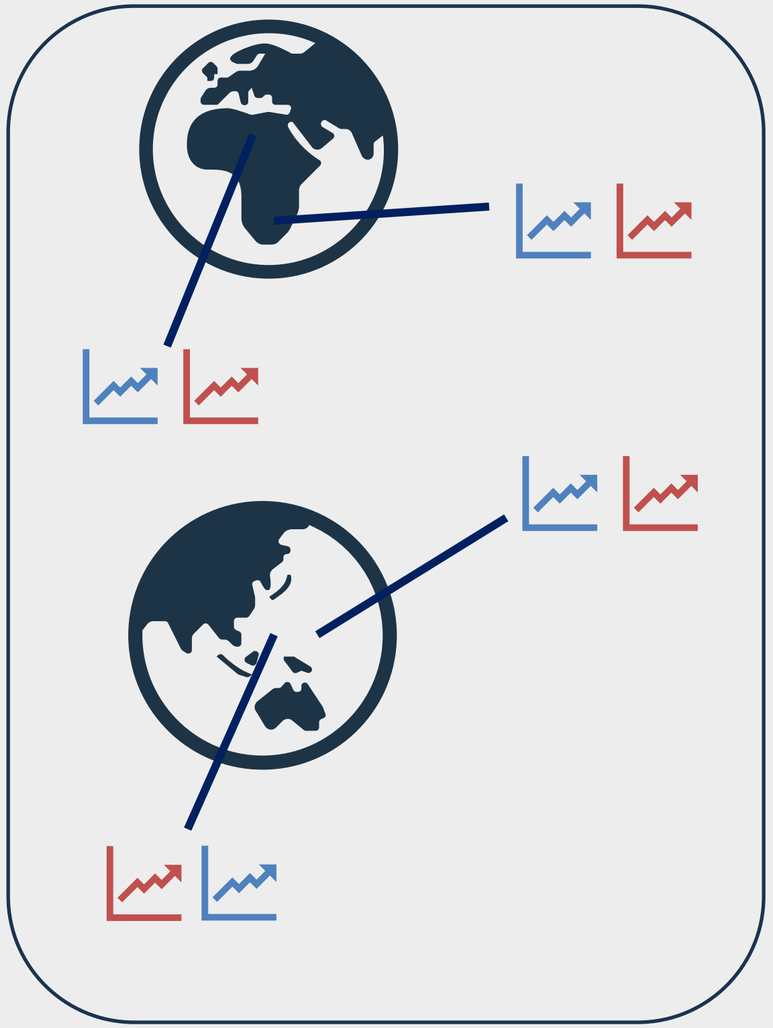
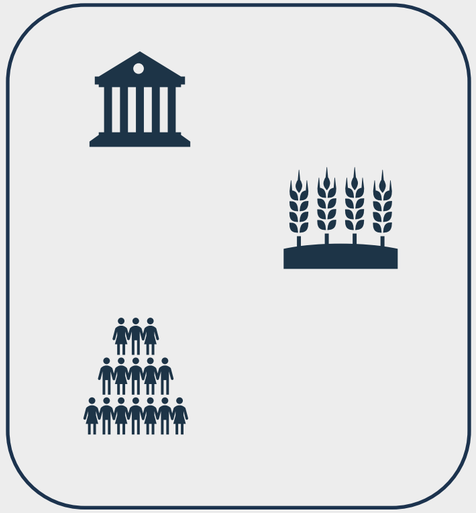
Global Models and Climate Data

ClimSA and CIS provide local climate predictions based on global perspective





The specific local impacts from global changes, and local predications

System Dynamics Project

OACPS chartered a system dynamics (SD) project to model the socio-economic benefits (SEB) of CIS in its member countries.

Demonstrating CIS Value

The SEB model aims to demonstrate how the CIS value chain builds capacity for responding to climate change impacts.

Building Climate Services Capacity

It shows the importance of building climate services capacity and how to effectively use these services to manage climate change impacts.

Global vs. Local Impact

OACPS countries' climate initiatives have a limited mitigation impact globally, but the model focuses on country-level abatement and adaptation scenarios.

Quantifying Country Improvements

The project aims to quantify country improvements from CIS in SEB when facing climate change.

Supporting Adaptation Strategies

Understanding SEB through the model supports the development of targeted adaptation strategies for OACPS member countries.

Project Timeline: Socio-Economic Benefits Modeling

Phases 1 & 2: Model Setup 2022-2024

Completed phases focused on building exploratory models for select OACPS countries, using a template and importing country-specific data.

Exploratory models
Template country model
Initial web deployment

Phase 3: Model Refinement Now

Currently planned, Phase 3 aims to strengthen models, and build explanatory models for each participant country.

Explanatory models
Model calibration and validation
Optimization & verification

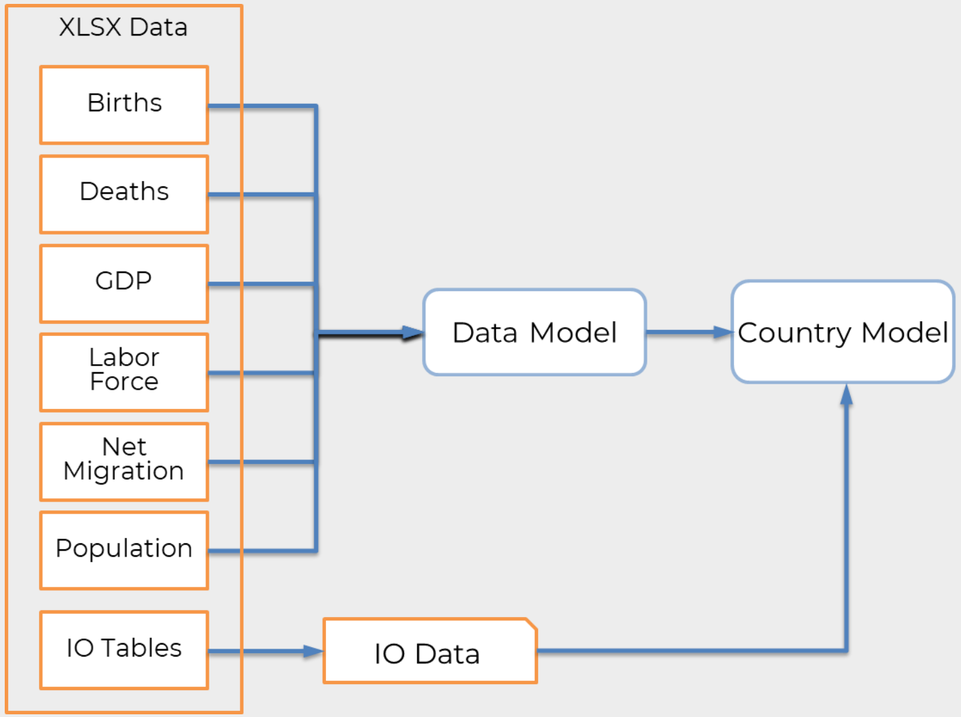
Collaboration & Engagement Future

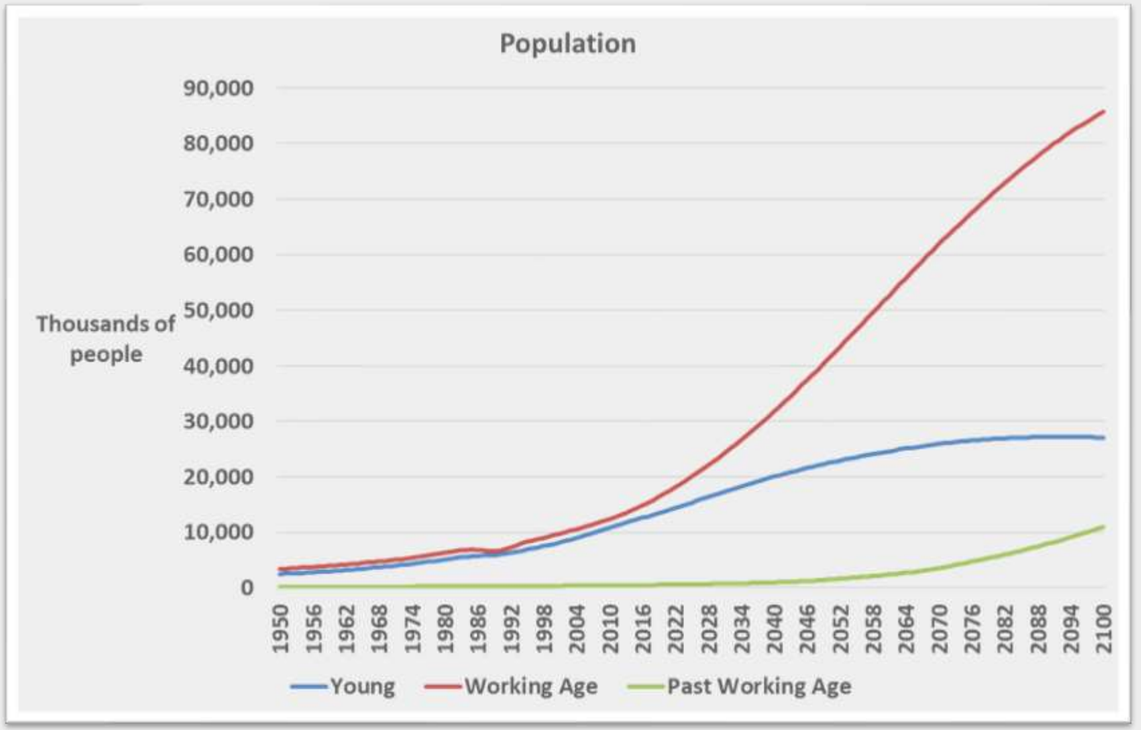
Phase 3 will expand collaboration, engaging more stakeholders and experts to support model use in climate policy decisions.

Stakeholder engagement
Policy acceptance
Expanded expert team

Each project phase builds on the last, advancing from exploratory models to validated, country-specific tools for climate policy.

Country Specific Data





Units of Input Needed to Produce 1 Unit of Output (Read Down the Columns)

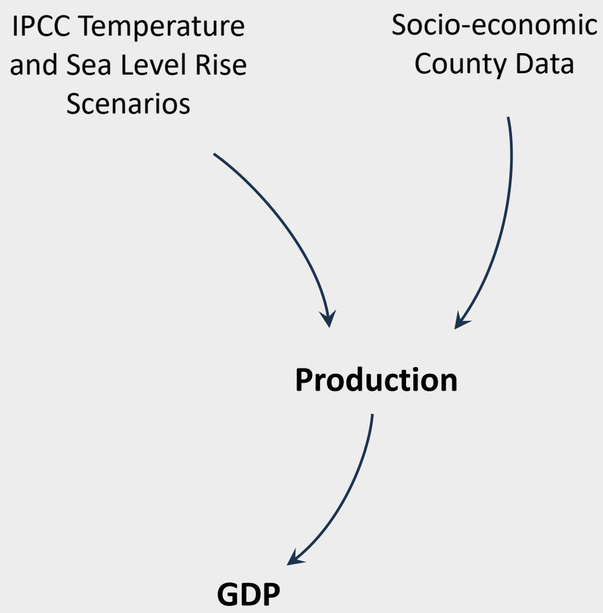
	Agriculture	Energy	Water	Infrastructure	Transportation	Health	Industry	Services
Agriculture	0.59	0.00	0.00	0.00	0.00	0.00	0.05	0.0(
Energy	0.01	0.24	0.24	0.01	0.01	0.02	0.08	0.0:
Water	0.00	0.05	0.08	0.00	0.00	0.00	0.00	0.0(
Infrastructure	0.00	0.01	0.01	0.02	0.00	0.00	0.01	0.0:
Transportation	0.01	0.01	0.01	0.02	0.21	0.02	0.03	0.0:
Health	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.0:
Industry	0.05	0.21	0.06	0.34	0.05	0.07	0.33	0.0(
Services	0.08	0.06	0.11	0.32	0.26	0.31	0.29	0.3:
Total Intermediate Inputs	0.74	0.59	0.52	0.72	0.55	0.42	0.80	0.4

IPCC Temperature and Sea Level Rise Scenarios

Socio-economic County Data

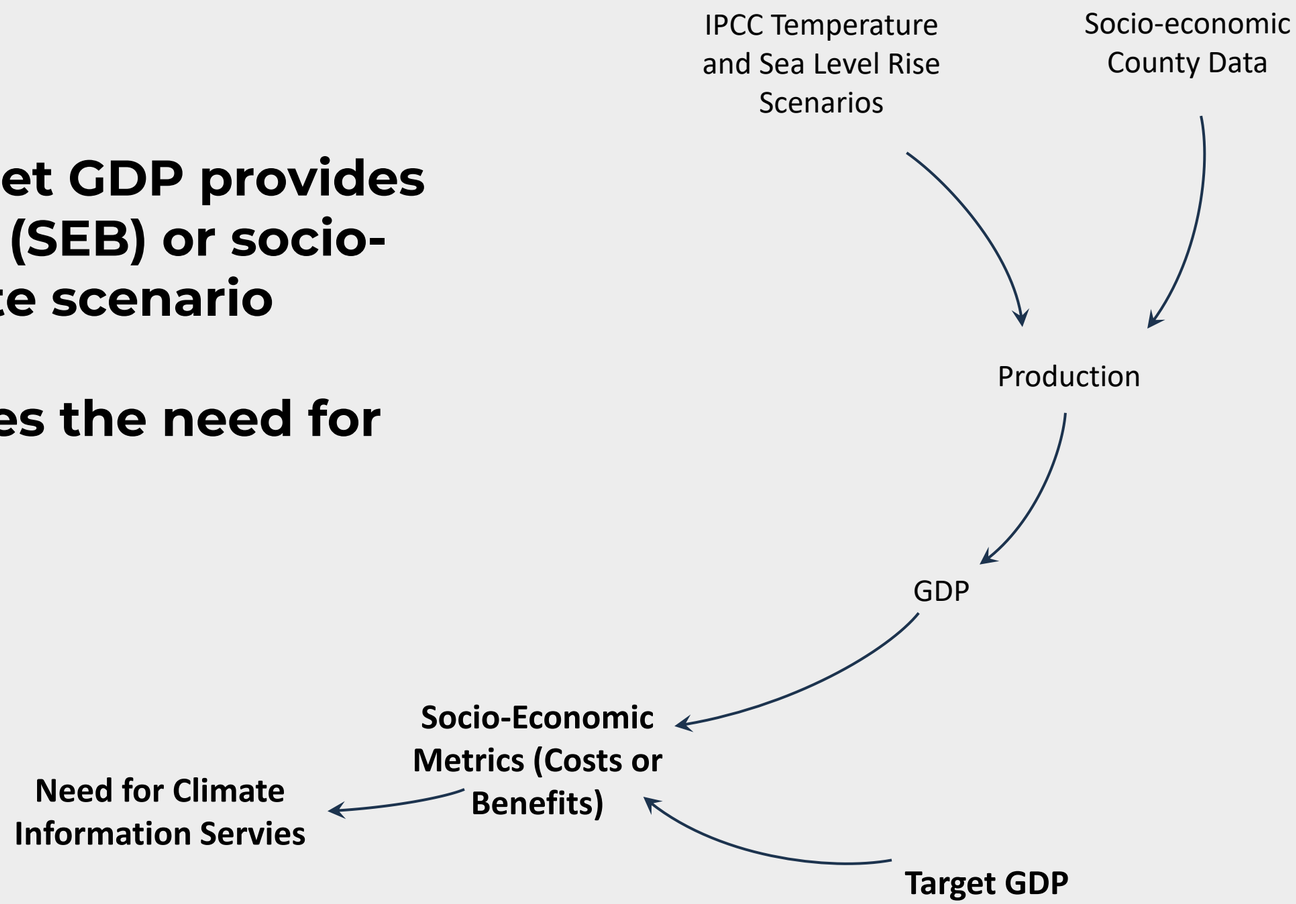
Starts with the IPCC data and country specific socio-economic data…

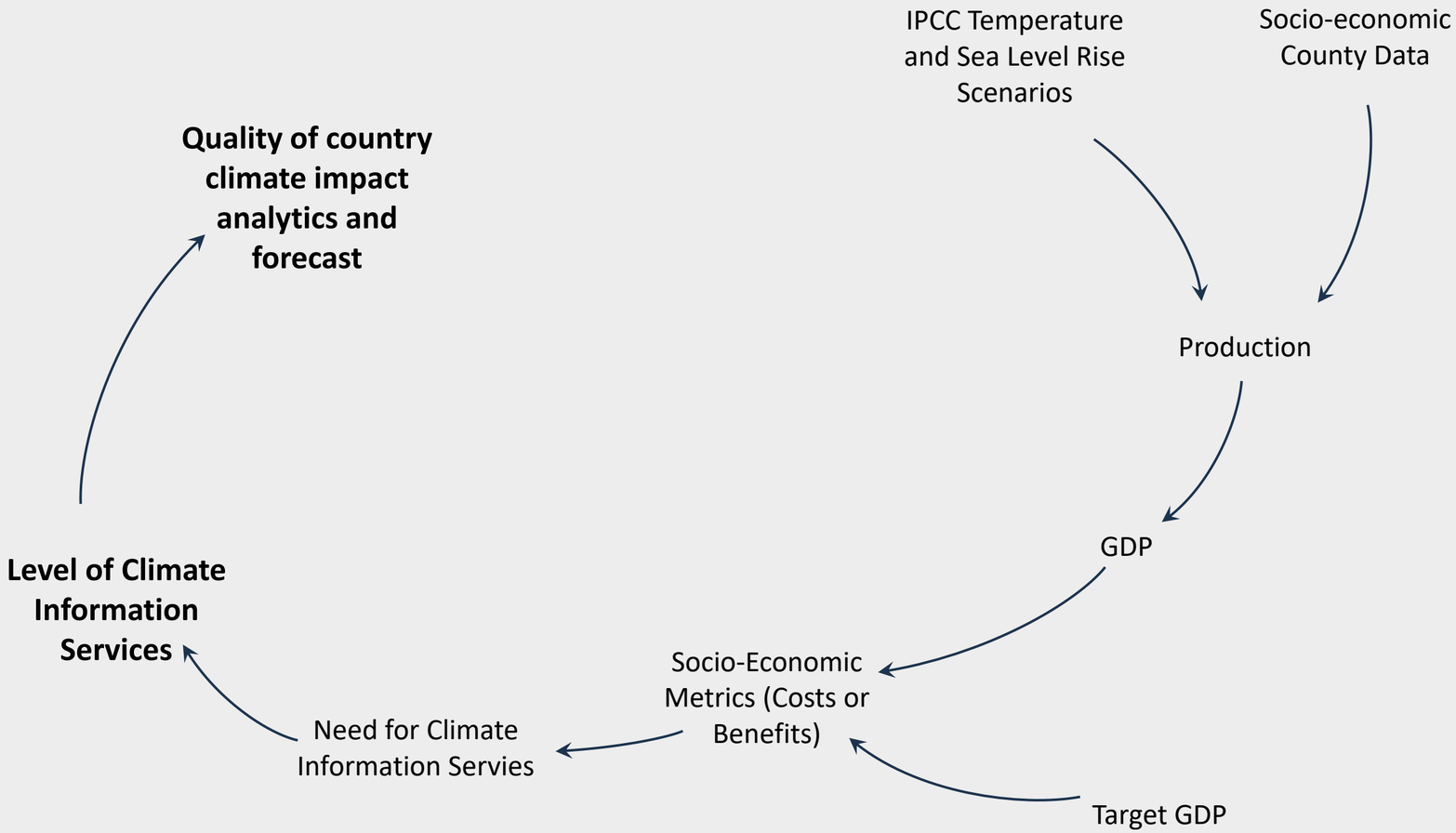
Which then leads to production across all sectors and thus GDP.



Comparing GDP with a target GDP provides the socio-economic benefit (SEB) or socio-economic cost of the climate scenario

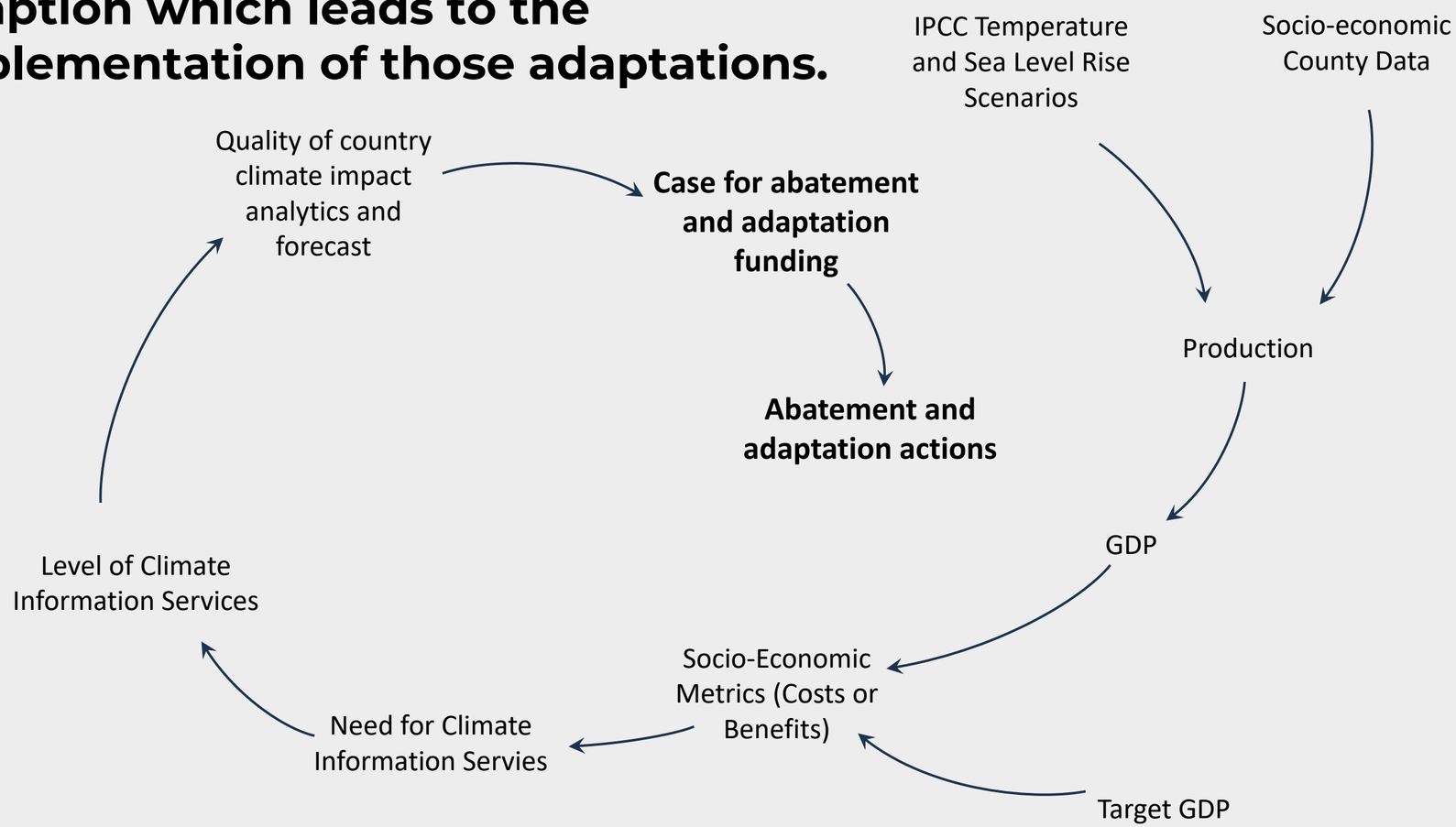
The SEB (or lack of) increases the need for CIS



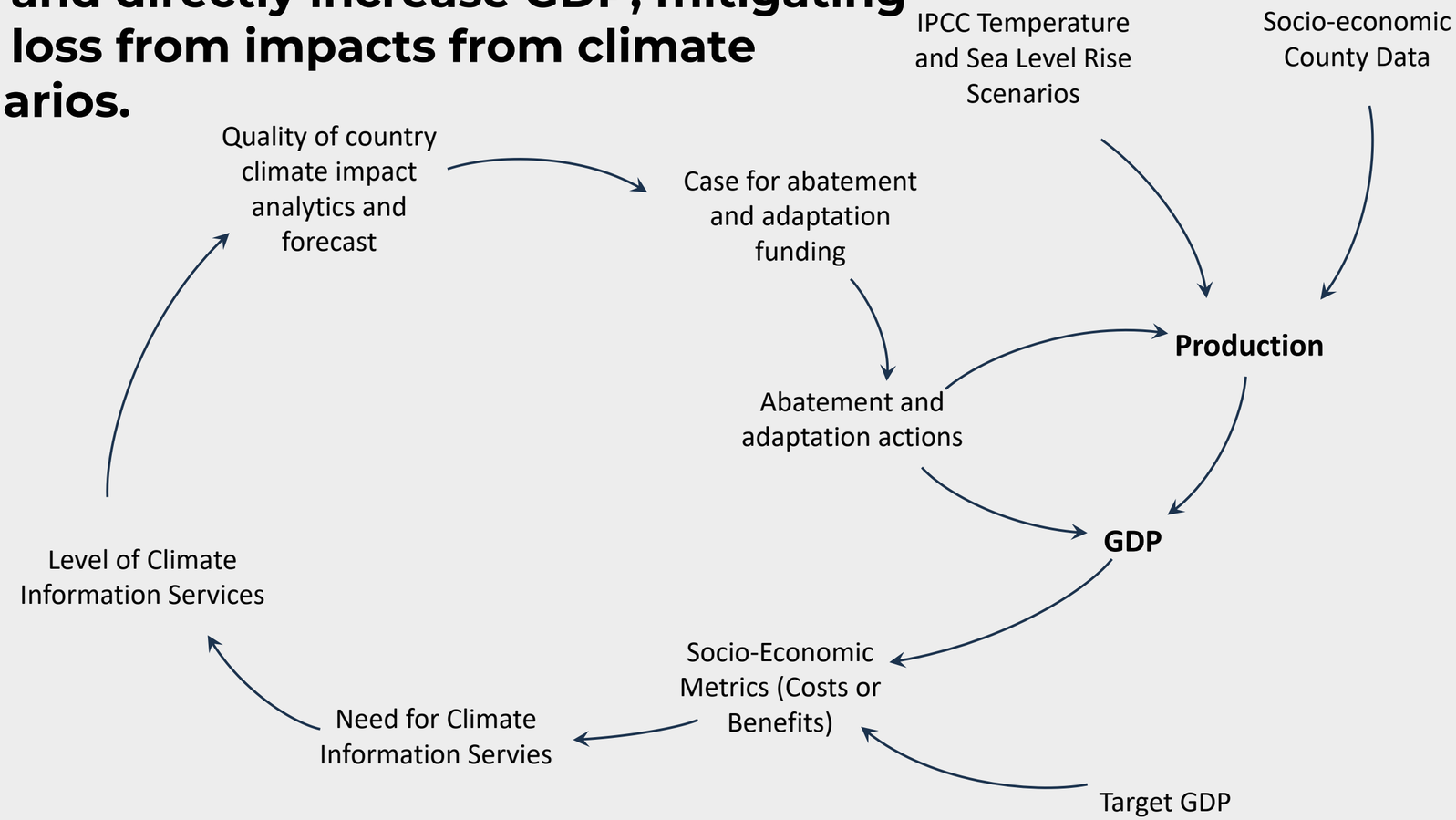


Higher CIS need increases the level of CIS which increases the quality of the forecasting.

Higher quality forecasting makes for stronger cases for abatement and adaption which leads to the implementation of those adaptations.



More useful adaptations can increase production across sectors, which increases GDP and directly increase GDP, mitigating GDP loss from impacts from climate scenarios.



Model Structure

- The SEB model consists of a **data model** (country-specific from the outset, importing historical data) and a **country model** (the main user interface realizing the CIS value chain).
- Key sub-models (or views) include:
  - **Population:** Uses a three-stage aging cohort structure, linked to mortality, fertility, and migration.
  - **Production:** Calculates annual production across **eight economic sectors**, utilizing subscript features to simplify complex calculations.
  - **Climate Change:** Defines variables like 'temperature degrees above 1990 level' and 'sea level meters above 1990 level' using user-selected **IPCC AR6 WG1 projections** (e.g., SSP 1-1.9, SSP 1-2.6). These projections influence the economy, productivity, population, and health via lookup tables.
  - **Climate Information Services:** Defines the 'Level of CIS' as an input parameter to forecast its benefits on production, health, and other sectors. For example, for exploratory purposes, the model shows that the 'fraction of vulnerable infrastructure protected by CIS' increases from 2% at CIS Level 1 to 20% at CIS Level 4, which directly reduces 'sea level destruction of fixed capital'.
  - **NDC Actions:** Quantifies the economic output generated by implementing NDC adaptation and abatement actions. The **Level of CIS determines the fractions of external and country (internal) funding** required for these actions, such as population health adaptation.

Quantitative Results Target

GDP Calculation by Sector

The model first calculates the value added in each producing sector, then sums them to get GDP for each scenario. Six OACPS countries were analyzed: Angola, Burkina Faso, Fiji, Guyana, Jamaica, and Kenya.

Net SEB Quantification

Net SEB (SEB - SEC) is quantified for different CIS levels. Results show Net SEB increases significantly as CIS advances from Basic to Advanced.

Drivers of Positive CIS Impact

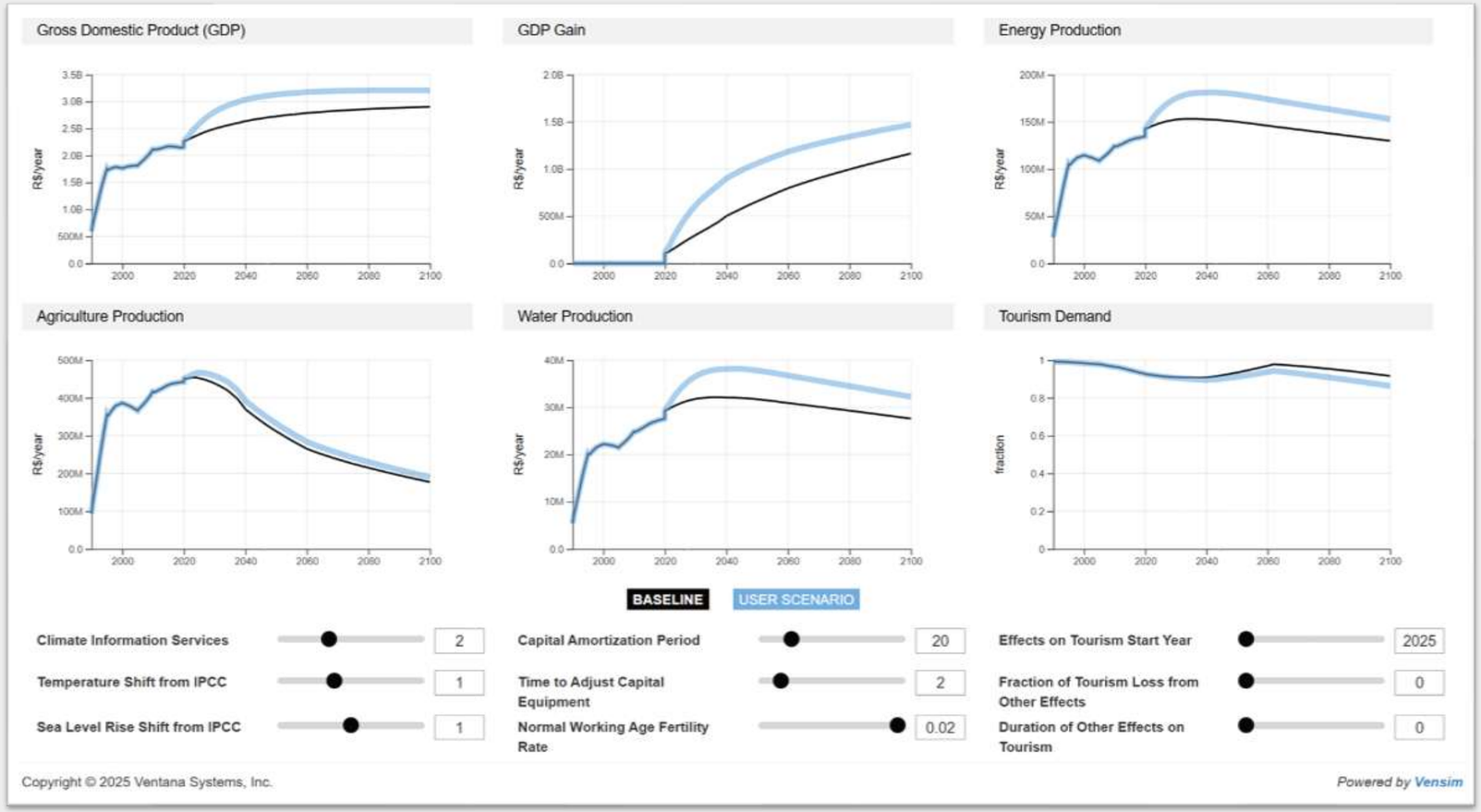
Improved climate information to production sectors boosts output and GDP. Increased economic activity comes from deploying infrastructure and services for abatement and adaptation actions.

Funding and GDP Recovery

The model assumes value-add lost to climate change (SEC) is the target funding level for NDC actions. External funding proportion is based on CIS level, offering insights into potential GDP recovery if fully funded.

Web Deployed Interface

Goal is for policy makers to utilize model as part of decision-making process



Key Future Work in Phase 3

- **Validate key macroeconomic leverage points** influenced by CIS levels.
  - Confirm leverage points for external and country climate funding.
- **Validate data with stakeholders and experts across sectors**
  - Macroeconomics, population, climate, health, water, agriculture, energy, infrastructure, transport, industry, services, social unrest, informal economy)
- **Optimize** country models using normative data and expert input.
- **Verify results** with broader country expert collaboration.
- **Enhance Web UI** to support diverse use cases with richer outputs, larger graphs, descriptions, and model assumptions.
- Plan **cross-functional expert panels** in each country to integrate climate insights into policy rapidly.