THE IEEM PLATFORM AND GREEN GROWTH

Evaluating the economic and ecosystem service impacts of Green Growth strategies in Rwanda

1

The Integrated Economic-Environmental Modeling (IEEM) Platform linked with **Ecosystem Services Modeling (IEEM+ESM)** shows how investment in Green Growth affects economic development, natural capital and ecosystem services

Green growth operationalizes the concept of sustainable development and **is defined as growth that is efficient, clean and resilient**

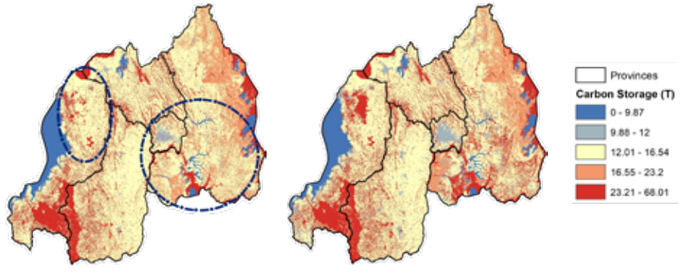
Some ecosystem services like **food and fiber** have a market **price but many other** ecosystem services **like soil erosion or flood mitigation are not** valued in the market or in the national **accounts, nevertheless they** are critical to human well-being

2

We applied IEEM+ESM to evaluate the economic, natural capital and ecosystem service impacts of Green Growth Strategies in Rwanda:

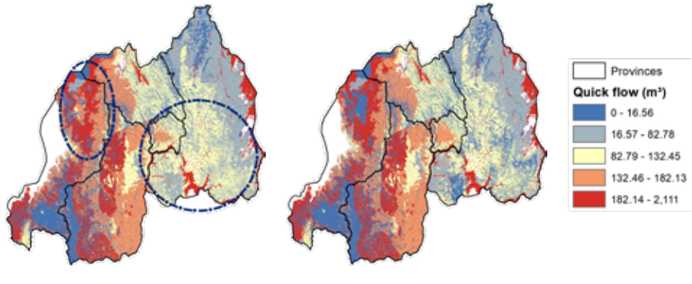
- We consider investments in increasing agricultural output and income through fertilization and irrigation, increasing forest plantations, and installing more efficient fuelwood cookstoves in households
- Our analysis is spatially explicit, providing estimated economic impacts at the national and provincial level, and; ecosystem service impacts at 30 meter spatial resolution

PANEL A. CARBON STORAGE



Carbon in tons in Base year of 2015 (left map) and 2035 with all investments (right map); dashed circle/ellipse indicates areas of greatest change

PANEL B. QUICKFLOW



Water quickflow in cubic meters in Base year of 2015 (left map) and 2035 with all investments (right map); dashed circle/ellipse indicates areas of greatest change

3 **IEEM+ESM revealed that:**

- Expanding forest cover generated faster economic growth, greater carbon storage and local water recharge, and reduced nutrient and fertilizer run-off
- Expanding irrigated agriculture had a positive impact on economic growth with little impact on ecosystem service supply when compared with the baseline
- Increasing fertilization, given the very low baseline rates of fertilizer application, resulted in the greatest economic gains, increasing both GDP and genuine savings by US$2,781 million and US$713 million, respectively
- Fertilization also resulted in increased nutrient run-off which has implications on water quality and water purification costs

4 **IEEM+ESM delivers spatially explicit, evidence-based policy advice on the optimal portfolio of Green Growth investment strategies**

- Impacts on ecosystem services are not homogenous across the landscape and knowing the location, magnitude and timing of change is critical for policy makers to target action
- Investment in fertilization, irrigation and efficient fuelwood cookstoves delivers important economic benefits to households
- At the same time, expanding forest cover provides fuelwood and other raw materials, reduces nutrient and sediment exports, and enhances water recharge
- Increased forest cover also increases carbon storage, helping to mitigate climate change

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