The Integrated Economic-Environmental Modeling Platform Project

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WHAT IS IEEM?

Environment

- Mineral and Energy Resources
- Land
- Soil Resources
- Timber Resources
- Aquatic Resources
- Water Resources

Economy

- Provisioning ecosystem services (raw materials for production)
- Non-provisioning ecosystem services
- Effluents and Emissions
- Environmental investments

Production
- Firms
- Households

Products

Employment

Consumption
IEEM Integrated Economic-Environmental Modeling

IEEM: WHAT IS NEW?

1. Integrates SEEA data in a forward-looking economy-wide framework.

2. Has environmental modeling modules for each environmental resource.

3. Indicators capture impacts on natural capital.

4. Links IEEM with ESM to project scenario-based future ecosystem service supply.
IEEM Integrated Economic-Environmental Modeling

IEEM AND THE POLICY CYCLE
IEEM APPLICATIONS

AN INTEGRATED FRAMEWORK
IEEM-GUA: SUSTAINABLE DEVELOPMENT GOALS

- SDG 2, Zero Hunger, Target 2.3: double agricultural productivity and rural incomes.
- Strategy: increase irrigated agriculture.

- Increase of irrigated area: 106,300 ha.
- Investment: US$7.95 million
- Time horizon: 5 years
- SDG 2, Target 2.3
• 41% and 83% gap remain to double agricultural output and income, respectively.

• Poverty impacts: 2.42 million people are lifted from poverty; 100,000 people attributed to investments.
**Synergies**

Certain lines of action (2- Zero Hunger) can contribute to various SDGs: **SDG 1**- Eliminating Poverty, and; **SDG 8**- Promoting Sustainable Economic Development and Employment (increase GDP by US$1.37 billion).

**Trade-offs**

Trade-offs: **SDG 2** implies more deforestation, moving away from **SDG 15**- Sustainable Use of Forests. Increased emissions slows progress on **SDG 13**- Action on Climate Change.

- Deforestation ↑ 4,699 ha by 2030.
- Water consumption ↑ 1,860 ML/capita.
- GHG ↑: 642,346 tons CO₂.
IEEM APPLICATIONS

ECONOMY-WIDE VS. PARTIAL ANALYSIS
IEEM - Integrated Economic-Environmental Modeling

IEEM-GUA AND THE NDCs

- Guatemala responsible for <0.1% of global emissions.
- BAU = 53.85 million tons CO2 equivalent in 2030.
- Reduce emissions 11.2%, by 6.04 M tons CO2 equivalent.
- Target sectors: forestry, agriculture and transport sectors.
TRANSPORT SECTOR INTERVENTION

• TRNS-EFF: 15% increase efficiency in fossil fuel combustion in transport (freight shipping) sector.

• TRNS-ELE: Substitute 15% of fossil-fuel based energy with electricity in transport sector (same number of terajoules generated).
TRANSPORT SECTOR EMISSIONS BY 2030
ECONOMY-WIDE EMISSIONS BY 2030

- TOTAL TRNS-EFF
- TOTAL TRNS-ELE

Tons of CO2 equivalent
IEEM-GUA: FUELWOOD SECTOR INTERVENTION

• Fuelwood supplies 57% of Guatemala’s national energy consumption.

• Issues: deforestation; 10 million m³ deficit; 5,000 premature deaths per year, and; 1% GDP loss.

EFFICIENCY + HEALTH

25% more efficient fuelwood cookstoves; health benefits agricultural labor productivity.

EFFICIENCY + ZERO DEFORESTATION

efficiency + health, with complementary strategy of zero deforestation.
ECONOMY-WIDE EMISSIONS
INDICATORS THAT CAPTURE NATURAL CAPITAL IMPACTS
POST-CONFLICT LAND-USE TRAJECTORIES IN COLOMBIA

• Baseline: historical deforestation trend of 240,000 ha/yr between 2000 and 2013.¹

**DEFOR-INC:**
16% increase in deforestation between 2018-2030.

**DEFOR-DEC:**
75% reduction in rate of deforestation between 2018-2030; better monitoring and enforcement.

**DEFOR-DEC-TFP:**
DEFOR - DEC + five percentage point increase in total factor productivity for agriculture between 2018 y 2022; 12.5% above baseline between 2022-2030.

Source: ¹ World Bank, 2015.
RESULTS: GDP

GDP, difference between baseline (1 USD: 3,012 COP).

- In 2030 DEFOR-INC: 348 B COP;
- DEFOR-DEC: -2,006 B COP;
- DEFOR-DEC-TFP: 1,853 B COP.
RESULTS: GENUINE SAVINGS

Genuine savings, difference from baseline.

- By 2030 DEFOR-INC: -482 B COP;
- DEFOR-DEC: 2,391 B COP;
- DEFOR-DEC-TFP: 3,383 B COP.
IEEM APPLICATIONS

IEEM + ESM

GUATEMALA
IEEM-GUA: SUSTAINABLE DEVELOPMENT GOALS

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IEEM Integrated Economic-Environmental Modeling

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Non-provisioning ecosystem services

Effluents and Emissions

Environmental investments

Economy

Production
- Firms
- Households

EMPLOYMENT

PRODUCTS

Consumption

Households

Firms
LAND USE LAND COVER MODEL
IRRIG
LULC in 2015
IRRIG
LULC in 2020
IRRIG
LULC in 2030
IRRIG
Sediment export
ton/ha/yr
in 2030
IRRIG Nitrogen export ton/ha/yr in 2030
IRRIG
Average annual baseflow mm in 2030
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Thank you.
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