COP21: From Decarbonization to Carbon Management

Michael Obersteiner
Ecosystem Services and Management Program, IIASA

US National Member Organization for IIASA meeting
Session: Global Climate, Ecosystems, and Biological Sequestration
Why (bio-)carbon management is important for Climate Change?

Sources and fate of anthropogenic CO$_2$ emissions (2004-2013)

- Fossil fuel emissions: $32.4\pm1.6$ GtCO$_2$/yr, 91%
- Deforestation emissions: $3.3\pm1.8$ GtCO$_2$/yr, 9%
- Remaining in the atmosphere: $15.8\pm0.4$ GtCO$_2$/yr, 44%
- Absorbed by forests: $10.6\pm2.9$ GtCO$_2$/yr, 29%
- Absorbed by oceans: $9.4\pm1.8$ GtCO$_2$/yr, 26%

Carbon from land is part of the problem and part of the solution...
Climate Risk Containment is about ensuring the option to reach 0-2DG target

_Major Land Use Challenge_

Obersteiner et al., 2001; Azar et al., 2011
Baseline Land Use
Carbon management

- Reforestation for Bioenergy
- Reforestation for Timber
- Avoided Deforestation for Carbon Value
- Extensive/Intensive Agriculture

Courtesy: StoraEnso
INDCs impacts on the LULUCF sector

- The expected contribution from LULUCF in meeting INDC at global level is about 20-25% of total emission reduction.

Admiraal et al. Assessing Intended Nationally Determined Contributions to the Paris climate agreement. PBL Policy report
Background calculations for the Brazilian INDC

National Institute for Space Research - Brazil

IIASA, International Institute for Applied Systems Analysis
Validation
Deforestation in Amazon Biome

PRODES

GLOBIOM

16.53 Mha

16.93 Mha
Bovine Numbers – 2010
INDC
GLOBIOM-Brazil Scenarios
Brazil’s new Forest Code Main Dispositions

• Legal Reserves (LR)
• Small Farms Amnesty (SFA)
• Environmental Reserve Quota (CRA) mechanism
• Illegal Deforestation Ban (IDB)
Forest
Leakage of forest conservation by driving the Ag Frontier into the Caatinga.
Forest Regenerating – 2050

BRCOD

BRCOD without SFA  
(Small Farm Amnesty)

BRCOD without CRA  
(Trading titles)
Soya in Amazon Biome

![Graph showing the trends of Soya in Amazon Biome over different periods (2000.00 to 2050) with different scenarios: NAPS, BRCOD, BRCOD without SFA, BRCOD without CRA, BRCOD. The x-axis represents the period, and the y-axis represents the Mha. The graph displays the projected increase and decrease in Soya land use over the specified years.]
Soya in Amazon Biome

Asymmetric winner/looser profiles => Political Economy problem
Peak Land use emissions occurred already!!!
Summary

- **Decarbonization** is no longer enough
- Land Use emissions **peak(-ed)** earlier than fossil
- (IIASA tropical flagship)\(^+\) in support of post INDC process
Ongoing Research

• Empirical evidence points to weaker CO$_2$ fertilization, but stronger climate impacts

• Social and environmental implications of this land use transformation are by orders of magnitude larger than in energy

=> Knowable Risks and Opportunities