Objective

To enhance the Chile AFOLU modelling framework through an understanding of the Brazilian AFOLU sector and the modelling framework they use - BLUM.

BLUM TRAINING FACT SHEET

Description

The Brazilian Land Use Model (BLUM) training was held in Santiago on the 22nd and 23rd of August 2013. An Agroicone expert from Brazil, Leila Harfuch, presented BLUM so that the Chilean team could understand both the advantages and disadvantages of using it and how it could possibly complement the Chile AFOLU model.

Overview of highlights

- An overview of the BLUM model was presented to the MAPS Chile modelling team, as well as a consideration of the assumptions, variables, database and equations used within the model. The researchers were able to compare key elements of the BLUM model to the Chilean approach.

- The Brazilian Land Use Model (BLUM) is a partial equilibrium model developed in Excel spreadsheets. It is a regional-level model that covers six regions and includes supply, demand and land-use modules of the agriculture and forestry sectors in Brazil.

- Demand in BLUM is defined by the domestic consumption, net exports and final stock at the end of each year. Supply is defined by the initial stock and production of each year. The land-use module defines the dynamics of the expansion and competition amongst crops and pasture. The market equilibrium is calculated annually at the country level through iterations that find a vector of prices that clears all markets simultaneously.

- The Chilean AFOLU modelling framework consists of different models that assess the supply of land expressed as cultivated area, the equivalent production and the demand of land from domestic crops. As with BLUM, the market equilibrium of the Chilean model is calculated annually, at the country level, through a vector of prices that clears all markets.

- The geographic and agronomic conditions in Chile define its agriculture as a small-scale production of
diverse products, which is opposite to Brazil’s large-scale production structure. While Chile is a price taker of international prices in the agriculture sector, Brazil as a large agricultural producer, is a price setter. For this reason, the way the international prices and the external market are incorporated into the AFOLU models in each country is different.

- The Brazilian agriculture structure consists of mainly annual corps, which allows the BLUM to simulate land competition across crops annually. The Chilean modelling framework needs to simulate long-term land competition of crops given the Chilean agriculture structure, which includes crops such as fruits.

**Recommendations:**

- Define the criteria for grouping crops according to level of emissions, profitability (labour cost, inputs etc.) and mitigation actions.

- Improve clarity surrounding the dynamics of each of the crops and products of the agriculture sector within the model, by characterising the agriculture sector; each of its products and crops and interrelations. Model the domestic demand for each crop and competition for land use (net profit) before modelling the whole sector.

- Improve the quality of the production and supply equilibrium by considering exogenous variables. This enables incorporation of the demand for agricultural products into the projection of the sector (e.g. international prices of products and inputs), real exchange rate, exports and imports, domestic demand and cost of labour, water, power etc. It was also suggested to separate exports and imports into two equations.

- Increase the robustness of the agriculture GDP projection and its assumptions by defining a formal estimation of agriculture GDP projections and possible sensitivities, present evidence on the assumption that elasticity of agricultural GDP balances production and supply, and present evidence on the relationship between agricultural GDP and national GDP.

  - Enhance the projection of the sectoral drivers by considering climatic variables (at least water availability).

  - Increase robustness of macroeconomic data sources through the validation of country specific data with information from IMF, USDA, ASOEX and producer organisations.

- Increase the validity of a long-term (2030 — 2050) projection as this incorporates a qualitative vision of the agriculture sector.
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2. Reflections

• The BLUM Lab served to compare the Brazilian and Chilean models and contexts, with the goal of learning from each other. The Lab held technical discussions concerning the BLUM and its relevance to the Chilean AFOLU model.

• The country specificity needed to model the agriculture sector in each country showed that it would not be possible to exactly replicate or populate the BLUM model with Chilean data: The dynamics of the sector are different in the two countries and new equations describing the dynamics of the Chilean agriculture would be needed (for example, including international prices as endogenous inside the Chilean model).

• However, the BLUM proved to be an excellent instrument to learn from as it is a comprehensive tool to assess the dynamics of an AFOLU sector. This model has many synergies with the Chilean modelling framework such as the way the market reaches equilibrium.

• The collaboration among the participants also served to draw important suggestions and recommendations to complement the Chile AFOLU model.

3. Next steps

• The Chile MAPS team together with the consultants will define how to address the recommendations made by the Brazilian expert.

• Share experiences, methodological, procedural and overall results between country teams at the sector level.