The Global Land Reserve: Where is it? What are the constraints?

A "hectare-by-hectare" approach

Fifth Academia Belgica-Francqui Foundation Conference – in partnership with Società Geografica Italiana, Rome, Octobre 26-28, 2011

Workshop objective

Land that is suitable for agricultural production is becoming a scarce resource globally, therefore increasing the competition between different land uses. Land reserve (aka spare land or land balance) is defined as productive land that is suitable for rainfed farming with low to moderate capital investments, and that is currently neither under intensive use, nor under nature protection status. Land reserve may be: (i) currently underutilized, productive land; (ii) recently abandoned cropland; (iii) grazing land that is used extensively; (iv) slightly degraded land that can be rehabilitated at a low cost; (v) idle croplands that are currently classified as croplands but unused; (vi) degraded forests or long fallows. That said, it is important to consider that this land reserve may be used as rangelands, long-term fallows, or a buffer against risks or rapid increases in demand. It may also have an ecological or social function – e.g., ecological corridor, buffer zone around parks, sacred forest.

There is a trade-off between land conversion for food and preserving natural ecosystems, forests in particular. How much forested land - distinguishing between primary, secondary or degraded forests - should be included in the land reserve is thus an open question. The land actually available for agricultural expansion will depend on future prices for agricultural products as this determines the amount of investment available. Future uses of the land reserve could be for food or biofuel production, or for intensive tree plantations. The land could be exploited by smallholders or largeholders.

A few recent studies have produced global scale, aggregate estimates of unused land with a good agroecological potential and of future demands for land uses that create pressures on the current land reserve. These top-down estimates relied on global assessments and projections based on various global statistics and models, therefore ignoring local ecological and socio-economic realities. The range of estimates is large and some figures seem unrealistic - e.g., large land reserve in RD Congo and Sudan that could be converted to agriculture in the short-term; 10 Mha of cropland abandoned every year due to land degradation.

At the Rome workshop, we will evaluate the current land reserve and the pressures affecting it based on observations and field knowledge (i.e., bottom-up approach). We will perform an observation-based assessment of land supply and, more specifically, evaluate the size and geographic distribution of the land reserve. We will also assess how this land reserve is currently used. We will thus address the following questions:

- *Where is the land reserve for agricultural production?*
- *What is the quality of this land reserve (i.e., productivity potential, input requirements)?*
- *How is this land reserve currently used and by whom; and what ecosystem services does it currently provide?*
- *What are the constraints to access it physically and socially (e.g., land tenure)?*

Workshop structure

This evaluation involves three steps: (i) availability of spare land based on agroecological suitability (climate, soil, topography, etc.), (ii) physical and social

accessibility of this land reserve based on current land use, roads, land tenure, conflicts, ecological constraints, etc., (iii) current pressures on that land from expanding land uses (e.g., croplands, forestry plantations, urbanization, protected areas, etc.).

The first step (availability) will rely on recent global assessments of the global land reserve. For example, a detailed mapping study by the *International Institute for Applied Systems Analysis* (IIASA) estimated that the non-cultivated area that is suitable for cropping while being non-forested, non-protected, and populated with less than 25 persons/km^2 amounts to 445 Mha globally (World Bank, 2010). (Note that IIASA will soon release its new evaluation of Global Agro-Ecological Zones). This land reserve is mostly concentrated in Latin America's cerrados and grasslands and in African savannas. The collapse of the Soviet Union resulted in the abandonment of farmland.

The second step (accessibility) will focus on the few countries that hold most of the land reserve. For the main areas identified as unused productive land, we will gather information and expert knowledge on its actual accessibility for agricultural conversion. For the third step (current pressures), we will evaluate current and near-term changes happening or about to happen in the land reserve. We will thus assess how the land reserve is changing now and what changes are anticipated over the next 5 years or so, based on observations. We will discuss both the current conditions and the near-term trajectory of unused land, considering on-going expansion of croplands, biofuels, grazing lands, industrial forestry, protected areas, cities, etc.

Method

We will confront recent land use assessments based on global land use models datasets with local and national-scale data and a compilation of case studies, as proposed by Young (1999). Thus, the distinguishing feature of this exercise compared to other projects on the same issue is that we will base our assessment on fine scale, observational evidence as derived from remote sensing analyses, land use mapping, field observations, local statistics, and expert knowledge ("hectare-by-hectare" approach). We will compare estimates based on global models and scenarios with the realities on the ground.

We will mainly focus on the dozen countries that hold most of the land reserve (>8,000 km^2 per country): Brazil, Argentina, Uruguay, Venezuela; Sudan, DR Congo, Mozambique, Madagascar, Chad, Zambia, Angola, Tanzania; Russian Federation, Belarus, Ukraine, Indonesia and Australia.

Each participant is asked to prepare a synthesis presentation related to the above questions, either on a global data set, a collection of national/local case studies, a specific country, or a cross-cutting theme (e.g., physical availability or social accessibility of land reserve). Participants are asked to assemble in advance a range of spatial data sets and published case studies to allow for in-depth discussion at the workshop. The group will define criteria to evaluate the reliability of the spatial information produced based on regional expertise.

Expected workshop output

We expect that the workshop will provide a reality check to the coarse land accounting approaches and refine the range of values, the geographic location and the attributes (in terms of population, infrastructure, accessibility, conservation implications, susceptibility to land degradation…) of the land reserve. One output of the workshop will be to rank and map specific areas of the land reserve as being: (i) immediately and easily available, (ii) requiring infrastructure or rehabilitation, (iii) being inaccessible due to land

tenure, local rights, conflicts, or national policy constraints, (v) providing important ecosystem services, i.e. watersheds, wildlife corridors, grasslands rich in biodiversity.

During and after the workshop, we will write a joint paper summarizing our findings, with all workshop participants being co-authors. This publication will include cartographic products.

Young A. 1999. Is there really spare land? A critique of estimates of available cultivable land in developing countries. *Environ. Dev. Sustain.* 1:3—18

The World Bank (2010) *Rising global interest in farmland: Can it yield sustainable and equitable benefits?* The World Bank, Washington, DC.

Fischer G, Shah M (2010) *Farmland investments and food security, Statistical Annex*, Report prepared under World-Bank-IIASA contract, International Institute for Applied Systems Analysis (IIASA), Laxenburg.

Workshop program:

Day 1: *at Academia Belgica*

Session 1: The concept of land reserve
Short presentations by: Lambin, Gibbs, Koohafkan, Latham, Searchinger

Session 2: Land availability
Short presentations by: Fisher, Cumani, Loyche Wilkie

Walking dinner at the *Academia Belgica*

Day 2: *at Villa Celimontana, headquarter of the Società Geografica Italiana*

Session 3: Social and physical accessibility of land
Short presentations by: Rudel, Meyfroidt

Session 4: Country case studies
Mayaux (Central Africa), Africa (Searchinger), Morton (Brazil), Ferreira (Brazil)…

Break to visit the beautiful cartographic collections of the Società Geografica Italiana www.societageografica.it

Day 3: *at Academia Belgica*

Session 4: Country case studies (cont)
Grau (Argentina and other LA countries), Gibbs (Indonesia), …

Session 5: Current pressures on the land reserve

Workshop participants as of August:

Conveners:

Eric Lambin (UCL, Belgium; Stanford University, USA)

Holly Gibbs (University of Wisconsin, USA)

Participants:

Parviz Koohafkan (FAO, Land and Water Division)

John Latham (FAO, Land and Water Division)

Renato Cumani (FAO, Land and Water Division)

Mette Loyche Wilkie (FAO, Forest Resource Assessment)

Philippe Mayaux (JRC, Italy)

Patrick Meyfroidt (UCL, Belgium)

Gunther Fischer (IIASA, Austria)

Laerte Ferreira (Federal University of Goiás, Brazil)

Ricardo Grau (Universidad Nacional de Tucumán, Argentina)

Tom Rudel (Rutgers University, USA)

Doug Morton (NASA, USA)

Tim Searchinger (Princeton University, USA)

Recommended by Società Geografica Italiana (contacted in August ; expecting an answer) :

Elio Manzi (Università degli Studi di Palermo)

Franca Canigiani (Università degli Studi di Firenze)