Patterns, Processes, and Potential Contributions to Food Security

Land is becoming an increasingly scarce and contested resource. Recent international large-scale land acquisitions can potentially impact local livelihoods and global trade and ecosystem services, including the production of food, fuel, and fiber. Here we classified and synthesized recently published data from GRAIN and the Land Matrix Partnership to identify 1,373 unique transactions in “virtual land,” which we used to visualize the spatial and structural patterns of such land grabs.

Targeted land is largely in the global South (region sizes shown proportional to total acquired area, above left). Nearly half of acquired hectares are in Africa. The top regions are Southeast Asia (23%), Eastern Africa (21%), South America (11%), Eastern Europe (6%), and Oceania (5%). Nearly half of targeted hectares were acquired by Asia, led by Southeast (18%) and Eastern Asia (15%). Other key investors are Europe (15% total), the Middle East (14%), and North America (9%).

Top investors in Africa, by sector

- **Regional Targeted Land**

- **Regional Land Investment**

- **Northern investors acquire southern land**

In total, an area of 1.03 million km² has been reported in international land deals since 2000; this is an area the size of Ethiopia. The area virtually traded by land grabs is shown by gray shading (darker for regions with more areas targeted, above). Nodes are scaled to the total amount of land either acquired (gray) or invested in (red) in each region. The trade in land between regions is represented by the width of each line, with arrows pointing towards targeted countries. Southeast Asia is the largest targeted region, with self-investments from within the region (shown as a loop), Eastern Asia, and Northern Europe. The second-largest target is Eastern Africa, with investors from Europe and the Middle East.

Regional land trade varies

We classified the area of traded land between regions into seven crop use categories (following FAO and GAEZ classifications) for the 103 crops in our database (above). Red nodes are investors and gray nodes are targeted regions, and are scaled to the size of the area targeted in or acquired by a region. Line size is proportional to the area of land traded by crop type. The largest categories of regional trades by area are investments by Northern Europe in food crops (mainly livestock) in Oceania, a variety of investments in Eastern Africa, self-investment in flexible crops in Southeast Asia, and Middle Eastern investment in fuel and East Asian investments in forest crops in Central America.

Classification of Crops Grown on Acquired Land

Flexible crops dominate production on acquired land for the ca. 80% of deals with reported crops, the top 20 out of 103 crops accounted for 85% of hectares and 70% of deals (soy), jatropha (fuel) and the flexible crops of palm, maize, and sugar cane were the top crops produced.

Potential Caloric Yield vs. Current Production on Targeted Land

Using calculations of potential production quantity, based on 95% of potential yield specific to soils and climates of each country, we found that the acquisitions of land for cereal production in Africa could potentially produce 7-9% of the current cereal production for all of Africa. However, the cereals currently selected for planting (areas shown in black numbers by country, right) are not in optimal locations for maximizing cereal production, shown as potential calorie yield per ha (increasing with darker green colors, right). To maximize calorie production and contribute to food security, investments should be in dark green areas. For example, we calculated that if the large wheat investments in Sudan (starred, right) instead produced sorghum or maize, calorie production would increase 40%. Overall, crop switching within land acquisitions could increase total calorie production from cereals in Africa by 29%, largely by switching from growing wheat and rice in Eastern and Western Africa to producing maize and sorghum. 

**Food crops currently grown in Africa do not maximize potential calorie production.**