SUPPLY DRIVERS FOR GLOBAL FARMLAND

ABSTRACT:

A review of global farmland supply trends and drivers

KEYWORDS:

Global farmland, climate, water scarcity, land degradation, urban development

INTRODUCTION:

Global farmland supply is affected by:

- Climate changes
- Water scarcity
- Land degradation
- Urban development

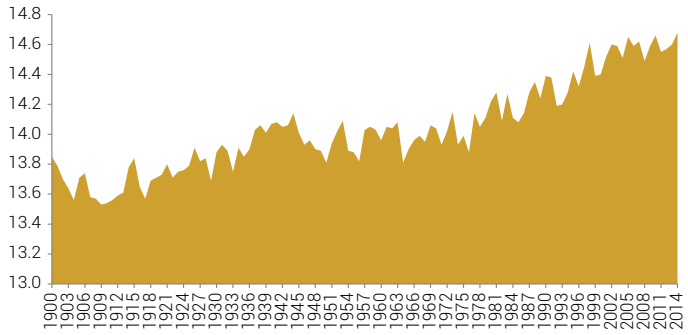
DISCUSSION:

Let us deal with each of the points above in order. No degree of importance is implied to the factor by its order in the list.

Climate

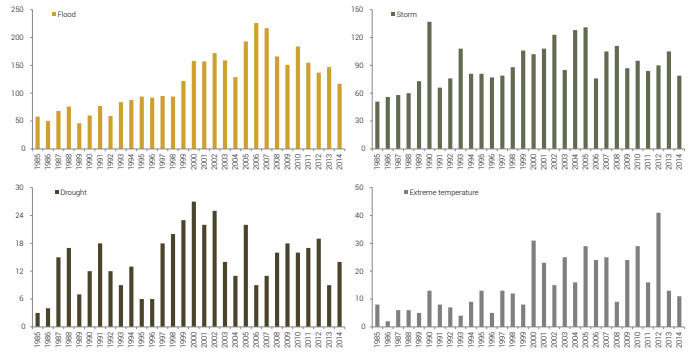
Changes in global temperatures are believed to have affected rainfall patterns and increased the number of extreme weather events, which in turn threaten global agricultural productivity. As can be seen from the chart on climate related disorders, the frequency of these events appears to have increased since 2000.

Fig. 1 – Global average temperature (in deg Celsius)



Source: Earth Policy Institute

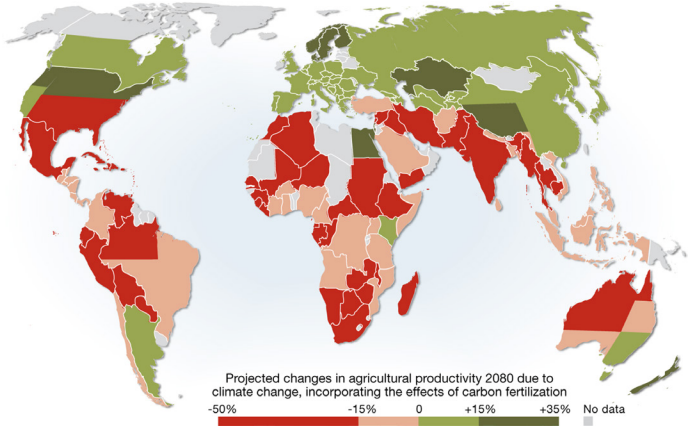
Fig 2 – Number of climate related disorders around the world (1985 – 2014)



Source: United Nations Office for Disaster Risk Reduction

Factoring all the climate variables, it is projected that the majority of countries will witness productivity drops by 2080 – the exception being northern latitude countries like Canada which are expected to experience productivity gains due to longer growing seasons.

Fig 3 – Projected change in agricultural productivity in 2080 due to climate change



Source: Hugo Ahlenius, UNEP/GRID-Arendal, Cline, W. R. 2007. Global Warming and Agriculture: Impact Estimates by Country. Washington D.C., USA: Peterson Institute

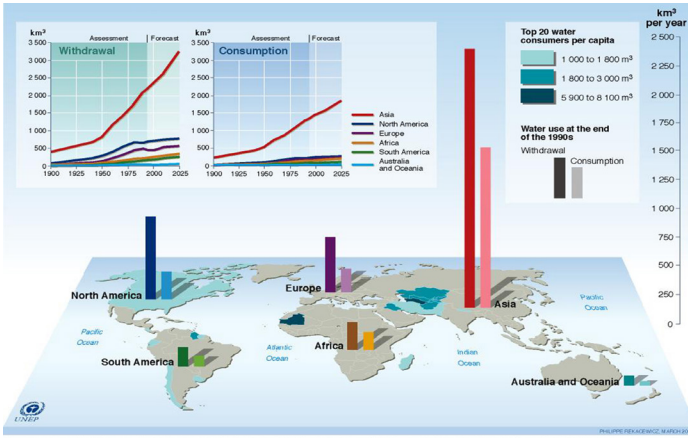
Water scarcity

The agricultural sector is one of the world's largest consumers of water, which is one of the limiting factors in food production. Irrigated land, which represents around 20% of cultivated land, produces around 40% of total food produced globally, and on average is two to three times more productive than dry-land farming.

At present, around 70% of the world's fresh water is used in agriculture. Withdrawals are expected to increase significantly by 2025 as compared to current consumption, leading to further stress in water levels. Water withdrawals are expected to increase by 50% in developing regions and 18% in developed countries.

Irrigation water supply is threatened by weather, agricultural practices, and urbanization. In poorer developing countries with rapid population growth and destruction of forests and wetlands, depletion of ground water can be particularly rapid. Most irrigated land is in areas downstream of the glacial masses or snow areas, and ice is therefore the primary source of water. However, glacial masses have been thawing in

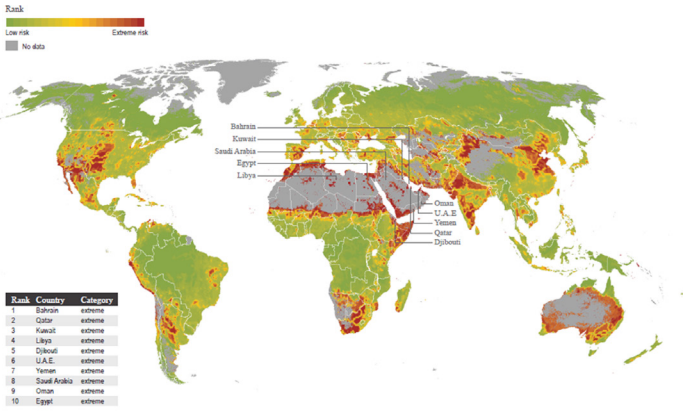
Fig. 4 – Global water withdrawal and consumption



Source: Philippe Rekacewicz, UNEP/GRID-Arendal

Central Asia (Tien Shan), parts of the Himalayan Hindu Kush, the tropical Andes, and the Alps. This has raised serious concern about the long-term viability of water resources in those areas, and therefore the long-term effect on food production. Also, the first two of these areas affect China and India, the world's most populated countries, estimated to grow in the future, and in which water demand is projected to increase by at least 70–90% by 2050. Those areas are already under high risk of water stress levels, which will be further aggravated as the population rises.

Fig. 5 – Water stress levels



Source: Maplecroft

Drought

If rainfall becomes more variable globally, drought is expected to affect more areas of the world, thereby reducing agricultural productivity. Statistics show that around 12 million hectares of agricultural land is lost each year specifically to desertification and drought, representing 20 million tons of grain growing capacity. In 2012, 80% of agricultural land in the United States experienced severe drought conditions when compared to conditions prevailing in the 1950s and earlier. Over 2,000 US counties were designated as disaster areas and areas experiencing drought in 2012.

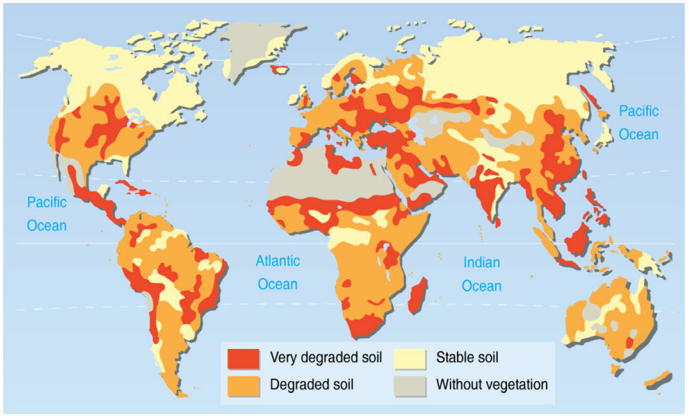
California is now into the fourth year of drought, said to be its worst in more than 1,200 years. In 2014, a team of NASA scientists found that water storage in the Sacramento and San Joaquin river basins was 11 trillion gallons short of normal seasonal levels and this deficit has soared steadily over the years. Drought maps reveal that groundwater levels across the United States Southwest are in the lowest 2-10% since 1949. The harsh conditions have even prompted many farmers to sell off their herds and abandon fields. Studies paint a bleaker picture for the future by predicting decade-long droughts in the Southwest and the Great Plains of the United States, much worse than the current drought in California.

By disrupting agricultural activities, droughts contribute to increase in the price of corn, soybeans, and other field crops and lead to price increases for other inputs in the food supply such as animal feed.

Land degradation

Productive farmland is constantly lost to soil erosion, salinization, and other forms of land degradation at an average annual rate of 35,000 km^2, equivalent to 95 km^2 per day, or 1,109 m^2 per second. Fifty-two percent of the land used for agriculture is moderately or severely affected by land degradation. At current rates, total losses could exceed 30% of all agricultural land by 2020. Over the next 25 years, land degradation could reduce global food productivity by as much as 12%, leading to a 30% increase in food prices worldwide.

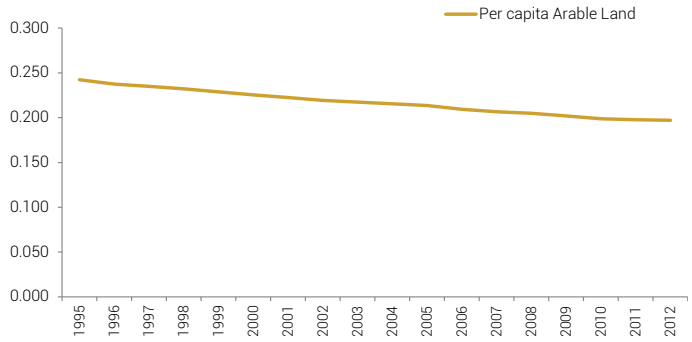
Fig. 6 – Soil degradation map



Source: Land Commodities Research, United Nations Environment Programme (UNEP), International Soil Reference and Information Centre (ISRIC), World Atlas of Desertification

Global per capita arable land has seen a continuous decline over the years from 0.242 hectares in 1995 to 0.197 hectares in 2012 due to soil degradation. This trend could continue in the future as indicated by current environmental conditions.

Fig. 7 – Effect of soil degradation on global per capita arable land (Ha)



Source: FAO, UN–Population Division

Urban development

Farmland in the United States decreased from 1,150,539 acres in 1949 to 904,892 acres in 2002 due to urbanization. The table below shows that growth in urbanization has not been uniform across the United States. The metropolitan counties having a population over 0.5 million have witnessed the greatest decline in farmland. From 1949 to 2002, farmland acreage decreased from 69 million acres to 37.9 million acres in areas with populations over one million, and from 48.9 million acres to 26.3 million acres for the areas with population between 0.5 million and 1 million during the same time period.

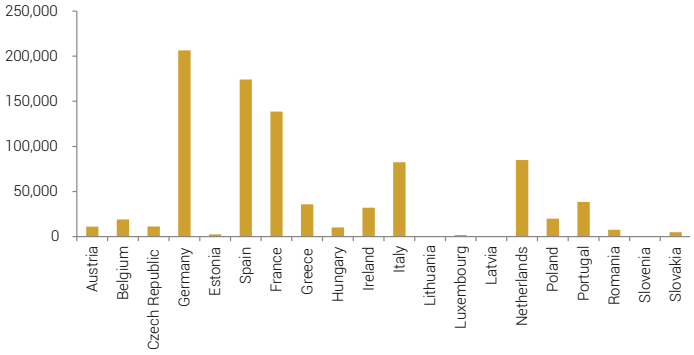
Fig. 8 – Impact of urbanization on US farmland

Metropolitan area size (in terms of population)	Percent farmland 1949	Percent farmland 2002	Percent change
More than 1,000,000	55%	30%	-45%
500,000–999,999	53%	28%	-46%
250,000–499,999	63%	43%	-31%
Less than 250,000	65%	50%	-23%
Non-metropolitan, adjacent to metro	61%	47%	-22%
Non-metropolitan, not adjacent to metro	68%	59%	-13%
Total	**63%**	**50%**	**-21%**

Source: Farmland change, Urbanization and a changing farm economy– Max J. Pfeffer, Joe D. Francis, Zev Ross; US Census of Agriculture

In Europe around 882,166 hectares of land were lost in 20 European nations to urbanization between 1990 and 2000.

Fig. 9 – Loss of agricultural land in Europe due to urbanization between 1990–2000 (Ha)



Source: European Environment Agency

Total urban area across the world is expected to triple between 2000 and 2030, with populations in urban areas set to double to around 5 billion in the same period. According to an assessment done by the United Nations Convention on Biological Diversity, over

60% of the land projected to become urban by 2030 is yet to be built on and will therefore consume more agricultural land in the future.

The following section details the outlook on urbanization across geographies and its possible impact on agricultural land.

- **Asia**–Asia will be home to half the global increase in urban area by 2030. Maximum growth will be seen in China and India. China is expected to see its urban population grow ~50% to over 900 million by 2030. China's urbanization growth will largely happen through encroachment on protected land. India's ~30% urban population is expected to be around 50% by 2045. India's urbanization growth will occur at the cost of its agricultural land. As a result of this consumption of agricultural land and insufficient planning for food supply lines, food security could well constrain India's growing population.

- **Africa**–The urban population is expected to more than double from 300 million in 2000 to 750 million by 2030. The urbanization rate in this region is expected to be the highest among all geographies of the world with a 700% increase in urban land cover over the period 2000–2030.

- **Latin America & the Caribbean**–Latin America may become one of the most urbanized areas by 2050 with 90% of the population living in cities, up from the current estimate of more than 80%. The number of cities has grown six times over the last 50 years and is likely to continue growing, but at a much slower pace. The Caribbean region has had a lower historical urbanization rate of around 65% and is expected to witness a steeper growth rate in future due to the low base effect.

- **Europe and North America**–In Europe, the current urbanization level is 70–80%, and urban growth in recent decades has mostly been in the form of land expansion rather than population growth. Many European and North American cities have exhibited trends of shrinking and/or shifting patterns of population in central parts of the cities, coupled with sprawling outer suburbs and ex-urban areas.

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