DGC Asset Management

Critical Insights

Part 4: Ecology and the Environment

DGC Asset Management Limited is a UK-based project developer and consultancy. This series of reports is intended to provide investors with an insight into developing trends in the underlying fundamentals that shape the global economy and investing landscape. Our goal is to drive better decision making for those considering long-term investment strategies.

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Foreword

As we now come to the final stage of the first section of the Critical Insight series; Threats to Wealth, we look at how rapid changes in the environment – man-made or otherwise – are driving changes in the global supply chain, and how this new ecology is supporting a shift in value away from financial markets and into sustainable real assets.

Recapping parts 1 through 3, we have already taken note of how the rapidly growing and ageing global population is causing a combination of volatile high growth in emerging markets, and a permanency of stagnation or deflation in the developed world. We have looked at how this new-normal, in the balance of global growth, is driving mass urbanisation and an exponential growth in consumption of natural resources. We have also looked at how devastating economic policy such has quantitative easing and negative interest rates has failed to stimulate post-crisis growth, but has instead created trillions in national debt and huge price bubbles in financial markets set to burst at any moment. I admit that the picture we paint is not a rosy one for investors. The outlook is, in fact, bleak.

Today we round up with an analysis of how resource scarcity pairs with increased demand to create a fast diminishing natural resource base. We look at how mismanagement of our essential resources such as productive soil, timberland and water is driving catastrophic losses in our ability to produce the most basic of essential commodities. We also look at how changing weather patterns are impacting productivity on a global scale, from a marked increase in natural disasters, to a proliferation of record droughts and floods.

Read on to gain insight into the what, where, why, who and how of global these mega-trends from the point of view of today's investor.

> *"The nation that destroys it's soil, destroys itself."*

Franklin D. Roosevelt

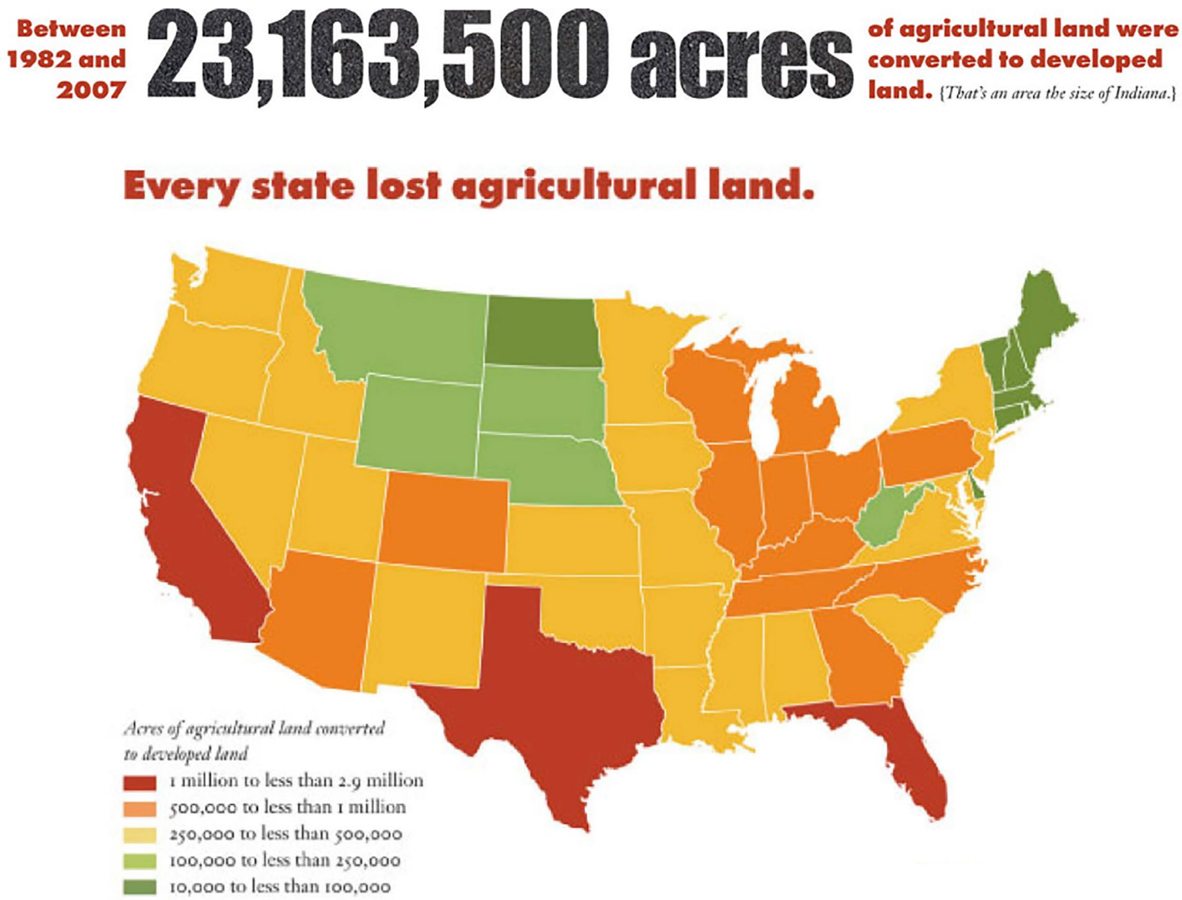
Urbanisation at the Cost of Farmland

Urban expansion is stealing millions of hectares of essential soil…

Productive soil forms the cornerstone of the agricultural economy. It is an essential component in the production of food, animal feed, and biofuels, yet a combination of urbanisation, climate change, and soil degradation- due to years of poor agricultural practice- has taken its toll. Today, around 50,000 square kilometres of productive soil is lost every year. Whilst this is offset to some degree by bringing new land into production, there is very little useful land left untilled, and so at current rates the total stock of useful land will begin to shrink in the very near future. All this at a time when 5 billion people in emerging markets are beginning to demand a much more resource-intensive, western-style diet.

First, let's look at use of land for urban development. As we addressed in report 1b, rapid economic growth in emerging markets is driving mass urbanisation as rural populations head to the city for jobs, education and healthcare. It is forecast that 6.4 billion people will live in urban areas by 2050, compared to just 2.9 billion in 2000. Putting aside the change in consumption patterns that occurs during this shift, and looking exclusively at land use, we already know that the vast majority of urban expansion comes at the cost of cropland. So taking into account the projection noted above, this expansion will come at the cost of circa. 1.17 million km2 of mostly farmland. A significant loss of some 27 million hectares by 2050.

China alone lost more than 14.5 million hectares of arable land to urbanisation between 1979 and 1995. When all combined, this is a total of 670,000 km2, which is an area of land 849 times the size of New York City, 424 times the size of Greater London, 1.2 times the size of France and just under 3 times the size of the United Kingdom.



Soil Degradation

One third of the world's arable land has been lost to soil degradation since 1960…

Having accounted for catastrophic losses to urban sprawl, we must look then to the viability of remaining land as a productive asset. This, however, comes with its own issues as much land is degraded and rendered useless.

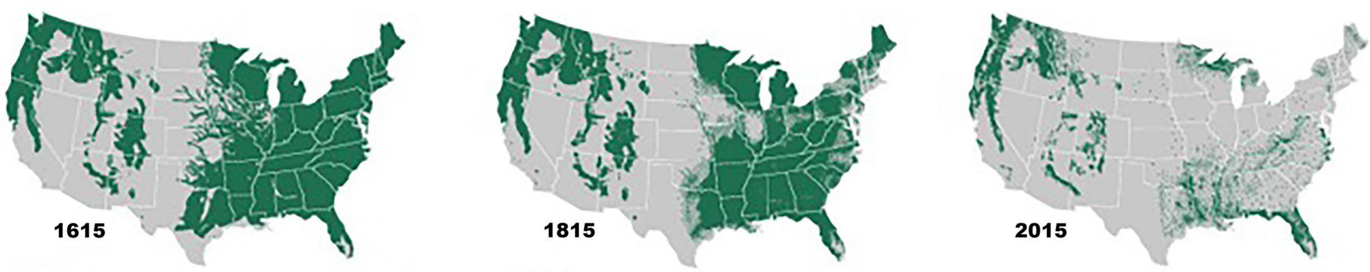
Major causes of depleted and unusable soil include deforestation, slash and burn agriculture, overgrazing (and animal agriculture in general), and the use of agrochemicals. These factors combined have resulted in the loss of huge volumes of arable land, as well as highly polluted water systems.

To date, deforestation and inappropriate agricultural practices have resulted in approximately 2 billion hectares of agricultural land becoming degraded. This includes an absolute decline measured by satellite imagery between 1981 and 2003 of 12% of the global productive land area. Some estimates suggest that at current rates up to 30% of all agricultural land will be unusable by 2020. Annually, the global rate of land degradation, which is due chiefly to soil erosion, is estimated to be between 20,000 and 50,000 km2. To put this in perspective, taking an average annual loss rate of 35,000 km2 equates to 95 km2 per day or 1,109 m2 per second. This means an area roughly the size of Tokyo, Singapore or New York City is lost every week, or one International Football Association standard size football pitch every 7 seconds.

Both arable and livestock farming has an impact. Due to overgrazing, compaction and erosion from livestock, some 70% of all grazing land in dry areas is considered degraded, and according to the World Wildlife Fund (WWF); erosion due to soy production sees Brazil lose 55 million tons of topsoil every year resulting in reduced soil fertility and degraded land.

Rapid industrialisation also impacts the supply of farmland as pollution renders the soil useless, or even poisonous. In China for example; the Ministry of Environmental Protection (MEP) admitted the existence of up to 450 'Cancer Villages' where chemical factories and other industrial plants have polluted surrounding lands and water supplies. Recent soil survey undertaken by the Chinese authorities covering 630 square kilometres of farmland show that around 16.1% of China's soil and about 19.4% of farmland were contaminated, and in 2011, Wang Bentai, then chief engineer of the State Environmental Protection Agency (now the Ministry of Environmental Protection) said that 10% of China's arable land is polluted with lead, zinc and other heavy metals. The wider economic cost is huge. A 1994 study sponsored by three United Nations agencies (FAO, UNDP and UNEP) concluded that soil degradation in South Asia cost the economy around US$10 billion, equivalent to 2% of the region's GDP, or 7% of its agricultural output at the time.

Deforestation in the US



Agricultural Yields

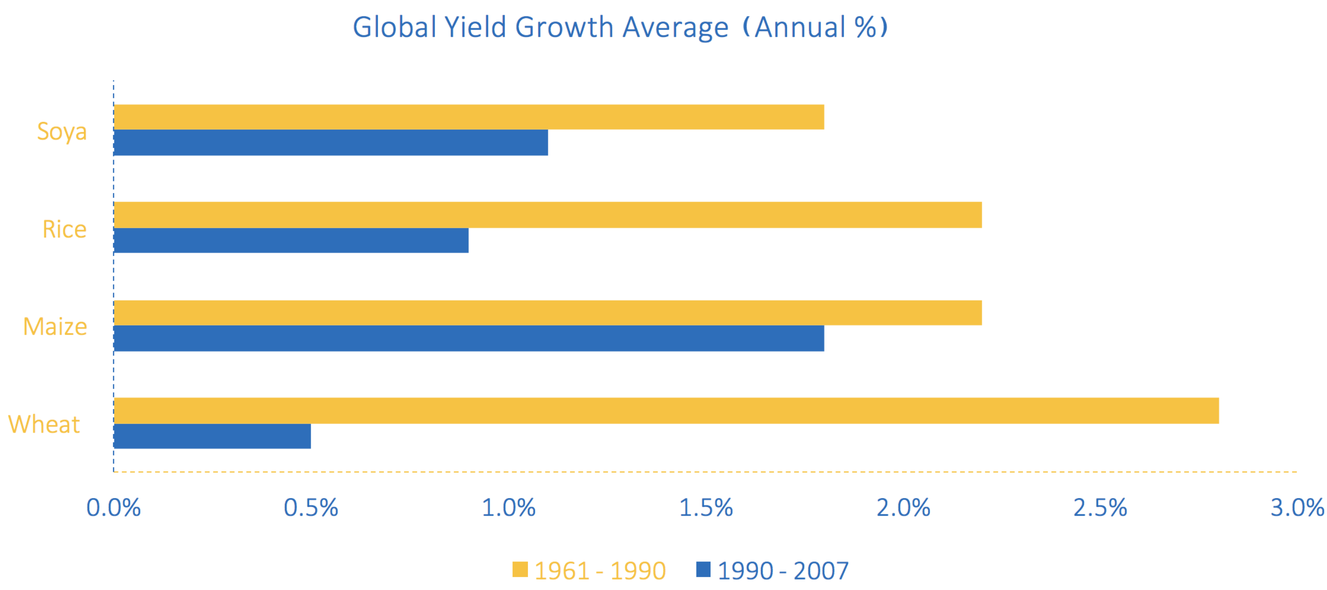
The law of diminishing returns applies to the expansion of agricultural yields using chemicals…

During the great depression of the 1920's, it was possible to bring more land into production in order to increase productivity. As noted previously, the opportunity to do this today is diminished, almost to nothing. At other times of crisis man has used science to increase yields from existing land stock. During the green revolution of the 1970's for example, the application of fertilizers helped to boost yields and allow productivity to keep pace with fast-rising demand for food. Today, this methodology fails to generate any meaningful return.

In 2015, the application of fertilizers, herbicides and pesticides result in annual yield increases of less than 1% (significantly less than the rate of population growth). In fact, as noted in the previous section of this report, we are now learning that many of the chemicals that have become farming essentials may actually be causing more harm than good.

In the 1960s the application of fertilizers saw agricultural yields increase by 3.5% per year, but by the 1990s this had fallen to only 0.5% despite the fact that global use of nitrogen-based fertilizers during the period increased by approximately 700% and water use doubled, whereas in the four decades between 1960 and 2000; the actual resultant increase in cereal production was only 167%. Furthermore, at the point yield gains bottomed out during the early 1980s, per capita consumption of cereals also started to decline whilst calorie consumption increased, demonstrating the shift to protein. The data clearly indicates that increasing yield per hectare cannot provide the increase in productivity required to meet current or future demand for food.

In other words, with regards to agricultural productivity; the world turned a corner sometime in the early part of the last century and again in the 1980s, from a state of increasing supply of food and farmland availability, to a state of decreasing supply relative to the population. This is extremely significant. We are now living in an era, where for the second time in recent human history, per capita food supply is in decline (the first time being prior to the Green Revolution when there was widespread starvation in Asia and Africa), and this is all taking place at a time when climate change threatens to constrain both further expansion of agricultural land as well as yields on existing lands.



Source: Alston, Beddow and Pardey; Food and Agriculture Organisation, UN Population Division

Climate Change

Rising temperatures and a high volume of impact events severely limit productivity…

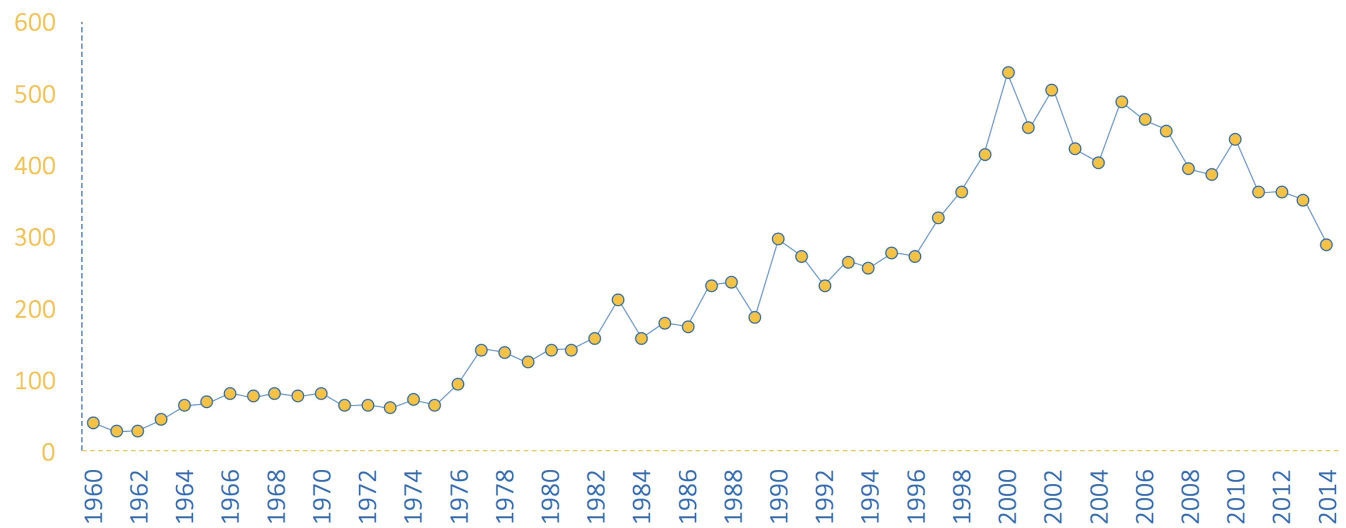
As previously noted, climate change impacts agricultural productivity through soil degradation, and water scarcity. But the way our environment is evolving also impacts productivity through rising global temperatures, and as a result of climate driven weather events such as storms, floods, earthquakes and the like.

Statistical data shows the undeniable trend towards a greater frequency of weather and temperature related anomalies. Global surface temperatures have risen by more than 4% between 1880 and 2000. This has had the effect of distorting normal rainfall patterns and creating a greater frequency of extreme weather events. This is evidenced in the recent (2014) extreme rainfall and flooding in the UK which was driven by a change in weather patterns elsewhere in the world. Much of the same can be said for extreme weather events in the United States of recent years, where entire communities have been devastated.

The total number of natural disasters (excluding earthquakes) has increased by approximately 1000% between 1960 and the present time, with the number of food emergencies roughly doubling since 1980. These events are also becoming more sudden and unpredictable, making mitigation and management ever more challenging and amplifying the negative effects on agricultural productivity. Against a background of rising demand for food, this could have significant implications for commodity prices.

On average, agricultural yields of the dominant regional crops in Africa and western Asia may fall by 15–35% once temperatures rise by 3 or 4 degrees. Even without including the effects of extreme weather events in forecasting models, a study for Southern Africa forecasts declines in production of 15% for wheat and 27% for maize by 2030, at a time when the more extreme effects of climate change would only just be emerging. The Food and Agriculture Organisation of the United Nations states: "The current scenarios of losses and constraints due to climate change and environmental degradation – with no policy change - suggest that production increases could fall to 0.87% towards 2030 and only 0.5% between 2030–2050". This equates to less than half the rate of global population growth; without factoring in a rapidly changing pattern in food and energy consumption in emerging market economies.

Reported Natural Disasters 1960 – 2014 (All Continents)



Summary

A nexus of factors prevents productivity expansion in the face of exponential growth in demand…

It is quite clear from the broad data presented within this report that a number of ecological factors add considerable weight to the current shift in value, both from advanced to developing economies, and from financial markets to sustainable real assets. When assessed alongside the data within parts 1 through 3 of this series, it paints a somewhat gloomy picture for investors that remain attached to traditional investment strategies and markets.

Diminishing essential resources such as land, and severe difficulties in expanding productivity from existing assets both serve to place increasing value on well-managed, and well-located real assets and businesses that play a key role in the new global supply chain. Investors that position themselves accordingly are most likely to continue to benefit.

Having now concluded the 'Threats to Wealth' section of the Critical Insights reports series, we move on to section 2; 'The Impact for Investors'. In this next section; comprising two parts, we look at the net impact of all of the factors discussed in section one on the global economy. We discuss inflation vs deflation, and we analyse the new risk premium attached to financial markets, considering as best we can whether current and future returns are worthy of this risk.

We look forward to greeting you next week with part 5 of the Critical Insights series.

Author Biographies

David Garner – Chief Executive Officer

With a background in real estate, finance and investment, David launched DGC Asset Management Limited in 2009 alongside Wendy Brittain as DGC Business Consulting Ltd; DGC was established to provide institutional investors, family offices and HNW Individuals with access to credible asset class and risk analysis within the real-asset space, focussing primarily on natural resource properties including farms and timberlands.

David has collaborated as an Advisor on investment projects within the distressed-residential and agricultural market segments with servicing Asset Managers and Family Offices through Europe. In 2009 he led a consortium of Investors investing in a structured sale-and-leaseback of a number of farm properties in the United Kingdom which has delivered annualised returns of more than 12% since inception. In 2010 David sourced and managed a multi-client investment into two farming estates in Western Australia. These assets were held and operated for two years before being profitably disposed of in November 2012 delivering a net return after fees and local taxes of 18%.

In 2011 – post financial crisis – David led a collective of US Mortgage Bankers and Real Estate Developers in developing the Secure Income Strategy™; a real estate investment project based on the acquisition and management of single family homes in the United States. This project has since attracted over USD $28 million from US and international investors, and has grown to include over 420 individual properties in five States. The SiS project has also executed a number of profitable exits; delivering liquidated annualised returns of between 18% and 65% for investors.

David is a passionate exponent of sustainable agriculture as an alternative asset class, and has developed an investment strategy and approach designed to deliver the most attractive blend of risk and reward in this growing and exciting space. Vaccinium is an extension of David's passion for agriculture, and he believes well-managed, well-located productive farmland will be one of the safest and most profitable asset classes for two generations.

Charlie Kermer - Director of Funding and Research

Charlie began his career working with BNY analytics, a quantitative asset manager belonging to The Bank of New York Mellon, where he held responsibility for business development and conducting deep market research and analysis which was used to advise central banks and institutional investors in strategic asset allocation.

His next step was to join American Express in the Credit Risk Team where he conducted thorough credit risk analysis and consulted some of the world's largest corporations on their risk profiles and advised on strategies to reduce their exposure.

After years of conducting market research and analysis and gaining a well informed view of world markets, Charlie opted to move into the investment sector in a capital raising capacity, with a focus on hard assets. Charlie used his analytical ability to build structured property portfolios in Central London for UHNW investors and institutions across the globe.

Since joining DGC, Charlie has advised on and managed real estate and agri-business transactions equating to $45 million across North America, The United Kingdom, South America and Australasia. Charlie has built a wealth of experience working with a variety of HNW individuals and Institutions, from project creation and due diligence stage all the way through to fund raising and execution.

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