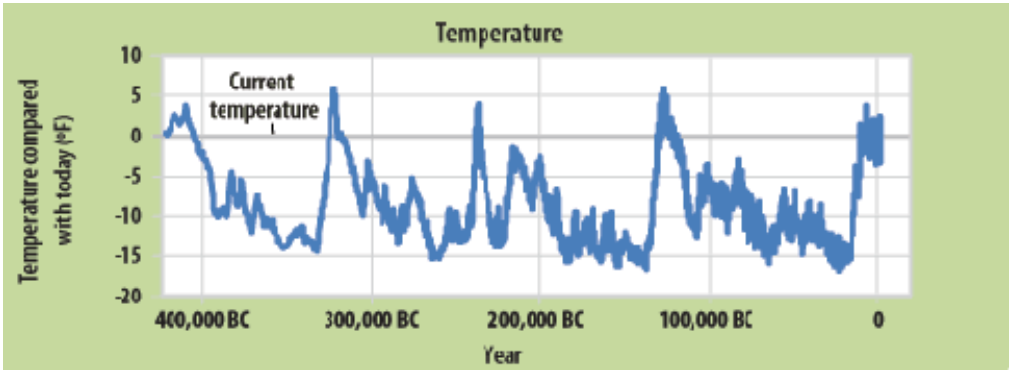
October 1st, 2012

Climate Change:
Can Environmental Risk Yield Investment Opportunities?

The issue of anthropogenic climate change has been much debated in recent years. What is not, for the most part, up for debate is "that climate change is occurring regardless of cause"[1] and that we will have to live with the consequences of this reality.

Our understanding of the causes of *natural* climate change – after all the earth has been through several previous warming and cooling cycles (see Figure 1) – is hazy: we are pretty sure that the extreme maximums and minimums are due to Milankovitch cycles[2]. Our understanding of our impact on those cycles, while logical, is still fairly theoretical (we have no previous examples to work with). Overall, one must agree with the American Institute of Professional Geologists that:

> *The sooner a defensible scientific understanding [of climate change] can be developed, the better equipped humanity will be to develop economically viable and technically effective methods to support the needs of society.*[3]



Source: http://epa.gov/climatechange/kids/basics/past.html

Unfortunately the few "economically viable and technically effective" technologies we do have, that propose to deal with the *causes* of global warming (at least the man-made causes) are still in their infancy, if they truly exist at all. As such, they are not yet a viable investment opportunity for anyone but Angel Investors. The *effects* of global climate change, however, do provide viable investment opportunities.

One consequence of global warming is that it appears to intensify, and increase the occurrence of, extreme weather events. In August of 2012, James E. Hansen, director of the NASA Goddard Institute for Space Studies, in his Washington Post opinion piece, written to accompany the publication of his analysis of the past six decades of global temperatures, wrote:

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[1] *The Professional Geologist* Jan/Feb 2010: 42-43. http://www.aipg.org/Publications/pdf/AIPG%20Statements%20article.pdf

[2] A Milankovitch cycle is a cyclical movement related to the Earth's orbit around the Sun. There are three of them: eccentricity, axial tilt, and precession. According to the Milankovitch Theory, these three cycles combine to affect the amount of solar heat that's incident on the Earth's surface and subsequently influence climatic patterns.
Read more: http://www.universetoday.com/39012/milankovitch-cycle/

[3] *AIPG Position Statement - Climate Change*. 9/20/2008. http://www.aipg.org/Publications/position.htm#Climate_Change.

> *Our analysis shows that it is no longer enough to say that global warming will increase the likelihood of extreme weather and to repeat the caveat that no individual weather event can be directly linked to climate change. To the contrary, our analysis shows that, for the extreme hot weather of the recent past, there is virtually no explanation other than climate change.*[4]

Other studies provide evidence that the "extreme weather" that accompanies climate change is not limited to heat waves and droughts, but includes hurricanes, torrential rains, and flooding as well.[5] Disaster relief and preparedness is an investable theme.

It is not just during times of crises that climate change will affect us. The intensifying climate, along with population growth, will inevitably affect the basic infrastructure requirements for maintaining a healthy and productive human population. The age-old problems of how to provide clean water, sufficient food and adequate shelter will take on new complexity as the environmental factors which cause these problems change and intensify.

The issue of water is twofold: quality and availability. This is a problem on a municipal level. Each municipality will have to deal with change unique to them and their water supply; torrential rains, greater seasonal variability, or decreased yearly precipitation, and the various continuing implications of those changes. For instance:

> *… increases in heavy precipitation events could cause problems for the water infrastructure, as sewer systems and water treatment plants are overwhelmed by the increased volumes of water. Heavy downpours can increase the amount of runoff into rivers and lakes, washing sediment, nutrients, pollutants, trash, animal waste, and other materials into water supplies, making them unusable, unsafe, or in need of water treatment.*[6]
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> *[While] changes in temperature alter the delicate interactions between the amount of precipitation that falls as rain and snow, the accumulation of snow during the winter, and when this snow melts and contributes to stream-flow. In addition, climate change can alter the demand for water, with demands increasing during dry, warm periods and decreasing during cool, wet periods. These changes in availability and demand of water will impact municipalities that are charged with providing safe and reliable drinking water.*[7]

Clearly there is investment opportunity in water management, reclamation, and purification technologies.

Global climate change will also affect food production. The changes in rainfall patterns will affect not only what crops can be grown in certain areas but will also change blight and infestation patterns. Rising temperatures will impact temperature-sensitive crops and increase the need for irrigation which can lead to long term soil salinization. More extreme weather conditions will increase the need to distribute production to cut down on risk of natural disaster impact. Rising temperatures and change in rainfall, however, may provide an investment opportunity by turning currently less productive areas, like Northern Saskatchewan, into prime farmland. In the rest of the world, it is likely to increase the demand for genetically modified and drought resistant crops as well as pesticides and fertilizers that do not pollute the water table. The era of high-tech farming is upon us!

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[4] http://www.washingtonpost.com/opinions/climate-change-is-here--and-worse-than-we-thought/2012/08/03/6ae604c2-dd90-11e1-8e43-4a3c4375504a_story.html

[5] For more information on the connection between extreme weather and climate change, please see: *Extreme Weather and Climate Change*. http://www.extremeweatherheroes.org/media/54045/extremeweatherclimatechange.pdf

[6] http://www.epa.gov/climatechange/impacts-adaptation.html

[7] *The Impacts of Climate Change on Portland's Water Supply: An Investigation of Potential Hydrologic and Management Impacts on the Bull Run System.* http://cses.washington.edu/db/pdf/palmerhahnportland111.pdf

Buildings will need to be tailored to withstand the types of extreme weather common to their location. This change will undoubtedly be brought about by the insurance industry. Eventually it will result in a new set of building codes that, like the earthquake codes, are tailored to location, e.g. if you live on a flood plain, it is high time you put your house on stilts (note that this is already happening in many areas along the Gulf coast[8]). "Smarter" high-tech building materials will undoubtedly play a role in these changes. One would also expect to see investment opportunities in the industries involved in retrofitting buildings.

It is clear that, in the approaching decades, humanity will be forced to make significant behavioral changes in order to adapt to a changing world. As climate changes occur, investment opportunities will present themselves. The astute and informed investor will benefit from not only the industries and companies that will protect our planet and species, but also will participate in the economic opportunities that occur.

- *Roger Johnson*
- *Jessie Kline*

[8] http://www.texasgulfcoastonline.com/News/tabid/86/ctl/ArticleView/mid/466/articleId/56/Default.aspx