FutureDirections international

INDEPENDENT STRATEGIC ANALYSIS OF AUSTRALIA'S GLOBAL INTERESTS

Strategic Analysis Paper

8 August 2017

Chinese Food and Water Security: The Effects of Air, Water and Soil Pollution

Jane Robinson
Research Assistant
Global Food and Water Crises Research Programme

Key Points

- China faces a multitude of issues related to air, water and soil pollution. These issues will impinge on its ability to continue to expand its agricultural sector.
- China's ability to address these issues will be difficult due to the increase to global population that will strain the global demand for food in the future.
- Australia has remained interested in playing a role in mitigating the risks to food and water security in China, as there is potential to improve bilateral relations while also benefiting Australia's desires for continued access to a cheap and reliable food source.

Summary

With China continuing its ambition to become the leading economic powerhouse, the international community continues its push to ensure that China addresses its environmental concerns. China's pollution levels are staggering, despite the Ministry of Environment Protection's (MEP) most recent annual pollution report. This report was covered in a recent Future Directions International Strategic Weekly Analysis paper, which made the point that multiple areas of environmental concern remained despite some improvement to the national level of air pollution. As the MEP indicates, there are key regions that cannot be ignored. The discovery of toxic ponds of industrial waste in rural China this year is among several key issues that threaten to show the reality of a dire situation. Such issues highlight the enormity of the challenge that China faces. Air, water and soil pollution must improve as these have a direct impact on food and water security. Addressing pollution levels will not be easy and will be costly for China. Australia can provide

assistance to enable China to carry out improvements quickly, especially considering the magnitude of the risks that Australia may be exposed to in the future. Australia could choose to provide this assistance, or find alternative food suppliers; although Australia is likely to be motivated by the desirability of maintaining a cheap source of food imports.

Analysis

The various levels of Chinese government and society acknowledge the urgency of addressing pollution, not least because of the associated health risks. China is attempting to reduce its reliance on coal-fired power generation, as the population increasingly understands the link between the burning of coal and air quality. In light of industrial pollution, such concerns are raised as China hopes to tackle pollution through the creation of megacities. This strategy aims to have major industries spread further outside of major cities, and while it is yet to be seen on whether this could improve pollution, it will improve the quality of life for inner-city residents, such as through improved transport networks. The large industrial provinces of Beijing-Tianjin-Hebei will be integrated into one of several key industry hubs. Beijing-Tianjin-Hebei aims to not only address environmental concerns, but also unbalanced development. The new strategy will be crucial in enhancing China's economy within the decade. Although this comes with risks as Hebei province's GDP was worth three trillion Yuan ($577.2 billion) in 2016 as it rapidly increases production in key industries. Hebei province is a major producer of coal and chemical products, such as pesticides and benzene. Industries within Hebei are gaining a reputation as poor custodians of the environment, if nothing is done to rectify this view the provincial government could struggle to overcome this stain on its reputation. As environmental stewardship is increasingly important in conducting business this could pose future problems for the province. Potential risks to the province's reputation are abundant as industries often hide environmental violations. Recent violations include chemical plants regularly dumping untreated wastewater directly onto the ground, and the leakage of hazardous benzene steam into the air.

The challenges the Chinese Government faces are severe and require a hands-on approach. The MEP understands that it has not done enough and has taken on a significant role in stepping up its approach to pollution. Notably, in December 2013 Premier Li Keqiang declared war on pollution with a major focus on cleaning up the air. Shortly after Beijing released its five year plan to tackle overall pollution, the MEP pollution report indicates that it is making progress in reducing air pollution. In March 2017, Li renewed his pledge, announced reductions to coal and steel output and also addressed soil and water pollution. China has also introduced fairly harsh measures, including detentions and fines, for environmental violations. In 2016, for instance, 720 people were detained after 33 thousand tip offs were received and the government issued fines, worth a reported 440 million yuan ($84 million). In the first quarter of 2017, the MEP received 88 thousand complaints; 55 per cent of which related to air quality, noise 30 per cent, water ten per cent, and solid waste seven per cent. The government is faced with an unmistakably severe, multi-faceted array of issues, although it is taking steps in the right direction.

Air Pollution

The need for Beijing to tackle its air pollution is critical as "airpocalypses" are a regular occurrence in major industrial cities. The urban population's perception has changed as the link between unfavourable air quality in China is undeniable, leading to coughing up black sediment and wheezing. This is a serious reality as multiple cities are faced with unhealthy air quality on a daily basis. Air quality updates are provided globally by the World Air Quality Index, the index highlights the area of industrial concern for air pollution levels which are unhealthy in a majority of areas. The index measures air quality in "PM2.5" that is a term for fine particulates within the atmosphere. Particulates take into account the burning of fossil fuels, and atmospheric pollutants (the most volatile of these are Nitrogen Oxides- NO_x and Volatile Organic Compounds-VOCs). Ozone damage is certainly a reality for China, as NO_x is a by-product of burning fossil fuels and contributes to ozone depletion. The government has indicated that it needs to decrease its levels, and China indicates somewhat of an improvement in reducing its air pollution levels. The World Health Organisation (WHO) recommends that exposure to PM2.5 greater than 25µg/m^3 (micrograms per cubic metre) over a 24 hour period is harmful to health. Considering that Beijing hits readings above 150µg/m^3 most days, and other cities have similar levels. Although the extent of this issue persists as red alerts within Beijing are issued, resulting in the closure of schools and factories. Red alerts are the most severe pollution warning within China and are issued when the air quality index forecasts levels of 200µg/m^3 for more than four days in a row, surpass 300µg/m3 for more than two days or are over 500µg/m^3 for at least 24 hours.

The link between air pollution and China's ability to address its food and water security does not appear as clear cut as the cases for water and soil pollution. The link between air pollution and food and water security is indirect, and cannot be directly measured. A report published by the *World Resources Institute* indicates that China's approach to reducing air pollution is posing an unintentional threat to water. As China plans to replace coal with cleaner natural gas, including synthetic natural gas (SNG) converted from coal. The implications of the plan will be challenging as one cubic metre of SNG requires six to ten litres of freshwater to produce. Arguably, China's ambitious strategy in controlling air pollution will have a great impact on water supply within the country. The effect of air pollution on food security is likely to be unambiguous in the future. High levels of PM2.5 have a direct impact on blocking sunlight and reducing surface solar radiation. Air pollution will contribute to a higher incidence of acid rain and slower crop growth, mainly because of lower amounts of photosynthetic chlorophyll pigments in plants. All of these factors will greatly impact China in the future as the factors are natural and may greatly alter China's desire to continue the expansion of its agricultural sector.

Water Pollution

There is an evident social context to China's water pollution woes as it has long seen its waterways as convenient dumping points for its waste. This was highlighted by an incident that occurred in 2013, when 16 thousand dead pigs floated in the Huangpu River, after being dumped off farmlands upstream of Shanghai. It would appear the overall societal mindset has not changed since, considering that similar events occurred in 2014 and toxic ponds of

improperly disposed industrial waste in northern China continue to be uncovered. While China chooses to flaunt major achievements during its 12th Five-Year Plan that officially ended in 2015, there is a long and daunting task ahead that needs to be addressed. Surface water quality is a major issue for China, as the water supply in Shanghai has a reported 85 per cent that is unsafe to drink, while Tianjin's water supply is 95 per cent unsafe. Shanghai and Tianjin are not standalone cases as an alarming 14 out of 31 provinces failed to meet their water quality targets, the extent of the issue becomes apparent.

China's water woes are compounded by reports that indicate that over half of the groundwater is unfit for consumption. China's ability to secure healthy water sources will be costly and difficult, and cannot be ignored as the issue will greatly affect urbanisation and industrial growth. Coal consumption in China requires 7.4 billion cubic metres of water annually, and this figure will rise significantly if the 2015 proposal to construct 200 more coal-fired power plants goes ahead. An extra 1.8 billion cubic metres of water would be required in that case, which is equivalent to the needs of almost 100 million people. If China is to avoid its looming water crisis, it will need to address its overreliance on coal.

Soil Pollution

China hopes to expand its agricultural sector, and has indicated that it requires at least 120 million hectares of agricultural land to achieve its aims. Once China removes land that is over polluted, it is left with 135.4 million hectares of arable land, some of which is set aside for forest restoration. This leaves Beijing's policy makers with a quandary - to risk adding to general health issues and grow crops in less-than-perfect land or disrupt food supplies. One potential risk from this is the threat of cadmium and other toxic heavy metals that leads to increased health risks, such as cancer. Cadmium can be present in waterways and is difficult and costly to eradicate. Cadmium poisoning is a prevalent issue within agriculture in China. Rice tainted with cadmium was found in the major industrial manufacturing city of Guangzhou in 2013. Nearly half of the rice tested there came back with excessive levels of cadmium. Another major concern has been over-exposure to agricultural products laced with pesticides. In 2013, the then-Vice-Minister of Land and Resources, Wang Shiyuan, ruled out the Government's usage of tainted land, ensuring that tests would be conducted before new land was cultivated to ensure it is safe for agriculture. This was reaffirmed in 2013 by a Chinese government who reported that approximately 3.33 million hectares of China's farmland was incapable of crop growth due to soil pollution. The question for China is whether, given the growing demand for food and water, it will decide to stay true to the promise of ensuring greater food and water security.

Despite the need for China to ensure it maintains arable land that will be sustainable in the future, there have been some positive outcomes in recent years. Developments in technology have allowed Beijing to invest in and experiment with plant factories. Plant factories have containers with plant seeds are in a self-contained room with LED lights to assist in healthy plant growth maximising the photosynthesis process. This could be a feasible solution to some agricultural concerns as they allow small-scale growth in an enclosed environment, away from the harsh air conditions in China. They also ensure that the soil used is safe.

Opportunity for Australia to Provide Assistance

China's pollution levels are impossible for Australia to ignore as Australia relies significantly on importing food items from China. Outbreaks of contaminated frozen berries have continued to plague Australia's food import market - with traces of Hepatitis A found in products in 2015, as well as more recently. Outbreaks of Hepatitis A are caused by contaminated faecal matter during growing, harvesting, but also during the transportation and packaging of products. While Australia could take the easy option and ignore the issue by finding alternative markets to import food from, or tolerate China's food crisis by imposing harsher standards at national borders, it would be better in the longer term to ensure that it confronts this issue with greater support in China. The Australian Centre for International Agricultural Research's operations in China could be a step in the right direction. Canberra acknowledges that it has an opportunity to co-operate with Beijing on the issue. Australia appears willing to collaborate in terms of assisting China to incorporate agricultural reform that could greatly alleviate China's soil and water pollution challenges. Such collaboration is still in its initial stages, but the number of bilateral agreements and dialogues is a positive sign of collaboration. An Australian Government initiative, the Cooperative Research Centre for National Plant Biosecurity has developed a number of memorandums of understanding with Chinese agencies; notably the Chinese Academy of Inspection and Quarantine and the Chinese Academy of State Administration of Grain. Also, China's Northwest Agriculture and Forestry University is working with the Australian Government in a joint research programme to assist in China's food security issues. China hopes to reduce its use of chemicals and pesticides during food production, while Australia can benefit from China's innovations within science and research. The China Australia Food Security Cooperation Initiative is also in operation on a similar level. Although these organisations are cooperating on a small-scale there can be room for Australia to assist further.

Conclusion

China faces a multitude of issues that relate to its food and water security. These issues will greatly become more relevant within the next decade as China continues to expand its agricultural industry. There is a secondary concern as China needs to address its contaminated water source that will be costly and will not be easy. The issues in China will cross borders, and it is necessary for Australia to seek a greater role in co-operating to ensure that the risks are mitigated into the future.

*****

Published by Future Directions International Pty Ltd.
80 Birdwood Parade, Dalkeith WA 6009, Australia.
Tel: +61 8 9389 9831 Fax: +61 8 9389 8803
Web: www.futuredirections.org.au