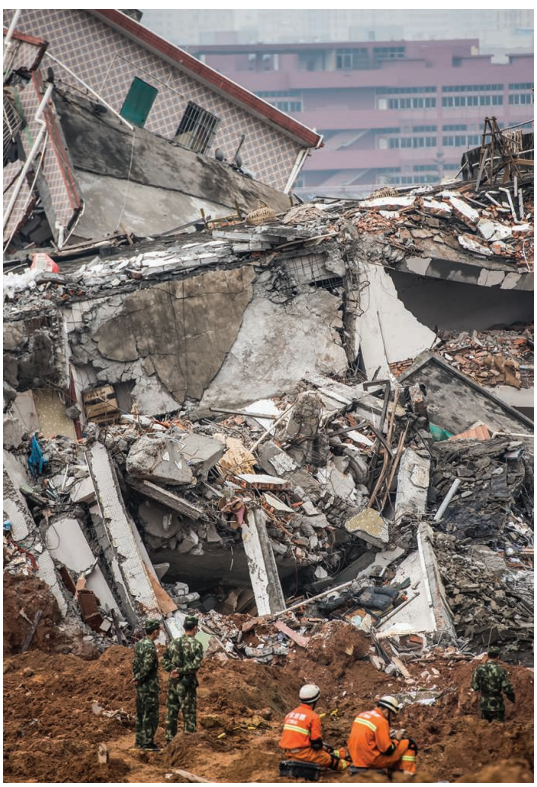
LETTERS

Edited by **Jennifer Sills**

The crushing weight of urban waste

ON 20 DECEMBER 2015, a mountain of construction waste collapsed in Shenzhen, north of Hong Kong. The man-made landslide destroyed 33 buildings, killed 69 people, and left 8 others missing (*1*). This disaster occurred only 4 months after the chemical explosions in a hazardous material storage facility in Tianjin (*2*). These events highlight the importance of proper design and risk management during China's rapid urbanization.



Construction waste collapse in Shenzhen, China.

Along with unparalleled urbanization, China produced approximately 30% of the world's municipal solid waste (MSW) in 2012 (*3*, *4*). Construction generates nearly 40% of China's MSW, more than 200 million tons every year. It also consumes about 40% of China's natural resources and energy. Rapid urban development is encroaching onto areas previously used for waste disposal that contain toxic substances, endangering human health (*5*). Landfill areas are filled so rapidly that many cities lack sufficient space to store the waste that is generated. Shenzhen's landfill capacity has been inadequate since early 2015 (*6*), but urbanization and the development of a network of underground railway lines continue.

The key solution is the implementation of construction waste minimization at the design stage, as described in the European Commission Waste Framework Directive (*7*). However, this concept is unknown to more than 60% of Chinese architects (*8*). Shenzhen was selected by China's Ministry of Housing and Urban-Rural Development as the pilot city for construction waste minimization and comprehensive utilization in 2012, but this did not stop the landslide tragedy (*9*). Close monitoring with GPS and other remote sensing techniques of large landfill sites and risk management are also important.

China is not alone. A similar landfill collapse happened in the Philippines' Quezon City, killing at least 278 people (*10*). These disasters should serve as a turning point for China and other countries to improve construction waste minimization and risk management.

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China's partial emission control

IN DECEMBER 2015, Beijing and other Chinese cities issued their first "red alert" for heavy air pollution, as heavy smog blanketed many parts of the country (*1*). China's red alert is the government's highest emergency response level to severe air pollution and includes school closures, suspensions of factory production, and driving restrictions (*1*, *2*). Nevertheless, Beijing's air quality index during the red alert remained hazardous, measuring 20 to 35 times above safe levels (*3*).

Over the past 35 years, China has implemented an antipollution system of total emission control (TEC) to curb increasing levels of environmental pollution (*4*). The Chinese government claims that the system has played a critical role in cutting annual emissions of targeted pollutants and improving the quality of the environment (*5*). The core of the TEC system is to set a 10% reduction for targeted pollutants and allocate total emission quotas on a year-to-year basis to provincial and regional governments.

However, the emission reduction target and quotas have been criticized for being unrealistic and lacking in scientific rationality from an environmental perspective (*4*, *6*). For instance, the TEC system is inconsistent in targeting the type and range of pollutants. From 1996 to 2000, the targeted pollutants included soot, sulfur dioxide, industrial dust, chemical oxygen demand (COD), cyanide, oil pollutants, five heavy metals (arsenic, mercury, lead, cadmium, and hexavalent chromium), and industrial solid waste. Yet, between 2001 and 2005, the list was reduced by half. From 2006 to 2010, only two pollutants were targeted (sulfur dioxide levels in air and COD levels in water) (*4*). Heavy metals were removed from the list in 2001, and the air pollutants soot and industrial dust are no longer targeted. As a result, heavy metals and air pollution have expanded across the country at an alarming rate (*7*). The increase took place despite the addition of ammonia-nitrogen and nitrogen oxides to the other two targeted pollutants (sulfur dioxide and COD) for the years 2011 to 2015 (*8*). Heavy metals comprise 82.8% of soil contaminants, and 16.1% of the country's total soil is polluted by heavy metals (*9*). Only 3 out of 74 key cities met the national standard of air quality in 2013 (*10*). The state media Xinhua News reported that Beijing's average density of fine particles (less than 2.5 μm) between 15 November and 31

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December 2015 rose by 75.9% since the previous year (*11*); in 2015, the fine-particle density averaged 80.6 μg/m^3 (*11*), compared with a safe level of 15 μg/m^3 (*12*).

China is taking steps to deal with its environmental problems by adjusting its industrial structure toward green development and environmental priority and by reviewing and strengthening its environmental policies and laws to ensure stronger enforcement, greater grass-roots accountability, system stability, and transparency and accountability of pollution data. To make these efforts meaningful, China must reinstate its original list of targeted pollutants and work to minimize them.

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Misguided strategy for mosquito control

AEDES AEGYPTI, a mosquito native to Africa, has recently transmitted zika, chikungunya, and dengue to humans in Brazil (*1*). In response, several Brazilian municipalities have encouraged the use of non-native "mosquito fish" (*Poecilia* spp.) to control *A. aegypti* by eating their larvae (*2*, *3*). This strategy is misguided.

The mosquito fish eats mosquito larvae.

Introducing non-native fishes into the aquatic environments of Brazil has been shown to negatively affect native biodiversity (*4*, *5*). The use of non-native species to manage other non-native organisms has also led to unintended consequences (*6*), and positive interactions between invasive species can make the environment more vulnerable to a secondary invasion (*7*).

If local policy-makers insist on the use of fish to cull the mosquito population, they should choose from Brazil's rich diversity of aquatic species (*8*). However, the efficacy of mosquito control by fish is questionable (*9*). Brazilian authorities should instead propose environmentally friendly strategies to control these epidemics (e.g., vaccines) and to suppress *A. aegypti* (e.g., sanitary measures), instead of encouraging the introduction of more non-native organisms.

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