



Population growth exacerbates flood risk

Population growth increases both the likelihood and the potential impact of flooding by increasing the pressure on sewer systems and prompting urban expansion into areas at high risk of flooding. Rising sea levels and changing rainfall patterns are expected to make floods more frequent and intense over the coming decades. The global poor are especially exposed to flooding and vulnerable to its damage. Slowing population growth by encouraging smaller families and meeting unmet demand for family planning materials should be pursued in parallel with flood and climate change adaptation.

Flooding in the UK

While flooding was once a serious but infrequent occurrence in the United Kingdom, major events have been increasing in both regularity and severity. The autumn of 2000 was reported as the wettest in England and Wales since rainfall records began for these regions in 1766.¹ Major rivers such as the Thames, Trent and Severn

reached peak levels and many smaller rivers burst their banks, resulting in widespread flooding and damage to more than 10,000 residential and commercial properties. Summer 2007 saw an even more destructive series of floods hit England, primarily concentrated around Gloucestershire. An estimated 500,000 people went without clean water supplies and 13 people died as a result of the flooding.² There are also psychological costs associated with flooding, such as anxiety, depression and insomnia, which one study found were two to five times more prevalent among people whose homes had been flooded.³

Most of the damage from the 2007 round of flooding was attributed to overloading of sewers, and the likelihood of sewer flooding is predicted to increase by approximately half by 2030 as a result of population growth and climate change.^{4,5} The 2015 – 16 floods were therefore just the most recent in a sequence of destructive flooding events. It is very difficult to attribute extreme weather events to one specific cause, but climate change and population growth are among the most significant factors.

High housing prices in population centres such as London are driving urban sprawl, while the Committee on Climate Change found that a growing population's demand for affordable housing has led developers to build 13 per cent of new housing on floodplains despite warnings from the Environment Agency.^{6,7} From June 2013 to June 2014, the number of people resident in the UK grew by almost 500,000.⁸ This growth was in consequence of both increased immigration and a higher birth to death rate ratio. While construction in vulnerable areas will inevitably result in material and financial losses when flooding occurs, the building process itself can increase the chances or severity of the floods. Changes in land use such as road-building and the

draining of marshes are known to lead to flooding, as the land becomes less able to absorb floodwater.⁹



According to the European Environment Agency, while land use change is the biggest reason for recent increases in flooding damage in the UK, climate change is expected to become a much greater factor.¹⁰ Climate change may increase the likelihood and intensity of flooding through altered rainfall patterns and sea level rise. Warm air retains more moisture, so more rain may fall under such circumstances. There is some evidence that this effect and its consequences for flood risk are already detectable, with one study estimating that rainfall attributable to manmade carbon emissions accounted for a 20 per cent rise in flooding events in England and Wales.^{11,12} Most of the increase in rainfall will be in winter, with summer rains expected to come in heavier, more periodic events than at present. Rapid summer rainfall, combined with the diminished ability of dry soil to retain water, will lead to increased flooding, as well as soil erosion and crop loss for UK agriculture. This is especially troubling given the burgeoning demand for food arising from a growing population. The UK Climate Change Risk Assessment estimated that between increased rainfall and a rising sea level, the amount of agricultural land in England at a greater than one in ten annual risk of flooding will nearly triple by 2080, while the largely coastal land at a greater than one third annual risk will increase

fourfold.^{6,13}

The widespread recognition of manmade climate change in the UK, and the concern generated by this, has contributed to decreased consumption of energy and a lowered level of greenhouse gas emissions.¹⁴ This indicates that despite an increase in population, per capita consumption must be decreasing at a rate sufficiently high to account for the increased number of people. While this is clearly a positive thing, much greater measures will need to be taken to mitigate or even partially reverse the changes we have made to the global climate system. The increasing population is therefore a limiting factor in the UK's capacity to deal with environmental issues and ensuing problems such as flooding.

Flooding globally

The UK was not the only country to be struck by flooding in 2015. Heavy rains and the resulting flooding devastated the country of Malawi last January. Hundreds of people died and almost 250,000 were permanently displaced from their homes.¹⁵ The South American countries of Paraguay, Argentina, Brazil and Uruguay were similarly affected in December, with substantial summer rains causing the swelling of primary rivers and forcing more than 150,000 people throughout the region to abandon their homes.¹⁶

While the repercussions of flooding can be vast regardless of the level of affluence of the affected region, it poses a particularly severe risk to residents of cities in the developing world, due to overcrowding and poor infrastructure.¹⁷ A World Bank study found that in countries accounting for nearly three quarters of the global population, poverty is correlated with flood exposure.¹⁸ Indeed, rapid population growth and urbanization in developing megacities like Mumbai and Dhaka

have forced some of the poorest residents out into unplanned floodplain settlements. In Dhaka, some of these settlements are actually on reclaimed land that used to hold water after heavy rain events.¹⁷ This is especially problematic because the poor have the most to lose from flooding, typically with less resilient housing where they keep a greater share of their assets in physical form. In case studies on Bangladesh, Honduras, and Mumbai, poor families affected by flooding lost more than twice as much as a percentage of their annual income compared to families above the poverty line.¹⁸



In Mumbai, typical flooding deprives more than three quarters of homes of clean water and leaves them inundated with sewage.¹⁸ The contamination of drinking water can lead to increased incidence of waterborne diseases, such as cholera and typhoid fever, while standing water can breed mosquitos that spread malaria.¹⁹ A dense population heightens the risk of outbreak.

Climate change may often be to blame for shifting weather patterns and extreme meteorological events, but so far many incidences of flooding are more closely correlated with increases in the human population. On the African continent, the number of deaths from flooding between 1950 and 1969 was below 2,000, while that from 1990 to 2009 was more than 15,000. Between 1950 and

2009, the population of all the African countries combined grew from under 240,000,000 to more than one billion in 2009. The increase in deaths from flooding was therefore much more dramatic than the increase in population. Researchers investigating hydrological and climatic trends found that there was no indication of changes in these being the cause of the increased number of fatalities. Instead, analysis of the data led them to conclude that concentrated and poorly-planned settlements, erected to house the burgeoning population, had encroached upon land that was highly prone to flooding. Nevertheless, another recent study by the World Bank predicts that climate change alone will increase the number of people exposed to river flooding by up to 15 per cent by 2030 and 29 per cent by 2080. This is before accounting for population growth, which is expected to introduce another 15 per cent and 45 per cent respectively.²⁰ The rate of population growth has been higher in areas at risk of flooding, so this is likely to be a conservative estimate.^{21,22}

Conclusions

With the threat of extreme weather set for the foreseeable future, much will need to be done to avoid the levels of destruction that have occurred due to past flooding. Despite this, it has been reported that the amount of spending the government has set aside for this purpose will not be sufficient to deal with the projected changes in climate.²³ The government has also been criticised for providing areas in the south of the country with greater financial support than those in the north, where recent flooding damage may have been preventable if adequate defenses had been funded sooner.²⁴

While managing climate change and focusing on

renewable energy sources are necessary pursuits, they will not lead to reduced incidences of flooding in the short term. Allowing floodplains to remain in their natural state to ensure proper drainage would likely have a more positive effect, but this will only be possible if the demand for housing falls. Population management is a highly complex issue, as it requires a balance to be struck between protecting the planet for future generations and allowing those currently living to exercise autonomy. Appropriate steps could include increases in funding for both contraceptive awareness and supply. It might also be beneficial to improve society's acceptance of couples and individuals who make the decision to refrain from having children. Immigration is also at the forefront of the population issue as it accounts for such a great proportion of the increasing trend. It has been suggested that there should be a significant increase in the amount of aid supplied to the less developed countries from which there tends to be significant migration, allowing for improvements to their standards of living and a resulting reduction in the inclination to leave. A combination of all these approaches may provide a foundation for dealing with the problematic population increases.

While all of the reports mentioned here identify population growth as one of the key challenges in managing flood risk, it is treated as an inevitability. Such complacency leads to missed opportunities. Among the global poor especially, but even in the UK, there is unmet demand for access to family planning materials and education. By providing it and highlighting the benefits of small families, we might relieve pressure on housing and sewer infrastructure and make it easier for authorities to prepare for climate change.

1. <http://www.metoffice.gov.uk/climate/uk/interesting/autumn2000.html>
2. <https://www.floodblockbarrier.com/flood-protection-news/major-flood-events-in-the-uk-in-the-last-20-years/>
3. <http://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-11-145>
4. http://www.ofwat.gov.uk/wp-content/uploads/2015/11/rpt_com201106mottmacsewer.pdf
5. https://www.theccc.org.uk/wp-content/uploads/2015/06/6.736_CCC_ASC_Adaptation-Progress-Report_2015_FINAL_WEB_250615_RFS.pdf
6. https://www.theccc.org.uk/archive/aws/ASC/CCC_ASC_2012_Spreads.pdf
7. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/292928/geo0609bqds-e-e.pdf
8. <http://www.bbc.co.uk/news/uk-34666382>
9. <http://www.bbc.co.uk/news/science-environment-28871577>
10. <http://www.eea.europa.eu/publications/climate-impacts-and-vulnerability-2012>
11. <http://www.nature.com/nature/journal/v470/n7334/full/nature09763.html>
12. <http://www.nature.com/nature/journal/v470/n7334/full/nature09762.html>
13. <http://randd.defra.gov.uk/Document.aspx?Document=CCRASummaryFloodsandCoastalErosion.pdf>
14. <http://www.theguardian.com/environment/2015/mar/26/large-fall-in-uk-greenhouse-gas-emissions-of-over-8-last-year>
15. <http://www.theguardian.com/global-development/2015/feb/10/malawi-floods-devastation-far-worse-than-first-thought>
16. <http://www.bbc.co.uk/news/world-latin-america-35179103>
17. <http://www-wds.worldbank.org/external/default/WDSCon>

- [tentServer/WDSP/IB/2015/11/19/090224b0831ebd6d/1_0/Rendered/PDF/Climate0and0di0micro0level0analysis.pdf](#)
18. <https://openknowledge.worldbank.org/bitstream/handle/10986/22787/9781464806735.pdf>
19. http://www.who.int/hac/techguidance/ems/flood_cds/en/
20. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2015/11/05/090224b0831972af/1_0/Rendered/PDF/Disaster0risk000floods0and0droughts.pdf
21. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2015/10/29/090224b0831793ce/2_0/Rendered/PDF/Urban0flooding0nce0to0disaster0risk.pdf
22. <http://www.sciencedirect.com/science/article/pii/S0959378012000830>
23. <http://www.bbc.co.uk/news/science-environment-25836084>
24. <http://www.bbc.co.uk/news/uk-35188146>