

Urban Exodus: Can Moving Out Save China's Air and Biodiversity?

Sophia Park¹ and Bethany Stallings[#]

¹Yongsan International School of Seoul, Republic of Korea

[#]Advisor

ABSTRACT

Air pollution is a pressing global health crisis, with the World Health Organization (WHO) attributing 7 million premature deaths annually to it, 4.3 million of them occur in Asia: especially China and India. This paper explores the potential of counter-urbanization policies to alleviate air pollution in China, which has faced severe environmental challenges due to rapid economic growth and urbanization. By encouraging a kind of cultural shift from densely populated urban areas to rural regions, counter-urbanization is one of many unique strategies to hypothetically reduce pollution levels, enhance ecological standards, and improve global public health. The study employs a comprehensive literature review, drawing on peer-reviewed journals, government documents, and reliable sources on air pollution, urbanization, and counter-urbanization policies. It examines the intricate relationship between urbanization and air pollution, assessing the benefits of dispersing populations and industries from urban centers. Our findings indicate that counter-urbanization can potentially reduce air pollution by decreasing industrial emissions and vehicle exhaust in cities. This policy shift also promotes biodiversity and sustainable agriculture in rural areas, which contributes to improved environmental health. Moreover, counter-urbanization can alleviate the strain on urban resources, fostering more balanced regional development and potentially revitalizing rural economies. By learning from successful examples globally, such as Sydney's approach, China can implement effective counter-urbanization policies that offer long-term ecological and health benefits. This research underscores the necessity of innovative environmental policies to tackle air pollution and improve the quality of life for millions in China, and hopefully the rest of the world.

Introduction

Air pollution is viewed as a global health issue that results in at least 7 million premature deaths annually. The World Health Organization (WHO) reports that Asia alone accounts for 4.3 million of them, especially in China and India.¹ Fan et al. noted that China's rapid economic growth and urbanization have led to severe environmental challenges in recent decades. As a result, people in these regions have been reported to have health effects. Rapid urbanization has been one of the leading causes of this crisis since it subjects large numbers of people and industries to the impact of environmental degradation.² Reducing population pressure in urban areas and dispersing industrial activities from densely populated areas could help diminish pollution.³ Thereby, this

¹ WHO, "7 Million Premature Deaths Annually Linked to Air Pollution," World Health Organization (WHO), last modified March 25, 2014.

² Vivian H. Chu, Winnie W. Law, and Jessica M. Williams, "Advocacy coalitions in rural revitalisation: The roles of policy brokers and policy learning," *Environmental Science & Policy* 136 (2022).

³ Ibid, 3

enhances ecological standards and health liabilities. This paper aims to investigate the impact of counter-urbanization policies in reducing the effects of air pollution in China. It also analyzes the work required to enhance the environmental and public health standards.

Methodology

The research paper relies on a literature review approach. It uses peer-reviewed journals, government documents, and other reliable sources of information on air pollution, urbanization, and policies on counter-urbanization. The primary sources for crucial ideas are health risks, assessing the impact of environmental policies in China, and counter-urbanization studies. The review examines explicitly the connection between urbanization and air pollution and weighs the advantages of counter-urbanization. Some sources included academic databases, government publications, and environmental research organizations. The search was done using keywords such as terms like “air pollution in China”, the effects of “urbanization” and “counter-urbanization policies.” Only the most appropriate and reliable sources presenting diverse and sound research results were chosen for an adequate literature review. Emphasis was made on contemporary literature that presented academic findings on urbanization and counter-urbanization in China. The theoretical underpinnings of the study are urban planning and environmental health. They help to analyze the prospects and issues related to counter-urbanization. From a theoretical point of view, the concepts of sustainable development and public health are relied on to guide the understanding and any proposed intervention.

Discussion

As Feinerman pointed out, counter-urbanization refers to moving from urban to rural areas. He further explains that counter-urbanization may occur through people switching to new or smaller cities for better living standards.⁴ It can also be the movement from rural areas for affordable living. From the perspective of environmental sustainability, counter-urbanization might have the potential to offer an answer to how people can live in harmony with nature. Yu, among other authors, agrees with this point, arguing that this is linear progress and that people should make better decisions to help China develop without negatively impacting nature.⁵ At the policy level, counter-urbanization can be utilized as a mitigation measure and eliminate the root causes of China’s current air pollution crisis.

It becomes paramount that diversification be given a high level of priority in managing the environment in China. According to Lu and his colleagues, an obligation to secure priority species, areas, and habitats must be acknowledged.⁶ It helps to prevent or moderate the effects of environmental change on those components of biological diversity. This also includes ecological processes and societal welfare that are being affected. Nonetheless, perhaps the most damaging effect that air pollution in China has on the country is the one that influences its biodiversity.⁷ This influence is due to emissions from industries, automobiles, and agricultural

⁴ Eli Feinerman et al., "Impact of Counter-Urbanization on Size, Population Mix, and Welfare of an Agricultural Region," *American Journal of Agricultural Economics* 93, no. 4 (2011).

⁵ Li Yu, Yiran Wang, and Mo Li, "The emergence of counter-urbanization in China: Can it be a pathway for rural revitalisation?," *Habitat International* 144 (2024).

⁶ Yonglong Lu et al., "Spatial variation in biodiversity loss across China under multiple environmental stressors," *Science Advances* 6, no. 47 (2020).

⁷ Chang Zhao and Bing Wang, "How does new-type urbanization affect air pollution? Empirical evidence based on spatial spillover effect and spatial Durbin model," *Environment International* 165 (2022).

practices, as Liyin He depicts.⁸ Fan noted that in 2015 China's PM2.5 concentration reached 59 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). Based on his findings, this is an increase from the WHO's recommended 10 $\mu\text{g}/\text{m}^3$ level.⁹ Pollutants have led to severe environmental repercussions, such as degraded soil quality, acid rain, reduced water availability, and disrupted food chains, impacting human livelihoods. Research shows that as plant growth and composition changes can affect other organisms' habitats and food supplies, air pollution's impact on plants will influence all ecosystems.¹⁰

In addition, the formation of ground-level ozone proves to be a threat to the environment and people's health. These formations are mainly a result of toxic exhaust products from vehicles, industrial activities, and others that lead to smog formation. Health effects associated with increased ozone levels are people with breathing problems like asthma may be more likely to die from the higher mortality rates.¹¹ A study by Lu revealed that air pollution has reduced life expectancy in Northern China by more than five years.¹² This is because particulate matter and other pollutants have high levels within the atmosphere. Peng Yin further calculates that 2017 air pollution led to 1.24 million premature deaths in China.¹³ Polluted air is also affecting millions of people, and according to the WHO, there are estimated to be 24 million premature deaths in China alone.¹⁴ To support this, the author cited Hong-Wei Xiao, who posits that respiratory diseases could be causing the death of over three million Chinese people annually by 2030. This data calls for better policy measures to control air pollution and the adverse impacts on the health of citizens.

Measures of Counter-Urbanization

China should accelerate counter-urbanization policies that considerably decrease air pollution levels in urban areas and curb industrial activities. By promoting a shift from urban to rural areas, these policies also capitalize on the greater availability of natural resources in rural regions. Muller and his colleagues implied that counter-urbanization would enhance biodiversity by increasing the proportion of arable crops.¹⁵ More importantly, plant biodiversity benefited the most in these organic farming areas. Organic farms showed higher species richness, maintaining 30% more biodiversity than conventional farms. More specifically, the biodiversity of plant species increased by 70-100%, and weed abundance increased by 75-150% more than traditional farms.¹⁶

More so, this approach can help protect scarce natural resources. Watson argues that counter-urbanization can allow people to learn about the differences in the world.¹⁷ In doing so, they can learn from the indigenous people to work together and develop a better future. This idea implies that gaining knowledge and

⁸ Liyin He et al., "Marked Impacts of Pollution Mitigation on Crop Yields in China," *Earth's Future* 10, no. 11 (2022)

⁹ Ibid.

¹⁰ EEA, "Impacts of Air Pollution on Ecosystems," European Environment Agency, last modified November 23, 2022.

¹¹ Jing Huang et al., "Health impact of China's Air Pollution Prevention and Control Action Plan: an analysis of national air quality monitoring and mortality data," *The Lancet Planetary Health* 2, no. 7 (2018).

¹² Lu "Spatial variation in biodiversity loss across China under multiple environmental stressors," 6.

¹³ Peng Yin et al., "The effect of air pollution on deaths, disease burden, and life expectancy across China and its provinces, 1990–2017: an analysis for the Global Burden of Disease Study 2017," *The Lancet Planetary Health* 4, no. 9 (2020).

¹⁴ WHO, "7 Million Premature Deaths Annually Linked to Air Pollution."

¹⁵ Adrian Muller, "Organic Farming, Climate Change Mitigation and Beyond | FAO," last modified 2016.

¹⁶ Ibid

¹⁷ J. Watson, "How to Build a Resilient Future Using Ancient Wisdom," TED: Ideas Change Everything, accessed May 27, 2024.

implementing ecological conservation methods of traditional and sustainable societies can be beneficial. It has been pointed out that the increased urban population has significantly distorted land resources.¹⁸ This has reduced water quality and soil health due to nasty emissions. Since urbanization exerts a lot of pressure on resources such as water and land, their utilization must be balanced, satisfying both the economic and the ecological systems. Employing counter-urbanization policies will make preventing the high demand for natural resources in urban places easier. It can act as a catalyst in ensuring that some of the natural resources are conserved and develop measures to undertake sustainable practices.¹⁹

Furthermore, it should be noted that counter-urbanization is a promising factor in the development of regional equality. This imbalance has persisted for years because China's economic growth has centered mainly on the large coastal cities. In this manner, counter-urbanization can contribute to the regeneration of less-favored areas by tapping into the potential of those places and offering better living standards.²⁰ It can empower the consequent creation of jobs and the development of such thriving secondary and tertiary sectors there. This can, in return, help bridge the urban-rural issues and foster more equitable growth throughout the country. Counter-urbanization could also rekindle an integral part of Chinese culture and the principles of a traditional lifestyle. People may also be willing and able to return to rural areas and embrace and practice traditional culture, music, and art, which modern modernization trends have eroded.²¹ This trend may thus help preserve China's diverse cultural heritage and increase awareness of the country's preserved countryside beauty in a more natural way.

In recent years, China has begun fighting air pollution by reducing emissions of pollutants. Research shows that Sydney also took on a similar approach and managed to minimize the damage to the population's health.²² Though the Three-Year Action Plan shows excellent initiative, counter-urbanization policies have not managed to become mainstream. Critics argue that counter-urbanization policies may result in the loss of economic growth and reduce job opportunities in urban areas. To counter this argument, Lindgren claimed that counter-urbanization actually includes increasing employment opportunities, especially for those who relocate from metropolitan areas to rural areas.²³ The problem lies in the stigmatization of downgrading by moving to a less urban area. However, in Tokyo, most companies have been moving to lower-cost areas due to the recent industrial changes.²⁴ To increase economic capital, investments in rural areas can bring many opportunities and jumpstart small business creations. Eli Feinerman also supports the idea that counter-urbanization can positively impact the welfare of rural regions through improved education and health facilities.²⁵ Thus, counter-urbanization policies could optimize residents towards a better life and increased income: a win-win scenario. In particular, most children living in urban areas suffer from Nature deficit disorder, which counter-urbanization can

¹⁸ Richard Broome et al., "The Health Benefits of Reducing the Air Pollution Health Burden in Sydney, Australia," ISEE Conference Abstracts 2014, no. 1 (2014)

¹⁹ Keith H. Halfacree and María J. Rivera, "Moving to the Countryside ... and Staying: Lives beyond Representations," *Sociologia Ruralis* 52, no. 1 (2011).

²⁰ C. Herrero-Jáuregui and E. D. Concepción, "Effects of counter-urbanization on Mediterranean rural landscapes," *Landscape Ecology* 38, no. 12 (2023).

²¹ Rina Ghose, "Big Sky or Big Sprawl? Rural Gentrification and the Changing Cultural Landscape of Missoula, Montana," *Urban Geography* 25, no. 6 (2004).

²² Broome, "The Health Benefits of Reducing the Air Pollution Health Burden in Sydney, Australia," 3.

²³ U. Lindgren, "Counter-Urban Migration in the Swedish Urban System," *Simple Search*, last modified 2002.

²⁴ *Ibid*, 30

²⁵ Feinerman, "Impact of Counter-Urbanization on Size, Population Mix, and Welfare of an Agricultural Region," 1033.

help eradicate. In research conducted by Haartsen and Sochdale, people who have moved to rural areas have noticed significantly better health among their children.²⁶

Another claim put forward by critics of counter-urbanization policies is that cities are already working alongside nature. For instance, an evolutionary ecologist claimed that cities are nature.²⁷ While it is true that cities use nature for natural sources and try to coexist with nature, cities are still, in essence, materials derived from nature. Coexistence is always a possibility and is related by virtue. However, to claim both as nature is far-fetched. Cities will always utilize and exploit natural resources, and conversations about air pollution will always be at the forefront of public concern. There is also the fear that counter-urbanization may affect the rural pastoral atmosphere primarily through their modern preferences. This includes construction and the disregard for historical and cultural charms.²⁸

Conclusion

The research analyzes the importance of China's biodiversity and preservation policies. By understanding the most densely populated country in the world, further discussions leading to cleaner air and open opportunities for economic reform in line with the Environmental and Sustainability Goals will be invaluable. The data surrounding air pollution in China has shown the lows of degradation of natural habitats and health consequences and the highs of worthwhile policies to tackle these challenges. If people acknowledge the significance of biodiversity for long-term ecological sustainability through research and awareness, then change is possible. Counter-urbanization is one of many diverse strategies to help alleviate these impacts by decreasing urban population density. It encourages sustainable development practices, reviving the agricultural job market and preserving natural resources. Although counter-urbanization policies can have adverse effects in the short-term, prioritizing the well-being of people and biodiversity in the long run is crucial in balancing the detrimental impact.

Acknowledgments

I would like to thank my advisor for the valuable insight provided to me on this topic.

References

- Broome*, Richard, Neal Fann, Tina Navin, Charles Fulcher, and Geoff Morgan. "The Health Benefits of Reducing the Air Pollution Health Burden in Sydney, Australia." *ISEE Conference Abstracts* 2014, no. 1 (2014). doi:10.1289/isee.2014.o-312.
- Chu, Vivian H., Winnie W. Law, and Jessica M. Williams. "Advocacy coalitions in rural revitalisation: The roles of policy brokers and policy learning." *Environmental Science & Policy* 136 (2022), 9-18. doi:10.1016/j.envsci.2022.05.006.
- EEA. "Impacts of Air Pollution on Ecosystems." European Environment Agency. Last modified November 23, 2022. <https://www.eea.europa.eu/publications/air-quality-in-europe-2022/impacts-of-air-pollution-on-ecosystems>.

²⁶ Tialda Haartsen and Aileen Stockdale, "S/elective belonging: how rural newcomer families with children become stayers," *Population, Space and Place* 24, no. 4 (2017).

²⁷ M. Sant and P. Simons, "The Conceptual Basis of Counterurbanization: Critique and Development," *Australian Geographical Studies* 31, no. 2 (2005)

²⁸ Yu, "The emergence of counter-urbanization in China: Can it be a pathway for rural revitalisation?"

- Feinerman, Eli, Israel Finkelshtain, Anat Tchetchik, and Mordehai Delgo. "Impact of Counter-Urbanization on Size, Population Mix, and Welfare of an Agricultural Region." *American Journal of Agricultural Economics* 93, no. 4 (2011), 1032-1047. doi:10.1093/ajae/aar027.
- Ghose, Rina. "Big Sky or Big Sprawl? Rural Gentrification and the Changing Cultural Landscape of Missoula, Montana." *Urban Geography* 25, no. 6 (2004), 528-549. doi:10.2747/0272-3638.25.6.528.
- Haartsen, Tialda, and Aileen Stockdale. "S/elective belonging: how rural newcomer families with children become stayers." *Population, Space and Place* 24, no. 4 (2017). doi:10.1002/psp.2137.
- Halfacree, Keith H., and María J. Rivera. "Moving to the Countryside ... and Staying: Lives beyond Representations." *Sociologia Ruralis* 52, no. 1 (2011), 92-114. doi:10.1111/j.1467-9523.2011.00556.x.
- He, Liyin, Jing Wei, Yuan Wang, Quanbiao Shang, Junjie Liu, Yi Yin, Christian Frankenberg, Jonathan H. Jiang, Zhanqing Li, and Yuk L. Yung. "Marked Impacts of Pollution Mitigation on Crop Yields in China." *Earth's Future* 10, no. 11 (2022). doi:10.1029/2022ef002936.
- Herrero-Jáuregui, C., and E. D. Concepción. "Effects of counter-urbanization on Mediterranean rural landscapes." *Landscape Ecology* 38, no. 12 (2023), 3695-3711. doi:10.1007/s10980-023-01756-1.
- Huang, Jing, Xiaochuan Pan, Xinbiao Guo, and Guoxing Li. "Health impact of China's Air Pollution Prevention and Control Action Plan: an analysis of national air quality monitoring and mortality data." *The Lancet Planetary Health* 2, no. 7 (2018), e313-e323. doi:10.1016/s2542-5196(18)30141-4.
- Lindgren, U. "Counter–Urban Migration in the Swedish Urban System." Simple Search. Last modified 2002. <https://www.diva-portal.org/smash/get/diva2:149524/FULLTEXT01.pdf>.
- Lu, Yonglong, Yifu Yang, Bin Sun, Jingjing Yuan, Minzhao Yu, Nils C. Stenseth, James M. Bullock, and Michael Obersteiner. "Spatial variation in biodiversity loss across China under multiple environmental stressors." *Science Advances* 6, no. 47 (2020). doi:10.1126/sciadv.abd0952.
- Muller, Adrian. "Organic Farming, Climate Change Mitigation and Beyond | FAO." Last modified 2016. <https://www.fao.org/family-farming/detail/en/c/1007298/>.
- Sant, M., and P. Simons. "The Conceptual Basis of Counterurbanization: Critique and Development." *Australian Geographical Studies* 31, no. 2 (2005), 113-126. doi:10.1111/j.1467-8470.1993.tb00409.x.
- Watson, J. "How to Build a Resilient Future Using Ancient Wisdom." TED: Ideas Change Everything. Accessed May 27, 2024. https://www.ted.com/talks/julia_watson_how_to_build_a_resilient_future_using_ancient_wisdom?language=en
- WHO. "7 Million Premature Deaths Annually Linked to Air Pollution." World Health Organization (WHO). Last modified March 25, 2014. <https://www.who.int/news/item/25-03-2014-7-million-premature-deaths-annually-linked-to-air-pollution>.
- Yin, Peng, Michael Brauer, Aaron J. Cohen, Haidong Wang, Jie Li, Richard T. Burnett, Jeffrey D. Stanaway, et al. "The effect of air pollution on deaths, disease burden, and life expectancy across China and its provinces, 1990–2017: an analysis for the Global Burden of Disease Study 2017." *The Lancet Planetary Health* 4, no. 9 (2020), e386-e398. doi:10.1016/s2542-5196(20)30161-3.
- Yu, Li, Yiran Wang, and Mo Li. "The emergence of counter-urbanization in China: Can it be a pathway for rural revitalisation?" *Habitat International* 144 (2024), 102998. doi:10.1016/j.habitatint.2023.102998.
- Zhao, Chang, and Bing Wang. "How does new-type urbanization affect air pollution? Empirical evidence based on spatial spillover effect and spatial Durbin model." *Environment International* 165 (2022), 107304. doi:10.1016/j.envint.2022.107304.