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HONG KONG HAZE

Air Pollution as a Social Class Issue

Rachel E. Stern

Abstract

Preliminary data show that Hong Kong's poor suffer increased exposure to air pollution. People in lower-class areas may be up to five times as likely to be hospitalized for respiratory illness as their counterparts in high-income areas. In addition, variation in household income may explain up to 60% of Air Pollution Index (API) variation between districts. Despite this, air pollution has not been seen as a class issue because of the invisibility of Hong Kong's poor, the nature of environmental activism, and a relative lack of class tensions.

Two of Asia's most significant trends are deepening income inequality and increasing environmental degradation. Yet, these two trends are often examined separately, as parts of entirely different spheres. Using air pollution in Hong Kong as a case study, this article argues that environmental issues and social class are intimately intertwined. Environmental burdens, such as air pollution, disproportionately affect the poor. Social class—who is generating pollution and who is affected—also determines how environmental issues are perceived and addressed. However, little combined analysis of social class and the environment exists outside the United States. Hong Kong's struggle to improve air quality in the post-handover period provides an unusual opportunity to examine the relationship between social class and the environment in Asia.

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Recent Trends Concerning Class and the Environment in Asia

Until the 1997 Asian financial crisis, Asia's lower classes were largely ignored by those academics, journalists, and policy makers who focused on Asia's economic growth. Between 1965 and 1990, East Asia (China, Taiwan, Hong Kong, Japan, South Korea, and Mongolia) grew faster than any other region in the world. This economic growth generated a new Asian middle class characterized by conspicuous consumption. In the 1990s, the international media was filled with stories about Asia's new rich and their "sexy" consumption patterns. The *Financial Review* described a Malaysia where the new rich "drive BMWs and Mercedes, ride Harleys, punch data into laptop computers . . . visit Paris and pay for it all on platinum Visa cards and large salaries."[1]

When the financial crisis arrested Asia's extraordinary economic growth, attention turned to some of the disturbing trends accompanying economic expansion. Economic growth was accompanied by rising Gini coefficients, indicating expanding income inequality, particularly in Hong Kong, Thailand, Malaysia, and the Philippines.[2] In some cases, these income inequalities generated class tensions, many of which surfaced in the 1990s labor movement. Workers banded together to protest layoffs, International Monetary Fund policies, and low wages, leading one academic to call East Asia "the focal point of the international class struggle."[3]

A general link between economic growth and environmental degradation is well-documented. In Asia, a combination of industrialization, urban growth, and mass consumption has generated air, noise, and water pollution.[4] According to the Asian Development Bank, Asia is now the "most polluted and environmentally degraded" continent in the world.[5] Air pollution is particularly bad. In 2000, 12 of the 15 cities with the world's worst air pollution were in Asia.

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1. *Financial Review*, October 2, 1995, quoted in *Culture and Privilege in Capitalist Asia*, ed. Michael Pinches (London: Routledge, 1999), p. 27.

2. As measured by Gini coefficients, all three of these countries are characterized as "high inequality." Between 1978 and 1998, Gini coefficients rose even in some of Asia's "low inequality" countries. See Nancy Birdsall and Stephan Haggard, *After the Crisis: The Social Contract and the Middle Class in East Asia* (Washington D.C.: Carnegie Endowment for International Peace, 2000), pp. 11–14.

3. David McNally, "Globalization on Trial: Crisis and Class Struggle in East Asia," in *Monthly Review* 50:4 (September 1998).

4. For a case study linking consumption and environmental degradation, see Ji-Hyun Kim, "Changes in Consumption Patterns and Environmental Degradation," in *Structural Change and Economic Dynamics* 13:1 (March 2002).

5. McNally, "Globalization on Trial," p. 4.

There is very little analysis linking income inequality, class tension, and environmental degradation. On an intrastate level, most of the academic research on these issues has been done in the United States, under the rubric of environmental justice. Environmental justice is the claim that environmental burdens—toxic waste sites, polluted air and water, dirty jobs, under-enforcement of environmental laws—fall disproportionately on poor and minority communities. On an international systems level, scholars have noted a flow of garbage, toxic waste, DDT, and hazardous products from richer countries to poorer ones. In Asia, for example, in August 2000, the Taiwanese government approved the renewal of a contract between Taiwan Power Company and North Korea, under which North Korea receives 200,000 barrels of nuclear waste in exchange for $300 million. The contract sparked concern about Asian neo-colonialism.

Air Pollution in Hong Kong

For the 2002 edition of its guide to Hong Kong and Macau, *Lonely Planet* changed its cover from a brightly colored temple to a bleak photo of the Bank of China building, silhouetted against a hazy sky. Inside, the guide warns visitors with respiratory conditions to consider "dangerously high levels of particulate matter and nitrogen dioxide" when planning to stay "for a prolonged period, particularly in summer."[6] The warning marks international recognition of Hong Kong's long-time air pollution problem.

Particulate pollution in Hong Kong currently stands at 54 μg/cubic meter, more than twice the level of any U.S. city. Particulate levels are even higher in Hong Kong's crowded downtown areas, in 2000 averaging 66 μg/cubic meter in Central, the downtown business district, and 101 in Causeway Bay, a busy shopping area. According to some estimates, 2,000 people per year die prematurely from air pollution in Hong Kong. Lost lives also translate into lost dollars; medical costs and lost productivity from air pollution cost Hong Kong HK $3.8 billion (US$487 million) a year.[7]

Air pollution is not a new problem in Hong Kong. As early as 1966, the governor set up a committee to study air pollution generated by industry and motor vehicles. Still, despite historical concerns, in the 1990s, air quality deteriorated markedly. From 1991 to 2000, ozone levels increased by 39% and nitrogen dioxide levels by 26%. Perhaps most important, the number of poor-visibility days tripled, raising public awareness of the problem.[8] In an

6. *Hong Kong and Macau* (London: Lonely Planet, 2002), p. 23.

7. Citizen's Party, *Clearing the Air—Still a Long Way to Go* (Hong Kong: Citizen's Party, 2000), p. 13.

8. Hong Kong Environmental Protection Department, *Executive Summary, Study of Air Quality in the Pearl River Delta Region* (Hong Kong: Environmental Protection Department, 2002), p. 2.

April 2000 survey, only 5% of residents said that they were not worried about air pollution, while 48% said that they were "very" worried.[9]

The recent crisis in air quality comes at a crossroads in Hong Kong history. Following its return to China in 1997, Hong Kong has been struggling to retain its status as a world-class city and the financial capital of East Asia. There is widespread concern about competition from Guangdong and Shanghai, rising economic stars and beacons for foreign direct investment. In the fight to maintain a competitive edge, air quality has taken on increased importance.

Sources of Pollution

With its hilly terrain, narrow streets, and towering skyscrapers, Hong Kong's topography traps air pollution. The primary source of street-level air pollution in urban Hong Kong is vehicles. In 1999, motor vehicles generated 58% of Hong Kong's particulate emissions. Part of the problem is the number of private cars fueled by petroleum products. A 2000 examination of 33 gasoline-fueled vehicles uncovered 27 exceeding emissions limits.[10] However, most vehicle pollution can be traced to commercial diesel vehicles. Diesel vehicles are responsible for 75% of nitrogen oxide (NOx) emissions and 98% of respirable suspended particulate (RSP) emissions.[11] Legally, drivers are only permitted to use Ultra-Low Sulphur Diesel (USLD) that, compared to high-sulphur diesel, generates relatively low emissions. However, there is a flourishing black market in high-sulphur diesel illegally siphoned off from industry.[12] This black market has undermined attempts to clean up diesel emissions.

Recognizing the problem posed by motor vehicle emissions, the Hong Kong government has taken steps toward introducing cleaner fuels and vehicles. The government set 2007 as the deadline for all diesel taxis to convert to Liquefied Petroleum Gas (LPG), a less-polluting alternative. To facilitate the conversion, each taxi is eligible for a grant of HK$40,000 (US$5,100).

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9. Hong Kong Transition Project, *Reform: Hong Kong's Version of "One Country, Two Systems" and China's Path to Unification* (Hong Kong: Hong Kong Baptist University, 2000), p. 35.

10. Felix Chan, "Cars Fail Smoke Test," *South China Morning Post,* June 15, 2000, p. 4.

11. "Nitrogen oxides" is an umbrella term encompassing nitrogen oxide and nitrogen dioxide. Hong Kong Environmental Protection Department, *Cleaning the Air at Street Level*, July 25, 2002, <http://epd.gov.hk/epd/english/environmentinhk.air/prob_solutions/cleaning_air_atroad.html>.

12. ULSD replaced regular diesel at filling stations after a tax concession introduced in 2000 made it cheaper than regular diesel. However, illegal high-sulphur diesel is even cheaper than USLD. In 1999, Hong Kong Customs seized 8.3 million liters of illegal diesel.

As a result of the scheme, 80% of taxis had switched to LPG by 2001.[13] In November 2001, the government introduced a similar financial incentive to encourage owners of minibuses to convert to LPG voluntarily.

The net effect of these initiatives is not yet clear. The number of times that short-term Air Quality Objectives (AQOs), a set of non-binding standards, has been unmet has decreased 45% since 1999. The Environmental Protection Department (EPD) attributes this drop to cleaner vehicles. It is not clear, however, that air quality has improved. In July 2002, the Air Pollution Index (API) hit 170, a new high.[14]

Power stations, operated by China Light and Power (CLP) and Hongkong Electric, are another major source of Hong Kong's air pollution. While both companies have installed cleaner technology such as scrubbers, rising electricity demand has made it difficult to reduce overall emissions. In 1999, power stations emitted 48.6% of all particulate pollution in Hong Kong, a significant contribution to overall air pollution.

Other than motor vehicles and power stations, the third major source of air pollution is cross-boundary emissions from southern China. It was long taken as a shibboleth that much of Hong Kong's air pollution originates in the Mainland, particularly in the winter, when prevailing winds from the north and west blow Guangdong's emissions toward Hong Kong. Shortly after her June 2002 appointment, Sarah Liao, the secretary for Environment, Transport and Works claimed that 90% of Hong Kong's air pollution comes from the Mainland, a reflection of this prevailing view.[15] However, the actual dynamics of cross-border air pollution are unclear. A recent study by Mainland scientists in fact claims that Hong Kong transmits more sulfur dioxide to the Mainland than vice versa.[16] Without scientific certainty, confusion about the extent of cross-border air pollution makes it easy to blame the Mainland for poor air quality.

Still, regardless of the actual amount of cross-boundary air pollution, both the Hong Kong and Guangdong governments have recognized it as a major problem. After the April 2002 publication of a joint study on regional air pollution, both governments agreed to cut sulfur dioxide (SO_2) emissions by 40%, nitrogen oxides (NOx) emissions by 20%, respirable suspended particu-

13. Hong Kong Environmental Protection Department, *Environment 2002*, <http://www.info.gov.hk/epd/misc/ehk02/textonly/en/ch3/index03.html>, accessed September 12, 2002.

14. The API ranges from 0–500. First, a sub-index is calculated for each individual pollutant, based on the concentration of the pollutant as compared to the AQOs. The highest sub-index becomes the overall API for the monitoring station.

15. Alyssa Lau, "Firms Could Buy Pollution Solution," *South China Morning Post*, July 5, 2002, p. 6.

16. Cheung Chi-fai, "Pollutants Said to Blow over Border from Hong Kong," ibid., April 17, 2003, p. 7.

lates (RSPs) by 55%, and volatile organic compounds (VOCs) by 55% before 2010.

On the Guangdong side, two of the major culprits are the energy sector and industry. In 1996, the electric power industry accounted for 68% of Guangdong's total sulfur dioxide emissions, causing acid rain as well as air pollution.[17] Guangdong industry is also responsible for an incredible 60% of regional RSP emissions.[18] As in Hong Kong, motor vehicles are the other major source of air pollution; they emit 80% of Guangdong's nitrogen dioxide and 90% of its carbon monoxide.[19]

Air Pollution as a Social Class Issue

"Air pollution is a poor man's issue."
—Ahmad Safrudein

Various studies lend credence to Safrudein's words.[20] Respiratory diseases associated with air pollution disproportionately affect the poor. For example, asthma, a disease linked to air pollution, has long been a leading killer of inner-city youth. In 1971, the U.S. Council on Environmental Quality overlaid air pollution maps with U.S. census data, and found that the richest income group suffered 40–45% less exposure to air pollution than the poorest income group.[21] In the Los Angeles air basin, more than 71% of African-Americans and 50% of Latinos live in areas with highly polluted air, while only 34% of whites live in highly polluted areas.[22] The World Bank uncovered a similar correlation between wages and RSP levels in Asia. High-in-

17. Christine Huang, U.S. Department of Commerce, *Market Assessment of Guangdong,* <http://strategis.ic.gc.ca/SSG/dd78196e.html>, accessed August 6, 2000.

18. Hong Kong Environmental Protection Department, *Study of Air Quality in the Pearl River Delta Region* (Hong Kong: Environmental Protection Department, 2002), chapter 3. The production of non-metallic mineral products and manufacturing generate the majority of industrial emissions. More detailed data on sources of air pollution in Guangdong are difficult to obtain. Huang and the 2002 EPD report are the two best sources, but both are outdated. In both reports, statistics on sources of air pollution in Guangdong date from 1996–97 (the EPD report uses 1997 as a baseline year).

19. Huang, *Market Assessment of Guangdong*.

20. Wahana Lingkungan Hidup Indonesia, Indonesian Forum for Environment (WALHI) is an Indonesian environmental non-governmental organization (NGO). Ahmad Safrudein, director, interviewed by author, September 9, 2000, Jakarta.

21. There are several contradictory studies that say income is negatively correlated with pollution, but most researchers agree that there is a connection between exposure to air pollution and class status. For a discussion of the controversy as well as information on the 1971 Council on Environmental Quality study, see Michel Gelobster, *Race, Class and Outdoor Air Pollution: The Dynamics of Environmental Discrimination from 1970–1990* (Ph.D. dissertation, University of California, 1993), pp. 16–17.

22. Robert D. Bullard, "Environmental Justice for All," in *Unequal Protection,* ed. Robert D. Bullard (San Francisco: Sierra Club Books, 1994), p. 13.

come Chinese cities had lower air pollution rates than their low income counterparts.[23]

Despite this intriguing correlation, there is little research linking social class and air pollution in Asia. In particular, no one has used the city as a unit of analysis. Researchers have tacitly assumed that everyone breathes the same air, creating uniform exposure to air pollution regardless of class. This is true in terms of the macroenvironment, but air pollution in *microenvironments*—within people's kitchens, their offices, their neighborhoods—differs greatly. Everyone does *not* breathe the same air. Hong Kong's poor both suffer increased exposure to air pollution and bear a heavy share of the economic costs of poor air quality. As Angela Spaxman, former chair of Clear the Air, a non-profit devoted to improving air quality in Hong Kong, said, "[Hong Kong's] poor are the ones most affected by air pollution."[24]

Residential Zoning Patterns and Air Pollution

Residential zoning patterns are the most-studied source of differential exposure to air pollution. In general, low air pollution levels tend to be a draw for the rich. Both Chief Executive Tung Chee-hwa and Chief Secretary for Administration Donald Tsang live in Deep Water Bay, an exclusive beach-front suburb described as a "green setting," providing "a tranquil lifestyle for the elite."[25] The cost of a "green setting" is, of course, high. Houses and apartments in Deep Water Bay begin at HK$13.5 million (US$1.6 million). In contrast, Mongkok, a high density low-to-middle-class neighborhood in the heart of Kowloon, has some of Hong Kong's highest pollution readings.

The difference in air quality between Deep Water Bay and Mongkok can be partially attributed to population density. High-density living, as in Mongkok, means more stoves, more vehicles, and more air pollution. Research has shown a close relationship between population density and air pollution. In 1960s industrial England, for example, researchers found that population density affected rates of chronic bronchitis, a disease linked to air pollution.[26]

In Hong Kong, a 1989 study of two groups of primary school children investigated the correlation between air pollution and neighborhood income.

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23. World Bank, *Clean Water, Blue Skies* (Washington, D.C.: World Bank, 1997), p. 62.

24. Angela Spaxman, chairperson of Clear the Air, interviewed by author, September 22, 2000.

25. Arun Sudhaman, "Rich and Famous Head for the Hill," *South China Morning Post,* October 15, 2000, p. 6.

26. J. L. Girt, "Simple Chronic Bronchitis and Urban Ecological Structure," in *Medical Geography: Techniques and Field Studies*, ed. N. D. McGlashan (London: Methuen, 1972). Girt also found that the prevalence of chronic bronchitis was markedly higher among low-income individuals.

One group was from Kwai Tsing district, the other from Southern district. At that time, Southern district was a far wealthier area, as measured by unemployment rates, education level, and size of living quarters. Southern district also had better air quality. Kwai Tsing had higher levels of nitrogen oxides, particulate pollution, and sulfur dioxide, primarily due to the presence of 8,000 factories that manufactured products as diverse as clothes, enamels, and electronics. As a result, for 11 of 15 symptoms, primary school children in Kwai Tsing had a far higher prevalence of upper and lower respiratory symptoms than did their richer Southern counterparts.[27]

Building on the Southern district/Kwai Tsing study, Table 1 shows data for monthly household income and the annual ambient API for eight Hong Kong districts in 2000 and 2001. A simple correlation test between API average and monthly household income reveals a correlation coefficient of -.059 in 2000, and -0.61 in 2001. These numbers are the first attempt to examine the link between air pollution and social class in Hong Kong. Simply put, they show that poorer neighborhoods also suffer higher levels of air pollution. While the data are not conclusive, they are highly suggestive. Averaging the correlation coefficient for the two-year variation in monthly household income explains roughly 60% of the variance in API average among districts.

This correlation is compelling enough to demand further study. This data set only includes two years because, previous to 1999, the EPD did not report data for individual stations. An aggregate API was released for "urban," "industrial," and "new development areas." 1999 was not included because household income data was not readily available. Future studies could procure income data for 1999 and could set up independent monitoring stations to compare pollution levels in selected low-income and high-income areas.

Looking beyond the neighborhood into the Hong Kong home, it is even clearer that residential exposure to air pollution varies with income. In an indoor environment, a high proportion of total suspended particulates (TSPs) comes from smoking, incense burning, and cooking. The presence of smoking or incense burning increases the mean TSP concentration by 26%, while cooking has a significant impact on nitrogen oxide levels.[28] In smaller homes, the impact of any point source of air pollution—smoking, cooking, or incense burning—is increased because there is less room for dispersion. As a result, smaller, lower-class homes are vulnerable to high indoor air pollution.

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27. S. G. Ong, J. Lui, et al., "Studies on the Respiratory Health of Primary School Children in Urban Communities of Hong Kong," in *The Science of the Total Environment* 106 (1991), p. 128.

28. Thomas C. W. Tung, Christopher Chao, et al., "A Territory Wide Survey on Indoor Particulate Level in Hong Kong," in *Building and Environment* 34 (March 1998), p. 213. Also Christopher Chao and Anthony Law, "A Study of Personal Exposure of Nitrogen Dioxide Using Passive Samplers," in *Building and Environment* 34 (March 1998), p. 545.

TABLE 1 *Annual API and Monthly Household Income, Hong Kong*

	API Average (2000)*	*Monthly Household Income by District** (2000)*	*API Average (2001)*	*Monthly Household Income by District (2001)*
Central/western (HK)	43	24,000	46	24,800
Eastern (HK)	39	25,000	41	22,000
Kwun Tong (K)	45	15,000	50	15,000
Sham Shui Po (K)	46	14,100	48	13,500
Kwai Chung (NT)	48	15,500	48	15,000
Sha Tin (NT)	40	19,000	43	20,000
Tai Po (NT)	40	17,000	43	18,100
Tsuen Wan (NT)	44	21,000	46	20,000

SOURCE: Hong Kong Environmental Protection Department, *Daily Summary of Hourly Air Pollution Index 2001 and 2001,* <http://202.85.169.232/cgi-bin/epd/api/apie_past.pl> [accessed April 23, 2002].

NOTE: (HK = Hong Kong Island K = Kowloon NT = New Territories)

*This API average represents data from EPD general monitoring stations. Data from roadside stations were not used because there are only three roadside stations—located in Central, Mongkok, and Causeway Bay—and not a sufficient range of household incomes. Yuen Long, Tap Mun, and Tung Chung were excluded from the data set either because (1) there were no data for household income in the area or (2) the author did not consider them to be part of urban Hong Kong. Isolated monitoring stations were excluded because the author wanted to examine the relationship between air pollution and class in a densely populated urban center.

** Hong Kong Census and Statistics Department, *Domestic Households by District Council District and Monthly Household Incomes 2000* and *Domestic Households by District Council District and Monthly Household Incomes 2001*. Data provided to the author on April 4, 2002, and April 11, 2002.

The residents of these homes are doubly vulnerable because lower-class families are likely to do the cooking themselves, instead of hiring a cook or eating out.[29]

Finally, indoor air pollution levels correspond to outdoor particulate levels, particularly when windows are opened frequently. In lower-class homes without air conditioners, the windows are often open, particularly in the summer, increasing levels of indoor air pollution.

29. Smoking, another point source of indoor air pollution, is also associated with class. Brookes (1997) reports that only 23% of Hong Kong's 740,000 smokers are managers and professionals, a broad category that indicates relative privilege. See Janet Rae Brooks, "In Hong Kong, Smokers Are Butting Out in Record Numbers," *Canadian Medical Association Journal* 156:10 (May 15, 1997), pp. 1441–43.

Work Place Exposure to Air Pollution

Air quality in the work place is the other main source of differential exposure to air pollution. The most vulnerable group is outdoor workers, such as vendors and construction workers.[30] In terms of particulate concentration, indoor air tends to be cleaner than outdoor air.[31] In large buildings, indoor air is usually filtered through an air conditioner, removing dust and larger particulates.[32] Outdoor workers must breathe street air all day and bear the resulting health risks. Two-thirds of outdoor workers have symptoms related to air pollution including asthma, throat irritation, and eye/nasal allergies. Outdoor workers recognize the poor quality of their air. Fifty percent describe it as "bad" or "very poor."[33]

Two low-income groups deserve special mention: construction workers and drivers. In a comparison of workplace environments, the highest dust particle concentration was found on construction sites.[34] Construction workers are a particularly important group because, as of 1999, they made up 9.2% of the employed work force. In addition, many construction workers are immigrants and have little leverage to improve working conditions. Taxi, minibus, and bus drivers also suffer poor air quality because the highest levels of air pollution are inside vehicles. Drivers, spending all day at the wheel, are exposed to more air pollution than pedestrians.[35]

Health Effects of Air Pollution

As a result of increased exposure to air pollution, Hong Kong's lower classes disproportionately bear the resulting health effects. Table 2 shows data drawn from four hospitals in 2000. Two of the hospitals, United Christian Hospital and Caritas Medical Centre, are located in the two lowest-income districts at the time. The other two hospitals, Queen Mary Hospital and Tung

30. A 2000 survey article on the health effects of air pollution in Hong Kong singled out outdoor workers as a high risk segment of the population. See S. T. Borwein, "The Health Effects of Air Pollution," in *The Hong Kong Practitioner* 22 (2000), p. 177.

31. Indoor air may have increased radon even though it has lower particulate concentrations.

32. Christopher Chao, professor of Mechanical Engineering at the Hong Kong University of Science and Technology, interviewed by author, October 22, 2000.

33. Cheung and Leung's study is one of few measuring exposure to air pollution in the workplace. Unfortunately, they never define "outdoor worker," making it difficult to know who this category encompasses. See K. K. Cheung and Y. C. Leung, "Particulate Problems of Different Occupational Environments in Hong Kong," in *Journal of Environmental Sciences* 11:4, pp. 385–92.

34. Ibid.

35. Borwein, "The Health Effects of Air Pollution," p. 177. It follows that Hong Kong's car owners, mostly middle- and upper-class, are also exposed to high levels of air pollution. However, length of exposure is an important variable. It is far more dangerous to work as a driver than to commute to work in a bus or a car.

TABLE 2 *Rates of Respiratory Illness and Income Differentials*

Hospital	*# of Beds*	*# of Bed Days/Year*	*Total Length of Stay for Respiratory Illnesses (Combined for All Respiratory Illnesses)*	*% of Beds Occupied by Patients with Respiratory Illness*
Queen Mary Hospital (Pokfulam, high income)	1,400	511,000	4,940	.97%
Tung Wah Hospital (Sheung Wan, high income)	707	258,055	288	.1%
United Christian Hospital (Kwun Tong, low income)	1,265	461,725	14,791	3.2%
Caritas Medical Centre (Shamshuipo, low income)	1,172	427,780	8,395	1.96%

SOURCE: Hong Kong Hospital Authority. Data provided to the author on May 14, 2002.

Wah Hospital, are located in the highest-income district. Efforts were made to choose four medium to large hospitals with a roughly equivalent number of beds. The two high-income hospitals have a combined total of 2,109 beds, while the two low-income hospitals have 2,437 beds. For all four hospitals, data was obtained on the number of cases of Acute Upper Respiratory Infection (AURI), acute bronchitis/bronchiolitis, and chronic/unspecified bronchitis. All of these respiratory illnesses are widely regarded as linked to exposure to air pollution.

Data shown in Table 2 reveal a major difference in rates of respiratory illness between high-income and low-income areas. In the low-income districts, respiratory patients occupied an average of 2.6% of the beds, compared to 0.5% in the high-income districts. This difference may be even more dramatic than the numbers indicate, given the probability that low-income people are generally less likely to take a day off work to seek treatment for respiratory illness. The sample size is far too small, but if these data hold for an expanded sample of hospitals, it means that people in lower-class areas are up to five times as likely to be hospitalized for respiratory illness as their counterparts in high-income areas.

The data are preliminary, but they suggest an association between income level and rates of respiratory illness that deserves further explanation. The first step in any future research should clearly be expansion of the sample size, both in terms of the number of hospitals included and the time frame examined. In this data set, Tung Wah Hospital reported very few cases of respiratory illness, leading to concern that it may be an outlier. Analysis of

this data set is also based on the assumption that patients with respiratory illness go to the hospital nearest their home. Future research may want to question this assumption and see how many patients choose to travel for treatment.

Class and Air Pollution Generation

Generation of air pollution is a function of class. Through ownership of cars, industry, and power plants, Hong Kong's rich generate a significant portion of overall emissions.

In the 1990s, the main local sources of air pollution were motor vehicles and power generation. In Hong Kong, as elsewhere, emissions from private cars have increased in tandem with rising incomes and the consequent increase in car ownership. Service classes and small proprietors are the two classes that are both most likely to own private cars and to travel overseas, giving some indication of their privilege.[36] Car emissions are forecast to rise still further as cars multiply. By 2010, the total distance traveled by private cars is predicted to double from 42,000 million kilometers to 87,000 million kilometers per year.[37]

Power generation, another important source of emissions, is controlled by two of Hong Kong's wealthiest families. Cheung Kong Infrastructure (CKI), a publicly traded infrastructure company, owns Hongkong Electric. CKI is listed on the Hong Kong stock exchange, but businessman Li Ka-shing owns the majority of shares. One of the most powerful people in Hong Kong, Li was the 20th richest man in the world in 2000. Similarly, the Kadoorie family, one of Hong Kong's oldest and richest families, owns the majority of China Light and Power.

In addition, some cross-border air pollution can be traced to Hong Kong's elite. In the late 1980s and early 1990s, Hong Kong's manufacturers began moving their factories from the then-Crown Colony across the border to Guangdong Province, where they could operate more cheaply. The number of manufacturing establishments in Hong Kong dropped from 50,606 in 1988 to 39,238 in 1993. Although no statistics exist, it is commonly acknowledged that the owners of much of Guangdong's industry, including some of its most polluting enterprises, live in either Hong Kong or Taiwan. Hong Kong companies are responsible for 70.7% of foreign direct investment in Guangdong, a percentage high enough to suggest that some portion of Guangdong's industrial emissions can be traced back to Hong Kong.

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36. Tai-lok Lui and Thomas W. P. Wong, *A Class in Formation: The Service Class of Hong Kong*, Hong Kong, Research report submitted to the Chiang Ching-kuo Foundation for International Scholarly Exchange, 1994, p. 73.

37. Hong Kong Environmental Protection Department, *Study of Air Quality in the Pearl River Delta Region*, chapter 4.

Why Isn't Air Pollution Seen as an Environmental Justice Issue?

The study presented here is the first to investigate a link between social class and exposure to air pollution in Hong Kong. While the data are not conclusive, Hong Kong's air pollution fits the definition of an environmental justice issue even at this early stage: it is an environmental burden that falls disproportionately on low-income individuals. If Hong Kong's air pollution *is* an environmental justice issue, why hasn't it been framed as one?[38] In other parts of Asia, NGOs have combined environmental issues with advocacy for social equity, human rights, and democratization. In the 1960s and 1970s, for example, Christian communities in the Philippines often promoted environmental conservation together with social justice. In the present case, there are three main reasons why air pollution has not been seen as an environmental justice issue: the invisibility of Hong Kong's poor, the nature of environmental activism surrounding air pollution, and the relative lack of class tensions in Hong Kong.

The Invisibility of Hong Kong's Poor

To begin, air pollution is not perceived as a poor person's issue because Hong Kong's poor are largely invisible. Owing to a long period of economic expansion, Hong Kong only began to think about poverty in the late 1980s, when the manufacturing sector began to move operations to Guangdong. The number of people employed in manufacturing dropped from 875,250 in 1987 to 508,313 in 1993, leaving many low-skilled workers unemployed. In 1995, Oxfam Hong Kong released a report on poverty calling attention to the economic and political disempowerment of the poor. Coupled with the decline in the manufacturing sector, the report raised awareness of poverty.

Still, air pollution was not perceived as a class issue because awareness of poverty did not translate into a wider consciousness of class. Tai-Lok Lui, a Chinese University of Hong Kong sociology professor, believes Hong Kong has only begun to think of itself as a class-based society in the past four or five years.[39] In part, class never entered the public discourse because Marxism never held much sway in capitalist Hong Kong. The economic growth of the 1960s and 1970s effectively undermined any potential for class conflict. In the 1990s, surveys show that Hong Kongers across class lines still espouse

38. Although air pollution has never been linked to social class, Hong Kong Green groups have occasionally framed other environmental issues in terms of class. In 1999, Greenpeace raised class issues when protesting the siting of an incinerator in Tuen Mun, a working-class community.

39. Tai-lok Lui, professor of Sociology at Chinese University, interviewed by author, October 23, 2000.

a strong belief in capitalism, in terms of equality of opportunity rather than equality of income.[40]

Activism and Air Pollution

In addition, air pollution was not framed as an environmental justice issue because Hong Kong's economic and social elite dominated activism against air pollution. When it comes to environmental activism, this kind of top-down approach is not unusual. In general, Hong Kong's Green Movement has focused on lobbying, consciousness-raising, and environmental education, rather than grassroots mobilization. Its members have mostly used a consensus-building approach rather than an adversarial one, working with government and business.[41]

This strategy is partially dictated by widespread cynicism about politics. In a 1992 survey, 61.2% of respondents agreed that "politics is only a power game for political groups and politicians."[42] The emphasis on consensus-building instead of protest also has particular roots in colonialism. In the 1970s, the British appeased various interest groups (usually business elites) by appointing representatives to consultative bodies.[43] In the 1990s, Hong Kong's government followed a similar strategy with Green groups. The government created organizations like the Advisory Council on the Environment (ACE), incorporating Green groups into the consultative machinery of government. Once granted input in decision making, the groups became more willing to work within the system.

In terms of air pollution, the most recent round of activism began in 1994–95 when Friends of the Earth formed the Air Action Group to lobby for a shift from diesel to gasoline for all vehicles under four tons. At this point, public interest was limited. Air pollution only took off as an environmental issue in 1996–97, when air visibility reached crisis levels. This coincided with the publication of a Friends of the Earth report on the economic costs of air pollution. In business-oriented Hong Kong, the paper attracted a lot of attention.[44]

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40. Lui and Wong, *A Class in Formation: The Service Class of Hong Kong,* p. 91.

41. Stephen Wing-Kai Chiu, Ho-Fung Hung, and On-Kwok LaiHung, "Environmental Movements in Hong Kong," in *Asia's Environmental Movement: Comparative Perspectives,* eds. Yok-shiu F. Lee and Alvin Y. So (New York: M.E. Sharpe, 1999), p. 60.

42. Lui and Wong, *A Class in Formation: The Service Class of Hong Kong,* p. 111.

43. Tai-lok Lui, "The Development of Social Movements in Contemporary Hong Kong," in *Forces from the Margin,* ed. Sophia Woodman (Hong Kong: July 1 Link, 1997), p. 134.

44. Lisa Hopkinson, co-founder of Civic Exchange, interview by author, October 14, 2001. The paper was *What Price Clean Air? The Economic Costs of Air Pollution* (Hong Kong: Friends of the Earth, 1997).

Also in 1997, five wealthy businesswomen, all of whom were either expatriates or had spent a significant amount of time abroad, founded Clear the Air, the only Hong Kong Green group devoted exclusively to air pollution. Clear the Air's statements and policy papers highlight the health risks of air pollution, particularly on children. In 1998, Clear the Air organized a march to put pressure on the government to improve air quality. The march attracted 500 participants, making it one of Hong Kong's largest environmental demonstrations ever.

Business Involvement

Besides environmental NGOs, foreign business has been among the most influential advocates for cleaner air, arguing that deteriorating air quality will hurt tourism and investment. A group of high-powered businesspeople formed the Business Coalition on the Environment in 1999. As Barrie Cook, director of the Coalition, put it:

> If [air quality] is allowed to deteriorate further, it's going to be a major problem for the economy. Companies are very concerned about employees working in a deteriorating environment. They won't want to invest here. They won't want to put people or factories here.[45]

The Business Coalition on the Environment spends the bulk of its time lobbying the government, including private meetings with Chief Executive Tung.

While the Coalition is the largest, most high-profile group, other business organizations are also lobbying for improvements in air quality. In a June 2000 statement, the American Chamber of Commerce wrote that "as a matter of urgency, the Hong Kong government should enforce current air quality standards and introduce new measures, which will result in genuine reductions in air pollution."[46] Two months later, the Swiss Business Coalition in Hong Kong released survey results citing air pollution as a major concern among its members. Some Chinese businesspeople are also vocally concerned about deteriorating air quality. In 1999, Victor Fung, one of Hong Kong's leading businessmen, was quoted as saying that the environment is not an "airy-fairy" issue but rather an important consideration for multinational corporations looking to invest in Hong Kong.[47]

Concerned about competition from the Mainland, the Hong Kong government has taken the potential economic impact of air pollution seriously. Echoing the rhetoric of the business community, Eden Woon, director of the

45. Mark Landler, "Choking on China's Air, but Loath to Cry Foul," *New York Times,* February 19, 1999, p. A-4.

46. American Chamber of Commerce, *Position Paper: Air Quality in Hong Kong*, May 2000, <http://www.amcham.org.hk/archives/position_papers/air-quality-in.pdf >.

47. Louise Lucas, "Poisoning the People," *Asian Business,* March 1999, p. 37.

Hong Kong Chamber of Commerce, calls air pollution "a rice bowl issue," meaning it affects the bottom line.[48] However, the actual extent to which air pollution affects Hong Kong's economy is unclear. There is anecdotal evidence that companies have moved operations and canceled conferences because of air pollution, but one member of the Business Coalition on the Environment calls the connection between air pollution and economics "a bit of a red herring" designed to get public attention. In Hong Kong, an appeal to the bottom line always gets attention, particularly as the Special Administrative Region struggles with rising unemployment rates. The impact on tourism is also unclear. A 2000 survey in the departure hall of Chek Lap Kok airport showed that 70% of visitors to Hong Kong found air quality "acceptable."[49]

The new environmental conscience of Hong Kong business is part of a worldwide trend. In the 1990s, the global movement for corporate responsibility influenced a new generation of Hong Kong businesspeople, a group that tends to be young, well-traveled, and well-aware of developments overseas. Over the past 20 years, Hong Kong has also been transformed from a manufacturing-based economy to a global financial center. A new generation of business leaders is free to speak out about air pollution, because their prosperity no longer depends on the industrial sector. In contrast, old-guard groups still tied to the industrial economy, like the Hong Kong Federation of Industries and the Chinese Chamber of Commerce, are less concerned with air quality.

The only unified lower-class voice in the air pollution debate comes from the transport lobby, a group that routinely opposes more stringent emissions controls on vehicles. In 1995, the Hong Kong government decided to phase out diesel fuel for all vehicles below four tons. Taxi and minibus drivers were concerned about the cost of switching over from diesel. Led by their legislative representative, Miriam Lau, they lobbied the Legislative Council (LegCo), Hong Kong's legislative branch, to defeat the proposal. Concerned about the economic effects of a "drive-slow" protest, LegCo members voted down the diesel phase-out.

The most important reason for lack of lower-class participation in air pollution advocacy is probably the simplest—it was effective and easy to recruit elite support. Hong Kongers are fond of saying, "Money talks in Hong Kong." In addition, Hong Kong's political system, a strange legacy of

48. Peter Wollacott, "There's Something in the Air: Is it Environmentalism?" *Asian Wall Street Journal,* June 26, 2000, p. A-1.

49. Catherine Cheung and Rob Law, "The Impact of Air Quality on Tourism: The Case of Hong Kong," in *Pacific Tourism Review* 5:1-2 (2001), pp. 69–74. Note that this survey was limited in duration. Hong Kong's air pollution varies greatly with the season, so a full-year survey would be necessary to accurately assess what tourists think of Hong Kong's air quality.

colonialism, gives disproportionate power to elites. The most important post in government, the chief executive, is chosen by an 800-member selection committee comprised mostly of business interests.[50] In 2002, this committee re-elected former shipping magnate Tung Chee-hwa, despite his low public popularity. The selection of the chief executive is critical because he has sole responsibility for appointing the Executive Council (ExCo), the group that creates and implements government policy, including environmental policy. The Basic Law, Hong Kong's Constitution, severely limits the power of the legislature. The legislature is not allowed to introduce bills "which relate to public expenditure or political structure or the operation of the government." As a result, LegCo is limited to a reactive role.

Even the legislature is an elite institution. Half of LegCo's 60 seats are elected by functional constituencies. The functional constituencies represent specific sectors, such as transport, tourism, banking, and manufacturing. For the most part, functional constituencies are business and professional elites, Hong Kong's privileged classes. One can even see structural power in action: LegCo's few environmental advocates, like Emily Lau, tend not to represent functional constituencies. They are usually directly elected, and represent the concerns of a broader spectrum of Hong Kong society.[51]

Given this governmental structure, it makes practical sense to recruit elite support for improvements in air quality, rather than rely on grassroots mobilization. One meeting between the Business Council on the Environment and the chief executive is likely more effective than a picket line outside the Legislative Council. Language is also an issue. Two important advocates of improved air quality, Clear the Air and the Business Council on the Environment, run their meetings in English. Only some materials are translated into

50. This close association between business and government reaches back into the colonial period. The amicable relationship between Chinese businessmen and the colonial government was legendary. During a strike in 1925–26, for example, businessmen supported the British government, coordinating anti-strike activities and serving as negotiators. Chinese businessmen supported the British because their power was deeply entrenched in the colonial system. The British created Hong Kong's early monied elite by granting land and monopolies to favored citizens, a pattern of favoritism that continued throughout the life of the colony. This is not to say that the close relationship between business and government is solely the product of colonialism. Cities are economic hubs and their political life is often dominated by business interests. See John Mark Caroll, *Empire's Edge: The Making of Hong Kong's Chinese Bourgeoisie* (Ph.D. dissertation, Harvard University, 1998), p. 201.

51. In 1991, 18 LegCo. members were directly elected. It was the first time any direct election had taken place. The number of directly elected seats increased to 20 in 1995 and to 24 in 2000. In 2000, the remaining six seats were chosen by the same election committee that chooses the chief executive. In the next elections, in 2004, the number of directly elected seats will increase to 30. Under the Basic Law, the eventual goal is universal suffrage (and a phaseout of the functional constituencies), but there is no official timetable.

Chinese, making communication with lower-class Chinese-only speakers difficult.

The Hong Kong Experience: Moving Up and Out

Hong Kong's lower classes are silent on questions of air quality, except to protest initiatives that are an economic burden. To a large extent, this is not surprising. Hong Kong's poor worry about food, housing, and the day-to-day logistics of survival. They do not have the time, energy, or organizational resources to rally public support or exert political pressure. Like many of the world's poor, they are politically disempowered. However, this explanation is simplistic. Political disempowerment is not an insurmountable obstacle to environmental action, particularly if the environmental threat either constitutes a crisis or occurs within a framework of economic deprivation.[52]

The silence of Hong Kong's poor can be partly explained by economic mobility. Hong Kong is characterized by an ideology of success—a belief that hard work leads to achievement.[53] Like the American Dream, the myth of the "Hong Kong experience" features Chinese immigrants who work their way up from rags to riches. An overwhelming 95.2% of Hong Kongers agree with the survey statement that "the job I have now and the standard of living my family is enjoying are mainly due to my efforts."[54] This belief in social mobility comes from historical experience. The Asian economic miracle allowed upward mobility and created hope that each person's turn to move ahead was coming soon.

There were also ample role models for those hoping to make their fortune. Historically, Hong Kong has been or has been perceived as a city of migrants,

52. For example, in Indonesia's Riau Province, the recent separatist movement was partially motivated by environmental concerns. Riau suffers some of Asia's worst air pollution because local landowners illegally clear land for palm oil plantations by burning off the undergrowth. Burning generates a haze so thick that children and the elderly can not go outdoors. Air pollution is coupled with political disempowerment. While Suharto's 1998 removal from power led to greater local autonomy, progress has been slow. Plantation profits go either to Java or Malaysia. In 1999, the Indonesian government collected Rp 5.9 trillion in revenue from Riau, but only funneled one trillion back to the province. In combination, air pollution and economic injustice have fueled support for Riau's separatist movement. Inhabitants of Riau are angry both because they are forced to endure haze from palm oil plantations and because they do not share the resulting profits. Riau shows that air pollution can motivate political action, especially when tied to economic deprivation.

53. The English helped encourage this association between hard work and success. A 1908 book on the "Oriental Mercantile Community" profiles successful Chinese merchants, emphasizing their honesty and industry. Tak Fan Sin, for example, owed his position to "hard work and honest endeavour" while Siu-ki Chau "owes his position entirely to his own initiative." Caroll, *Empire's Edge*, pp. 104–05.

54. Lui and Wong, *A Class in Formation: The Service Class of Hong Kong,* p. 88.

of Chinese who fled the Mainland either to make their fortune or because of political persecution. In 1858, Governor John Bowring noted the success of many exiles from Qing dynasty China, writing, "There can be no doubt of the present opulence of many of the Chinese settlers who came penniless to the Colony."[55] Contemporary examples include the aforementioned Li Ka-shing, a Guangdong immigrant and school dropout who went on to found the Cheung Kong business empire.

It is worth noting that the myth of the Hong Kong experience is only partly true. In Tai-Lok Lui and Thomas Wong's 1992 survey, about 60% of the service classes were newcomers and from lower-class origins. Many of these upwardly mobile newcomers fit the stereotype of the hardworking immigrant. Eighty percent of the new entries to the service classes were born outside of Hong Kong, usually in Guangdong.[56] However, and very importantly, Lui and Wong also found that social mobility was embedded in class inequality. Lower classes are less upwardly mobile. Only 14.6% of respondents whose fathers were manual workers were able to move up to the service classes.[57] This class inequality might lead to lower-class bitterness were it not counterbalanced by a strong sense of fatalism and personal pessimism. The majority of Hong Kongers, particularly those in lower classes, believe that "in every society, some people are bound to be at the bottom and others at the top."[58] Only 12% of respondents believed they had a "great chance" for career development.[59] While Hong Kongers believe in the Hong Kong experience, the poor are pessimistic about their personal chances for success.

Still, relative economic deprivation, the gap between what people have and what they think they deserve, is almost completely absent in Hong Kong because people believe the system is fair. Hong Kongers believe that rags-to-riches stories are possible, particularly if one works hard. There is little resentment toward upper-class polluters—private-vehicle drivers, power plant owners, industrialists—because the poor are willing to wait their turn to move ahead and earn the right to pollute, themselves.[60]

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55. Caroll, *Empire's Edge*, p. 56.

56. Tai-lok Lui and Thomas Wong, *Reinstating Class: A Structural and Developmental Study of Hong Kong Society* (Hong Kong: Social Science Research Centre, Occasional Paper 10, 1992), p. 55.

57. Lui and Wong, *A Class in Formation: The Service Class of Hong Kong,* p. 61.

58. Tai-lok Lui and Thomas W. P. Wong, *Morality, Class and the Hong Kong Way of Life* (Hong Kong: Chinese University of Hong Kong, 1993), p. 20.

59. Ibid., p. 17.

60. In addition, air pollution in Hong Kong is a chronic problem. Although it gets worse during certain seasons, it is omnipresent. When air pollution is an everyday part of people's lives, it loses its urgency as an issue. There is no crisis event and no spark for political action (Bill Barron, professor at the Center for Urban Planning and Environmental Management, University of Hong Kong, interviewed by author, September 24, 2000). In contrast, the haze in Riau

Directions for Further Research

This article is meant as a thought piece, a new way to think about an old problem. The data presented here suggest a link between social class and air pollution that deserves further study and harder numbers. Given the limitations of government data, future studies may wish to set up air pollution monitoring stations independent of the EPD. It would be interesting, for example, to sample both roadside and ambient pollution in various neighborhoods. Roadside air pollution is primarily generated by motor vehicles and likely to be less closely correlated with income level than ambient air pollution.

The best study would take place on the individual level. There are polluted wealthy neighborhoods, like Hong Kong's busy Central business district, just as there are polluted poorer neighborhoods. The true test of the correlation between social class and air pollution is individual exposure to pollutants. To date, studies have focused either on work place exposure or home exposure because it is difficult to calculate individual exposure. However, new technology may make it possible to do exactly that. In an Australian study launched in October 2001 by the Canberra government, volunteers are carrying around monitors the size of a fountain pen to measure personal exposure to air pollution. A similar Hong Kong study would make it possible to draw definitive conclusions about social class and exposure to air pollution. Alternatively, future research could collect data on the income of individual patients, instead of using aggregate hospital data. This would be another way to directly measure the relationship between income level and rates of respiratory illness. However, it would require the cooperation of Hong Kong's Hospital Authority, which currently does not collect income or class data on patients as part of its routine statistics.

Conclusion

As for the future, air pollution and poverty are not going away. In the next decade, Hong Kong's population is forecast to grow 20%, reaching 8.3 million. With such radical population growth, it will be hard to decrease overall levels of air pollution even with stringent cuts in emissions. At the same time, income inequality and the size of the lower class are also growing. The top 20% of Hong Kong's population earns 11.6 times more than the bottom quintile,[61] and Hong Kong's lower class now comprises 16.3% of the popula-

is a seasonal event. Fires usually occur in March and July, during Riau's drier season, when it is easier to burn off undergrowth. The resulting smoke is intense but limited in duration.

61. Asian Development Bank, *Cities Data Book Study* (Manilia: Cities Data Book Workshop, February 15–16, 2001), <http://www.adb.org/Documents/Events/2001/Cities_Data_Book>.

tion, up from 9.5% in 1986.[62] This enlarged underclass means fewer opportunities for social mobility, especially because there is little opportunity for advanced education. Less than 25% of Hong Kong's youth aged 17 to 20 are enrolled in tertiary education, compared to 55% of South Koreans. These trends have led to concerns about resentment and social unrest. In November 2001, Financial Secretary Anthony Leung remarked that he "was a bit concerned with . . . a change in mood. In the past, people did not get jealous about people getting rich. Recently . . . that has changed."[63]

Air pollution and income inequality were the respective themes of Chief Executive Tung's 1999 and 2000 annual policy addresses, speeches similar to the State of the Union in the United States. Clearly, both air pollution and income inequality will remain hot topics. In Hong Kong, as elsewhere in Asia, it is worth further considering how they intersect.

62. Richard Estes, *Social Development in Hong Kong: The Unfinished Agenda* (Hong Kong: Hong Kong Council of Social Service, 2000), p. 5.

63. Editorial, *Hong Kong Magazine*, November 23, 2001.