INDUSTRIAL RELOCATION IN GUANGDONG PROVINCE:
Avoid Repeating Mistakes

January 2012
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Berton Bian
PREFACE AND ACKNOWLEDGMENTS

Civic Exchange’s work on water is one of our major areas of interest because water is fundamental to all aspects of life. Hong Kong and Guangdong share the water’s sources that feed our economic and social activities. The continuing industrial transformation of Guangdong impacts the entire South China region. Civic Exchange accepts that Hong Kong has responsibility to contribute to cleaning up the environment in Guangdong, as our industries have expanded many times by relocating across the boundary since the 1980s, and have caused considerable pollution.

This research paper examines the implication of industrial relocation in Guangdong, the environmental risks involved, and how Guangdong and Hong Kong can collaborate to move forward.

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Christine Loh
Chief Executive Officer

January 2012
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The authors wish to thank their families for their unwavering support. Investigating China’s environment is not only an intellectual challenge but also a physical and emotional trial. The support of our families provides us with the strength to carry on.

LIU Su
BIAN Dao

January 2012

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INTRODUCTION

In the thirty years since the beginning of China's Reform and Open Door policy, the growth and success of Guangdong Province reflects the entire country's growth and success. Likewise, the problems and difficulties facing Guangdong are also those of the entire country. Just as Guangdong is a microcosm of China, the Pearl River Delta (PRD) is in turn a microcosm of Guangdong.

The development bottleneck, and the challenges and limitations faced by the PRD in the effort to replace the old with the new, are a harbinger of the challenges and limitations that China will inevitably face in its industrial upgrade and restructure process.

The growth of Guangdong started with the “head north” movement of Hong Kong companies in the early 1980s. The large-scale transfer of Hong Kong's manufacturing industry to China, in particular the PRD, was a vital step in Hong Kong's transformation from a manufacturing-based economy to its current status as a centre of trade, commerce and finance.

As the primary destination for Hong Kong’s relocated industries, the PRD not only became known as the “world’s factory”, it also suffered the consequences of this label. The PRD is now facing the same developmental and environmental limitations that previously plagued Hong Kong.

Hoping to break through the bottleneck, decrease the social and environmental pressures on the PRD, and balance the development of the entire province, as well as coordinate and sustainably develop a larger economically productive area, the Guangdong Provincial Government began investigating the feasibility of relocating industries within the province in 2005. In 2008, the Provincial Government began encouraging the “dual relocation” of factories and labour by continuously promulgating and implementing new policies.

However the current pattern, scale and speed of industrial relocation in Guangdong pose significant threats to the province’s water resources. If not managed properly, industries relocating to the upper reaches of Guangdong’s rivers will only spread water pollution and other environmental problems further upriver, thereby widening the threats to more areas including ecologically vulnerable ones.

Heyuan is the first line of defense for the Dongjiang River. The rapid industrial development in the city of Heyuan and its satellite counties presents direct risks to the ecological system of the Dongjiang. If Heyuan is threatened, Hong Kong is also vulnerable, as 80% of Hong Kong’s water supply comes from the Dongjiang.

For Guangdong to achieve sustainable development, its industrial relocation programme must be successful. Guangdong must also guard against repeating the mistakes of the earlier industrial relocation from Hong Kong to the PRD, to avoid sinking further into an even deeper crisis.

Hong Kong’s industries, whose fates and interests are inextricably bound with Guangdong, will be forced to follow the inexorable tide of industrial relocation and move its factories to Guangdong's ecologically sensitive regions. The ecological consequences of these actions will also be shared by Hong Kong people. Hong Kong needs to proactively promote the good health of the Dongjiang River in order to sustain its economic and social development.
What are industrial relocation and “dual relocation”? 

Industrial relocation refers to an economic activity, motivated by a desire to upgrade or improve the industrial operations of a region or a country, in which production, sales, research and development, or even headquarters are physically relocated to another region or country. Typically, industrial relocation involves industries that are transitioning into new phases of maturity, innovation, or decline brought on by changes in resource availability, market demand or other factors.¹

“Dual relocation” is a term commonly used to describe the industrial and labour relocation policies that Guangdong initiated in 2008. Specifically, “dual relocation” involves the movement of labour-intensive industries from the PRD to the east and west “wings” of the province, as well as the mountainous northern region. It is hoped that through this process, the labour force in the eastern, western, and northern areas of Guangdong will be ushered into the secondary (mining, manufacturing, electricity, public utilities and construction) and tertiary (services) industries. More highly educated and skilled portions of the labour force will be brought to the PRD.² The Guangdong Provincial Government has committed to spending approximately RMB 50 billion between 2008 and 2013 to promote dual relocation.

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¹ Source: [Guangdong Provincial Government](https://www.guangdong.gov.cn/)

² Source: [Guangdong Provincial Development and Reform Commission](https://www.guangdong.gov.cn/)
1 Guangdong's Industrial Relocation

1.1 More space for modernized industries

After thirty years of development in the PRD, Hong Kong and Guangdong businesses are again facing pressure to relocate and transform. Guangdong needs to open up space for new development while also carrying out industrial upgrading. The primary motivations behind this effort are to decrease pressure on the PRD and to balance the province's economic development.

1.1.1 Decreasing pressure on the PRD

Since the Reform and Open Door policy was adopted, Guangdong has been one of the fastest-growing regions in China. Its GDP increased from RMB18.585 billion in 1979 to RMB4.56 trillion in 2010, growing by a factor of 245 in 31 years. For many years, the PRD accounted for over 80% of the province’s productivity, and has always remained Guangdong’s most economically important region.3

<table>
<thead>
<tr>
<th>Year</th>
<th>Guangdong Province (RMB)</th>
<th>PRD (RMB)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>26,588</td>
<td>21,686</td>
<td>82</td>
</tr>
<tr>
<td>2007</td>
<td>31,777</td>
<td>25,760</td>
<td>81</td>
</tr>
<tr>
<td>2008</td>
<td>36,797</td>
<td>29,946</td>
<td>81</td>
</tr>
<tr>
<td>2009</td>
<td>39,483</td>
<td>32,147</td>
<td>81</td>
</tr>
<tr>
<td>2010</td>
<td>45,473</td>
<td>37,388</td>
<td>82</td>
</tr>
</tbody>
</table>

(a) Low-end manufacturing industry cluster

Thanks to its low cost of labour and operations, the PRD was not only the first choice for relocating Hong Kong companies but also attracted a large number of internationally-invested factories, resulting in the formation of an enormous industrial cluster.
However, most of these factories are at the low end of the international production chain, relying essentially on labour-intensive production models with low value-added. For example, furniture manufacturing, leather, clothing, shoes and hats and other labour-intensive industries use 25% of the province's labour force, but contribute only 8.5% of industrial value-added.4

(b) Population pressure and the resource dilemma

The expansion of the scale of production in the PRD has resulted in rapid population growth and resource shortages. Since 2000, the PRD’s permanent population has grown by 5 million, and the number of labourers has increased by 13 million (see Figure 3).5 Population and resource pressures have triggered various societal problems, including land shortages, rising real estate prices, energy and electricity shortages, hiring difficulties, and shortages in education opportunities and shelter for labourers’ children.6

Figure 2: Growth in the number of labourers in the PRD 2000-20097

(Guangdong Statistical Yearbook)
(c) Environmental over-burdening and degradation

The concentration of a large number of labour-intensive industries accompanied by their crude manufacturing processes has seriously exceeded the region’s environmental capacity. The PRD’s economic miracle has brought with it rapid deterioration of the Delta’s ecology and natural environment. A representative example of environmental deterioration is the area's worsening water quality. Currently, only 20% of the delta's rivers meet China's Grade III water standard (the lowest grade still suitable for drinking after treatment), leading to the odd situation in which even people who live on the banks of the river must be allocated clean water from other sources.9

1.1.2 Balancing the economic development of the province

Although Guangdong is an economic powerhouse in China, geographic regions within the province still exhibit huge disparities in economic development. The PRD region occupies only one-third of the province’s land area, but 58% of the province's labour force is concentrated there, creating 80% of the province's total economic output.10 Ostensibly, stimulating cooperation between the PRD and Guangdong's poorer regions is a policy that will decrease disparity and benefit the entire province (see Figure 4).

Figure 3: Comparing the PRD, Guangdong’s Eastern and Western Wings, and the Mountainous North11

(Excerpts from the Guangdong Province Statistical Yearbook 2010)

<table>
<thead>
<tr>
<th>2009 Contribution of Region to the Entire Province (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial value added by large-scale enterprises</td>
</tr>
<tr>
<td>Total economic output</td>
</tr>
<tr>
<td>Year-end employed laborers</td>
</tr>
<tr>
<td>Year-end permanent residents</td>
</tr>
<tr>
<td>Urban population</td>
</tr>
<tr>
<td>Land area</td>
</tr>
</tbody>
</table>

*9 Cities* in the PRD  
*Eastern Wing*  
*Western Wing*  
*5 Cities* in the Mountainous North

*Rural areas fall under the jurisdiction of the cities, so the entire area is included.*
1.2 Industries targeted for relocation in Guangdong

1.2.1 Main composition of industries to be relocated

Industrial relocation is an important aspect of China’s industrial upgrading strategy. *The Outline of the Plan for the Reform and Development of the PRD (2008-2020)*, formulated by the National Development and Reform Commission, states that planning for Guangdong’s industrial upgrade process should include “eliminating outdated enterprises, relocating labour-intensive enterprises, promoting advantageous enterprises, and cultivating high-potential enterprises.”

“Labour-intensive”, in official parlance, has come to mean “targeted for relocation”. In 2008, the Guangdong Province Economic and Trade Committee formulated the *Guidelines for Guangdong Province’s Industrial Relocation Regional Deployment*, which provided more specific definitions for the types of industries to be relocated or prohibited and the standards by which enterprises would be chosen for relocation.

1.2.2 The vehicle for industrial relocation - Industrial Relocation Parks

Industrial Relocation Parks (“IR-Parks”) are the primary vehicle for industrial relocation.

According to policy regulations, the two parties to a relocation project are to act under a cooperative development agreement which the target location’s local government submits to the State Council and provincial government for approval. Through this process, numerous “industrial relocation parks” have been set up, including “development zones”, “industrial parks”, and “high technology industrial development zones”. Additional large tracts of land have already been set aside for future industrial parks in the comprehensive land-use plans of many localities.

The local governments of the PRD region are responsible for most of the planning and preparation work for these IR-Parks, including organising, raising investment funds, developing, constructing, recruiting businesses, and negotiating the schedules and percentages for profit sharing with business owners.

Currently, 36 IR-Parks have been recognised at the provincial level. There are also many county-level and district-level IR-Parks distributed across the province that have not been officially recognised by local governments. Please see Appendix 1 for a list of province-level IR-Parks.

1.2.3 Policies for promoting industrial relocation

To date, Guangdong Province has established a comprehensive set of industrial relocation policies. It has already promoted two rounds of industrial relocation using a model based on “core policies + complementary policies”.

The first round began with the promulgation of the *Trial Guidelines for Cooperation Among Guangdong Province’s East and West Wings, Mountainous North and the PRD To Promote Industrial Relocation* in 2005. This document formally raised industrial
relocation to the level of Guangdong Province's “overall strategy” and primarily focused on the construction of infrastructure for IR-Parks.

The core document for the second round was the *CPC Guangdong Provincial Committee and Guangdong Provincial People's Government’s Decision on the Promotion of Industry and Labour Force Relocation*, promulgated in 2008. This document renamed the effort as the “dual relocation” of labour and industry. The joint promulgation of this document by the provincial government and the provincial party committee emphasised the authorities' extremely high prioritisation of industrial relocation.

During the three years following 2008, Guangdong has continued to release additional high-priority documents providing regulations and guidance for all facets of the industrial relocation effort. “Dual relocation” progress has even been added as a factor for evaluation and promotion of government officials. Regarding the environmental problems arising from industrial relocation, Guangdong Province established a number of regulations between 2006 and 2009. These regulations imposed specific environmental protection requirements on IR-Parks and relocated businesses, and also allocated funds for assisting in the construction of environmental facilities in IR-Parks. See Appendix 2 for a summary of the evolution and content of Guangdong’s industrial relocation policies.
Industries encouraged & prohibited

According to the Guidelines, the Guangdong Government encourages enterprises in the following industries to relocate:

I. Traditional labour-intensive industries including apparel, hardware, toys, shoes, and packaging;
II. Resource-based industries such as ceramics, concrete and other construction materials, furniture, recycled metal products, alloys and die-casting of non-ferrous metals;
III. The assembly and manufacturing processes of capital-intensive industries such as information technology products and home appliances;
IV. Industries that do not stimulate complementary economic activity in the original location, such as agricultural products;
V. Industries for which raw materials are abundant in target locations, such as plastic products, coating materials, paint and other downstream petroleum products;
VI. Industries which already have mature operations or bases in target locations, such as manufacturing of traditional toys, audio-visual equipment, and food products.

The Guidelines also provide that the following industries are prohibited from being included in relocation plans:

I. Techniques, processes, equipment and products that are wasteful of resources, are unsafe, or do not accord with relevant laws, regulations and industrial policy;
II. Outdated techniques, processes, equipment and products that have already been specifically eliminated by the national and/or provincial governments;
III. Projects that will seriously damage the ecological environment, particularly water resources, including projects that will emit carcinogenic, teratogenic, mutagenic, or odorous substances; projects whose wastewater emissions do not meet the water quality standards required by Guangdong’s east wing, west wing, and mountainous north; and projects that bring hidden hazards and potential risks to the security of nearby water resources.
2 The Current State of Industrial Relocation

2.1 Current scale

Industrial relocation in Guangdong has already occurred on a large scale. At the end of June 2011, 2,988 projects had already been relocated, or were in the process of relocating, to Guangdong’s 35 province-level IR-Parks (one Park was not enlisted as a provincial-level Park at that time). The total amount invested in relocation surpassed RMB702.9 billion (see Table 2).

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Number</th>
<th>Amount invested (RMB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under construction</td>
<td>573</td>
<td>176.4 billion</td>
</tr>
<tr>
<td>Completed</td>
<td>1448</td>
<td>155.25 billion</td>
</tr>
<tr>
<td>Under contract</td>
<td>423</td>
<td>227.83 billion</td>
</tr>
<tr>
<td>Under discussion</td>
<td>544</td>
<td>143.49 billion</td>
</tr>
</tbody>
</table>

Since 2008, the province-level IR-Parks’ total economic output has exceeded RMB300 billion, providing tax income of RMB19 billion.

2.2 Target locations are distributed within protected water source areas

It is apparent from the 2008 province-wide industrial relocation map that a large number of IR-Parks are being placed along rivers in upstream regions (see Figure 4).

Three years have passed, but there has been no apparent change in this trend. Looking at the 36 recognised province-level IR-Parks, half are distributed upstream of protected water resource areas or close to areas with Grade I or Grade II water quality. Some IR-Parks are even located within protected water source areas (see Figure 5).

In addition to province-level IR-Parks, these important water source regions also contain many regional-level, city-level, county-level and even township-level IR-Parks. Some pre-existing local-level industrial parks have used the wave of industrial relocation as an opportunity to shift into new roles as IR-Parks without upgrading their facilities in line with the new environmental requirements. Similarly, many old factories have not upgraded or cleaned-up production processes at all; they have merely moved to the new IR-Parks. This situation creates supervision and control difficulties – IR-Parks have a mix of appropriate and inappropriate factories. Within the jurisdiction of Heyuan’s Yuancheng District (the city centre) alone, there are 15 openly advertised IR-Parks of various sizes, with no lack of examples of the “old wine in new bottles” phenomenon.
Figure 4. Guangdong Province industrial relocation distribution map\textsuperscript{(2008)}

Industrial Relocation Parks
- Foshan-Chancheng (Yangdong Wonxiang)
- Zhongshan-Shiqi (Yingjiang)
- Zhongshan-Huaju (Yangxi)
- Guangzhou-Baiyun Jiangpao (Dianbai)
- Foshan-Shunde (Lianjiang)
- Dongguan-Dalang (Xinyi)
- Foshan-Shunde (Xinxiang Xincheng)
- Foshan-Chancheng (Yuncheng Duyang)
- Shunde-Chongjiang (Oqing)
- Zhongshan-Dayong (Huiti)
- Zhongshan-Sanjiao (Zhenjiang)
- Dongguan-Dongkeng (Chechang)
- Dongguan-Shilong (Shiling)
- Shenzhen-Yantian (Meizhou)
- Dongguan-Shijie (Xingning)
- Zhangshen (Huiyan)
- Dongguan-Qiutou (Longmen Jinshan)
- Dongguan-Fenggang (Huidong)
Figure 5. Industries are being relocated en masse to areas with high quality water sources.

Provincial Industrial Relocation Parks in Guangdong (as of 2011)

Western Guangdong: metal scissors and stainless steel products manufacturing, petrochemical, port logistics, steel, agriculture, seafood processing, paper, pharmaceutical, electronics, machinery, equipment manufacturing, textile, plastics and chemical fiber processing, and comprehensive utilization of advantaged resources.

Northern Guangdong: metallurgical and processing, machinery, motor vehicles and parts, electronic communications and equipment, clocks and watches manufacturing, fine chemicals, hardware, building materials, non-metallic mineral products (cement), lumber, tobacco processing, pharmaceuticals, toys, footwear, aluminum, stainless steel products, furniture, agricultural products processing, food processing, textiles and clothing, and other resources processing and labor-intensive industries.

Eastern Guangdong: textile and garment, electronics handicrafts, footwear, toys, ceramics, petrochemical, power, equipment manufacturing, electronic information, logistics, leather, pharmaceutical, food and beverage, biotechnology industry, stainless steel hardware and other industries.

Classification of Water Quality in China

Under the Environmental Quality Standards for Surface Water (GB 3838-2000) the Ministry of Environmental Protection uses the following grades to classify surface water quality in China:

- Grade III - drinkable
- Grade III - drinkable
- Grade IV - polluted - for industrial and agricultural use only
- Grade V - polluted - for agricultural use only
- Exceed Grade V - extremely polluted - not suitable for any use
2.3 Potential problems caused by the pattern of industrial relocation

In theory, target locations are supposed to raise the bar for accepting relocated factories, but in the real world, where resources for supervision and control are limited, there is a possibility that substandard factories will be allowed in.

Target locations are limited by their own intrinsic ecological and environmental capacities, and are even closer to ecologically sensitive areas, including important water sources and watersheds, than the source locations. It is possible that Guangdong's east and west wings and its mountainous north will re-create the current environmental predicament of the PRD.

At present, China's overall manufacturing capability is still relatively low-tech. As the world's factory, Guangdong is no exception. The industrial relocation programme may not have sufficient resources to upgrade and transform Guangdong's manufacturing capabilities. Many of the expected benefits may be sacrificed in favour of the rapid development that target locations desire.
The Regional Distribution of IR-Parks May Result in Water Crises

3.1 Increase in target regions' water demand may exacerbate water shortages

3.1.1 Skyrocketing industrial water use

Four of the industries whose relocation is encouraged in Guangdong – manufacturing of electrical/mechanical equipment; non-metal mineral products; textiles; and telecommunications equipment, computers and other electrical equipment – are among the top 7 water-intensive industries (see Table 3). Over 80% of already operating province-level IR-Parks contain water-intensive industries such as electronics manufacturing, textiles and mechanical equipment manufacturing.

Table 3: Water extraction by the 7 most water-intensive industries in Guangdong

<table>
<thead>
<tr>
<th>Name of Industry</th>
<th>Net quantity of water extracted (cubic meters)</th>
<th>Percentage of the total water extracted in Guangdong Province</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 most water-intensive industries (total)</td>
<td>3,052,335,774</td>
<td>65.2</td>
</tr>
<tr>
<td>Water production and supply</td>
<td>1,145,485,584</td>
<td>24.5</td>
</tr>
<tr>
<td>Electrical power and heating production and supply</td>
<td>485,500,747</td>
<td>10.4</td>
</tr>
<tr>
<td>Telecommunications equipment, computers and other electronics manufacturing</td>
<td>390,335,429</td>
<td>8.3</td>
</tr>
<tr>
<td>Textiles</td>
<td>350,778,800</td>
<td>7.5</td>
</tr>
<tr>
<td>Paper and paper products manufacturing</td>
<td>266,345,186</td>
<td>5.7</td>
</tr>
<tr>
<td>Electrical and mechanical equipment manufacturing</td>
<td>216,456,615</td>
<td>4.6</td>
</tr>
<tr>
<td>Non-metal mineral products manufacturing</td>
<td>197,433,413</td>
<td>4.2</td>
</tr>
</tbody>
</table>

In order to attract factories to their IR-Parks, target regions often charge water-consuming industries extremely low water fees. For example, Heyuan's largest park, the Zhongshan (Heyuan) Industrial Relocation Park, advertises that it provides “the best land prices, electricity prices, and water prices in the entire province”. For two years
in a row, this park has also received an “excellent” rating in the provincial evaluation of IR-Parks. It has also been awarded money and land for expansion by the Provincial Government.\textsuperscript{30}

One effect of the industrial relocation policy is that Heyuan’s industrial water usage has grown from 374 million cubic meters in 2006 to 553 million cubic meters in 2010, an increase of 48% (see Figure 6).

\textbf{Figure 6: Heyuan City’s industrial water use 2006-2010}\textsuperscript{31}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure6.png}
\caption{Industrial Water Consumption in Heyuan}
\end{figure}

\textbf{3.1.2 Rapid urbanisation exacerbates mismatches between water demand and supply}

The rapid deployment of industries in target regions has also accelerated these regions’ urbanization. The arrival of labour-intensive industries in the undeveloped regions of Guangdong has brought increased employment opportunities accompanied by population growth, and correspondingly, increased pressure on the water supply for domestic use.

Using Heyuan as an example, even though it is a poor, mountainous region, its total population has increased by 30% over the last 20 years. Its non-agricultural population grew from 350,588 in 1990 to 839,876. This 140% increase exemplifies industrialization’s dramatic effect on urban populations.\textsuperscript{32}
Heyuan has named a new water source project as the most important of the 10 major livelihood-related construction projects of 2010. Once it is completed, the planned Heyuan City New Water Source Engineering Project will supply the 640,000 cubic meters of water per day needed by 1 million people, which is over three times the current supply capacity of 190,000 cubic meters per day. 

Currently, industry and domestic water supply share the same fixed quota and therefore are mutually restricted. Increasing domestic demand will suppress the supply for industry.

### 3.1.3 The shortage of water resources becomes more apparent day by day

Guangdong has long been known to have abundant water resources – it was previously regarded as a place where one could “wring water from the air.” Yearly average precipitation is 1,774 millimeters, which is 2.74 times the national average.

Even though Guangdong’s water resources total 183 billion cubic meters in the average year, the per capita yearly amount is only 2,100 cubic meters, lower than the national average of 2,200 cubic meters, and only one-quarter of the world's average.

In the Dongjiang River Basin, which appears to possess abundant water, the yearly per capita water resource is only 1,100 cubic meters, much lower than the internationally recognised level of 1,700 cubic metres below which a region is considered to be “water stressed”.

An investigation by the *Southern Daily* found three other factors exacerbating the situation: uneven rainfall distribution throughout the year; the lack of facilities for
collecting and transporting rainwater ("engineering shortage"); and, most importantly, poor water quality.

First, 80% of each year's precipitation falls during the rainy season from June to September, primarily in the form of floods that quickly flow into the ocean, and impossible to control and utilize. Guangdong's dry season runs from October to March, which corresponds with the period of peak agricultural demand for water. As one can imagine, droughts are a common occurrence.

Second, due to the lack of waterworks facilities and the widespread continuous destruction of watershed ecology, most precipitation runs off before it can be controlled and used. This is referred to as an engineering shortage.38

Third, scarcity due to low water quality is a serious problem. The hasty and over-extensive economic development from the early years of Reform and Opening Up to the present has heavily polluted water resources and caused grievous damage to aquatic environments.

Taking Dongguan as an example, economic and societal developments have already reached the limits of the city's environmental carrying capacity. The water quality in practically all of Dongguan's waterways is Grade V or worse, meaning that they are essentially open sewers.39

Dongguan relies on the Dongjiang River for 90% of its municipal water supply. Currently, almost all of the Dongjiang's usable water resources have been utilised. By 2020, Dongguan's water consumption is predicted to increase by 21% to 2.53 billion cubic meters. It is important to note that Dongguan is only one of 6 cities (including Hong Kong) that rely primarily on the Dongjiang River for their water supplies.40

In addition to climate change, many short-sighted human activities, such as the replacement of natural forests with cash crops like fast-growing eucalyptus and fruit orchards, and unregulated mining, are causing disastrous soil erosion and the destruction of precious watersheds.41

If Guangdong continues to encourage the relocation of industries to important water source regions amidst a situation in which clean water is already in short supply, without adequate supervision and preventative measures, the shortage of water will only become more serious, the mismatch between supply and demand will become more acute, and the aim towards sustainable development of its economy and society in Guangdong will become increasingly difficult to achieve. The original goal of increasing space and modernizes industry will be ever further out of reach.
3.2 Increasing wastewater emissions overwhelm target regions’ pollutant loading capacities

3.2.1 Good policies sometimes lack effective implementation

The Guangdong Provincial Government has not ignored the importance of protecting water resources.\(^{42}\) It has imposed a number of relevant measures, and earmarked RMB2.5 billion for the construction of wastewater treatment plants and pipe networks within province-level IR-Parks.\(^{43}\) But the construction of water resource-related IR-Park infrastructure has been less than ideal (see Appendix 3).

For a number of IR-Parks, the construction of central wastewater treatment facilities has not been completed in line with the construction of factories. There are only 12 wastewater treatment plants distributed among the 36 province-level IR-Parks, 17 IR-Parks have not completed the environmental impact assessment process, and facilities for solid waste disposal and domestic wastewater treatment are even further behind.\(^{44}\)

3.2.2 Increased wastewater treatment capability doesn’t mean total control of emissions

From studying Heyuan, a principal target region located in the upper reaches of the Dongjiang River, it is clear that the development of industrial relocation IR-Parks has been accompanied by a dramatic increase in the region's total wastewater emissions.

![Figure 8: Heyuan's wastewater emissions, 2004-2010\(^{45}\)](chart)

Heyuan's wastewater treatment capacity in 2009 was 125,000 tonnes per day, or 45.62 million tonnes annually. At this capacity, only 34.9% of Heyuan's wastewater was treated. At the end of 2010, Heyuan had nine water treatment plants, with a total capacity of 225,000 tonnes per day, fully operating. Even though treatment capacity had increased by 80%, this was still only enough to treat 58.7% of Heyuan's total wastewater.
These numbers reveal that although wastewater treatment capacity has increased, its growth has still not caught up to that of total wastewater emissions.

### 3.2.3 National standards for industrial wastewater emissions do not match environmental requirements

It is important to note that meeting industrial wastewater emissions standards can still lead to the emission of pollutants, as standards cannot guarantee that the hydrological system and aquatic ecology are adequately protected. Even if every single factory's practices meet the standards, if the number of factories located in a river basin exceeds the area's environmental capacity, then pollution from the factories can still cause damage on a catastrophic scale.

For many years, China's standards have primarily been based on pollutant concentration limits. Many IR-Parks have been known to mix industrial wastewater with domestic wastewater before discharging it in order to dilute the industrial pollutant concentration to regulated levels. After 2008, China introduced some standards based on absolute wastewater emission volume limits, but the lack of effective regulatory and enforcement systems has created a situation in which the cost of compliance is significantly higher than the cost of non-compliance. Therefore, exceedances are still commonplace.

Although China's wastewater source emissions standards have improved in recent years, they are still inconsistent with real-world environmental requirements. Currently, the setting of emissions standards is still primarily based on each industry's pollution prevention capabilities, with relatively little emphasis on objective measurements such as the amount of each pollutant in the effluent. Additionally, emissions limits have not yet undergone appropriate evaluation, thus undermining their scientific basis and real-world effectiveness.

In this period of frenzied regulation-setting, old and new standards need to be simultaneously separated, integrated, applied and enforced. A combination of a lack of technical ability among environmental regulators, a shortage of human resources, and outdated organisational hierarchies that prevent efficient administration, makes it extremely difficult to effectively enforce standards.

According to an investigation by *Southern Weekend*, a significant proportion of industrial wastewater treatment plants are simply “flow-through plants”. IR-Parks manufacture products of all sorts. Different factories emit different pollutants in different concentrations, and the amount of effluent varies greatly with time. However, the majority of wastewater treatment plants use the same set of processes: the activated sludge process combined with coagulation-sedimentation or filtration. It is simply not possible to adequately process varied, chemically complex effluents using a single standard process.

Some effluent from “flow-through plants” actually does meet standards, but not for the right reasons. Of the many pollutants for which standards have been set, only four are
regularly tested and strictly enforced: COD, suspended matter, ammonia and total phosphorus. Other important industrial pollutants such as heavy metals, organic chemicals and hormone-mimicking agents either are not required to be monitored or are not monitored because local regulatory agencies lack the resources to do so. The result is a set of toothless regulations.51

Research into environmental capacity and the regulation of total emission quantities are still in the exploratory phase in China. Even though Heyuan's municipal government has announced that it will continue to increase wastewater treatment capacity, it still has not taken other important measures such as providing information to the public on industrial wastewater emissions, treatment, and progress towards meeting standards.52 As an important water source protection area in the upper reaches of the Dongjiang, it is crucial for Heyuan's wastewater treatment operations to be transparent and for related information to be publicly available. Only then can scientific policymaking and public supervision be effective.

3.2.4 Risks of wastewater treatment capacity lagging behind IR-Park construction

Wastewater from industrial IR-Parks usually goes through two levels of treatment before it is discharged. It is vital that wastewater treatment facilities are in place at both factory and IR-Park level before industries move in.

In reality, wastewater treatment facilities are often not synchronised with the construction of IR-Parks. As the newest report from 2011 shows, in the 35 province-level IR-Parks in Guangdong, only 12 wastewater treatment plants have been built (1 park was not included in the statistics).53

The Zhongshan (Heyuan) Industrial Relocation Park, which has been held out as a model provincial park, was the first park to construct a wastewater treatment plant, which began operating in 2009. However, this treatment plant was designed to be a domestic wastewater treatment plant and constructed accordingly because “factories located in this park are not permitted to emit any industrial wastewater.”54

It is unlikely that none of the more than 100 factories operating in the Zhongshan (Heyuan) Park emit industrial wastewater. The recently constructed Hanneng solar photovoltaic thin-film panel factory has already commenced production in Zhongshan Park. Its industrial wastewater treatment circumstances are yet to be publicly shared, but it is common knowledge that similar photovoltaic production processes do create industrial wastewater.

3.2.5 Weak regulation of old factories

Adjacent to the city of Heyuan is Dongyuan County, which is home to the province-level Hudieling Park. This park does not have a wastewater treatment plant at all because “it contains no wastewater emitting factories. The only water-emitting company is the Bawanghua rice noodle factory which discharges water used for washing rice. This water does not harm the environment and can be directly discharged.”55
First, individual factories must pre-treat wastewater (distributed treatment) to minimum quality levels according to the requirements of the municipal sewer system and requirements targeting specific industrial processes. After pre-treatment, the wastewater is treated again at the industrial park’s wastewater treatment plant (centralised treatment). After centralised treatment, a portion of the water can be re-used for industrial processes or even some domestic uses, and the remainder of this grey water, which in theory meets standards for water discharged into the hydrological system, is piped to a nearby river or lake. (See Figure 9 for a visualisation of the basic wastewater treatment process followed by IR-Parks).
In addition to newly built IR-Parks, Dongyuan also has some older industrial parks. These old parks are ostensibly administered by Hudieling management, but in fact they are weakly managed, if at all. For example, the Xudong Industrial Park still operates numerous ceramics factories which directly discharge wastewater and severely pollute the air. The processes used in these factories are extremely dirty and outdated.58

3.2.6 Staircase-style hydropower development impairs natural water purification

An investigation by the Water Resources Department of Guangdong Province revealed that “a portion of the waters flowing into the three large reservoirs of Xinfeng Jiang, Fengshu Ba and Baipenzhu are already showing a trend towards worsening water quality. Additionally, field inspections have discovered numerous manmade factors negatively affecting the protection of water resources near all three reservoirs.”59 The blockage of free-flowing rivers by dams creates a series of impacts that seriously decrease water quality.

The main trunk of the Dongjiang River will soon be home to fourteen stair-step hydropower plants, of which eleven will be within Heyuan’s jurisdiction.60 In Heyuan, three have been completed, three are under construction, and five are awaiting construction. In the foreseeable future, the flow rate of the river will be further reduced, and the negative effects from the fragmentation of the river's ecology will become more obvious. The Dongjiang's natural water purification ability will be further impaired.61

In addition to the main trunk, the Dongjiang's tributaries are already dotted with small-scale hydropower plants. Areas along the tributaries are even more lacking in environmental controls and basic hygienic practices. Garbage, cultivation, and livestock and other sources of pollution are practically unregulated, or regulated with little effect. Following heavy rainfall, pollutants on the banks of tributaries are washed into the water and flow into the Dongjiang, adding to the pollutant load of the main trunk and the entire river basin.

The fragmentation, eutrophication, and the sequestration of pollutants will significantly weaken the Dongjiang watershed’s natural ability to purify water.
Industrial Relocation Threatens the Security of Drinking Water from the Dongjiang

4.1 The importance of Heyuan

The Dongjiang River Basin takes up only 6.3% of Guangdong Province's total land area, but it shoulders the burden of providing industrial and domestic water supplies to nearly half of Guangdong's population (which produces 70% of the province's total GDP)\(^6\), the residents of Heyuan, Huidong, Dongguan, Guangzhou, and Shenzhen, as well as exporting water to Hong Kong.

Heyuan is located in the mid-upper reaches of the Dongjiang River and the upper reaches of the Hanjiang and Beijiang rivers. The city's total land area is 15,800 square kilometers, of which the Dongjiang basin takes up 81.6%, the Hanjiang basin takes up 10.4%, and the Beijiang basin takes up 2%. Many waterways flow through Heyuan, including 47 with drainage areas of 100 square kilometers or greater. Of these 47 waterways, 39 are part of the Dongjiang basin, 6 belong to Hanjiang, and 2 belong to Beijiang.\(^6\) Heyuan is also home to the largest reservoir in southern China, the Xinfeng River Reservoir, as well as another large reservoir, the Fengshuba Reservoir. As one can see, the city's name, “river source”, is very appropriate.

There are 1,257 water extraction points in the Dongjiang River Basin, and almost half (622) of them are located in Heyuan.\(^6\) Heyuan is accurately described as Dongjiang’s faucet. The water that flows from Heyuan is intricately intertwined with the security of the entire river basin's ecosystem and human population.

The Dongjiang's water has long been placed on a pedestal, regarded as “water of politics, water of life, water of the economy”. It has received attention from all levels of government. When it comes to the protection of water resources, Heyuan's position is of the utmost importance.

However, in this powerful tide of industrial relocation, Heyuan has also been designated as a focal point, receiving enormous support from the provincial government. Currently, Heyuan possesses 5 large province-level IR-Parks. The scale of these IR-Parks and the amount of government assistance they have received go far beyond those of the IR-Parks of any other target region.
How Heyuan manages its water is critical not only to the security of the Dongjiang, but also the entire Pearl River Basin. Any crisis that strikes the Dongjiang will be a crisis for all of Guangdong, as well as Hong Kong. Without a doubt, Heyuan must be a focal point of attention and protection for Guangdong and Hong Kong.

4.2 Hidden risks of high-pollution processes in high-tech production lines

High-tech industries are generally regarded as having low emissions. The provincial government has encouraged their relocation, and local governments clamour for them, hoping to form larger and more powerful high-tech clusters.

Heyuan has labeled four high-tech industries as the “four news”: new electronics, new energy, new materials, and new pharmaceuticals.

Taking the “new energy” sector as an example, Heyuan wants to “focus on building a new energy industry based on second-generation solar photovoltaic technology, with an emphasis on solar energy and LED lighting technology”. Heyuan plans to “utilise the area’s unique high-quality quartz resources to develop a complete supply chain from mining to glass to thin film panels, and hopes to construct a large scale base for the new energy industry.”

Many steps along this production chain can create large-scale environmental damage and pollution. Heyuan’s publicly announced goals of “creating mountains of wealth” while “preserving clear waters and green mountains” may be in direct conflict with each other.

4.3 Clean assembly of end products does not mean clean production of the entire chain

Heyuan has identified 3G portable communication devices as a development opportunity. The emphasis is on advanced portable end-user devices, especially 3G smart phones. To date, Heyuan has already attracted 10 mobile phone handset manufacturers as well as 25 manufacturers of handset parts. In 2009, these companies produced a total of 14.8 million handsets. In 2010, this number leaped to 34 million units, which means that 34 million printed circuit boards (PCBs) were also supplied or produced in Heyuan.

Production steps in PCB manufacture such as electroplating and chemical etching use materials such as copper, nickel and chromium, which create heavy metal pollution.

An investigation revealed that large PCB manufacturers cannot reliably meet emissions standards. Using Shenzhen as an example, a spokesman for the Shenzhen Municipal Residential Environment Committee claimed: “In 2009, PCB manufacturers illegally and directly discharged pollutants. Their standards-exceeding emissions show no sign of stopping despite repeated warnings, and they continue to use fraudulent methods to appear as if they are meeting standards. These actions are the primary culprit behind the ongoing heavy metal pollution of Shenzhen’s waterways.”
4.4 Heavy metals of concern in the Dongjiang River Basin

According to the Chinese Academy of Sciences’ Environmental Earth Chemistry National Laboratory, the most abundant heavy metals in the Dongjiang’s sediment are cadmium, copper, tin, mercury, and lead. In the Dongjiang, all of these metals occur in higher concentrations than China’s background concentration levels, with cadmium and mercury, pollutants with common origins, at the highest levels. The ecological risk index (RI) of these pollutants in the Dongjiang sediment averages “extremely high”. In the upper reaches near Heyuan, the RI is “low”; in the middle reaches near Huizhou, it is “high”, and in the lower reaches near Dongguan, it is “extremely high”.

The regulation and treatment of industrial wastewater has been a major challenge to industrial nations around the world, owing to its complexity and diversity. The rise of international industrial relocation has been motivated not only by a desire to cut financial costs, but perhaps more importantly by the pressure to avoid the environmental costs that appear after production costs have been incurred.

According to reports, Heyuan’s annual mobile phone production capacity will reach 200 million in five years. Zhongxing Telecommunications, in building its 3G mobile phone factory in Heyuan, has attracted over 300 related companies and created a large cluster of mobile phone manufacturers. Heyuan’s Zhongshan (Heyuan) IR-Park has already become the “Guangdong Province Mobile Phone Production Base” and also one of the four largest mould-stamping machinery production centres in the world. Such rapid growth could be a perilous trap, not a sign of healthy development.

Because Dongjiang’s heavy metal pollution has already reached levels that cannot be ignored, there are many issues of concern, including the number of PCBs supplied to Heyuan that are made in the Dongjiang River Basin; whether the treatment of heavy metal pollution is properly carried out in the factories; and how regulations are being implemented.

The priority is clear: Prevent further heavy metal pollution in Dongjiang River Basin.

4.5 Rapid growth of Heyuan’s heavy industry is of major concern

The realities of industrial relocation in Heyuan are found not only in the high-tech zone. A wide variety of businesses have set up shop across the districts and counties of Heyuan under the industrial relocation banner.

According to Heyuan's 2010 People's Bulletin on Economic and Social Development Statistics, the high-tech industry contributed only 15.5% of Heyuan's total industrial value-added by large-scale enterprises while Heyuan's heavy industry contributed 73.7%. Furthermore, the year-on-year growth rate of heavy industry was 28.9%, more than double the growth rate of light industry (13.1%).

In such an important water source region, the rapid growth of heavy industry is a major cause for concern. Heyuan therefore needs to re-examine its "go green" development model to see if it is returning to the path of GDP-centric growth.
The Real-world Difficulties of Industrial Relocation

5.1 IR-Parks failing to attract factories

The Hong Kong Shippers’ Council’s research found that the worldwide financial crisis has affected PRD businesses in many ways. Shrinking orders have resulted in severe production overcapacity, which means that businesses have no desire to expand their factories. Furthermore, small to medium sized Hong Kong manufacturing businesses are currently facing serious challenges to their survival; their most likely development direction would be to follow and assist multinational corporations and large Hong Kong businesses who operate in the PRD by upgrading their existing factories.

Also, many target locations are not naturally endowed with the conditions that are required for the healthy development of relocated industries. Most target locations have weak industrial foundations and are located in areas where shipping and transportation are inconvenient, especially in comparison with the PRD. Especially when one includes the costs of relocation, it makes little economic sense to relocate weak, outdated, low value-added, low profit margin industries from the PRD to these target locations. Even if relocation costs can be lowered, it is hard to predict these businesses’ prospects for long-term survival in the volatile seas of international trade.

Third, the large decrease in the number of outside labourers, especially skilled workers, has made it difficult to hire workers for expanding factories. Many businesses have remained idle since their relocation; the lack of labourers and tight funding are ubiquitous problems.

For labour-intensive industries, whether in the PRD or relocated elsewhere, the province-wide labour shortage could be a fatal obstacle to continued survival.

5.2 IR-Parks cannot overcome limitations

5.2.1 The gap between “relocation” and “setting up business”

The newest data shows that there is a huge gap between “relocation” and “setting up business”. According to The Economic and Information Commission of Guangdong Province, up to early 2011, 5,900 businesses had moved out of the 9 cities of the PRD. Of these, 3,000 were located to the east, west and north Guangdong. But only 700 (less than one-quarter) of these “relocated” businesses have actually set up business in IR-Parks.

This revelation brings up a whole series of questions. First, where have these relocated businesses gone, if they haven’t been placed in IR-Parks? What kinds of businesses are
they? What barriers to entry have IR-Parks set up for these businesses? The facilities have been provided, but the companies have failed to take advantage as hoped. What is the real reason behind this phenomenon?

The primary subjects of relocation are low-end manufacturing industries, and the expectation is that these industries will be able to remould themselves through the relocation process. Perhaps this is not realistic.

When manufacturers lack enthusiasm for relocation and the environment for international trade is unstable, the frenzied building of IR-Parks may ultimately result in an enormous waste of resources. The subsidies and other financial aid used to encourage relocation may be better spent elsewhere, for example to help factories upgrade in their present locations, or to help businesses with closures, consolidations and conversions.

5.2.2 IR-Parks may attract the wrong industries

Environmentally high-risk industries have not been removed from the list of industries encouraged to relocate.  

The government's list of industries that are encouraged to relocate includes many industries that may seriously threaten the environment and natural resources, such as the manufacturing of clothing, ceramics, cement, hardware, electronics, plastic products, and paint.

Taking the clothing industry as an example, a 2011 report by Greenpeace investigated the clothing industry in the Pearl and Changjiang River Deltas, discovering that these factories discharge a variety of harmful toxic materials, including hormone-mimicking chemicals that interfere with the human endocrine system. These toxins are already strictly regulated in the European Union, but currently, China's clothing industry has taken no specific measures to control their use.

Similarly, the paint and coating industry also discharges complex pollutants in high concentrations, including organic pollutants such as phenolic aldehyde and benzene, metallic ions such as Cr6+ and Pb2+, and metallic compounds that accumulate in human tissue. Despite these issues, Xinfeng County, located in the upper reaches of the Dongjiang River, has already set aside 600 hectares of land for constructing a park for the relocation of coating factories, hoping to establish the “Guangdong Base for Coating Materials”.

Unless these industries carry out relocation in a measured manner that takes account of total environmental capacity, no matter how well the IR-Parks' environmental facilities are built, sooner or later, their fate will be closure or conversion.
5.3 How good are the IR-Parks?

At the core of the relocation programme is the construction of well-planned, reasonably placed, orderly populated, and effectively regulated IR-Parks.

5.3.1 The “crucial item veto” on environmental impact assessments in practice

Environmental impact assessments have been designated as a crucial item in the “crucial item veto” system for target locations' approval of industrial relocation projects. This is the first barrier to entry for ensuring that pollution does not accompany relocated industries to their new locations. However, in practice, environmental impact assessments are used as a tool, not necessarily based on reality, to make GDP growth appear more benign. In order to gain certification as a province-level IR-Park, a park's owners need only to draw up a plan for environmental impact assessment.

These relaxed requirements have led to a large number of IR-Parks beginning operations before completing environmental impact assessments. Statistics show that as of April 2011, 17 of the 35 province-level IR-Parks had not completed environmental impact assessments. Furthermore, many IR-Parks will alter the park boundaries set by the assessment to increase the park's size, after the assessment for the original area has passed review. Some will even clear and level a large tract of land, squatting on it but not developing it or using it.

5.3.2 Environmental barriers to entry serve no purpose in many areas

When it launched the industrial relocation policy, the Guangdong Provincial Government stated that certain industries would be prohibited from relocating to the east wing, the west wing, and the mountainous northern area of the province. Specifically prohibited are “projects that will seriously damage the ecological environment, particularly water resources, including projects that will emit carcinogenic, teratogenic, mutagenic, or odorous substances; projects whose wastewater emissions do not meet the water quality standards required by Guangdong's east wing, west wing, and mountainous north; and projects that bring hidden hazards and potential risks to the security of nearby water resources.”

But this prohibition has placed target regions between a rock and hard place – they are encouraged to bring in environmentally risky factories that are on the low end of the industrial chain while also strictly controlling pollution. In many respects, these contradictory goals have eviscerated the purpose of setting high environmental barriers to entry, with environmental boundaries broken over and over again. A significant portion of relocated industries have not achieved clean production at all; many have simply relocated without upgrading.

The ceramics industry, which is a serious polluter of air and water, is an example of such an industry. Some local governments have allowed old ceramics factories to relocate with low barriers to entry, sometimes even no barriers. On the issue of energy conservation, local officials are even more likely to look the other way. In the end, the
“industrial relocation” of ceramics factories is more accurately described as “pollution relocation”.84

The refusal to enforce environmental barriers to entry is short-sighted. Target localities may enjoy some increased tax income and other temporary benefits, but to the sacrifice of their long-term development path.

Only when the standards for environmental quality is improved, the enforcement of environmental laws is intensified, and public awareness of environmental rights is increased, would companies that have exceeded environmental boundaries be forced to pay for the damage that they have done. It is then that they will find that they have damaged their own prospects for sustainable development.

As for local governments who have tacitly approved the crossing of environmental boundaries, they will eventually find that they have lost not only the natural environment on which their livelihoods depend, but they will also have lost the support of the people and created a new source of social instability.

5.4 Too many IR-Parks, too many factories

5.4.1 Land-use violations in IR-Parks

The rapid expansion of IR-Parks has created an all-too-common of lax land-use regulations and control over admission.85 Despite multiple reminders from the provincial government regarding the importance of regulating land-use in IR-Parks, land-use violations are commonplace and have had irreversible effects on local environments.

A typical example of this problem occurred in 2009 when it was discovered that Qingyuan City's IR-Park, located in the upper reaches of the Beijiang River, had exceeded its planned land area by more than 533 hectares. Even worse, this area was already under construction. The land-use bureau intervened, stopping construction, razing buildings, and mandating the restoration of the land to its original condition.86

Unfortunately, the artificial restoration efforts have resulted in a vast stretch of water-hogging fast-growing eucalyptus seedlings.87 These actions have not only destroyed the biodiversity of local vegetation, they have also brought a second trauma to this already damaged land, introducing a new threat to this important water source region.

5.4.2 Factories giving way to houses – risks of profiteering from improper land use

In September 2011, news media reported that developers in the Huizhou City IR-Park had, without permission, violated land-use permits by building a golf course and residential villas.88 In Heyuan’s planned Linjiang Industrial Park Logistics Area, where construction of approved facilities has not yet begun, residential villas are already available for public purchase.89 Adjacent to the Xingang fishing village, the Guojigongguan luxury villa community is being built directly on the shores of the vitally important Wanlvhu Reservoir. The developers of this community have even enclosed a large area of the reservoir, turning it into a private scenic lake.90
These examples reveal another problematic facet of the IR-Parks that is springing up all over Guangdong: administrators taking advantage of the relocation policy to enjoy the high profit margins of residential real estate. In this process, farmers who have been displaced under the banner of industrial relocation have not only been denied the chance to find employment in a new factory, they've become unwitting victims in the process of widening the chasm between rich and poor. Such land-use violations reflect a deeper unfairness in society, a hidden danger that may become yet another cause of social instability.

The high profits earned from real estate create an extremely short-lived boost in taxes and prosperity, just enough to reflect positively on government officials' GDP targets for promotion. This boost does not bring long-term prosperity, nor does it contribute to the average citizen's happiness or wealth. Simply put, profits from manipulation of land-use policy are unsustainable. At most, they are a one-off boost to the local economy.

5.5 Uneven quality of IR-Parks

It is undeniable that some IR-Parks in Guangdong, such as the Zhongshan (Heyuan) Industrial Relocation Park, have been well planned and well managed. All of the businesses that have entered that park were carefully selected to meet the requirements. These businesses have received high levels of attention as well as high levels of regulation.

Unfortunately parks like Zhongshan are not typical. Government officials from all levels visit, investigate, and write reports on model IR-Parks, while the problems and lessons of most other IR-Parks are rarely analysed or reported.

As Heyuan's Environmental Protection Bureau has limited human resources for examining environmental impact assessments, it is very hard to safeguard Heyuan’s environment.

More energy should be spent on investigating and regulating the factories located outside of the model IR-Parks, especially those operating in county, town, and district-level IR-Parks.

5.6 Governmental participation or governmental interference?

The Guangdong Provincial Government realised early on that industrial upgrading would be the key to solving the PRD's predicament. Therefore, its first goal was to move labour-intensive industries out of the PRD.

In the past five years, the government has repeatedly promulgated documents pushing forward the relocation effort, simultaneously emphasising the importance of GDP growth targets and targets for the number of relocation projects. The government's actions induced local governments to work hastily and pursue short-term gains. Some local governments have been especially negligent with respect to environmental issues, failing to complete environmental impact assessments for IR-Parks and failing to construct wastewater treatment facilities.
On the one hand, the recent period of high-intensity, high-frequency policymaking has brought nearly RMB1 trillion in relocation-related investment to Guangdong’s less-developed target areas. But on the other hand, it has led to the construction of numerous IR-Parks, large and small, that lack the necessary facilities and infrastructure, creating a number of isolated industrial islands. Many relocated businesses are finding that they now lack access to the upstream and downstream linkages crucial for their operations.

In its effort to create more “GDP miracles”, the government may actually strangle the market’s natural process of obsolescence, creating barriers to industrial upgrading and transformation. Leaders of target locations act only to meet administrative quotas for industrial relocation projects, thereby artificially hastening the relocation process; policymakers are thus improperly interfering in the market.

In a situation that lacks both market-based checks and balances and legal regulation, the attraction of businesses and capital incentivised by government officials creates artificial interference in the market, causing industrial adjustment to stray from the path of scientific development and giving rise to new imbalances in industrial structure.

5.7 “Three antis” and “Four news”

To promote industrial relocation, Heyuan introduced the “Three antis” (anti-traditional development paths, anti-operation according to economic cycles, and anti-transfer of gradient industries) and “Four news” (new electronics, new energy, new materials, new pharmaceuticals). In summary, these concepts reflect Heyuan’s ostensible goal of “creating mountains of wealth while preserving clear waters and green mountains”. Heyuan is aware that the natural environment is Heyuan’s greatest advantage, and that it must avoid “polluting first, cleaning up later”.

Heyuan has held out its advantageous resources such as high quality quartz and clay mines as “new energy” and “new materials” in order to attract high-tech businesses and investment. In doing so, the desire for “mountains of wealth” and “clear waters, green mountains” has already sunken into the trap of not being able to have one’s cake and eat it too. Which path Heyuan chooses will not only be a test of the municipal government’s wisdom, it will also challenge the Guangdong Provincial Government's courage and foresight.
Guangdong's Industrial relocation and Hong Kong

The National Development and Reform Commission’s *PRD Regional Reform and Development Planning Outline (2008-2020) (Outline Plan)* published in December 2008 provides a guide to China’s policy for the industrial transformation of the PRD, including Hong Kong and Macau.94

The relocation of industries in Guangdong has a major impact on Hong Kong manufacturers with factories in the PRD. The Federation of Hong Kong Industries sees the *Outline Plan* as placing Hong Kong businesses in an uncertain position. On the one hand, policymakers wish to see closer cooperation between Guangdong and Hong Kong but on the other hand, traditional manufacturing, which includes many longstanding Hong Kong SMEs, may well be squeezed out.95

Moreover, the PRD is the home to many industrial clusters that make up whole supply chains, such as for the clothing, apparel, shoes, electrical and electronics sectors, some aspects of which are highly polluting. When a particular factory is relocated away from a cluster, the transport costs and time delays affect the rest of the chain. In relocating, Hong Kong-owned factories are further away from their suppliers and buyers, but staying may be temporary in any event if they are going to be forced out sooner or later.

There is a solution however – Hong Kong SMEs all along the supply chain must actively adopt cleaner production. They too have a responsibility to protect Hong Kong’s and the region’s water sources. Moreover, by upgrading with a proactive attitude they have a chance to regain their competitive edge.

China has enormous environmental problems, including in Guangdong. Cleaning up and preventing pollution is no longer just a technical matter. It is now seen as a part of central and local policies concerning social stability, the people’s well-being and the nation’s future. Thus, Hong Kong-owned businesses, which are part of many global supply chains, are expected to contribute to China’s industrial transformation as well.

Cleaning up provides an opportunity for those who are innovative and adaptable but for those unable to change, they may well not survive.96 Moreover, many multinational companies buying from China and Chinese state-owned enterprises are under greater scrutiny by Chinese and international NGOs to practise corporate social responsibility. Companies publicly listed in Hong Kong with major production on the mainland are also beginning to be watched by NGOs.
7 Policy Recommendations

7.1 Overall Policies for Guangdong and Heyuan

The shortage of water in Guangdong is already a fact of life. If the scale and pace of industrial relocation continues on its current momentum, the Dongjiang will face an inevitable crisis that will threaten Guangdong’s economic and social development. Single-minded pursuit of industrial relocation would be inconsistent with effective environmental management. The authorities must prioritise prevention ahead of falling back on restoration when damage is done.

The focus must be on pollution avoidance. To turn back from the brink of developing a Dongjiang River crisis, the authorities in Guangdong and Heyuan need to urgently adopt new policy principles that can guide specific measures. The policy principles should aim to achieve the following:

7.1.1 Give top priority to ecological security

The authorities must change their attitude and policies to give top priority to ecological health, thereby securing the ecosystem services that sustain long-term economic and social development. Thus, comprehensive ecological baseline investigations must be done in areas where industries have been relocated.

Development gains should not be measured by GDP growth alone. The decline in the health of ecosystems is a signal of unsustainable development. A negative shift in the baseline of an area’s freshwater aquatic ecosystems represents a danger to an area’s entire ecological security.

7.1.2 Defend Heyuan’s water

In light of the importance of Heyuan’s water resources to Guangdong and Hong Kong, the good health of its water resources must be maintained and reinforced as a top priority alongside tough and consistent enforcement. This requires the industrial relocation process to be comprehensively monitored with specific measures (see below).

Furthermore, with higher-tech industries, including the production of mobile phones and accessories (PCBs, batteries, power-cords, keypad coatings), manufacturers must be strictly regulated and monitored so that sustainable production can be achieved in Heyuan, as well as other water source areas.
7.1.3 Slow down industrial relocation

Industrial relocation must be done with the utmost care and at a speed and scale that is appropriate for important water source areas. By slowing down the process now, remedial and/or forward-looking measures can be put in place to enable:

(i) The authorities to investigate and record the locations where industries have moved to and assess their environmental and social impacts;

(ii) Thorough environmental auditing of all IR-Parks and for full environmental impact assessments to be conducted especially for IR-Parks at township, county and city levels; and

(iii) Adequate environmental infrastructures to be built, especially water supply, sewage and wastewater treatment facilities.

The Guangdong Provincial Government should help fund the building of environmental infrastructure, and to find ways to help businesses finance their environmental upgrade as a way of sharing the relocation costs involved. Financial assistance could be specific to environmental protection and given directly to businesses to comply with regulations.

7.1.4 Regulations, audits, monitoring, enforcement and accountability

It is unsatisfactory to continue to rely primarily on the willingness of businesses to comply with wastewater discharge regulations. The authorities need to create, improve and implement a chain of regulatory measures to ensure that:

(i) Regulatory standards are high enough to adequately protect water sources and ecosystem health, and where standards are not adequate they need to be tightened;

(ii) Special attention should be paid to pollution arising from higher-technology industries, such as IT and electronics manufacturing, that creates heavy metal pollution;

(iii) Regular monitoring and audits of industrial enterprises must be conducted to give vital information to the authorities for proper enforcement;

(iv) Sensitive water source regions, including Heyuan, must strictly enforce central and provincial pollution discharge standards and require strict compliance with total pollution discharge limits;

(v) Legal liability for pollution must be set high enough to be a deterrent to businesses polluting, and for liability to also fall upon the directors and senior executives of the offending enterprise;
(vi) Regulatory officials and agencies failing to enforce the law also need to be held responsible (within the Chinese system, individual officials may face administrative and party disciplinary action, and the negligent agency may face fines); and

(vii) Guangdong provincial authorities should consider whether to take back some supervisory and project approval powers from local agencies in order to strengthen enforcement and deal with local protectionism that have too often weakened higher level authority.

7.1.5 Transparency and public participation

Official sanctions against polluters and negligent bureaucrats, as noted above, can be coupled with introducing transparency so that citizens, the media and NGOs can help to play a part in exposing law-breaking and local protectionism.

The health of local ecosystems and industrial relocation are intertwined with the interests of the people. By mobilising citizens, the media and NGOs to assist in exposing problems, the authorities can strengthen their capacity to regulate, gain the trust of the people, and at the same time improve corporate social responsibility.

The Guangdong authorities can:

(i) Release data on discharges, IR-Parks, audits, environmental impact assessments, monitoring results, and charges and penalties for offences relating to industrial relocation through a comprehensive, easy-to-navigate, regularly updated and publicly accessible web-based information platform; and

(ii) Design a process to invite residents to play an active role in monitoring local conditions.

7.2 Hong Kong-Guangdong cooperation

While Guangdong has many responsibilities within its own jurisdiction, Hong Kong on its own should explicitly accept responsibility to do what it can to contribute to cleaning up. Hong Kong and Guangdong should become ever closer partners in actualising sustainable development because their socio-economic fate is closely tied. There are now regular government-to-government exchanges and cooperation agreements that enable them to explore many issues of mutual interest although water management has yet to gain high policy attention (as air quality management has achieved).

Important steps going forward can include the following five measures.
7.2.1 Using the existing framework as the dialogue platform

Framework Agreement signed in April 2010 provides the basis for closer cooperation between Hong Kong and Guangdong.98 and it could be used as the dialogue platform for creating a way to protect water sources and enhance ecological security.

The Framework Agreement is designed to promote joint socio-economic development in Hong Kong and Guangdong to create a new economic zone. It envisages capitalising on Guangdong’s competitiveness with Hong Kong’s global business edge to upgrade production in the region.

Specific policies include focusing on upgrading and restructuring Hong Kong-owned processing enterprises, as well as building “a regional ecology and environmental protection regime” that is at the forefront of national standards.99 The Framework Agreement also makes reference to expanding Hong Kong’s Cleaner Production Partnership Programme financed by the HKSAR Government.100

Following on from the Framework Agreement, the authorities of Guangdong, Hong Kong and Macau jointly published the consultation document,101 Regional Co-operation Plan on Building a Quality Living Area, in September 2011, which proposes many positive measures to establish “a clean and safe ecological system and natural environment” in regional terms, including many ideas on improved water pollution control and water basin management.

However, the potential environmental risks of industrial relocation within Guangdong are not emphasised, and in terms of improved water management, the Dongjiang was only very lightly mentioned.102 Hong Kong and Guangdong should specifically explore the better management of water sources in the Greater PRD, especially the Dongjiang, so that the “regional ecology and environmental protection regime” envisaged in the Framework Agreement and repeated in the consultation document can be properly defined and implemented as a matter of priority along the lines noted above.103

Guangdong Provincial Government and HKSAR Government may consider establishing “The Greater PRD Total Water Management Dialogue Platform” under the existing Framework Agreement. Trial could be done in Dongjiang watershed first to explore methods of cross-border cooperation to promote comprehensive watershed managements and to enhance ecological security.

7.2.2 Reviewing the Clean Production Partnership Programme in 2013

Hong Kong’s incoming administration on 1 July 2012 will have the opportunity to review the five-year Cleaner Production Partnership Programme in 2013, to consider how it can be improved, and to work with the Guangdong authorities as well as business associations to target protection of the Dongjiang water sources.
7.2.3 Reconfigure Dongjiang’s water basin management

It is practical to reconfigure Dongjiang’s water basin management – or at least create a dialogue platform for all the relevant agencies from Jiangxi, Fujian and Guangdong through which the Dongjiang flows.

The Dongjiang’s source is not under the management scope of the Pearl River Waterworks Committee because the headwaters are located in Jiangxi Province. Its management falls within the scope of the Changjiang Waterworks Committee even though the Dongjiang is not part of the Changjiang River Basin.

Moreover, the portion of the Dongjiang that flows through Guangdong is managed by the Dongjiang River Management Bureau (a provincial level agency), but this body’s function is separate from the Pearl River Waterworks Committee even though the Dongjiang is a major tributary of the Pearl River Basin.

The Guangdong authorities should lead the effort to reconfigure the management of the entire Dongjiang water basin to follow ecological instead of political delineations. If this is politically too challenging, Guangdong can initiate an exchange with Jiangxi, Fujian and Hong Kong (a buyer of Dongjiang water) to establish a dialogue platform to explore how to connect the economically poorer upstream areas with the wealthier downstream areas in order for the richer areas to compensate the poorer areas for efforts to protect water sources for the benefit of all.

Such a move could also be the forerunner to enabling the whole of the Pearl River watershed to move towards whole-basin management,\(^{104}\) which is an aspect that can be incorporated into the Regional Co-operation Plan on Building a Quality Living Area vision noted above.\(^{105}\)

7.2.4 Learn from overseas experience of industrial relocation

Hong Kong and Guangdong can learn from the successes and failures of other jurisdictions on industrial relocation. Appendix 4 provides examples from North and South America, as well as within Asia.

7.2.5 Joint requirement on environmental information disclosure for listed companies

Hong Kong and Shenzhen stock exchanges can require listed companies to announce environmental violations and penalties.

The Framework Agreement provides for the enhancement of Hong Kong’s position as an international financial centre. It envisages facilitating the flow not only of people, capital and products across the boundary but also information.
The governments and financial regulators on both sides can discuss specific work plans through the Hong Kong-Guangdong Co-operation Joint Conference and other relevant platforms. The Expert Group on Hong Kong-Guangdong Financial Co-operation has had various exchanges on a variety of issues, and it is a stated goal to encourage more Guangdong enterprises to list in Hong Kong. Moreover, the Hong Kong and Shenzhen stock exchanges have a general agreement signed in 2009 to cooperate.106

These various efforts can be expanded to include measures for the Hong Kong and Shenzhen stock exchanges to require listed companies and their subsidiaries to notify the exchanges of environmental violations committed within China and elsewhere. The disclosure should include all relevant details on the violations, follow-up remedial measures and penalties. The exchanges can also require companies wishing to launch Initial Public Offerings to disclose their environmental records relating to the number and nature of violations, remedial measures, penalties and liabilities.107
Appendix 1
A Survey of Province-level Industrial Relocation Parks

Guangdong's province-level IR-Parks are development areas, industrial parks, high-tech industry development areas, and other areas of land set aside in land-use plans for industrial relocation, that have been approved by the State Council and the Guangdong Provincial Government. These IR-Parks are located in Guangdong's east and west wings and mountainous north, and all or part of their land area is developed under cooperative agreements between local governments in the PRD and the target locations.

Requirements for the approval of province-level IR-Parks:108

- **Land use:** The ownership of land rights is clear, and land use has been approved according to law. The land area of the planned IR-Park is 400 hectares or greater, and the first phase of development uses 50 hectares or more. Compensation for land expropriation has been completed, and land taxes have been paid according to national regulations.

- **Infrastructure requirements:** A report including the plan for the industrial park and feasibility study has been completed; a regional environmental impact assessment report has been completed; the industrial park must already possess certain infrastructure and have set aside additional funds for infrastructure construction. Additionally, efforts to attract investors and businesses have already begun according to the plan for the industrial park and the cooperation agreement.

- **Management system:** The two local governments who are parties to the cooperation agreement have also come to an agreement regarding the joint promotion of relocation to the park; have created a system for holding joint conferences; have set policies regarding the development of the park; and have clearly set out a method for allocating economic interests in the park. Additionally, the management structure of the park has been clearly defined, including permanent offices and a set of management regulations for the park.
### Certified Province-Level IR Parks as of June 2011

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Name of IR-Park</th>
<th>Location</th>
<th>River Basin</th>
<th>Certification Date</th>
<th>Main Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shantou City IR-Park</td>
<td>Shantou City</td>
<td>Hanjiang</td>
<td>March 2009</td>
<td>Primarily manufacturing of electronics and IT equipment; secondarily, textiles and clothing.</td>
</tr>
<tr>
<td>2</td>
<td>Dongguan (Shaoguan) IR-Park</td>
<td>Shaoguan City</td>
<td>Beijiang</td>
<td>August 2008</td>
<td>Primarily mechanical equipment, electronics and IT, and toys; high-tech is encouraged, as well as labour-intensive industries such as food products, textiles and clothing.</td>
</tr>
<tr>
<td>3</td>
<td>Dongguan Dongkeng (Lechang) IR-Park</td>
<td>Shaoguan City, Lechang County</td>
<td>Beijiang</td>
<td>June 2006</td>
<td>Casting of mechanical parts; manufacture of furniture and clocks/watches.</td>
</tr>
<tr>
<td>4</td>
<td>Dongguan Dalingshan (Nanxiong) IR-Park</td>
<td>Shaoguan City, Nanxiong City</td>
<td>Beijiang</td>
<td>March 2010</td>
<td>Fine chemicals, including special coatings, special inks, and chemicals containing tree resins.</td>
</tr>
<tr>
<td>5</td>
<td>Dongguan Shilong (Shixing) IR-Park</td>
<td>Shaoguan City, Shixing County</td>
<td>Beijiang</td>
<td>December 2005</td>
<td>Manufacture of electronics, precision instruments, and mechanical equipment.</td>
</tr>
<tr>
<td>6</td>
<td>Zhongshan (Heyuan) IR-Park</td>
<td>Heyuan City</td>
<td>Dongjiang</td>
<td>September 2006</td>
<td>Mobile phones and associated electronics/IT parts; manufacture of machinery for mould-stamping.</td>
</tr>
<tr>
<td>7</td>
<td>Shenzhen Futian (Heping) IR-Park</td>
<td>Heyuan City, Heping County</td>
<td>Dongjiang</td>
<td>April 2007</td>
<td>Primarily manufacture of clocks/watches and electronics/IT; secondarily, bags/purses, clothing, pharmaceuticals, electronics, and fine chemicals.</td>
</tr>
<tr>
<td>8</td>
<td>Shenzhen Luohu (Heyuan Yuancheng) IR-Park</td>
<td>Heyuan City, Yuancheng District</td>
<td>Dongjiang</td>
<td>June 2008</td>
<td>Energy-conserving electronics and appliances, primarily high-end industries.</td>
</tr>
<tr>
<td>9</td>
<td>Shezhen Nanshan (Longchuan) IR-Park</td>
<td>Heyuan City, Longchuan County</td>
<td>Dongjiang</td>
<td>November 2008</td>
<td>Electronics, communications and related industries.</td>
</tr>
<tr>
<td>10</td>
<td>Guangzhou (Meizhou) IR-Park</td>
<td>Meizhou City</td>
<td>Hanjiang</td>
<td>October 2006</td>
<td>Manufacture of automotive parts and accessories, communications/electronics equipment, electrical/mechanical equipment, and metal products.</td>
</tr>
<tr>
<td>11</td>
<td>Dongguan Shijie (Xingning) IR-Park</td>
<td>Meizhou City, XingningCity</td>
<td>Hanjiang</td>
<td>September 2006</td>
<td>Automotive parts and accessories; mechanical hardware.</td>
</tr>
<tr>
<td>12</td>
<td>Dongguan (Huizhou) IR-Park</td>
<td>Huizhou City</td>
<td>Dongjiang</td>
<td>February 2007</td>
<td>Primarily, electronics/IT, clothing assembly and processing, new construction materials; secondarily, light</td>
</tr>
<tr>
<td>Serial Number</td>
<td>Name of IR-Park</td>
<td>Location</td>
<td>River Basin</td>
<td>Certification Date</td>
<td>Main Industries</td>
</tr>
<tr>
<td>---------------</td>
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</tr>
<tr>
<td>13</td>
<td>Dongguan Fenggang (Huidong) IR-Park</td>
<td>Huizhou City, Huidong County</td>
<td>Dongjiang</td>
<td>October 2006</td>
<td>Manufacturing of electronics/IT, clothing (shoes), and advanced mechanical equipment.</td>
</tr>
<tr>
<td>14</td>
<td>Shenzhen (Shanwei) IR-Park</td>
<td>Xianwei City</td>
<td>Hanjiang</td>
<td>September 2009</td>
<td>Manufacturing of electronics/IT, marine products, and energy-related products.</td>
</tr>
<tr>
<td>15</td>
<td>Jiangmen IR-Park</td>
<td>Jiangmen City</td>
<td>Xijiang</td>
<td>June 2009</td>
<td>Electronics/IT, hardware/mechanical, textiles/clothing (not including dyeing and other polluting steps).</td>
</tr>
<tr>
<td>16</td>
<td>Guangzhou (Yangjiang) IR-Park</td>
<td>Yangjiang City</td>
<td>Marine coast of western Guangdong</td>
<td>May 2009</td>
<td>Shipping port industries, advanced manufacturing, non-staple food processing.</td>
</tr>
<tr>
<td>17</td>
<td>Zhongshan Huoju (Yangxi) IR-Park</td>
<td>Yangjiang City, Yangxi County</td>
<td>Marine coast of western Guangdong</td>
<td>December 2005</td>
<td>Light textiles/clothing (primarily shoe manufacturing), electronics/hardware.</td>
</tr>
<tr>
<td>18</td>
<td>Foshan Chancheng (Yangdong Wanxiang) IR-Park</td>
<td>Yangjiang City, Yangdong County</td>
<td>Marine coast of western Guangdong</td>
<td>September 2006</td>
<td>Hardware/mechanical, automotive and motorcycle accessories, manufacture of nuclear power equipment, new materials, furniture.</td>
</tr>
<tr>
<td>19</td>
<td>Dongguan Chang’an (Yangchun) IR-Park</td>
<td>Yangjiang City, Yangchun County</td>
<td>Marine coast of western Guangdong</td>
<td>May 2007</td>
<td>Electronics/electrical appliances, mechanical, clothing.</td>
</tr>
<tr>
<td>20</td>
<td>Guangzhou (Zhanjiang) IR-Park</td>
<td>Zhanjiang City</td>
<td>Marine coast of western Guangdong</td>
<td>March 2009</td>
<td>Advanced manufacturing including petrochemical, iron/steel and associated industries.</td>
</tr>
<tr>
<td>21</td>
<td>Foshan Shunde (Lianjiang) IR-Park</td>
<td>Zhanjiang City, Lianjiang City</td>
<td>Marine coast of western Guangdong</td>
<td>February 2007</td>
<td>Home appliances (rice cookers).</td>
</tr>
<tr>
<td>22</td>
<td>Shenzhen Longgang (Wuchuan) IR-Park</td>
<td>Zhanjiang City, Wuchuan City</td>
<td>Marine coast of western Guangdong</td>
<td>August 2007</td>
<td>Light industry, electronics, toys, clothing.</td>
</tr>
<tr>
<td>23</td>
<td>Zhuhai (Maoming) IR-Park</td>
<td>Maoming City</td>
<td>Marine coast of western Guangdong</td>
<td>February 2009</td>
<td>Products associated with petrochemicals, fine chemicals, industries associated with high-technology and intensive processing.</td>
</tr>
<tr>
<td>24</td>
<td>Dongguan Dalang (Xinyi) IR-Park</td>
<td>Maoming City, Xinyi City</td>
<td>Marine coast of western Guangdong</td>
<td>September 2006</td>
<td>Wool textiles, electronics and appliances, clothing, paper products.</td>
</tr>
<tr>
<td>25</td>
<td>Guangzhou Yunjianngao (Dianbai) IR-Park</td>
<td>Maoming City, Dianbai County</td>
<td>Marine coast of western Guangdong</td>
<td>June 2006</td>
<td>Processing of aquatic products, fragrances, post-processing of ethylene, medical devices.</td>
</tr>
</tbody>
</table>

Liquid Assets II - Industrial Relocation in Guangdong Province: Avoid Repeating Mistakes
<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Name of IR-Park</th>
<th>Location</th>
<th>River Basin</th>
<th>Certification Date</th>
<th>Main Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Zhongshan (Zhaoqing Dawang) IR-Park</td>
<td>Zhaoqing City</td>
<td>Xijiang</td>
<td>July 2008</td>
<td>New metal materials, electronics/IT, manufacture of automobiles and motorised vehicles, manufacture of advanced equipment.</td>
</tr>
<tr>
<td>27</td>
<td>Zhongshan Dayong (Huaiji) IR-Park</td>
<td>Zhaoqing City, Huaiji County</td>
<td>Xijiang</td>
<td>January 2007</td>
<td>Panel furniture, metals processing, clothing/shoes, automotive accessories, electronics assembly, non-staple food processing.</td>
</tr>
<tr>
<td>28</td>
<td>Shunde Longjiang (Deqing) IR-Park</td>
<td>Zhaoqing City, Deqing County</td>
<td>Xijiang</td>
<td>November 2006</td>
<td>Plastic products, automotive accessories, lighters, furniture</td>
</tr>
<tr>
<td>29</td>
<td>Foshan (Qingyuan) IR-Park</td>
<td>Qingyuan City</td>
<td>Beijiang</td>
<td>January 2008</td>
<td>Manufacture of mechanical parts and electronics/IT</td>
</tr>
<tr>
<td>30</td>
<td>Foshan Chancheng (Qingxin) IR-Park</td>
<td>Qingyuan City, Qingxin County</td>
<td>Beijiang</td>
<td>February 2009</td>
<td>Primarily, new construction materials, textiles/clothing, advanced manufacturing; secondarily, manufacture of metal products, communications equipment, computer and other electronic equipment, specialised equipment.</td>
</tr>
<tr>
<td>31</td>
<td>Foshan Shunde (Yingde) IR-Park</td>
<td>Qingyuan City, Yingde City</td>
<td>Beijiang</td>
<td>January 2011</td>
<td>Primarily, light industry; secondarily, assembly of electronics and appliances, manufacture of mechanical equipment.</td>
</tr>
<tr>
<td>32</td>
<td>Shenzhen (Chaozhou) IR-Park</td>
<td>Chaozhou City</td>
<td>Hanjiang</td>
<td>September 2007</td>
<td>Manufacture of electronics/IT equipment, energy industry located near ports, Chaozhou ceramics, wedding gowns and formal wear.</td>
</tr>
<tr>
<td>33</td>
<td>Zhuhai (Jieyang) IR-Park</td>
<td>Jieyang City</td>
<td>Hanjiang</td>
<td>June 2008</td>
<td>Hardware/stainless steel, mechanical/electronics, strategic new industries.</td>
</tr>
<tr>
<td>34</td>
<td>Foshan (Yunfu) IR-Park</td>
<td>Yunfu City</td>
<td>Xijiang</td>
<td>March 2009</td>
<td>Manufacture of specialised mechanical equipment, processing of metallic materials and manufacturing of metal products, new materials.</td>
</tr>
<tr>
<td>35</td>
<td>Foshuan Shunde (Yunfu Xinxing Xincheng) IR-Park</td>
<td>Yunfu City, Xinxing County</td>
<td>Jiangxi</td>
<td>April 2006</td>
<td>Stainless steel products, hardware and mechanical industries.</td>
</tr>
</tbody>
</table>
Appendix 2
Main Content of Guangdong Province's Industrial Relocation Policies

1. Guangdong Province's Development Goals for Industrial Relocation\textsuperscript{110}

- By 2012, strive for a significant improvement in the Pearl River Delta in terms of its layout and functioning level, including an observable optimisation in industrial structure; plan one or two more large-scale IR-Parks based on experiences from operating the existing IR-Parks in the east and west wings and the mountainous north; form relocated industrial clusters with sensible layouts, distinct specialisations, and economies of scale; push Guangdong’s competitiveness to the highest in the nation.
- Amply develop human resources, raise the overall quality of the labour force, comprehensively optimise hiring structures, raise the employment rate of the province, realise a significant increase in the number of rural workers employed in urban secondary and tertiary industries. Increase the number of relocated rural workers by 6 million, organise technical training for 3.6 million people, raise the percentage of non-agricultural employment to 80% of total employment in the province. Significantly decrease the number of labour-intensive industries in the Pearl River Delta, and realise growth in per capita economic output that is at least 2 percentage points higher than growth in total economic output.

2. Main industries to be relocated to the east and west wings and the mountainous north:\textsuperscript{111}

- Eastern Guangdong (Shantou, Shanwei, Chaozhou, Jieyang): Textiles and clothing, electronic products, shoes, toys, ceramics, petrochemical processing, electrical power equipment manufacturing, electronics/IT, shipping logistics, leather, pharmaceuticals, food products and drinks, biological industries, hardware and stainless steel.
- Western Guangdong (Zhanjiang, Maoming, Yangjiang): Manufacturing of home appliances, hardware and stainless steel products, petrochemical processing, shipping logistics, iron and steel, processing of agricultural and marine products, papermaking, pharmaceuticals, electronics, mechanical equipment manufacturing, textiles, plastic products, synthetic fibres, and the processing and comprehensive utilisation of the region’s natural resources.
- Guangdong’s mountainous north (Shaoguan, Heyuan, Meizhou, Qingyuan and Yunfu): Metallurgy and intensive processing, mechanical equipment, automobiles, automotive parts and accessories, electronic communications and equipment, clock/watch manufacturing, fine chemicals, hardware, construction materials, non-metal mineral products (concrete), forestry, tobacco processing, pharmaceuticals, toys, shoes, aluminium foil, stainless steel products, furniture, processing of agricultural products and food products, textiles/clothing, other processing or raw materials and labour-intensive industries.
3. **Structural diagram of Guangdong Province's Industrial Relocation Policies through July 2011.**

<table>
<thead>
<tr>
<th>Document title</th>
<th>Document number</th>
<th>Promulgating body</th>
<th>Main functions</th>
<th>Date promulgated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First round of industrial relocation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulations on Certification of Guangdong Province’s IR-Parks</td>
<td>粤经贸工业[2005]582号</td>
<td>Economy and Trade Committee of Guangdong Province</td>
<td>IR-Park management: establishment of standard IR-Park management practices</td>
<td>2005.8.1</td>
</tr>
<tr>
<td>Guidelines for supporting the use of land for IR-Parks</td>
<td>粤府办[2005]72号</td>
<td>The Office of the People’s Government of Guangdong Province, Provincial Land Use Resources Bureau</td>
<td>Land-use policies and support regulations for the physical establishment of IR-Parks</td>
<td>2005.9.1</td>
</tr>
<tr>
<td>Guangdong Province’s Regulations on the use and management of provincial funds for subsidising the construction of infrastructure surrounding IR-Parks</td>
<td>粤财工[2005]258号</td>
<td>Department of Finance of Guangdong Province, Economy and Trade Committee of Guangdong Province</td>
<td>Detailed implementation of financial subsidies</td>
<td>2005.12.07</td>
</tr>
<tr>
<td>* Trial guidelines for the strengthening of the joint promotion of environmental protection work in the industrial relocation effort by the east and west wings, the mountainous north, and the Pearl River Delta</td>
<td>粤府办[2006]14号</td>
<td>The Office of the People's Government of Guangdong Province</td>
<td>Sets out regulations regarding the environmental problems arising from industrial relocation</td>
<td>2006.03.09</td>
</tr>
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<td>Document title</td>
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<td>* Guidelines for Guangdong Province’s Industrial Relocation Regional Deployment</td>
<td>粤经贸工业[2008]385号</td>
<td>Economy and Trade Committee of Guangdong Province</td>
<td>Plans for the entire province’s overall industrial relocation deployment</td>
<td>2008.05.28</td>
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<td>Trial Regulations for Performance Evaluations of meeting industrial and labour relocation goals</td>
<td>粤经贸工业 [2008]386号</td>
<td>Economy and Trade Committee of Guangdong Province, Labour and Social Security Department of Guangdong Province</td>
<td>Sets out in detail the standards for evaluating the performance of every level of government in promoting dual relocation</td>
<td>2008.05.28</td>
</tr>
<tr>
<td>* Guidelines on IR-Park construction and accelerating industrial relocation</td>
<td>粤府[2009]54号</td>
<td>People’s Government of Guangdong Province</td>
<td>1. Emphasises the different efforts regarding promotion of industrial relocation, strengthens policy support; 2. Sets out regulations targeting problems with IR-Park infrastructure construction, particularly the lag in environmental facilities</td>
<td>2009.6.16</td>
</tr>
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<td>Management Guidelines for Guangdong Province’s IR-Parks</td>
<td>粤经信园区 [2010]649号</td>
<td>Economic and Information Commission of Guangdong Province</td>
<td>Improves the management of IR-Parks</td>
<td>2010.7.14</td>
</tr>
<tr>
<td>* Guidelines on the task of advancing the promotion of industrial relocation</td>
<td>粤府办[2010]61号</td>
<td>The Office of the People’s Government of Guangdong Province</td>
<td>Increases the scale of IR-Parks, addresses the issues of cooperative joint construction, attracting investment, environmental planning, and policy support</td>
<td>2010.11.9</td>
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<td>Trial regulations on the promotion and demotion of Guangdong Province's IR-Parks</td>
<td>粤办函[2011]187号</td>
<td>The Office of the People's Government of Guangdong Province</td>
<td>Strengthens the performance evaluation management of province-level IR-Parks, strengthens incentives</td>
<td>2011.4.11</td>
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<td>Guidelines for advancing the promotion of IR-Parks' cooperative joint construction work</td>
<td>粤府函[2011]198号</td>
<td>People's Government of Guangdong Province</td>
<td>Encourages the market-based operation of IR-Parks and the separation of government and enterprises; sets out various models and regulations for encouraging IR-Parks to cooperate and jointly construct.</td>
<td>2011.7.11</td>
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(* asterisk indicates document containing specific environmental protection provisions)
Appendix 3.
Brief descriptions of water-related infrastructure in IR-Parks

- Provision and discharge of water: IR-Parks and nearby residential areas both need tap water supplies and water discharge facilities. In the IR-Park design and planning process, builders estimate the water consumption of the IR-Park and use those estimates to design the discharge system and the water pipe network. Guangdong Province's relevant regulations require that IR-Parks' water provision and discharge systems “separate clean water from wastewater, separate rainwater from wastewater, and recycle used water”. If IR-Parks neglect to build appropriate water provision and discharge systems, not only will the upstream water resources be severely wasted, there will be a high risk of pollution events.

- Wastewater facilities: According to regulations, IR-Parks must centrally treat wastewater from factories to reduce the cost of treatment. Wastewater facilities in IR-Parks primarily consist of wastewater treatment plants and their accompanying pipe networks. The design and deployment of wastewater treatment facilities must account for the different types of pollutants in domestic wastewater and industrial wastewater, and include treatment systems that target the pollutants discharged in each particular IR-Park. Since IR-Parks' wastewater treatment plants are the last line of defense before discharge into the ecosystem, the quality of the water discharged from these plants must be carefully monitored in order to guard against lapses in treatment.

- Rainwater drainage and flood prevention facilities: Many IR-Parks are located in areas that receive heavy rainfall. Rainwater drainage facilities are not only necessary for basic disaster prevention, but when properly designed they also prevent IR-Parks' surface pollutants from being washed into nearby rivers.

Solid waste treatment: Solid waste produced by IR-Parks includes industrial solids, hazardous wastes, and domestic garbage. IR-Parks must have disposal solutions for all different types of solid waste, or else these solid wastes will become additional sources of water pollution.
Appendix 4.
Industrial Relocation Practices in China and Internationally

(a) Industrial Relocation in Latin America

The promulgation of the North American Free Trade Agreement (NAFTA) in 1994 spurred the relocation of factories from the United States to Mexico. It had become clear by the early 1990s that globalisation was resulting in an outflow of manufacturing from the United States to countries where labour and other costs were much lower. In an effort to keep manufacturing as geographically close as possible and simultaneously benefit its neighbours, the United States spearheaded NAFTA to lower trade barriers with Canada and Mexico.

At the same time, environmental awareness was gaining momentum in the US, and cities such as El Paso, Texas were beginning to take action to conserve resources and reduce pollution. To slow down the depletion of its aquifers and improve water quality, the city of El Paso instituted pricing policies and wastewater treatment requirements that raised the costs of operating factories in El Paso.

Although industrial relocation was not an active goal of the United States, the market factors described above resulted in a significant migration, from 1993 to 2000, of stonewashing (fabric processing) factories from El Paso, Texas to an area in Mexico called La Laguna. This migration of factories brought jobs to La Laguna, but also hastened the depletion of its groundwater and increased the amount of pollution in its hydrological system.

Due to the departure of the stonewashing industry, El Paso’s water use has decreased significantly, but it lost a large number of high-paying, low-skilled jobs. For El Paso, this may have been a blessing in disguise because it forced the government to invest in the creation of more service-based jobs.

Lessons from the North American experience:

• Relocation should take into account the natural resources and environmental capacities of both origin and destination. The relocated industrial processes must match the natural resources available in the destination. Government policies should also encourage the conservation of scarce resources.

• Although it is hard for business owners to admit, government policies encouraging water conservation are likely to be an important factor in convincing business owners to adopt more efficient equipment and processes.

• The government must consistently enforce its regulations to ensure business owners' good behaviour.
• From the perspective of business owners, the most convincing reason to upgrade equipment is to match the demands of customers. The smartest way to clean up industrial processes is to package cleaner processes with more efficient use of expensive inputs and the production of higher quality products.

(b) Industrial Relocation in Asia

Japan

Japan led industrialisation in Asia. By the 1960s, industrial activity had already expanded to the point that relocation became necessary. In the urban centres of many cities, poor planning and uncontrolled industrial expansion had created a situation with which both residents and factories were unhappy. On the one hand, residents complained of noise, air, and water pollution. On the other hand, factories were operating inefficiently because of bad traffic and lack of specialised industrial infrastructure. Therefore, the government began to build IR-Parks and impose more rational city planning.

To encourage relocation into the new IR-Parks, the government offered many enticements to business owners such as 3 to 5 year exemptions for property, business income, and construction taxes; compensation for the sale or lease of abandoned factory sites; provision of public funds as low-interest loans for relocation expenses; and provision of public funds for shared infrastructure such as roads and joint facilities.

The government also imposed some environmental requirements, such as the building of green belts as buffer zones between IR-Parks and surrounding areas; the building of industrial wastewater treatment facilities; requiring all tenants to submit detailed pollution control plans; and assisting tenant factories with similar industrial processes to build collective wastewater pretreatment plants to reduce costs and increase efficiency.

Industrial relocation in Japan appears to have been relatively successful. Cities are generally much more rationally planned and laid out now, with clean, comfortable residential areas and efficiently operating industrial areas.

Lessons learned from Japan’s experience:

- Rational zoning policies can maximise comfort for residents and maximise operational efficiency for businesses
- Rational classification of industries and grouping of similar factories can create logistical and environmental efficiencies.

Korea

Through the early 1970s, heavy industry was spread across several cities in South Korea, but during that decade, the South Korean Government started to concentrate heavy and chemical industry in Ulsan in order to reap the benefits of economy of scale.

Onsan Industrial Park, a national-level development in Ulsan, was established in 1974 and in 2002 contained 214 relocated firms in industries such as petrochemicals, non-ferrous metals, and timber. Relocation policies focused on financial benefits to the business owners and
neglected other considerations such as environmental protection and the interests of local residents and landlords.

Pollution in Onsan became so severe in the 1970s and 1980s that pollution-related illness became known as Onsan Disease in South Korea. In the mid-1980s, the government spent about US $100 million to relocate and compensate about 8,000 households who had been living in the most heavily polluted areas.

Starting in the 1980s, the government started implementing volume-based fees for emissions and waste disposal. These polluter-pay policies, as well as regulations requiring factories to install waste treatment facilities and upgrade to cleaner industrial processes, have resulted in improved air and water quality since the 1990s.

Initially, policymakers made several errors that contributed to Ulsan's environmental disaster. First, the interests of factory owners were emphasised at the expense of environmental considerations. Next, there was no effective zoning, which resulted in heavily polluting factories being placed next to residences. Finally, relevant stakeholders such as landlords and residents were not included in the planning process, creating a situation in which many of the people who were impacted had no voice in decision making.

Lessons learned from South Korea's experience:

- Environmental considerations are important from the beginning – the cost of cleanup and compensation is far greater than the cost of prevention.
- In the long run, it is better to spend time and resources at the planning stage rather than hastily executing a project.
- Decision making and planning must involve all parties who will be affected by the project.
- Intelligent classification and placement of factories can result in more favourable business and living conditions in the same amount of space.

**China**

In the past, China has been a “beneficiary” of international industrial relocation. By accepting relocated industries from developed countries around the world over the past 30 years, China's eastern coastal regions have simultaneously enjoyed rapid economic growth and suffered catastrophes caused by environmental pollution and overuse of resources. In recent years, the dramatic growth of China's economy and its consumer class has been accompanied by continuously increasing pressure on the environment. China's economic structure faces severe challenges, and calls to upgrade its industries become more strident by the day.

According to the “Guidelines of the State Council on Central and Western Regions’ Undertaking of Industrial Relocation”, industries located in China's eastern coastal regions (especially labour-intensive traditional manufacturing) are to be relocated en masse to inland regions and the far west.
As a pioneering region in China’s Reform and Opening Up efforts, Guangdong is now also a pacesetter for industrial relocation. As early as 2005, Guangdong began industrial relocation trials. In 2008, the government intensified its efforts, comprehensively encouraging the relocation of industries from the PRD to the province’s eastern and western “wings” and the mountainous north.\(^{119}\)

The Guangdong model will undoubtedly have profound effects on the entire country’s industrial relocation efforts.

**Hong Kong**

Guangdong's economic growth spurt was closely tied to Hong Kong's past industrial relocation activity.

After World War II, Hong Kong's economy shifted from re-export trade to assembly for export with a focus on light textiles. In the mid- to late 1970s, Hong Kong's economy again shifted, this time from assembly for export to manufacturing. Hong Kong's manufacturing labour force reached a peak in the mid-1980s. Around the world, the “Made in Hong Kong” label had gained recognition on products ranging from textiles and clothing, shoes and hats, to plastic products, electric motors, home appliances, and electronics. At that time, Hong Kong's local industrial development had reached a bottleneck due to limitations in land area, environmental capacity, labour, costs, and a number of other factors. New space for development was urgently needed.

At the same time, mainland China was in the midst of aggressively implementing its Reform and Opening Up policies, designating the Shenzhen Special Administrative Region as a target for Hong Kong companies' “head north” efforts and also promoting Dongguan as an important target region for relocation within the PRD. Hong Kong had long enjoyed the advantage of being ideally located as a re-export trading port, with direct access to international markets. Making use of these advantages, Hong Kong successfully upgraded itself from a centre of manufacturing to a centre of commercial services.\(^{120}\)

Relying on its strong free-market mechanisms, independent judicial system, relatively clean and honest government, and its highly talented workforce, Hong Kong was again able to upgrade its economic structure after the Asian financial crisis. Moving towards even higher value-added service industries, Hong Kong has successfully become an international capital for finance, logistics and services.
ENDNOTES


6. See note 3.

7. According to China’s standards for surface water quality, 《地表水环境质量标准》（GB3838-2002），there are five grades of water quality, each with distinct purposes and levels of protection. Grade III water is primarily used for centralised domestic and drinking water and stored in level two surface water protection areas. It is also used for wintering ponds for fish and shrimp, fish migration passages, other aquaculture purposes, and swimming areas. For details, see 国家环境保护总局, 国家质量监督检验检疫总局 (28 April 2002), 《中华人民共和国国家地表水环境质量标准》, 中国环境标准网, http://www.es.org.cn/download/35-1.pdf, 6 December 2011.


9. See note 3.

10. For the keeping of economic statistics, Guangdong Province’s cities are classified into the following regions: Pearl River Delta includes Guangzhou, Shenzhen, Zhuhai, Foshan, Jiangmen, Dongguan, Zhongshan, Huizhou and Zhaoping. The west wing includes Shantou, Shanwei, Chaozhou and Jieyang. The west wing includes Zhanjiang, Maoming and Yangjiang. The mountainous north includes Shaoguan, Heyuan, Meizhou, Qingyuan and Yunfu. Source: see note 3, the latest publicly available statistics.


According to China’s standards for surface water quality，《地表水环境质量标准》（GB3838-2002），there are five grades of water quality, each with distinct purposes and levels of protection. Grade I water is water at natural sources, located in national nature reserves. Grade II is used primarily for centralised domestic and drinking water supplies, stored in level one surface water protected areas. It is also used for habitats of rare aquatic species, spawning ponds for fish and shrimp, and growing ponds for fish fry.

See note 8 for a URL from which this document may be downloaded.

For example, adjacent to the province-level Hudieling IR Park in Dongyuan County are still many old industrial parks in operation. One of these, Xudong Industrial Park, is home to ceramics factories built over 10 years ago. They use outdated production methods and crude management systems, but they are nominally under the unified management of Hudieling IR-Park.


See Appendix 1: A Survey of Province-level Industrial Relocation Parks

Diagram compiled from above data sources by author Su Liu.


49 See note 45.

50 Ibid.

51 Ibid.

52 Heyuan City Government Statistics Bureau has only made public 2004 and 2005 data on Heyuan’s rate of meeting industrial wastewater discharge standards and penalty rates for industrial solid waste disposal.

53 See note 44.

54 As described by an employee of the Zhongshan (Heyuan) Wastewater Treatment Plant.

55 As described by management personnel of the Hudieling IR-Park.

56 See note 23.


61 Su Liu (March 2011), Risks of Intensification of Hydropower Development in Southwestern China:

See note 60.

Ibid.

Ibid.


July 2011.
87 Ibid.
89 See note 58.
90 See note 58.
91 Public Information Board of the Heyuan City Environmental Management Bureau.
92 See note 44.
94 See note 12.
96 The Framework Agreement on Hong Kong-Guangdong Cooperation follows on from the National Reform and Development Commission’s “Outline of the Plan for the Reform and Development of the Pearl River Delta” issued in December 2008 and promulgated in January 2009, see http://www.info.gov.hk/gia/general/201104/07/P201104070113.htm.
97 Ibid.
98 The Cleaner Production Partnership Programme (CPPP), a 5-year programme from 2008-09, was put in place by the HKSAR Government to assist HK-owned factories in Hong Kong and the PRD to adopt cleaner production technologies and processes. The HKSAR Government allocated HK$93.06 million to promote awareness, do on-site improvement assessment, support demonstration projects, and verify effectiveness of improvement projects. Since 2010, the CPPP includes reduction and control of effluent discharge.
100 Dongjiang was mentioned under “progressively exploring the implementation of an ecological compensation mechanism along the Pearl River basin” to be part of “a topical study on Dongjiang and Xijiang river basin” to examine the necessary policies. See The Regional Cooperation Plan on Building a Quality Living Area (Consultation Document). September 2011, page 27, http://www.info.gov.hk/gia/general/201109/01/P201109010129.htm.
102 The Framework Agreement includes an Infrastructure Construction Plan to implement the agreement on water supply and to jointly take forward the implementation of the protection measures under the Dongjiang Water Resources Allocation Scheme, which can be expanded to include whole basin management.
103 The Consultation Document proposed that the three parties (Guangdong, Hong Kong and Macau) will “explore the feasibility of and possible option for setting up long-term water resource and water environment coordination management mechanism among the six
provinces (regions) in the Pearl River basin as well as Hong Kong and Macao; and strengthen
water resource management in the Pearl River basin, including the implementation of a
centralised water distribution mechanism for all the areas of the river basin during dry seasons
so as to safeguard water supply to the cities in the Greater PRD”. See The Regional Cooperation
Plan on Building a Quality Living Area (Consultation Document). September 2011, pages 26-27,

They signed a closer cooperation agreement in 2009 to assist with the international fundraising
needs of Chinese enterprises and contributing to the development of the China’s economy.
For more details, see Hong Kong’s Role in Mending the Disclosure Gap, Civic Exchange and

Organised and compiled from information provided at the Economic and Information
Commission of Guangdong Province website. For details, see “各园简况,” 广东省经济贸易委

and its Implications for Trade and the Environment,” North American Symposium on
Understanding of Trade Linkages between Trade and Environment,

Kwon, C and S. Lee (27 August 2003), “The Experience of Industrial Relocation in Korean Cities
With Special Reference on Ulsan Metropolitan City,” Proceedings of Kitakyushu Initiative
Seminar on Industrial Relocation,

Kwon, C and S. Lee (27 August 2003), “The Experience of Industrial Relocation in Korean Cities
With Special Reference on Ulsan Metropolitan City,” Proceedings of Kitakyushu Initiative
Seminar on Industrial Relocation,

Inamura, M. (27 August 2003), “Relocation of Industries to Yokohama Kanazawa Industrial Park,”
Proceedings of Kitakyushu Initiative Seminar on Industrial Relocation,

and its Implications for Trade and the Environment,” North American Symposium on
Understanding of Trade Linkages between Trade and Environment,