



Chinese floating population: the reciprocal relationship between rural to urban migrant population and environmental concerns in Shenzhen, China.

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Abstract

In the significant migration cities of China, such as Shenzhen, large numbers of constantly in movement floating population of working settlers is said to have a severe impact on the ecological environment (Li, Zhang & Jiang et al., 2021). Called a 'malign tumour' by the population and the local government, they settle in vastly overcrowded settlements - urban villages where poor standards force the group to make poor environmental decisions. At the same time, due to their dire economic situation as urban poor, they become the subject to vulnerability in the face of harmful effects of environmental degradation. Poor environmental hygiene of this social group has a connection with their alienation from society and lack of integration in decision-making. This social dichotomy between rural migrants and urban citizens is better understood based on past policies such as the hukou household registration system. Current design policies toward ecological situation improvement support the hypothesis of floating population exclusion from decision making. Based on the above finding, suggestions for improving the floating population's position in the society, hence strengthening their role in addressing environmental concerns, are formed. Firstly mixed-income housing as an alternative to luxury redevelopments in place of urban villages can work towards better integration of rural migrant and urban citizens. Additionally, the policies aiming to bring awareness to migrant groups about the environment should be implemented together with the integration strategies.

Keywords: Floating population, internal migration, ecology, environmental concerns, rural-urban transformation

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* - primary source

Introduction

The brief span of an individual life is misleading. Each one of us is as old as the entire biological kingdom, and our bloodstreams are tributaries of the great sea of its total memory.

- J.G. Ballard, *The Drowned World*

Overview

1

chi. Shēnzhèn translates to shēn, “deep”, and zhèn to “irrigation ditch”.

2

A fragment from Story of Spring is a patriotic song from the early Chinese reform era. Written in 1992, it praises Chinese leader Deng Xiaoping, described in the piece as “an old man”. It alludes to economic reforms, but most importantly, it portrays the country’s spirit and government during that time, showcasing the ambitions and the unity of the leading party through widely propagated, melodic statements, easy to remember for a wider audience. The song also describes the leader’s tour to the southern part of China and the vision of Shenzhen as a miraculous “mountain of gold” drawn by Deng Xiaoping.

*“The year 1979

That was a spring

There was an old man

Drawing a circle by the South China Sea

Mythically building a great city

Miraculously forming a mountain of gold

Shenzhen! Shenzhen!”

- Story of Spring, 1993

(From Kairu Jaing, “Chuntian De Gushi” (The Story of Spring), 1993 in Du Juan, *The Shenzhen Experiment*

3

A Special Economic Zone is an area in a country that is subject to different economic regulations than other regions within the same country (Barone, 2022).

The level of urbanisation in China increased from 17.92% in 1978 (Xiao, Song & Wu, 2018) to 63.89% in 2020 (World Bank, 2020). The scale, high pace and radical erasure of agrarian settlements in favour of boosting the urban growth within the last 40 years have lifted the country from its previous global isolation and low-income status to a GDP of 14.7 trillion USD (World Bank, 2020) - the second-largest economy in the world. This growth in the last four decades reflects fundamental social and demographic changes in Chinese society (Liang & Ma, 2004) and, as the primary driver of urban development in the country (Qin & Liao, 2016), introduces environmental implications.

Shenzhen’s dynamic construction phase created high pressure on the environment in the last four decades. Due to the lack of appropriate policies, incoherent development of the city followed by the high concentration of nine industrial parks and manufacturing centres. At the same time, Shenzhen has been nominated as China’s low-carbon eco-demonstration city in 2010 (Vlassenrood, 2016) and has since implemented numerous strategies to improve its environmental situation. Despite that, Shenzhen still faces many challenges and points to the migrant population as a cause of the problem and malign tumour (chi. *du liu*) of the city planning to be eradicated from Shenzhen.

Due to its brief but dynamic history, Shenzhen has a close connection with migration and has the highest number of internal migrants across China (Gu & Ma, 2013). Lying adjacent to Hong Kong in Pearl River Delta, it used to accommodate around 2000 rural¹ and fishing villages (Fig.1-2). The unprecedented flow of migrant workers searching for life prospects in Shenzhen was primarily triggered by the implementation of Chinese Reforms and Opening Up, launched in December 1978 and led by the leader and ‘Chief Architect’ - Deng Xiaoping (Fig.3). One year later, the same man ‘drew a circle over the South China Sea’² and started one of the most economically successful Chinese projects - Shenzhen Special Economic Zone³ (SSEZ) - a ‘controlled experiment’ (Vlassenrood, 2016) and a new land of opportunities.

The focus on the environment in studying rural to urban migration and demographics should become an exciting point for urban planners and policymakers in the cities. This is due to increasing urbanisation and the migrant populations worldwide. With its complex ecological situation and the highest among China migrant population, Shenzhen has become an insightful case study in understanding the correlation between floating population and environmental concerns.



*Fig. 1-2

The map of the Sun-On District, Kwangtung Province; zoom in to present day Nanashan, Shenzhen area. Italian Misoner.1866. BMArchives, accessed February 17, 2022, <https://www.bmarchives.org/items/show/100203135>

The map was developed by Italian missionaries who explored the Canton region (also known as Kwangtung or Guangdong) in the second half of the 19th century. The map itself represents today's Hong Kong and Shenzhen's territory. It has to be noted that it was drawn from observations; thus, it might not be perfectly accurate in terms of borders and exact location and distances between certain villages



*Fig. 3

a. (top) Intensive farming (Pingshan). 1975. He Huangyou

b. (bottom left) Rural weir (Longgang). 1973. He Huangyou

All images were sourced here: <https://static.nfapp.southcn.com/content/201909/19/c2638076.html>



*Fig. 4

Comrade Deng Xiaoping in his South Investigation Tour to Shenzhen - poster. Designer unknown. 1992, December. Publisher: Lingnan meishu chubanshe. Accessed on March 17, 2022. <https://chinese posters.net/posters/e15-292>

Existing literature

In recent years, two significant studies have been conducted regarding the correlation between rural to urban migration and related pressure on the environment in Mainland China (Qin & Liao, 2016). Resulting discoveries regarding air and water pollution concerning internal migrants groups confirmed the correlation between growth in this portion of the population and increased pressure on the natural environment.

The relationship between the floating population and its environmental satisfaction in Shenzhen has been discussed in an example of a local community in the Shawan River Basin in Shenzhen (Gu et al., 2016). The study mainly focused on analysing the floating population's age, gender and occupation but did not provide enough insight into the impacts of the group on the environment. Internal migration's relationship with environmental concerns is gaining more interest among scholars in China and the United States (Qin et al., 2016; Rafiq et al., 2017; Pebley, 1998). However, not enough academic effort has yet been invested in understanding the complexity of environmental ramifications of rural-to-urban internal migration, focusing on the floating population and their environmental vulnerability due to social exclusion and insufficient economic position in the city of arrival⁴.

Research question & hypothesis

Therefore, this paper focuses on the reciprocal relationship between the floating population and the natural environment in Shenzhen, China, intending to suggest the importance of this social group in responding to the city's environmental challenges. It concentrates on the question of what role does floating population plays in creating and addressing those concerns as both the driver and the subject to vulnerability in the face of harmful effects of natural environment degradation. In effect, what policies can be introduced to see the floating population not only as a root cause but rather as the solution to this complex problem? In order to answer the above questions, this paper will argue that the

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The term used in Lei QU, Machiel van Dorst in Perceived Control and Liveability: Environment and behaviour interaction in two urban villages of Shenzhen (2014). Arrival city refers to urban centres such as Shenzhen which act as gates to a better economical situation for the migrants. Those points of arrival are usually limited to urban villages.

social and economic position of floating migrants among the destination city population is one of the forces driving environmental motivation towards their temporary settlement. Further, this effect is amplified by the historical chasm created by population control reforms and insufficient environmental education. Additionally, this study will argue that the lack of sense of belonging plays a substantial role in the environmental approach and decision making of this social group resulting in less environmental control in the city of Shenzhen.

Methodology

The relationship between internal migration and environmental degradation is a multidimensional consideration and should not be limited solely to studying migrant groups' effects on the environment. Before understanding and effectively responding with appropriate policies and urban design interventions to the above problem, this paper suggests studying it in two capacities. Therefore, the effect of internal migrant movements on the environmental situation in the arrival city, together with the impact of ecological concerns in a given destination, on the migrant population will be studied.

The role of the floating population in addressing environmental challenges will be examined together with a discussion on potential policies, and design interventions that could bring rural and urban together in addressing the challenges will conclude the findings. Firstly, Shenzhen's historical background, migrant history and structure will be provided, focusing on the household registration system - hukou, to discuss the dichotomy between the migrant and native⁵ population in Shenzhen. Secondly, an overview of the current ecological situation in Shenzhen will be discussed with the environmental impact created by the in-migration group, as an example of air and water pollution in the city. Thirdly, the analysis of the current impacts of environmental degradation on the floating population will be outlined and followed by a theoretical discussion on climate change driven future scenarios. The case of Guangming New Town in northern Shenzhen will be analysed as a case study of current pro-environmental policies. Lastly, key factors playing a role in the lack of environmental cohesion between internal migrant groups will be suggested.

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Only 40 years ago, Shenzhen had a population of 300,000 people, which expanded to the current size due to the large migration flows. Therefore, 'native' residents who do hold the local status of permanent residents are not the original population but have migrated to Shenzhen during the time of its most intense development.

Important primary sources used in this paper are statistical data from China's National Statistics Bureau (NSB), Chinese Census Data, Chinese Ministry of Ecology and Environment data and previously conducted empirical and theoretical studies on the correlation between in-migration and level of environmental concern (Qin & Liao, 2016; Rafiq et al., 2017; Gu & Ma, 2016).

Research area

Speaking of Shenzhen in its population context, it is worth noting that Shenzhen Municipality includes two areas: the Shenzhen Special Economic Zone (SSEZ) and Bao'an County (Fig. 4), today colloquially referred to as inner (chi. *guannei*) and outer (chi. *guanwai*) districts (O'Donnell, 2016). This paper focuses on Shenzhen Municipality as a whole.

The Migrant Population Service Centre data shows that Guangdong - the province where Shenzhen is located, noted the most significant inflow of Chinese floating population travelling from other provinces (MPCS, 2020). In 2018, Guangdong province retained the migration trends and totalled almost 21 million (MPCS, 2020) floating citizens, accounting for a third of the total migrant population across China. Migrants entering Shenzhen came majorly from provinces such as Hunan (22%), Guangxi (16%), Jiangxi (10%), Fujian (4%), Guizhou (4%) - the neighbouring provinces with one of the lowest income per capita characteristics (except Fujian, another coastal highly industrialised province); as well as Sichuan (12%), Hubei (14%) and Henan (8%) (Fig. 5). All the regions mentioned above are characterised by lower than Guangdong's average GDP, indicating the migration's economic motivation.

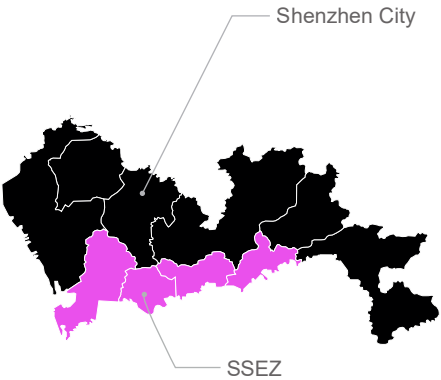
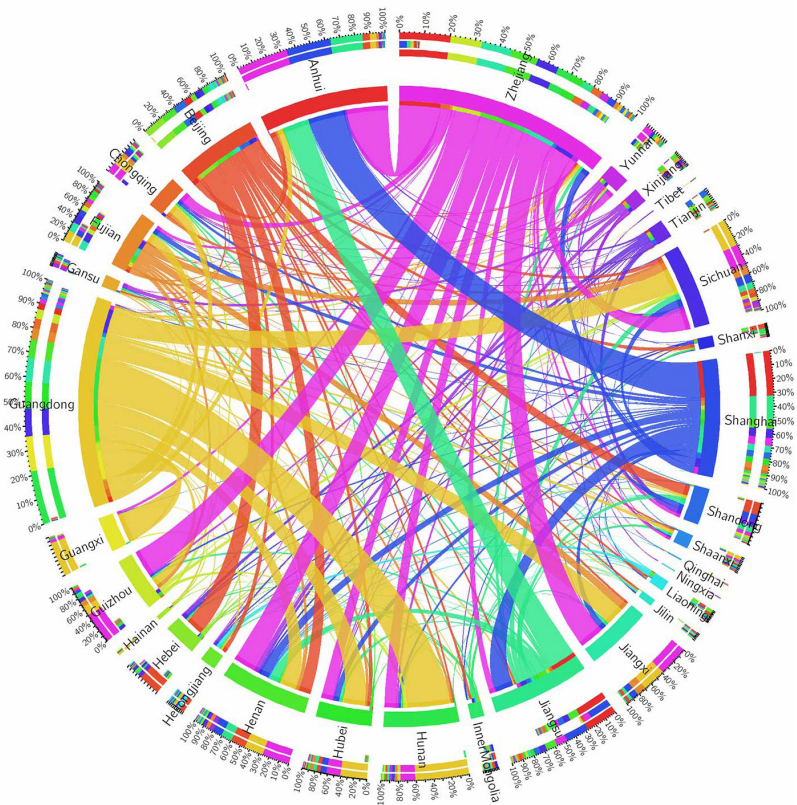


Fig. 5
The outline of Shenzhen with 1979 Shenzhen Special Economic zone in purple and Shenzhen city - Bao'an County in black. Drawn by the author.



*Fig. 6
Population inflow and outflow data of provinces and cities in the years 2011-2016. Migrant Population Service Center. chinaidr.org.cn

Chapter 1: The correlation of migrant communities and environmental concerns

1.1 Migrant group background

6 China introduced hukou - a household registration system in the 1950s. It divided the Chinese population into rural and urban citizens with different benefits and welfare allowances depending on their origin (Vlassenrood, 2016). This system, despite having undergone multiple relaxation reforms, is currently still in use.

7 The permanent residents of a given city who hold the local urban household registration status, thus forming the official, de jure population of a given urban agglomeration.

8 Intra - provincial migration refers to movements within a given province. Inter-provincial migration which is more relevant in this paper refers to population flows between two provinces - e.g. migrant groups travelling to Shenzhen (Guangdong) from neighbouring regions like Hunan and Guangxi.

9 The rate of two children per woman is usually considered as most beneficial in continuing a healthy population growth.

Parallel with new economic reforms from the late 1970s, opening the Chinese market to foreign investments created a high demand for unskilled labour, primarily in the manufacturing sector. The *hukou*⁶ - local household registration system was eased to accommodate the needed workforce, opening the opportunity for more free internal migration movements, previously restricted by the division between rural and urban citizens. As an effect of those two events, rural to urban migrations rose from 25 million in 1990 to 292.51 million in 2021 across China, making up 39% of the 746.52 million total workforce (National Bureau of Statistics [NBS], 2022).

Chinese internal migrants, usually consisting of labour workers seeking economic situation improvements but without the local household registration status, are referred to as the floating population (*chi. liudong renkou*) or temporary migrants (Chen, Guo & Wu, 2011). Due to the lack of an official change in their hukou, they usually hold a lower status than the permanent, 'official'⁷ urban residents of a given destination city and are usually excluded from urban population statistics (Chen et al., 2011). In this paper, both terms 'internal migrants' and 'floating population' will be used interchangeably when referring to this social group.

Rural-to-urban migration follows primarily the outward direction from the western and inland provinces towards the coastal regions with newly formed special economic zones concentrating manufacturing clusters (Fig.6). Both inter-and intra-provincial⁸ movements have accounted for the dynamic urbanisation process and expansion of the urban population, especially given the relatively low urban fertility level in the country and Guangdong province (Qin et al., 2016; The Economist, 2018). To illustrate, since receiving city status in 1979, Shenzhen's population has grown from 300,000 people to an estimated 20 million people, with an average fertility rate of 1-1.29%⁹ in Guangdong.



Fig. 7
Special Economic Zones of China, 1997. Author unknow. Ed Maps. <https://www.edmaps.com/htmlchina.html>

The floating population consists of rural-to-urban and urban-to-urban migrants of different ages, occupations and economic statuses. The number of this group was estimated at 376 million people across China in 2020, according to the 7th Chinese Census survey (NBS, 2021). This paper focuses on the rural-to-urban movement as the most significant in size (avg. 65% of the total migrant population in 2020 (Cheng et al., 2021)) and of crucial historical background explained in the following section. It should be noted that the current trend of dominant rural-to-urban migration is expected to change in the coming years as China's urbanisation rate grows above the current 63.89%.

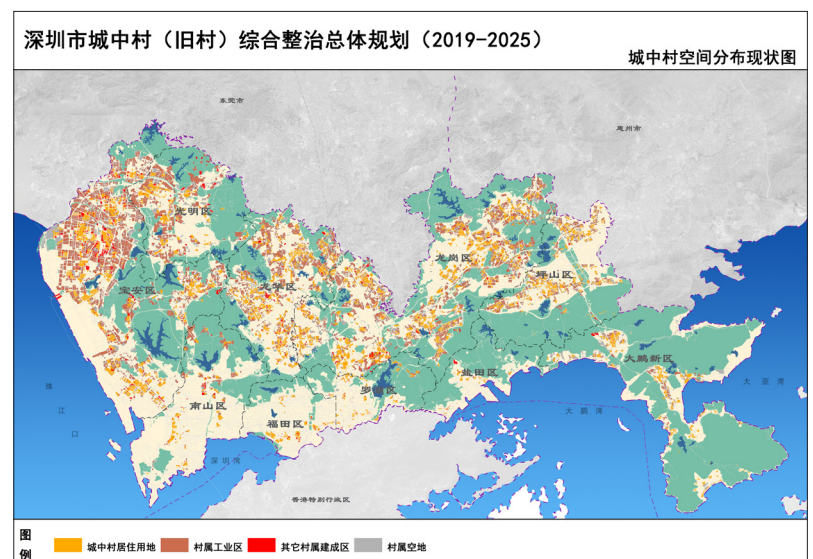
In Shenzhen, only 4 million own a local hukou and 8 million own permanent residencies, which leads to a rough estimate of eight million people functioning as a floating population, residing in densely populated urban villages (Vlassenrood, 2016). Those self-organised settlements currently host 50% of the city's population on 5% of its land.

Most of the workers (66.1%) are younger than 30 years old, with a slight advantage in proportion towards females (53.5%) over the male (46.5%). This connects directly with the region's labour force structure and type of industries (Gu et al., 2013), mainly pharmaceuticals, chemical, telecommunications, equipment, and electronics manufacturing.

The distribution of the floating population across Shenzhen concentrates in Bao'an, Longgang and Longhua districts. This pattern is consistent with the city's manufacturing industry layout. It can also be noted that the distribution of migrant workers in Shenzhen follows the same pattern as the location of urban villages (Fig.7), which supports the claim of the lower economic status of in-migrant workers concentrating in those 'informal settlements' (Meulder & Shannon, 2014). Due to the desperate economic situation of floating citizens and a need for unskilled labour in Shenzhen, specific job titles, perceived by the permanent residents as undesirable, were reserved solely for the in-migrant group (Chan et al., 2018). Floating migrants in Shenzhen are usually engaged in manufacturing (29.3%) and retail (20.2%), followed by the social service sector (12.85%), hospitality (11.28%) and construction (6.68%) (MPSC, 2016). The remaining group runs self-employed businesses selling food and everyday products (Gu & Ma, 2013), mainly operating among the migrant customer group concentrated in urban villages. This division naturally evolved into a floating population being perceived as a source of the problem in terms of ecological pressure.

*Fig.8

Translation of the title: 'Shenzhen Urban Village (Old village), Comprehensive Renovation Master Plan (2019-2025)' (translation by the author). Legend : in yellow - Village residential area; in brown - Village industrial zone; in red - Other; In grey - Village vacant land. Shenzhen Government, China. 2019. Shenzhen Urban Village (Old Village) Comprehensive Improvement Master Plan. <http://www.sz.gov.cn>



1.2 Historical context

The internal migration, hence the floating population, is historically closely tied with the household registration system called hukou¹⁰ (chi. full name *Hukou Dengji Tiaoli* - eng . Household Registration Regulation) introduced in the 1950s by the Communist Party. It divided the Chinese population into rural and urban citizens with different benefits and welfare allowances depending on their origin (Vlassenrood, 2016). Having undergone multiple relaxation reforms, this system is still associated with the inequality between rural and urban citizens and, more relevant to this paper - between rural migrants and permanent urban citizens.

In 1958, during the initial period of Mao Zedong and the Communist Party regime in China, the hukou system codification was finalized as a population registration and control over the internal migrations. Initially, the system divided the population into at the time, 85% involved in rural and agricultural activities citizens and the remaining 15% of urban residents who became the government's primary tool in the *Big Push* - a strategy to industrialize the urban centres and shift China's interest in worldwide cheap manufacturing power (Fig. 8). The system created the societal and economic division between the residents of the agricultural areas and, at the time, mainly coastal urban zones, which is believed to be the chasm between the urban and rural populations in China

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The household migration control system is not per se a Chinese invention. It was present in other communist countries such as Vietnam and North Korea. Similarly to China, it adapted the idea from the former USSR *propiska* - an internal passport system introduced first in the Russian Empire and later in the Soviet Union.



*Fig. 9

'Special Economic Zones - China's great open door' (translation by the author). 1987. Sun Yi. Publisher Renmin meishu chubanshe. <https://chineseposters.net/posters/e13-354>

11

The hukou status became particularly important during the Chinese Great Famine between 1958 and 1961, when rural citizens were almost entirely deprived of food, collected mainly by the state and sent to cities. Strict security would not allow the rural population to migrate to urban centres to better their situation.

12

For more information on hukou ramifications on the overall Chinese population, their social and economical position as well as the urbanisation and industrialization of China refer to: Chan, Kam Wing. *The Chinese Hukou system at 50; in Urbanisation with Chinese characteristics: The Hukou system and migration*. London ; New York, NY : Routledge, Taylor & Francis Group, 2018. p.85

(Whyte & Martin, 2010). The assigned status allocated certain benefits and either granted or limited the access to social welfare depending on the birth origin - limiting migration to wealthy citizens.

In the post-1984 opening up reform period, the change to the hukou system was made, which allowed for more geographical freedom, unleashing the mass migrations of rural workers into the city in search of additional income. The years of Big Push were particularly hard for the rural population, whose primary role was providing food and raw material to urban centres (Fig.9-10) at a discounted price and minimum financial remuneration¹¹. In effect, motivation for migration to cities became purely economic driven, creating an army of cheap and mobile workers - current floating citizens. This group have built cities like Shenzhen in both literal and figurative sense, powering the industrialization of the region and its economic growth¹².

1.3 Ecological context - Forty years of transformation from village to twenty million metropolis in the light of environmental pressure

In the last four decades, Shenzhen's aggressive urban development created high pressure on the environment. Rapid change and population expansion and a lack of timely and appropriate infrastructure or policies ready to accommodate such growth led to environmental degradation and waste management issues. In the



*Fig. 10

'Sell surplus grain to the nation to support the construction of national industry!'. 1953. Chi Ke. Publisher: Zhongnan renmin wenyi yinshu chubanshe. <https://chineseposters.net/posters/e37-357>.

*Fig. 11

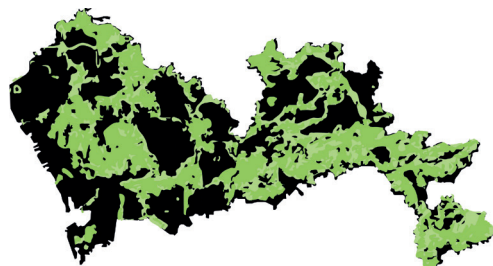
'Develop industrial and agricultural production, realize the simultaneous development of industry and agriculture'. 1960. Designer unknown. Publisher: Shanghai renmin meishu chubanshe. <https://chinese posters.net/posters/d25-136>.

Fig. 12-13 (next page)



hence contributing to the pollution. With the lack of appropriate green strategies in Shenzhen's factories, wastewater, exhaust gases and garbage are generated at a high rate (Gu & Ma, 2013).

Shenzhen's overall urban structure has been determined by three masterplans, successively presented in 1986, 1996 and 2006 (Vlassenrood, 2016). In 2005, Shenzhen implemented, as the first city in China, the Basic Ecological Control Line [BECL] (Fig.13) regulation to address the pressure of ecological degradation (Luo, Zhang, Li, Yang & Lin, 2018). Nearly half of Shenzhen's land has been permanently prohibited from urban development. Overall, the regulation has decreased the vulnerability of the west and central urban areas outside the zone since its implementation (Luo et al., 2018). However, the quality of the landscape within the zone and eastern part of the city has decreased.



■ Basic Ecological Control Line

Fig. 13

The Basic Ecological Control Line [BECL] in Shenzhen - coverage area. Drawn by the author

Shenzhen was nominated as China's low-carbon eco-demonstration city in 2010 (Vlassenrood, 2016) and has since implemented numerous strategies to improve its environmental situation. Despite

that, Shenzhen still faces many challenges and points to the migrant population as a cause of the problem and malign tumour (*chi. du liu*), planning to eradicate this social group from the city.

In the significant migration cities, large numbers of constantly in the movement of migrant workers severely impact the ecological environment (Li, Zhang & Jiang et al., 2021). Population size and density, among other factors like increasing energy consumption and waste production, are considered the most important drivers of urban environmental concerns (Qin et al., 2016). Due to its high number and concentration, unsurprisingly, the floating population is studied.

***Fig. 12 (top)**

The first explosion before construction in the Shekou area, Shenzhen, July 1979. The blast marked the beginning of China's reform and opening-up era. He Huangyou. Shenzhen Art Museum. <https://www.sixthtone.com/news/1006111/Collage:%20Shenzhen%20at%2040>



***Fig. 13 (bottom)**

View over Nanshan district in Shenzhen over past 40 decades of city's development. 1985-2015. Chen Zonghao http://inanshan.sznews.com/content/2017-08/16/content_17027171.htm



Chapter 2: Impact of internal migration on natural environment in Shenzhen

What is the relationship between the migrant workers and their immediate natural environment?

Several environmental quality indicators include air quality, water pollution, inadequate waste management and sanitation systems, unsustainable natural resource use, and degradation of sensitive ecosystems - in the case of Shenzhen, the coastal and water bay environments (Rafiq et al., 2017). The first three factors, among others, have the broadest population reach and direct correlation with one another, which gives them importance in research on the environmental situation. Further, they can be tied most closely with the floating population, which mainly inhabits poor quality and over-crowded accommodations.

2.1 Air & water pollution in Shenzhen

In a recent study on air pollution concerning migration movements in China, a dataset of 113 critical environmental protection cities, including Shenzhen, was created (Qin et al., 2016). Two factors of economic affluence and industrial product per capita as the most closely related to the environmental impacts were considered in the study. The factors were measured following the most significant air pollutants (PM_{10} , NO_2 , SO_2) against the population density and net migration rate. The average air pollution index has increased during the study period (Qin et al., 2016). At the same time, the average migration rate has also increased and was significantly associated with the PM_{10} value - the particulate matter 10 describing the compounds found in air due to combustion activities, pollens or unsealed road dust. Another compound of NO_2 was also found to strongly relate to internal migration related to population density (Qin et al., 2016). Nitrogen Dioxide pollutes the air mainly due to road traffic and energy production, leading to acid rains and affecting public health. Based on the above findings, a particular aspect of in-migration activities can be pointed out. Those are an increase in transportation and mobility and everyday household oriented activities among migrants. The emissions can be linked to the increase in population and, therefore, the need for transportation and temporal migrations. At the same time, it is common among low-income migrants to use low-grade solid fuels for cooking, which are harmful to both people in direct contact and the environment. However, this observation requires further study as the environmental consequences of the spatial distribution of population, in this case, the migrant group, are not always directly attributable to the local changes in demographics and their activities (Pebley, 1998). For example, it is understood that both the origin and destination locations of migrant groups will be affected on the environmental level. However, the pollution costs (Pebley, 1998) will also be paid by the migration corridors areas. This can be understood in the mentioned Chunyun - three billion inter-provincial migration occurring every year known in western media as the "spring movement" (chi. *Chunyun*) connected to the occasion of the Chinese Lunar New Year (Chan, 2018).

In 2014, South China Morning Post claimed 'Shenzhen is losing the

“My family doesn’t dare to open the windows. Our throats are sore, our eyes burn and our noses itch. And then, there’s the mosquitoes”

- Li Li, in the article from South China Morning Post. *Shenzhen is losing its fight against pollution in main rivers.*

fight against river water pollution’ (Huifeng in SCMP, 2014). In informal settlements such as urban villages, reliance on insufficient household waste can discharge waste into nearby water bodies. Untreated wastewater discharge, released into the city’s rivers due to the population growth, impacts the quality of water significantly, with 25% of rivers in Shenzhen pronounced as “unfit for human contact’ (Albert & Xu, 2016 in Rafiq et al., 2016). This is coherent with the grey water footprint study, which claimed that residential activities were the main contributor to urban grey water footprint (Wang, Xian, Jiang, Pan & Ouyang, 2019). The areas with especially high potential water pollution, urban rivers, were primarily located in the northern Bao’an, and Longgang districts (Wang et al., 2019).

Dasha river ecological corridor is located on the western side of Baishizhou, an urban village, and is designated as a restricted development zone; however, due to its connection to the most densely populated urban village in the city, it is suspected to have a high level of untreated waste disposed of in it. Among other rivers in the city, the Dasha river has been one of the most affected by the pollution of water bodies. From the ecological point of view, the Dasha River is an integral ecological corridor between the mountains (the Yantai Mountain-Wutong Central Mountain) and the coastal belt in the fundamental Shenzhen ecological pattern (Aecom, 2019). It also plays a vital role in sea-level rise predictions, which indicate that the Dasha river could be one of the first zones affected by the rising water levels in Shenzhen Bay. Therefore, pollution management strategies and the flooding risk reduction design interventions need to be implemented in the area. In addition, the strategies should be directed toward raising public awareness of residential wastewater reduction and pollution in the city (Wang et al., 2019).

2.2 Impact of internal migrants on natural environment

The temporary nature of the floating population (Gu & Ma, 2013) becomes one of the factors in the context of environmental challenges. However, this effect cannot always be attributed to floating citizens’ origin or migration location, which makes it a complex subject to investigate. Despite finding a correlation between the growth of the migrant population and air and water pollution, some other recent studies suggest a lack of empirical evidence of the direct correlation between the negative impact of internal migration on the environment (Qin et al., 2016). It can be argued that floating population activities per se have no significant impact on the environment’s condition in urban areas and is instead an effect of economic drivers and exponential growth, which did not consider the appropriate infrastructure capable of adapting to the effects of sudden population swelling. Together with previous discoveries in this chapter, it can be concluded that both the migrant population and the environmental concerns in Shenzhen are both outcomes of high-speed industrialization processes. Further, their decision making in everyday activities is primarily dictated by the economic and social situation rather than the latter being the result of the negligence of the mentioned migrant group.

Chapter 3: The effects of environmental degradation on floating population

How floating population is becoming a subject to vulnerability of natural environment degradation? What policies are being implemented and how do they relate to this social group?

Environmental degradation can be more significant for particular social groups such as the urban poor (Pebley, 1998). Due to the low housing standards and high population concentration in self-organised urban village clusters, floating citizens are among those who are the most affected by the harmful impact of environmental degradation, such as above-studied air and water pollution. It can also be speculated that this social group will be the first to be reached economically and concerning health by the rising sea level and heat stress, intensified by high air pollution concentration and pollution-triggered changes in weather patterns. Insufficient education and understanding of pollution and climate-related challenges deepen the vulnerability of the floating population to pollution.

3.1 Case study - Guangming, 2015 landslide disaster - a danger of waste pollution

As dense settlements, often located in coastal areas and on floodplains, cities also concentrate vulnerability – to the impacts of hazards such as flooding, landslides, heat waves, and other natural disasters (International Federation of the Red Cross and Red Crescent Foundations [IFRC]. 2010. WorldDisasters Report: Focus on urban risk. Geneva: IFRC in Forster et al., 2014). The group of migrants concentrated in poorly conditioned high-density urban villages becomes subject to particular environmental vulnerability amplified further by social and policy exclusion. Shenzhen has undergone fast economic growth and rapid urbanisation since the Reform and Opening-up of China (Li, Zhang & Jiang, 2021). with increasing construction of new buildings and subway lines has created a large amount of construction mud waste. Shenzhen cannot accommodate all of the waste. (DW, 2015). In effect, according to China Daily, in 2015, an unnatural disaster occurred in Guangming New Town (Fig.14). This event led to a few deaths, 33 collapsed buildings and damaged gas pipelines (China Daily, 2015). The accident was caused by an unstable construction waste collapse, a 100-metre high mountain stored at a disused quarry (DW, 2015). As in the case of most urban disasters in the region, the victims consisted mainly of migrant workers. Additionally, the debris from the landslide has destroyed nearby factories, which many in-migrants rely on financially.

In this case, the place of both work and settlement of migrants was located in an environmentally degraded area of the city - their economic status determined their exposure to damaging factors of lousy waste management, depriving many of homes or workplaces, pushing them into more profound economic despair. If this social group is the one most vulnerable to harmful effects of ecological degradation, does their social and economic status affect their role in creating the problem?

The socio-economic segregation in fast-developing cities like Shenzhen is a natural product of high-income gaps between



Fig. 14

Collapsed migrant housing in Guangming New Town after the landslide. China Daily News. http://www.chinadaily.com.cn/china/2015-12/20/content_22755014.htm

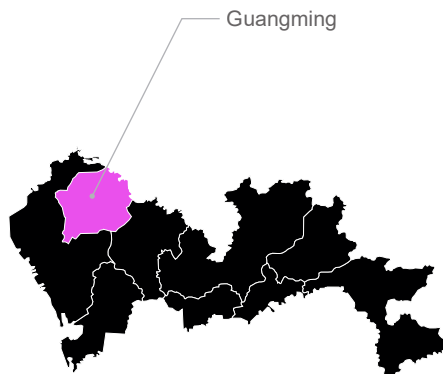


Fig. 15
Location of Guangming district, Shenzhen.
Drawn by author.

the groups. This translates into spatial segregation and social exclusiveness (Alpermann, 2020) and the creation of two separate entities in the city with limited social contact.

3.2 Case study of current design policies - Guangming New Town, Sponge City in Fenghuangcheng

Throughout history, expanding cities have always run over villages (Meulder & Shannon, 2014), swallowing the agrarian domains and those who inhabit them. Since the 11th and 12th Five Year Plan - a series of social and economic developments released every five years, the Chinese government has pronounced the importance of working towards a better ecological situation, with many cities expressing their willingness to become low-carbon and eco-friendly (Vlassenrood, 2016). However, there has not been enough effort to establish a coherent and standardised definition and steps to achieve those plans among different involved departments and stakeholders. One of the 14th Five Year Plan [2021-2025] includes optimising the city's layouts and integrating the ecological aspects into the urbanisation process (Hu, 2014). This encompasses places like Guangming New Town (Fig.15) - a north located Shenzhen district with only 34% (42,000 out of 1.23 million) population holding local hukou status. It is currently considered an 'economically underdeveloped' part of the outskirts area, announced as the first low-carbon district in Shenzhen. Guangming is divided into three main zones: high-tech industry, traditional industry development and ecological industry development bordering with suitable for agricultural activities Basic Ecological Control Line. Therefore, half of its land is reserved for urban development, with another permanently prohibited from urban activities. As the city continues to grow and the government plans to expand current manufacturing clusters to the west and north of Shenzhen, Guangming is still to experience the full scope of urbanisation which (together with a high concentration of migrant workers) creates a good case for understanding the issue towards similar areas in China and other developing countries.

In order to satisfy developers' demand in Guangming, the developments are built on top of the recent agricultural land, which reduces the amount of natural water absorbent surface - resulting in seasonal flooding. In response, the series of sponge cities was introduced across China, with Guangming becoming a pilot project to implement this strategy in Shenzhen. Sponge city's strategy is to redesign flood-prone areas to cope with and process the water. The aim is to reach 70% infiltration, retention and storage of water compared to its current 20% (Vlassenrood, 2016) through 52 projects focusing on water infrastructure, green parks, wetlands, rivers and industrial and business parks. As good as those policies sound, working towards bettering the ecological situation of the city, the economic and political reasoning behind them requires more attention. Chinese planning happens in a largely segregated way, with different stakeholders and departments being disconnected from local inhabitants (Vlassenrood, 2016). Projects such as Guangming Sponge city and others are based on a mission to attract more developers and businesses to the region to expand the current plot of manufacturing parks around Shenzhen.

Despite pro-environmental intentions, those projects and policies pay very little attention to the development opportunities of Guangming's community. They mainly concentrate on addressing the im-

mediate ecological challenges in the form of design intervention that introduces substantial changes to the current lives of the migrants working in the manufacturing sector. It can be argued that the isolation of the central part of the population of Guangming in decision making regarding the environmental challenges lowers their general understanding of the topic. In addition, migrants whose current self-initiated settlements are claimed by the municipality to be sold for future developers force the group to resettle, further increasing the impact on the natural surroundings. At the same time, a disruption to the existing relationship between human activities and the natural environment is forced. For example, the local municipality has recently banned agricultural activities in the district. The environmental hazard and decreased biodiversity in the region become a new problem, mainly projected onto the migrant community who rely heavily on existing infrastructure.

The exclusion and isolation of rural migrants in Shenzhen were discussed in the previous chapter. This division, as mentioned, originated in the economic and social chasm created by the hukou system, creating the division in the society between the rural and urban. This can also be argued to reflect a spatial, clear division in China between these two areas. However, places like Guangmin, which are perceived as a strategic spot for the urban densification of Shenzhen (Liu, 2016) while still retaining parts of their agrarian past, can be used as pilot projects in search of possible solutions to genuinely sustainable cities. This should be achieved by integrating rather than transforming the existing agricultural landscape. The understanding of the rural-urban relationship can lead to urban sustainability and increase the chances of better assimilation of rural migrants into the urban centres and decrease the pressure of urban growth on local farmers who rely on their existence on their land and activities (Liu, 2016). Despite being inevitable, careful incorporation of rural land into the urban area has the potential to increase the environmental situation of the place and make it stable and help in incorporating on a slower pace rural to urban migrants, decreasing the societal division between two groups.

Chapter 4: Factors behind the lack of environmental cohesion of the community

How the social and economical position of the floating migrants influence their perception and intentions towards the natural environment?

4.1 Living conditions & economic situation

The previously explained hukou system created a dichotomy and alienation of the rural labour force in coming to Shenzhen on social, economic and spatial levels. Current research focuses on determining the group's social, demographic, and economic situation, further investigating the spatial and organisational implications on the places of destination. In Shenzhen specifically, this relationship is often translated into the living conditions of the urban villages and their relationship with the non-migrant occupied part of the city. Due to hukou regulations until the 2014 reform, rural migrants were not entitled to the Urban Affordable Housing scheme and therefore had to rely either on the provision of the dormitory allocation (34.3%) through their place of work, in this

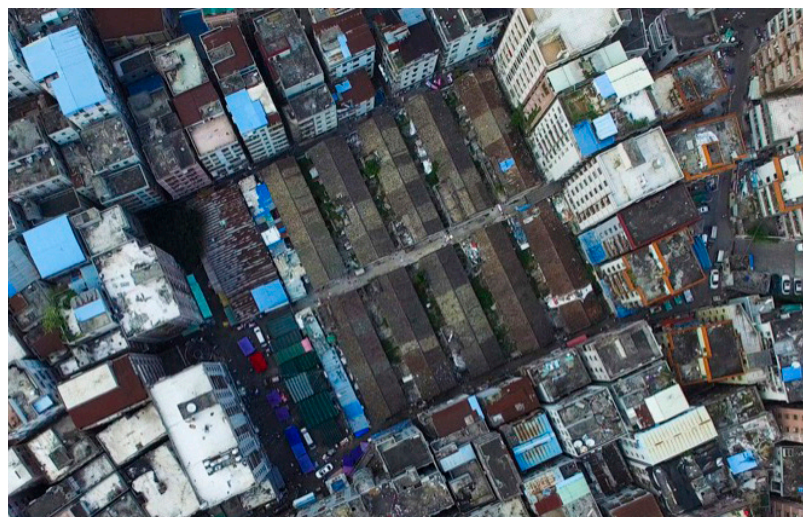
Fig. 15

Old communal farm houses, currently serving as accommodation for migrant workers in Baishizhou, Shenzhen. Author unknown. <https://medium.com/@travisjared/the-urban-village-conundrum-shenzhen-and-the-impotence-of-historic-preservation-61170303bfef>



Fig. 16

Top view of old communal farm houses. Author unknown. <https://medium.com/@travisjared/the-urban-village-conundrum-shenzhen-and-the-impotence-of-historic-preservation-61170303bfef>



case, mainly the factory, or seek cheap rental (47.6%) accommodation solutions in already overcrowded urban villages; 10.2% owns their private accommodation in the city (Gu et al., 2013).

Economically underprivileged groups of migrants were forced to settle in urban villages (Fig. 16-17). However, this system of incoming workers turning to the urban villages creates a self-perpetuating mechanism. In most cases, the rental rooms are offered by the native urban villagers who make a living out of the subdivision and rent out their own homes. These cheap accommodation opportunities, however, create a dangerous pattern where migrant workers, already separated from their families in the culture of strong family connections (Chen, 2011), are deprived of the sense of belonging to the place of their stay - it becomes only a necessity without the emotional connection which influences their settlement intention. Furthermore, living and networking exclusively in the urban village setting creates further social separation from the rest of the city, as the majority of the workers operate solely in these areas.

The low-skill jobs, which are usually occupied by a floating population, translate into the average income of the workers, which in comparison to the average income of permanent citizens, marginalises the group and pushes it into the status of urban poor. The urban villages are referred to as the product of permanent rural-urban duality and division over the past decades (Buckingham, Will & Chan, 2018). Generally, accepted theory suggests that poor migrant households may disturb the environment due to unsustainable decisions derived from their poverty. Nevertheless, the poverty of migrant households is intricately woven with the social environment, inter-marriage, and urbanisation, which are mediating variables between migrants and their impacts on the environment (Cassels et al., 2015).

4.2 Exclusion, isolation & settlement intention

Difficulty of migrant groups in integrating with urban populations influences their isolation in the society deciding on their settlement intention and in effect their connection to the city. It was found that due to the lack of a sense of belonging and ownership, the floating population pays little attention to the local environment and pollution control (Gu et al., 2016).

The history of exclusion on both policy-making and social level due to economic drivers has its beginnings in previously mentioned household registration system. The lack of sense of belonging and exclusion of the floating citizens in the cities have an impact on their intention towards their natural environment and the cohesion of the community's behaviour as a whole. The social division between the rural and urban population was another ramification of the hukou system. To pursue the 'Big Push' industrialization program, the state has deliberately created a dual economy and society based on the preexisting conditions of the rural and urban Chinese. Until the 1980s the priority in terms of the state financial and social welfare support was granted to the urban citizens which were announced as a priority, industrial sector. The 'non-priority' sector consisted of remaining rural, agriculture oriented population which main's role was providing the capital for the urban-industrial sector in the form of raw material, food and labour at state dictated low prices, and with no compensation or access to the same social welfare benefits as the urban citizens. (Chan, 2018, p.88) It should be

remembered that this system was implemented in the 1950s when the percentage of the Chinese population living in the rural setting was roughly 85% in comparison to the current number of 38%.

In China, until 2014 relaxation reforms, the hukou status prevented migrant citizens with rural hukou from enjoying the same benefits and social welfare as those with urban hukou. This origin-based segregation within the city resulted in feelings of exclusion and lack of belonging to the community. In effect, among economic factors, the settlement intention of migrants was influenced. Based on the study conducted in Shawan River Basin in Shenzhen, only around 15% of floating migrants decide to settle permanently in the place of destination (Zhu, 2003); around 50% of migrants intend to move back to their place of origin after saving substantial amount of money to support their families, around 25% will continue the migration to other destinations (Gu & Ma, 2013). Migrants with relatively high income in comparison to the general standard for this population group are on average more willing to consider long-term stay in the city which indicates the motivation behind their migration as economic. Based on the study conducted in North Sulawesi, Indonesia in 2005 the motivation and context behind the migration can be perceived as a large factor to whether the migrant household's activities differ largely from permanent citizens' activities in the level of harm towards the environment. The assimilation of the migration group here plays a crucial role, especially in terms of the economic activities of the migrant group - those arriving trying to escape poverty from the countryside will usually arrive on their own, leaving the family behind. This might mean that their motivation towards environmentally sound decision-making is lower as they are guided primarily by the economic advantage of the city rather than the intention of long term settlement.

A strong case of division and sense of alienation is expressed in a documentary made by Japanese director Takeuchi Ryo - "Beyond the mountain". The production tells a story of a journey to one of the poorest places in China, Liangshan Yi in Sichuan Province. The director travelled around the area to record the life of the rural community and talk with the local community. Based on multiple interviews with natives which are presented in the video, an observation can be made. The interviews were conducted with young children living in the villages in Liangshan. Despite mass migrations of rural workers into big cities such as Shenzhen in search of economical benefits, the interviews with children from Liangshan indicated that the willingness to migrate from the countryside to the city isn't always that strong among the youngest generation. The parents of children mentioned exclusion and feeling of being 'unwelcomed' because of often large differences in financial situation, habits, language (depending on minorities) and education. These feelings can be also linked with many families being separated due to migration. These observations support the hypothesis of exclusion from society as one of main drivers in environmental motivation of the floating population.

Mass migration to urban centres is not limited to Shenzhen or China only but occurs in many developing countries. At the same time, segregation of people in big cities, the break of communities and their identity with new developments replacing old urban villages, it is essential to understand what will this transformation lead to. These findings are coherent with the hypothesis that the difficulty of migrant groups in integrating with urban populations influences their isolation in society, deciding on their settlement intention and their

connection to the city. Further, it can also be observed that the lack of sense of belonging plays a role in the environmental approach and decision making of this social group resulting in less environmental control in the city of Shenzhen.

Discussion & conclusions

What is the role that the floating population of Shenzhen plays in addressing the ecological concerns as both the driver and the subject to vulnerability in face of harmful effects of environmental degradation?

*“Being a migrant is not fun,” says Shi Wenjian. “You can’t ever earn that much money, and you are far away from your family.”

- Shi Wenjian in a report by Dexter Roberts (2016).

Suggested measures

The favourable products of high urbanisation like higher labour productivity and larger economies of scale (Qin et al., 2016) resulted in economic growth. At the same time, they posed two threats to Chinese society - exclusion of core to the economic success - rural to urban migrant workers group, together with a high level of industrialisation and migration-related factors, environmental crisis.

Redevelopment plans to eradicate urban villages that currently do not fit in the city’s vision of a ‘city of innovation’ and changes currently occupied by migrant population places such as Guangming are planned in Shenzhen. These projects seem inevitable. However, they can be seen as an opportunity to integrate the city’s current floating population. It can be suggested to introduce a mixed-income housing typology to achieve this goal. The Barbican complex (Fig.1) could be a historical example, built between 1965 and 1976 in central London. This large scale development has combined affordable housing with multiple functions such as a theatre, restaurant, cafe and art centre, which attracted the affluent class - generating the income needed to maintain the complex. This relationship allowed for the creation of low-medium income housing in the middle of the city and the integration of different social groups.

Due to the shift in industries and a slight decrease in the demand for rural, unskilled labour, successful practice can be observed. In Guizhou, a province in southwest China, the local, provincial government is offering financial help in starting eco-friendly businesses to the local citizens of the province. They can return from work in other provinces. Redistribution of the population from eastern environmentally fragile coastal regions, which are currently the main direction of migration, could decrease the level of problem and reunify split families. For example, in one recent report (Roberts, 2016), a previous factory worker from Shenzhen explained that life in his home province, Guizhou, has improved significantly since he left. The developed infrastructure in recent years and the local government’s funding helped him open his fish farm and restaurant. This also turns out to be beneficial to the local community as migrants bring new skills and knowledge from their time spent in the city.

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China is still considered a developing country based on the criteria of the World Bank and the United Nations (World Atlas, 2021).

As we continue the process of globalisation and cultural exchange, we can see Shenzhen as a window into the future to investigate and form conclusions about the problems our global cities might experience in the coming years due to expanding migrant populations and environmental challenges. The analysis of the relationship between the floating population and environmental degradation can prove crucial to other developing countries in providing insight on policies, design strategies and social interventions. While most western countries go through steady development in the urbanisation process, many developing countries¹³ will experience similar economic and environmental shocks as Shenzhen. Therefore the outcomes of this study can provide insights to urban designers and ecology policymakers in countries that are still entering the phase of intense urban growth followed by rural to urban migration, yet to transform urban domination.

Conclusion

In general, the floating population in Shenzhen, China, has been proven to impact the natural environment situation in the city. It was suggested that the high concentration of this social group in poor quality accommodations and everyday activities driven by an unprivileged economic situation were factors in decision making towards a weak environmental approach. However, this behaviour has been connected directly to the alienation and exclusion of the floating population from Shenzhen's society and policy (an example of Guangming New Town), which, together with the poor financial situation, led to low settlement intention. Through the historical background of this group, it was proven that the dichotomy between rural migrants and the urban population had its origin in policymaking from the 1950s and had, therefore, influenced this community's position in the environmental crisis. It was argued that despite the floating population being one of the drivers in creating environmental challenges, they were also a subject to vulnerability in the face of harmful effects of natural environment degradation.

In effect, actions to strengthen the role of internal migrants were suggested. Creating a sense of belonging and a common cause could potentially initiate more interest in the group towards the city's environmental issues. Additionally, the policies aiming to bring awareness to migrant groups about the environment should be implemented together with the integration strategies.

The floating population and environmental concerns are tightly correlated in a complex net of dependencies not; however, how many sources suggest and how they like to be described by policymakers and investors as malign tumours in the root cause of Shenzhen's environmental issues. The correlation is visible on the level where the city's economic potential lies in the hands of migrant workers who are summoned by growth-motivated requests for cheap labour and tempted by the building of the city from tabula rasa of agrarian history.

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