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Triumph or tragedy: unintended consequences of political planning and social engineering in Maoist China

Using the Maoist anti-schistosomiases campaign as case study, this chapter explores the complex and dynamic relationships between politics and health. It argues that utopian solutions linking health to absolute political goals are bound to frustrate and disappoint those most directly affected. The centralized approach to people's health, as seen with the anti-schistosomiases campaign, was neither politically effective nor it was feasible. Furthermore, it had long-term negative consequences on the environment and, by extension, on human health.

Politics and health in the People's Republic of China

In modern China, politics and health are inextricably linked. From the onset of the Chinese revolution in the early twentieth century, both in its nationalist and its communist stages, public health objectives had been an integral part of revolutionary ideology linked to the survival of China and of social changes. The overwhelming poverty in China, mirrored by the poor hygiene and health of the Chinese population, signaled China's backwardness to the world. China was the "sick man of Asia" in so many ways. Revolutionaries and social reformers in and outside of China, including Western medical missionaries, believed that improving the health and medical care of the Chinese people would therefore open the door for modernization.[1] Although Mao Zedong, who became the supreme leader of the Chinese Communist Party (CCP), believed that only Communism—not Christianity or any other religion—could bring the ultimate healing to his sick country, he also understood from very earlier on in his revolutionary

1 For further readings see Bu Liping, *Public Health and the Modernization of China, 1865–2015* (Abingdon and New York: Routledge, 2017); John Z. Bowers, William J. Hess, and Nathan Sivin, eds., *Science and Medicine in Twentieth-Century China: Research and Education* (Ann Arbor: University of Michigan Center for Chinese Studies 1982); AnElissa Lucas, *Chinese Medical Modernization: Comparative Policy Continuities, 1930s–1980s* (New York: Praeger, 1982).

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career that public health work could be utilized as a tool to win the support of the masses and that hygiene discipline could simultaneously be employed as means to "improving" individual bodies, hence turning the peasant into the soldier or the ideal mass fit for the revolutionary cause.[2] In 1933, when he was still a young communist branch leader faced with heavy criticism from the CCP central leadership, Mao urged his comrades—the CCP cadres in Jiangxi—to attend to ordinary people's everyday health needs:

> Many people suffer from boils and other ailments. What are we going to do about it? All such problems concerning the well-being of the masses should be placed on our agenda. ... We should convince the masses that we represent their interests, that our lives are intimately bound up with theirs. We should help them to proceed from these things to an understanding of the higher tasks which we have put forward, the tasks of the revolutionary war, so that they will support the revolution and spread it throughout the country, respond to our political appeals and fight to the end for victory in the revolution.[3]

After the CCP seized power in 1949 and established a strong centralized communist state, the People's Republic of China (PRC), health played an outsized role in the internal politics of the new state. Throughout the Mao era, public health work came to be one of the central means of impacting and influencing the "masses." Public health campaigns were political campaigns, and, at the same time, the CCP leadership understood the propaganda power of promises of healing and health.[4] Health also appeared in complex ways to define the PRC globally.

Between 1949 and 1983—for more than 30 years—the CCP leadership made eradicating diseases and improving the health of the entire population a central pillar of its policies.[5] By the beginning of the 1980s, the official Chinese statistics, based on the 1981 census, showed that life expectancy had increased from around 40 years in 1949 to close to 70 years, although Banister and Preston's

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2 Charles P. Cell, *Revolution at Work –Mobilization Campaigns in China* (New York: Academic Press, 1977), 44–46; M. Foucault, *Discipline and Punish: The Birth of the Prison* (London: Penguin, 1995), 135.

3 Mao, "Be Concerned with Well-Being of the Masses," in *Selected Works of Mao Tsetung*, vol. 1 (Peking: Foreign Language Press 1965), 147–152.

4 For a case study, see Nianqun Yang, "Disease Prevention, Social Mobilization and Spatial Politics: The Anti Germ-Warfare Incident of 1952 and the 'Patriotic Health Campaign'," *The Chinese Historical Review* 11, no. 2 (Fall 2004): 155–182. For further reading, see Zhou Xun, *The People's Health: Health Intervention and Delivery in Mao's China* (Montreal: McGill-Queen University Press, 2020).

5 For further readings see David M. Lampton, *The Politics of Medicine in China: The Policy Process, 1949–1977* (Boulder, CO: Westview Press 1977); Sheila M. Hillier and J.A. Jewell, *Health Care and Traditional Medicine in China, 1800–1982* (London & Boston: Routledge & Kegan Paul, 1983).

study suggests the latter number was overstated.[6] A few years later, analyzing anthropometric data and morbidity patterns, the Nobel Prize-winning economist Amartya Sen concluded that "China has achieved a remarkable transition in health and nutrition."[7] In his keynote address to the fifty-second World Health Assembly on May 18 1999, Sen cited Maoist China and the Indian state of Kerala as positive examples to make the argument that political will and a state-sponsored program of "skilful social support of health care, education, and other relevant social arrangements" were key to health improvement, and that better health would in turn contribute to economic growth.[8] Even before Sen's assessment, in the "Long 1970s" and in the context of the Cold War, the People's Republic of China was also most identified by many international health stakeholders as a "positive deviant" in achieving better health outcomes with limited resources. Along with the Barefoot Doctor program, the PRC's anti-schistosomiasis campaign was widely cited around the world as evidence of the country's purportedly superior primary healthcare system. Like Sen, many observers argued that the CCP's political will was a key to the PRC's success story.[9]

While the CCP's political vision and ability to mobilize the masses may have contributed to an improved healthcare system and, ultimately, to overall better health, e. g., longer life expectancy and reduction in infant mortality, political factors have also had unintended yet truly negative consequences for the people's health. On 8 May 1958, speaking at the Second Session of the Eighth Communist Party Congress, Mao announced that the PRC would make the superhuman breakthrough to achieve the Great Leap Forward by "mak[ing] the high mountain bow its head; mak[ing] the river yield the way."[10] The utopian project

6 Banister, J. and S. H. Preston, "Mortality in China," *Population and Development Review* 7, no. 1 (1981): 98–110.

7 Jean Drèze and Amartya Sen, *Hunger and Public Action* (Oxford: Clarendon Press; 1989), 204.

8 Amartya Sen, "Health in Development," *Bulletin of the World Health Organization* 77, no. (1999): 619–624. Also see Amartya Sen, "The Economics of Life and Death," *Scientific American* 268, no. 5 (1993): 40–47, accessed 12 July 2021, http://www.jstor.org/stable/24941476.

9 For examples see Victor and Ruth Sidel, "Barefoot in China, the Bronx, and Beyond," in *Comrades in Health: U.S. Health Internationalists, Abroad and at Home*, ed. Anne-Emanuelle Birn and Theodore M. Brow (New Brunswick, NJ: Rutgers University Press 2012), 119–133, doi.org/10.36019/9780813561226–010; Joshua Horn, *Away with All Pests: An English Surgeon in People's China* (London and New York: Monthly Review Press, first paperback edition, 1971 [1969]). For further reading, see Zhou, "chapter 9," in *The People's Health: Health Intervention and Delivery in Mao's China*.

10 Mao Zedong, "The First Speech May 8, 1958," *Speeches at The Second Session of the Eighth Party Congress*, accessed 11 August 2021, https://www.marxists.org/reference/archive/mao/selected-works/volume 8/mswv8_10.htm.

of the Great Leap Forward that aimed to transform China into an industrial superpower and ultimately the first country on earth to enter communism—the superior form of modernity—led to the worst famine in human history. It lasted for four years between 1958 and 1962 and claimed tens of millions of human lives as well as causing a massive loss of wildlife. At the same time, the program of transforming the Chinese countryside into a "disease free socialist garden" through health improvements and by conquering diseases,[11] as seen in the internationally acclaimed anti-schistosomiasis campaign, also had unplanned and lasting negative consequences for the environment and hence for the people's health. As this chapter demonstrates, in a massive drive to eradicate schistosomiasis, which was viewed as integral to end rural poverty, the application of molluscicides, as well as the use of radical engineering interventions such as land reclamation to kill snails, damaged the natural ecosystem. Such physical changes in the environment also conflicted with the system for water conservation, contributing to the severe flooding that still haunts the residents of the impacted regions along the Yangtze river and its flood plain. At the same time, human exploitation of the environment, as part of the agricultural expansion that aimed to end rural poverty and conquer diseases such as schistosomiasis, exposed the wider population to the disease and increased the number and geographic distribution of those becoming ill from it.

Eradicating schistosomiasis and the "socialist upsurge in the Chinese countryside"

Interrelated with the predominant agricultural way of life, especially for rice-growing farmers in rural China, "schistosomiasis japonica" (schistosomiasis hereafter) has been endemic in many of the rice-growing regions along and south of the Yangtze River. Historically, the disease had evoked widespread fear in these regions. In the first half of the twentieth century, social reformers, many of whom were Western trained public health experts, linked the disease to infertility and hence a major contributing factor for under population and poor productivity, which were perceived as the underlying causes of China's rural poverty. Chen Fangzhi was a graduate of the Imperial Tokyo University's Medical

11 Ke Qingshi, "劳动人民一定要做文化的主人 [The Labour Mass Must Become the Master of Culture]," *Red Flag Magazine*, no. 1 (1958): 28–32; "渭河岸上一朵花——甘肃武山县大柳树村的变迁 [The Transformation of Big Willow village in Gansu province's Wushan county]," *People's Daily*, October 1958, 10.

School who became the first director of the Nationalist Ministry of Interior's Sanitary Department and who later headed the Nationalist Ministry of Health's Central Hygiene Laboratory in Shanghai. He, for instance, labelled schistosomiasis "the disease of national humiliation" (国耻病). According to him, it injured China's national economy as well as people's livelihoods, and argued that controlling schistosomiasis should be a "shared responsibility" for every Chinese person.[12]

Immediately upon the founding of the PRC in 1949, schistosomiasis was elevated to one of the most serious diseases that needed to be combated. At the time, Jin Baoshan (known outside of China as P. Z. King), a graduate of Johns Hopkins School of Public Health who went on to pioneer preventative medicine and lead public health work for the Republic of China (ROC) as well as serving as the Director General of the National Health Administration during World War II, estimated that nearly 20 million people throughout rural China were infected with schistosomiasis.[13] Using varied and incomplete Chinese data, however, Willard H. Wright, the head of Tropical Diseases Division at the USA National Institutes of Health and a member of the newly founded WHO's Study-Group on Bilharziasis in Africa, gave a much higher number of nearly 33 million.[14] Viewed as vital to the national security, and to the productivity and the military manpower of the new state, fighting schistosomiasis came to stand for fighting for socialism in the PRC. The national anti-schistosomiasis campaign linked medicine and public health work with the ongoing legitimization of the new order. Furthermore, as schistosomiasis was a disease which afflicted people in many parts of the underdeveloped world, it was thought that it would bring prestige to the new communist state as well as to Chinese scientists if the PRC were the

12 一九四九年三月陈方之为浙江地方病防治所抄在现阶段抢救血蛭病步骤之商酌 [Chen Fangzhi's Suggestion Regarding the Current Procedure for Emergency Treatment of Schistosomiasis (1950–1)], J166–003–001, 1–2, 12.

13 Jin Baoshan, 地方病在广大农村的重要性 [Endemic Diseases in Rural Countryside], 大众医学 *Popular Medicine*, no. 2 (1950): 37–39.

14 Willard Wright, "Bilharziasis as a Public Health Problem in the Pacific," *Bulletin of World Health Organization* 2, no. 4 (1950): 583. Writing in 2006, Professor Yuan Hongchang of the School of Public Health at Fudan University, a renowned expert in schistosomiasis control in the PRC, maintained that the actual numbers of infection between 1949 and 1950 remained largely a "mystery": the infection figures varied from 20 million to 50 million, due to incomplete and often unreliable data at the time. See Yuan Hongchang, "新中国建立前及初期我国血吸虫流行情况 [Schistosomiasis Prevalence Prior to and in the Early Years of the PRC]," in中国血吸虫病防治历程与展望 – 纪念血吸虫病在中国发现一百周年文选 [*The PRC's Schistosomiasis Control and Prospect*], ed. Wang Delong (Beijing: Zhongguo weisheng chubanshe, 2006), 54–55.

first country to eliminate it. In other words, to succeed in this medical and public health challenge that "Western" experts had failed was a prize worth trying for.[15]

As time went on, the political importance of the disease grew. Towards the end of 1955, as Mao was mounting the "Socialist High Tide" to bring the socialist revolution (Mao called it a "socialist storm" 社会主义大风暴) to the Chinese countryside and to transform the "poor and blank land" into the "pest free" socialist garden, he and the State Council singled out schistosomiasis to be eradicated. It was also argued that the disease resulted from the traditional way of life. So, bringing a socialist cultural revolution to the Chinese countryside would entail eradicating schistosomiasis by changing the "prevailing custom and habit" (移风易俗). The national goal was to eradicate it in seven years. This did not happen, however. Firstly, scientists questioned the feasibility. Upon reading the official statement concerning the eradication plan, Su Delong, an Oxford trained epidemiologist who had gained experiences in schistosomiasis control during the war years and had been assigned as the scientific expert to lead the official campaign, commented: "wild boasting." He even confronted Mao and warned the chairman that eradicating the disease within seven years was implausible. Su's warning was ignored, however, and he was personally attacked for expressing doubt and for having a "bureaucratic attitude."[16] On the other hand, during the first decade of the PRC, central economic and political planning was dragged out in a chaotic and disorderly fashion across the country. As with many other aspects involved in centralization, the central authority's sense of urgency with regard to eradicating schistosomiasis caused the local responses to the complexities of the hasty implementation of such a colossal public health campaign to be fragmented and often contradictory. So, the picture that emerged was that as soon as they encountered the wide variety of human experiences of health, disease, and, indeed, changing politics, the great plans on paper were transformed into makeshift solutions that bore little or no resemblance to the original political project.[17]

To consolidate state control over the management and distribution of agricultural resources, the party introduced a number of campaigns across the countryside, ranging from grain procurement (state monopoly over grain distribution)

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15 See Zhou, "Chapter 2," in *The People's Health: Health Intervention and Delivery in Mao's China*. See also Miriam Gross, F*arewell to the God of Plague: Chairman Mao's Campaign to Deworm China* (Oakland CA: University of California Press, 2016), 43–61.

16 Shanghai Medical University Department of Epidemiology & Shanghai Medical University Archive, eds., 苏德隆教授论文选集 [*Selected Academic Essays of Professor Su Delong*], (Tianjin: Tianjin Science and Technology Press 1995), 1.

17 Zhou, "Chapter 2," *The People's Health: Health Intervention and Delivery in Mao's China*.

to developing agricultural co-operatives and improving agricultural productivity. The rural administrative machinery was constantly overburdened by these new programs. Due to the shortage of trained personnel, grassroots cadres often had to at least make attempts at multitasking. In addition to leading schistosomiasis control, public health cadres had to implement other public health programs, from the enforcement of "new-style" medicalized childbirth to engaging villagers in the Patriotic Health Campaign (1952), to helping with mass immunization and combatting seasonal infectious diseases, as well as supporting army recruitment work and enforcing the New Marriage law. They were also dragged into implementing the party's core rural policy of supporting agricultural collectivization and grain procurement work.[18] Juggling their multiple tasks, besides having little experience in disease control and a limited amount of time and resources, many focused on completing each task rather than systematically implementing the state policy. Planning was thrown out the window and responsibility was pushed around as if in a ball game. In some cases, when cadres resented what they were asked to do they came up with makeshift solutions. In several villages in Zhejiang province, for instance, with no time to mobilize the villagers to catch snails, local cadres spent the government-allocated schistosomiasis prevention funds to purchase enough snails to meet the snail elimination quota.[19]

As of the last months of 1957, however, with the advent of the Great Leap Forward, the utopian project aimed at transforming China into an industrial superpower on a par with the United Kingdom and, eventually, into the first communist country in the world, there was an even greater political demand to speed up the goal of eradication by eliminating the vector snails. Land reclamation and irrigation schemes, known as environmental control interventions, were favorable methods used to bury, and hence kill, the snails or to kill snails by destroying the habitat. Such measures were recommended by a team of Japanese experts led by Komiya Yoshitaka who were invited by the PRC's chief administrator, Premier Zhou Enlai, to help China eradicate schistosomiasis.[20] It was hoped that

18 Ren Jixian, 一个老血防战士的心愿 [A Former Schistosomiasis Control Soldiers' Wish], in *Send off the God of Plague: Schistosomiasis Control in Jiaxing*, ed. Hua Li, Jiaxing Historical Sources vol. 4 (Beijing: Keji Chubanshe, 1995), 139.

19 Zhejiang Provincial Health Bureau's Investigative Report on Zhejiang's Schistosomiasis Control, J166–003–009, 6 March 1953, 4.

20 Yoshitaka Komiya, "A Recommendatory Note for the Control Problem of Schistosomiasis," *Japanese Journal of Medical Science and Biology* 10 (1957): 461–471, accessed June 15, 2022, doi: 10.7883/yoken1952.10.461. For detailed study on the Komiya Mission, see Iijima Wataru, "Farewell to the God of Plague: Anti-Shistosoma japonicum Campaign in China and Japanese Colonial Medicine," *The Memoirs of the Toyo Bunko* 66 (2008): 59–64..

such control measures could also be combined with agricultural development and management of water resources, hence increasing the amount of agricultural land and improving the irrigation system as well as accelerating growth in fishery production. On the other hand, the Japanese experts also warned their host about the challenge of controlling the disease in a country as vast as China whose topography varied greatly.[21] Nevertheless, the prospect of more land for agricultural cultivation and better irrigation systems that would enable China to achieve an agricultural leap and eventually attain the utopian goal of becoming the first "communist paradise" on earth that would be simultaneously disease free was irresistible to the PRC leadership.[22]

Eradicating schistosomiasis was of great political importance. Mao and the PRC's other top leaders, such as Zhou Enlai, determined that the country should achieve this superhuman public health breakthrough via political will and mass participation as well as via science. The latter would mean "doing away with the mysterious notions about science" and "combining scientific research with technological revolution and the mass campaign."[23] While Ke Qingshi, the party leader in charge of the official eradication campaign, exclaimed that "we must take science seriously," science had to serve the higher political (i.e., ideological) goal.[24] On behalf of the State Council, Zhou Enlai decreed that all local authorities in the endemic regions had to incorporate schistosomiasis control into their yearly plan for agricultural and water conservation work for 1957.[25] In the last quarter of 1957, braving the freezing cold weather, the Great Leap Forward began with a massive drive to divert the water from the south to irrigate the arid yellow earth in the north as well as to control floods in the south. By January 1958, the official estimate was that over 100 million people in China were mobilized to take part in the Great Leap water conservation campaign. Between 1958 and 1962, in Hunan province's Dongting Lake and Jiangxi province's Poyang Lake, two of the worst endemic regions along the Yangtze, more than 110,000 mu (18,121 acres) of marshland were reclaimed. In the Dongting Lake along,

21 Komiya, "A Recommendatory Note for the Control Problem of Schistosomiasis."

22 Felix Wemheuer, *A Social History of Maoist China: Conflict and Change, 1949–1976* (Cambridge: Cambridge University Press, 2019), 120.

23 Lin Yang, "Here's to Better Health," *Peking Review*, no. 3 (20 January 1959): 12–14.

24 The CCP Central Committee's Nine-Man Schistosomiasis Control Committee, "Comrade Ke Qingshi's Summary Speech at the Second National Meeting on Schistosomiasis Control" (printed in April 1956), Conference Document no. 1 [internal publication].

25 国务院关于消灭血吸虫病的指示 (1957) [The State Council's Edict to Eradicate Schistosomiasis, April 1957], 4–25 December 1963, Sichuan JC 133–450, 10–12.

the total amount of cultivable land increased from 5,360,000 mu in 1954 to 7,190,000 mu.[26]

Contrary to the claim of the PRC's political planners, however, having more land for agricultural production did not bring economic improvement for the rural villagers. The increased effort of reclaiming pestilential lands for agricultural production turned out to be a public health as well as environmental catastrophe. Land reclamation and water conservancy work exposed hundreds, indeed thousands, of healthy laborers to the disease when such projects were carried out with little or no protection for those who participated in them, as this occurred during and immediately after the Great Leap Forward (1957–1962). Earlier on, Chen Huxin, the expert who had led the pilot study of controlling schistosomiasis by reclaiming the marshes for agricultural cultivation during the South Dongting Lake Reconstruction project between 1953–1956, had warned about the dangers of exposing a large number of previously fit and healthy laborers, mostly imported from non-endemic regions with zero resistance to the disease, to the risk of infection. Against such massive risk, Chen advised that it was necessary to wait until all the snails had been destroyed before the reclaimed land could be cultivated for agricultural use. He also urged all local authorities to regard the protection of laborers against infection as imperative when planning land reclamation and water conservation projects as well as agricultural work.[27] His warning was largely ignored, however. Weighing the political risk of failing to fulfill the water conservation and land reclamation quota handed down from above against the health risk of laborers, local authorities often gave priority to the former as its failure would lead to the loss of their position of power or chance of promotion and cause their region to receive fewer resources from the State Council. On the other hand, due to the severe shortage of cotton (all cotton produced was procured by the state, mainly for export) and rubber, local authorities could not supply enough of the fabric needed to make

26 几年来各地国营农场职工发生血吸虫病急性感染的一些情况[Reports about Acute Schistosomiasis in States Farms Around the Country in Recent Years], 4–15 December 1963, Sichuan JC133–450, 59; Bian Hongxiang, "Preliminary Study on the Reclamation Problems in the Dongting Lake Area," *Acta Geographica Sinica* 40, no. 2 (June 1985): 135–139.

27 Chen Huxin, "洞庭湖区域自然环境的改造在消灭血吸虫病中的意义 [Eradicating Schistosomiasis by Controlling the Environment in the Dongting Lake]," *Chinese Journal of Preventative Medicine* 5, no. 2 (1957): 73–74.

protective socks and leg wrappings as well as rubber shoes for all the workers laboring in the contaminated water or paddy fields.[28]

Land reclamation and increased agricultural activities entailed more agricultural workers being exposed to the disease, and more frequently. During the Great Leap Forward, with 33 state farms being built on newly reclaimed land, more than 30,000 workers, many of them from non-endemic regions, as well as an increasing number of livestock, were drafted to Hunan and Jiangxi provinces to work on these new, sometimes makeshift farms.[29] Schistosomiasis was the new plague for these farm employees and their families. Official statistics show that during 1960 and 1961 more than 4,000 workers from 20 different state farms suffered acute infection in that year alone, among them more than 170 workers from state farms in Hunan province who died of schistosomiasis.[30] In addition, large numbers of livestock were infected and died of the disease. In one state farm in Jiangxi province, for example, in 1960 the farm procured more than 1,100 fine wool sheep from Wenquan county in Xinjiang autonomous region, bordering Kazakhstan. In less than a year, nearly 92% became infected with schistosomiasis and died. In another state farm in Jiangxi province, 52 farm oxen out of the total number of 135 became infected and subsequently died.[31] In 1949, an official estimate showed that the cultivable land in Jiangxi province's Yujiang county was 12,468 mu, and that the total number of infections amongst farming oxen was 571 (out of 14,303). By 1957, the cultivable land increased to 33,757 mu and the number of infected farming oxen more than doubled to 1,356 (out of 16,142). The morbidity rate was 8.4 per every hundred oxen compared to 3.9 percent in 1949. The number of infections amongst rural residents also rose from 8,100 in 1949 to 13,450. The morbidity in 1957 was 20.3 percent (13,450 cases of infection out of the total number of 66,210 villagers) compared to 14.20 percent in 1949 (8,100 cases of infection out of total number of 57,066 villagers).[32] Even after the official declaration of eradication in 1958, which was backed by data that showed a drastically decreased number of snails,

28 除害灭病工作情况简报[Summary Report of Disease Prevention and Eradication], no. 5 (8 April), January–October 1959, Sichuan JC133–2684, 3–4; no. 14, 30 June, 5–6; no. 2, 20 September, 6.

29 "Reports about Acute Schistosomiasis in States Farms around the Country in Recent Years," 4–25 December 1963, Sichuan JC133–450, 59; Summary Report of Disease Prevention and Eradication, January–October 1959, JC133–2684, no. 5 (8 April): 3–4; no. 14 (30 June): 5–6.

30 "Reports about Acute Schistosomiasis in States Farms around the Country in Recent Years," 4–25 December 1963, Sichuan JC133–450, 59.

31 Ibid., 60.

32 *Jiangxi province Yujiang County Schistosomiasis Control Annals* (Yujiang, 1984), 12, 25.

human and animal morbidity rates continued to rise steadily each year for the next decade and more.[33]

Eliminating snails by land reclamation was extremely costly and wasteful. In Jiangxi and Anhui province, for instance, 10 million prime agricultural laborers were diverted to from their farming duties to help clear snails from 11 counties, leaving only elderly people to attend fields.[34] In a number of southern provinces, such as Guangdong, there were also reports that land reclamation work had exacerbated the ongoing shortage crisis.[35] In addition, the environmental control method by reclamation was into conflict with the system for water conservation, contributing to severe flooding as well as causing alkalization of the soil. Land reclamation caused siltation and reduced the lake size, which in turn decreased the lakes' flood storage capacity. Land reclamation and siltation, as well as the construction of levees, also restricted flood discharge capacity, causing the flood levels to rise even higher.[36] Studies of the Dongting Lake by local researchers showed that land reclamation had sped up the siltation process, and it in turn caused reduction of lake storage and flood discharge capacity. Between 1956 and 1977, the lake size shrunk by an average of 40 cubic kilometers per year. By 1998, the size of the Dongting Lake had shrunk from 22.667 hm^2 in 1954 to 9.2 hm^2, and the drainage capacity fell from 30.11% to 8.7%. In the meantime, the flood level rose on average by one meter, reaching a peak of 3.7 meters.[37] As the flooded area enlarged, so did the frequency of the flood, causing a serious drain on local economy.[38]

Furthermore, agricultural intensification, when it was coupled with land overuse (i.e., deforestation, land reclamation, and overgrazing), also damaged

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33 Ibid., 38.

34 "News and Notes," *Chinese Medical Journals* 77 (1958): 103.

35 血吸虫病防治工作情况简报 [Schistosomiasis Control Summary Report], no. 35, 14 January 1959, Sichuan JC133–2684 (January–October 1959).

36 Min Qian, "Study on the Floods on the Poyang Lake in the 1990s," *Journal of Lake Science* 14, no. 4 (December 2002): 323–330; Zeng Tao et al., "The Dongting Lake Floods and its Future," 水利水电科技进展 [*Advances in Science and Technology of Water Resources*], 24 no. 1 (February 2004): 7–10; Mao Dehua, "Comprehensive Assessment and Analysis on the Risk Degree of Flood – Waterlogged in the Dongting Lake Region," *Journal of Natural Disasters*, vol. 10, no. 4 (November 2001): 104–105.

37 Mao Dehua, "Assessment and Analysis of Flood – Waterlogged Condition in Dongting Lake region," *Journal of Natural Disasters* 9, no. 3 (August 2000): 49; Bian Hongxiang, "Preliminary Study on the Reclamation Problems in the Dongting Lake Area," 135–139.

38 Min Qian, "Study on the Floods on the Poyang Lake in the 1990s," 329–330; Mao Dehua, "Comprehensive Assessment and Analysis on the Risk Degree of Flood – Waterlogged in the Dongting Lake region," 104–105; Bian Hongxiang, "Preliminary Study on the Reclamation Problems in the Dongting Lake Area," 137–139.

soil quality by causing land degradation, increased drought, and water logging, which in turn damaged agricultural productivity. Historically, the lakes on the Yangtze river had been major sources of water for the agricultural population living in the area, and there had rarely been any risk of water shortage. The increased land reclamation activities since the late 1950s led to a reduction of storage capacity, and drought became a new threat to these regions in addition to floods. In the 1960s and 70s, the local farmers faced severe annual spring droughts when they needed water the most for planting. In 1972, the drought was so severe that the local population living along the Dongting Lake had limited to no access to even drinking water.[39] Some villagers walked more than 20 kilometers to buy water while others had to dig more than 150 meters deep to find water.[40]

At the same time, increased amounts of ditches were built to connect the natural wetland and reclaimed agricultural land, and this changed the natural wetland hydrology by increasing the flow of water into and pass wetlands. As result, less water was retained by the wetlands. On the other hand, when it rained, excess rainwater led to the escalating problem of waterlogging, particularly in ditches and those unclaimed (decreased in size) wetland areas, then creating the new ideal environment for snails as well as mosquitoes to become quickly propagated. Unplanned, excessive reclamation as was undertaken during the Great Leap Forward period and during the Maoist anti-schistosomiasis campaign also had a serious impact on the lakes' ecosystem. Such schemes aimed at destroying the snail habitat also reduced the size of the lakes. While they succeeded in reducing the number of snails, they also reduced the number of other aquatic species living in these lakes. Chinese sturgeon, one of the world's oldest and biggest freshwater fishes, for instance, has become nearly extinct. Despite efforts to regulate overfishing and to encourage breeding, the problem persisted. One reason was the shrinking in lake size that led to habitat loss and endangered their survival. As a case study conducted in 1993 by local researchers Li Jingbo and Deng Luojin shows, land reclamation activities on the Dongting Lake after the 1950s, partly carried out as a measure to control schistosomiasis, not only damaged the lake's eco-environment but also led to the loss of invaluable biodiversity. As a result, the amount of fish—vital economical revenue and food source for the local population—decreased by more than half in

39 Bian Hongxiang, "Preliminary Study on the Reclamation Problems in the Dongting Lake Area," 136–137.

40 Xinhua News Agency and Ministry of Water Conservation Propaganda Dept., 水水水, 新华社记者眼中新国水利事业 [*Journalistic Coverages of Water Issues and Water Conservation in the PRC*] (Beijing: Ministry of Water Conservation Chubanshe, 2012).

less than 30 years. In addition, the expansion of agricultural activities led to an increase of water pollution through the use of fertilizer and other forms of polluting run-off.[41] The lake's pollution has become a serious health threat to human and aqua lives in the region. This was a truly vicious circle. By the beginning of 1970s, due to strong opposition from water conservancy and agriculture departments, such methods of controlling snails by land reclamation were gradually abandoned.[42]

Attacking snails with lethal chemicals

When reclamation initiatives ceased, snails quickly repopulated the reclaimed land, hence spreading the disease to humans and livestock who relied on the same contaminated water for livelihood. The authorities switched to killing the snails using molluscicides. As the following section shows, the switch to the chemical control method further damaged lake eco-systems in the affected regions, with long-lasting negative consequences on the environment and on human and animal health. Known as the chemical control method, killing snails with molluscicides was a favored intervention globally and endorsed by the WHO after the World War II, despite many shortcomings and confusions over its safety and efficacy.[43] In their 1957 recommendation to the Chinese host, the Japanese experts were against its use, arguing that NaPCP and other similar molluscicides were highly toxic and might "increase the resistance of vector snails." They also warned that the chemical was soluble in water and that the creeks of the Yangtze delta region could be easily contaminated by it: "In those areas the inhabitants often culture fish in creeks and sodium pentachlorphenate was proved to be poisonous for fish in a concentration of one ppm [1 ppm = 1 mg

41 Li Jingbao and Deng Luojing, 洞庭湖滩地围垦及其对生态环境的影响 [Land Reclamation and its Effects on the Eco-Environment of the Dongting Lake], *Resources and Environment in the Yangtze Valley* 2, no. 4 (1993): 342–343.

42 Mao Shoubai, ed., *Biology and Pathology Schistosomiasis and its Prevention*, 703–704; Mao Dehua, "Ecological and Environmental Problems and Their Causing Mechanisms in the Dongting Lake Wetland," *Journal of Glaciology and Geocryology* 24, no. 4 (August 2002): 446, 487–489.

43 E. Paulini, "Bilharziasis control by application of molluscicides: A Review of its Present Status," *Bulletin of World Health Organization* 18 (1958): 975–988. For further reading see John Farley, *Bilharzia: A History of Imperial Tropical Medicine* (Cambridge and New York: Cambridge University Press 1991), 269–285.

per litre]. There exists the danger to human beings because the inhabitants in these areas usually drink creek water."[44]

Awareness of its health and environmental risks did not preclude the use of this easier and comparatively cheaper method, as immediate successes were vital for the political status of the PRC leadership. Eyeing the crown of being the first in the world to eradicate schistosomiasis, the relevant authorities and some experts sought out molluscicides as the 'magic bullet' for getting the job done. Experts such as Su Delong also saw the chemical control method as a better suited strategy for China as it was economically more viable, at least in the short run. Although spraying molluscicides can effectively kill the intermediate snail host, sodium pentachlorphenate (NaPCP) and other similar molluscicides are highly soluble in water. The toxicity remained for many months or even years, as recent studies show, and continue to harm human and animal health well after the initial application.[45]

Bearing this in mind, on many occasions Su Delong stressed the importance of training villagers to take special precautions when spraying.[46] In the desperate rush to eliminate snails, however, the very real concerns over human and animal health were regularly compromised due to the severe shortage of trained personnel to carry out or supervise the spraying. In the suburbs of Shanghai, the local authority of the schistosomiasis control model county Qingpu, for instance, gave an order to spray everywhere, irrespective of the warning to avoid spraying near residential areas and animal barns.[47] A similar "spray everywhere" program was carried out in nearby Jiangsu province, where 16 schistosomiasis control cadres were reported in 1964 to have suffered severe toxic poisoning after continuously handling NaPCP for several days without any protective measures.[48] Further in-

44 Yoshitaka Komiya, "A Recommendatory Note for the Control Problem of Schistosomiasis," *Japanese Journal of Medical Science and Biology* 10 (1957): 466–467.

45 Dai Jianrong, Huang Mingxi and Zhu Yinchang, "灭螺药物的研究进展 [An Evaluation of Development of Molluscicides]," *Chinese Journal of Schistosomiasis Control* 12, no. 3 (2000): 189–191; Li Kun et.al, "Distribution Characteristics and Potential Risk of CBs in Aquatic Organisms from Typical Epidemic Areas of Schistosomiasis Prevalence," 环境科学 [*Environmental Science*] 36, no. 10 (October 2015): 3866–3871; Tan Da, Zhang Jianbo, "Estimates of PCP-Na Consumption in Districts and Provinces in China by the Top-down Calculation Method," 环境污染与防治 [*Environmental Pollution and Prevention*] 30, no. 3 (2008): 18–21.

46 Su Delong, "How to Eliminate Snails with Calcium Arsenate" (lecture notes presented at Fudan University, Fudan University's School of Public Health archive, file number RM008–08, 10 July 1958), 2.

47 "County Level Schistosomiasis Control Cadres Reporting on Local Opinions," Shanghai B242–1–1315, 1961, 128.

48 Mao Shoubai, ed., *Biology and Pathology*, 709.

land, in Sichuan province's Mianyang county in the southwest, many female sprayers were asked to carry out spraying barefoot in the paddy fields over an extended period. Some subsequently vomited repeatedly, while others fainted after inhaling too much of the toxin. In Mianyang county's Mawei Commune, seeing their skin peeling off, villagers became extremely frightened. In shock, they began to scream and threw away the spraying guns as they ran out of the village and paddy fields. Here, villagers often complained that molluscicides killed more crops and grass than snails. Without any grass to eat, cows and pigs also died of starvation, adding further stress to the ongoing famine. The locals began to view snail control work as directly contributing to the local famine, and they called those public health cadres in charge of schistosomiasis control "life snatchers."[49]

There were also frequent reports of people becoming ill or even dying after ingesting fish poisoned by the chemical. The problem of food poisoning after eating contaminated fish was widespread at the time due to the increasing starvation caused by the famine. In Zhejiang province's model county of schistosomiasis control, Jiaxing, some communes planned to solve the labor shortage problem by carrying out spraying during the rainy season when farming work was suspended. Due to the rise in water level, however, snails crawled out from the canals where NaPCP had been applied. At the same time, floods transported dissolved chemicals downstream into sections of river used for breeding fish and a huge number of fish were poisoned as a result.[50] Despite frequent reports of NaPCP poisoning, its application continued. As late as 1985, cases of death by NaPCP poison relating to the local schistosomiasis control work were reported in Yunnan Province's Dali region.[51] Across China, skin lesions were also a common ailment among the sprayers. In severe cases, they led to skin cancer. Even after the introduction of government guidelines banning the use of NaPCP in the early 1990s, local authorities continued to mix it with the less toxic niclosamide (more widely known as Bayluscide or by its tradename Bayer 73), partly because its high toxicity produced quicker results in killing snails.[52]

49 绵阳县血防干部思想情况 [Some Ideological Issues Among Schistosomiasis Control Cadres in Mianyang county], January–November 1962, Sichuan JC133–2811, 14–18.

50 嘉兴县净湘公社血防试点工作简报 [News Bulletin of Schistosomiasis Control Experiment Work in Jiaxing county's Jingxiang Commune], 1963, Jiaxing 102–001–031, 102–103.

51 Shoubai, *Biology and Pathology*, 709.

52 Li Kun et al., "Distribution Characteristics and Potential Risk of CBs in Aquatic Organisms from Typical Epidemic Areas of Schistosomiasis Prevalence," *Environmental Science* 36, no. 10 (2015): 3866–3867.

As mentioned earlier, NaPCP is highly soluble in water, and its toxicity can remain for many months, and even years. According to the most recent published list of unsafe foods by the PRC State Administration for Market Regulation (2020), fish harvested from the schistosomiasis-endemic Hunan province contained a level of NaPCP that made them unsafe for human consumption.[53] Even more alarming is that according to the Center for Disease Control in Jiangsu, a harmful level of NaPCP is also found in locally produced beef as well as in duck and goose meats. This is because the paddy fields, water ponds, and grasslands where the poultry and animals regularly grazed and drunk water have been contaminated with NaPCP in a continuous effort to control schistosomiasis.[54] NaPCP (HCB) and DDT are also widely detected in the surface sediments from the Xiang river, the second largest tributary of the Yangtze and the largest river into the Dongting Lake. A joint study by Fudan University and the Chinese Academy of Science attributed this to the continuous efforts to control schistosomiasis and malaria with NaPCP and DDT in these regions. The study concluded that the high volume of organochlorine pesticides (OCPs) in the sediments from the Xiang River likely had an adverse biological effect on organisms living in the and by the river.[55]

It is also worth noting that the Great Leap Forward's drive to irrigate the ever-expanding agricultural land and to power the rapid industrialization by building more dams in this part of the Yangtze also had other health consequences. More agricultural land and more construction projects also entailed unrestricted deforestation. Intensive agricultural practice, irrigation, and dam building as well as deforestation not only caused long-term damage to the environment through alkalization and waterlogging of the soil but also increased malaria transmission through an explosive growth of the mosquito population. In 1962, still in the midst of the massive famine crisis, many provinces along or south of the Yangtze River experienced some of the worst epidemics of malaria in recent history. Sichuan province's Rong county, for example, had a total population of

53 "Edict Regarding Food Risks," accessed May 22, 2021, http://gkml.samr.gov.cn/nsjg/spcjs/202006/t20200605_316255.html.

54 "The Amount of NaPCP in Meat," accessed May 22, 2021, http://news.xhby.net/js/yw/202008/t20200820_6773804.shtml.

55 Yuanyuan Li and Tian Lin et al., "Distribution and Sources of Organochlorine Pesticides in Sediments of the Xiangjiang River, South-central China," *Environmental Monitoring and Assessment* 185 (2013): 8861–8871, doi:10.1007/s10661–013–3218-z.

820,000. In 1962, about 180,000 cases of malaria were reported.[56] Throughout China, in 1962, the official estimate of malaria morbidity surpassed ten million people. Almost all provinces rampaged by the malaria outbreak were also the worst endemic schistosomiasis regions.[57] Spraying DDT was an intervention widely applied to control malaria by killing the vector mosquitoes.

Studies also showed that the unrestricted use of chemicals over a long period of time damages the quality of the soil. For instance, copper salts and other molluscicides that kill snails and fish also destroy nitrogen-fixing algae (BGA). The latter is recognized as one of the bio-fertilizers necessary to keep the rice paddies fertile. After applying copper salts and other molluscicides repeatedly over time, the BGA was destroyed, and thus the quality of the soil of the rice paddies deteriorated.[58] In China and during the Great Leap Forward famine, in the light of the ongoing food shortage as well as a severe labor shortage, an increasing number of local authorities began to resist the method of controlling snails with molluscicides. Some rejected it outright on the ground that it would damage the quality of soil and thus decrease the agricultural yield.[59] The work of controlling snails with molluscicides was further hampered by the supply shortage that was a result of the collapse of the overall nationwide distribution system during the famine, as well as poor management at the local level.[60] Goods perished or were degraded at transport depots because there were not enough trains, trucks, boats, or workers to move them. An increasing number of train robberies, triggered by the famine crisis, also prevented molluscicides from being delivered to their destinations in time for the control work.[61] The other national problem

56 Zhou Zaoxi, "Malaria Eradication in County Rong, Sichuan," in *Malaria, A Publication of the Tropical Programme of the Wellcome Trust*, ed. A.J. Knell (Oxford: Oxford University Press 1991), 80.

57 省委除害灭病办公室关于防病治病工作的计划，总结，报告，指示 [Sichuan Provincial Party Committee Disease Eradication Office's Plan, Evaluation, Report and Edict on Disease Prevention and Treatment], February–December 1962, Sichuan JC133–449, 71–73; Sun Luo, "岳阳市疟疾防治五十年 [Malaria Control in Yueyang in the Past 50 Years]," *China Tropical Medicine* 2, no. 3 (August 2002): 354–355.

58 Norman Levine, "Integrated Control of Snails," *American Zoologist,* 10, no. 4 (1970): 579–582; P.A. Roger, "Blue-Green Algae in Rice Fields, their Ecology and their Use as Inoculant" (paper presented at the Proc. Consultants Meeting, FAO/IAEA Joint Project, Vienna, 11–15 October 1982).

59 "County Level Schistosomiasis Control Cadres Reporting on Local Opinions," Shanghai B242–1–1351, 1961, 128.

60 "Summary Report of Disease Prevention and Eradication," no. 16, 31 July 1959, Sichuan JC 133–2684 (January–October 1959), 5–6.

61 For prevalence of train robberies during the Great Leap famine, see Frank Dikötter, *Mao's Great Famine: The History of China's Most Devastating Catastrophe, 1958–62* (London: Blooms-

was simply the lack of access to available containers to store and transport the chemicals. As a result, the demand for molluscicides far exceeded the supply.[62]

With molluscicides in short supply, local authorities were encouraged to practice "self-reliance." This meant coming up with local solutions to eliminate snails that required little or no financial input from the state. From its inception, the PRC's anti-schistosomiasis campaign was a crusade that involved the masses. In the context of the Great Leap Forward, communities, including grassroots schistosomiasis institutions in affected regions, were further encouraged to come up with technical solutions or local innovations to eliminate snails. Bio-pesticides were widely promoted, such as an oil emulsion extracted from croton seeds and a paste made of *camellia oleosa*, as they were claimed to have produced some success in reducing snail populations. *Camellia oleosa* is a plant found throughout southern China. Traditionally, fishermen and villagers in parts of China used it as a poisonous bait to stun fish and shellfish. Prior to the introduction of commercial soap, rural villagers also used it as a sanitizer to wash their hands and hair. To kill snails required using large quantity of high dose *camellia oleosa* paste (rather than using it as a poison bait at lower doses). The overuse of *camellia oleosa* paste also killed a huge quantity of fish, shellfish, and water plants. Since many villagers relied on fish and shellfish for food and since water plants were an important source of fertilizer, it is understandable that the method was unpopular. In laboratory tests, the oil emulsion of croton (at 4–8 g/㎡) achieved a similar success in killing snails as NaPCP (1 g/㎡). In the field, especially when covering a large area, its efficacy was much smaller, as uneven temperature and moisture often led to the denaturation of the herb oil emulsion. It was also even more harmful to human and animal health than *camellia oleosa* paste. A few grams of it could cause severe diarrhoea, and even fatalities. Traditionally, it was an abortifacient, well known for causing miscarriages. At the time of an escalating famine crisis, with malnutrition and infertility being two of the most widespread health risks, many rumors accused croton oil of being a cause of the problem. There were also reports of villagers who suffered skin ailments after handling it. Thus, instead of viewing it as a beneficial intervention, villagers regarded it as just one more health risk.

bury 2010), 155–162; Zhou Xun ed., *The Great Famine in China, 1958–1962: A Documentary History* (New Haven and London: Yale University Press 2012), 127–130.

62 "Summary Report of Disease Prevention and Eradication," no. 16, 31 July 1959, Sichuan JC 133–2684 (January–October 1959), 5–6.

Furthermore, it, too, was constantly in short supply, since it was expensive and labor intensive to produce by hand.[63]

Still, the political goal of eradication could not be questioned. In the meantime, local authorities, with the help of experts, were compelled to come up with new cost-effective innovations. One innovation was using toxic industrial chemical waste—such as a residual of calcium carbamide and a sodium salt of coal tar acid and phenol—to get rid of snails by poisoning their habitat. In addition to reducing snail populations, the method was utilized as a means of recycling the excessive industrial waste. Since the goal was to control schistosomiasis by eliminating snails with industrial waste, such as the residual products of calcium carbamide or the sodium salts resulting from coal tar acid, little attention was paid to what a safe quantity would be or even how the products should be applied. As a result, the actual amounts used and their application procedure varied from location to location. In general, to eliminate snails, it required at least one kilogram of such a chemical mix for every square meter of area. But in many affected regions, in a haste to eliminate snails, the amount used far exceeded what was recommended. Writing in the 1980s, Mao Shoubai, the PRC's foremost authority on schistosomiasis control, discouraged such measures, as "they harm human and animal health, damage the quality of soil, and pollute water. There are more drawbacks than benefits. Such measures cannot be recommended."[64]

As such undertakings were always focused on short-term gains, either because of political pressure from above or because of the resultant social and economic gains among officials in charge of implementation as well as those who participated in disease eradication, little or no attention was given to the longer-term consequences. Not only did the chemical control method cause harm to the environment and to human and animal health, but the environmental control method of draining swamps and marshes to reclaim low and flooded land, as mentioned earlier, also had long-lasting negative consequences on the environment.

Another widely applied environmental control measure employed by the Chinese in the late 1950s and 1960s was burning grass to roast the snails and destroy their habitat. Burning the grass that grew on the banks of small creeks and ditches as well as decimating the reeds in the lake regions was initially pro-

63 Brian Maegraith, "Schistosomiasis in China," *The Lancet* 1, no. 7013 (25 January 1958): 208–214; Mao Shoubai, ed., *Biology and Pathology Schistosomiasis and its Prevention*, 721; 嘉兴县血防站 一九五五年年度工作总结 (12 January 1956) [Jiaxing County Schistosomiasis Control Station's Report of 1955 Schistosomiasis Control Work], Zhejiang J166–003–026 (1956), 6.

64 Mao Shoubai ed., *Biology and Pathology Schistosomiasis and its Prevention*, 717.

moted by experts and the relevant political authorities as a simple and cost-effective way of reducing the snail population. While the method was reported to have achieved some success, it turned out to be more time consuming and labor intensive than killing snails with bio-pesticides made from plants. More importantly, its efficacy was unreliable as it depended on the season and topography. Furthermore, it destroyed reeds, bushes, grass, and other vegetation, all of which were necessary to a healthy lake ecosystem. For villagers living in the lake regions, reeds were also a source of vital economic revenue. Traditionally, reeds were used as building materials, as the raw materials for making weapons, tools, and musical instruments, as well as being fashioned into paper. During the Great Leap Forward and the subsequent famine, trees, bushes, and grass were all in high demand as they were essential substances for keeping starving animals alive, as well as fuel for local iron and steel production, and in everyday use as fertilizer. One grassroots cadre in south-western China remembered that, in 1958, after a campaign to kill snails by burning grass, the two brigades involved lost 44,000 kilos of bio fuel as result.[65] It is not surprising, therefore, that many villagers in these regions resisted applying such methods.[66] A 2016 study by a team of researchers from the PRC and Australia also suggests that continuous open-field biomass burning, sometimes over several days—as was done to reduce the snail population—caused severe air pollution with the attendant risks to public health and a potentially adverse impact on the climate.[67]

Conclusion

The anti-schistosomiasis campaign was the centerpiece of the PRC's public health campaign. This campaign was officially launched in 1955, when Mao was mounting the "Socialist High Tide" to bring a socialist revolution to the Chinese countryside. The central party leadership declared the national goal to eradicate the disease and said it would be achieved within seven years, by the end of the Second Five Year Plan. Land reclamation and irrigation schemes were methods used to bury and hence kill the vector snails. This not only proved extremely costly and wasteful, but these schemes also ran into conflict with the system for water conservation, contributing to severe flooding as well as causing alkalization of the soil. The subsequent switch to killing the snails using molluscicides

65 Interview with Su in Xichang, May 2015.

66 Mao Shoubai ed., *Biology and Pathology Schistosomiasis and its Prevention*, 726.

67 Chen Jianmin et al., "A Review of Biomass Burning: Emissions and Impacts on Air Quality, Health and Climate in China," *Science of the Total Environment* 579 (February 2017): 1000–1034.

further damaged the ecosystem, with long-lasting negative consequences on the environment. At the same time, needless to say, the devastating famine resulting from the Great Leap Forward further complicated the earlier eradication initiatives. In fact, towards the end of the Great Leap Forward famine in the early 1960s, the morbidity rate was sharply on the rise. In the meantime, famine-related oedema, gynaecological problems, and child malnutrition became even more widespread in the countryside. Unable to cope with the crisis, the PRC's rural health system collapsed. In the face of diminishing returns, in order to control the collapse of the public health system, ever more authoritarian and centralized methods came into play. With increasing desperation and despite the official claims, to the contrary, officials saw the promised goal of schistosomiasis eradication, and the rural utopia it was to help create, slipping away from them.[68]

To address the failure, reporting at a national schistosomiasis control conference in 1962, the Vice Chair of the Nine-man Subcommittee on Schistosomiasis Control Wei Wenbo laid the responsibility for the campaign's overall failure on the "error of misjudgement" and on poor leadership on the ground.[69] In his widely cited study *The Politics of Medicine in China* (1977), political scientist David Lampton argues that "[l]ike a leading character in a Greek tragedy, [the PRC]'s mobilization system had a tragic flaw; there were no individuals charged with objectively evaluating the progress which was, or was not, being made."[70] Later, in a 1984 evaluation of the Chinese campaign, Kenneth Warren discredited the earlier Chinese strategy of eradication as not only too costly and ineffective but also harmful to the people's health.[71] Warren, the Director of Health Science at the Rockefeller Foundation, was in favor of "good healthcare at low cost" and advocated for Selective Primary Health. In the early 1980s, he led an international team to the PRC to conduct a study on schistosomiasis mortality in the rural Anhui province, a marshy region along the Yangtze river. As an expert on schistosomiasis, Warren favored controlling the disease with chemotherapy. According to him, using newer single-dose, oral, non-toxic chemotherapeutic agents – Praziquantel – in treating the disease simply cost less than attempts to eliminate snails. He used the PRC's anti-schistosomiasis campaign as his counter ar-

68 For further reading see Zhou, *The People's Health*, 136–166.

69 "Transcript of Comrade Wei Wenbo's Speech at the Schistosomiasis Control Work Meeting)," in 关于防治血吸虫病工作的报告 [Report on Schistosomiasis Control Work], Sichuan JC 133–447 (April–December 1962), 2–3.

70 David Lampton, *The Politics of Medicine in China*, 118.

71 Kenneth Warren et al., "Morbidity in Schistosomiasis Japonica in Relation to Intensity of Infection: A Study of Two Rural Brigades in Anhui Province, China," *The New England Journal of Medicine* 25, no. 309 (1982): 1533–1539.

gument. He argued that the Chinese approach of involving the rural masses to kill the snails by burying old canals and digging new ones was too costly and ineffective in controlling the disease, at least for the interim period.[72] In subsequent years, the post-Mao PRC government abandoned the earlier integrated eradication strategy and implemented the morbidity control strategy intended to reduce the prevalence and intensities among local populations and livestock in the lake regions along the Yangtze.[73] This also coincided with the World Health Organisation (WHO) expert consultation committee changing its strategy and objective from controlling snails and the environment to reducing morbidity and mortality by focusing on chemotherapy and health education.[74]

Between 1992 and 2001, with a loan from the World Bank, the PRC government introduced the chemotherapeutic intervention favored by Warren as the key strategy to reducing the rate of human infection and the intensity of schistosomiasis. An official study evaluating the program suggests that as a consequence of this the number and morbidity of cases of the disease were reduced by half in several endemic regions.[75] For the next decade, the PRC government published the Schistosomiasis Prevention and Control Regulation, which resulted in the implementation of a more comprehensive strategy for disease control. Such controls ranged from the construction of lavatories with running water to the institution of drug treatment and health education.[76] The introduction of this new national schistosomiasis control program also coincided with the modernization of agriculture in China, with the reduction in the number of agricultural workers through mechanization and with the simultaneous urbanization and the moving of displaced rural workers into the ever-expanding industrial centers that has occurred since the end of the twentieth century. With the coter-

72 Warren et al., "Morbidity in Schistosomiasis Japonica in Relation to Intensity of Infection," 1533–1539.

73 Zhou Xiaolong et al., 我国血吸虫病防治历程与监测 [Schistosomiasis Control and Surveillance in the PRC], in中国血吸虫病防历程与展望 [*The PRC's Schistosomiasis Control and Prospect*], ed. Wang Delong (Beijing: Renmin weisheng chubanshe 2006), 61–62.

74 WHO, "The Control of Schistosomiasis: Report of a WHO Expert Committee" (paper presented at the meeting held in Geneva, 8–13 November 1984) (Geneva: World Health Organization 1984), 82, accessed 15 June 2022, https://apps.who.int/iris/handle/10665/39529.

75 Chen Xianyi et al., "Schistosomiasis Control in China: The Impact of a 10-year World Bank Loan Project (1992–2001)," *Bulletin of the World Health Organisation* 83, no. 1 (2005): 43–48. Also see Xiao-Hua Wu, Ming-Gang Chen, and Jiang Zheng, "Surveillance of Schistosomiasis in Five Provinces of China Which Have Reached the National Criteria for Elimination of the Disease," *Acta Tropica* 96, no. 2–3 (2005): 276–281.

76 J. Xu et al., "Evolution of the National Schistosomiasis Control Programs in the People's Republic of China," *Advances in Parasitology* 92 (2016): 11–12, doi.org/10.1016/bs.apar.2016.02.001.

minous shift of agricultural land being contracted to individual households, a greater number of villagers also switched from growing labor-and water-intensive crops such as rice to cash crops like tea, medicinal herbs, fruits, or vegetables. While a combination of sanitary interventions and Praziquantel drug therapy have undoubtedly contributed to the decrease in the number of infected people in the endemic regions, as John Farley pointed out for Japan's ability to mitigate the disease which had little to do with elaborate control schemes, rather, it was a decrease in agricultural activities as well as improved standards of living and hygiene that had brought it about.[77] In China too, the shifts in the means and modes of agricultural production had a much greater effect in the overall reduction of schistosomiasis. These shifts in agricultural practice radically decreased the proportion of people and farm animals engaged in agricultural activities as well as the acreage taken up by rice paddies. The farmers' working hours were also shortened, and the resulting overall improvements in the standard of living were at the core of the upgrading of the people's health.[78] The depopulation of rural regions and the mass abandonment of agriculture also radically reduced the incidence and prevalence of what were actually primarily rural diseases, such as schistosomiasis. By 2016, official published statistics showed that all endemic regions had achieved control of the infection, with the number of infected people falling by 97.7 percent in 2013 compared to 2005. The infection rate of livestock dropped by 96 % in 2013 compared to 2005.[79]

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77 Farley, *Bilharzia*, 300.

78 Interview with Professor Gu Xueguang in Chengdu, Sichuan province, 11 September 2014; interview with Tang in Danlin CDC, Sichuan province, 14 October 2014.

79 Y. Yang et.al., "Integrated Control Strategy of Schistosomiasis in The People's Republic of China: Projects Involving Agriculture, Water Conservancy, Forestry, Sanitation and Environmental Modification," *Advances in Parasitology* 92 (2016): 237–268, doi: 10.1016/bs.apar.2016.02.004.

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