6.

The Indian Economy and Disasters during the Late Nineteenth Century: Problems of Interpretation of Colonial Economy[1]

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1. Introduction

The period from the beginning of the 1870s to the end of the 1910s can be called 'the age of famines and epidemics' in British India. The population growth rate was very low (0.37%) due to the many mortality crises such as famines and epidemics (McAlpin, 1983b, p. 153). Eleven famines occurred during the second half of the nineteenth century. At least three (1876-78, 1896-97, and 1899-1900) out of the eleven were great famines, resulting in millions of deaths. For example, it is estimated that about 5 million people died in the 1876-78 famine, though one estimate puts the total at 8 million (Maharatna, 1996, p. 15). During this period, there occurred many epidemics, such as cholera, malaria, smallpox, plague, and influenza. The death toll from these epidemics was extraordinary. For example, as is well known, mortality in British India from the influenza pandemic in 1918 was more than 10 million. However, more usual epidemics such as malaria and cholera carried away many more precious lives. In particular, 'epidemic malaria' often occurred in combination with famine, causing a huge human toll.

Figure 1: Two Periods of Population Change in British India

1871～1920	Population Growth Rate 0.37% Many Mortality Crises (Famines and Epidemics)
1921～1941	Population Growth Rate 1.22% Disappearance of Mortality Crises

Source: Visaria and Visaria, 1983, p. 490.

We now take one example. In the United Provinces between 1873 and 1948, severe mortality crises occurred seven times, in 1879, 1894, 1897, 1905, 1908, 1911, and 1918. In all cases, more deaths were due to disease than starvation. Such diseases as cholera, malaria, plague, and influenza caused these mortality crises. In the United Provinces, too, 'epidemic malaria' was the biggest factor in raising the mortality rate (Wakimura, 1996).

[1] This short paper is mainly based upon my unpublished papers which have been presented at some conferences during the last decade.

After the beginning of the 1920s, the population growth rate rose above the 1% level because of the disappearance of mortality crises like famines and epidemics. If we look at figure 1, we find that there is a contrastive picture of two periods. We wonder why there occurred so many mortality crises during the 1871-1920 period. The usual answer is that the most decisive factor was the negative impact of colonial rule on the Indian economy since nationalist thinkers propagated this kind of interpretation almost a century ago. In this paper, however, I will try to give a more complex explanation on these phenomena. I will introduce environmental and epidemiological reasoning into the explanation.

2. The Indian Economy 1871- 1920

2.1. Nationalist and Revisionist

How has 'the age of famines and epidemics' been explained? We now examine the nationalist interpretation, taking an example from Sumit Sarkar's work (Sarkar, 1983, pp. 24-42).[2]

(1) Drain of Wealth: Indian wealth was squeezed through land revenue and other means, and then drained off to England, leaving no surplus in India.

(2) Commercialization of Agriculture: Although the commercialization of agriculture was driven by railway construction and the resulting growth in exports, it was a 'forced' process. Peasants were forced to produce commercial crops in order to pay heavy land revenues or rents. The conversion to commercial crops necessarily led to a decrease in food production, worsening the damage of famines. In addition, the commercialization of agriculture intensified the dependence of peasants on moneylenders, thereby promoting differentiation of the peasantry.

(3) Agricultural Production: Big landlords, moneylenders, and rich peasants who gained greatly from commercialization of agriculture did not invest much in agricultural production, continuing to depend rather on semi-feudal exploitive relationships. Therefore, agricultural production did not increase, leading to outbreaks of destructive famines.

According to the nationalist interpretation, famines and epidemics were the necessary results of the economic process during the colonial period. The most predisposing factors were economic exploitation and economic differentiation which were forced under colonial rule. But recent studies have presented another interpretation. We now call it a revisionist interpretation. Below, we present the revisionist interpretation, using the works of N. Charlesworth (1982, pp. 20-28), B. R. Tomlinson (1993, pp. 51-67), and T. Roy (2000, pp. 51-113).[3]

(1) After the 1850s, agricultural prices increased faster than the nominal amount of land revenue. Thus, the real burden of land revenue was lightened.

(2) The commercialization of agriculture was not a forced process, but rather driven by the peasants' initiatives. Peasants responded to rising agricultural prices resulting from railway

[2] But, needless to say, this interpretation can be traced back to some nationalist writers a century ago, such as R. C. Dutt, D. Naoroji, and W. Digby.

[3] Concerning famine history, a revisionist perspective was presented by McAlpin (1983a).

construction and the resultant export growth. The process of substitution from food crops to commercial crops did not occur on a large scale. There was an increase in agricultural indebtedness, but it did not lead to a substantial increase in transfers of land ownership to moneylenders.[4]

(3) Agricultural production gradually increased from the late nineteenth century to the First World War. After the First World War, agricultural production began to stagnate.

This interpretation presupposes a picture of growth of world trade after the 1860s. The transport revolution brought by railways and steamships substantially reduced freight rates, leading to a large increase in low-value-added bulk shipments. The opening of the Suez Canal accelerated these processes. The export of cotton, wheat, oilseeds, jute, tea, rice, and so on from India substantially increased after the 1870s. This export growth drove the commercialization of agriculture during the 1871-1920 period. But this interpretation cannot reasonably explain the dismal picture of the 1871-1920 period in terms of famines and epidemics.

2.2. 'Tropical Development' and India

Which is a more persuasive interpretation at least in the sense of economic history: the nationalist's interpretation or the revisionist's? If you consider India in the context of world economic development before the First World War, you naturally get the answer. The revisionist interpretation that the Indian economy more or less grew because of increased exports of agricultural produce is more reasonable.

According to W .A. Lewis (1970), tropical countries experienced a substantial export growth of primary goods in the last quarter of the nineteenth century. This was caused by the transportation revolution and 'growth in demand resulting from the increase in the national incomes of the leading industrial states' (Lewis, 1970, p. 14). The annual rate of growth of exports from tropical countries between 1883 and 1913 was 3.4%, which was slightly lower than the annual growth rate of industrial production in the world, 3.7%. The strong export performances of these tropical countries resulted from the peasants' own initiatives.

W. A. Lewis suggested that tropical countries achieved primary-good export-led economic growth between 1880 and 1913. He asserted that this picture does not necessarily call to mind such keywords as 'colonialism', 'exploitation', or 'drain'. But this export-led economic growth faltered after the First World War.

We find the same tendency in the Indian case. India's export growth rate was 2.8% during the 1883-1913 period. This was low among many tropical countries. It resulted from a land-population ratio that was very low compared with other tropical countries. The peasants could not afford to allocate much land to commercial crops due to the scarcity of land. Nevertheless, there is no doubt that the increase of commercial agricultural exports was a kind of 'engine of growth' in the economy as a whole.

[4] This point should be treated more cautiously. I will try to elucidate it at another opportunity. See, Balachandran (2003, p. 8).

Table 1 shows that output of both food grain and non-food grain grew at a certain rate, which was driven by export growth. After the First World War, however, output levels started to stagnate due to the fall in the rate of growth of world trade. In addition, table 2 shows that the NDP for both agriculture and the entire national economy grew at about 1% until the end of the nineteenth century, and then slowed down.

The period from the 1870s to the First World War saw a certain measure of economic growth in British India. The improvement of transportation, the development of infrastructure, and the incorporation of the territory into the world economy promoted the export of agricultural products and the commercialization of agriculture.[5] This process probably generated income growth in many rural areas. Therefore, this period was not economically stagnant, although income distribution was possibly becoming more unequal and the standard of living of the lower strata may have become unstable. Why, then, despite modest growth, did this period see many famines and epidemics? On the other hand, the period from the 1920s to the 1940s was truly stagnant in terms of economic growth. However, there were no serious famines and epidemics during the latter period, except the Bengal famine in 1943 which was a rather political tragedy. Then we have seen a steady population growth in this period. This contrastive picture between two periods is

Table 1: Growth Rates of Agricultural Output and Population in British India, 1891～1946

(percent per annum)

	1891-1916	1921-1946
Population	0.44	1.12
All crops	0.84	0.34
Food grain	0.61	0.03
Non-food grain	1.66	1.08

Source: Roy (2000, p. 57), originally based on Blyn (1966).

Table 2: Growth Rates of Net Domestic Product, Total and Agriculture, 1868-9～1946-7

(Annual trends in growth rates as percentage)

	Agriculture	Total	Population	Per capita NDP
1868～98	1.01	0.99	0.40	0.59
1882～98	1.08	1.29	0.51	0.78
1900～46	0.31	0.86	0.87	-0.01

Source: Roy (2000, p. 52), based on Heston (1983); Sivasubramanian (1997).

[5] Again unfortunately I could not examine the influence of international business cycle on the Indian economy during this period. For example, we should pose the question whether the extraordinary damage of famines during the late 1870s was related to the recession of international cotton markets during the 1870s or not. I will try to answer this question in the near future. On the other hand, the influence of the silver rupee depreciation on the Indian economy during this period should be examined. There were both positive aspects and negative aspects. The deflationary effect of recessionary international primary goods market on Indian economy was countervailed by the inflationary effect of depreciation of Indian rupee. However, the drain (the Home Charge) from India to Britain in terms of pound sterling became heavier (McGuire, 2001). This negative aspect also should be examined in the near future.

certainly paradoxical in the sense that economic growth did not match with population growth. From the next chapter onward we would try to explicate this paradoxical question.

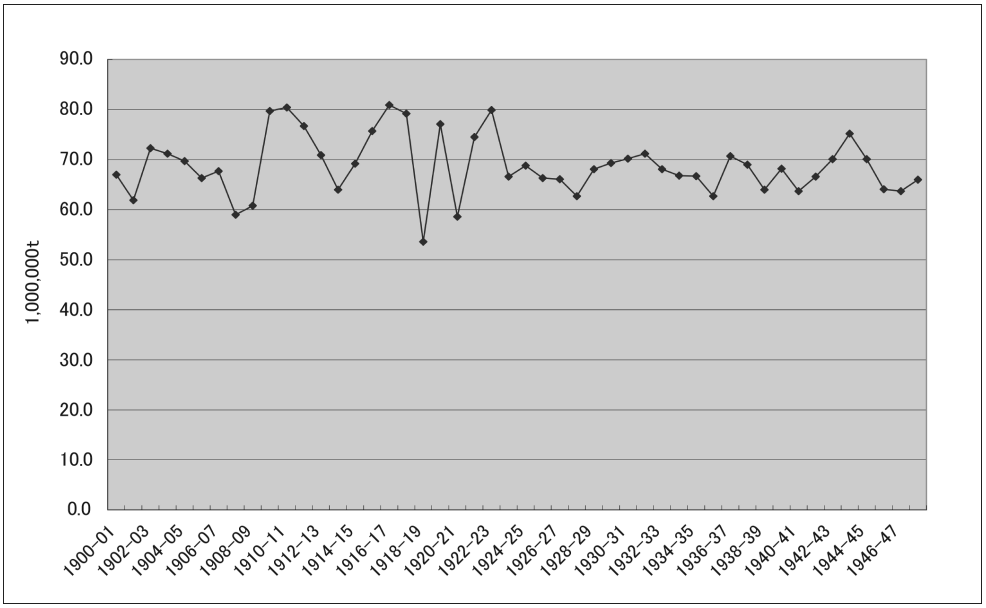
3. Famines, Epidemics and Colonial Development

3.1. Scarcity of Land in the Late Nineteenth Century[6]

The problem of land scarcity became apparent in the second half of the nineteenth century. Many agrarian historians concur with this author's judgment. For example, Haruka Yanagisawa wrote that 'in South India, much uncultivated land was being cultivated during the nineteenth century. In 1840, two-thirds of cultivable land was uncultivated in the South Arcot district. From 1852 to 1890, unirrigated land increased by 25%, canal-irrigated land, by 41%, and well-irrigated land, by 138%. As a result, cultivated land substantially increased'. Furthermore, 'this extensive increase of cultivated land reached its limit by the late nineteenth century or the early twentieth century. Then, labour intensification in agriculture started' (Yanagisawa, 1991, p. 97).

In addition, another fact apparently reveals the problem of land scarcity. As already mentioned, several serious famines occurred in the second half of the nineteenth century. We may conclude that this fact meant overpopulation or a Malthusian crisis during this period. However, there was a contradictory fact that negated the idea of a Malthusian crisis. If we look at the changes in agricultural production (both food grain and non-food grain), we find that some

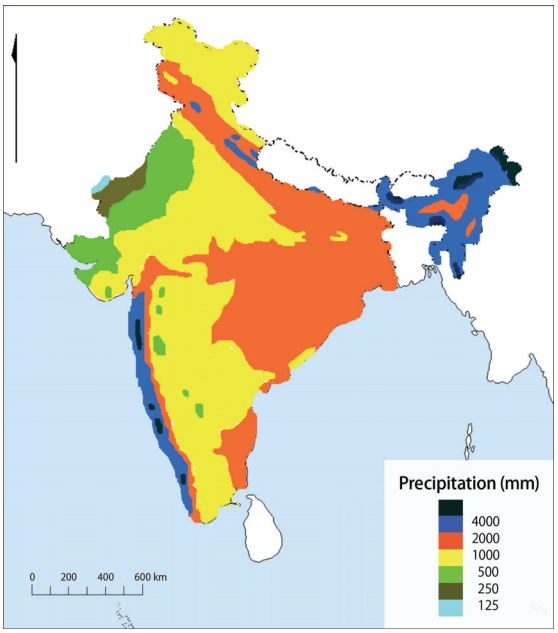
Figure 2: Food Grain Production in British India (1900–01~1947–48)



Source: Sen (1971, pp. 2-3).

[6] The high frequency of serious drought in the late nineteenth India has been recently explained in terms of climatological reasoning (Davis, 2001). Unfortunately I have not been able to examine this aspect of events during the late nineteenth century in this paper. However, I feel that Davis's view on the Indian economy during the period depends on rather Indian nationalist's interpretation which this paper tries to argue with.

Figure 3: Map of Precipitation



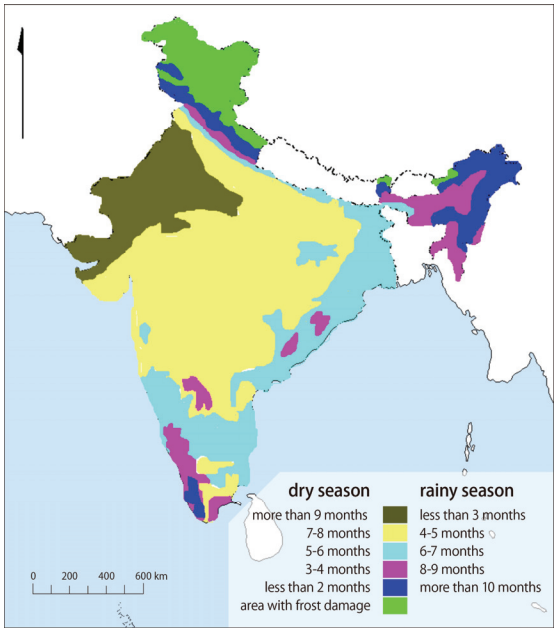
agricultural growth was recorded during the period from 1891 to 1916 (table 1). We cannot simply argue that a Malthusian crisis (scarcity of land) led to the famines during the late nineteenth century (Wakimura, 2002).

Thus, a simple Malthusian model cannot be applied to this period. Nevertheless, the problem of land scarcity appeared in this period to some extent. The growth of primary goods export must have intensified the pressure to clear land. It is worthwhile referring to the hypothesis proposed by S. R. Sen in the 1970s. He examined the statistics on food grain production during the first half of the twentieth century. He then argued that there was a dilemma between growth and stability in food grain production. The trend of food grain production was slightly upward but very unstable in the period from 1900–01 to 1923–24. On the other hand, the trend was stagnant but stable in the period from 1924–25 to 1950–51 (figure 2).

Why did this phenomenon occur? S. R. Sen pointed out that inferior land or marginal land was cultivated in the growth period of the early twentieth century, which promoted the instability of food grain production. In the period after the mid-1920s, the instability disappeared because there was no cultivation of inferior land or marginal land (Sen, 1971, pp. 2-3). This means that the problem of land scarcity became apparent in the early twentieth century. This explanation can also be applied to the late nineteenth century.

Labour absorption in agriculture was limited by climatic conditions on

Figure 4: Map of Duration of the Rainy Season



the subcontinent, however.[7] The response of peasants to land scarcity was also constrained by these conditions. There was the 1,000-mm isohyet as a crucial divide between humid (rice-producing) India and arid and semi-arid (wheat- and millet-producing) India. We can note that there is a very wide semi-arid area that covers almost half of the subcontinent. Precipitation in this area is from 500 mm to 1,000 mm. Even agriculture in areas with more than 1,000 mm of precipitation was constrained by the short duration of the rainy season (figure 3 and figure 4). Not only the precipitation but also the duration of the rainy season is limited in India. These conditions determined the extent of both labour intensity and capital intensity in the agriculture of India.

3.2. Agricultural Labourers and Famine

If we historically characterize Indian rural society from an East Asian perspective, it is clearly apparent that there was a thick layer of landless class. Before going into this issue, we now consider the fact that the proportion of the service sector in Indian rural society might have been rather large until the beginning of the nineteenth century. Dharma Kumar once pointed out this fact. She insisted that in the first half of the nineteenth century, namely from 1800 to 1872, a great change occurred in the industrial structure, in which employment in the service sector decreased and increased in agriculture. The service sector included a wide variety of occupations, such as work related to local administration, police, military, education, law, medicine, trade, finance, transport, domestic and personal services, entertainment, the arts, religious services, and begging (Kumar, 1998).

What is most striking in Kumar's argument is that the proportion of employment in the service sector was higher than in the handicraft industry in the periods prior to the eighteenth century. Kumar did not pursue this point thereafter, but it is probable that pre-modern Indian rural society had a larger service sector compared with that of some European countries or East Asian countries such as Japan.

Why did such a large service sector came into force in Indian rural society? It can be speculated that the people who belonged to the service sector were those employed in agriculture only during a limited season when farm work was heavily needed. It was an essential condition of Indian agriculture to have a repository of low-cost workers outside peasant households to maintain steady agricultural production. This essential condition was determined by the tight seasonality of the monsoon rains. Thus, such a free labour force was produced on a large scale. As a sort of repository of a temporary workforce, the agricultural labourers were engaged in various traditional occupations of the service sector in the season when they were not required for farm work (Nakamura, 1975, pp. 66-67). In this sense, a high proportion of employment in the service sector of village communities, as pointed out by Kumar, can be explained ecologically. However, over the first half of the nineteenth century, the layer of landless class tended to lose its traditional occupations and become specialized as agricultural labourers.

[7] T. Roy (2005) much earlier pointed out the importance of water resources in thinking about South Asian economic development.

There occurred eleven famines in the second half of the nineteenth century, including three great famines in 1876–78, 1896–97, and 1899–1900. Most of the famines resulted from the failure of the southwest monsoon. Drought has been a very common phenomenon in India since ancient times. We should ask why famines caused such extensive damage in this period.

From the 1860s to the end of the 1920s, India continued to export food grain, with the exceptions of the great famine years. There was no absolute food scarcity in this period as a whole (Ghose, 1982). However, there was certainly very severe local food scarcity when serious droughts occurred. The development of railways must have prompted movements of food grain from areas of plenty to areas of scarcity. However, famine became a more class-biased phenomenon in this period than before. We need to look at the vulnerability of the lower classes to famine. The mortality rates among agricultural laborers who belonged to the lower castes were much higher than in the other classes. At times of drought, they lost their employment and were then unable to purchase food (Wakimura, 1996, pp. 287-288).

While there was a certain degree of agricultural growth, the real wages of agricultural laborers hardly increased during the period (Roy, 2000, pp. 80-84). This means that agricultural growth did not have a trickle-down effect on the lower classes. A fact to be noted is that real wages were drastically reduced at least during the time of famine. Although agricultural growth occurred, food availability for agricultural labourers must have become unstable during this period.

3.3. Deterioration of the Disease Environment

We need to analyze the specific causes of death in order to understand why famines brought about huge human mortality. We find that more deaths were due to disease than starvation. Such diseases as cholera, smallpox, diarrhoea, dysentery, and malaria combined with famine to produce large-scale mortality. We examined the changes in the crude mortality rate in the United Provinces between 1873 and 1948. We found that there were seven mortality crises before 1920, occurring in 1879, 1894, 1897, 1905, 1908, 1911, and 1918 (table 3). Most mortality crises resulted from disease. The most dangerous was epidemic malaria, which often broke out in the United Provinces. Recent studies by T. Dyson (1991a, 1991b) and A. Maharatna (1996) have shown that such famine-malaria nexuses were also seen in other provinces.

Table 3: Mortality Crises in the United Provinces

1879	Famine＋Epidemic Malaria (Famine-Malaria Nexus)
1894	Cholera＋Epidemic Malaria
1897	Famine＋Epidemic Malaria (Famine-Malaria Nexus)
1905	Plague
1908	Famine＋Epidemic Malaria (Famine-Malaria Nexus)
1911	Plague
1918	Influenza

Source: Wakimura (1996).

Epidemic malaria did not necessarily occur along with famine. However, epidemic malaria most often occurred when the nutritional deficiencies of the rural poor after famine coincided with a proliferation of

Anopheles—vector of malarial parasite—caused by heavy rain. *Plasmodium falciparum* took many lives under conditions of reduced human resistance to disease due to malnutrition along with drastic changes in environmental conditions, including heavy rain (Zurbrigg, 1992; Maharatna, 1996).

There were also epidemics independent of famines, like the plague epidemics of 1905 and 1911 and the influenza epidemic in 1918. We can attribute the basic cause of frequent epidemics in this period to the deterioration of the disease environment. The disease environment is the environment in which people are exposed to disease-causing germs, vectors, or hosts. Deterioration of the disease environment means that there is a greater possibility of human beings suffering from infectious diseases.[8]

Firstly, as already pointed out, while the development of the railways speeded movements of food grain, it also increased the negative effect of epidemics. The increased movement of people necessarily involved disseminating infectious diseases over wide areas. For example, the eastern part of the United Provinces was a source of labour supply to industrial cities like Calcutta and Bombay. Many migrant laborers came and went between village and city. This labour movement was the basic cause of the high plague mortality in the eastern United Provinces. Migrant laborers returned to their villages with plague bacillus (Derbyshire, 1987, pp. 190-191). This causal relationship can be applied to the cases of cholera, diarrhoea, and dysentery.

Even malaria, a seemingly endemic disease, fits this causal relationship. During the early decades of the twentieth century in India, there was an appreciable increase in labour mobility that was brought about by industrial development and plantation agriculture. The high incidence of malaria on tea plantations should be understood within such a context (Wakimura, 2001).

Secondly, urbanization started with the commercialization of agriculture and a certain degree of industrialization in the late nineteenth century. This made urban hygiene conditions worse, resulting in the prevalence of cholera and plague in the cities (Crook, 1993, pp. 8-15; Ramachandran, 1989, p. 67).

Thirdly, environmental changes caused by developmental activities like railway, road, and canal construction made the disease environment worse. A typical case was the effect of canal irrigation on the prevalence of malaria. The spread of canal irrigation in the western part of the United Provinces led to an expansion of waterlogged areas, leading to a proliferation of the *Anopheles* vector. When epidemic malaria occurred, high fever mortality was concentrated in the Doab area, which was the most canal-irrigated area in the United Provinces (Wakimura, 1996, pp. 290-292).

Human movement, urbanization, and environmental changes were among the factors that aggravated the disease environment, worsening the human misery caused by famines and epidemics. These factors were primarily caused by colonial development activities, and the period from the 1870s to the First World War was when colonial development was most intense. In this sense, we can call these epidemics ‘developo-genic diseases’.

[8] Concerning this part, I owe much to Klein (1989; 1990), Derbyshire (1987).

4. Conclusion: Semi-arid Tropics and Disasters

From the middle of the nineteenth century, most parts of Asia faced globalization in terms of trade growth. This globalization led to serious health hazards in some parts of Asia during the nineteenth century. In particular, various epidemics inflicted severe damage on South Asia. From the early 1870s to the late 1910s, South Asia experienced many famines and epidemics, leading to huge death toll and checking the population growth.

Similarly, East Asian countries that opened themselves to the outer world faced epidemic diseases such as cholera. Trade growth had a close connection with the spread of epidemic disease. East Asia, too, faced serious health hazards in this period. There was a great difference in the scale of damage between South Asia and East Asia. Although mortality data on China is not available, particularly on inland China, for this period, we can estimate that various epidemics resulted in lower mortality in China than in British India. Vital statistics are not available at all, but we may speculate that the level of cholera mortality in China was much lower than in India in the second half of the nineteenth century.[9] According to some studies on the epidemic history of Southeast Asia (Owen, 1987, pp. 8-16), during the period in question, some areas were ravaged by epidemic diseases like cholera and malaria. The Philippines experienced the highest mortality crisis in the late nineteenth century (Smith, 1978, pp. 62-72). In general, Southeast Asia recorded high population growth even in this period (Reid, 2001). Although high fertility must have been a factor, it seems that the level of mortality was not as high as in South Asia. This is a just rough speculation, but this kind of comparison should be attempted more rigorously in the future.

If we compare India with China, it is certain that there was a big difference in railway development between these countries in the second half of the nineteenth century. The total length of the railway network recorded 41,221 km in British India in 1903, while in China, it was only 3,330 km in 1902. Railway development must have promoted the diffusion of epidemics such as cholera and plague in India. But there is another factor explaining the different mortality levels of epidemics.

Ecological conditions must have disadvantaged South Asia. Needless to say, in the semi-arid region of the Indian subcontinent, the possibility of famine was high. The semi-arid climate might also have raised the level of mortality in epidemic diseases in the following two senses. Firstly, a tropical climate, particularly high temperature and high humidity, propagated both micro-parasites (micro-organisms) such as *Plasmodium* and vectors such as *Anopheles*. For example, even in semi-arid regions, high temperature and intensive precipitation during the monsoon season sometimes made vectors (*Anopheles*) proliferate, leading to epidemic malaria.

In the Indian subcontinent, secondly, the semi-arid region faced the problem of serious water scarcity during the dry season (between seven and eight months). In the case of cholera, the scarcity of water aggravated the problem of water contamination. In combination with high

[9] Wataru Iijima compiled the mortality data of treaty ports in China recorded by maritime customs. He pointed out that the frequency and mortality level of various epidemics in modern China were not as high as usually assumed (Iijima, 2000, p. 333).

temperature, water scarcity amplified the death toll in cholera epidemics in the Indian subcontinent during the nineteenth century.

In any case, we have tried to examine the underlying causes of mortality crises during the period in question from an environmental and epidemiological perspective. However, this trial is only half finished. We will continue to elucidate these mortality crises.

The recent controversy in historical analysis of the Indian economy during the colonial period has focused upon industrialization (Roy, 2010; Mukherjee, 2011). Although I will not intervene in this controversy itself, I do suggest some implications from my argument for interpretations on colonial economy.

I have already pointed out that the revisionist interpretation of colonial economy during the late nineteenth century is more plausible as far as the context of economic history is concerned. Nevertheless, this interpretation has not reasonably explained 'the age of famines and epidemics'. It can be pointed out that this interpretation has basically regarded famines and epidemics during this period as 'natural disasters'.

On the other hand, we have clarified that famines and epidemics during this period mostly were 'man-made' phenomena. However, we call them 'man-made' disasters in a different sense from the nationalist interpretation that the impoverishment process caused by colonial rule led to 'man-made' disasters. Rather, our interpretation is that the development process tended to trigger famines and epidemics during this period. We also have to point out that development activities caused a backlash due to the ecological conditions of the semi-arid tropics in the Indian subcontinent, intensifying the death toll.

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