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Why England and not China and India? Water systems and the history of the Industrial Revolution*

Terje Tvedt
Centre for Advanced Studies, Drammensveien 78, 0271 Oslo, Norway
E-mail: terje.tvedt@global.uib.no

Abstract

Global history has centred for a long time on the comparative economic successes and failures of different parts of the world, most often European versus Asian regions. There is general agreement that the balance changed definitively in the latter part of the eighteenth century, when in continental Europe and England a transformation began that revolutionized the power relations of the world and brought an end to the dominance of agrarian civilization. However, there is still widespread debate over why Europe and England industrialized first, rather than Asia. This article will propose an explanation that will shed new light on Europe's and England's triumph, by showing that the 'water system' factor is a crucial piece missing in existing historical accounts of the Industrial Revolution. It is argued that this great transformation was not only about modernizing elites, investment capital, technological innovation, and unequal trade relations, but that a balanced, inclusive explanation also needs to consider similarities and differences in how countries and regions related to their particular water systems, and in how they could exploit them for transport and the production of power for machines.

Studies that aim to explain the origins of the modern world must be concerned with limitations and possibilities inherent in different types of waterscapes and river basins. Discharge patterns, precipitation variations, and silt loads in rivers all matter, as do diverse water management traditions and dominant ideas about water and water control. These issues are crucial, because they strongly influenced the ability of governments and entrepreneurs to develop efficient transport systems and factory production. Although the Industrial Revolution relied on water for power and transport until the coming of the steam engine and the railways, comparative analyses of this transformative process have generally overlooked water landscapes, and water control achievements and traditions. By highlighting regional similarities and differences in complex and multifunctional water systems, it may be possible to

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solve some of the empirical and theoretical problems with dominant modes of explanation as to the origins of the Industrial Revolution.

The most influential explanations of the 'great divergence' between Europe and Asia share structural problems.[1] Theories that underline either European cultural and political uniqueness or European exploitation of 'the other' can explain hypothetically why Europe succeeded and Asia failed, but not explain simultaneously why England took the leading role in Europe, or why certain parts of western Europe industrialized before the rest of the world. A plausible explanation should not turn correlations into causal explanations but should distinguish between necessary and sufficient causes, causes and occasions, and causes and preconditions. Such an approach should also be exogenous, in the sense that fundamental technological and economic transformations need a causal element that does not itself require an economic or technological explanation. A convincing explanation should also make sense of the Industrial Revolution's gradual and regional character. Moreover, a useful account of 'the triumph of the West' must break away from an almost exclusive concern with the West, to the neglect of Asian economies and technologies. Recent research findings question widespread assumptions about fundamental differences in economic and technological levels between Europe and 'the rest', as well as between the modern and the 'traditional' West.

It is also essential to avoid a near exclusive focus on social variables, to the neglect of natural and environmental conditions. Instead, one needs to provide a nuanced view of how environmental conditions contextualized social interactions, and how political and social systems interpreted environmental contexts.[2] Since all societies at all times have had to relate to and control the waters that run through their territory, studying complex and multifunctional water systems is useful for analysing comparative patterns of development and transformation. This is especially so in the context of the first phase of the Industrial Revolution, when the water systems and the ways in which they were exploited underwent fundamental changes.

A complex and multifunctional water system is understood as consisting of three interconnected layers. First, physical form and behaviour includes precipitation and evaporation patterns, how rivers run in the landscape, the interface between rivers and sea (where applicable), and the development patterns and initiatives that these physical structures tend to encourage. The second layer consists of the human modifications of the physical water landscape, for a water system also reflects societies' ability or determination to manipulate their water. One important aspect of the Industrial Revolution was not only that water was used and controlled in new ways and in new economic sectors but also that water's multifunctional role in societies increased and deepened, as an aspect of modernity. The institutional and conceptual dimension of a water system is the third and final layer: that is, management practices and ideas about water and water control, which are only very briefly addressed in this article. 'River system' is used here to refer to how a river actually manifests itself

1 For this expression, see Kenneth Pomeranz, *The great divergence: China, Europe, and the making of the modern world economy*, Princeton, NJ: Princeton University Press, 2000.

2 Terje Tvedt, *The way the rivers run*, unpublished working paper for the Centre for Advanced Studies, Oslo, November 2008; idem, 'Bridging the gap: a water system perspective', in Willy Østreng, ed., *Transference: Interdisciplinary Communications*, Oslo: Centre for Advanced Studies, 2009.

in society, reflecting the complex combination of physical and social variables that influence a river's behaviour. These include not only physical aspects, such as rainfall, evaporation, topography, tributaries, soil types, discharge, and sediment transportation, but also alterations due to human interference.[3] G. W. Skinner suggested dividing China into eight distinct regions, ending up with river basins as a decisive descriptive criterion.[4] A complex and multifunctional water system is a much broader term than a river basin, but it buttresses the notion that regions, rather than countries, are often the most appropriate units of comparison. This article presents some data from a comparative research project of developments of the industrializing regions of England and of the core economic regions of India and China– that is, the great river valleys of the Brahmaputra/Ganges system, the Indus, the Yangtze, and the Huang He, for the period 1760–1820.

The emphasis on the need for a comparative analysis of complex and multifunctional water systems in order to understand regional and global transformations of the late eighteenth and early nineteenth centuries is not an attempt to manufacture a single-cause and deterministic hypothesis of the Industrial Revolution. This perspective does not imply criticism of analyses that deal with overarching and interconnecting trends in economic relations between Europe and Asia, or of cultural and ideological traditions, but provides a new context, in which such issues can be studied comparatively. At the same time, emphasis is given to additional variables, which have so far been neglected in the literature. This article argues that it is necessary to understand how different water systems created different possibilities for the development of trade and industries, without in any way claiming that the Industrial Revolution was predetermined to happen when and where it did. Innovative British entrepreneurs were not historically inevitable, but it is argued here that, whatever the strengths of market orientation, capitalist mentality, or investment capital, similar entrepreneurs could not succeed in the core economic regions of China, India, or other European countries of the time, because of the character of their water systems.

Transportation and water systems

Transportation has been widely recognized as a crucial factor in the Industrial Revolution, and there is little doubt that waterborne transport was most important for the new industries. Transportation systems encouraged commercial expansion, facilitated the division of labour, and linked production to markets. Until the middle of the nineteenth century, rivers and canals were essential in deciding which regions and cities could trade with each other, and where industry could profitably be located, coal mined, and iron refined. Most importantly, they allowed the shipment of heavy raw materials, such as iron and coal, from their extraction points to industrial sites. However, comparative studies of the Industrial Revolution have given waterborne transport too little attention, even though Adam Smith, in his *Wealth of nations* in 1776, recognized that industrial development depended on the

3 Terje Tvedt, ed., *A history of water*, 4 vols to date, London: I. B. Tauris, 2006–. For China, see Ch'ao-Ting Chi, *Key economic areas in Chinese history*, New York: Paragon Books, 1963; Mark Elvin, *The retreat of the elephants: an environmental history of China*, New Haven, CT: Yale University Press, 2004, pp. 115–65.

4 G.W. Skinner, ed., *The city in late imperial China*, Stanford, CA: Stanford University Press, 1977.