Understanding China

Jianxiong Ge
Yunsheng Hu

A Historical Survey of the Yellow River and the River Civilizations

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Jianxiong Ge
Fudan University
Shanghai, China

Yunsheng Hu
Fudan University
Shanghai, China

Translated by
Qingyong Wang
Tianjin University of Technology
Tianjin, China

Lijia Yao
Tianjin University Renai College
Tianjin, China

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About This Book

Most early major civilizations emerged along rivers, which served as a hub for both transportation and economy alike. The relationship between mankind and rivers has been enduring and complicated. This book traces the changes of the Yellow River with the passage of time and examines the origin and the course of development of Chinese civilization closely intertwined with the Yellow River throughout history. With their attitudes toward the river changing from fear to respect, and from exploitation to protection, the Chinese people have found the Yellow River basin a cradle of culture, a nurturing place for their well-being and a guarantee for their country's future prosperity. Furthermore, comparisons are drawn between the Yellow River and the Nile, the Tigris and Euphrates Rivers as well as the Indus River to provide insights into the road to civilizations incubated by rivers. Similarities and differences of early river civilizations are summarized to look at their respective nature and characteristics. Efforts are also made to reflect on the lessons learned from the taming of the Yellow River basin in terms of the control of pollution and silt concentration. This book is an urgent reminder of the crucial role human activities play in coping with the environmental issues of the Yellow River so as to achieve a sustainable development of the mother river of China. It also hopes to provide insights for all peoples to help get along with their own rivers.

Contents

Chapter 1
The Yellow River and the Yellow River Civilization

Any stream of water, as thin as a trickle or as vast as a river, is a member of the river family and is necessary for human beings. While the role of great rivers is irreplaceable, the functions of regional and world-class rivers are unique. A large river nurtures a people, a state, a spirit, and even a civilization, which together constitute the chapters of history. Thus, it is no exaggeration to say that the early phase of history is also a history of rivers. What the Yellow River means to China is what the Nile to Egypt, the Tigris and the Euphrates to Babylon and the Ganges to India. These ancient civilizations cannot survive without their great rivers. Hence, the Chinese people and its culture as well as the East Asian civilization are closely intertwined with the Yellow River.

In the history of China and even in that of human civilization, the Yellow River is never merely the name of a river composed of two simple Chinese characters—"黄河", but a synonym for civilization and an integral part of human civilization. The over-five-thousand-year civilization that China takes pride in mostly takes place in the Yellow River basin. This civilization originated and developed here and then spread to the entire country and further to its adjacent parts in Asia, eventually making an irreplaceable contribution to the civilization of the world.

1.1 Unique Physical-Geographical Environment of the Yellow River

The Yellow River that has long been honored by the Chinese as their "Greatest of the Four Rivers" and "First of the One Hundred Springs", is the second largest river in China after the Yangtze, and is one of the longest rivers in the world. Originating from the northern foothills of Bayan Har Mountains in Qinghai Province, it flows eastward through provinces of Qinghai, Sichuan, Gansu, Ningxia, Inner Mongolia, Shaanxi, Shanxi, Henan, and Shandong and pours into the Bohai Sea in Kenli District of Dongying City, Shandong Province, with a length of 5,687 km and a fall of 4,480 m.

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The average annual runoff is 58 billion cubic meters and the total basin size is 813,100 km^2 (including the inflow area in Erdos that covers an area of 42,000 km^2). The cultivated area of the basin is 190,000,000 *mu* (around 31.300,000 acres), with a population of nearly 100 million. Yet, if the vicinity of the river in Henan and Shandong provinces are also taken into account (as it is under strong influence of the river), the total area of the cultivated land would add up to 300 million *mu* (around 49.400,000 acres) and the population 120,000,000. Along its way, the Yellow River is joined by hundreds of tributaries such as the Wei, the Jing, the Fen, the Su, the Yi, the Luo, the Zhang and the Huan rivers, forming a vast and enormous body of water. In the course of thousands of years, the Yellow River has been rushing and rolling, piercing through stones, cutting and cleaving through mountains as well as valleys, (among which stand even the tallest and greatest mountains of all—the Jishi, the Qilian, the Helan, the Yinshan, the Lüliang and the Taihang mountains), before it travels through the Loess Plateau and the North China Plain and finally empties into the sea.

1.1.1 A Continuous River Owned by One Nation

Besides the Yangtze, the Yellow River is the only great river in the world that has been entirely owned by a single nation for over 3,000 years. Yet, the former is no match for the latter in terms of their contribution to China's early civilization. Any other big river in the world, whether the Nile, the Mississippi, the Amazon, the famous Tigris and Euphrates, or the Ganges River in India, is either owned by a people or a culture for too short a time or shared by different peoples, states or civilizations. Meanwhile, they are often discontinuous or have experienced many rises and falls. However, the people born in the Yellow River basin has developed into the most populous nation in the world, with the influence of their civilization radiating far beyond East Asia to the rest of the world. This is the most basic feature that distinguishes the Yellow River from all the other rivers in the world.

1.1.2 Unique Landscape of the Basin

The second characteristic of the Yellow River is that it flows through the largest plateau in the world—the Loess Plateau, and, with its alluviation, forms China's largest plain—the North China Plain (also named the Huanghuaihai Plain). The Loess Plateau of China is the largest and thickest loess plateau in the world. It ranges from the Riyue Mountain in Qinghai Province in the west to the Taihang Mountains in Shanxi Province in the east, and from the Great Wall (the parts in Shanxi and Shaanxi provinces) in the north to the Qinling Mountains in the south, with a total area of about 400,000 km^2. Except for the thin deposit of loess on some rocky mountains, the rest of the plateau is covered with thick loess, generally between 50 and 80 m, but the

thickness comes to 100–200 m in the area between the south of the Baigan Mountain and the west of the Lüliang and Ziwuling mountains in the north of Shaanxi. In the area between the north of the Huajialing and the Maxian mountains (respectively in Tongwei County and Dingxi City in Gansu Province) and the south of Lanzhou, the loess is as thick as 200–300 m. Such thickness of loess is unique in the world. To be specific, the thickness in central Europe is generally below 5 m, with the thickest loess found in the Rhine Valley, only 20–30 m. In Russia the thickness is mostly 10–20 m, and in North America it is several to 20 m except for some areas along the west bank of the Mississippi in the US, where the loess is the thickest, up to over 30 m. In South America, the thickest loess is merely slightly over 10 m. All these figures are dwarfed by the average thickness of the Loess Plateau in China.

The accumulation of loess on the Loess Plateau has begun since the early Pleistocene 2.4 million years ago at the latest. Later, the area of sediment on the Loess Plateau gradually expanded, and the majority of the bedrock formed in the Quaternary Period within the range of today's Loess Plateau was eventually concealed, with only a few towering rocky mountains still exposed. Since the Yellow River has the largest amount of water and sediment, it takes the greatest "credit" in building the North China Plain. At the beginning of the formation of the Plain, the terrain was low, and there were no levees on either side of the Yellow River. Therefore, the water was unrestrained and flowed in random directions, with no fixed river course. When one place was silted up, the river changed its course to seek a lower place, causing the vast plain to be constantly silted up. With the formation and development of the human society, the meandering of rivers was found to hamper agriculture and people's living, so dikes and channels were built to restrain and divert the water in order to make the Yellow River flow in a fixed channel. That is how the sediment came to be deposited only in the river channel and therefore raised the riverbed continuously. Correspondingly, the river embankment was also constantly strengthened and built higher and higher. Years later, when the riverbed was above the riverbanks behind the dikes, a "suspended river" was formed. The Yellow River, now "up in the air", had neither tributaries, other forms of water supply, nor a drainage area. The former "owner" of the North China Plain is now merely a passer-by. The towering Yellow River embankment has thus become the watershed of the Hai and the Huai river systems, which is perhaps a unique scene in the world.

1.1.3 High Sediment Concentration

The third characteristic of the Yellow River is its high sediment concentration, which helps the river forge an indissoluble bond with the Loess Plateau. Named after its golden color, the river has the largest amount of sediment among all the world's major rivers. Seen from high above, the vast plateau is strewn with thousands of gullies, like loess dragons rushing into the arms of the great river. It seems that it is not the river that is washing away the loess, but the loess that has been trying to bury the river every day for hundreds of millions of years. The stubborn and daring

river breaks through the dikes of the mud and the dams of the earth. With the surges carrying the mud it captures, the river flows all the way from the Hukou Waterfall in Shanxi down to the lower reaches, wuthering and rumbling, day and night, until it reaches the sea.

Since loess is composed of fine particles and calcium-containing components, coupled with numerous pores and vertical joints, it is as hard as rocks when dry, and becomes muddy when exposed to water, and washes away easily. These features are the internal factors that contribute to the soil erosion of the Loess Plateau, which provides building blocks for the sediment of the Yellow River. Besides, the middle reaches of the Yellow River are supplied with water by a large number of tributaries from the hinterland of the Loess Plateau, where there are frequent rainstorms in summer and autumn. The torrential rains lead to deluges that cut and split the Loess Plateau into pieces. Thus, a vast amount of sediment is conveyed to the Yellow River. Take a smaller tributary, the Kuye River as an example. The water volume is only about 800 million cubic meters, but the average annual input of sand into the Yellow River is as much as 130 million tons, which is one and a half times the total amount of sand contained in all the river courses upstream of Lanzhou. The Kuye River scrapes off 15,700 tons of sediment annually from a drainage area of one square kilometer, which is equivalent to stripping 1.5 cm of land every year. Its ability to erode the surface is truly unparalleled. The average sediment concentration of other tributaries is also high. For example, the Wuding River carries 138 kg of sand per cubic meter and the Jing River 171. No wonder the ancient Chinese concluded that 60% percent of the weight of the Yellow River water is contributed by mud.

The average amount of sediment conveyed into the Yellow River is 37.7 kg/m^3 annually, and the river has an average annual sediment load of 1.6 billion tons, 77 times that of the Yangtze River. Compared with other sandy rivers in the world, the Yellow River is also far ahead. The Colorado River, which ranks second in terms of the amount of silt, has a sediment concentration of 27.5 kg/m^3, but its annual sediment load is merely 136 million tons. Among other big rivers in the world, only the Ganges, which flows through India and Bangladesh, is close to the Yellow River in sediment load, with an annual amount of 1.45 billion tons, but it has a water volume 10 times that of the Yellow River, so the amount of sand contained per cubic meter of water is only 3.95 kg. Among the domestic rivers, only the Hai River, which originates in the Loess Plateau, has the same sediment concentration as the Yellow River. The other rivers are much lower in this respect. For example, the Huai River has a sand concentration of 0.397 kg/m^3, and the Pearl River 0.32. Even the famous sandy rivers in the north, the Liao and the Luan rivers, are with a concentration of merely 3.6 kg/m^3 and 3.96 kg/m^3 respectively. If the sand the Yellow River transports to the lower reaches every year were laid flat on the 430,000 km^2 Loess Plateau where the soil and water loss is serious, the thickness would be 1.5–2 mm. Therefore, in the past 100,000 years, the soil layer that has been eroded from the Loess Plateau should have been as thick as over 150 m. If these sediments were piled up to form a one-metre-high and one-metre-wide earth embankment, the length would be about three times the distance between the earth and the moon. With a water volume of merely 46.64 billion cubic meters per year (statistics from the Huayuankou Station), it is

impossible for the Yellow River to bring such an enormous amount of sediment all into the sea. Therefore, 1/4 of the sediment is piled up in the river course upstream of Lijin, Shandong Province, and 1/2 in the estuary delta and coastal areas downstream of Lijin. Only 1/4 ends up in the deep sea.

1.1.4 Low Water Volume

The fourth prominent feature of the Yellow River is its low water volume. Although the Yellow River is the second largest river in China, it contains an amount of water only 1/20 that of the Yangtze River and 1/6 that of the Pearl River. Its volume is less than that of the Min River and only about same as that of the Qiantang River. The Yellow River basin is located in arid and semi-arid areas, with an average annual precipitation of only about 400 mm. Meanwhile, in the two sections ranging respectively from Lanzhou to Hekou Town and from Zhengzhou to the estuary, which are more than 2,000 km long in total, the Yellow River not only fails to get replenished, but also loses nearly 9 billion cubic meters of water. The curve of the Yellow River's water volume is saddle-shaped, which is rare in the world's rivers. The cause of this phenomenon is the differences in the natural geographical conditions of the various sections of the river course and the characteristics of the distribution of tributaries.

The main stream of the Yellow River upstream of Lanzhou is on the Qinghai-Tibet Plateau. Although the precipitation in the basin around here is only 200–300 mm, the high terrain leads to low temperature and little evaporation. Thus, 30–50% of the precipitation is converted into runoff. Rich river basin runoff has formed many tributaries. In the over-100 km-long river section near Lanzhou alone, there are three large tributaries—the Daxia River, the Tao River and the Huangshui River (including its tributary—the Datong River)—that flow into the Yellow River. Therefore, although with a length of merely over 1,600 km and a drainage area of just 220,000 km^2, accounting for only 29.6% of the whole Yellow River basin, the main stream of the river ranging from the river source to Lanzhou is supplied with over 34 billion cubic meters of water, more than 70% of the river's overall water intake. When the Yellow River passes Lanzhou into Ningxia and Inner Mongolia, which are desert and semi-desert regions, the annual precipitation is reduced to only about 200 mm. The climate turns dry and the evaporation rate is very high. Therefore, there is almost no tributary here, so the Yellow River cannot get replenished. Meanwhile, as a large amount of the river's water is used for irrigation, the river section between Lanzhou and Hekou Town loses nearly 9.3 billion cubic meters of water. The river section ranging from Hekou Town to Mengjin, Henan Province is the middle reaches of the Yellow River, where the precipitation is between 400 and 800 mm. With many rainy areas centered around Lüliang, Qinling and Taihang mountains, the Yellow River is supplied with abundant water from many tributaries. Thus, the water in the mainstream increases from 24.78 billion cubic meters in Hekou Town to 49.69 billion cubic meters in Huayuankou, Zhengzhou, more than double its original size. Obviously, although the Yellow River has a long course of more than 5,687 km,

the section that actually gets replenished with water is only about 3,500 km. The remaining 2,200 km not only gets no supply, but also loses as much as nearly 10 billion cubic meters of water, which is the main reason for the low volume of the Yellow River.

1.1.5 Special Climate in the Basin

The Yellow River basin is known to have enjoyed a favorable climate in history, which is one of the important features that distinguishes the river from others. According to studies, the climate of the Guanzhong and the Huang-huai plains as well as the lower reaches of the Fen River turned rapidly warm between 10,000 and 9,000 years ago. Although the annual average temperature was close to or lower than that of the present day, the precipitation increased significantly, which accelerated plant growth and peat deposition. The period between 8,500 and 3,000 years ago is known to have had the most amiable climate since the Holocene. It is called "China's Holocene Warm Period" or "Yangshao Warm Period" in China. As the famous Chinese meteorologist Zhu Kezhen pointed out, the annual average temperature (in the basin) was mostly 2 °C higher than that of the present in the first 2,000 of the past 5,000 years from the Yangshao Culture period to the Anyang (City) Yin Ruins Culture period, and it was 3–5 °C higher in January. This shows that in the ancient times, the middle and lower reaches of the Yellow River, lying in the "ecological transition zone" between the north and the south, enjoyed not only a warm and humid climate, but flourishing plants and a diversity of animals as well as rich water resources and loose and fertile loess. According to "*The Distribution Map of the Forests in the Middle Reaches of the Yellow River in the Spring and Autumn period and the Warring States period of the Western Zhou Dynasty*" by Shi Nianhai (a famous Chinese historical geographer), the forest coverage rate was 53% in places including the part of the Loess Plateau near the Yin Ruins, the middle reaches of the Yellow River, the adjacent Qinyang Basin and the middle and lower reaches of the Luo River. It is believed that the forest coverage rate should be even higher in the Xia Dynasty, which was over 1,000 years earlier than this age. Back at that time, there were elks and wild boars showing up in the forests, deer and hares chasing their partners and cattle and goats grazing on the grassland, and the lakes were home to various aquatic and hygrophilous animals, including elks, river deer, raccoon dogs, cranes, turtles, Chinese softshell turtles, crocodiles, fish, freshwater mussels and spiral shells. At the same time, the basin was also a habitat for elephants—a subtropical animal. Due to the large elephant population in Henan, the province has been called "豫" (part of the character—"象" means elephant) since ancient times. All the favorable ecological conditions provided unique advantages for the Yellow River to play an important role in China and even in the world.

1.1.6 Numerous Disasters in History

Another important historical feature of the Yellow River is that it has suffered from many disasters in history. It is a "suspended river" rich in sand and with frequent siltation, changing of courses, and breaching of dikes. In the lower reaches in particular, floods are very frequent. As the Chinese vividly conclude, "the dikes are breached twice in every three years and the river changes its course every hundred years". According to legends, the earliest great floods in China occurred in 21st century BC, the ruling period of Yao and Shun, when people fled their homes that had been destroyed by the floods. After 9 and 13 years of control efforts by Gun and Yu respectively, the floods were eventually brought under control. During the Spring and Autumn and the Warring States periods, there were also records of the extraordinarily heavy "Lin Yu" ("霖雨", i.e., long-continued heavy rain). Even more floods have been recorded since the Western Han Dynasty. Floods were a major concern of the country. Therefore, as time went by, more and more records were kept about floods of the Yellow River and the records became increasingly detailed. The Yellow River floods appeared time and again in Chinese history.

As the large amount of sediment contained in the Yellow River floods quickly deposits after entering the plain areas in the lower reaches, the meandering mainstream gradually forms a "suspended river" in the floodplain over a long period of time. The riverbed is significantly higher than the ground of the riverbanks, often higher by several to over ten meters. According to the measurements conducted since the twentieth century, the silt in the downstream river channel has been growing by 3–5 cm in thickness per year on average, but in recent years the speed has increased to an average of 10 cm per year. Now the beach land within the dikes at the lower beaches is usually 3–5 m higher than the ground outside the dikes. In some places, the figure is even bigger. Placed high above the plains, this unparalleled "river in the air" sees its torrents held by the embankments on both sides, rushing to the sea. Standing on the embankments of this "hanging river", no one would fail to be touched by this wonder of the world, or to be haunted by numerous concerns at the same time: The dikes are too fragile to sustain any damage! The impetuous flow is only bound by two embankments. Once the dike is breached, the water would pour out at a high speed. With such a powerful momentum, it is easy for the water to rush down and cover hundreds of miles of land, pulling down houses and destroying whatever stands in its way. This makes the Yellow River far more devastating than any ordinary river on a plain. The Yellow River is unique in the world in terms of its changing courses and the intensity of the process. Meanwhile, due to frequent changes of courses downstream and the impact of transgression and regression, the length of the river channel and the size of the drainage area in the lower reaches are also constantly changing. This is another prominent feature of the Yellow River that makes it different from others.

The Yellow River has cultivated a splendid civilization, and contributed to the progress of the human history. Its development has given people strength as well as a deep and profound revelation. Thus it has become a symbol of the Chinese people's spirit. The secrets of the Yellow River itself, such as the periodicity of flooding, of

the peak and trough of sediment transport, and the mysteries of the Yellow River becoming suddenly clear for several times in history, all deserve people's long-term meditation.

1.2 The Basic Characteristics of the Early Yellow River Civilization

As any civilization in the world is deeply rooted in its birthplace, the Yellow River civilization is closely related to the natural, geological and geographical features of the Yellow River basin. With its favorable natural environment, the basin has nurtured the Yellow River civilization and given it motherly care. The unique natural and geographical environment determined the basic characteristics of the early Yellow River civilization.

The Yellow River civilization is a typical civilization marked by a great river. Yet, with its uniqueness, it stands out from a great variety of river civilizations. It is unlike the Egyptian civilization in the Nile basin, the Babylonian civilization in the Tigris-Euphrates river basin, and the Indian civilization in the Indus basin. It is even different from the Yangtze River civilization, another part of the Chinese civilization. The Yellow River played a leading role in pushing China to civilization, and in 221 BC gave birth to the Qin Empire—China's first unified centralized country. In the two thousand years that followed the establishment of the Qin Empire, China remained the one of the most powerful nations in the world and often had the largest population as well. At the same time, the Chinese civilization, with its great vitality, continued updating itself and suffered no interruptions.

1.2.1 An Advanced and Precocious Civilization

Compared with the grassland and the fishing-and-hunting civilizations in Chinese history, the Yellow River civilization, in its early phase, featured an advanced and precocious agriculture.

The birth and development of the early Yellow River civilization was closely linked to the Yellow River, whose rich water resources and fertile river basin provided particularly convenient material conditions for early agricultural production. These material conditions, coupled with long-term agricultural practice, turned the early Yellow River civilization into a mature and highly developed agricultural one. People living in this civilized atmosphere became pragmatic and settled, emphasizing the harmony between man and the heaven as well as the preservation of their experience and traditions. Most of the time before the tenth century, the Yellow River basin was at the heart of the agricultural civilization in China. It was here that the traditional Chinese agriculture with its own characteristics came into shape before gradually

extending to other farming zones. It can be said that the early Yellow River civilization had the characteristics of the "loess culture" whose typical icons were millet and pottery.

Loess is a yellow soil-like sediment composed of a large amount of silt, which is slightly cemented by calcium carbonate. It is even in structure and loose in property, but rich in pores, vertical cleavages, and mineral content. Therefore, it is an excellent parent material of soil. Loose loess is easy to open and cultivate, and the riverside tablelands are easy to drain. Under dry conditions, the water buried deep underground can reach the surface through the capillary action of the vertical cleavages in the loess, which is conducive to the survival of crops. When agriculture was still in its primitive form and people still used wood and stone tools, the Yellow River basin was the most ideal place for farming. The qualities of the land here made farming easy for the local Chinese, and led to the high efficiency of farm work with *si* ("耜", a plough-shaped farm tool used in ancient China). That is why many ancient residents chose farming as their main means of livelihood. Therefore, when the Chinese ancestors invented the simple farming tools like *si* and developed the drought-tolerant grain varieties like millet and glutinous millet, the vast and relatively flat loess-covered area became rather superior in agricultural production. More importantly, compared with the Yangtze River basin, the Yellow River basin had a low groundwater level, and the land here was easy to penetrate for water, thus it was hard to form long-term floods. After the floods, people could quickly effect self-rescue and resume agricultural production. It is reasonable to believe that the Yellow River was one of the most important factors that helped the Xia Dynasty stand out from numerous other small states in the middle reaches of the Yellow River. The Zhou clan, which rose in the Wei River basin in the late Shang Dynasty, had a special liking for agriculture. When ironware became gradually widespread in the Eastern Zhou Dynasty, the agricultural tradition featuring intensive cultivation began to take shape.

Meanwhile, as loess has a vertical structure and is hard in dry conditions, it is easy for loess walls to stay upright. In addition, loess has a high porosity. These properties make loess suitable for making cave dwellings, which provided ideal shelters for primitive people. Thus, the prehistoric Yellow River basin, with its favorable climate and fertile land, offered unique conditions for the local people to flourish. The "Lantian Man" and "Dali Man" in Shaanxi Province, the "Dingcun Man" in the Fen River basin, the "Hetao Man" in the Hetao area of Inner Mongolia, as well as the "Yangshao" culture which centered around the Guanzhong Plain, western Henan Province and southern Shanxi Province, were all widely distributed in the Yellow River basin. Like the Longshan culture which occurred later in the middle and lower reaches of the Yellow River, these were all typical Neolithic agricultural cultures. Likewise, the Erlitou culture (a typical example of the Xia Dynasty culture), the Shang Dynasty culture and Zhou Dynasty culture, all originated in the same place. Therefore, it can be said that the southeastern part of the Loess Plateau is the birthplace of these cultures.

Looking into the origin of human civilization, one tends to compare the Yellow River with the Nile. The former, especially its middle reaches, flows through the largest loess plateau in the world. The latter (its middle and lower reaches) is covered

by deserts and bare granite hills on both sides and there is a huge temperature difference between day and night. That is why the Nile civilization is completely concentrated in the oasis and delta areas. In contrast, the Yellow River sees its middle and lower reaches pass through the Loess Plateau and the alluvial loess plains. When people complain about the severity of soil erosion today, few may come to think that it is in fact this yellowish land brought by long-term soil erosion that was the easiest to cultivate in the early days when man lacked tools. What underlies the emergence and survival of the Yellow River civilization? Mainly the fact that the loess was easy to cultivate and thus conducive to agricultural production. Besides, the loess was large enough in area (so that agriculture could develop on a scale). If the Yellow River basin had been covered with clay and dense forests, China's early agriculture would not have developed here. However, such was not the case in the Nile basin, where crops could only be planted on the silt brought by the annual flooding.

The Yellow River civilization originated at an early time. One proof is that it was the first to develop the textile and silk production and make them a special part of the Chinese agriculture. For instance, spinning wheels processed with pottery shreds were found in both the Peiligang and the Cishan cultural sites. Based on the excavations at the Yangshao culture site, studies show that the then textile and weaving techniques were rather developed, as demonstrated by the patterns of cloth, ropes, baskets and mats found on the relics. There were also tools like spinning wheels, bone needles and bone awls. The weaving tools excavated in the Majiayao site included stone and ceramic spinning wheels. In the tombs of the Liuwan site, traces of linen were found near the human bones. Clear patterns of fabrics can also be seen on the relics in the Dawenkou cultural site (Apart from the textile and silk production,). China's sericulture also first developed on the Loess Plateau. By the Shang Dynasty (about 1300–1046 BC) at the latest, the production of silk textiles had reached a high level. The words "mulberry, silk, and silk cloth" are often seen in the oracle inscriptions from that time. Hence, the important cultural feature of emphasizing farming and sericulture at the same time had already formed in agriculture in as early as the beginning of the Yellow River civilization.

In the history of the Chinese civilization, the Yellow River basin was the first to step across the threshold of civilization, and thus has become the dominating form of the Chinese civilization. Compared with other types of civilizations, the early Yellow River civilization was also characterized by its rapid maturity, an icon of which was the creation of writing.

At the end of the nineteenth century, over 160,000 pieces of oracle bones from the late Shang Dynasty were found in Yin ruins, Anyang, Henan Province. The inscriptions they carry proved a progressive and rather complete character system as they used advanced character-making methods, contained a large number of characters and demonstrated neat and orderly writing. The bones were so large in number that this finding was a miracle in the history of the world's ancient writing systems. It confirmed that the ancient Chinese characters had originated in the early phase of the Yellow River civilization. The patterns and physical structures of these characters were taken from "as far as anything in the natural environment and as near as man itself" (Anonymous, 2006: 380). Vivid in shape and diverse in pattern, they combined

form with meaning and reflected objective things as well as rich human emotions and activities. Undoubtedly, the discovery of oracle bone inscriptions has set the origin of the Chinese characters to 3,000 years ago. However, these inscriptions are by no means the most primitive Chinese characters. The origin of Chinese characters can be dated even further back when more research is done and more evidence is found. All inferences about the origin of Chinese writing indicate that the Chinese characters are the product of the early Yellow River civilization.

Since the birth of writing, the Yellow River basin has entered the civilized era ahead of other civilizations. Apart from the Chinese characters, other independently developed ancient writing systems include the cuneiform characters in the Tigris-Euphrates river basin, the hieroglyphics in ancient Egypt, and the Maya glyphs which used a graphic expression. However, all of them have disappeared except the Chinese characters, which have lasted for tens of centuries to the present day and become the text used by the largest number of people in the world. Thus it is undeniable that the early Yellow River civilization has made a great contribution to the development of human civilization. Furthermore, since the Chinese characters do not directly relate to the internal sounds of their components and are a kind of ideographic text, they transcend local dialects and effectively constrain the differentiation of local dialects, which is not seen in other texts such as syllable- and phoneme-based ones. Therefore, the Chinese characters are of great significance to China's political and cultural unification as well as to the formation and consolidation of a unified multi-ethnic country.

Besides the square-shaped Chinese characters, bronze ware and city relics are also symbols of the early Yellow River civilization. After bronze smelting method was introduced from the West Asia into the Yellow River basin, it was constantly improved and took on an entirely new look. The development of bronzes reached its peak with the bronze ritual vessels at the end of the Shang Dynasty and the beginning of the Zhou Dynasty (This conclusion is supported by many archaeological findings.). For example, bronze slag was found in Pit H15 among the ash pits excavated in the third phase of Pingliangtai archaeological excavation. In Pit H617 of the fourth phase of Dengfeng Wangchenggang site, a bronze fragment was found from the bottom of a bronze called *gui*. Bronze blocks were unearthed in the Niuzhai site in Zhengzhou City (as part of the Longshan culture), and a crucible for copper smelting was found in the Meishan site in Linru County (as another part of the Longshan culture). A piece of bell-shaped bronze ware from the late Taosi phase was also unearthed in a tomb in the Taosi site in Shanxi Province. It was the only complete bronze ware found in the Longshan culture in the Central Plain region and was also the earliest product of multi-component molds. In the period of Erlitou culture, the bronzes could already be divided into four general categories: containers, weapons, tools and decorative vessels. In terms of the casting techniques, there was the single casting of multi-component molds as well as piece molding and composite casting, which shows that during the Erlitou culture period, the Central Plain region was second to none in bronze casting technology.

In other countries and regions of the world, bronze products were mainly weapons and tools, while their role as daily utensils was only secondary. However, it was just

the opposite in China, where bronze vessels were mainly used in routine life, with ritual ones being the most common. They were used to worship the heaven and the ancestors, to feast guests, to sing praises, and to be buried underground with the dead. The bronze ritual vessels like *ding* ("鼎", tripods) were regarded as the symbol of imperium, which was a matter of life and death to a country. That is why there were such descriptions in ancient documents as "When King Jie of Xia became cruel, the tripods were transferred to Shang" and "when King Zhou of Shang became cruel, the tripods were transferred to Zhou". (Zuo, 2016 335) In the middle and late Western Zhou Dynasty, a system was set up, requiring that the type and number of bronze vessels to be used in ceremonial activities such as sacrifices, banquets and funerals should strictly match the identity or rank of users. Thus, the king of Zhou was entitled to use, according to this system, nine *ding* and eight *gui* ("簋", tureens), the zhuhou ("诸侯", feudal lords) seven *ding* and six *gui*, the qingdafu ("卿大夫", ministers) five *ding* and four *gui*, the shi ("士", scholars and intellectuals) three *ding* and two *gui*. Apparently, ritual bronzes were no longer general tools in routine life, but the "materialization" of hierarchy. This is another important feature of Chinese bronzes and has been unique in the world's bronze family.

In addition, the early Yellow River civilization was also home to a series of the world's earliest findings and creations in geography, agriculture, mathematics and physics, and the humanities. For example, the earliest lunar eclipse record—the partial eclipse on March 21, 776 BC—was 55 years earlier than that of Egypt. The earliest cereal and rice planting, poultry farming, lacquer ware production, as well as the earliest use of the decimal counting method and the earliest appearance of alchemy as the primitive form of chemistry, etc. all indicate the maturity and progress of the early Yellow River civilization.

Another basis for the rapid maturity of the early Yellow River civilization is that the Yellow River basin gave birth to the first embryo of state, and that it took the lead in China in realizing the transition from a primitive society to a civilized one. As the birthplace of the early Yellow River civilization, the basin has witnessed the efforts of numerous generations to establish large-scale social organizations to cope with the frequent floods in the area. It can be seen from a large number of ancient cultural sites that the social organizations in the Yellow River basin emerged at a quite early time. Some sites of Yangshao culture show that the basic social structures were already quite complete, with each collective living area occupying tens to hundreds of thousands of square meters, such as the Xiguanpu site in Huayin City and the Yinjiacun site in Xianyang Municipality, each covering about 1,000,000 km^2. The sites like Banpo and Jiangzhai included residential areas, squares and other public spaces, pottery kilns, livestock pens, cemeteries and protective ditches. Experts believe that such villages may have been tribal sites where several clans lived together. All of this was clearly paving the way for the emergence of states.

For the ancients living in the Yellow River basin, the need for water control and irrigation drew much of their attention to social and political organizations. The clan chiefs of the late primitive society and the early state power were all linked to water control and conservancy. It should be noted that Yu the Great, the legendary founder of the Xia Dynasty, thrived by controlling floods. Due to his contribution in water

control, Yu was chosen as "leader of all men under heaven" and thus established the Xia Dynasty. Meanwhile, the water control institution led by Yu evolved into the first state power in China. The Xia people's living area mainly included the middle reaches of the Yellow River, the Songshan Mountain area in Henan Province and the Yi and the Luo river basins. Since its founding, the Xia Dynasty changed its capital several times, but the locations were all in the central area of the early Yellow River civilization. Later, the Shang Clan thrived in the lower reaches of the Yellow River. It is said that their ancestor Qi used to work with Yu in flood control in the ruling period of Yao and Shun. After Cheng Tang of Shang conquered the Xia Dynasty, he had his capital built in the place of Bo. After that the capital of the Shang Dynasty was changed five times by its succeeding rulers: Zhong Ding moved it to Xiao (now northeast of Xingyang, Henan Province); He Jia moved it to Xiang (now southeast of Neihuang, Henan Province); Zu Yi moved it to Bi (now Xingtai, Hebei Province); Nan Geng moved it to Yan (now Qüfu, Shandong Province); Pan Geng moved it to Yin (now Anyang, Henan Province). But these capitals as the political and cultural centers of the Shang Dynasty were always in the vicinity of the Yellow River, either in its north or its south. The Zhou Clan rose in the middle reaches of the Wei River which was an important component of the Yellow River water system. The early leader of the Zhou Clan, Gong Liu, was a person with outstanding talents in water conservancy and irrigation. As is depicted in the *Book of Songs*, "Duke Liu was devoted to his people. His territory was broad and long. He determined the points of the heavens by means of the shadows. Ascending the ridges, he surveyed the light and the shade and viewed the course of streams and springs. His army consisted of three troops. He measured the marshes and plains. He fixed the revenue on the system of common cultivation of the fields" (Anonymous, *Book of Songs*, 2014: 278). Duke Liu's purpose of viewing the course of streams and springs was actually to check whether the source and the flow direction were convenient for irrigation and drainage. When he chose the location of the farm land, his priority was to make sure of the water sources. After the Zhou Dynasty took the place of the Shang Dynasty, it set its new capital in Haojing (now southwest of Chang'an, Shaanxi Province), and built an important town in the east called Luoyi (now 15 km east of Luoyang). The Zhou Dynasty was based in the Yellow River basin, with its ruling power expanding to the Yangtze-Han river basin.

The Xia, Shang and Zhou dynasties were the products of the early Yellow River civilization. It was the early maturity of the Yellow River that propelled the Chinese history onto the stage of civilization. Throughout the changes of the Chinese dynasties, the period when the cities in the Yellow River basin were used as capitals took up more than 2,400 years in the over-4,100-year history (from the Xia Dynasty in the twenty-first century BC up to now). All those capital cities were located in a broad area ranging from Gaolan in the west to Kaifeng in the east and from Yinchuan in the north to Xi'an in the south. So far, six ancient cities of the Longshan culture have been discovered in the Henan part of the Yellow River basin, including Pingliangtai near Huaiyang County, Wangchenggang in Dengfeng City, Hougang in Anyang City, Haojiatai in Yancheng District (in Luohe City), Mengzhuang in Huixian City and Guchengzhai in Xinmi City. The Pingliangtai ancient city was found to have drainage

pipes laid under the doorway, with the city wall built using rammed earth techniques and small wooden formwork boards, indicating that the ancient engineers had been very particular about the planning and construction of the city. The Guchengzhai site in Xinmi even possessed large palace foundations and portico-style buildings, which were unique to the site. Four of the most famous ancient Chinese capitals (i.e., Xi'an, Luoyang, Kaifeng and Anyang) were located in the Yellow River basin. Recalling the busy and prosperous ancient capitals, one can never fail to think of the Yellow River.

Whether judged from the metal tools the ancients used, as the archaeologists prefer, or from the invention of scripts, as the historians prefer, the early Yellow River civilization's growth into maturity was with a faster pace and at an earlier time than other civilizations. If the beautiful legends, such as the Yellow Emperor pioneering the Chinese civilization, Shenlong teaching people to grow crops and Yu the Great controlling floods, only mean that the Yellow River basin has developed material culture such as cultivation, domestication, and water control about five thousand years ago, then, the birth and development of the Hundred Schools of Thoughts show the fruits of the early Yellow River civilization in the spiritual realm, such as Confucianism represented by Confucius and Mencius, the legalist school of thought championed by Guanzi, Li Li, Shang Yang and Han Fei, as well as Taoism advocated by Laozi and Zhuangzi. The Yellow River basin was established as the center of Chinese culture ever since the Huaxia tribe headed by the Yellow Emperor defeated Dongyi tribe headed by Chiyou. Such a position had not changed for thousands of years until the end of the Southern Song Dynasty. The Yellow River basin is indeed a remarkable place producing outstanding people, and the Yellow River culture is definitely the most splendid culture with the longest history of all Chinese cultures.

1.2.2 Continuity

Another prominent feature of the Yellow River civilization is that it is the only one of the world's four ancient civilizations that has never been interrupted but has kept moving forward ever since its origination. The civilization has always been a self-contained system in the long course of history. Since regional cultural traditions began to form in the Yellow and the Yangtze river basins in the Yangshao culture era, the Yellow River civilization has seen the elements of civilization emerging and spreading in the Longshan culture period, before the civilization itself entered the classical civilization phase consisting of the Xia, Shang and Zhou dynasties and then went all the way through the other great dynasties in the Chinese history, like the Han, Tang, Song, Yuan, Ming and Qing. Despite the internal transformations and external shocks time and again, the bloodline and frame system of the early Yellow River civilization basically continued, without ever being alienated or interrupted. The period from Peiligang to Yangshao, Longshan and Erlitou cultures can be said to be interlocking except for a small part between the Peiligang and the Yangshao

cultures, as almost all archaeological excavations and discoveries seem to confirm their links.

No other civilizations in the world is parallel to the Yellow River civilization in terms of continuity. Some of them have disappeared, leaving behind only unrecoverable broken memories. Others either have discontinued, having nothing to do with today's civilization, or have transferred, with only broken remains in places far away from modern civilization, waiting for the arrival of historians and archaeologists. As for the ancient Egyptian civilization, it gradually declined since the Persian invasions and basically died out in the Hellenistic period. The Egyptian characters remained unrecognized over a long period of time. People in Medieval Europe even mistook the ancient Egyptian scripts on the stones for pagan symbols rather than the remains of ancient writing. It was not until the texts were interpreted in 1923 that people gradually dug into the Egyptian civilization to re-understand it. The same was even more true of the ancient Mesopotamian civilization. As the cuneiform texts had long been unknown to anyone, it was also after the texts had been interpreted that the related ancient and complex history was understood. The same also happened to the ancient Indian civilization developed by the original Indians at around 3,000 BC. Later, however, when the Indo-European nation entered India, the civilization disappeared. Only the Yellow River civilization, having gone through dozens of dynasties and weathered endless winds and rains, has been passed down to the present day with its glorious history. Today, the Chinese are still the traditional carriers of this civilization and they will still be under its influence in the days to come. At the same time, more efforts are needed to study it as there is much for people to know about it. Without a good knowledge or careful study of the early Yellow River civilization, no deeper understanding of the entire Chinese cultural traditions can be achieved.

Compared with the other types of Chinese civilization in the surrounding areas, the early Yellow River civilization also stood out with its obvious continuity. To be specific, besides the Longshan culture in the Yellow River basin, there were other archaeologically recognized cultures in the same period, including the Longshan culture (another Longshan culture) in the Haidai region (eastern seaboard area of China), the Liangzhu culture in the Taihu Lake region and the Shijiahe culture in the Yangtze-Han river basin. Judging from the archaeological findings, these ancient cultures were even more advanced than the Longshan culture in the Yellow River basin. However, they were either completely interrupted, or were in decline. For instance, the Longshan culture in the Haidai region was succeeded by Yueshi culture, which was at a significantly lower level. The Liangzhu culture in the Taihu Lake region, though the most splendid in Southeast China, ended up nowhere, and its disappearance has remained an unsolved mystery in the academic circle. As to the Shijiahe culture, it was finally integrated into the Longshan culture in the Yellow River basin. Contrary to their unfortunate endings, the Longshan culture in the Yellow River basin gave birth not only to the alliance formed between Yao and Shun but also to the first hereditary dynasty in Chinese history. All these prove the strong continuity of the early Yellow River civilization. The continuous development of the Yellow River civilization naturally paved the way for the arrival of the civilized era.

Although the Yellow River civilization did not suffer from interruptions or changing of places, it has presented the world with different stages and patterns. When the energy of one pattern is exhausted, changes will soon take place, and when that happens, the pattern's "blood flow" becomes smooth and elements of new civilizations are nurtured internally. With the help of the external factors, the civilization grows and develops into a new pattern… Thus, spiraling upwards, the Yellow River civilization becomes continuous and has lasted to the present day. Hence, the modern Chinese can still understand the literature that occurred thousands of years ago, and the aphorisms in ancient scriptures are still active in people's daily language. Although its center did experience changes and shifts in history, as a whole the civilization has been staged on the vast land of the Yellow River basin. What lies under cottages today may be the ruins of palaces of a certain dynasty, and wherever the Chinese people go in their country, they can always feel their history and culture. In places that prospered in history but have become poor and backward today, all things with profound cultural accumulations, such as a tomb, a stone monument, an old tree, a hill and a river could be witnesses of history and embodiments of stories. The sons and daughters of the Yellow River, born and brought up here, have been working diligently on this same land generation after generation. Whether consciously or unconsciously, they have passed down the ancient civilization and constantly endowed it with fresh life through their own practice, thus helping establish the great traditions for today's Chinese society.

Many ancient civilizations in the world have been basically or completely destroyed due to various reasons, but one common cause is that their overburdened ecological environment has led to a decline in productivity. The Yellow River civilization, on the contrary, has survived owing greatly to some factors that helped it overcome the problem of productivity reduction. Among these factors stands out the intensive farming technology system developed in this area, together with the fact that several other large river basins around the Yellow River basin were utilized for agricultural development. Thus, they shared the latter's heavy ecological burden. Furthermore, on the outskirts of the intensively cultivated agricultural area of the Han nationality, there had been a large number of closely related areas inhabited by non-Han people who had distinctively different economic patterns, including the extensive farming areas of the ethnic minorities in the south, the grasslands, desert pastoral areas and oasis agricultural zones in the northwest, and the composite zones for animal husbandry, agriculture, fishing and hunting in the forests and grasslands in the northeast. These areas were complementary to the intensive farming areas of the Han nationality. Thus, the Yellow River civilization, which constantly grew stronger in history, has been created hand in hand by many ethnic groups in this complementary relationship.