

## TOUR B

### INTERNATIONAL TRAINING & STUDY TOUR TO THE YELLOW RIVER (YR-2006)

WASER /IAHR-APD/UNESCO/IRTCES



**Venue:**

IRTCES, Beijing, China

**DATE:**

8-15 July 2006

**DEADLINE FOR REGISTRATION:**

May 1, 2006

**PARTICIPATION:**

The trainings and study tour is open for participants who are interested in the Yellow River and Loess Plateau.

**OUTLINE:**

This is a one-week trainings and study tour to study sediment transport in hyper-concentrated rivers and reservoir sedimentation and management and interaction between fluvial systems with large dams. The study tour will include lectures, a seminar, demonstration of physical and mathematical models on sediment transport, a visit to the Yellow River, Loess Plateau, World Bank China-Loess Plateau



Watershed Rehabilitation Project, Sanmenxia Reservoir, Xiaolangdi Reservoir, Yellow River Research Institute, Bureau of Upper and Middle Reaches of Yellow River, Bureau of Xiaolangdi Reservoir Administration, Bureau of Sanmenxia Reservoir administration, Laboratory of Sediment Research, Tsinghua University, Institute of Sediment Research, China Institute of Water Resources and Hydro-electric Power Research, Yellow River Water Resources Commission and some social events including a cultural recreation evening party and other interesting activities.

#### LECTURES:

- Training and management of the Yellow River
- Sediment transport mechanics
- Soil and water conservation
- Reservoir Sedimentation and management strategies
- Impacts of the Sanmenxia Project and Xiaolangdi Project
- Fluvial Processes
- Artificial floods to scour the lower Yellow River by utilizing the Xiaolangdi Reservoir

#### DEMONSTRATION:

- Artificial floods to scour the lower Yellow River by utilizing the Xiaolangdi Reservoir
- Demonstration of mathematical modeling of sediment transport
- Demonstration of Physical model of sediment transport

#### GENERAL INFORMATION:



##### Beijing---The Host City

Beijing is the capital city of China, is both an old and a new city, old in its cultural heritage, and new as the capital of the People's Republic of China. The story of Beijing dates back long before the recorded history. The fragments of the bones of

"Peking Man", dated to a period about 300,000 - 500,000 years ago, were discovered in a village to the southwest of the present-day city.

Following the 1911 revolution that overthrew the Qing Dynasty, Beijing became the arena of important political events, such as the May Fourth Movement. On October 1, 1949, Beijing became the capital of the New China. Today's Beijing is mingled with tradition and modernity. While seeking for industrialization, the Government is also carrying out a conservation program to protect the traditional houses in the downtown area to partly maintain Beijing's original outlook.

Beijing has a whole area of 16808 sq km (about 6500 sq mi). The city has a total number of 13 million residents.

As China's political, economic and cultural center, Beijing is linked to over 50 cities in the world by many regional and international air routes. In addition to China's own airlines, 30 plus foreign airline companies operate regular



flights to and from Beijing. By connecting flights you can easily fly to Beijing nonstop.

Beijing is an ancient yet modern city. This fast changing city has retained colorful and harmonious mixture of ancient and modern civilizations. It has many wonderful cultural opportunities for you to discover and to enjoy. Dear friends, please take the time to come to explore the future of study on sedimentation and erosion, to contribute your knowledge, to renew acquaintances, to make new friends, and to enjoy our hospitality. The Great Wall is waving to you!

### THE YELLOW RIVER:

The Yellow River rises on the northern slopes of the Bayankela Mountains of Qinghai and traverses nine provinces or autonomous regions including Qinghai, Gansu, Sichuan, Ningxia, Inner Mongolia, Shaanxi, Shanxi, Henan, and Shandong. The river falls 4,450 m over a length of 5,465 km, draining an area of 795,000 km<sup>2</sup>. In its upper reaches it flows through swamps and grasslands of Ningxia and Inner Mongolia. The river runs to the south before leaving Inner Mongolia to form the boundary between Shaanxi and Shanxi and, after a sharp turn to the east, it flows across the North China Plain to the delta on the Bohai Sea. A notable feature of the Basin is the largest loess deposit in the world. Because of intense soil erosion from this area; the Yellow River far exceeds any of the world's large rivers in terms of annual sediment transport. In its lower reach, over a length of some 800 km, the river becomes a broad meandering channel contained by flood embankments and here the river drops part of sediment load and the bed rises above the surrounding land at a rate of one meter every ten years. Some 6 million ha are irrigated by the Yellow River, of which about 3 million are irrigated from the lower reaches in the North China Plain.



**Sediment in the Yellow River:** Statistics show that 13 of the large rivers in the world carry annual sediment loads of over 5.8 billion tons. Among these, the Yellow River plays a leading role in so far as total load and average sediment concentration are concerned. About 30% of the sediment load carried by the 13 rivers comes from the Yellow River and the Yangtze River.

**Reservoir Sedimentation in the Yellow River:** The seriousness of capacity loss introduced by reservoir sedimentation was convinced by people only in the recent three or four decades when the finding of suitable dam-sites for exploitation of water resources became increasingly difficult.

In the United States, the total annual amount of deposition in reservoirs had reached 1.2 billion tons. In Japan, up to 1979, from statistics on 425 reservoirs with a combined capacity exceeding 1 million m<sup>3</sup>, 6.3% of the reservoir capacity had been lost due to deposition. In China, according to the preliminary statistics from Shaanxi



Province, the amount of deposition in reservoirs exceeding 1 million m<sup>3</sup> in capacity had been 512 million m<sup>3</sup>, thus constituting 15.3% of the original capacity.

#### **HUKOU WATERFALL:**

Big rivers enjoy good reputations either for long history or for achievements in fostering human civilization. The Yellow River in China is no exception.

In the Yellow River basin, there is a tourist resort that visitors should not miss experiencing in person. That is the Hukou Waterfall, the second largest waterfall in China.



The Yellow River runs all the way from Qinghai Province to the border of Shanxi and Shaanxi provinces, zigzagging to Jixian in Shanxi Province and Yichuan in Shaanxi Province where it suddenly finds its way through a narrow valley guarded by flocks of

flourishing forests on both sides. The riverbed of the Yellow River narrows from 300 meters to 50 meters, turning the tranquil river into a turbulent one.

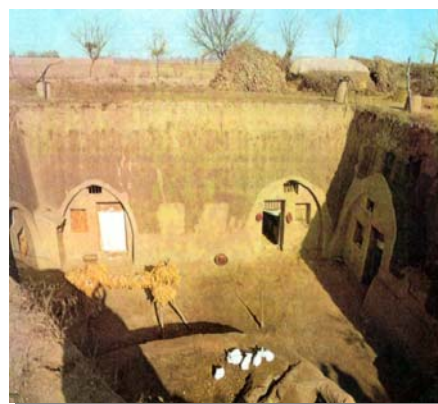
It is this narrow path that makes Hukou Waterfall's popularity unequalled in China. The tremendous water splashes on the rocks, causing countless waterbeads and foam, then water fumes from which visitors may notice a colourful rainbow by chance. The water fumes curl upwards; turning from yellow to grey, grey to blue. Local residents give such phenomenon an exact metaphor, calling it "smoke from river".

If visitors are lucky enough to have a look at the waterfall in rainy seasons, they will undoubtedly be surprised by the tremendous scene - all streams, rivers and rains converge at Hukou, combining numerous waterfalls into a gigantic one. They may be frightened by the rumbling sound and exclaim that mother nature is incredibly sublime.

It is also said that when boats reach Hukou, boatmen have to embark off their ships and pull them on the bank so to detour around the waterfall. As for flying birds, they will lose their way in the water fumes and can hardly go through this natural barrier.

Just below the waterfall, there is a shining stone called guishi. What makes the stone mysterious is that it moves up and down according to the water level. No matter how large the water volume is, it shows up a little.

In the middle of the river, about 3,000 meters off the Hukou Waterfall, an enormous rock catches the attention of visitors. When the Yellow River flows to this point, it will be divided into two flows, rolling and roaring on and on from both sides of the rock and then rejoining together.



**LOESS PLATEAU:**

Containing more nutrients than sand, it is also much finer. Its silt-like nature is noted as being among the most erosion-prone soils known on the planet (Jiang 18). Loess is also extremely sensitive to the forces of wind and water, bearing the dubious honor of being blown or washed away quicker than any other soil type (Pye 125).

Prior to this century, loess was a compelling mystery for geologists seeking to know its origins. Former theories included that loessal deposits were beds of ancient

oceans, and even that they were composed of cosmic Saturn-like rings of dust that may have once encircled the globe but somehow rained down in pockets (Pye 237). Into the 19th Century, however, an apparent agreement was shown



**Loess Distribution in China**

between the timing of noticeable waves of loessal sedimentation and the glaciation of the northern hemisphere (Smalley 358).

The Loess Plateau was formed in waves between 2.4 and 1.67 million years ago, helped along by the uplift of the Tibetan Plateau, the movements of several huge glaciers across desert regions, and strong winds maintained by a high-pressure system in a cold and dry continental interior (Meng and Derbyshire 141). It is the world's largest deposit of loess, approximately the size of France, designated by the large black area (Yoong 95).

This mass of dust sprawls over the whole of Shanxi Province and great areas of Shaanxi, Ningxia, Gansu, and Henan Provinces (Yoong 95). Surrounded by the Ordos Desert to the north and mountain ranges in all other directions, it has a remarkable average thickness of 150 m, extending to 330 m near Lanzhou.



**Soil Erosion and Soil and Water Conservation in the Loess Plateau:** Soil erosion is the most significant threat to land





productivity and environmental quality on the Loess Plateau of China. The annual total sediment load of the Yellow River is 1.6 billion tons, with about 90 percent coming from soil erosion from the Loess Plateau. To reduce soil erosion from the Loess Plateau, conservation practices, including tree planting, ridge construction between fields and around gullies, terrace and ditch construction perpendicular to the main slope, and dam construction are being implemented.

#### **SANMENXIA RESERVOIR:**

The Sanmenxia dam is situated on the main stream of the Yellow River at the junction of Sanmenxia City in Henan Province and Pinglu County in Shanxi Province. It was the first major project built on the main river as recommended in the Comprehensive Planning of the Yellow River Basin in 1955. It controls 92% of the total drainage area of the river including two of the three major flood source areas and controls 89% of the runoff and 98% of the sediment carrying down the lower Yellow River. Dam construction started in April 1957 and the principal structures completed in September 1960. It consists of a dam, outlet structures and a power plant. In the original design, the maximum water level in the reservoir was set at elevation 360m, a total storage capacity 64.7 billion m<sup>3</sup>, an installed capacity 1160MW and resettlement of 870,000 people. The reservoir area includes a part of the main river downstream Long men and the lower reaches of tributaries Weihe and Beiluohe River, located in Shanxi, Shanxi and Henan Province.

After putting into operation, the reservoir was severely silted and the backwater opposites extended rapidly towards the upper stream, threatening the industrial and agricultural production of the lower reaches of the Weihe River. In addition, there were many difficulties to resettle a large number of people and to operate the reservoir according to the original design. The reconstruction work was carried out in two stages: In the first stage, two tunnels were built on the left bank for sluicing sediment and releasing flood and four penstocks were remolded into outlets. The first stage work was completed in August 1968; the discharge capacity had been increased from 3080 to 6100 m<sup>3</sup>/s at water level 315m. The second stage was to reopen 8 bottom outlets previously used for diversion for sluicing sediment, to lower the intake elevation of the penstocks No. 1~5 for power generation from 300m to 287m, and install five generation units with a total installed capacity of 250MW. The second stage reconstruction commenced in December 1969, 8 bottom outlets opened one after another until October 1971. The first generating unit started to operate at the end of 1973, and the rest were put into operation by the end of 1978. After reconstruction, releasing capacity of all the outlets increased to 10,000m<sup>3</sup>/s at elevation 315m. and the operational mode of the reservoir has been changed into “storing the clear water and releasing the muddy”, i.e. the reservoir stores water and retains sediment in non-flood season (November to next June), managing the water for irrigation and ice flood prevention, while in the flood season (July-October), the water level lowers down for sluicing sediment.

At present, the effective storage capacity of the reservoir below elevation 335m amounts to 5.9 billion m<sup>3</sup>, in which an effective storage of 1.8 billion m<sup>3</sup> below elevation 326m has been kept for long run, giving effective play to comprehensive benefits of summer flood and ice run flood prevention, irrigation, water supply and power generation. When a major flood occurs in the upstream basin of Sanmenxia, the outflow released from the dam would be limited to less than 15,000m<sup>3</sup>/s through reservoir regulation; when a major flood occurs in the downstream area of the project, the standard for flood prevention in the lower reaches could be increased from less than once in 100 years at present to once in 1,000 years through coordinating the operation of the Sanmenxia, Xiaolangdi Reservoir and Luhun Reservoir on the tributary of Yihe River and Guxian Reservoir now under construction on the tributary of Luohe River. In the past 15 years, during ice run period, release from the reservoir was regulated by utilizing the effective storage capacity below elevation 326 m of the Sanmenxia Reservoir. This has played an important role in reducing the threatening of ice run flood and guarantee the safety of the lower Yellow River, Besides, in coordination with the ice run control, in average, 1.4 billion m<sup>3</sup> of water were stored annually in the spring, mitigating to certain extent the contradictions of water shortage for irrigation on both banks, and that for cities and industries such as the Zhongyuan and Shengli Oil Fields on the lower Yellow River in May and June. By 1988, the accumulated output of electricity amounted to 12.0 billion kw • h, equivalent to 700 million Yuan.



With the mode of operation to store clear water and release the muddy in the reservoir, the rate of deposition in the lower reaches of the Yellow River has been reduced because the river channel would be scoured in non-flood season due to the release of clear water and during flood season more sediment may be transported by a greater discharge. The modified flow regime is more suitable to sediment transport of the lower reaches.

It is estimated that, in average, the annual amount of deposition in the lower reaches has been reduced by about 60 million tons. The practice of operation by water and sediment regulation in the Sanmenxia Reservoir has set an example and provided valuable experiences for solving sediment problems of large sized reservoirs built on sediment laden rivers.

#### **XIAOLANGDI RESERVOIR:**

Xiaolangdi Multipurpose Dam Project is located at the exit of last gorge of the middle reach of Yellow River, 130 KM downstream of Sanmenxia, 128 km upstream of Huayuankou of Zhengzhou city. The main objectives of the project are: flood control,

ice jam control, siltation control, irrigation, water supply, as well as hydroelectric power generation.

The project consists of many main structures, such as 10 intake towers, 9 flood & sediment tunnels, 6 power tunnels, 1 underground powerhouse, and 1 zoned earth and rockfill dam with a sloping impervious core, 154 m high, with a crest length of 1317 m. The powerhouse mainly features 6 turbine and generator units of 300 mw, totaling installed capacity of 1800 mw and annual energy output of 5.1 gw.h.



The total storage capacity of the reservoir is 12.65 billion m<sup>3</sup> or live storage. Of the Yellow River drainage basin, 694,000km<sup>2</sup> or 92.3 percent is located upstream of Xiaolangdi Dam Site. Thus, Xiaolangdi is located in the key position for flood and sediment control of the Yellow River.

The Xiaolangdi project, a key water control project on the Yellow River attracting world wide attention, has begun to reap comprehensive benefits after joint efforts made by engineers from 51 countries and a workforce of over 10,000.

With it, China's flood control standard on the Yellow River has been increased greatly: Power has come to be produced by underground generating sets, which will effectively relieve the pressure on power demand for electricity supply in the Central Plains area.

Meanwhile, Xiaolangdi Reservoir, already with 2000 million cubic meters of water in storage, has begun to demonstrate its power for flood control and silt deposition this year, not to say outstanding scenery going to be created in the area.



The construction will also bring a fine prospect for sustained tourism development. Since last year there were comprehensive harness construction projects of ecological environments such as "Protect the Mother River" having been launched, these will bring into full play Xiaolangdi's



functions in contributing to China's economic development.

#### ARTIFICIAL FLOOD TO SCOUR THE LOWER YELLOW RIVER BY UTILIZING THE XIAOLANGDI RESERVOIR:

On the 14th day of the implementation of Yellow River sediment-water regulation,



The sediment discharged out of Xiaolangdi after the appearance of density current



The water discharged out of Xiaolangdi before the appearance of current density

artificial density current, as a key link of the regulation had appeared successfully and began to discharge out of Xiaolangdi reservoir at 16:00, on June 29, 2004. Reservoir density current is the peculiar flow form of the rivers with high concentration of suspended load such as the Yellow River. When the flow with high concentration of suspended load enters the reservoir and encounters clear water, due to the density difference, it goes under the clear water and becomes a stream of turbid flow. The density current of the Yellow River appeared in Sanmenxia reservoir in 1960s for the first time, as well in August 2001, it began to appear in Xiaolangdi reservoir, and in August 2 to 7 2003 again. In 2004, during the third sediment-water

regulation experiment, density current was made artificially for the first time through the scientific regulation of Wanjiashai, Sanmenxia and Xiaolangdi reservoirs.

The artificial density current of the year of 2004 was still made through the regulation of Wanjiashai, Sanmenxia and Xiaolangdi reservoirs.

#### BRIEF INTRODUCTION TO XIAN CITY:

Xian, the eternal city, records the great changes of the Chinese nation just like a living history book. Called Chang'an in ancient times, Xian is one of the birthplaces of the ancient civilization in the Yellow River Basin area of the country. During Xian's 3,100 year development, 13 dynasties such as Zhou, Qin, Han and Tang placed their capitals here. So far, Xian enjoys equal fame with Athens, Cairo, and Rome as one of the four major ancient civilization capitals.

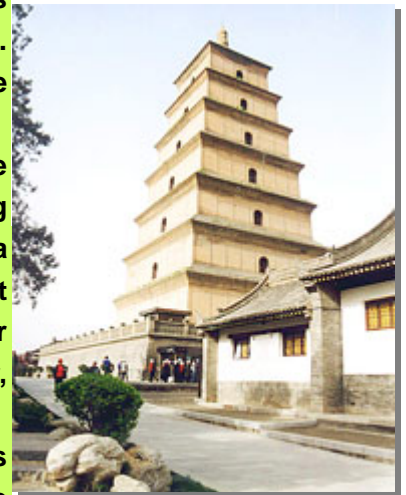
Xian is the capital of Shaanxi province, located in the southern part of the GuanZhong Plain. With the Qinling Mountains to the north and the Weihe River to the south, it is in a favorable geographical location surrounded by water and hills. It has a semi-moist monsoon climate and there is a clear distinction between the four seasons. Except the colder winter, any season is relatively suitable for traveling.

The cultural and historical significance of the area, as well as the abundant relics and sites, help Xian enjoy the laudatory title of "Natural History Museum". The Museum of Terra Cotta Warriors and Horses is praised as "the eighth major miracle of the world", Mausoleum of Emperor Qin Shi Huang is listed on the World Heritage List, and the City Wall of the Ming Dynasty is the largest and most intact Ming Dynasty castle in the world. In the city, there is the 3000 year old Banpo Village Remains from the Neolithic Age, and the Forest of Stone Steles that holds 3,000 stone steles of different periods from the Han Dynasty to the Qing Dynasty. Around Xi'an, the Famen Temple enjoys the reputation of being the "forefather of pagodas and temples in Central Shaanxi," because it holds the finger bones of Sakyamuni--the founder of Buddhism. The natural landscape around Xian is also marvelous. Mt. Huashan, as one of the five best-known mountains in China, is famous for its breath-taking cliffs and its unique characteristics.

The Terracotta warriors (bingmayong) are among the top archaeological excavations of the 20th Century. The warriors have made Xian the big tourist destination that it is today and the wealth in this city owes much to their discovery. This incredible collection of 6,000 men and their horses was actually discovered completely by accident by a group of peasants in 1974 who were digging a well! In a bizarre twist, the man who supposedly discovered them now sits in a hall at the site signing postcards of the stone army.

#### THE BELL TOWER AND THE DRUM TOWER:

The Bell Tower in Xi'an is situated in the very heart of the city and at the junction of four main roads. The original city Bell Tower was situated to the west





of this site and the present construction was built in 1582 and restored in 1739.

There is a huge bell hanging on the roof of the tower which was traditionally used to tell the time by and there are other, smaller bells on exhibit in the tower too

#### HUAQING POOL (HUAQING CHI):

Huaqing Hot Spring (huaqing chi) is situated 30 kilometers east of Xian at the foot

of the Lishan Hills. The Springs were a popular retreat with Emperors more than 2500 years ago, many of whom enjoyed bathing in the perfectly clear mineral water.

Today this is a favorite site for Chinese tourists. In fact, there is not a great deal to actually see here, but the history behind the area is very vivid and colorful!

Praised as "the capital of table delicacies", Xian has been rich in the delicious Shaanxi snack, delicate Guangdong Cuisine, various kinds of fashionable foreign delicacies, and popular Sichuan Cuisine such as the hot pot. Among all the delicacies, the most famous and popular one is the Muslim Snack Street.

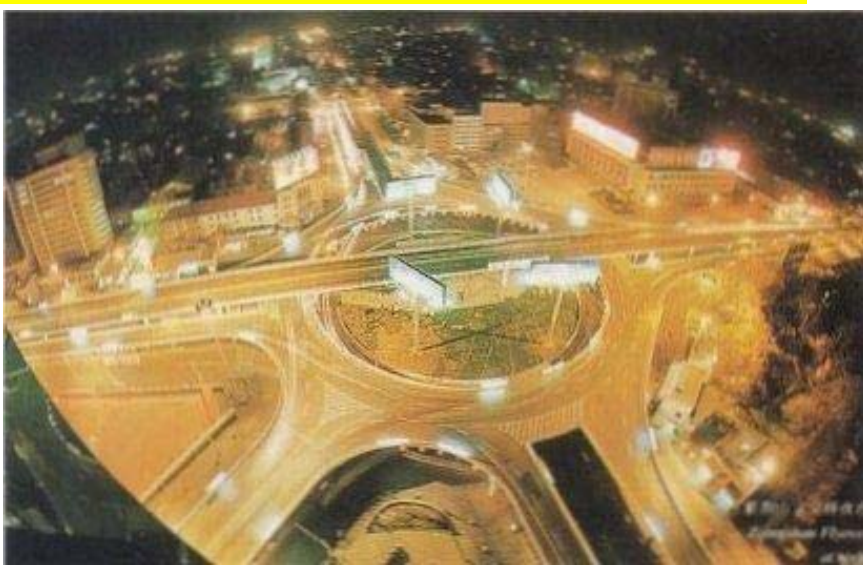
Xian is the most important city in northwest China, and so there are a lot of shopping outlets for locals and tourists alike.

The night life in Xian has a unique glamour. Traditional ways include enjoying the night scenery around the Bell Tower, taking part in a Tang Dynasty Dinner Show, strolling on the ancient Big Wild Goose Pagoda Square and watching the music fountain performance. More modern and fashionable ways include singing in the KTV, hanging out in a bar, or dancing in a Disco. All in all, any experience in this ancient city will bring you fun and possibly a little surprise!

#### BRIEF INTRODUCTION TO ZHENGZHOU CITY:

Henan province is called Central China. In ancient times it was Yu State, and was called Yu for short, and also called the central plain or the central state. It has an area of 67, 000 square kilometers and a population of over 100 Million.

Zhengzhou City is capital city of Henan Province.





Henan has four seasons mixed with the continental monsoon climate and wet and semi – wet subtropical climate. The annual average temperature is 13 – 15 degree centigrade (average 20 degree centigrade in April), the average frost – free period is 190 – 230 days, the annual average precipitation is 600 – 1200 mm. Henan is one of the biggest agricultural provinces in China. Since the reform and opening to the outside world, especially since the 1990s, Henan's economy has been developing

very fast. Since 1992, the increasing rate of its GDP has been successively higher than the average of the whole country. Historically, Henan province was the cradle of the Chinese civilization. The amount of historic relics under ground discovered in Henan ranks the first in China. Throughout the history, the central plain area witnessed its prosperities and ever was the political, economic and cultural center of the country repeatedly. Anyang was the first capital in China, and Luoyang became an international metropolis in the Tang Dynasty, and Kaifeng reached her most glorious period in the Song Dynasty. Natural landscape and traditional culture make Henan extremely attractive.

#### INTRODUCTION TO SANMENXIA CITY:

Sanmenxia lies in west of Henan Province, at the point of 111°15'E and 34°45'N, and among the intersection of Henan, ShanXi, and Shaanxi Province. The whole city covers mountains, hills, walls and valleys. The climate is warm here, the average temperature being -0.7C in January, 27C in July. The annual rainfall averages 630 mm, the frost free period lasting 228 days on the average.

Sanmenxia City covers Mianchi, Shaan County, and Lushi County, Hubin District, Lingbao and Yima City. It has a total area of 10,496 sq. km (21.92 sq. km, urban). The population of the city is 2.14 million, including 0.24 million urban.

There are 57 kinds of detected mineral reserves, covering 70 per cents of the whole province, 27 sorts among which have been explored and used. The most prominent are gold, aluminium and coal. The natural water reserve in Sanmenxia is 2690.00 million cubic meters, and the surface water is 2400.00 million cubic meters. The storage capacity of Sanmenxia Reservoir is 5300.00 million cubic meters. The water from the Yellow River averages 4,200,000 million cubic meters. Wentang in the west of Sanmenxia is the rare mineral spring in China, which drains 6,000 tons daily, and includes 42 sorts of useful trace elements. Experts comment that Wentang hot spring is as good as Vancey hot spring of France, which has high value of exploration. Sanmenxia is rich in history, splendid in culture, beautiful in Mountains and valleys.

It is said that Davu (one of the ancient emperors) split a high mountain into "People gate" "Ghost gate" and "God gate". Then San menxia got its name. There are many famous sites of scenic beauties or historical interests such as Huang Emperor Ling to worship holly place, Hanguguan which occupies an important place, the tower in





Baolun Temple which is one of Chinese 4 Echo architectures; Yangshao culture relics of the Neolithic, aristocrat tomb group of the late West Zhou ; the 1st dam of Yellow River Sanmenxia dam, which stands in the midst of Yellow River.

#### BRIEF INTRODUCTION TO LUOYANG CITY:

Luoyang lies in the northwestern part in Henan province. It is the important base of machinery industry and the famous historical city in China. It is 15 thousand square kilometers in area. The population is 577 thousand.

The topography in Luoyang mainly is hilly lands and areas. Luo River flows from the Southwest to the Northeast. It is monsoon climate in warm-temperate

zone. The average temperature is 14.6 degree Celsius, and the average precipitation is 600mm. The black frost period can last 217 days. The reserves abound in molybdenum, aluminium, tungsten, sulphuric iron ore, and refractory clay and cement rock. In industry, there is machine, metallurgical industry, building materials, textile and petroleum process.

Luoyang is one of the seven ancient cities in China. East Zhou dynasty, East Han dynasty, Cao dynasty, Wei dynasty and other nine dynasties took here as the capital city. Longmen cave is the important place of interest. White-horse Temple was built in East Han dynasty. It is the earliest temple in China. Moreover, there is Hanjiacang, Baijuyi Tomb and Erlitou cultural ruins in Yanshi.

The peonies in Luoyang are well known. Every year, on April 20th, there is the splendid peony ceremony. The traditional specialties are resemble Tangsancai, Palace lantern, ham and cherry.

#### LONGMEN CAVE:

Located in Luoyang city in Henan Province, the Longmen Caves was first constructed in the Emperor Taihe's Reign of the Northern Wei Dynasty (488 AD). The construction lasted many years from the Wei Dynasty through the Northern Qi, Sui, Tang and Song Dynasties etc. The niches on the sides of the two mountains resemble a honeycomb. There are over 2100 niches, more than 100,000 statues, some 40 pagodas and 3600 tablets and steles in the caves of Guyang, Binyang and Lianhua constructed in the Northern Wei Dynasty and the Qianxi Monastery, Wanfu Cave (Cave of Ten Thousand Buddhist Statues), the Fengxian Monastery and Kanjing Monastery etc. built in the Tang Dynasty. Longmen Caves, as one of China's



four major Buddhist Caves, is important materials for study of history and arts in ancient China. It's an art-treasure house in the world as well.

Scattered about the various caves are carved figures of Flying Apsaras, with some of them, light and graceful, riding clouds and mist dexterously, some dancing in the air, holding a plateful of fruits in the hand, some playing music and singing, and others casting flowers and fish about. Longmen is not only renowned for the caves, but also endowed with lush mountains and ridges, springs and waterfalls. The two mountains are covered with green pines and cypresses. Towers and pavilions set each other off. It's a unique scenery area.



**Guyang Cave:** Three tiers of niches are carved on each of the two walls. The arched lintel and the back of the niche are painted with decorative designs and patterns, which are exquisite, rich and colorful. The sculptured statues of Donors with a solemn and pious expression are vivid and lifelike. There is a dazzling array of carvings. The annotations on the statues in the cave were inscribed in simple and crude calligraphy.

**Lianhua (Lotus Flowers) Cave:** Constructed in the late period of the Northern-Wei Dynasty, the Cave houses a standing statue of Sakyamuni, 5.1 meters high and with a damaged face and broken hands, which could be the "image of Sakyamuni begging for alms", with a statue of Kasyapa Buddha at his right side holding a Buddhist abbot's staff. In the Cave, there are numerous niches of various arches and decorated with fine carvings of peal and jade necklace, curtain, colorful strings, clouds, lotus flower, geometrical patterns etc. Sculptured upon the Cave ceiling is a large lotus flower surrounded by figures of Apsaras in relief, which are slim, graceful and vivid.

#### WEATHER:

The city of Beijing falls in the monsoon region, experiencing hot, wet summers and cold, dry winters. There are four very distinct seasons, with a wide temperature variation between winter and summer, when the mercury hits the high spots. During the height of summer, July and August, Beijing is subject to sudden evening downpours of rain, so an umbrella comes in handy. The average temperature in July is 26°C and an average rainfall is 224 mm.

#### LOCAL GROUND TRANSPORTATION SERVICE:

**Beijing Airport:** Free bus service will be provided from the Airport to the IRTCES Guesthouse for all participants. Participants are required to inform their arrival time and flight number.

Beijing Capital International Airport is to the northeast of the city, 35 km to IRTCES Guesthouse. Taxi is always available at the airport whenever there are flights, and there are shuttle buses from the airport to the main points of the city every half hour. The cost of a taxi from the airport to IRTCES Guesthouse is about 120 Yuan, or US\$ 15. There are 65,000 taxicabs running on Beijing's streets, and the rate of taxi is



generally 1.60 Yuan per kilometer. The rate applies only to the starting 4 kilometers, then 50% more will be added to every kilometer.

At the IRTCES Guesthouse, taxi can be easily found, and there are also bus stops around the area. As bus conductors speak only Chinese, taxi seems to be the most convenient and the fastest.

#### HOTEL RESERVATION:

##### ►IRTCES Guest House (★★):

The Guest House IRTCES, located at 1 kilometer to the east of Hua Yuan Flyover, West 3rd Ring, is convenient for its traffic, quiet and graceful for its circumstances, developed for its facilities. Its guest rooms are equipped with IDD.DDD phones, Internet and air conditioner. The Guest House has Business Center, and provides booking and conference facilities and services. The staff of the Guest House will try best to provide guests hospitable services to feel at home.

Address: IRTCES, 20  
Chegongzhuang Road West, Beijing  
100044, China

Tel: +00 86-10-68413372 or  
68786413 Fax: +00 86 10 68411174

Website: [www.irtces.org](http://www.irtces.org)

##### ►Jingling Hotel (★★★Three Star Hotel): *(Additional \$12 USD per room will be charged if accommodated at Jingling Hotel)*

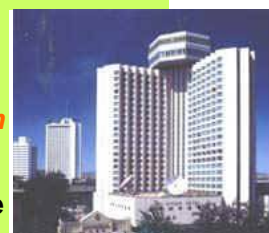
Address: Yi 20 Chegongzhuang  
Road West, Beijing 100044, China

Tel: + 00 86-10-68715588

##### ►Xiyuan Hotel: (★★★★Four Star Hotel): *(Additional \$24USD per room will be charged if accommodated at Xiyuan Hotel)*

Beijing Xiyuan Hotel (Xiyuan fandan) is a luxurious 4 star garden style hotel, is managed by the Cathay International hotel group. Strong business leadership begins with your choice of the internationally managed Xiyuan Hotel - conveniently located near Beijing's new financial district.

It is in an excellent location and easily accessible. It takes only 15 minutes to drive to the downtown area and the hotel is only 36 km from the Capital Airport and **about 1 km from IRTCES building.**





## Tour B: Preliminary Timetable of YR-2006

July 8-15, 2006		Program	Place
Date	Time		
July 8 (Saturday)	15: 00-22: 30	Registration	☞Lobby of IRTCES Building ☞ Overnight at Beijing (★★★)
July 9 (Sunday)	09: 00-09: 45 09: 45-10: 00 10: 00-12: 00 12: 00-13: 00 13: 00-18: 30 18: 30-19: 30 20: 00-21: 30	<ul style="list-style-type: none"> <li>● Opening Ceremony</li> <li>● Group photo and Coffee Break</li> <li>● Classroom Lectures</li> <li>● Lunch break</li> <li>● Classroom Lectures</li> <li>● Opening Reception</li> <li>● Cultural Recreational Evening Party</li> </ul>	☞ Conference Hall, 9th Floor of the IRTCES Building ☞Overnight at Beijing(★★★)
July 10 (Monday)	08: 00-12: 00 12: 00-14: 00 14: 00-16: 25 16: 25-18: 35	<ul style="list-style-type: none"> <li>● Technical Exchange (Each 10 Minutes) + 10 Wrap-up and Discussion</li> <li>● Lunch Break</li> <li>● Technical Visit and Seminar with experts of IWHR and Tsinghua University</li> <li>● Leave for Xi An City</li> </ul>	☞ Conference Hall, 9th Floor of the IRTCES Building ☞Overnight at Xi An(★★★★)
July 11 (Tuesday)	Full day	<ul style="list-style-type: none"> <li>● Visit Bureau of Upper and Middle Reaches of Yellow River</li> <li>● Visit Terracotta warriors, Bell Tower and the Drum Tower</li> </ul>	☞Overnight at Xi An (★★★★)
July 12 (Wednesday)	Morning Afternoon	<ul style="list-style-type: none"> <li>● Tour to the Loess Plateau and WB funded Soil and Water Conservation Project</li> <li>● Visit Hukou Fall</li> <li>● Tour to the Yellow River</li> </ul>	☞Overnight at Hukou (★★★)
July 13 (Thursday)	Full day	<ul style="list-style-type: none"> <li>● Leave for Sanmenxia City</li> <li>● Visit Sanmenxia Reservoir and sightseeing at Sanmenxia city</li> <li>● Seminar with experts of reservoir sediment</li> <li>● Leave for Luoyang city and visit Longmen Cave</li> <li>● Sightseeing at Luoyang city</li> </ul>	☞Overnight at Luoyang city(★★★★)
July 14 (Friday)	08: 00-15: 30 15: 30-17: 30 17: 30-18: 30	<ul style="list-style-type: none"> <li>● Visit Xiaolangdi Reservoir</li> <li>● Demonstration to test of regulation for sediment-water of Xiaolangdi Reservoir</li> <li>● Visit Huanyuankou Hydrological Station</li> <li>● Visit Research Institute of Yellow River and Physical models of Hydraulic Projects</li> <li>● Seminar with sediment experts</li> <li>● Closing Ceremony (Farewell Banquet)</li> <li>● Back to Beijing by Train</li> </ul>	☞Overnight at the train from Zhengzhou to Beijing
July 15 (Saturday)	08: 00	●Tour Ends after Breakfast	See the Participants off at Airport

◆ IWHR- China Institute of Water Resources and Hydro-electric Power Research

◆ Lecturers-will be international well known experts from Tsinghua University, IAHR, Yellow River Water Resources Commission