

# PLAN WITH NATURE

# JINAN REGIONAL STUDY

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Figure 1: Panoramic view of Jinan

» One thing caught the planners' attention: with continuous heavy investments in hydrological engineering, the Yellow River has now become well maintained and the flooding possibility is greatly dropped. The lush and spacious flood buffer with views to the river could become a major open space amenity. «



## OVERVIEW OF JINAN

Jinan, a major city in eastern China, has a population around 7 million of which around 4.5 million live in the central (or metro) area. The City serves several major roles. Politically, it is the capital of Shandong Province. Jinan also is one of the 7 major military regions of China, hosting the command headquarters in charge of Shandong and Henan Province, resulting in heavy government spending on transportation infrastructure.

All the advantages and crucial roles Jinan now enjoys are related to the two natural elements: its river front location and Mt. Taishan. The city developed as a trading post reliant on river transportation of salt from the east coast. This important trade gradually evolved the city's military role. Until the late 19<sup>th</sup> century, the river serving the city was the Jishui, but then the mighty Yellow River changed its course northward usurping the Jishui streambed as its own channel. Now Jinan is located along the Yellow River.

The Taishan Mountain bestowed Jinan with other gifts. The mountain established its own water cycle in the region. It collects storm water that



Figure 2: Yellow River and Taishan Mountain

become both streams and aquifer feed springs in the city. Jinan became known as the “Spring City” for its abundance of springs within the urban area. In a generally dry region, Jinan’s numerous waterways and springs, making it a unique place that attracted poets, nobles and scholars. This role was further enhanced by Confucius. Culturally, it is the birthplace of Confucianism as he developed his philosophy in this region, which attracted generation of followers. Finally, as the only large mountain standing amid the flat North China Plain, Taishan Mountain served as the royal ritual location for ancient emperors.

## EXISTING PROBLEMS

The Yellow River and Taishan Mountain keeps exerting influence on the city. In recent years, however, the interplay between the city, the river and the mountain changed. After the Yellow River took over the riverbank of Jishui River, it caused frequent floods. Meanwhile, with its lush vegetation and better view, the mountain keeps attracting development towards



Figure 3: Sequence 1  
Yellow River and Mt Taishan

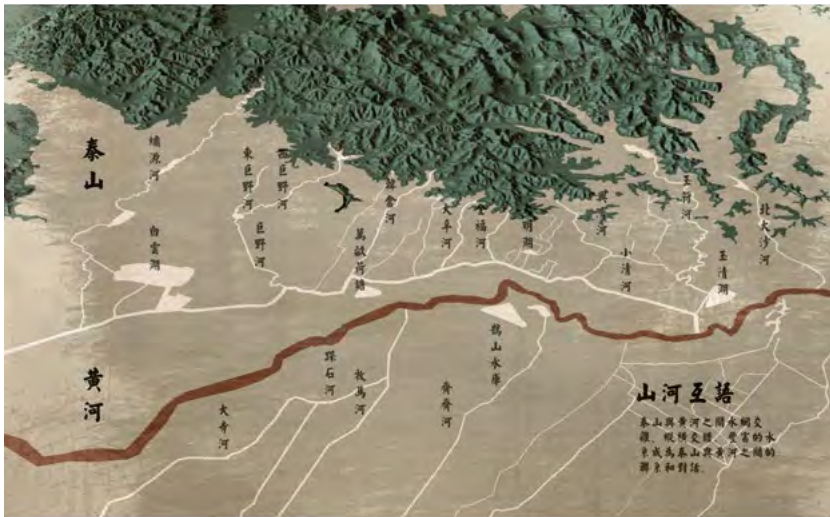


Figure 4: Sequence 2  
Waterway Network

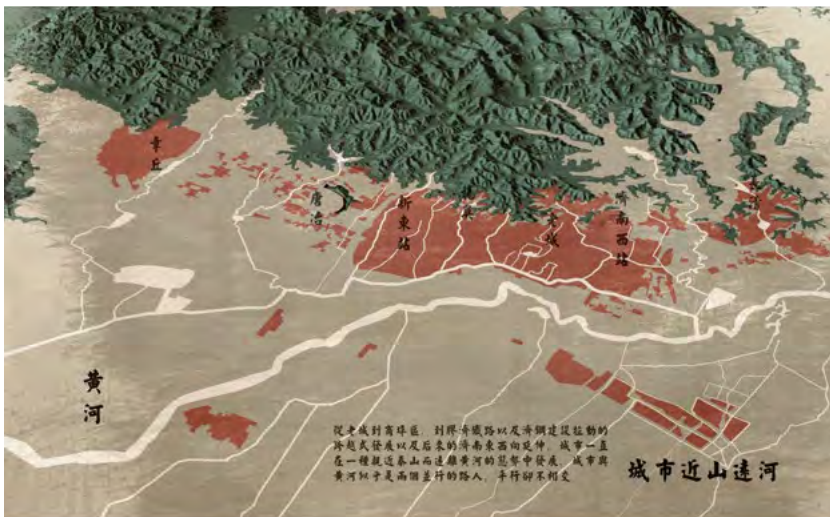


Figure 5: Sequence 3  
Existing city footprint

it. Thus the city gradually shied away from the river and spreads into the mountain. Several negative impacts resulted from this growth shift.

First, there were serious environmental impacts. As urban development eroded into the mountain and reduced ecologically sensitive zones, the aquifers that feed the springs were affected and many stopped flowing.

Transportation-wise, as the city keeps expanding to the east and west following the foothill, the urban form stretched into a ribbon. The traffic demand between the east and west over-burdened the infrastructure and cause exacerbating gridlock. Adding to this problem, Jinan developed a strong and growing industrial base on the east, causing increasing number of blue-collar workers to commute to the center, further burdening the already overloaded roads.

Lastly, there were issues implementing previous master plans. An effort to encourage development across the Yellow River to the north (named “Cross River Strategy”), was not succeeded due to the formidable costs of new bridges to cross the river and the high cost of building infrastructure on the north shore. Also the fast urbanization in Jinan often outran the targets set in the existing plan, even with their relative short 15 year planning horizon. As a result, actual progress was far from ideal. Today, paradoxically, growth forecasts predicted a growth slow down.

All of these existing problems encouraged the city to revise its plan and to rethink its growth strategies. As a result, the city decided to revise its master plan and to carry out a regional study. The team of Calthorpe Associates and China Sustainable Transportation Center was commissioned to perform the study.

## **DEVELOPMENT OF THE PLAN**

With compact development in mind, the plan looked for growth opportunities close to the existing built area. One thing caught the planners’ attention: with continuous heavy investments in hydrological engineering, the Yellow River has now become well maintained and the flooding possibility is greatly dropped. The lush and spacious flood buffer with views to the river could become a major open space amenity. Also the land south of the river that is vacant or under-utilized, due to prior flood concerns, could serve as a prime land for future growth. Thus the regional study proposed the first strategy (a grand vision): “Yellow River Parkway” & “Yellow River District”.

The strategy comes with several benefits. First, the vision can redirect the urban growth northward to the bank of the Yellow River, relieving environment pressure on the southern part of the city where the aquifers lie. Secondly, unlike the Cross River Strategy, the “Yellow River District” is right next to the existing downtown where infrastructure and developable land already are available. Thirdly, the parkway will add an identity to the city. Besides, given the reputation of the Yellow River, the grand vision can be easily understood and remembered by Jinan citizens.

A second strategy involves land use changes and application of TOD planning methods to shape future growth. This will have several positive results. First, by setting up the green buffers (community separators) ecologically sensitive areas are reinforced. Second, land use recommendations have been modified so each growth area will have a more bal-

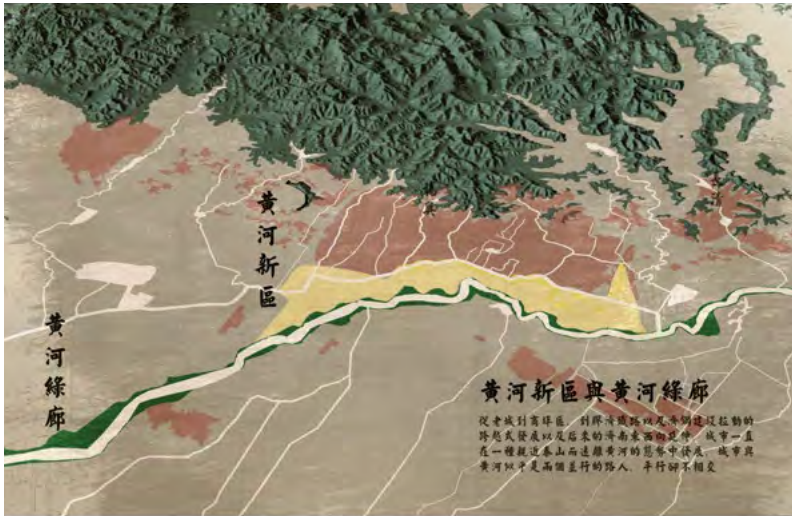


Figure 6: Sequence 4  
Vision Yellow River Parkway  
and Yellow River District



Figure 7: Sequence 5  
Strategy Transit Oriented  
Development

anced job housing ratio, reducing long commute and relieving burdens on road infrastructure. Third, the plan calls for transit to be extended and used as the framework for organizing land use. This also benefits overall transit efficiency.

## TECHNICAL DETAILS ON THE REGIONAL STRATEGIES

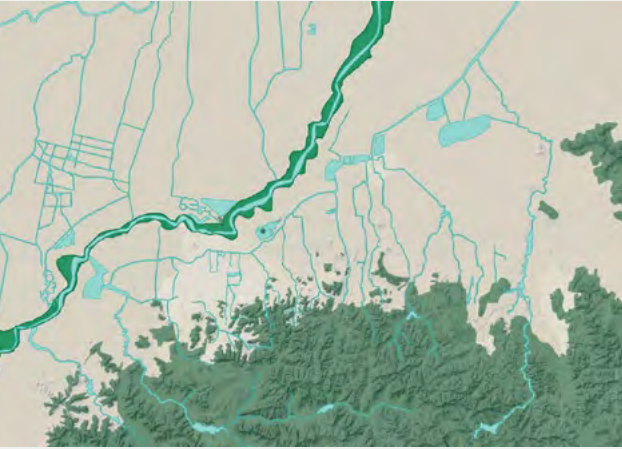
The above paragraphs briefly introduced the evolution of the plan; technical details and main procedures will be covered next.

### SITE ANALYSIS · DELINEATE OPPORTUNITY SITES

The first major step involves a focused site analysis to identify opportunity sites for redevelopment and future growth. This process involves the mapping of key site features, successively layered on top of the preceding data, resulting in clearly demarcated zones that are appropriate for the development of growth areas.

## REGIONAL PLANS

### GROWTH STRATEGIES FOR OPPORTUNITY SITES



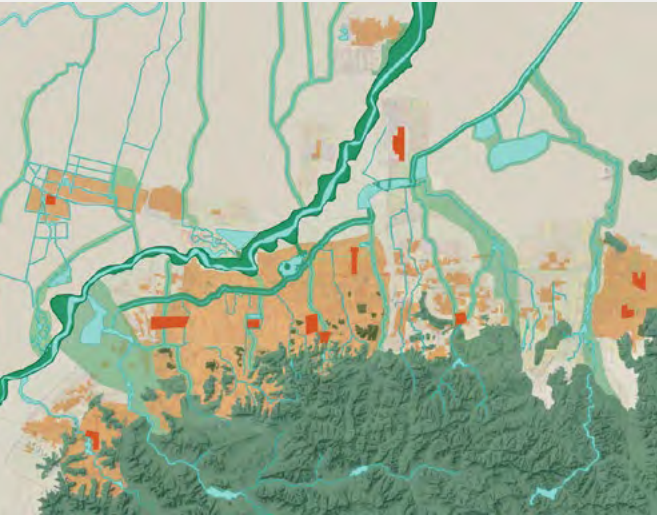
The starting point for the analysis is to understand the site within its natural setting. With an objective of designating areas for growth that do not disrupt ecological systems in the region. This step involves mapping environmental features and constraints using aerial maps, slope and elevation studies, and similar data. In the case of Jinan, the most valuable natural assets include the Yellow River, set within its levees and green buffer; the extensive riparian network of streams and rivers; the mountains including Taishan, one of the most important cultural sites in the country; and the numerous springs that Jinan is famous for.



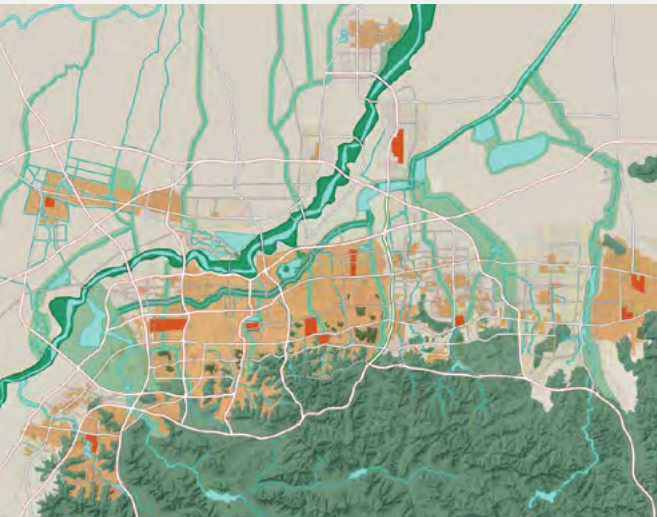
An analysis of the natural setting helped identify prominent ecological assets that should be preserved. These include the Yellow River, Baotu and Heihu springs, Xiaoqing River, Xiuyuan River and other rivers and streams; floodplains, reservoirs, farmland and the mountains that should be kept in their natural state to the extent possible. This is done by designating Eco Corridors - preservation zones that should not be part of future development. They also act as buffers between communities, and help shape growth areas. The Eco Corridors play a critical role in maintaining riparian connections, drainage patterns and habitat for local flora and fauna as a comprehensive, interconnected system.

## REGIONAL PLANS

### GROWTH STRATEGIES FOR OPPORTUNITY SITES



Once the Eco Corridors have been located, the next step is to identify built areas. This includes existing settlements and land parcels that have been sold or planned for special uses. When mapping existing development, it is important to consider existing centers and destinations that will influence future development as well as circulation and transit connections. These include existing and planned Central Business Districts (CBDs), retail centers, transportation hubs, employment nodes, tourist attractions, etc. Awareness of these destinations and centers will help guide future development as well as transit and highway connections, and strengthen linkages between the existing and future communities.

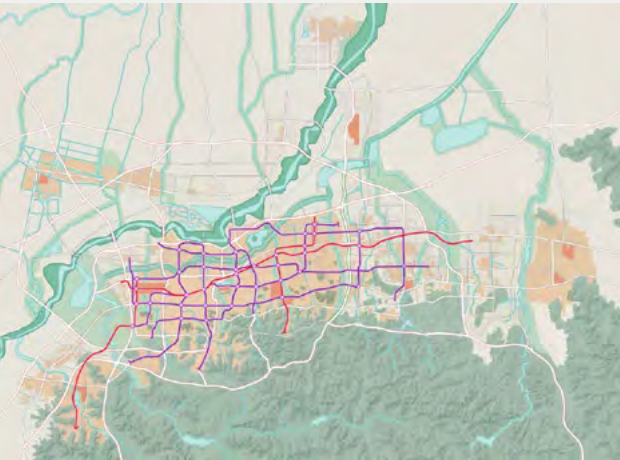


Freeways and expressways are an essential part of a region's circulation network, but also act as pedestrian barriers, in particular those that are grade-separated. In this step, major roads that are regional connectors, and will have fast-moving traffic, have been highlighted. It is important to note that in some cases, wide arterial streets (that are at-grade) may not necessarily act as barriers if they can be modified.

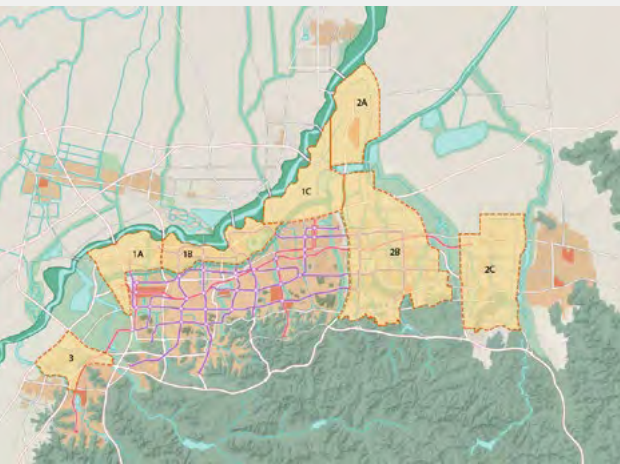


## REGIONAL PLANS

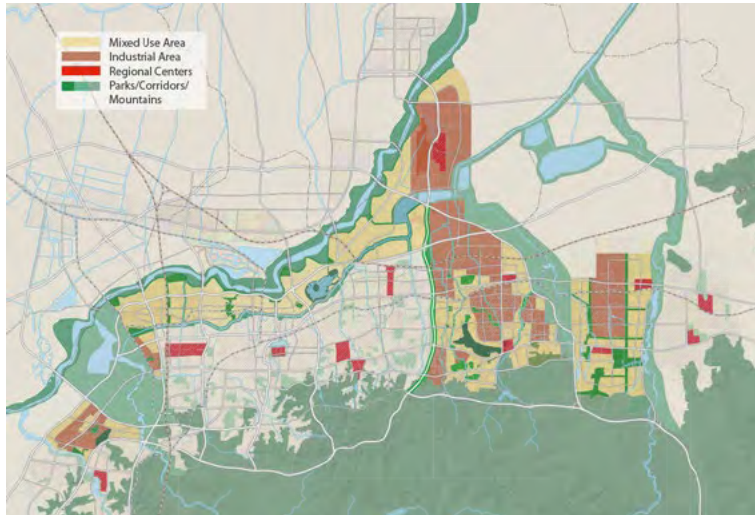
### GROWTH STRATEGIES FOR OPPORTUNITY SITES



The fifth step after locating major roads is to map another critical part of the circulation network - transit routes, stations and transfer hubs. This includes High Speed rail, passenger and cargo rail, commuter rail, metro, light rail as well as BRT. Transit plays a vital role in the success of future centers and destinations, and is an important factor in determining future development densities as well as phasing.



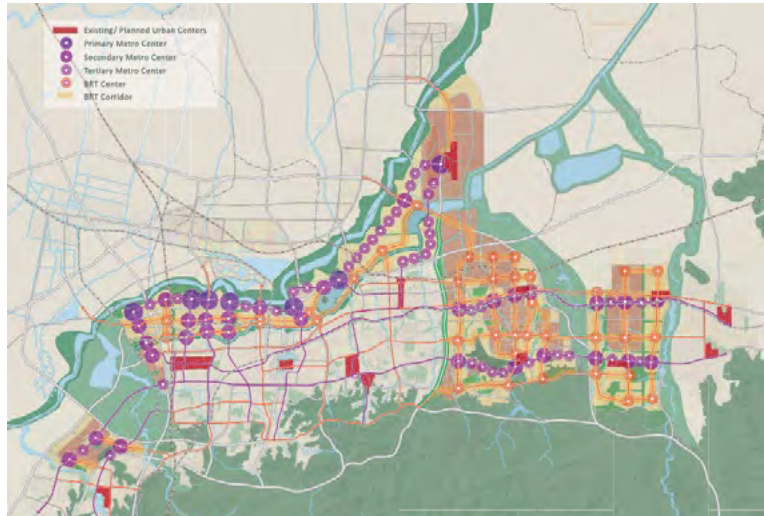
After layering relevant elements, suitable sites for future growth emerge. Most of these areas are at the periphery close to the existing development. Leapfrog pattern is avoided and infill opportunities are carefully considered.



### REGIONAL PLANS · GROWTH STRATEGIES FOR OPPORTUNITY SITES

The planning process involves two stages. First it builds on the results of the Site Analysis and uses that information to propose transit extensions, modify elements of the circulation network and suggest land use changes if required. Secondly, the opportunity sites are further classified into Placetypes. Existing and planned regional destinations are taken into consideration as well.

The existing and planned land uses in the study area are analyzed to identify areas that will be retained as per the original master plan, and areas that have potential for renewal or redevelopment. The analysis also helps to shape future land uses in vacant or underdeveloped areas. To get a holistic understanding of the region, the detailed land uses are simplified into four categories: Mixed Use Areas (consisting mainly of residential, commercial and supporting uses), Industrial Zones, Parks and Recreation; and Preservation/Special Function Areas (including eco-corridors, reservoirs, heritage sites, etc.). Thus a clear picture is obtained of how residential and non-residential areas are distributed; and also open space amenities and corridors that can act as Community Separators.



The final stage of the plan process is to locate Placetypes, the size and densities of which will be decided on the basis of transit capacity and access. Minimum density criteria have been established for each Placetypes with the aim of maintaining a jobs-housing balance at the city and regional scale. There are in total 7 Placetypes, including Mixed Use Area and Industrial Areas, as well as five types of Transit Centers:

- Primary Metro: located at a Metro-Metro transfer station; 1000 m walk radius
- Secondary Metro: located at a Metro-BRT transfer station; 800 m walk radius
- Tertiary Metro: located at a BRT-BRT transfer station; 600 m walk radius
- BRT Center: located at a single Metro station; 600 m walk radius
- BRT Corridor: located along a BRT route, 800 m total width (400 m on either side of BRT route)

The standard for each of the Transit Centers are generated through comparable cases in Jinan and the numbers are listed below:

ASSUMPTIONS FOR NEW GROWTH AREAS Place - type	Radius & Area	Population Density (People per hectare)	Jobs Density (Jobs per hectare)	Sq m per capita
Primary Metro Center   Metro-Metro Transfer Station	1000 m   314 ha	300	150	33
Secondary Metro Center   Metro-BRT Transfer Station	800 m   201 ha	300	150	33
Tertiary Metro Center   Metro Station	600 m   113 ha	250	75	40
BRT Center   BRT-BRT Transfer Station	600 m   113 ha	250	75	40
BRT Transit Corridor	800 m   Varies	200	50	50
Mixed Use	Varies	150	30	67
Industrial	Varies	10	100	



Figure 8: The existing levee roads flanking the river will be converted to a trail for pedestrian and bikes. Dense development will be encouraged south of the river (Yellow River District) to allow residents a grand view of the river and open spaces in the north



Figure 9: The high speed rail crosses the Yellow River before entering the city, and the bridge serves as a key gateway. By creating a sculpture park near the bridge, a welcome & arrival feature is created for high speed rail passengers



Figure 10: The Luokou Rail Bridge is one of the earliest rail bridges in China, dating back to 1909. It witnessed the late Qing Dynasty, the Republic of China, the Anti-Japanese War, the Civil War, the founding of People's Republic of China and it still serves the city today. By creating a park here, citizens and visitors will be invited to celebrate its history



Figure 11: Huashan Mountain holds the highest ground in the future Yellow River District, providing a panoramic view of the city. The park will be surrounded by high density development, allowing more residents to enjoy the feature



Figure 12: There exists a series of ponds along the river for aquaculture uses, which could be converted to wetland parks for education and recreation purposes



This method is different from conventional regional plans, where a target number of jobs and population would be arrived at through growth projection or environmental capacity evaluation. Basically what the plan tells the city is: If the future growth is guided by transit and developed in a compact way similar to chosen comparable, then the growth area could accommodate this number of jobs and population.

Figure 13: Spacious flood buffers are maintained along the river, especially at the curves. These areas offer opportunities for people to get close to the water

## LANDSCAPE CONCEPT

The highlight of the regional study is the vision of “Yellow River Parkway”. In order to visually communicate the idea, a team of landscape architects from China Sustainable Transportation Center was brought in to perform an illustrative landscape study (see Figure 8 - 13).

## SUMMARY

The Jinan we have today is a city that enjoys the natural gifts of springs and mountain, but leaves behind the Yellow River. It is a city with strong growth momentum but in need of a right direction, without which traffic condition, infrastructure efficiencies and quality of life would suffer and ecology may deteriorate. It is also a city without a clear vision or identity.

The strategies applied in this regional study could be a cure that creates a better Jinan. It enables citizens to celebrate all the natural gifts, including springs, mountains and the Yellow River. It provides for a place where eco-corridors identify districts of suitable size that can support themselves with sub-centers and a healthy balance between jobs and housing. It re-establishes and strengthens the linkage between the city’s growth and the Yellow River. ♦