

Rizhao, China

The Eco-City Building Plan of Rizhao

Since the Rizhao Municipal Government began to implement the Eco-City Building Plan in 2003, the local ecological environment and extended urban development area has significantly improved. Similarly the city has benefited economically from this and the quality of life of its residents has increased substantially. Rizhao's efforts have been nationally and internationally recognized. This case study illustrates the achievements of Rizhao and how other cities may replicate such efforts.

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Abstract

Rizhao Municipal Government drafted the Eco-City Building Plan under the banner of 'Planning an Ecological City and Building a Livable Home'. The plan seeks to integrate the idea of sustainable development into how the city expands and grows. The objective is to develop a new city model that accelerates economic development, while securing ecological quality and social harmony. The program has four main strategic areas of focus: the harbor, industry, technology and ecology, and is divided up into three time phases, 2001-2005, 2006-2010 and 2011-2020. The Eco-City Building Plan presents an ecological spatial plan for the Rizhao city area (5310km²). It advocates for sustainability principles to be integrated into urban development including urban infrastructure, the renovation of destroyed ecological habitat, the development of eco-economics such as the 'circular economy', the improvement of environmental quality and to maintain environmental attributes known as 'blue sky', 'blue sea' and 'golden beach'. Rizhao has received numerous international and national awards for its sustainable urban development.



Population / Land area

~ 2.9 million (2010)
5310 km²

Municipal budget

US\$ 340 million (2011)

Importance of sustainable urban development

In 1989, Rizhao's municipal political designation was upgraded from a 'County-level City' to a 'Prefecture-level Municipality'. In comparison to most neighboring cities, Rizhao was economically under-performing, had a low per capita income and poor living conditions. The city also lacked a planning capacity, and sufficient infrastructure and services. In the entire city of 5,310 km², there existed only 49 km of road, public green space per person was less than 3m², and waste and sewage treatment plants and other pollution control projects were almost non-existent.

With accelerating urbanization, population growth and industrialization the pressure on the local natural environment increased. To stay economically and socially attractive and viable, the city required effective planning and investment, particularly investments which boost the ecological protection and economic productivity of Rizhao. Rizhao realized that to manage maintain economic growth sustainably, an Eco-City transformation was necessary. This was imperative to ensure that sustainable development and building urban resilience occurs before the challenges the city was facing would become unmanageable.

Case Study



Photo: © Rizhao City

World Sailing Boat
Championship base, Rizhao.

City context

The name of Rizhao means 'the first city to enjoy the sunshine as the sun rises'. Rizhao is located at the southern end of Shandong Peninsula, in the middle of the east coast of China.

After 1989, the Rizhao municipal government adopted a series of plans, including the 'Rizhao Sustainable Development Plan', the general 'Plan for Developing the Circular Economy' in Rizhao, the 'City Master Plan' and most recently, it introduced the 'Eco-City Building Plan of Rizhao' in 2003, on which this case study focuses.

Currently, Rizhao is at the primary stage of its economic growth, however it has experienced high GDP growth in recent times. This has put profound pressure on the environment and as a result a strong emphasis in the need for a liveable environment for the city's inhabitants was established. Local government executives began to have an increasing awareness and urgency for establishing a sustainable development path to build a resourceful and environmental-friendly society in the city. Now, there exists a sustainable environmental planning model and the beginning of a viable circular economy.

'Functional, Ecological, Attractive and Dynamic'- a livable waterfront city

Development of the plan

In September 2000, at the request of the City Mayor, the municipal government commissioned the Research Center for Eco-Environmental Sciences of the Chinese Academy of Science to prepare the "Eco-City Building Plan of Rizhao". This was assessed by the Provincial Environmental Protection Agency part of central government in January 2002. In November 2002, the plan was approved by the municipal government and officially inaugurated in August 2003.

Scenario analysis underpinning the plan

The plan assessed factors and existing problems in urban development through a systematic identification, simulation and analytical process. In addition to this, an urban design plan for the city area was prepared by the municipal government. The analysis highlighted population predictions, resource use and environmental and industrial development strategies that would be needed to strengthen the city's capacity and promote sustainable development. The most comprehensive and practical aspects included stimulating investment in renewable energy technologies. The analysis argued that ecological protection is both an immediate and long term concern, and that social and economic urban development need not necessarily be a conflicting objective with ecological protection but can be mutually compatible.

Governance

The Eco-City Building Plan of Rizhao is mainly driven by the Eco-City planning

team or 'task force' located within the Municipal Environmental Protection Bureau, which provided key input into the plan and strategy, and is directed by the Municipal Secretary. It also played a key role in developing citizen and stakeholder involvement in the process. The team's strength comes from the fact that it includes representation from all the relevant implementing departments of the municipality (see text box).

Timeline of the plan

The time frame of the Eco-City Building Plan of Rizhao was divided into three phases:

Phase I: The kick-off period (2001-2005)

This phase was aimed at establishing the institutional framework that is required for the Eco-City Plan. It is imperative to incorporate more eco-friendly principles into everyday economic and industrial activity. Pilot projects were introduced that enabled stronger environmental pollution control and green infrastructure construction projects were prioritized. This included more public transport modes, improved sewage systems, renewable energy-based electricity supply and innovative communication networks.

Phase II: The development period (2006-2010)

This phase supported the creation of eco-industries, such as those based on photosynthetics, renewable energy technologies, eco-logistics and marine resources. They were supported through a municipal subsidy which encouraged investment in ecofriendly technologies. Small and medium enterprises were also supported, particularly those involved in the hospitality and travel sectors.

Phase III: The enhancement period (2011-2020).

The intention of the last phase is to ensure a comprehensive improvement in the quality of life for Rizhao's residents and a consolidation of the circular economy system that was established in the preceding stages. Priorities include promoting green industry, increasing education enrollment and improving public transport accessibility. Through these efforts, it is envisaged that Rizhao will become an eco-community.

Eco Planning: "Green belt - Two areas and Three corridors - Four landscapes"

Under the banner of 'Establishing an Ecological City and Building a Livable City', the Eco-City Building Plan of Rizhao presented an ecological spatial plan known as: *Green belt - Two areas and Three corridors - Four landscapes*. This was the first time the city was considered in a systematic way at the urban-landscape scale. This coordinated eco planning allows Rizhao to achieve its Eco-City goal by creating a functional and attractive waterfront city that is sustainable, dynamic and provides a good quality of life for all inhabitants.

Green Belt - Two areas

Green Belt: A green belt will connect the four mountains surrounding the urban area: Mt. Huangshan, Mt. Heshan, Mt. Kuishan and Mt. Sishan. This will be characterized by a green eco-corridor between each mountain with urban forests, park landscapes and urban gardens planned between. This improves the environmental health of the city, the local ecosystem and allows for a more sustainable urban development form.

Two Areas: There will be two areas dividing the city into two unique districts on an axis along the east-west boulevard. The main function of the southern district is to focus on production; such as maritime industries, port transportation,

The Rizhao Municipal Departments involved are:

- Development and Reform Commission.
- Economic and Trade Commission.
- Municipal Foreign Economic and Trade Commission.
- Municipal Construction Committee.
- Municipal Finance Bureau.
- Municipal Environmental Protection Bureau.
- Municipal Public Security Bureau.
- Publicity ministry of Rizhao
- Municipal committee.
- Municipal Educational Bureau. Municipal Cultural Bureau. Municipal Water Conservancy Bureau.
- Municipal Agriculture Bureau. Municipal Marine and Fishery Bureau.
- Municipal Forestry Bureau.
- Municipal Bureau of Land and Resources.
- Municipal Science and Technology Bureau.
- Municipal Family Planning Commission.
- Municipal Statistics Bureau.
- Municipal Tourism Bureau and Municipal Industry Bureau.

warehousing and trade. The northern district mainly emphasizes culture and heritage, and services, such as administration, housing, science, education, and tourism.



Photo: © Rizhao City

Rizhao Waterfront.

Three Corridors - Four Landscapes

Three Corridors

First: 200 meter wide 'Ecological Boulevard'.

Second: North-south ecological corridor characterized by natural ecology and rural scenery.

Third: Coastal shelterbelts that will act as screens along the seafront and prevent erosion etc.

Four Landscapes

Building an ecological water corridor along the five rivers in the city area, Xiangdian River, Houlou River, Yingzi River, Zhang River and Shadun River. Its core aim is to create water featured landscapes around the city area by connecting the Zhang River

to the Shadun River. This will create an attractive water habitat throughout the city providing an excellent amenity for the residents of Rizhao.

Forming a unique sea landscape through innovative design and landscape architecture where the juxtaposition of the urban fabric within the natural environment creates a vibrant and dynamic urban form.

Restoring the lagoon ecosystem and reconstructing the lagoon landscape by dredging and expanding the lagoon water areas.

Creating the exclusive estuarine wetland landscape by establishing the estuary wetland reserve of Futuan River in order to preserve the wildlife habitat and breeding grounds located there.

Further associated programs and activities.

Furthermore, the Eco-City Building Plan of Rizhao also developed a circular economy aimed at eco-friendly industries, and the promotion of clean energy use, such as solar energy, biogas, wind and other renewable energy technologies. Active promotion of such initiatives will instill fundamental changes in economic policy and development. The relevant supporting policies are as follows:

- Installation of solar power energy infrastructure across both the residential and commercial sectors, particularly during the construction phases.
- Establishing an environment protection capital fund. Rizhao Municipal Government gives capital support to companies that use waste water to produce gas for electricity generation. This involves the establishment of waste water discharging fees, water source and waste water treatment fees.
- Encouraging clean technology transfer and knowledge sharing between clean technology services.

Establishing an integrated and law-based mechanism and improving the monitoring system. Rizhao Municipal Government signed a responsibility pact with the different heads of departments and the directors of each district and county in the Rizhao Municipality. This pact involves the establishment of targets each year. In addition, assessment methods were introduced to examine the program initiatives, including indicators of environmental protection, ecological construction, energy conservation etc.

Results

Rizhao, has just begun the final phase of the Eco-City Program and thus far there have been considerable achievements. In recognition of the successes of Rizhao's Eco-City Plan, the municipal government won the first 'World Clean Energy Award' as well as the 'UN-Habitat Scroll of Honour Award' in 2009. It was the first Chinese city to receive the award, primarily due to its achievements in the field of sustainability, improvements in quality of life and the protection of the local environment.

Further achievements are listed below:

Economic improvements: The economy has maintained significant economic growth in the past decade. In 2008, GDP reached US\$ 9.66 billion. Initiatives such as the eco-industrial Park Project in the Rizhao Economic Zone enabled this success. Since 2009, Rizhao has actively promoted eco-friendly policies in service sectors such as tourism, education and energy provision. This has not only improved the overall natural environment, it also enticed more tourists to the city. More than 20 million tourists have visited Rizhao since 2008.

Ecological environment: Following the implementation of the Eco-City Building Plan, Rizhao aims to preserve its ecological environment, characterized by its 'blue sky, a blue sea and golden beaches ideal'. Urban noise pollution has reduced significantly and is more effectively controlled through policies such as a prohibition of night construction, improvements in public transportation and defined 'no-honking areas'.

The air quality in Rizhao ranks top amongst the 113 cities for environmental protection at the national level and is amongst the best in the Shandong province. Furthermore, Rizhao has ranked top among prefecture-level cities for eight consecutive years in the quota-based evaluation on the comprehensive rehabilitation of the urban environment. From 2006 to 2010, sulphur dioxide and chemical oxygen demand emissions decreased by 23.7 per cent and 18.7 per cent respectively.

The quality of its urban water system has also improved remarkably. The drinking water and sea water quality have reached the national Standard Class I level. Furthermore, Rizhao has been the top ranked city for eight consecutive years for urban environmental rehabilitation efforts as a result of its water pollution control and waste management policies.

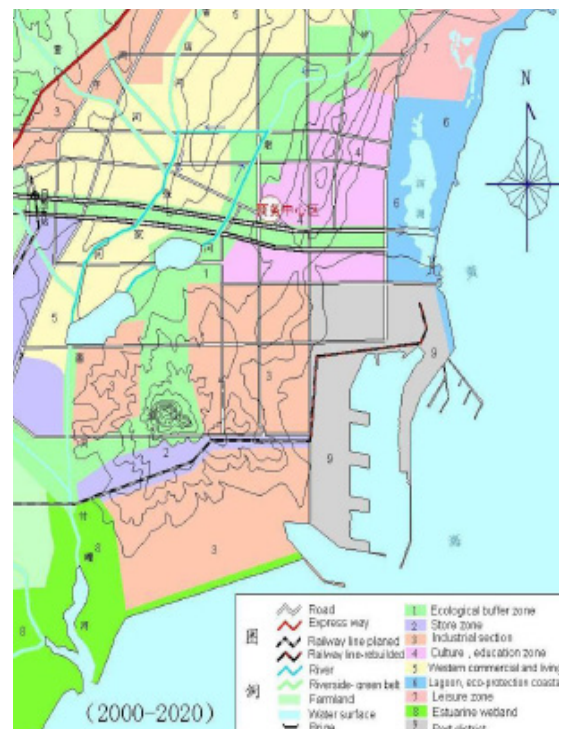
Green cover rate: Green open space has reached 2,160 hectares, an increase to 42.2 per cent of the total urban area by 2010. The public green area per person increased from 10.5m² in 2000 to 19m² in 2010. In addition, the municipality plans to prevent soil erosion in the surrounding mountains by reclaiming 130 km² of land per land. From 2006 to 2010, the total reclaimed natural land in mountainous areas was 412 km².

Utilization rate of clean energy: Developing the clean tech industry was one of the pre-requisites in achieving an eco-friendly city. The municipality encouraged factories and industries to develop the utilization of



Rizhao Waterfront.

Photo: © Rizhao City



The concept map for urban landscape plan of Rizhao.

Photo: © Rizhao City

clean energy. The utility rate of clean energy use increased from 70 per cent in 2000 to 99 per cent in 2010. Urban central heating systems, that are fueled with solar energy, heat up to 1 million m² and the utilization rate has reached 65 per cent in the city area. Solar lighting systems are now widely used in parks and public squares. Due to the utilization of clean forms of energy, the city saves 3.8 billion kwh of electricity annually, replacing 1.44 million tons of standard coal, thus reducing emissions of CO₂ (3.25 million tons), SO₂ (2.2 million tons) and 20,000 tons of dust. In addition, there are 25 industrial enterprises passing the ISO14001 environmental management system certification with a further 63 companies currently carrying out the audit.

Drinking water quality: After building 8 water plants in Rizhao from 2003 to 2011, the water supply capacity which comes from the nearby reservoirs increased to approximately 322,000 tons per day which equates to 114 liters per capita per day. The supply rate of urban water coverage including drinking water and city surface water has remained at 100 per cent. Quality of urban surface water and coastal waters are meeting or overachieving the currently required national and provincial environmental standards.

Integrated coastal restoration project. To protect and restore beaches, reefs, wetlands and other ecological habitats the Integrated Coastal Restoration Project was implemented. The municipal government invested US\$ 290 million to re-design the nearly 10 km² Wanpingkou beachfront and establish it as a prime center for tourism, water sports, leisure and recreational activities. Furthermore, various initiatives were introduced to improve the 120km of waterways in the city. Primarily based on flood prevention, aesthetic quality,

ecological sustainability and recreational functionality, improvements to the natural and physical environment were made. This included broadening the width of rivers, improving rainwater and sewage systems and building water storage infrastructure.



Solar power street lighting, Rizhao.

Lessons learned

Ensuring cities are livable and sustainable is a complex task. The idea is to combine ecosystem science with economic growth and enshrine it in the municipal decision-making process. This is the challenge that Rizhao has set itself. The achievement of this program can be attributed to the following strategies and mechanisms:

The statutory framework. It was essential that a guiding principle was established when creating the Eco-City master plan. The most important of which was that each initiative should have consideration for environmental protection and the principles of sustainable development regarding urban development. In order to protect ecologically sensitive areas, Rizhao municipal government issued notices designating protected areas where construction was limited or prohibited.

Promoting an eco-efficient city. Resource conservation and protection is an imperative in Rizhao to ensure sustainable urban development. Renewable technologies such as solar energy technology was placed in high priority. Sustainable design must be incorporated into the construction process enabling

more energy efficient buildings. Furthermore, it is essential to increase investment in, scientific research technology and policy studies. In addition, 'Low-carbon indicators' should gradually be developed and improved.

Establishing the idea of eco-culture and encourage public participation.

Rizhao's eco-culture needed to be developed and constantly adjusted by local policy making and information initiatives. Bus shelters and other public platforms were used as advertising platforms to make the residents more aware of the envisioned eco-culture. Public support and participation is also an important factor in achieving success in this program.

Replication

In order for such a comprehensive city plan to be implemented in other cities, two important principles would have to be adhered to.

Firstly, promote protection of the natural environment through the legal system.

The development of an Eco-City should depend on legal norms such as those adopted by the 3rd meeting of the Standing Committee of Rizhao Municipal People's Congress and the relevant planning scheme. The related legal documents of Eco-City projects can be used as an important basis for the Eco-City development and management. Under the guidance of statutory instruments, policy can be created by which development and planning applications can be decided upon.

Secondly, public participation encourages citizens to take ownership of the urban area's environmental wellbeing. Involving the public in development strategies is extremely beneficial. It establishes multiple levels of cooperation with government led projects, the wider public and interested stakeholders. All of which allow for dialogue and multi-financing opportunities to plan and construct a liveable city.

Rizhao has been gradually holding expert seminars and public hearings. The media has begun documenting information about the latest policies and their implementation. Next steps could be the establishment of a forum in which the public can express their views and have a say regarding the policy direction that the municipal government is taking.



Rizhao received the 'UN Habitat Scroll of Honour' Award.

Photo: © Rizhao City

Budgets and finance

Rizhao municipal government invested significant amounts of money to make its city plan a reality:

- Construction investment: 2009 - US\$ 5 million, 2010 - US\$ 325 million. In the past three years it totalled 2011 - US\$ 340 million.
- Ecological protection: coastal ecological protection US\$ 83 million; water treatment US\$ 20 million; renovation of enterprises' ecology and circular economic development; US\$ 50 million, new energy development and utilization - US\$ 12 million.

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International Income:

- The EU assisted Rizhao's Eco-industrial Park Project through the EU-CHINA Environmental Management Cooperation Programme (EMCP),
- A World Bank loan of US\$ 15 million to construct a wastewater treatment plant and the garbage disposal facilities in the city.

Furthermore, Rizhao also invited companies to participate in the planning, design and construction phases of the project. Most of the funding comes from local taxation revenue.

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