

# China-Sweden Erdos Eco-town Project, Dong Sheng, Inner Mongolia, China

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Urban pit latrines today, Dong Sheng

## Summary

To show that it is possible to build and operate an urban centre using sustainable approaches to sanitation, water use, solid waste and infrastructure, a bold new research and development project has been undertaken by the City of Dong Sheng in Erdos Municipal District in collaboration with the EcoSanRes Programme and Sida. A town with one-, two- and four-story buildings including service and shopping facilities for 7000 people is currently being built. The first houses are presently being built for inhabitation by the end of 2004 and the project will be completed by 2007. This represents the first major attempt in China (and the world) to build from the ground up an entire functioning modern town using sustainable water and sanitation practices.



## Introduction

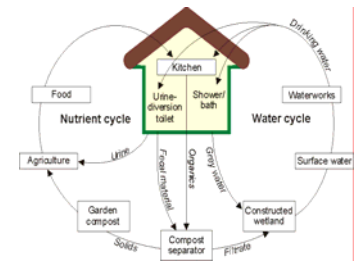
The location is Northern China in Inner Mongolia 100 kms south of Baotou in the Yellow River Basin. The area receives an annual precipitation of 300-400 mm with an evapotranspiration potential of c 2800 mm and water rationing is commonplace in most urban centres. Erdos represents a cluster of cities in a coal mining belt (73 billion tons coal reserve) containing about 1.5 million people. Dong Sheng itself has a population of 260,000 and the new town (**Hei Zao Kui**) is being developed as a suburb a few kilometres from the city centre.

In the downtown city area of Dong Sheng, there are about 60,000 households, among which 15,000 households live in multi-story and 45,000 in single-story buildings. About 20,000 households have flush toilets while the rest of the population use 280 public toilets, among which 17 are flushing, 156 deep pit latrines, and the balance shallow pit latrines. In the peri-urban and rural areas most households have their own shallow pit latrines but these are in bad condition. Open defecation is common. The pit latrines vary in quality but in general are very poor risking both health and the environment. In general the entire situation regarding sanitation in the city is typical for China, a patchwork, under-maintained activity resulting in groundwater pathogen contamination and nutrient pollution. The poor sanitation conditions tax further the already impoverished water supply situation.

Prior to 1985, sewage from the flush toilets was mixed with rainwater in ditches and directly discharged without treatment. The city began to construct its sewage system with collector pipes in 1985. This system covered 64% of the city area in 2002, and rainwater was collected in a separate system of 31 kms of pipeline and covered/lined ditches in 2000. The sewage treatment plant started to operate in 2002 with a daily capacity of 30,000 tons but is running at a much lower level due to lack of a proper collector system. An additional sewage treatment plant has a capacity of 2,000 t/day. It is planned to build 2 additional smaller wastewater treatment plants each with capacities of 2,000 t/day. The groundwater beneath the city is polluted with sewage. There is an obvious need for a wiser use of water and transformation over to a sustainable sanitation system that is using little or no water as a real option for this city.



International Project Agreement signed in September 2003



Principle of closing the nutrient and water ecocycles

## Project Plan

- 1600 households in 1-, 2- and 4-story buildings to be completed by 2007
- dry urine-diverting toilets
- urine collection and recycling
- dry faecal collection, sanitisation and recycling
- greywater collector, treatment and reuse
- kitchen organics collection, composting and recycling
- source-separation of solid waste and recycling



Detailed town plan

## The Hei Zao Kui Ecosan Project

The houses in the new ecosan town are being equipped with modern, affordable porcelain urine-diverting dry toilets using standards developed and applied in Sweden. Toilets and related equipment and fixtures are being developed and manufactured in China specifically for this project. Urine (ca 500 L per person per yr) will be collected on site in decentralised tanks and used in local agriculture. Water supply will be restricted to kitchen and bath use only (ca 80 L per person per day). The greywater (30,000 L per person per year) will be collected and treated on site in decentralised small treatment oxygenation and filtration facilities to reduce pathogens, BOD, N and P prior to surface soil discharge (there is no surface water in this area and the safety zone to the groundwater is 20-30 meters). Grease traps requiring maintenance will be supplied in order to improve hydraulic flow of the greywater but also to reinforce at the household level the immediate effects of waste discharge to water. Organic and solid wastes will be sorted and collected in ecosanations. Faecal material (50 L per person per year) will be retained in dry form in cellar containers, which are to be emptied once or twice a year and composted along with household organic wastes and used in soil improvement. Storm and runoff water will not be mixed with any household products and will drain following the natural contours of the landscape.

The tenants purchasing houses and apartments in this town will receive training and follow-up information in order to build up their level of awareness and interest in this project. Many studies will be carried out in connection with this project both during and after construction. Performance and cost profiles will be evaluated in order to be able to make comparisons with conventional practices.

The project staff has been organised into a series of R & D teams specialising in various project components e.g. infrastructure planning and installation (roads, water supply, power, IT, heating), housing architecture and building, ecotoilet installations, urine and greywater systems, agro-reuse, communications, etc. The project will undergo a period of development and testing prior to full-scale implementation in 2005 and 2006. Once in operation the model town will be the object of further performance studies by water and sanitation specialists, urban planners, urban agriculturalists, etc.

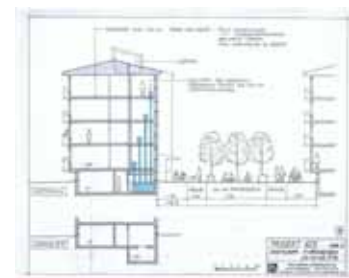
Four-story building



Block-plan



Straight drop urine diversion toilet design



Year-round greenhouse for reuse of eco-town nutrients



## The EcoSanRes Programme

The inter-related cornerstones of the Sida-financed and SEI-administered EcoSanRes Programme include:

- **Outreach** – Promotion, Networking and Dissemination
- **Capacity** – Methods Development, Studies and Training
- **Pilot Projects** – Asia, Africa and Latin America

For references, research findings, links and debate in regard to the EcoSanRes Programme and related initiatives, please refer to [www.ecosanres.org](http://www.ecosanres.org). Alternatively, for further details contact:

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