



# Yellow River Delta: Support for sustainable development

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## Yellow River Delta: fast rate of development

(source: photos: NASA Landsat 1997; Google Earth 2010: ©2011 Mapabc.com, © 2011 Cnes/Spot Image, Image ©2011 GeoEye, Image © 2011TerreMetrics)

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### Summary

The environment in the Yellow River Delta (YRD) is under stress from large socio-economic pressures, leading to air, soil and water pollution. A Sino-Dutch project the Sustainable Development YRD project (1995 – 1997) was undertaken with the principle goal of contributing to the sustainable, long-term development of the Yellow River Delta. Objectives and criteria for sustainable development were defined.

One of the main project challenges was to show how to use the limited fresh water resources in a sustainable way. This was undertaken using integrated and analytical tools in which future developments and strategies were systematically analysed. Such an approach provides a strong incentive to begin communication and develop mutual understanding between the different responsible authorities and stakeholders.

Natural and socio-economic developments in a dynamic deltaic area are interrelated. This calls for an integrated approach whereby economic, environmental and social developments are balanced. The management of the river course in the delta should not only include short-term local considerations, but also be geared to a long-term overall vision for the entire river basin.

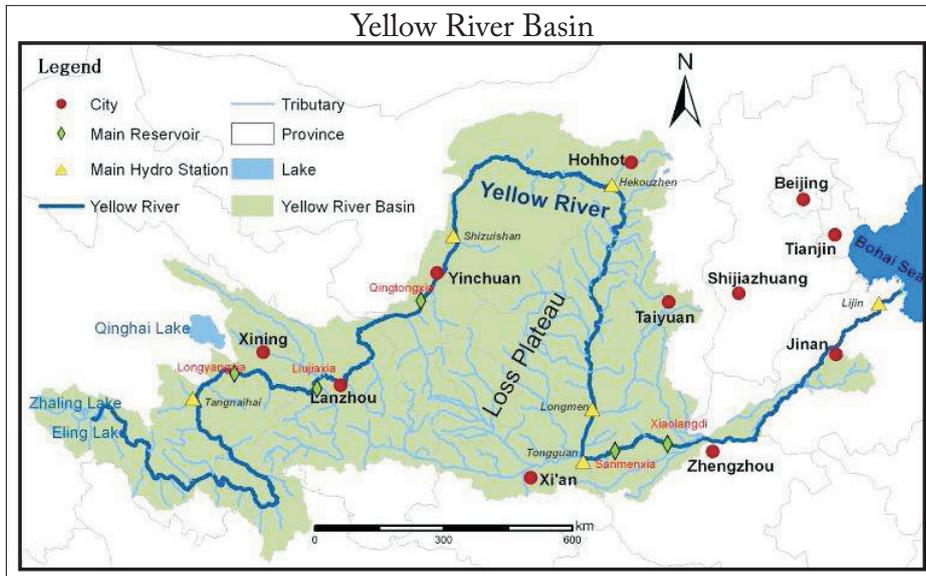
The Sino-Dutch cooperation resulted in a number of different products: an integrated framework for analyses, hydraulic and economic tools and a GIS allowing temporal and spatial analyses of alternative development scenarios including risk analysis for flooding hazards. Several training courses were organised familiarising the tools and integrated approaches, in China and abroad.

The challenges for the future are manifold. The ongoing rapid economic development in China and Shandong Province increases the demand for energy and fresh water. Complying with the latest environmental standards and the reduced water and sediment flows of the Yellow River due to upstream developments provides a further challenge. In addition, the impacts of climate change will become increasingly important.

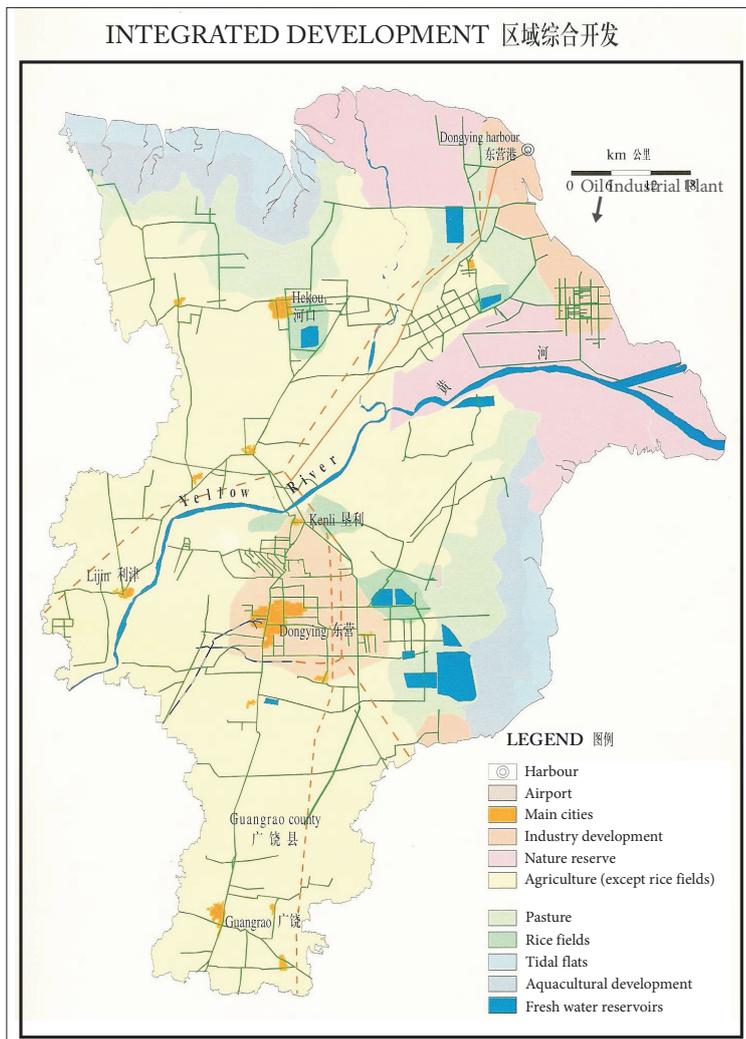
Various follow-up studies were proposed upon the finalisation of the YRD project and some of them were executed including a continuing study on the future of one of the main channels of the Yellow River Estuary in relation to long term management. The Yellow River Delta Environmental Flow project, a bilateral cooperative venture between Dutch and Chinese research organisations (2005-2007), provided information on the environmental water demands of the lower (new) delta and its nature reserves.

The results of these international cooperative activities confirm that

an integrated water management policy is the key element in the future development of the Yellow River Delta. Such an approach requires continuation and reinforcement of the teamwork between the many agencies and departments involved in the delta. It will also require a robust system to monitor changes relevant for upgrading design criteria and evaluating the consequences of policy options.



*The Yellow River Basin: second largest river basin of China - 800,000 km<sup>2</sup>, accommodating 9% of the Chinese population and the Three Gorges Dam near Lanzhou. (map: © Shannon, Creative Commons Attribution-Share Alike)*



*Integrated, socio-economic development of the Yellow River Delta: oil and gas exploration plant, agriculture grounds, settlements and nature reserves near the new mouth. (from 'GIS Atlas of the Yellow River Delta' – Sustainable Development YRD project, 1997)*