

Transboundary Pollution Reduction in River Basins and Coastal Areas by Watershed Management in China: The Jiulong River Basin-Xiamen Bay Case Study

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The Jiulongjiang River with a total basin area of 14,240 km², is the second largest river in Fujian Province running from the hills of Longyan City through Zhangzhou City, entering the sea in Xiamen City, and nourishing a population of 10 million people in the basin. The Jiulongjiang River consists of three major tributaries, with lengths of 272 km, 172 km and 8 km, respectively, and sub-basins of 9,640 km², 3,940 km² and 660 km² each. Fujian provincial government has paid great attention to the control of pollution in the river basin of the Minjiang (the largest river of Fujian running into the sea in Fuzhou) and the Jiulongjiang Rivers. However, after a decade of ICM practices in Xiamen, the managers and stakeholders in Xiamen came to realize that the Jiulongjiang Basin still has great impact on ecosystem health and marine biodiversity conservation in the Xiamen Bay as the Jiulongjiang River accounts for 50% of the non-point source pollution in the Bay. Therefore, the Strategic Management Plan of Xiamen ICM developed in 2004 made the control of transboundary pollution from the Jiulongjiang Basin as one of its priority objectives. Since 2004, Xiamen Government initiated a comprehensive program for transboundary pollution reduction in the Jiulongjiang River through institutional, technical and financial arrangements with the upstream and downstream cities.

Institutional Arrangement. Xiamen, Zhangzhou and Longyan set up a City-Alliance since 2004, in which, the mayors of the three cities meet and discuss every year the transboundary pollution reduction issues in the river basin. In 2005, the marine departments of the three cities connected



23-27 November • Manila, Philippines

by the Jiulongjiang River estuary and the Xiamen Bay, Xiamen, Zhangzhou and Quanzhou, initiated a Programme for United Actions in Coastal Zone Management and two Mechanisms for Meetings of the GDs of Marine and Fisheries and the Commanders of the Law Enforcements from the three cities. Under the Programme and through routine meetings, the three cities have been practicing a united effort in coastal zone management, pollution reduction and coastal law enforcement. In 2006, the Schemes for the Conservation of Marine Rare and Endangered Species, for Coastal Disaster Prevention and Mitigation, and for Intensive Fishery law Enforcement were developed and adopted by the United Meeting of GDs from the three cities. At the same time, an arrangement was also made between Xiamen and Jinmen for marine environmental monitoring, conservation of rare and endangered species and removal of coastal debris.

Technical Arrangement. Technical workshop and fora are arranged among the cities and lessons are exchanged. Every year at the beginning, the mayor of the three cities will sit down to summarize what has been achieved in the past year and lay down the target for the coming years in transboundary control pollution. With financial arrangements from the province, Xiamen City, automatic water quality monitoring facilities have been deployed at the administrative junctures for routine water quality monitoring. Every year in the World Ocean Week held in Xiamen, transboundary pollution control has always been a topic for the forum of Water Week, in which, participants from the world exchange lessons and best practices in pollution control in various river basins.

Financial Arrangement. In 1999-2005, Fujian provincial government invested RMB 3 billion (US\$ 400 million) in water pollution control and ecological management, resulting in a reduction of 313,000, 15,000 and 9,000 tons of total discharge of COD, ammonium-nitrogen and total phosphorus in the basin, with a reduction rate of 14.2%, 6.9% and 12.3%, respectively. Since 2004, the Xiamen Municipal Government was providing RMB 200 million to upper reaches of the watershed for pollution reduction activities and in 2009, the figure increased by 50% to 300 million RMB. In 2007, the State Oceanic Administration granted the Third Institute of Oceanography RMB 8 million for the project to provide technical support for the reduction of transboundary pollution control in the Jiulongjiang River Basin, in which, NOAA of the United States will be a partner of the project.

Pollution Control Arrangement. Zhangzhou City has made the following decisions: Animal farms that are located within 1 km from primary stream or 500 meters from branch stream must be relocated, closed or removed before February 28, 2009; no new animal farm shall be constructed within 5 km from primary stream or 1 km from branch stream. all businesses that discharge ammonia nitrogen must stop running; industrial businesses that have no waste water treatment facility or cannot meet discharge standard will be shut down; no heavy pollution industrial project shall be approved for construction within the watershed; restrictions on sand mining in river tunnel; prohibit mining on mountains along streams, prohibit new woods or orchard development along stream; reduce chemical fertilizer use and encourage organic fertilizer use in established woods and orchards; prohibit cage aquaculture in the watershed (including reservoirs); and prohibit destructive and contaminative fishing activities.