



**Theme 6**

**Pollution Reduction and Waste Management**

**WORKSHOP 2:  
INNOVATIVE POLICIES AND  
PRACTICES IN WATER SUPPLY,  
SANITATION AND POLLUTION**

**24 November 2009**



The World Bank



Korea Maritime Institute  
RO Korea

**Chair:** Dr. Magda Lovei  
The World Bank, USA

**Co-Chair:** Mr. Edward Clarence-Smith  
United Nations Industrial Development  
Organization (UNIDO)

**The East Asian Seas Congress 2009**

**“Partnerships at Work: Local Implementation  
and Good Practices”**

**Manila, Philippines  
23–27 November 2009**



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**Theme 6: Pollution Reduction and Waste Management**  
**Workshop 2: Innovative Policies and Practices in**  
**Water Supply, Sanitation and Pollution**

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**Co-Convening Agencies:**

The World Bank and  
Korea Maritime Institute

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**THEME 6 KEYNOTE ADDRESS**

Dr. Magda Lovei, World Bank, delivered the theme keynote address. She stressed the need to collectively deal with the increasing pollution as population and economies grow, and how each sector can respond to address the various environmental challenges, such as:

- **Nutrification:** excess nitrogen and phosphorus from cities and farms can promote algae growth; obstruct navigation; causes fish kills, dead zones, red tides (harmful algal bloom)
- **Oil pollution:** impacts marine life; kills mangroves, seagrass and corals; obstructs fishing gear
- **Plastic waste:** kills seabirds, marine mammals and sea turtles each year and releases toxins
- **Industrial waste:** toxic, non-toxic, hazardous and non-hazardous wastes
- **Contribution of climate change:** oil fields, agricultural lands and toxic waste sites get flooded as a result of sea level rise, natural disasters; Sediments containing contaminants get re-suspended, increase exposure

She discussed the GEF/World Bank East Asia Land-Based Pollution Reduction Investment Fund Project (Partnership Fund) as a financing and technical assistance facility to accelerate pollution reduction initiatives in the East Asian Seas region. The objective of the Fund is to reduce local, national and transboundary degradation of East Asia's marine ecosystems due to land-based pollution. It would focus on the countries involved, and help implement the action plans that are emerging from the GEF-supported planning efforts for the South China Sea and the Yellow Sea Large Marine Ecosystems, and the national and local commitments facilitated by the PEMSEA. Its strategic objective would be to help address the above-referenced three major gaps in regional land-based pollution control efforts. The Fund's development goal would be to promote sustainable development of the coastal areas of the East Asia region by reducing land-based pollution of its rivers and seas. Its global environment goal would be to promote the environmental sustainability of several of East Asia's large marine ecosystems by reducing land-based pollution of them. Some of the projects financed through this partnership investment fund were showcased in Workshop 2.

## **INTRODUCTION**

Objectives of the workshop:

- To showcase new and innovative policies, practices, and financing approaches
- To promote enhanced public-private partnership for pollution reduction

Sessions of the workshop

- Session 1: Knowledge sharing on innovative policies and practices
  - Optimizing technology to suit local conditions
  - Demonstrating partnerships that work
  - Using scientific support in cleaning up rivers and coasts
- Session 2: Moving forward—new initiatives, challenges, and opportunities
- Session 3: Sustaining the momentum—Developments in financing and investments
- Session 4: Panel discussion on financing

Dr. Magda Lovei, The World Bank, and Mr. Ned Clarence-Smith, UNIDO, chaired and co-chaired this workshop..

## **SESSION 1: KNOWLEDGE SHARING ON INNOVATIVE POLICIES AND PRACTICES**

### **Optimizing technology to suit local conditions**

The first set of presentations focused on technology options to address various sources of pollution (industrial, agricultural/livestock, domestic/municipal wastes). This session shows that technologies — conventional or innovative; low cost or high cost — are available, but there must be supporting policies in place and development of institutional and technical

capacities to ensure appropriate technology selection (affordable and cost-effective), implementation and replication. Decentralized and community-based wastewater treatment systems should be explored in rural and urban poor communities. In addition to pollution reduction, other benefits from waste management must be promoted, such as improved public health conditions, more efficient production in industrial companies, reversal of economic losses (e.g., attract more investments and tourists, lower cleanup cost), biodiversity conservation (constructed wetlands), and energy generation from biogas. Moreover, the application of treated sludge as soil conditioner/organic fertilizer and treated wastewater for agricultural use may be promoted as ways to contribute to addressing various issues like the use of energy-intensive chemical fertilizers, food security, water scarcity and climate change mitigation.

### **Pollution Reduction Applications for Industry in East Asia**

The United Nations Industrial Development Organization (UNIDO) advocates for cleaner production and application of best available techniques (BAT) and best environmental practices (BEP) to reduce/eliminate danger to human health and environment caused by persistent organic pollutants (POPs) and persistent toxic substances (PTS). The organization has a portfolio of projects that support sustainable industrial development while preventing or mitigating pollution. Ms. Carmela Centeno recommended the implementation of Industrial Pollution Prevention Policies, such as eco-towns models, zero discharge policies for EDS in coastal zones, CP/BAT and BEP, regional policies, market-based policies and economic incentives, and participative decision making for coastal zone communities. Embedding such policies and risk management measures in the development plans at both the national level and industry level would contribute to a sustainable growth in productivity and, within the proper framework conditions, would result in a sustained and more equitable economic development.

UNIDO strategy to address POPs and PTS includes the following:

- Application of IPPC and enforcement of regulation for toxic chemicals
- Move CP from voluntary to mandatory
- Encourage effluent trading
- Introduce direct toxicity assessment techniques
- Initiate an EQM model through R&D institutions
- Raise public awareness on EDS in the food chain
- Initiate partnership to develop initiatives
- Registration and notification of new chemicals
- Community “right to know” programme
- Ensure obligations of industry to disclose chemicals toxicity
- Support R&D on contaminants and contaminated sites
- Establish an effective biomonitoring system for the above

## **Livestock Waste Management in East Asia Project**

The GEF-World Bank Livestock Waste Management in East Asia Project aims to reduce the major negative environmental and health impacts of rapidly increasing concentrated livestock production on water bodies and thus on the people of East Asia. It is a collaboration between PR China, Vietnam and Thailand, three of the major livestock producing countries in the region, and the Food and Agriculture Organization (FAO). Mr. Arux Chaiyakul, Department of Livestock Development, Thailand, presented the project components and showed examples of innovative wastewater and sludge treatment and biogas electricity generation systems in pig farms — demonstrating technologies that treat waste, convert waste into a resource (energy source) and generate revenue (carbon credit).

The project would finance the incremental costs of moving from the business-as-usual approach of ineffectively addressing the environmental problems that are being created by the rapidly increasing large-scale livestock production units to a strategic framework for livestock production development which is not only economically, but also environmentally sustainable. The project involves capacity and institution building in the countries concerned, and comprises: (a) awareness raising and policy and replication strategy development; (b) livestock waste management technology demonstration and training involving introduction of a better spatial distribution of intensive livestock production to bring the nutrient emission more in line with the adsorptive capacity of the surrounding land, and the use of improved manure management technologies to reduce the environmental damage that industrial livestock activities currently cause; (c) setting in place a project management and monitoring and evaluation system; and (d) regional support services to be provided by FAO. Examples of training courses and capacity development activities that have been conducted; technologies on waste control implemented in the three countries; policies, plans and regulations that have been set in place; information, education and communication (IEC) activities and materials were also presented.

The project benefits include: organic (BOD) stabilization and nutrient conversion; pathogen reduction and odor control; energy generation — reducing use of fossil energy and additional revenue stream to farms; greenhouse gas reduction and obtaining carbon credit (in Thailand); and social contribution — Community Benefit Plan (in Thailand).

## **Ningbo Water and Environment Project**

The Ningbo Water and Environment Project (NWEP) is the first project financed under the Strategic Partnership Investment Fund for Pollution Reduction in the Large Marine Ecosystems (LMEs) of East Asia established by the GEF and World Bank. In line with the Fund's objective, the overall project development objective is to reduce land-based pollution along the Cixi coast and the East China Sea, promote the replication of innovative, low-cost wastewater treatment techniques, and encourage coastal zone conservation. This project's concept, objectives and components were previously presented during the East Asian Seas Congress in Haikou City, Hainan Province, PR China in December 2006. Since then, progress has been made, starting with the establishment of the Wetland Center in 2007. Li Hai Sheng,

GEF/World Bank Cixi Wetland Project, presented the activities that have been undertaken towards ecological restoration and improvement of the water quality of the coastal area through natural and constructed wetlands.

The Ningbo Water and Environment Project is implemented by Ningbo Municipality (in Zhejiang Province), which is located 175 km south of Shanghai, borders Hangzhou Bay, and is China's second-largest port. Investments in water supply and pollution control in the municipality have lagged far behind its rapid economic development, so its coastline is severely polluted. Its local governments have now declared pollution reduction a priority and adopted a progressive, subregional and multisector approach to it. The project implements this approach, and demonstrates cost-effective and innovative solutions, including a constructed wetland for municipal wastewater treatment and a natural wetland conservation area for non-point source pollution control, biodiversity protection, and environmental education. It also aims to produce multi-focal area benefits that have high replication potential. The Cixi County–Ningbo Government established a Wetland Management Company to develop and manage the Wetland Center, and has engaged a Consortium consisting of Wetlands International, Global Environmental Center and East China Normal University to provide technical assistance on design and operations of the Wetland Center.

#### **An Integrated Approach for Septic Tank Management: Yantai Demonstration World Bank Investment Fund Project**

The Yantai GEF-World Bank Pilot Project is part of the bigger second Shandong Urban Environmental Protection Project II. The Shandong project aims to promote sustainable urban development in Shandong province by implementing the following projects:

- Upgrade the urban wastewater treatment facilities, solid waste disposal and water supply facilities;
- Improve the efficiency of urban wastewater treatment plants, solid waste disposal companies and water supply companies;
- Disseminate results of the Yantai GEF Pilot Project in Shandong province; and
- Institutional and capacity development.

Li Jin, Yantai Xin'anhe Wastewater Treatment Co. Ltd., pointed out that the Yantai GEF-World Bank Pilot Project aims to address septage management issues, such as lack of regulations on obligations, responsibilities, design, construction, operation and maintenance of septic tanks, and septage collection, treatment and disposal. The major project components include:

- Policy and Regulation Study – reviewed and analyzed current policies and regulations, developed a new policy framework and specific regulations on septic management in Yantai
- Institutional Development: To develop the structure and analyse the costs of management, inspection, and field operation for sustainable and financially viable septic tanks management

- Establishment of GIS/IMS System
  - geographic information systems (GIS): database and maps based on spatial and attribute information of septic tanks
  - global positioning systems (GPS): for vacuum trucks' operation and transport optimization
  - Asset management system
- Construction of septage treatment station, including procurement of vacuum trucks and treatment equipments with GEF funds; and development of Operation and Maintenance Manuals
- Environmental Monitoring
- Project Assessment
- Training, Public Education and Technology Transfer
- Development of septic tank training and certification center for practitioners
- Investigation on decentralized/on-site wastewater treatment technologies

Li Jin highlighted the role of the improved GIS and GPS for monitoring and regulating septic tank systems in Yantai, and this could be scaled up in other cities in PR China.

### **Demonstrating partnerships that work**

The second set of presentations focuses on projects with various types of partnership arrangements, and the factors that make these partnerships and projects work. There are three cases: Pearl River Delta, PR China; Puerto Galera, Philippines; and Manila Water Company Inc., Philippines.

#### **Pearl River Delta**

Terry Sing Cho, The World Bank, reported on inter-district collaboration projects for wastewater treatment plants and water quality monitoring in the Pearl River delta (PRD) in PR China. The following are key issues in the PRD: (a) financial sustainability (inability to pay O&M of expensive treatment systems); (b) wastewater in Small Towns/Cities (lack of investments in wastewater treatment facilities); (c) agricultural waste; (d) sludge treatment and disposal; and (e) impacts of global warming (lower base flows, sea level rise, etc.). To address these issues, GEF support would catalyze three key innovative aspects.

First, this GEF-WB project promotes the planning and construction of shared municipal wastewater treatment and waste management facilities. This collaborative approach to wastewater and waste management would achieve significant capital and operational cost savings, which in turn would accelerate investment in wastewater treatment and landfill development, and expand the volume of investment and enhance its financial sustainability. These actions would achieve faster and larger reductions in pollution loads. There are three

pilot wastewater treatment facilities under construction in: (a) Foshan Nanhai (collaboration between Nanhai and Changcheng Districts; (b) Guangzhou Nangang (Collaboration between Guangzhou Economic and Technical District and GWAB); and (c) Guangzhou Luoxi Island (collaboration between Panyu District and GWAB). The study on constraints, and the review and updating of the PRD wastewater master plan have been completed. All municipalities signed up in the PRD Clean Up Campaign.

Second, the project aims to stimulate greater private sector involvement in waste management and wastewater treatment investment and operation by: (a) encouraging the municipalities to actively seek private sector partners; and (b) assisting potential private sector investor/operators to prepare facility management investment and operational service proposals for consideration by the municipalities and ensuring that such proposals are evaluated solely on their technical and financial merits and implemented when they are both least-cost and financially sustainable options.

Third, additional funding is provided for water quality testing that would improve the collection and dissemination of water quality data that would enable collaborative sharing of data with other municipalities and other stakeholders. One of the recommendations that came about is to integrate the results of the improved data collection/monitoring exercises with diagnostic/modelling exercises. Initial simulations models were presented showing assessment of impacts of proposed location and schemes for wastewater treatment as well as impact of sea level rise.

The project has shown that inter-sectoral planning and information sharing, and interjurisdictional collaboration on water quality monitoring and wastewater treatment are necessary if water quality objectives are to be achieved. Moreover, significant savings in both capital expenditures and operating and maintenance costs can be obtained through inter-regional sharing of infrastructure. The development of a PRD Water Agency to act as a financing vehicle has been proposed. A key lesson learned concerns the role of the private sector: less in infrastructure financing, but more in operation and maintenance of facilities.

### **Puerto Galera, Oriental Mindoro Province, Philippines**

Hon. Hubbert Christopher Dolor, Mayor of Puerto Galera, provided the perspective from the local government. Located at the center of marine biodiversity and a major tourism destination, it is easy to understand why pollution reduction is important to Mayor Dolor's town. He discussed the key elements in pushing their sewerage project:

- making it a priority project within the coastal resource management plan;
- mobilizing political and stakeholder support through conduct of public awareness and consultations campaign;
- enforcing national policies and local ordinances;
- implementing the environmental user fee system as a financing mechanism; and



- integrating the water supply and wastewater treatment projects, and executing them through partnership with the private sector.

### **Manila Water Company, Inc. (MWCI)**

Mr. Jose Almendras, President and CEO of the Manila Water Company, Inc. (MWCI), highlighted the perspective from the private sector. He showed the accomplishments of MWCI in increasing coverage of water supply distribution and improving sewerage system and septage management. With the latter, he proved that sewerage service can be a profitable business. He pointed out that public–private partnership (PPP) is a solution *that works*. However, the private sector is prepared to get involved only if risks are manageable and this requires a good regulatory framework that would provide them with incentives. He also presented the investment plan to increase coverage of wastewater treatment to 100 percent of its concession area by 2018. This is a unique case of financing wastewater treatment projects wherein capital investment is privately sourced, with no government subsidies. Cost recovery is primarily through collection of user fees (with some cross-subsidy from the water supply distribution), and enhanced by more efficient operations, and improved staff capacity and customer relations.

### **Using scientific support in cleaning up rivers and coasts**

The third set of presentations highlighted the use of scientific support to enhance planning and river and coastal cleanup projects. Two case studies, both from Xiamen, were presented.

#### **Linking strategic environmental assessment to integrated coastal management**

Dr. Qinhua Fang, Xiamen University, called for increased rigor in implementing legislation to better link strategic environmental assessments to ICM. Compared with project-specific environmental impact assessment (project EIA), strategic environmental assessment (SEA) is a process of anticipating and addressing the potential environmental consequences of proposed initiatives at higher levels of decisionmaking, and integrating environmental considerations into the earliest phase of policy/plan/program development. Mr. Fang showed how the SEA approach was used in evaluating the proposed land reclamation projects, developing options and recommendations, and augmenting the sea-use zoning scheme. A well-designed SEA framework can therefore support and improve decision making in ICM programs.

#### **Calculation of marine environmental carrying capacity in Xiamen Bay**

Zhaoyun Chen, Xiamen University, drew attention to the utilization of multi-objective and numerical models that calculate the wastewater discharges and marine environmental carrying capacity to reduce sewage flux in Xiamen waters. Such models can be used to

reduce pollution loadings in certain rivers and discharge rates from point and non-point sources so that overall water quality is maintained in accordance with the standards.

## **SESSION 2: MOVING FORWARD — NEW INITIATIVES, CHALLENGES, AND OPPORTUNITIES**

This session focused on the new initiatives in pollution reduction in the PEMSEA pollution hotspots – Manila Bay, Bohai Sea and Jakarta Bay.

### **Integrated River Basin and Coastal Area Management Project in Bohai Sea: Current Status and the Future**

Dr. Quan Wen, State Oceanic Administration, PR China, described the integrated river basin and coastal area management project in the Bohai Sea Economic Region in northeast China, focusing on pollution reduction in five major river systems: Dalinghe River; Luanhe River; Haihe River; Guanglihe River; and Xiaoqinghe River. Programs/projects that will be implemented include: (a) implementation of the National Plan for Bohai Sea Environment Protection; (b) infrastructure for pollution control; (c) establishment and networking of protected areas; (d) zoning and eco-engineering; and (e) ecosystem-based management.

### **Pollution Load Assessment in the Marilao-Meycauayan-Obando (MMO) River System Water Quality Management Area**

Mr. Lorenzo Valenton, DENR-Japan International Cooperation Agency Project, summarized the water quality management area program as part of the implementation of the Clean Water Act of 2004, and presented the results of the pollution load assessment for the Marilao-Meycauayan-Obando river system, which is a sub-basin in the Manila Bay area. One of the issues raised during the discussion was the sole focus of this project on BOD loadings, given that previous studies and water quality monitoring results have shown that there are problems with nutrients, heavy metals and oil and grease. This may result in a lack of comprehensive approach and insufficient/inappropriate pollution control facilities that can effectively deal with the pollution problem in this river system.

### **Jakarta Bay: Ciliwung River Pollution Reduction Project**

Mr. Hermono Sigit, Ministry of Environment, Indonesia, discussed the monitoring program and the water quality conditions in Jakarta Bay and Ciliwung River, one of the rivers draining Jakarta Bay. He also detailed the master plan developed to reduce pollution and improve the water quality of the Ciliwung River. The master plan involves: (1) water pollution control, for domestic, agricultural, livestock and industrial wastes; (2) environment degradation control to address erosion and sedimentation; (3) spatial planning, including zoning of both upstream and downstream areas; (4) law enforcement; and (5) community empowerment — through raising community awareness, information dissemination, training and community

participation in composting and biogas projects, harvesting rainwater and recharge of deep and shallow wells.

### **SESSION 3: SUSTAINING THE MOMENTUM — DEVELOPMENTS IN FINANCING AND INVESTMENTS**

This session focused on investment modalities (public-private partnership), financing instruments (carbon market, clean development mechanism), and cost-recovery mechanism (user fees and ring fencing). Viability of pollution reduction initiatives can be further enhanced through the effective use of carbon finance, with public and private sectors; innovative blending of financial products; complementary incentives and regulatory instruments; affordable user fees; and targeted subsidies to support initial capital outlays and to reach the poor communities. Political will, awareness of the benefits, community buy-in and participation, institutional capacity development, and commitment of implementers are crucial to promote and sustain investments in pollution reduction.

#### **Public – Private Infrastructure Advisory Facility (PPIAF)**

Mr. Paul Reddel, PPIAF, underlined that management contracts and operational efficiency projects had proved to be more suitable capital intensive projects for public-private partnerships in urban water, and stressed the need for tailor-made solutions. PPP projects that have failed were caused by poor design, lack of regulatory framework and cost-recovery mechanism. Overall, performance of PPP projects had been mixed. He gave an overview of the lessons learned from the performance of PPP projects:

- PPP is a viable option to reform water utilities in developing countries.
- A new generation of private operators has now appeared.
- The focus on trying to attract private money (to fund the huge backlog of water investments in developing countries) proved to be a mistake.
- The main contribution of private operators lies in improving service quality and operational efficiency.
- Social considerations need to be incorporated explicitly in the design of PPP reforms.

#### **Carbon Finance for Pollution Reduction Investment Projects**

Ms. Maya Villaluz, The World Bank Office, Philippines, discussed the carbon market and gaining access to the Clean Development Mechanism (CDM) to recover costs for pollution management projects. Carbon Finance projects can help scale up implementation of SDS-SEA objectives and actions.

She discussed examples of pollution reduction projects where CDM was applied: (a) replacing aerobic with anaerobic treatment and adding biogas recovery in wastewater treatment projects (Shanghai); (b) converting organic wastes into renewable energy; (c)

converting manure to energy (Livestock Waste Management Project, Thailand); (d) methane recovery in landfill (Payatas, Quezon City, Philippines); (e) excavating and composting of partially decayed municipal solid waste (Kota Kinabalu, Malaysia); (f) methane recovery in agricultural activities at household/small farm level (Laguna de Bay Community Waste Management project, Philippines); (g) avoid deforestation by improving charcoal production (Plantar sequestration and biomass reuse, Brazil).

With the end of the Kyoto funds approaching, new facilities are being developed, such as the Carbon Partnership Facility (CPF): Carbon Asset Development Fund (CADF) operational at €7 million, and the Carbon Fund currently at €100 million (operational target at €200 million).

### **Cost Recovery and Ring Fencing: Promoting Sustainability in Solid Waste Management**

Ms. Stella Salas, DAI-EcoGov, Philippines, explained the ring fencing approach in solid waste management (SWM) utilities to improve cost recovery and sustainability for local governments. Low compliance with the Ecological Solid Waste Management Act can be attributed to: (a) high investment costs; (b) increasing operational and maintenance costs; (c) highly subsidized program and no user fee system in place; (d) limited access to financing; and (e) low priority given by local government as funds compete with other basic services of government. A key strategy to make SWM financially viable and sustainable is to apply business principles and implement a cost-recovery mechanism. Another strategy and one that complements cost recovery is ring fencing, which involves keeping the resources earmarked for SWM exclusive within the SWM program, and plowing revenues generated through SWM activities back to the program. The case of the SWM project in Jagna, Bohol province, Philippines was presented. The benefits are:

- Performance can be monitored, allowing implementors to do proper budgeting and planning.
- Funds are more wisely used.
- Reliable data is available to determine subsidy levels and for validating tariff rates.
- It keeps the SWM team focused on their performance targets and outcomes.
- Financial viability due to increased revenues and controlled expenses.

### **SESSION 4: PANEL DISCUSSION ON FINANCING OPTIONS FOR SUSTAINABLE POLLUTION REDUCTION AND IMPROVED WATER QUALITY**

Mr. Arunkumar Abraham, DAI-EcoGov, and Mr. Kim Jong Deog, Korea Maritime Institute, facilitated the panel discussion. Mr. Reddel called for large-scale roll-out of a “small selection” of water projects. Mr. Juergen Lorenz, private sector representative, called for integrated solutions and improving institutional and market conditions to increase private sector participation. Based on his previous experience as environment officer in a coastal municipality, Mr. Mark Tom Mulingbayan of Manila Water deplored that sense of ownership

and accountability issues in projects at the local government level are the major obstacles to sustained progress, and supported by Mr. Joe Taylor, World Bank, underlined the need for passionate champions to carry forward the cause. Mr. Mulingbayan also pointed out that one of the key factors that made Manila Water a success story is the clear regulatory framework. Clear contracts and allowing utilities to recover costs improves service delivery and provides for future expansion. Mr. Reddel reiterated the importance of implementing pilot projects to demonstrate what works and how it works.

## CONCLUSION

Dr. Magda Lovei summarized the key issues and points that were raised, and presented the major lessons learned, and the recommendations coming from the different presentations and panel discussion.

The key issues are:

- Pollution — from a range of sources from municipal areas to industries and agriculture — is a major threat to sustainable development in the region.
- Impacts on health, quality of life, and ecosystems impose large economic costs.
- Major constraints include lack of: political will; access to innovative and affordable technologies; capacity to access financing and engage private sector.
- Climate change adds additional challenge — threat of increased pollution, need for climate-proofed infrastructure, imperative to reduce vulnerability.
- There are many successful experiences in EAP countries to learn from, replicate, and scale up.

Major lessons and points arising are:

- **Strategic integrated planning**
  - Optimization of infrastructure planning, linking investment with expected environmental outcome, targeting investments to highest impact (Pearl River, Jakarta Bay)
  - Eco-system based planning
  - Pollution load modeling, SEA
- **Regulatory/policy/ institutional framework**
  - Environmental laws, user fees (e.g., Laguna de Bay, Puerto Galera)
  - Economic regulation: tariffs (e.g., Metro Manila concession)
  - Institutions (e.g., river basin agencies) to support integrated approaches
- **Innovative approaches and technologies**
  - Using alternative and cost-effective approaches to water treatment (e.g., artificial and natural wetlands in Ningbo)
  - Piloting technologies/techniques (e.g., biogas digesters in livestock waste management, waste-to-energy, treated wastewater reuse)

- **Financing**
  - Cost recovery, through tariffs and user fees, is essential to ensure financial viability.
  - Special financing instruments (e.g., CDM/carbon financing, targeted subsidies) can further help.
  - Private sector is particularly efficient in operation and management, but less effective in filling the financing gap for capital investments
  - Technical assistance is important to help access financing (e.g. PPIAF) and develop bankable projects
- **Learning and capacity building**
  - Learning across countries by practitioners (e.g. twinning network)

**RECOMMENDATIONS:**

- Use strategic planning approaches (e.g., SEA), ecosystem-based management and scientific support (pollution load assessments, environmental carrying capacity, GIS, etc.) more systematically to optimize investments.
- Focus on a small number of demonstration projects that can deliver development outcomes.
- Provide incentives for innovation and systematic learning from their implementation.
- Replicate and scale up successful examples/pilots through programmatic financing.
- Build capacity for engaging the private sector to improve efficiency.
- Develop capacity of local governments to develop bankable projects and implement cost recovery mechanisms.
- Need champions for policy reforms and sustained implementation.