臺北市政府
Taipei City Government

永續臺北海綿城市

2018 TAIPEI WATER EXPO
Resilient Sustainable Vibrant

Taipei International Water Environment Forum

Observations and Recommendations

Presenter:

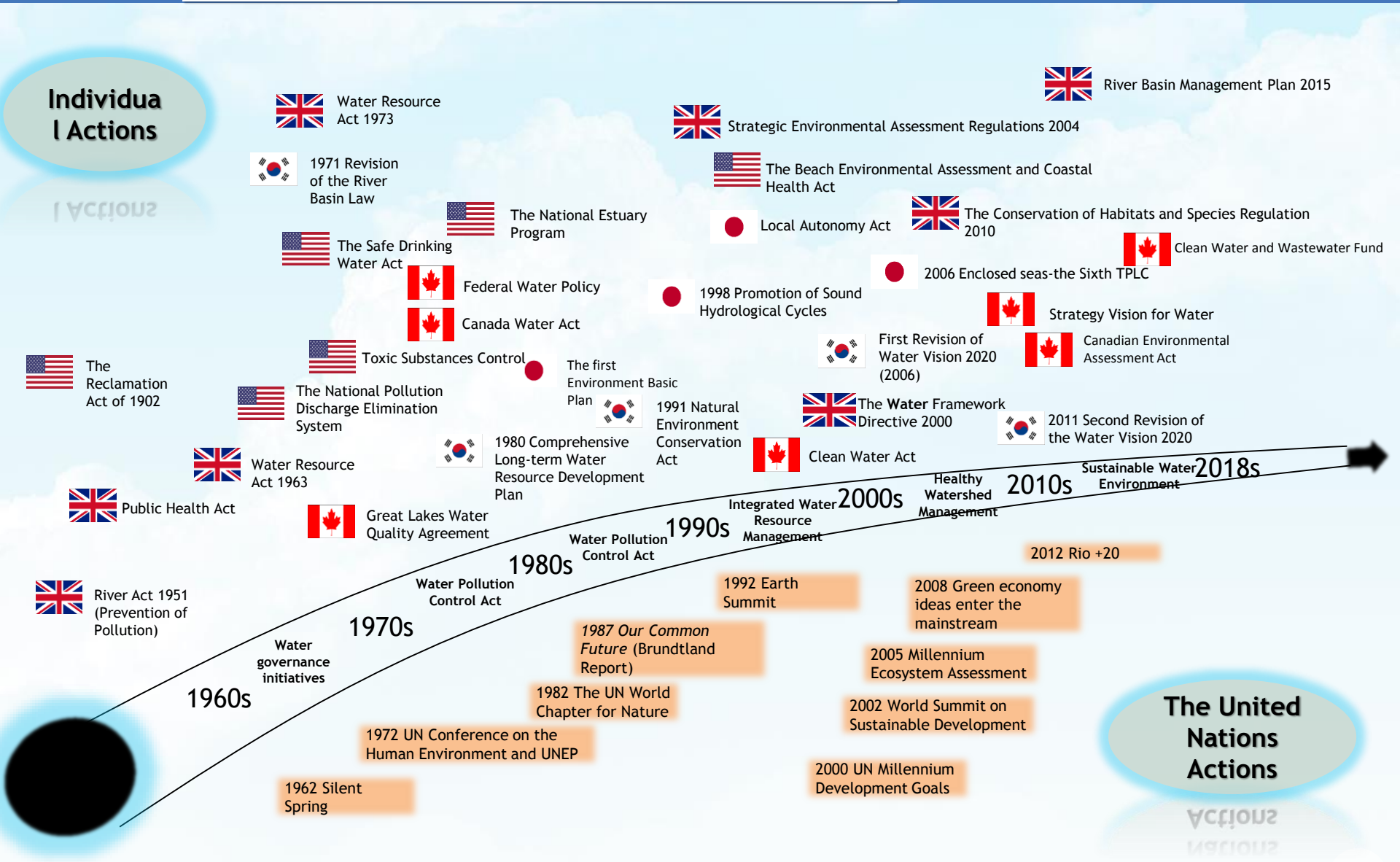
Pen-Chi Chiang

Distinguished Professor
National Taiwan University
Graduate Institute of Environmental Engineering

Building the Resilient Sustainable Vibrant City towards Sustainable Development Goals

31th August 2018

International Movements on Sustainable Water Environment



1. Smart Water Management

Smart Water Management

1. Key Strategy

- To build smart resilient and circular city by developing integrated management and innovated technology with stakeholder. **(Mr. Charles Lin, Deputy Mayor of Taipei City, Taiwan)**
- Water information integration
- R&D sensor technology
- Data analysis & model development
- Innovative water industry and providing international water services. **(Dr. Yi-Fung Wang, Taiwan)**

2. Smart flood management

- To develop smart flood management by building up an automatic operation system involving maintenance, scheduled monitoring, controlling and forecasting **(Kai-Yao Chang, Taiwan)**
- To establish flood control infrastructure for flooding prevention including three principal pillars: embankments, drainage systems and pumping station **(Kai-Yao Chang, Taiwan)**
- To develop the green infrastructure, urban landscape and to reduce surface water pollution, the peak and volume of overland flow and cope with future uncertainty with the flexibility of urban water space.**(CHAU Nguyen Xuan Quang, Vietnam)**
- To establish debris flow management framework by controlling risk degree of potential debris flow torrents**.** **(Dr. Chin-Lun Wang, Taiwan)**

Smart Water Management

3. Disaster prevention and Emergency Response

- To establish flood-risk management with 3 layers: Prevention, Spatial planning, Disaster management **(Mr. Johan Remijn, Netherlands)**
- To build the interactive model of climate adaptation via implementing resilient urban planning, sewer design, flood early warning and groundwater management. **(Dr. Fons Nelen, Netherlands)**
- To promote the efficiency of emergency operation center of Taipei city through the inter-agency coordination and executive decision-making **(Jia-Yi, You, Taiwan)**
- To build an efficient EOC information systems with the following sections: Multiple Situational Awareness, Social Media in disaster, GIS Display Systems, CCTV Monitoring Systems, CCTV Monitoring Systems, Rain Alert & Information Service, 119 Video APP, Communication Systems. **(Jia-Yi, You, Taiwan)**

4. Smart Water Distribution

- To enhance water distribution with three principles: Store, Retain, Drain **(Johan Remijn, Netherlands)**
- To promote innovative methods for water supply system **(Dr. Yi-Fung Wang)**

a) Increase efficiency of supply and demand;

b) Increase agricultural water and tap water efficiency;

c) Groundwater management, conservation, utilization and drought risk reduction;

d) Systematic flood prevention and water facilities safety.

2. Green Infrastructure

Green Infrastructure

1. Enhancing the performance of green infrastructure by upgrading urban infiltration and water conservation facilities.

- To achieve 2030 water and green Taipei Goals, Green infrastructure area, torrential rainfall resisting capacity and recycled water would reach 80%, 88.8 mm/hr and 16%, respectively. **(Dr. Cheng-Sheng Pong, Taiwan)**
- To establish the institutional foundation for water reuse by using low impact development and rainwater management**.** **(Mr. Han Yuseok, Korea)**
- To revitalize the area of Służewiecki pond with retention function, islands for waterfowl, observation platform, small hydro power plant and two parks. **(Mr. Leszek Drogosz, Poland)**

Green Infrastructure

2. Providing incentive measures by building public private partnership (PPP) program.

- To identify the green infrastructure development partners, establish public private partnership (PPP) and the design, build, finance, maintain and/or operate (DBFMO) business model. **(Prof. Pen-Chi Chiang, Taiwan)**
- To amend regulations of land use to encourage the new development area construction of smart Eco-community. **(Mr. Te-Chuan Li, Taiwan)**
- To build a cooperation platform with the Public-Private-Academia crustal organizing, water circulation citizen committee and rainwater festival. **(Mr. Han Yuseok, Korea)**
- To encourage stormwater management on private property is to reduce stormwater fees in exchange for desired green infrastructure practices, such as reducing impervious cover or installing rain barrels, rain gardens, or trees. **(Prof. Pen-Chi Chiang, Taiwan)**

Green Infrastructure

3. Strengthening green infrastructure management system for ensuring long-term performance of the facility.

- To develop the regular maintenance and monitoring plan of green infrastructure and the technical guidelines for best management plans (BMPs) of rainfall runoff and non-point pollutant control. **(Pen-Chi Chiang, Taiwan)**

- To development distributed data networks for water and ecosystem dynamics in cities and rivers. **(Pen-Chi Chiang, Taiwan)**

Green Infrastructure

4. Promoting public education of green infrastructure by encouraging public participation.

- To utilize geographic information system (GIS) to integrate water quality improvement and biodiversity data, establish sustainable water environment education. **(Pen-Chi Chiang, Taiwan)**
- To form Warsaw Greenery Authority involving citizens, kinder gardens and schools for street trees, ecological corridors, community garden and green project. **(Mr. Leszek Drogosz, Poland)**
- To achieve the goal of water sustainability., both environmental and hydraulic engineers are required to learn lessons such as ecological environment, green infrastructure and landscape planning from ecological engineer. **(Pen-Chi Chiang, Taiwan)**

Green Infrastructure

5. Establishing the research center of excellent for green infrastructure by developing the localized green infrastructure.

- To build up the Environmental Zoning Operation-Geographic Information System(GIS), green network and ecological database for green infrastructure development and climate change adaptation. **(Mr. Yen-lun Tsao, Taiwan)**
- To establish an assessment indicator system of green infrastructure to estimate the service benefits of green infrastructure. **(Pen-Chi Chiang, Taiwan)**
- To develop the integrated model of climate adaptation for resilient urban planning, sewer design, flood early warning and groundwater management. **(Dr. Fons Nelen, Netherlands)**

3. Circular Economy

Circular Economy

1. Developing the diversified investment policies for promoting water reclamation technology towards Sustainable Water Environment.

- To establish circular economy system, political commitment and support should be established to rebuild capital, whether this is financial, manufactured, human, social or natural **(Dr. Chung-Chieh Lin (Taiwan), Prof. Pen-Chi Chiang, Taiwan)**
- To establish legislative framework (national policy) for wastewater (water use license) and water reclamation technology to achieve sustainability **(Mr. David Ntsowe (S-Africa), Mr. Paul Versteeg (Netherlands))**
- To implement product innovation, process and organizational innovation in circular economy to establish strong economic market place **(Dr. Niven Huang (Taiwan), Dr. Chung-Chieh Lin (Taiwan), Dr. Kinjal Shah (India))**
- To find out the alternative green energy technology by replacing Taiwan's traditional water reclamation technology by long term investment and high return investment plans. **(Prof. Pen-Chi Chiang (Taiwan))**

Circular Economy

2. Strengthening the water resource sustainability for Circular Economy.

- To identify bottlenecks and challenges to minimize the environmental impact and resource productivity. **(Dr. Wang-Kuan Chang (Taiwan))**
- To promote water sustainability and material sustainability on a life-cycle basis and enhance the Extended Producer Responsibility (EPR) policy for enhancing resource/water sustainability. **(Mr. K. K. Mustafa (Turkey))**
- To achieve sustainability in Economic, Materials and water reclamation technology to support SDGs. **(Dr. Wang-Kuan Chang (Taiwan))**
- To accelerate the broad ,ongoing public dialogue on life cycle of waste materials management for enhancing resource sustainability. **(Dr. Wang-Kuan Chang (Taiwan), Dr. Kinjal Shah (India), Mr. Paul Versteeg (Netherlands))**

Circular Economy

3. Integrating Water-Energy and Nexus, and products market to establish Circular Economy system.

- To develop and deploy the zero waste policy by long term investment and high return investment plans to achieve SDGs **(Dr. Home-Ming Chen (Taiwan), (Mr. K. K. Mustafa (Turkey), Mr. Hirofumi Okahisa (Japan))**
- To build capacity and integrate materials management approaches in existing government programs for establishment of sustainable materials management cycle in supply of water in chemical industry **(Dr. Niven Huang (Taiwan), Dr. Chung-Chieh Lin (Taiwan))**
- To establish sustainable planning and evaluation, and design blue print for national sustainability policy toward Circular Economy. **(Prof. Pen-Chi Chiang (Taiwan), Dr. Kinjal Shah (India))**
- To develop short and long-term plans for education of the consumers under Taiwan Environmental Education Act. **(Dr. Home-Ming Chen (Taiwan))**

Circular Economy

4. Developing the international collaboration programs to improve Sustainable Water Management plan.

- To Establish green technology exchange platform, and establishment of international collaboration programs to monitor 12 green principles. **(Dr. Kinjal Shah (India))**
- To provide a legislative impact studies for national and international agreements to promote green science and technology. **(Mr. Hirofumi Okahisa (Japan))**
- To enhance public awareness on water reusing technology, water harvesting technology and green commerce council (GC3) to establish sustainability in industry. **(Dr. Kinjal Shah (India), Mr. Paul Versteeg (Netherlands))**
- To formulate an international alliance to promote circular economy in water reclamation through awards in the category of materials, technology and distributors in order to establish green supply chain. **(Prof. Pen-Chi Chiang (Taiwan))**

Circular Economy

5. Establishing the Water Sustainability Center of Excellence to provide knowledge platform

- To formulate an international alliance to maintain water quality standards, sludge reuse and SMART IoT for water analysis. **(Dr. Home-Ming Chen (Taiwan))**
- To provide a financial incentives for national and international company over international agreements to promote circular water management system. **(Dr. Niven Huang (Taiwan))**
- To introduce 6R practices (Reduction, Recycle, Recovery, Redesign, Reclamation and Research) into waste minimization for circular economy towards impact measurements and valuation developments. **(Dr. Niven Huang (Taiwan))**
- To establish national sustainability policy to identify high value added materials for sustainability planning and evaluation. **(Dr. Kinjal Shah (India))**

4. Sustainable Water Resource

Sustainable water resources

1. Security and Sustainability of Water Supply System.

- To develop water supply asset management for enhancing effectiveness and efficiency of water supply provision. **(Ms. Indrarini Tenrisau, Indonesia)**
- To implement good governance and good corporate government principle developing a corporate plan. **(Ms. Indrarini Tenrisau, Indonesia)**
- To implement comprehensive water resources plan not only for surface water and groundwater, but also for off-river storage, rain water harvesting, and the usage of recycle water. **(Mr. Teo Kok Seong, State Government of Negeri Sembilan)**

Sustainable water resources

1. Security and Sustainability of Water Supply System

- To reduce per capita water consumption from 250 liter/head/day to 180 liter/head/day. **(Mr. Teo Kok Seong, State Government of Negeri Sembilan)**
- To establish water safety plan including multi-barrier approach, comprehensive risk assessment, and pre-warning system with SCADA control. **(Chen Jing-Shyang, Taiwan)**
- To develop sustainable water reservoir management for S^2E^2 (Safety-Smart-Ecology-Excellence). **(Dr. Cheng-Daw Hsieh, Taiwan)**

Sustainable water resources

2. Healthy Watershed Management Plan

- To manage water quality in the whole watershed, integrated approaches should be taken into account in future such as the ecosystem approach. **(Chao Nokyoo, Thailand)**
- To encourage public participation by developing the partnership program between government agencies and public or private sector. **(Chao Nokyoo, Thailand)**
- To provide economic instruments resulted in a changed behavior of water users and polluters such as pricing, tax etc. **(Chao Nokyoo, Thailand)**
- To apply basin-wide total pollutant loads controlling wastewater discharges from various sources of pollution for attaining receiving water quality standards. **(Chao Nokyoo, Thailand)**

Sustainable water resources

3. Water and Energy Nexus.

- To cut across modeling, data, technology, and policy analysis generated integrated and innovative solutions for water and energy nexus. **(Penchi-Chiang, Taiwan)**
- To develop the innovative anaerobic processes thereby overcoming the biodegradability limit, effective 3 phase separation with biogas collection and purification. **(Yang-chung Pai, Taiwan)**
- To implement instrumentation control automation (ICA) and management information system (MIS) for processes optimization in WWTPs. **(Penchi-Chiang, Taiwan**)
- To integrate renewal energy, water reclamation and energy-efficient technologies for WWTPs. **(Penchi-Chiang, Taiwan)**
- To promote reclaimed wastewater by command and control i.e., reclaimed water resource development act and economic instrument i.e., price reduction of reclaimed water **(Jyh-WoeiChen, Taiwan)**

GI Technology Road Map on Sustainable Water Environment

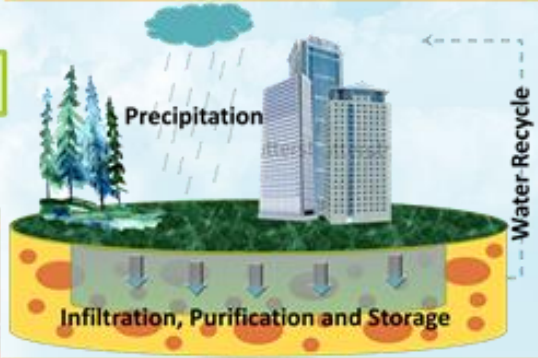
TAIPEI 臺北

永續臺北海綿城市

Eco-Service Conservation

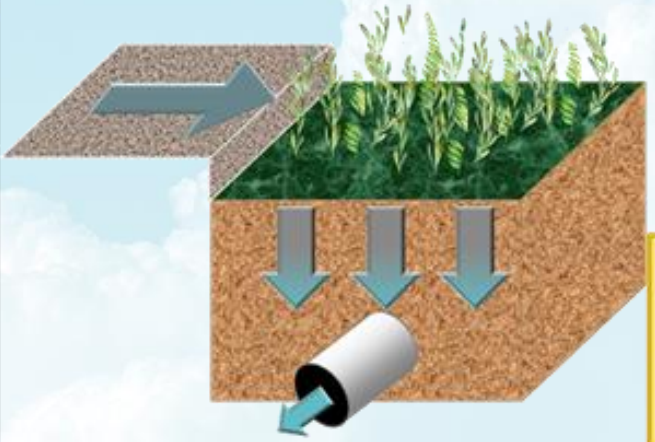
- ✓ Landscape modification
- ✓ Water circulation fortification
- ✓ Habitat re-creation
- ✓ Ecosystem conservation
- ✓ Climate change adaptation

Municipal Service Provision



- ✓ Clean water supplementation
- ✓ Water-energy nexus optimization
- ✓ Economic activity consolidation
- ✓ Community culture development
- ✓ Livability improvement

Engineering Design & Optimization



- ✓ On-site runoff attenuation
- ✓ Combined-sewerage-overflow reduction
- ✓ Stormwater Purification
- ✓ Grey infrastructure economization
- ✓ Urban sanitation maintenance

Sustainable Water Environment

Enhancing Stormwater Management against Climate Change → **Building Sponge City for Better Livability** → **Creating Healthy Watershed towards Water Sustainability**

THANK YOU!