Exploring linkages between Climate Change Adaptation and the Water-Energy-Food Nexus

Sub-regional Conference for Southeast Asia
12 February 2015  Bangkok, Thailand

Conference Proceedings
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<td>Asian Development Bank</td>
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<td>APAN</td>
<td>Asia Pacific Adaptation Network</td>
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<td>BMZ</td>
<td>German Federal Ministry of Economic Cooperation and Development</td>
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<td>CCA</td>
<td>Climate Change Adaptation</td>
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<td>DRR</td>
<td>Disaster Risk Reduction</td>
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<td>GCAP</td>
<td>GrEEEn City Action Plan</td>
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<td>GCOF</td>
<td>GrEEEn Cities Operational Framework</td>
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<td>GIZ</td>
<td>German Federal Enterprise for International Cooperation</td>
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<td>IGES</td>
<td>Institute for Global Environmental Strategies</td>
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<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<td>IWA</td>
<td>International Water Association</td>
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<td>RCAP</td>
<td>Resilient Cities Asia-Pacific</td>
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<td>UMP</td>
<td>Urban Management Partnership</td>
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<td>United Nations Environment Programme</td>
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<td>United Nations Economic and Social Commission for Asia and the Pacific</td>
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<td>UNISDR</td>
<td>The United Nations Office for Disaster Risk Reduction</td>
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<td>VSS</td>
<td>Vacuum Sewer System</td>
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<td>WEF</td>
<td>Water-Energy-Food</td>
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Executive Summary

As part of its continuing effort to forward climate change adaptation, the Asia Pacific Adaptation Network (APAN), together with ICLEI Southeast Asia (ICLEI SEAS), the sub-regional node for Southeast Asia, partnered with GIZ Urban Nexus and UNESCAP in organising a sub-regional conference entitled “Exploring linkages between Climate Change Adaptation and the Water-Energy-Food Nexus”. The conference was held on 12 February 2015 at Swissotel Nai Lert Park in Bangkok, Thailand. Nearly 100 participants from several Asian cities, local and national government representatives, international and non-governmental organisations, universities, and civil society groups attended the event.

The first session presented evolving challenges, risks and vulnerabilities being faced by cities and highlighted the need to increase urban resilience. The nexus approach promotes a holistic, integrated approach to urban planning and resource management specifically in the water, energy and food sectors. ‘Resource efficient and low carbon cities will become more livable, competitive, resilient, sustainable, and ultimately more successful’, stated by Mr. Donovan Storey, Chief of the Sustainable Urban Development Section, Environment and Development Division of UNESCAP. Points that surfaced in the discussions include the importance of comprehensive and city-wide approaches, vertical and horizontal coordination, utilisation of innovative technological solutions to implement the WEF nexus, the need for paradigm shift in urban governance, building resilient physical and social infrastructure, and recognition of transboundary issues in terms of integrated resource management. All of these can lead to inclusive (pro-poor) urban climate resilience.

During the second session, panelists discussed the importance of partnerships and platforms for knowledge exchange, including national-local dialogue, peer-to-peer learning, and South-South discourses. On the other hand, it is stressed that there is no ‘one-size-fits-all’ approach to development; context is always critical, along with issues of expansion and scalability. Some challenges in implementing the nexus approach that were mentioned include coordination problems (siloistic thinking), difficulty for local governments to access loans from international financing agencies, and lack of autonomy of some local governments to implement plans and programmes.
Introduction

Dissecting the Nexus Resilience Link: from planning to practice “The Urban Nexus”

The urban population in Asia is growing by 44 million people per year. This rapid urbanisation brings about major challenges for urban supply and municipal utilities. In particular, when it comes to water supply and sanitation systems, energy supply and energy efficiency, land use and food security, most Asian cities have already reached a critical situation. This jeopardises sustainable development. Municipal administrations in Asia tend to plan and manage along sectorial lines and not in an integrated manner. Thus, they are not able to fully utilise the interaction and synergies in the three nexus sectors (i.e. water, energy and food security) and their related potentials during the implementation processes. The underlying causes go back to a wide range of responsibilities and competences, often lying with the regional and national level, that is, beyond the immediate sphere of influence of the city governments.

The nexus approach aims at integrated planning and management processes of the key sectors of energy, water and food security, and this can contribute substantially to the long-term sustainable development of rapidly growing cities in their regions. It is increasingly evident that the resource footprint of cities as well as ecosystem boundaries transcends administrative boundaries, calling for coordination across actors and institutions. The need for integrated planning requires a multi-disciplinary approach as well as effective and dynamic governance. Thus, it is crucial, in this context, to involve municipal and regional actors and utilities towards more integrated planning and management of the nexus sectors.

Water-Energy-Food Nexus and Climate Change Adaptation

Population increase, rapid economic development, changing consumption patterns, and environmental degradation exacerbate existing pressures on water, food and energy securities. It is anticipated that in order to sustain the world’s population by 2050, food production would have to increase 70%, and agricultural land would have to expand by about 10%. Furthermore, global energy demand will grow up to 40% by 2030 (Hoff, 2011). While, there is an ever-increasing demand for water, energy, food and other resources, vital resources such as water, land and fossil fuel are limited. This dilemma creates a need for inclusive innovation in technology and efficient resource management.

To further complicate things, climate change is putting additional pressures on the WEF security. The relationship between the WEF nexus and climate change is reciprocal. Climate change exacerbates existing pressures on water, energy and agriculture sectors and it can undermine resilience of humans and ecosystems to external shocks due to critical thresholds. On the other hand, WEF nexus approach can help contribute in mitigating as well as adapting to climate change impacts. However, the application of climate change mitigation or adaptation measures without cautious consideration of the WEF inter-linkages could also create adverse

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1 The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH along with its political partner, United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and implementation partner, ICLEI Southeast Asia are implementing the project “Integrated resource management in Asian Cities: the urban nexus”, financed by the German Federal Ministry of Economic Cooperation and Development (BMZ).

The project supports selected cities across six countries, namely: China, Indonesia, Mongolia, Philippines, Thailand and Viet Nam. The project provides technical advice to municipal administrations/planning offices to oversee the design, planning and, where possible, implementation of practical nexus initiatives (with a focus on water, energy and/or food security) and at the same time seeks to feed the experiences gained at the local level into a regional dialogue and learning platform to achieve a pooling of knowledge and the potential for synergies in action.
externalities.

For instance, promoting biofuel use as a means to replace fossil fuels and to reduce the build-up of GHG emission competes with agricultural land for food production. Moreover, new farming technology such as drip irrigation introduced to adapt to water uncertainty is overall more energy intensive than conventional irrigation. Desalination and using groundwater to ease the water stress are both energy consuming, which may trigger resource competition for producing more electricity, notwithstanding other environmental change drivers. Thus, unsystematic and siloistic climate policies can impact on WEF nexus, and can lead to maladaptive if not well aligned in a nexus approach and implemented by appropriately interlinked institutions.

Asia and the Pacific, a rapidly developing region which is rich in natural resources, needs to address issue of resource management for development without compromising sustainability. Developing and emerging countries in the sub-region experience unequal allocation of resources, and are highly vulnerable to climate change. These altogether put Southeast Asia under tremendous pressure to address and take advantage of the WEF nexus approach.

As part of its continuing effort to forward climate change adaptation, the Asia Pacific Adaptation Network (APAN), together with ICLEI Southeast Asia (ICLEI SEAS), the sub-regional node for Southeast Asia, partnered with GIZ Urban Nexus and UNESCAP in organising a sub-regional conference focused on exploring the linkages between climate change adaptation and the water-energy-food nexus. The conference was held on 12 February 2015 at Swissotel Nai Lert Park in Bangkok, Thailand. Nearly 100 participants from several Asian cities, local and national government representatives, international and non-governmental organisations, universities, and civil society groups attended the event.

**Objectives**

- Improve awareness on the importance of integrated resource management in the WEF nexus;
- Increase understanding of how the WEF nexus relates to CCA;
- Familiarise participants with practical measures and solutions that demonstrate WEF nexus as an approach to be resilient to climate change;
- Identify trends in WEF management schemes in the region and determine points for leveraging the WEF nexus-CCA linkage.
- Facilitate sharing of practices and experiences among practitioners and country representatives about WEF nexus security within the context of climate change adaptation;
- Promote networking among experts and participants.
The Nexus-Resilience Link: integration as the basis for sustainability

Donovan Storey

Chief
Sustainable Urban Development, Environment and Developmental Division
United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP)

Mr. Storey commenced his presentation by stating that the Asia Pacific region is characterised by its high economic growth and high population growth. However, he said that economic growth does not transcend to poverty alleviation as one-fifth of Asians still live with less than $1 per day.

Moreover, the Asia-Pacific region has the highest proportion of natural disasters - between 1994 and 2013, over 40% of the world’s reported natural disasters occurred in the region. This is further aggravated by the fact that most extreme weather disaster deaths in urban centers are in low and lower-middle income nations, and risks are further concentrated in informal settlements (IPCC 5th Assessment Report). However, he noted that while cities are front liners in terms of vulnerability, there are also actions for resilience. He identified selected entry points in gaining urban resilience including:

- **Basic services and Infrastructure**
  - Leveraging the skills and resources of different actors to finance, design and manage services and infrastructure
- **Housing**
  - Support pro-poor housing finance
- **Land use planning and tenure security**
  - Effectively plan and implement land use strategies, integrating climate projections and vulnerability assessments
- **Food security, urban agriculture and ecosystems**
  - Promote urban agriculture and develop effective environmental planning, including enforcement for sensitive ecosystems
- **Disaster Risk Management**
  - Disaster monitoring and surveillance, documentation of impacts and be open to new ideas and strategies
Mr. Storey emphasised that “while much can be achieved through sector-based approaches, more concerted attention needs to be paid to the specific benefits of comprehensive city-wide approaches.” This entails vertical coordination, horizontal collaboration, lesson learning, and whole-of-system thinking.

The linkage of Urban Nexus to city resilience necessitates on the following:

- Moving from sectoral to holistic frameworks: from fragmentation to integration through innovation
- Integrated sustainable development requires financing: the right enabling factors/incentives
- Planning to meet current and projected resource needs requires data and transparency in decision-making
- Commitments to equity and access underpin social dimensions
- Balancing decentralization and local level fragmentation with national and regional planning: getting institutional relationships right

To end, Mr. Storey indicated that integration creates opportunities across levels of governments. He noted though that national and regional resilience to disasters and to climate change starts with local actions. Cities embarking on resource efficiency and low carbon transformation will become more livable, competitive, resilient, sustainable and ultimately more successful. However, to achieve this, he reiterated the need for a quantum shift in thinking and action in terms of governance, innovation, technology and enablers (especially fiscal policy).

Furthermore, he noted that the preparation of policies and plans including regulations, codes, and similar instruments should be evidence-based and enabling. Other important mechanisms include institutional strengthening and development, technology transfer, mobilisation of finance, and new normative frameworks for low-carbon urban development based on regional platforms of exchange.
Integrated Urban Resource Management in Asian Cities: The Urban Nexus (Water/Energy/Food Security/Land Use)

Ruth Erlbeck  
Regional Project Director  
GIZ Urban Nexus

The presentation introduced the Urban Nexus project implemented by GIZ across six Asian countries and running from 2013 to 2015. The Nexus project is financed by the German Federal Ministry for Economic Cooperation and Development (BMZ), its political partner is UN ESCAP and the implementation partner is ICLEI – Local Governments for Sustainability Southeast Asia Secretariat (ICLEI SEAS). Participating countries and cities are summarised below:

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<thead>
<tr>
<th>Country</th>
<th>City</th>
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<tbody>
<tr>
<td>China</td>
<td>Ba’nan</td>
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<td>Indonesia</td>
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<td>Philippines</td>
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<td>Santa Rosa</td>
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<td>Thailand</td>
<td>Chiang Mai</td>
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<td>Vietnam</td>
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The Urban Nexus approach involves:

- Introduction of innovative engineering technologies in the area of wastewater, agriculture and solid waste management, generation of energy, link to (urban) agriculture, energy efficiency in/of buildings
- Holistic/integrated urban planning breaking the “silo” thinking
- Creation of Nexus task force in cities
- Multi-level approach (micro, meso, macro, supraregional)
- Private sector, civil sector, state /communal
- Grounded/concrete demonstration projects/PFS/FS/scaling up

Figure 2: The Urban Nexus responding the challenging demands of a rapidly urbanising world
Ms. Erlbeck cited the Asia Pacific region as the most disaster prone region worldwide that crises like drought, typhoons, earthquake, and floods have become normal. She emphasised that solutions to such crises must be innovative and anticipatory. People should not wait for a disaster to strike, they should be prepared. She further explained that the Urban Nexus project is about building a resilient and all-inclusive city that responds to the challenging demands of a rapidly urbanising world with an objective of creating resilient physical and social infrastructure.

![Figure 3: The Urban Nexus building resilient and all inclusive cities](image)

**The Urban Nexus: Wastewater to Energy**

**Ralph Trosse**  
*Technical Project Director*  
GIZ Urban Nexus

The presentation mainly focused on the vacuum sewer collection system, a technology designed to address wastewater collection and treatment.

He also presented current conditions of wastewater collection in most Asian cities explaining that only a few gravity sewage systems are currently installed and individual septic tanks are built with no sewerage treatment. He noted that the overflow from the septic tanks and grey-water are often connected to drainage lines.
Such system results to contamination of groundwater and soil; disturbance through odor, rats, and cockroaches; and occurrence of infectious diseases. These also translate to high risk for the environment and high amount of methane gas emissions ultimately resulting to unhealthy living conditions.

Under the nexus project, GIZ promotes the use of vacuum sewer collection system. The system reduces adverse environmental impacts and has the lowest carbon footprint of any municipal sewerage system. The totally closed vacuum sewerage system is collecting wastewater by vacuum means, thereby minimising:

- Risk to the environment
- Emissions of methane gas
- Odour
- Diseases
- Contamination
- Energy use
- Water used
In conclusion, he said that for planning and layout of a sewerage system, both gravity and vacuum sewer systems should be considered. The use of conventional gravity systems is more applicable in the presence of sufficient slope as well as in densely populated areas. In rural communities and town extremities, the vacuum system should be regarded as an appropriate solution for the installation of a sewer network. It does not only protect the environment, but at the same time reduces the installation costs. Furthermore, it improves the hygienic conditions and raises the population’s living standards.

Connecting Catchments with the Urban Nexus

Katharine Cross
Program Manager
International Water Association (IWA)
Asia Pacific Region

Ms. Cross’ presentation emphasised that upstream management of catchments is an essential investment for the WEF nexus in urban areas. She also presented multiple challenges seen in securing WEF resources for the future. To wit:

- By 2050 water demand is projected to increase by 55% over current levels; energy demand by 80%; food demand by 70%
More than half of the population now lives in cities. Large cities alone represent US $21.8 trillion in economic activity, or 48 percent of global GDP.

Growing urban areas have increasing pressure on available WEF resources from their surrounding catchments.

- The 100 largest cities in the world currently transfer 3.2 million cubic meters of water a distance of 5,700 kilometers everyday in artificial channels.
  - E.g. Beijing, China receives its water supply from the Yangtze River basin located 1,500 kilometers (930 miles) away from the city.
- There is a need for a reliable energy source.

She mentioned that without healthy ecosystems in well-functioning watersheds, the infrastructure built for irrigation, hydropower or municipal water supply does not function sustainably; hence, they are unlikely to achieve the economic returns necessary to justify investments.

She noted that nature is part of the infrastructure needed to manage the urban nexus. She added that by linking catchments and the urban nexus - forests, wetlands and floodplains in catchments help by:

- Providing water supply to cities;
- Sustaining water quality for urban water supply, industries and recreation;
- Attenuating floods;
- Reducing reservoir sedimentation;
- Providing water to generate energy for cities; and the energy is needed for the abstraction, treatment and distribution of water supply for multiple uses across cities.

Consequently, she said that disturbance and change in one system in a catchment area can negatively impact the other sectors. Isolated solutions aimed at only one sector no longer fit this purpose. There is a need for innovative approaches that optimise and address the interdependencies of WEF by breaking down silos through coordinated processes of development and management to maximise economic and social welfare in an equitable manner without compromising the ecosystems. Some examples include:

- **Water-Energy** - Co-locate wastewater treatment plants in conjunction with bio-digesters for power generation.
- **Payment for Ecosystem Services** - Downstream users in urban areas participate financially in protecting upstream water resources through cost-sharing. Investments are made to improve agricultural technology and practices.
- **Data Democratisation** - Better sharing and collection of data; collaborating with community-based organisations.
- **Interdisciplinary planning and design** - Requires the involvement of engineers, finance experts and social scientists to collaborate on infrastructure planning and design.

In terms of practical action, she noted that IWA is working with GIZ on a project funded by the German Federal Ministry of Environment, Nature Conservation to improve the carbon balance across utilities. The project focuses on different parts of the nexus such as addressing greenhouse gas (GHG) emissions reduction, energy efficiency and water efficiency.

In the future, IWA is planning to expand the scope to the entire urban water cycle – from catchment to tap – practically linking watersheds with the urban nexus. This includes looking at technologies and processes which can improve energy efficiency during water abstraction as well as reducing water loss during distribution.
APAN: An Overview

Yi Ying Lee
Associate Coordinator of the Regional Hub for Asia Pacific Adaptation Network (APAN)
Institute for Global Environmental Strategies (IGES).

The presentation introduced APAN as the regional network of practitioners responding to the growing and urgent need for CCA. Ms. Lee presented APAN’s core activities, host organisations, operation, sub regional and thematic nodes, and the results and impacts of its activities in the region which raised awareness on CCA to different stakeholders.

Catherine Diomampo
Project Officer,
ICLEI Local Governments for Sustainability Southeast Asia Secretariat (ICLEI SEAS)

Ms. Diomampo presented the partnership between ICLEI SEAS and APAN and its role as implementing partner of the GIZ Urban Nexus project. It provided an opportunity to link and find entry points for CCA and WEF nexus which are intricately connected in that actions and interventions in one area can have an effect in one or both of the others.

A GrEEEn Nexus for Integrated Planning and Resilience

Sonia Chand Sandhu
Sr. Environment and Climate Change Specialist
Southeast Asia Urban and Water Division
Asian Development Bank

The GrEEEn Cities Operational Framework (GCOF) is seen as shifting from a business as usual manner into a liveable city approach. GCOF has two key outputs which are the Green City Action Plans (GCAP) and the Urban Management Partnerships (UMP). Ms. Sandhu mentioned that the “EEE” in GrEEEn means Economy, Environment, and Equity which are the elements of integrated urban development and environment planning as shown in the figure below.

According to Ms. Sandhu, ADB works with cities that commit to a long term partnership (15–20 years) to make actions and initiatives happen through the Green Cities Initiative. A long term commitment under the initiative allows ADB to work with cities on developing resilient green urban plans and urban management partnerships that would help:
- Identify green projects (short to long term);
- Conduct feasibility studies;
- Develop creative financing modalities for green infrastructure projects;
- Prioritise and program investments, including financing options.

She also discussed the Green City System, a flexible, scalable, replicable model. It adheres to the principle that while projects are implemented by different sectors and/or divisions, the system’s core lies on integrated planning and building complementarities of the different sectors. It is only through integration that the city can be a green, resilient, and sustainable.

Finally, Ms. Sandhu presented case studies from selected cities in Vietnam and Malaysia. These case studies substantiate the GrEEEn framework that ADB has undertaken.

In Hue, Vietnam, their GCAP priority is the Citadel Development Partnership consists of different government and private organisations, institutions and community groups with an objective to enhance professional and technical capacity for integrated planning and preparations of Citadel redevelopment plans. While in Malaysia, the GCAP priority is to expand the ongoing Melaka river improvements to optimise and integrate the use of its waterway and catchment for water supply, water reuse, waste assimilation, storm water retention and discharge, recreation, and transportation.

The technical assistance helped develop green city action plans aligned with the...
respective cities’ master plans, prioritised strategic investments, and developed core capacities at national and local government levels through urban management partnerships, for improved management of key liveability attributes covering land, water, and air.

**Developing a Policy Model for Resilient City: How Do Assessment Indicators of Risk, Vulnerability and Endpoints, and Participatory Scenario Development Work for NEXUS Issues?**

**Kenshi Baba Ph.D**  
*Professor*  
Hosei University, Japan

Professor Baba started his presentation with a phrase in risk management – “How safe is safe enough?” This statement implied a framing gap among experts, stakeholders, and the public. He added that the scientific evidence that experts provide usually contains uncertainty, while the stakeholders and public tend to have other types of qualitative local knowledge. There is no zero-risk society. Hence, the climate change aspects which have a high level of uncertainty, acceptable standards of risk should be decided based not only on expert knowledge but also from local knowledge.

He stressed that organising dialogues between and among experts, stakeholders, and public at an early stage (i.e., problem definition and agenda setting) is essential especially for complex issues such as the water-energy-food nexus. This helps develop the stakeholders’ and the public’s trust to the experts as well as build capacities of relevant actors through qualitative improvement of decision making.

He then cited the recent application of the process in Nagano and Sendai in Japan. For Nagano, it is the nexus of climate change and agriculture where stakeholder analysis, meetings (collection of local knowledge) and scenario development (collection of expert knowledge) using the Delphi method were attained. The next step will be the designing process which is the integration of local and expert knowledge. For Sendai, the nexus of multiple risks and resilience. The steps they took are the delivery of questionnaires, assessment and scenario development.

Professor Baba, explained that urban systems will remain completely unaffected and will be able to maintain their original state because of resistance and robustness up to a certain level of risk exposure only (refer to Figure 11). Resilient measures that can be taken to this point include precautionary measures that strengthen the city’s defensive capacity.
However, when risk exposure exceeds this level, effects on urban systems will begin to appear in a discontinuous manner. Still, at this stage urban systems will not be affected because of their tolerance and flexibility. Resilient measures that can be taken to this point include adaptive measures to draw out the recovery capacity of the city. Furthermore, when risk exposure surpasses a certain threshold, a regime shift will take place, so that the existing urban systems broken down and transformation measure creates fundamentally new systems.

Accordingly, to increase resilience, a combination of precautionary, adaptive, and transformation measures are required.

He emphasised that the likelihood of the occurrence of events that should be avoided for purposes of environmental protection and the extent of damage to the environment resulting when such events occur - mitigation measures can help minimise the former, while adaptive measures can help minimise the latter. Based on this understanding, there is a need to implement both of these types of measures, both before and after such events.

He also discussed the 3 types of resilient indicators:

1. **Urban Indicators (UI)** - local governments’ officers and experts collaboratively assess the degree of resilience in terms of infrastructure, economic activity and environmental factors contribute to resilience based on some published quantitative data.

2. **Administrative indicators (AI)** - local governments’ officers and experts collaboratively assess the degree of resilience in terms of the situation of progress and preparedness of the existing policies contribute to resilience based on the questionnaire to the officers (self-assessment) and scrutiny on the administrative plans.

3. **Civic indicators (CI)** - stakeholders, the general public and experts collaboratively assess the degree of resilience in terms of civic life and environmental factors such as local knowledge, attitude and social capital contribute to resilience based on the questionnaire to the general public (self-assessment) and some published quantitative data.

The assessment results of these indicators were to be integrated to examine the gaps and common points of the assessment results by the indicators to understand the degree of resilience comprehensively.

To measure the risks, vulnerabilities and endpoints, he said that survey questionnaires will be provided to the different subjects of the 3 resilient indicators. The survey questionnaires have the following identifying indicators:

- 41 for risks from external forces;
- 28 for vulnerabilities inherent to local communities;
- 24 for anticipated situations that to be avoided (endpoint); and
- 44 for the state of preparation of resilience measures.
To end, Professor Baba disclosed a plan to hold a scenario workshop on 14th March 2015 during the UN 3rd World Conference on Disaster Risk Reduction in Sendai, Japan with a goal of integrating expert knowledge and local knowledge among the relevant actors and providing opportunity to begin studying building a resilient city.

Urban Resilient Strategy in Nonthaburi: Protection of Nonthaburi City from the Great Flood 2011

Pornsri Kictham
Advisor and Former Municipal Clerk
Nonthaburi City

The presentation discussed how Nonthaburi City in Thailand managed to abate the flood which lasted for 45 days -- from 1st October to 15th November 2011. Ms Kictham explained that the city is surrounded by rivers in four directions, an indication that the city is vulnerable to flooding. With this, the city initiated a number of flood prevention planning and strategies.

However, although plans and strategies have been established, problems and setbacks still arise. These include deceptive/confusing information, shortage of manpower and raw materials, conflict between people, and sudden leakage of dikes.

She emphasised the need to account all of the city’s resources and recognise its strengths and weaknesses in coming up with appropriate strategies to combat challenges such as flooding.

As a public servant, she suggested that officials should always think positively and remain determined in the midst of
crisis, confusion, and conflict. She said that one should not wait for aid and start to help themselves. To quote, “We cannot prevent natural disasters from happening but we can mitigate the damages from a disaster. That [to me] is a resilient city,” she explained.

**Conclusion**

The sub-regional conference was able to increase the participants’ understanding of the importance of integrated resource management in the WEF sectors. It was able to enhance the knowledge on the interaction between the WEF nexus and CCA. The panel discussion of experts and participating cities provided several insights on how decision makers applied urban nexus principles in their respective localities. One of the main thrusts is acknowledging and understanding the underlying risks brought by climate change and rapid urbanisation.

However, as gleaned from the panel discussion, there is only so much a city can do to address the impacts of climate change especially if neighbouring cities are not doing the same or have different priorities. As such, intercity cooperation and collaboration is needed to better address the challenges brought by climate change. Clustering approach is also one of the strategies pushed by the Urban Nexus project for better integrated resource management.

Through coordinated process of development and management, the interdependencies of WEF can be addressed and optimised by breaking down silos and embracing innovative approaches. This helps maximise economic and social welfare in an equitable manner without compromising the ecosystems. For example, water used to irrigate the land for food is also water used to generate energy in dams and cooling nuclear power plants. In addition, energy is used to distribute water into the cities and in refining food.

Due to its interdependencies, isolated solutions aimed at just one sector no longer fit the development agenda. A holistic approach is needed and this also calls for the use of innovative technologies. In conclusion, advancement in terms of WEF prioritisation and its alignment and integration into city master plans is one of the attributes of becoming a resilient city.

The sub-regional conference was able to improve the participants’ awareness on the importance of integrated resource management, particularly in the WEF sectors. These liveability elements ought to be treated as one of the primary concerns in CCA and resiliency planning. Essentially, the interconnectedness between the urban systems, in the midst of climate change, should be approached holistically.
References


# Appendix A: Conference Agenda

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<th>Time</th>
<th>Title / Topic</th>
<th>Potential Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00-11:10</td>
<td>Dissecting the Nexus Resilience Link: from planning to practice “The Urban Nexus”</td>
<td>Facilitator: Mr. Rashane Sala-ngaarm, GIZ Urban Nexus</td>
</tr>
<tr>
<td>11:00-11:10</td>
<td>The WEF Nexus: An Overview</td>
<td>Mr. Donovan Storey, Chief of the Sustainable Urban Development Section, UNESCAP</td>
</tr>
<tr>
<td>11:20-11:40</td>
<td>Technological Solutions for the WEF Nexus in Asian Cities</td>
<td>Mr. Ralph Trosse, Technical Project Director, GIZ Urban Nexus Team</td>
</tr>
<tr>
<td>11:40-11:50</td>
<td>Connecting Watersheds with the Urban Nexus</td>
<td>Ms. Katharine Cross, Programme Manager, International Water Association (IWA) Asia-Pacific Region</td>
</tr>
<tr>
<td>11:50-12:30</td>
<td>Panel Discussion Wrap up</td>
<td>Representatives of Participating Cities GIZ/UNESCAP</td>
</tr>
<tr>
<td>12:30-14:00</td>
<td>LUNCH BREAK</td>
<td></td>
</tr>
</tbody>
</table>

## Water-Energy-Food Nexus and Climate Change Adaptation

Facilitator: Dr. Puja Sawhney, IGES

<table>
<thead>
<tr>
<th>Time</th>
<th>Title / Topic</th>
<th>Potential Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00-14:10</td>
<td>APAN: An Overview</td>
<td>Ms. Yi Ying Lee, Associate Coordinator for the APAN Regional Hub, IGES; Ms. Catherine Diomampo, Project Officer, ICLEI SEAS</td>
</tr>
<tr>
<td>14:10-14:25</td>
<td>GrEEEn Nexus for integrated planning and resilience</td>
<td>Ms. Sonia Chand Sandhu, Sr. Environment Specialist, Asian Development Bank</td>
</tr>
<tr>
<td>14:25-14:40</td>
<td>Developing a Policy Model for Resilient City: How Do Assessment Indicators of Risk Vulnerability and Endpoints, and Participatory Scenario Development Work for NEXUS Issue?</td>
<td>Prof. Kenshi Baba, Hosei University</td>
</tr>
<tr>
<td>14:40-15:00</td>
<td>Resilient Policies and Asian Cities</td>
<td>Ms. Pornsri Kictham, Advisor and Former Municipal Clerk, Nonthaburi Municipality</td>
</tr>
<tr>
<td>15:00-15:15</td>
<td>Resource Efficient Cities: Addressing environmental and social challenges while creating major financial savings</td>
<td>Mr. Stefanos Fotiou, Senior Regional Coordinator, UNEP</td>
</tr>
<tr>
<td>15:15-15:30</td>
<td>Open Forum Wrap up</td>
<td>ICLEI SEAS</td>
</tr>
</tbody>
</table>
APPENDIX B: Evaluation Report

Summary
According to the participants’ feedback, the APAN-ICLEI sub-regional conference for Southeast Asia on ‘Exploring linkages between Climate Change Adaptation (CCA) and the Water- Energy-Food (WEF) Nexus’ was successful in terms of organizing and achieving the conference objectives. Participants were mostly or extremely satisfied with the content, methodologies employed, delivery, staff support, time allocation, and logistics. The overall satisfaction rating is 4.14 on the scale of 5, which is high.

However, the participants’ self-assessment on knowledge and understanding after the event is lower than before the event. Internal evaluation raised some issues concerning presentations and logistics brought in part by the fact that this event is co-organized with other partners. These are further discussed under the section “Conclusions and Recommendations” highlighting lessons learned as well as areas for improvement.

Results and Discussion
This report summarises the results of pre- and post- evaluation of APAN-sponsored participants during the sub-regional conference “Exploring linkages between Climate Change Adaptation and Water-Food-Energy Nexus”. Participants were national climate change officers, civil servants of environmental department and local governments in Southeast Asia. International organizations, academic institutes and NGOs also attended the session but were unable to fill out the evaluation forms.

The evaluation was conducted to assess the learning progress of APAN-sponsored participants on CCA and WEF Nexus. It also covered assessment of other objectives and desired outputs/outcomes that the conference set to achieve, including: (i) identifying trends in WEF Management schemes in the region and determine points for leveraging the WEF nexus-CCA linkage; (ii) facilitating sharing of practices and experiences on WEF security in the context of CCA; and (iii) promoting networking among experts and participants.

Eight (8) out of ten (10) APAN-sponsored participants accomplished the pre-event evaluation while only seven (7) was able to submit their post-event evaluation questionnaires.

Self-Assessment (Pre- and Post- Conference)

The pre-evaluation assessment revealed that before the event, all participants have more than average understanding about the topics. ‘High understanding’ was selected most frequently by the participants for three out of five topics, namely ‘Concept and theory behind WEF nexus’ (4 out of 8 respondents), ‘Linking WEF nexus and CCA’ (5 out of 8), and ‘Practical measures and solutions that demonstrate WEF nexus as an approach to be resilient to CC’ (3 out of 8). (Table 1).

The post-event self-assessment on the same topics was only answered by seven respondents. Results showed a backward trend in terms of participants’ understanding of the topics. Most participants posited that after the event, they have ‘average’ understanding on the topics, except...
for ‘Leveraging points and existing challenges in maximising benefits from linking the WEF nexus and CCA’ which showed a little move from average to moderate understanding (Table 1).

### Table 1. Participants’ self-assessment

<table>
<thead>
<tr>
<th>Topics</th>
<th>Pre-event assessment</th>
<th>Post-event assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>Valid</td>
<td>Missing</td>
</tr>
<tr>
<td>Concept and theory behind WEF nexus</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Trends in WEF management schemes in the region</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Linking WEF nexus and CCA</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Practical measures and solutions that demonstrate WEF nexus as an approach to be resilient to CC</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Leveraging points and existing challenges in maximising benefits from linking the WEF nexus and CCA</td>
<td>8</td>
<td>0</td>
</tr>
</tbody>
</table>

Rating scale: 1=low; 2=some; 3=average; 4=moderate; 5=high

### Event Feedback

**Session topics/objectives.**

Overall assessment regarding the session objectives showed that objectives were clear and relevant. All respondents opined that the conference is ‘mostly’ successful in meeting the objectives (Figure 8).

![Figure 8. Ratings of session topics/objectives](image-url)
Content of the conference. The conference content was evaluated based on: 1) newness of information presented, 2) relevance of information to his/her job, and 3) likelihood of using knowledge and skills acquired from the event.

For majority of the participants, information presented was not very new: 4 out of 7 participants selected neutral to the content newness. On the other hand, all participants agreed that information acquired is relevant to their jobs and there is a high likelihood of them using their learnings when they return to their offices/countries (from ‘neutral’ to ‘strongly agree’) (Figure 9).

![Figure 9. Ratings of Session Content](image)

**Methodology**

Three methodologies were adopted in the conference. These include: 1) introductory presentation on the WEF nexus, 2) case study presentations, and 3) exploration of the linkages between the WEF nexus and CCA. According to participants, the three methodologies employed were mostly effective and appropriate (see Figure 10).

![Figure 10. Effectiveness and Appropriateness of Methodology Used](image)
Intent to use

Majority of the respondents answered that they are “mostly” (42.9%) and “extremely” likely (42.9%) to use the information acquired from the event in their organisations. Three (3) out of 5 respondents opined that they would likely encounter challenges or obstacles if they apply the information and skills they acquire from the conference.

Potential challenges raised include (i) governance and funding; (ii) capacity building and technical assistance; and (iii) political will and (human and financial) resources. In light of the concerns, participants suggested that APAN-ICLEI could provide training and partnership to assist their organizations to overcome these challenges.

Event Structure and Logistics

In terms of time allocation, all the participants found that time allocated for discussion and Q&A was ‘mostly’ sufficient. Six (6) out of 7 respondents opined that time for sharing and networking was ‘mostly’ sufficient while only one was ‘not sure’ about time allocation rating.

Eighty-six percent (84.7%) of the participants thought that the overall length of the event was adequate while 14.3% found the conference too short.

In terms of the event’s logistics, all participants were mostly and extremely satisfied with the event’s logistics and the venue’s facilities. However, 14% of the respondents were ‘not sure’ if they were satisfied with the logistics of the events or not.

Overall Satisfaction Rating

Overall, majority of the participants were “mostly” satisfied to “extremely” satisfied with the event, with the percentage of 28.6% and 57.1% of total number of respondents, respectively. Only 14.3% were not sure if the conference experience was satisfying or not.

Figure 11. Overall Satisfaction Rating
Conclusion and Recommendations

There were very positive feedbacks from the 7 respondents in terms of pre-event information, session topics/objectives, methodologies used, support and facilitation, as well as event structure and logistics. However, the pre- and post-evaluation results showed a decrease in terms of respondents’ knowledge and understanding on the topics. It should be noted that the pre-evaluation and post-evaluation forms were done separately by the participants at different stages of the conference (before and after the conference). While the audience will have a general idea on which knowledge they may learn from the conference from the evaluation forms, answering the pre- and post- questionnaires at different times may cause confusion to the participants, especially if the event is concurrent with other events. Probably reasons behind the decline in the participants’ understanding could be confusion of the participant or failure to submit the partner questionnaire (missing pre- or post- evaluation forms). It could also be that the conference brought out new issues during the session on WEF nexus and CCA but the conference was not able to allocate enough time to dig deeper into the issues, which resulted to lower scores during post-evaluation. However, the latter explanation contradicts the respondents’ answer regarding the topic’s newness where majority of the answers were ‘neutral’ as well as responses on time allocation and session content.

This event marks the second time that APAN-ICLEI held its SRAC under the auspices of another event. For the RCAP, participants sponsored by APAN were specifically requested to attend the two sessions on WEF Nexus and CCA. Nevertheless, the organizers still encountered logistical issues which should be addressed if APAN-ICLEI is going to convene a similar integrated event in the future:

1. As stated earlier, the pre- and post-evaluation results are incongruous. During big events where parallel sessions are ongoing and crowd control is an issue, it is difficult to expect participants to answer pre- and post-evaluation questionnaires properly. The participants can get confused whether the evaluation is for the APAN-ICLEI session only or for the entire conference. In this light, this confusion will affect not only the accuracy but also the validity of their responses.

2. In terms of appropriateness of speakers’ topics vis-à-vis planned session, it is important to secure a copy of their presentation in advance to make sure that it meets the overall session objectives. This should also be done to maintain session coherence that significantly helps the audience’s flow of thinking and keep them away from distraction. While this can be a precautionary measure, this is still not a guarantee as speakers sometimes make some last minute changes in their presentations.

3. Regarding crowd control issues, it is challenging to collect all the attendee’s names. Putting up an attendance sheet prior to the session will take time and potential participants might lose interest. Furthermore, some participants attend a session only for a short time and then transfers to another parallel session. Hence, it is suggested that only an estimate of the total number of attendees be reported.