POLICY BRIEF ON Integrated Resource Management in Asian Cities: The Urban Nexus

The urban nexus approach aims at integrated planning and management of the key resources of energy, water and food, and this can contribute substantially to the long-term sustainable development of rapidly growing cities and their regions. In supporting integrated approaches it is essential to engage municipal, provincial and national actors towards collaborative planning and management in order to fully utilise the synergies and co-benefits arising from policies which integrate water, energy and food resources.

The 2030 Agenda for Sustainable Development was developed with an emphasis on synergies and innovative approaches so that achieving a goal would not be at the expense of another and that co-benefits could be found in integrated approaches. Natural resources remain as one of the cross-cutting issues fundamental to the achievement of sustainability in cities and across sustainable development goals and targets. The urban nexus can be a vehicle for new forms of thinking, leadership and commitment to close the gaps that exist between how we manage those resources today and where we need to be in the future and thereby address the urban challenges.











THE ASIA PACIFIC REGION IS URBANIZING RAPIDLY

With a current urban population of over 2 billion, the Asian and Pacific region is expected to pass the 50 per cent level of urbanization in 2018. The future of Asia-Pacific is increasingly urban, with important economic, social and environmental implications.

ITS CITIES ARE THE ENGINES OF ECONOMIC GROWTH...

Cities are centres of societal transformation and as much as 80 per cent of the region's GDP is generated in urban areas. Managing rapidly growing cities and the development outcomes of urban regions is one of the most critical challenges facing Asia and the Pacific. This is especially true with regard to the relationship between urban development and natural resource use.





...BUT ARE VULNERABLE TO FUTURE RESOURCE DEMAND...

Of all natural resources, energy, water and food are the most essential to sustain development efforts – but they are also the most vulnerable to future demand. The 2012 report of the United Nations Secretary-General's High-Level Panel on Global Sustainability has warned that by 2030 the world will need at least 50 per cent more food, 45 per cent more energy and 30 per cent more water. Much of this demand is being driven by cities, and their urbanising regions.



Figure: Recent trends in food, energy and water demands. Source: Resource Revolution: Meeting the world's energy, materials, food, and water needs, McKinsey & Company November 2011.

...INCREASING THE RISK OF WIDENING SUPPLY GAPS

The Asia-Pacific region is characterized by resource-intensive growth patterns and increasingly it is cities that are at the centre of this unsustainable and inefficient resource use. Rapid urbanisation entails the risk of widening supply gaps, in particular for water and sanitation systems, energy, land and food. Therefore, it is in the urban environment where the pressure, and opportunity, for change lies.

AN URBAN NEXUS APPROACH: SYNERGIES FOR SUSTAINABILITY

The interconnections between energy, food and water are clearly evident. But the food and fuel crisis that hit many developing countries in conjunction with the global financial crisis in 2008 exposed the vulnerability of developing economies to the trade-offs in the use in these critical resources and highlighted the urgent need to look at resources in an integrated manner. In 2011, United Nations Secretary-General Ban Ki-moon underlined the importance of the "nexus approach" noting: "As the world charts a more sustainable future, the crucial interplay among water, food and energy is one of the most formidable challenges we face.²"

The landmark Bonn 2011 Nexus Conference "The

Water-Energy-Food Security Nexus – Solutions for the Green Economy" was the first to present and discuss the concept of the nexus as a viable policy approach. Co-organized by the German Federal Ministry for Economic Cooperation and Development (BMZ) and the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) the conference highlighted an integrated approach to natural resource management as a key tool for pursuing sustainable development, ahead of the Rio+20 conference. The Rio+20 conference itself recognized the importance of an integrated approach to natural resource management.

In order to translate the concept into practice, the Deutsche Gesellschaft für Internationale Zusammenarbeit (**GIZ**) GmbH and the United Nations Economic and Social Commission for Asia and the Pacific (**ESCAP**) are implementing the project "**Integrated resource management in Asian Cities: the urban nexus**", in partnership with ICLEI and with funding from **BMZ**. The project supports ten cities in six countries, namely: China, Indonesia, Mongolia, Philippines, Thailand and Viet Nam.

The project is providing technical advice to municipal administrations to oversee the design, planning and implementation of practical urban nexus initiatives. At the same time seeks to feed the experiences gained at the local level into national and regional policy dialogues and learning platforms to promote the necessary shifts in policy and practice.

²UN (2011), "In Message for World Water Day, Secretary-General Says Urban Water Crisis One of Governance, Weak Policies, Poor Management, Not One of Scarcity", Press Release, United Nations, March 18, http://www.un.org/press/en/2011/sgsm13456.doc.htm



WUNDERSTANDING THE URBAN NEXUS

Urban Nexus Relationships Across Core Sectors

Water/Energy: Energy is required for pumping water for supply and treatment. Similarly water is needed to produce electricity, for extraction of fossil fuels, or cooling in thermo-electrical power plants.

Water/Food (land): Globally water demand is the highest for agriculture. It is needed for crop agriculture and for animal farming. Land is needed for recharging groundwater, capturing water, watershed management and hydro-geological purposes.

Food (land)/Energy: Energy is needed in many forms of irrigation, for the production of food, for processing and transport of food. Land is needed for building dams/reservoirs, power plants, refineries, solar and wind farms and for the production of biofuels.

Waste/Energy/Food (Land): Energy is needed for transporting waste (solid and liquid) to the treatment plants and for treatment. In return, wastewater and solid waste can be used to generate energy and the sludge (after composting) can be used as fertilizer. Land is needed for constructing wastewater treatment facilities and for sanitary landfills.

Enhancing governance

An integrated approach to the design of sustainable urban development solutions: The nexus aims at sustainably managing the critical resources of water, energy and food through an integrated, collaborative and participatory approach to urban development. It guides multiple stakeholders to identify and pursue possible synergies between the sectors to optimize resource management, and reduce sectorial trade-offs.

Catalysing cooperation across levels of governance: The nexus approach counters traditional sectoral thinking and responsibilities that often result in poorly coordinated investments, increased costs, and underutilized infrastructures and facilities. It enhances cooperation between different departments within city administrations, across city jurisdictions, and different levels of government.











Entry Points for the Urban Nexus

Solid Waste Management: 60–70 per cent of waste in developing countries in Asia-Pacific is organic and can be transformed into fertilizer that can enrich the soil, or into biogas, while the treated water can be used for irrigation. Proper waste treatment can also greatly contribute to climate change mitigation, as untreated organic waste is one of the main sources of methane, a powerful greenhouse gas.

Green Buildings: The building sector contributes 40 per cent of global energy use and 12 per cent of freshwater use. Greening buildings offers a great opportunity to introduce nexus thinking, for example through energy efficiency and energy saving measures, rainwater harvesting and water efficiency measures, as well as rooftop and vertical gardens. "Energy-plus houses" can even produce more energy that they consume. However, in order to be effective, technical solutions must be accompanied by regulatory and fiscal instruments, such as building standards and consumption-based energy and water tariffs.

Wastewater management systems: Wastewater treatment provides clear opportunities for producing energy. But the presence of combined sewers in most cities means that the organic load of the wastewater reaching the treatment plants is often too low. Moreover, individual septic tanks can contaminate the soil, rivers and the groundwater. The application of separate sewers to collect wastewater and storm water can address this challenge (see case study of Da Nang). Considerable opportunities exist also to improve the energy efficiency of water supply and wastewater treatment, as considerable amounts of energy are used to pump water.

Case Study 1.1 Implementing integrated resource management – Da Nang, Viet Nam

Da Nang adopted the nexus approach to address one of their priority challenges in dealing with wastewater and sewerage systems. A pilot project based on the concept of separate sewerage systems, to increase the organic load in the wastewater, will be implemented. Also the kitchen waste from households will be combined with the increased organic load in the wastewater for energy production, treated wastewater will be used for irrigation and the agricultural residue will be used for urban farming.

The Department of Planning and Investment (DPI) and Department of Natural Resources and Environment (DoNRE) of Da Nang will be implementing the pilot project in An Hai Bac Ward, benefitting 110 households, with funding from World Bank and technical assistance from GIZ.

The "Excellence in City Transformation" award won by Da Nang shows increased international recognition for cities that adopt a progressive and holistic approach to urban development, as promoted by the project.



Comprehensive Land Use Plans: Comprehensive land use plans can integrate the nexus principles to effectively reduce waste, pollution and environmental degradation, while efficiently using water, energy, land and other resources in a participatory manner (see case study of Naga). Moreover, adopting integrated resource management can support collaborative governance across boundaries, strengthen urban-rural linkages and support the implementation of both urban and rural strategies.

Case Study 1.2 Integrating the nexus approach into land use planning - Naga, Philippines

The city of Naga, in the Philippines, initiated the process of formulating its new land use plan in 2013. As the concerned committees met to discuss consolidated outputs of the four sectoral and the 16 sub-sectoral councils, the need for adopting a nexus approach as the basic framework of the spatial planning emerged over time.

The 2016-30 Comprehensive Land Use Plan of Naga will build on the concept of "compact city" urban development strategy. It will integrate the nexus principles of cross-sectorial coordination; leverage synergies across key sectors of water, land and energy; collaborate across administrative domains to improve institutional functioning; and optimize resource management in its spatial planning. This will bring about a more liveable city where communities are resilient, natural resources are protected, recycled and reused; and land use policies lessen vulnerability of people and property.

Resilience Strategies: A nexus approach can also support the development of resilient cities. Using surplus rainwater and sustainably managing wastewater can increase the resilience to climate change and water-related disasters. Similarly, preserving mangroves and wetlands, not only provides cities with important environmental services, including improved water quality, but it can also reduce the impact of intense rainfall, flooding, storms and other forms of extreme weather.

**** POLICY RECOMMENDATIONS ****

Implementation of the urban nexus can be limited by lack of policy coherence, weak governance, inefficient regulatory frameworks and limited financial resources. Policy recommendations formulated by the GIZ-ESCAP-ICLEI project through regional and national policy dialogues with multiple stakeholders include the following.

Planning

• Policy responses must consider impacts and relationships beyond urban boundaries and across

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