

Research Opportunities for Sustainable Urban and Regional Development in Vietnam and Indonesia

Final Report

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Cover Image

Urban and Coastal Development in Da Nang, Vietnam (Source: Google Earth)

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EXECUTIVE SUMMARY

Asia is one of the most vulnerable regions for climate change impacts, including sea level rise, tropical cyclones, flooding and drought. With the recognition that much climate change is 'locked-in' and cannot be mitigated, there is a growing emphasis on finding ways of reducing vulnerability and helping communities adapt to current and anticipated climate change impacts.

Asia's exceptional economic growth over the last two decades has led to the region constituting one-third of the world's economy and has helped reduce income poverty in general and promote the expansion of cities and towns. However, this growth and the rising importance of global cities and city regions have created a new economic geography with significant disparities in urban development both within and between countries. Asia is now home to some of the world's largest and richest economies and some of its poorest. More than 200 million people live in poverty in Asian cities, although cities, on average, provide 80 percent of the national economic base. Though cities have become the hubs of economic growth, they are also responsible for 78% of carbon emissions while occupying less than 3% of the Earth's surface.

One of the key challenges for managing urbanisation in Asia is finding ways to promote new social, economic and environmental development pathways through strategic investment in urban policy, governance, and development practice. Foreign aid investments in cities are one of the potential pathways to influence a sustainable development trajectory. A systems approach has been developed in this report emphasizing the role of different actors and various linkages among different governmental hierarchies, sectors, and actors (local and international). The report also questions how do changes occur in a particular social-technological or social-ecological system, what induces change, and what are the barriers to change?

This report is developed in response to AusAid request to provide scientific input to the ongoing development of AusAid internal urban development strategy. Thus, the initial audience of the report is AusAid. Nonetheless, the conceptual framework outlined in this report recommends establishing an integrative, multi-scale view of cities, which can be used to:

- 1) organise and interrogate urban problems,
- 2) identify opportunities for coordinating activities and maximising co-benefits between sectors, and
- 3) identify ways to link local capacity building with broader initiatives, such as economic policy instruments.

Australia is a small player in terms of international aid for urban development in Asia. However, we have a strong geopolitical interest in working constructively in Asian countries. Australia is well placed to contribute knowledge for sustainable urban development and reducing the severity of unavoidable environmental changes on vulnerable communities.

Providing knowledge and developmental assistance in targeted cities and regions in Asia, such as Vietnam and Indonesia would allow AusAID to establish an urban development and research

agenda linked to key international aid and development assistance. This is a worthy and timely organisational goal for AusAID. The AusAID Alliance would allow CSIRO research, which is already well developed and recognised in Australia and internationally, to be deployed into Asia, where we have little urban experience but can build up and test our scientific knowledge and contribute to sustainable urban practice. A full project proposal for the next phase will be developed in conjunction with key partners in the AusAID Alliance. Possible areas of research might include one or more of the following, with local engagement established in Asian countries:

- Sustainable Urban Development – By working with local urban planning and management agencies to improve spatial and environmental impact assessments for major infrastructure projects, AusAID and CSIRO can help fill an important niche in integrative urban planning and development for sustainable and equitable urban development.
- Urban and Coastal Vulnerability Assessment to climate change – By identifying vulnerable places and populations, including exposure to extreme events like typhoons, storm surge, flooding and landslides, AusAID and CSIRO can provide advice and work with cities to develop strategies for reducing vulnerability while improving social and environmental sustainability.
- Community Adaptation and Resilience to extreme events – By working with local urban managers and coastal communities to assess their adaptive capacity to respond to the consequences of extreme events and enhance preparedness and post-event recovery from natural disasters, AusAID and CSIRO can help empower cities to find multi-scale, multifaceted solutions that achieve significant co-benefits for poverty alleviation and enhanced quality of life.
- Buildings and Infrastructure – AusAID and CSIRO can work together to provide technical solutions to reduce urban vulnerability and increase quality of life. For example, what materials would work best with coastal and delta flooding and storm surge from typhoons? How could communities and government better plan for uncertainty in climate change in cities? How could government and international donors’ stage infrastructure investments to cost-effectively deal with uncertainty?
- Capability Building and Knowledge Transfer – AusAID and CSIRO have a unique opportunity to help coordinate and build capacity for local solutions to social, economic and environmental sustainability, both within Government Ministries, and between agencies such as the World Bank, the Asian Development Bank and UN Habitat.

1. AIMS AND OBJECTIVES OF THIS REPORT

One of the key challenges for understanding and managing the opportunities and adverse effects of urbanisation in Asia is finding ways to promote new social, economic and environmental development pathways through strategic investment in urban policy, governance, and development practice. For many bi-lateral aid agencies, development assistance has focused predominantly on rural areas. Yet, with an increasing urban population, providing adequate living conditions and employment for urban residents has become a challenge for both local and national governments. Statistics show that the health and wellbeing of residents in some Asian cities is lower than that of their rural counter parts. On the other hand, cities produce and consume the majority of national wealth. It has been suggested that sustainability, measured along social, economic, and environmental scales, will be either lost or won in cities (Clark, 2003). Consequently, there is a clear need for better understanding of Asian cities, their dynamics, their interactions with rural areas, as well as identifying priority action and investment opportunities for promoting sustainable urbanisation.

On the one hand, research into these aspects will help provide a sound information base for AusAID to make investment decisions in urban areas in Asia. A better understanding will also help AusAID, and other development agencies, put their investment decisions into a longer term perspective informed by urban systems dynamics. On the other hand, there is a need to identify and engage with urban managers, policy makers and developers to identify researchable questions with practical outcomes.

The underlying mechanism that shapes the evolutionary trajectory of cities involves both internal and external factors. Foreign aid investments in cities are one of the external forces that have the potential to influence this trajectory. It is important to recognize this potential, and direct them to key intervention points that can bring about a positive sustainability outcome to the urban social-ecological system. Rather than taking either a top-down or bottom-up approach, a systems approach that emphasizes the role of different actors and various linkages among different governmental hierarchies, sectors, and actors (local and international) is the key to bring about a positive outcome.

This report has been developed through AusAID and CSIRO's research partnership (see Box 1) and reviews key aspects of urbanisation in Asia and associated social and environmental impacts that must be addressed for the region to transition to more sustainable forms of development. This report also details visits to cities in Vietnam and Indonesia for discussions with urban policy makers, managers, consultants and NGOs working in urban and coastal areas in Asia.

2. AN OVERVIEW OF URBANISATION IN ASIA

Cities are increasingly becoming the dominant environment where people live. The future quality and sustainability of our cities will, to a large degree, be the major determinant of human well-being and quality of life. While there are diverse patterns of human settlements from region to region, it is worth noting some of the major features of global urbanisation (see next section for a more detailed definition of the term urbanisation). In just over 50 years, the global population living in cities has increased from 29 to 49 percent (Hunt & Watkiss, 2007).

Perhaps most significant, just over half of the world's population of nearly 6.8 billion now lives in urban areas, a threshold reached sometime in 2008 (UN-HABITAT, 2008), and by 2030 that number is expected to increase to 60 percent, representing nearly 5 billion people (Hunt & Watkiss, 2007). Indeed, through 2050, 95 percent of urban population growth will occur in cities in developing countries (UNFPA, 2007), whereas moderate growth and decline will be experienced by most developed countries (UN-HABITAT, 2008). In addition to these general trends, there are also significant differences in other demographic characteristics of cities, including large differences in population structure in developed and developing countries (e.g., population aging in more developed countries) that have implications for future development and quality of life.

Box 1 – The AusAID CSIRO Research for Development Alliance

The CSIRO and the Australian Agency for International Development (AusAID) have formed a four year Alliance to undertake research for development. Initial work will consist of projects in the areas of climate change, integrated water management and sustainable urban and regional development. Urbanisation is a key aspect of development in the Asia-Pacific region, and the CSIRO's Climate Adaptation Flagship, Sustainable Cities and Coasts Theme has overlapping objectives with the CSIRO/AusAID collaboration and both seek to develop science that can inform decision making about sustainable urbanisation in the region. A major pathway for impact for the Alliance will be the uptake of project learning into AusAID projects, programming, policy, and investment decisions. Other avenues will include informing the decision making of international stakeholders and influencing science thinking.

The project discussed in this document, Urbanisation in Asia, will provide a sound scientific base to guide development investment in the urban arena in Asia through a better understanding of urbanization drivers and consequences in the region, the sustainability performance of selected cities, and the identification of intervention points to achieve sustainability transitions in Asian cities. This work will involve the close coordination of the CSIRO research team and AusAID to assure high quality and leading-edge scientific impacts and strong linkages to AusAID's mission of assisting countries in identifying pathways for sustainable and equitable development.

Urbanisation and climate change are arguably two of the most serious challenges facing Asian cities, with urban populations increasing at a rate of 1.2 million per week. By 2030, the urban population will rise from approximately three billion to five billion people. Effectively all future population growth will be in cities and most will occur in developing countries. The opportunities and problems associated with urbanisation will be variable from country to country and city to city and influence a wide range of social, economic and environmental responses.

Urbanisation in Asia is of particular relevance when considering global trends in the growth of cities. Asia accounts for 60% of the world's population and 46% of its urban population. Urban populations are increasing at an average annual rate of 3%, with significant regional and country to country variation. Countries such as Korea, Malaysia, and the Philippines have already experienced high rates of urban population growth while countries such as Viet Nam

and Thailand have experienced slower rates of urbanisation. Urbanisation in Asia is also characterised by new patterns of economic development. Cities rather than individual countries or regions are now the engines of economic growth. This has created a new economic geography with significant disparities in urban development both within and between countries.

While the phenomenon of mega-cities (i.e., cities with populations of 10 million or more) is an important hallmark of recent urbanisation trends, the greatest urban growth is occurring in secondary cities (i.e., cities with populations between 500,000 and 2 million). This is a trend that is expected to continue and will be a key feature of urban growth throughout the world. Secondary cities also present important challenges for sustainable development as they often do not have the resources and economies of scale available to larger urban areas.

The environmental impacts of cities range across local, regional and global scales and span a range of social and economic domains. Grimm *et al.* (2008) recently observed that, “although urban population growth over the past century occurred on less than 3% of the Earth’s surface, the impact has been global, with 78% of carbon emissions, 60% of residential water use, and 76% of wood used for industrial purposes attributed to cities.” Local scale impacts include issues related to poverty, low access to basic services and infrastructure, and vulnerability to infectious diseases. At local to regional scales, environmental pollution and ecosystem deterioration related to rapid urban and economic growth emerge as key environmental impacts. Finally, at the regional to global scales the emissions of greenhouse gases related to industrial activity and high consumption are key concerns. All of these issues have significant influences on the health and well-being of people, with significant inequities in urban populations, amongst cities and amongst countries in the region.

There are also significant environmental impacts and vulnerabilities in Asia related to global climate change. At the broadest level, it is clear that the main climate change impact issue for developing countries in the Asia-Pacific is the possibility that climate change, along with other social, economic, and environmental stressors, could lead to negative outcomes for livelihoods and social cohesion (Wilbanks *et al.*, 2007). In their study of climate change vulnerability for coastal cities around the world, Nicholls *et al.* (2007) make the following observation about the vulnerability of port cities in the Asia-Pacific region:

- Most of the world's largest port cities are found in Asia (38%) and many (27%) are located in deltaic settings, again mainly in Asia;
- By the 2070s, the top 10 cities in terms of population exposure to climate change impacts are Kolkata, Mumbai, Dhaka, Guangzhou, Ho Chi Minh City, Shanghai, Bangkok, Rangoon, Miami and Hai Phòng;
- The top 10 cities in terms of assets exposed are Miami, Guangdong, Greater New York, Kolkata, Shanghai, Mumbai, Tianjin, Tokyo, Hong Kong, and Bangkok;
- Cities in China, India and Thailand will become more dominant in terms of population and asset exposure due to expected rapid urbanisation and economic growth;
- Ninety percent of the population exposure in the 2070s will be contained in eleven countries: China, USA, India, Japan, Thailand, Vietnam, Bangladesh, Myanmar, Egypt, Nigeria and Indonesia; and,

- Ninety percent of the total estimated 2070s asset exposure in large port cities is concentrated in eight countries: China, US, India, Japan, Netherlands, Thailand, Vietnam and Bangladesh.

This analysis clearly highlights that when considered globally, the Asia-Pacific region will likely experience a large share of climate change impacts, especially cities in developing countries. As an example of one such impact, one study suggests that climate change along with additional concentration of populations in coastal areas will cause 200-450 million people to be affected by sea-level rise in the Asia-Pacific region (Mimura, 2006). Most at risk are the low-lying river deltas of Bangladesh, India, Vietnam, and China as well as the small island states (Preston *et al.*, 2006).

With the recognition that much climate change is 'locked-in' and cannot be mitigated, there is a growing emphasis on finding ways of reducing vulnerability and helping communities adapt to current and anticipated climate change impacts.

3. UNDERSTANDING URBANISATION AND DEVELOPMENT

3.1 Demographic and economic processes

Urbanisation has long been understood as a demographic process. Historically, rural to urban migration has been a major driving force of urbanisation in Asia (UN-HABITAT, 2008). Higher wages and other opportunities are strong attractors to migrants from rural areas, and some have argued that there is a positive relationship between city size, income, and productivity increasing the attraction of large cities (e.g., (ADB, 2008). However, rural to urban migration is no longer the main determinant of urban population growth, rather natural increase accounts for 60 percent of urban growth (UN-DESA, 2006). Other forms of migration have increased in importance including inter- and intra-urban population movements, especially flows from big cities to intermediate size cities. This has actually led to population decline in some Asian cities (UN-HABITAT, 2008). Suburbanisation and the rise of satellite cities also represent processes leading to urban population decline in some places and new urban growth in others.

The rise of informal settlements, or slums, on the urban fringe is another hallmark of urbanisation in the region. Informal settlements are often cut off from city services and markets and there are weak incentives for government to provide services or development support leading to a host of social and environmental problems (Cities Alliance, 2007).

Finally, understanding patterns and drivers of urbanisation in Asia has been confounded by inconsistent definitions of what constitutes an urban area. For example, UN-Habitat (2008) reported that 25 percent of urban growth in China is due to land reclassification. Changes in city boundaries can result in the amalgamation of previously 'unconnected' populations that were not considered part of the same city. There are examples of the opposite situation where urban administrative boundaries are redrawn to smaller areas (e.g., Angel, et al., 2005).

Another dominant perspective on the growth of cities focuses not solely on population growth but also on the importance of the agglomeration or clustering of economic activity (ADB, 2008). This traditionally has related primarily to economic activity within countries with geography (e.g., location of cities in relation to markets, sea ports, resource base), but patterns of economic development are increasingly linked to the globalised economy. National economic and industrial policies are increasingly responding to this ‘new economic geography’ through investment in information technology, communications infrastructure, and the creation of special economic zones (SEZ). SEZs are particularly a key feature of urbanisation and industrialisation in Asia with 35 cities with SEZ achieving the fastest urban growth among all cities in the developing world from 1990 to 2000 (UN-HABITAT, 2008).

Urbanisation in Asia is also characterised by new patterns of economic development. Cities are now the engines of economic growth rather than individual countries or regions (Duranton, 2008; Sassen, 2001). The regions exceptional economic growth over the last two decades has led to Asia constituting one-third of the world’s economy and has helped reduce income poverty in general (ADB, 2008) and promote the expansion of cities and towns (UN-HABITAT, 2008). However, this growth and the rising importance of global cities and city regions has created a new economic geography with significant disparities in urban development both within and between countries (World Bank, 2009). Asia is now home to some of the world’s largest and richest economies and some of its poorest (UN-HABITAT, 2008). For instance, more than 200 million people live in poverty in Asian cities, although cities on average, provide 80 percent of the national economic base (ADB, 2008).

Economic development has been spatially variable in Asia, with uneven development occurring within and between countries in the region. UN-Habitat (2008) has described how globalisation has created winners and losers amongst developing countries:

“Geography and national economic policies alone do not determine which cities will grow and which will decline. In an increasingly globalizing world, countries and cities that take advantage of global, regional and local markets tend to thrive while those that are not part of this marketplace tend to decline in size and significance. The concentration of economic activities and population generates efficiency gains in certain regions and urban centres that benefit from international, national and local factors, while leaving other regions and cities behind.”

These patterns have real implications for patterns of advantage and disadvantage both within and between countries (ADB, 2008), and this is reflected in many examples of disparities in economic, social and health indicators, and in development opportunities (UN-HABITAT, 2008).

3.2 Environmental linkages

3.2.1 Environmental impacts of urbanisation

The environmental impacts of cities are increasing and include local, regional and global scale impacts that span a range of social and economic domains. Urbanisation has important

implications for environmental quality both within cities and between cities, peri-urban, and rural areas. For example, in many Asian cities, air pollution has reached alarming proportions, mostly because of the burning of fossil fuels for transport and power generation. The World Health Organization reported that concentration of particulate matter in most Asian cities now exceeds health and safety norms (ADB, 2008). A lack of essential environmental resources, including clean water and air, is directly responsible for 25% of all preventable negative health outcomes worldwide (ADB, 2008). The environmental influence of cities goes beyond the areas they occupy. For example, the resource demands of cities has triggered land use change in the surrounding ecosystems and degradation of productive landscapes in some countries (Grimm, et al., 2008). Cities are responsible for 78% of carbon emissions although cities occupy less than 3% of the Earth’s surface (Grimm, et al., 2008).

Table 1: Environmental problems associated with different states of urbanisation.

Type	Typical Issues	Causes	Major Impacts	Spatial Extent
Poverty related	Low access to safe water, lack of sanitation facilities	Low infrastructure, rapid urbanisation, income disparity	Sanitation-related health impacts such as infectious and water-borne disease	Local
Growth related	Air pollution, water pollution, solid waste	Rapid industrialisation, low emission control, lack of effective management	Industrial pollution disasters, deterioration of regional ecosystems	Local and regional
Consumption related	CO2 emissions, municipal wastes	High consumption lifestyles, low local incentives for improvement	Global warming, chemical pollution, over extraction of resources	Regional and global

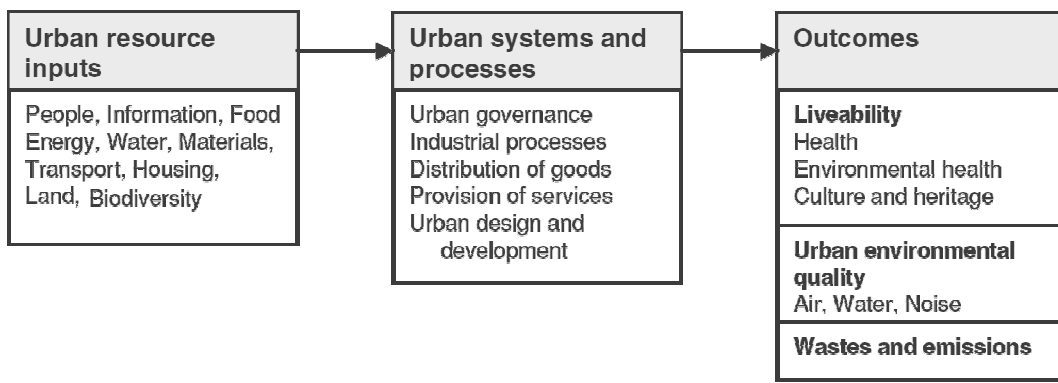
From Bai and Imura, 2000.

There is evidence that the type and severity of environmental problems associated with urbanisation change over time with economic development. For example, research by (Grossman & Krueger, 1995) suggests that environmental problems increase in severity before improving. This idea has been explored for East Asian cities by Bai and Imura (2000), and they argue that, rather than decreasing altogether, environmental problems are different at different stages of development with different causes, impacts and spatial scales (e.g., Table 1). Initially, urban environmental problems are mainly poverty related such as infectious disease and poor living conditions associated with access to safe water and sanitation facilities, appropriate housing, and health care. Next, production-oriented economic development leads to new environmental problems such as air and water pollution, and solid waste management. Finally in later periods of urbanisation and economic growth, environmental problems are related to high consumption lifestyles and include over utilisation of resources, increased carbon dioxide emissions. The spatial scale of these different environmental problems also change overtime with a shift from relatively localised to global impacts (X. Bai & Imura, 2000). It is important to note that in many countries in Asia, we are seeing a compression of these trends where all

three forms of environmental problems are occurring at the same time (X. Bai & Imura, 2000). This creates unique challenges for urban environmental management and questions arguments that economic development alone will solve environmental problems associated with development in the region.

3.2.2 Cities as coupled social-ecological system

There has been a growing recognition of cities as complex social-ecological systems where social, economic, and environmental factors are linked and interacting. This has also led to an understanding that not only do cities impact on the environment, but that the environment has important influences on human health and well-being and opportunities and constraints for economic development.



Adapted from Newton *et al.*, 2001.

Figure 1: Conceptual diagram of urban metabolism.

When considering the entire ‘urban system’, which includes the city and its connections to rural areas, it is useful to contrast different the ways that information, energy, and materials are ‘metabolised’ and the implications for the local, regional, and global environment (Figure 1). Urban metabolism approaches examine how materials and energy 1) move into a city, 2) are transformed by patterns of production and consumption, and 3) are sent out as products and wastes (Huang & Hsu, 2003).

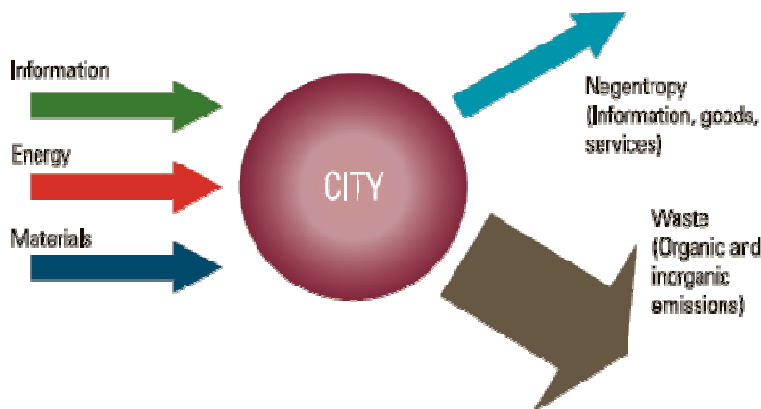
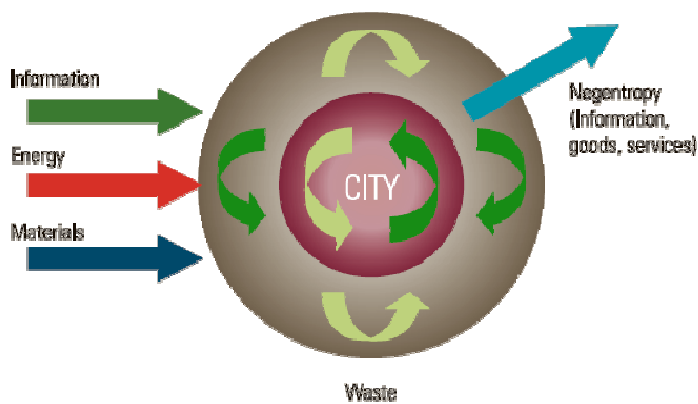


Figure 2: Linear urban metabolism.

Currently, most cities have a linear urban metabolism where there are high levels of waste production that either accumulate in the city or are exported to other places (Figure 2). These waste products are often the source of environmental problems and negative impacts for people, often the most vulnerable in society. In contrast, a circular model of metabolism involves systems within a city that recycle and reuse materials and energy as much as possible (Figure 3). This means greater efficiency in production activities, lower accumulation of wastes and pollutants that negatively impact on people, and slowing the flow of wastes pollutants to other places. Huang and Hsu (2003) have described this as the city becoming an entity where outputs are also inputs that sustain the city (Huang & Hsu, 2003).



Source: UN-Habitat 2008

Figure 3: Circular urban metabolism.

This discussion of urban metabolism may seem abstract at first, but there are important implications in terms of development practices, selection and sourcing of building materials, transportation systems, and ultimately for promoting forms of the development that are sustainable and equitable. Newton and Bai (2008) have argued that such a systems framework leads to a set of guiding principles for more sustainable urban development:

- Using resources more efficiently;
- Using wastes as resources;
- Restoring and maintaining urban environmental quality;
- Enhancing human wellbeing; and,
- Promoting highly efficient and effective urban and industrial planning , design and management systems (Newton & Bai, 2008)

Finally, the urban metabolism concept can be used to identify a set of relevant, repeatable and measurable indicators that can be used to track progress towards social, economic, and environmental sustainability (Figure 1).

An understanding of cities as social ecological systems facilitates the development of metrics for understanding the vulnerability, resilience and adaptability of cities. This may include factors associated with patterns of urban development (e.g., How resilient are transportation systems to increasing car use? How vulnerable are neighbourhoods to natural disasters and new vulnerabilities related to climate change?). Vulnerability to natural disasters that may be exacerbated by climate change is particularly important to cities in many Asian countries as many lie in coastal areas. The complex and adaptive nature of cities can be captured by the analogy of “cities of resilience”- an approach aimed at integration of ecological, socio-economic and planning realms (Pickett, Cadenasso, & Grove, 2004). This integrated approach acknowledges the close connection between human activities and their impact on natural habitats and the resilience of urban ecosystems (Alberti & Marzluff, 2004). The concept of resilience is gaining much currency as it can be used effectively for disaster prevention, preparedness and recovery (Klein, Nicholls, & Thomalla, 2003).

3.2.3 Sustainability and equitable urbanisation

Sustainability science (Raven, 2002) is the study of how long-term trends in environment and development, including consumption and population growth, reshape nature-society interactions in ways relevant to sustainability (Kates, et al., 2001; Kates & Parris, 2003). Transitioning to sustainable development is an endeavour of understanding the positive and negative trends in development and accelerating positive transitions (Kates, et al., 2001; Kates & Parris, 2003). One of the key challenges for managing urbanisation in Asia is finding ways to promote a sustainability transition where new social, economic and environmental development pathways are identified and promoted through strategic investment in urban policy, governance, and development practice. As pointed out by the ADB (2008),

“Clearly, the scope for improving sustainability lies with directing the economic growth of developing cities along a more sustainable path and changing the way in which developed cities work to reduce their ecological footprint. In the developing world, the focus must be on mitigating existing negative economic, social, and environmental conditions— and ensuring that negative environmental impacts do not increase with economic development as they have in the developed world.”

The underlying mechanism that shapes the evolutionary trajectory of cities involves both internal and external factors (Bai and Imura 2000). Foreign aid investments in cities are one of the external forces that have the potential to influence this trajectory. It is important to recognize this potential, and direct them to key intervention points that can bring about a positive sustainability outcome to the urban social-ecological system. Rather than taking either a top-down or bottom-up approach, a systems approach that emphasizes the role of different actors and various linkages among different governmental hierarchies, sectors, and actors (local and international) is the key to bring about a positive outcome. As such, some of the fundamental questions regarding sustainable development transitions include: How do changes occur in a particular social-technological or social-ecological system? What induces change? and, what are the barriers to change? (Bai et al., 2009).

3.3 A systems approach for understanding urban systems

3.3.1 Framework

The previous discussion highlighted a range of ideas about urbanisation ending with a consideration of cities as social-ecological systems. In this section, we present a conceptual framework (Figure 4) for an integrative, multi-scale view of cities that can be used to 1) organise and interrogate urban problems, 2) identify opportunities for coordinating activities and maximising co-benefits between sectors, and 3) identify ways to link local capacity building with broader initiatives, such as economic policy instruments. Some of the key principles for understanding cities from a systems point of view include:

- Cities are coupled social-ecological systems with linkages and interaction amongst the built environment, natural and social components of an urban ecosystem;
- Cities are open systems, relying on interactions with surrounding regions;
- Cities have multi-scale environmental impacts, and are influenced by regional and global economic and environmental trends; and
- Cities function within a nested hierarchy of governance systems, and inherit changing internal and external constraints.

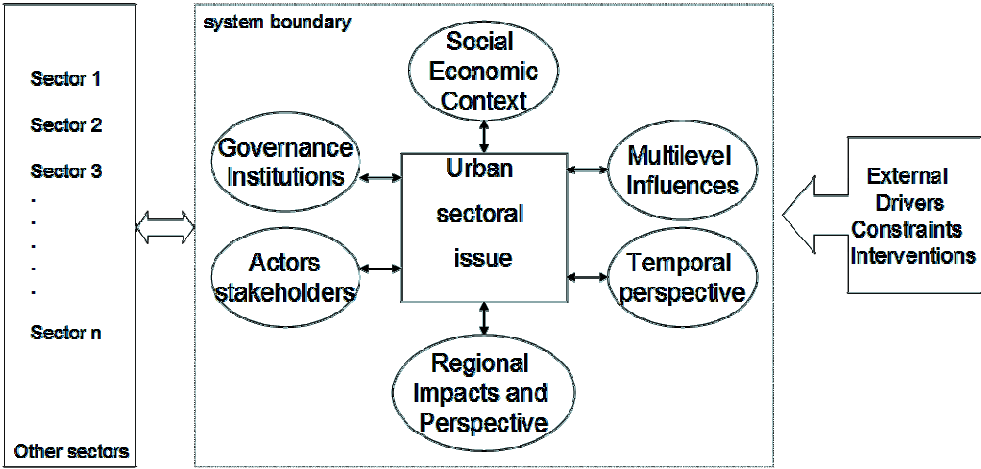


Figure 4: Framework for understanding urban system interactions

When examining a specific sectoral issue in a city, it is important to recognize the full chain of influences and interactions (Figure 4). The following are among the most important aspects in adopting a systems approach to a sectoral issue: the context of the issue, governance and institutional settings, actors and linkages both within and beyond the sector, relations and interactions with other sectors, upstream/downstream impacts, multilevel influences, temporal perspective, and external drivers, constraints and interventions.

3.3.2 Examples

As diverse and complex as the issues listed above may be, there are internal linkages among issues, which present opportunities in addressing them. A systems approach focuses on key intervention points. The following case studies show that by strategically targeting one issue, significant co-benefits can be achieved in other areas.

Example 1: Solar energy use and strategic interventions in Rizhao

Rizhao is a coastal city of nearly 3 million on the Shandong Peninsula in northern China. The city is relatively small by Chinese standards, and the income level is slightly below average compared to other cities in the region. Since the early 1990s, the city has started to promote renewable energy use, including solar energy use and methane production. To date, the city has achieved widespread success in adopting renewable energy. About 99% of households in the central districts use solar water heaters, and most traffic signals, streetlights, and park illumination are powered by photovoltaic solar cells. In the suburbs and villages, more than 30 percent of households use solar water heaters, and over 6,000 households have solar cooking facilities. More than 60,000 greenhouses are heated by solar panels, reducing operating costs for farmers in nearby areas. Methane generated from sewage is used for cooking and electrical power generation. It is estimated that the use of clean energy has reduced CO₂ emissions by 3,340,000 tons and SO₂ by 12,500 tons annually. The Rizhao initiative was awarded the World Clean Energy Award in June 2007 by the Transatlantic 21 Association.

The success story of Rizhao demonstrates the importance of positive synergies among multiple actors. The Shandong provincial government instituted policy measures to encourage the development and adoption of solar energy use. This included providing subsidies to the research and development activities of solar energy industries to improve efficiency and reduce costs of their products. The Rizhao city government also played a pivotal role in the popularization of solar water heaters by introducing a series of policy measures and undertaking widespread efforts of public education. The city mandates all new buildings to incorporate solar panels, and it oversees the construction process to ensure proper installation. To raise awareness, the city held open seminars and ran public advertising on television. Government buildings and the homes of city leaders were the first to have the panels installed.

While contributing significantly to improved energy profile and reduced peak energy demand, the merit of popularizing solar energy has profound impacts beyond the energy sector. It has reduced coal burning in the city, which has contributed to improved air quality. The enhanced environmental profile of the city has in turn brought about benefits to other important aspects of the city's development. The city has been attracting increasing levels of foreign investment, tourism, international sports events, and highly educated people to become the residents of the city, where better environmental quality due to clean renewable energy use played a significant role (Bai, 2007; Bai et al., 2009)..

Example 2: Poverty, vulnerability, and informal settlements in Manila, Philippines

The Smokey Valley Garbage Heap is a landfill dumpsite located in the suburbs of Manila, just 20 km from the city centre. It sprawls over 70 hectares and receives over 3000 tonnes of industrial and domestic waste are added every day from the urban centres of Manila. The dumpsite is also home to approximately 92,000 people who scavenge the garbage heap to collect reusable and recyclable items (Yaswant, 2002). Most come from rural areas where they have lost their jobs and livelihoods and now depend on the garbage heap for their survival. The garbage heap is also vulnerable to a range of natural and anthropogenic hazards. In 2000, a typhoon destroyed a large part of the landfill and killed hundreds of people.

The situation described above creates significant challenges for achieving sustainable and equitable development in Manila and is an example of a complex problem with social, economic and environmental components. For example, there are a set of direct environmental health exposures that put residents of the heap at risk, but there are also deeper issues related to the absence of alternative livelihood opportunities and open land markets. This situation strains municipal services that have a responsibility for the site and for social and environmental outcomes.

Strategic investment aimed at enabling alternative employment and livelihood opportunities may provide significant co-benefits beyond directly helping people living in the garbage heap. For example, capacity building may promote the integration of individuals into the formal/mainstream sector of the economy thereby reducing the risks and vulnerabilities associated with scavenging activities and informal settlements.

Systems thinking can provide a way of understanding the different dimensions of the nexus between informal settlements, environmental quality, and vulnerability to natural and anthropogenic disasters. There is probably not one intervention that will be effective, but by identifying strategic opportunities for addressing root causes of poverty and land tenure forcing the settlement of sites like the Smokey Valley Garbage Heap an integrative solution might be possible.

Example 3: Urban and coastal vulnerability to climate change in New Orleans

Hurricane Katrina struck New Orleans on the morning of 29 August 2005. The cities defences against storm surge and flooding were overwhelmed with overtopped and collapsed levees and floodwalls in more than 50 locations (Andersen et al., 2006). Over 80% of the city was flooded and some neighbourhoods were under more than 3.5 metres of water. There were over 1000 deaths, large numbers of sick and injured, financial losses over USD 20 billion, dismantling of essential services, and large scale displacement of communities and culture. The storm was, by far, the most costly natural disaster in American history.

Unfortunately, the likelihood of a major hurricane striking New Orleans and its effects on the city were both predictable and predicted (Costanza et al., 2005). While the levee breaches and subsequent flooding revealed poor or nonexistent disaster planning and preparedness, much of the damage that the hurricane caused could have been prevented by actions taken well in advance (Costanza et al., 2005). Moreover, scientific and engineering studies conducted over

the last 50 years suggest that New Orleans was becoming more and more vulnerable as the resilience of the ecological, engineering, and social systems that mitigate hurricane damage became eroded (Wallace and Wallace, 2008).

In addition to the direct failures of the New Orleans and Mississippi river levee system which led to the flooding of the city, there are a number of contributing factors that played out on different time scales. These include the loss of protective wetlands and barrier islands, land subsidence, inadequate levee systems, low understanding amongst the public of the cities vulnerability, and poor coordination amongst agencies responding to the disaster and coordinating essential services.

While what happened to New Orleans as a result of Hurricane Katrina was a terrible natural disaster, the cumulative result of poor planning and management of natural, engineered, and social systems made the impacts and aftermath of the storm much worse than it would have been under different circumstances (Costanza et al., 2006). For example, what would the likely outcome have been if the hurricane protection system had not failed? Katrina, due to its size and intensity, would have likely resulted in life and property loss (e.g., due to wind, rain, and some flooding). However, a modelling study, that compared expected deaths assuming the failure of the protection system versus it being successful (Andersen et al., 2006), found that if the levees and floodwalls had not failed and the pumping stations worked properly, two-thirds of the deaths would not have occurred and less than half the property losses would have occurred (Andersen et al., 2006).

4. OPPORTUNITIES TO ADDRESS URBAN ISSUES IN ASIA

4.1 Overview

Australia is a small player in terms of international aid for urban development in Asia. However, we have a strong geopolitical interest in working constructively in Asian countries. In this sense Australia could contribute knowledge for sustainable urban development and reducing the severity of unavoidable environmental changes on vulnerable communities.

Providing knowledge and developmental assistance in targeted cities and regions in Asia, such as Vietnam and Indonesia would require AusAID to establish an urban development and research agenda linked to key international aid and development assistance. Given the increasingly significant urban challenges described above, and the dominant role cities play in national economic development, this is a challenging organisational goal for AusAID. The AusAID Alliance would allow CSIRO urban research, which is already well developed and recognised in Australia, to be deployed into Asia, where CSIRO currently has little urban experience compared to our research in water resources, farming systems and forestry in Asia..

CSIRO and AusAID could also play a role in linking other research organisations in Australia, who have considerable urban research experience, into a far more co-ordinated and knowledge sharing collaboration. This would encourage and allow better utilisation of scarce resources

and capability in the Australian innovation system to be targeted into urban research in selected areas of Asia.

In this section, we describe some of the key recommendations that have come out of our work to date with the AusAID Alliance. First we describe some of the key ideas and perspectives that give CSIRO and AusAID a comparative advantage in urban research and development assistance in Asia. Next, we detail some specific focal research areas which have the greatest urgency for action. Finally, we link these ideas to specific opportunities that we have identified through consultation with a range of stakeholders in Vietnam and Indonesia.

4.2 Comparative advantage of Australian urban research

CSIRO has developed an integrative approach to urban research over the last three years by merging long standing capability in building, materials and infrastructure together with urban environmental scientists and social scientists. This knowledge base has resulted in a large scale capacity to undertake urban research in Australia, with a particular focus on sustainable urban development; urban infrastructure systems assessment; spatial analysis and integrated risk assessment and management. This urban research capability can be combined into teams with other scientists in CSIRO and universities to address the challenges of climate change, water, energy and food security that increasingly affect people living in vulnerable built environments. Most recently, CSIRO has started to build this capacity by partnering with AusAID through the Research for Development Alliance. The goal of this new initiative is to bring the knowledge and expertise of both organisations to develop a targeted and integrated urban agenda in Asia. Some of the most important perspectives and approaches informing this effort include:

- **Systems thinking on complex interacting urban issues** – such as climate change and coastal and floodplain vulnerability; population, food and water security.
- **Incorporating regional scale issues into local urban planning** – such as understanding the integrity of water supplies and catchments; food production in peri-urban areas; industrial and wastewater pollution controls; and social exclusion resulting from new urban developments.
- **Co-ordination and capacity building** – such as linking key players in government, international agencies, and research organisations; participatory action research linking diverse stakeholders.
- **Urban research and knowledge transfer** – Australia has been engaged in cutting-edge urban research for decades. CSIRO being a research institution with varied disciplines co-ordinates and integrates the scientific efforts from different scientific disciplines and organisations to render a multi dimensional, contextual output in the issues like urbanization.

5. SUMMARY OF IN-COUNTRY VISITS

After discussions with AusAID staff, Vietnam and Indonesia were identified as countries of interest for exploring case study opportunities. This matches existing research experience within CSIRO and aligns with AusAID's investment pathways.

5.1 Vietnam

5.1.1 Summary of country visit

The overall learning from speaking to many interviewees in international agencies and urban managers in various levels of government during the country visit to Vietnam in March 2009 was a need for a better understanding of climate impacts, such as urban flooding and storm surge, on vulnerable urban areas and coastlines. There was a strong interest in what could be called *integrated urban assessment*. This took the form of many comments about the need for better spatial analysis of urban and coastal vulnerability and an interest in sustainable urban development as a response to rapid, inadequately planned for or anticipated urbanisation pressures and environmental impacts. This should not be surprising as these are interests shared by urban managers in Australia and other countries as well.

There were numerous comments about the lack of integration between government ministries and other levels of government and that this was hampering Vietnam's economic and social development. This lack of integration, along with an insufficient capability and empowerment at the local (city) level, appeared to be inhibiting Vietnam's ability to adapt to climate change in their vulnerable coastal cities.

There were many potential opportunities identified for the CSIRO-AusAID Alliance to participate in existing projects or identify new partnerships in Vietnam. The key country stakeholders were well-aware of the scale of their country's urban and coastal vulnerability challenges and keen to engage with the CSIRO-AusAID Alliance on specific projects. During interviews with many different organisations, the team noted that there is currently a lack of co-ordination and communication between the key government and international agency players in Vietnam, resulting in duplication of work and knowledge gaps.

Based on in-country discussions three distinct opportunities for a niche advantage and role for the CSIRO-AusAID Alliance has emerged:

1. A need for a focus on research that addresses complex and dynamic interactions in the urban environment such as climate change impacts on the built environment, particularly for assessing coastal and floodplain vulnerability. Other complex problems raised by stakeholders included: the impacts of population increase on land use and food production; improved drinking water quality and security of water supply; and, managing the increasing impacts of saline intrusion in groundwater and environmental degradation of surface waters. These linked issues emerged in numerous discussions about the need for sustainable urban development and managing the rural migration to

the cities. Various examples of potential case study areas were given in most meetings and are summarised later in this section.

2. Incorporating regional scale context into local urban planning including the integrity of water supplies and catchments; food production in peri-urban areas; industrial and wastewater pollution controls and social exclusion of existing residents resulting from new urban developments.
3. Co-ordination and dissemination of knowledge generated on urban infrastructure projects and knowledge transfer between key players in government and international agencies

The CSIRO-AusAID Alliance's comparative research advantage would be exploring urbanisation from an integrated urban systems perspective. However, this urban systems theory focus would need to be complemented by practical urban sector studies in local urban areas in order to build engagement and relevance for urban policy makers and urban managers in Vietnam. The CSIRO Research for Development approach to working with existing players to identify researchable questions and suitable urban projects was well accepted and appeared to be novel and welcomed in terms of approach and engagement. The *integrated urban assessment* focus could be expanded to incorporate the region in urban planning, rather than looking at the city in isolation. This is an approach to urban planning and development that is currently not being offered in Vietnam by other research organisations according to the opinions of many of those interviewed by CSIRO.

There is also a niche role for some international entity to facilitate coordination and knowledge transfer between key players in Vietnam, both within the many Government Ministries responsible for urban and coastal issues and climate change, and between the various agency players, such as the World Bank, the Asian Development Bank and UN – Habitat. The Swiss Agency for Development and Cooperation (SDC) helped establish and fund the Urban Development Forum in 2000, with over 25 participants, to facilitate coordination and knowledge transfer of urban information between major stakeholders in the area. This Urban Forum has not been successful, according to a number of interviewees, and a gap remains for facilitating this important knowledge sharing role. It has been suggested that the Cities Alliance is exploring funding the Forum (Dean Cirra, pers. comm.) in the future. However, this role is not one that CSIRO nor AusAID would have any comparative advantage in trying to facilitate given the lack of long term in-country knowledge and expertise.

Gaps in our in-country meetings, that will need further development in subsequent visits, included:

- Contacts with universities in Vietnam on relevant research capability and capacity
- Contacts with Ministry of Natural Resources and Environment (MONRE) on climate change and urban and coastal vulnerability.
- Contacts with both these groups will be important for future project engagement in Vietnam.

5.1.2 Focal areas and investment priorities

There was a broad interest in CSIRO capability in urban research and there is attraction from a theory perspective in developing this area of urban systems integration for cross-sector analysis. On the other hand there was a strong interest to approach better urban systems understanding through concentrating on aspects of the urban environment and urban infrastructure investment such as through water supply or sanitation projects. These urban sector-based projects appeal more to the major funding agencies and to Vietnam government organisations than urban theory development.

Consequently, the key focal areas for integrated urban assessment with more of an urban sector-based focus for Vietnam could include one or more of the following areas of research informed through local engagement:

- Sustainable Urban Development – working with local urban planning and management agencies to improve spatial analysis and environmental impact assessment for major infrastructure projects.
- Urban and Coastal Vulnerability Assessment to climate change - identifying vulnerable areas and assessing exposure to extreme events, including typhoons, storm surge, flooding and landslides in a selected case study area
- Community Adaptation and Resilience to extreme events – working with local urban managers and coastal communities in a selected area to assess the adaptive capacity to respond to the consequences of extreme events and enhance preparedness and post-event recovery from natural disasters
- Capability Building and Knowledge Transfer both within Government Ministries, and between agencies such as the World Bank, the Asian Development Bank and UN – Habitat by working with the Association of Cities in Vietnam in a selected case study area
- Buildings and Infrastructure – what materials would work best with coastal and delta flooding and storm surge from typhoons? How could communities and government better plan for uncertainty in climate change in cities? How could government and international donors’ stage infrastructure investments to cost-effectively deal with uncertainty?

5.1.3 Cities and regions

The country visit to Vietnam exposed a plethora of opportunities and locations for potential research projects. The highlights are summarised below in order of recommended priority by the CSIRO project team for research and engagement:

Da Nang, a city of almost 1 million people on the central coast, is undergoing rapid urbanisation while struggling with poverty, social issues, growing coastal tourism pressures and massive environmental degradation. The central coast region of Vietnam has a high incidence of extreme events, with typhoons, landslides and flooding. The local government is proactive by Vietnamese standards. Da Nang is also geographically located within a relatively small urban-region and relies on water, food and energy from outside the province boundaries. If

there are opportunities to work with the Provinces to the north and south of Da Nang then this would be a significant benefit for enhancing integrated regional assessment.

Hue is a World Heritage Area listed city located on the central coast approximately 200kms north of Da Nang. Hue has a population of 340,000 people and shares many of the same opportunities and issues as Da Nang, including rapid urbanisation, poverty, social issues, growing tourism pressures and environmental degradation. There are fewer agencies working in Hue which would allow the CSIRO-AusAID Alliance space to undertake a pilot project. One option would be to explore several cities on the central coast, allowing for a regional coastal study exploring how cities can work together or compete. The Asian Development Bank is working on one such proposal at the moment and is interested in potentially partnering with CSIRO-AusAID Alliance in either Hue or the coastal towns north of Hue towards Thanh Hoa.

Red River Delta and Hanoi - the Development Strategy Institute (Ministry of Planning and Investment) in Hanoi was keen on engagement with the CSIRO-AusAID Alliance. However, this would be a massive and complex research undertaking as there are many existing players and the area covered is over 11,800 square kms. The region is a major agricultural region in the north of Vietnam, with most of the land devoted to rice cultivation. The region is also densely populated, with approximately 17 – 18 million people in the region, 6-7 million living in cities within the region and 10 million living in rural areas. The Vietnamese Government has plans to move 8 million people from rural areas into cities, leaving 2 million on the land. This will allow aggregation of traditional family farms with the goal of improving the economic prosperity of the region. However, there was a clear recognition that rapid urbanisation in agricultural areas, despite restrictions on loss of rice production areas is affecting food security as well as peri-urban and urban development challenges in the Hanoi region.

Can Tho, in Vietnam's largest rice growing region, is the biggest city in the Mekong Delta with a population of just over 1 million, 170 kms west of Ho Chi Minh City. Located on one of the most active deltas in the world, only 1 metre above sea level, Can Tho suffers from flooding and sanitation issues. The German international cooperation enterprise, GTZ, are currently working in Can Tho on a water and sewage project for urban poor (valued \$26 million AUD). There is scope for further work in this region and other low-lying coastal and delta regions of Vietnam on urbanisation processes, vulnerabilities and exposure to extreme events, particularly flooding.

5.1.4 Development assistance research collaboration

This project aims to catalyse better collaboration across Australia's international aid and development assistance research groups. In order to achieve this CSIRO will develop partnerships in Phase 2 with Australian universities, their Vietnamese counterparts, and other agencies and organisations already working in Vietnam. This could include;

- University of Technology Sydney, Institute for Sustainable Futures (UTS ISF)
- RMIT Global Cities Research Institute
- Griffith University
- ANU Asia-Pacific Centre

- University of Canberra
- University of Queensland

This type of approach would allow some harmonisation of efforts across the Australian innovation system delivering knowledge into international development projects through AusAID or other organisations like ACIAR or NGOs operating into Asia. Bringing Australian research organisations together in some form of integrated Research for Development approach would also enhance the ability of Australia and AusAID to scale up and provide more focussed international development efforts in Asia-Pacific.

In addition, a small network of international researchers working in South-east Asia and elsewhere, on climate change and urban and coastal vulnerability has been identified at the 5th World Bank Urban Research Symposium in Marseille in June 2009. This small group of international researchers could provide a valuable role in Phase 2 as well as bring a more extended network of contacts in Vietnam and Indonesia.

5.2 Indonesia

5.2.1 Summary of country visit

The Republic of Indonesia, one of Australia's closest neighbours, has a population of 237 million spread unevenly across more than 17,000 islands making it the fourth most populous country in the world. As the world's largest archipelagic state, Indonesia will be heavily impacted by rising sea levels and other climate change issues. In the last 8 years Indonesia's urban population has risen from 41% in 2000, to 52% in 2008. By 2030 Indonesia's urban population is predicted to reach over 65% (Roberts and Kanaley, 2006). As such it is strategically important for Australia to assist the Indonesian government and to build relevant knowledge to enable informed decision making on the urbanisation process and urban and coastal vulnerability.

Due to a delay in the start of the project, changing research interests and regional instability the scoping trip to Indonesia was not undertaken by the same team who visited Vietnam. However, CSIRO has extensive experience in the South Sulawesi region through a number of ACIAR farming systems projects that have led to discussions with urban managers and government officials over the years about the consequences of rapid urbanisation. Consequently, CSIRO colleagues who were visiting the South Sulawesi region in June 2009 were able to, make a number of additional enquiries on behalf of the Urbanisation in Asia project team and to make a preliminary assessment of the opportunities for urban research.

5.2.2 Focal areas and investment priorities

Current urban issues in Indonesia include:

1. lack of adequate infrastructure, including sewage and transport networks,
2. poverty alleviation,

3. poor urban air quality,
4. water pollution and lack of access to water in some areas, through incursion of sea water into aquifers, and
5. health issues, including vector borne diseases.

In addition, Indonesia is subject to extreme events which impact on urban centres, such as flooding, severe droughts, tsunamis, earthquakes, volcanoes, and forest fires.

The recommended focal areas and investment priorities will be scoped with an in-country visit to be undertaken after Ramadan 2009 and prior to the implementation of Phase Two. However, as with Vietnam, it is expected that the key focal areas will include one or more of the following areas of research with local engagement:

- Sustainable Urban Development
- Urban and Coastal Vulnerability Assessment to climate change
- Community Adaptation and Resilience to extreme events
- Buildings and Infrastructure
- Capability Building and Knowledge Transfer

5.2.3 Cities and regions

CSIRO has a long and successful history of working on research projects in Indonesia. Based on discussions with colleagues currently working in Indonesia the following cities and regions have been identified as potential areas of interest. These areas, in addition to the capital Jakarta, will be visited on a scoping trip to further explore their suitability.

- **Makassa**, South Sulawesi, with a population approaching 1.6 million, Makassa is the largest city on the island of Sulawesi.
- **Bone City (Watampone), South Sulawesi** has a population of approximately 600,000 and is located on the eastern side of South Sulawesi. The local officials of Watampone have approached our CSIRO colleagues about undertaking an urbanisation project in the city.

Since 2000 there is local regulation concerning land use in Bone City called Rencana Tata Ruang Wilayah (RTRW). The regulation defines land use, design and planning and classifies land into public space, business centres, residential use etc. Although this regulation exists, it has not been applied very well and as a consequence, there is up to a 50% deviation in land use. Similarly, building codes exist but are not often followed. Other issues identified include sanitation, urban poverty and health infrastructure.

6. RECOMMENDED FOCAL AREAS AND INVESTMENT PRIORITIES

6.1.1 Sustainable urban development

Urban planning is the code by which development decisions are made. It decides a city's future urban form and provides options for a more sustainable and adaptive city. Whilst the goal of sustainable urban development is widely accepted, implementation is complex and difficult in practice. For instance, large urban development projects will require hundreds of major planning and design decisions to be made, often in the political context of a complex network of stakeholders who are all striving to achieve their objectives, maximise their returns, and protect their interests. Exploring sustainable development options in selected case study regions, we will work with local urban planning and management agencies to improve spatial analysis and environmental impact assessment to aid decision making for major infrastructure projects.

6.1.2 Urban and coastal vulnerability to climate change

South East Asia's population is predominately concentrated in settlements along an extensive low-lying coastal zone. As a result this coastal zone contains much of the region's critical infrastructure, built environment and economic activity. Due to their location at the interface of the oceans, atmosphere and land, coastal settlements have a high degree of potential vulnerability to the effects of climate variability and long term climate change. Looking to the future, sustainable coastal settlements will be those that have developed a robust resilience to the diverse array of climate challenges and extremes. Our research will identify vulnerable areas, assess exposure, adaptive capacity, and adaptation options to extreme events, including typhoons, storm surge, flooding and landslides in selected case study areas.

6.1.3 Community resilience and adaptation

People continually adapt. However, the combination of population growth and changing climate ensures that communities now need greater assistance in order to adapt appropriately. The capacity for community adaptation contains three core determinants:

- 'agency' or the efforts of individuals or their behavioural characteristics;
- 'resources', or the financial and information capital (including the science on various options for adaptation) of a community;
- 'structure' or the connectivity within the system, which defines how information is disseminated and exchanged, and how governance arrangements are enacted, adapted and resisted.

We will work with local urban managers and coastal communities in a selected area to assess the adaptive capacity to respond to the consequences of extreme events and enhance preparedness and post-event recovery from natural disasters. Outcomes of the case studies will include options for adaptation which are culturally appropriate based on full consideration of the likely drivers of change, including economic; technological; and behavioural.

6.1.4 Buildings and infrastructure

The physical skeleton of the built environment is made up of engineered materials, which are designed and constructed into buildings and physical infrastructure such as transport, energy, water and communication systems. It is this physical skeleton which facilitates the majority of human and economic activity, and consumes considerable economic and natural resources, especially in populated urban areas. Our research will explore optimised climate adaptation, including the effects of extreme events, measures for the design, construction, management and regulation of the physical built environment. This could include: what materials would work best with coastal and delta flooding, and storm surge from typhoons? Key questions include: how to plan for uncertainty in climate change in low-lying coastal cities, and how to stage infrastructure investments to cost-effectively deal with uncertainty?

6.1.5 Capability building and knowledge transfer

One of the key understandings of the scoping trips to Vietnam and Indonesia was the need for improved knowledge transfer and capability building, both within Government Ministries, and between agencies such as the World Bank, the Asian Development Bank and UN – Habitat. The optimal pathways forward for engagement and knowledge transfer by CSIRO and AusAID will be explored by working with the Association of Cities in Vietnam in a selected case study area. A similar process will be explored in Indonesia.

7. CONCLUSIONS AND NEXT STEPS

Urbanisation and vulnerability to climate change are arguably two of the most serious challenges facing Asian cities. As cities become the dominant environment where people live, the future quality and sustainability of our cities will, to a large degree, be the major determinant of human well-being and quality of life. The opportunities and problems associated with urbanisation will be variable from country to country and city to city and influence a wide range of social, economic and environmental responses. There are also significant environmental impacts and vulnerabilities in Asia related to global climate change.

This scoping study has identified many opportunities for the AusAID-CSIRO Alliance, including knowledge gaps and regional vulnerabilities. Pathways forward for improving the processes of urbanisation in Asia will focus on five identified focal areas for *integrated urban assessment*:

1. Sustainable Urban Development
2. Urban and Coastal Vulnerability Assessment
3. Community Adaptation and Resilience
4. Buildings and Infrastructure
5. Capability Building and Knowledge Transfer

Upcoming project developments in Vietnam and Indonesia will allow identification of strategic case study cities and an opportunity to build off existing CSIRO relationships and research in the region. Finally, the knowledge gained from the creation of this Phase 1 report, along with feedback from AusAID, will form the basis of our proposal to the Alliance for Phase 2 due in September 2009.

APPENDIX A: AUSAID’S PRIORITIES AND URBANISATION

The Australian Government is sharpening the focus of its aid program on practical development outcomes, including faster progress towards the Millennium Development Goals, with a substantial increase in attention to the most vulnerable and excluded. Attaining these goals is significantly complicated by the dramatic changes in the Asia Pacific region driven by demographic, environmental and climate change. Urbanisation is at the centre of these challenges, and Australia is in a unique position to provide development assistance that promotes social, economic, and environmental sustainability.

AusAID is in the process of developing an urban strategy in alignment with their broader development assistance mission. This will draw upon expertise and experience in a number of areas the agency has a long history working in (e.g., infrastructure, water, health), at the same time recognising the unique challenges that urbanisation creates, particularly rapid urbanisation and emerging vulnerabilities to social, environmental, and climate change in the Asia Pacific region. It is important to understand that urbanisation creates unique challenges for poverty reduction and sustainable development in all sectors that AusAID focuses on. Thus, urbanisation is an important cross-cutting issue, requiring consideration in programs across all sectors and specific attention through targeted initiatives.

Just as cities provide many challenges for social, economic and environmental sustainability, they also provide important opportunities for innovative solutions. For example, the goals of poverty reduction, increasing quality of life, reducing vulnerability to environmental hazards, and providing access to land, infrastructure, employment and social services can be pursued through in-country capacity building and strong and effective partnerships with other donors.

A key opportunity for AusAID involves aligning its efforts with major international strategies such as:

- Cities Alliance – AusAID has been a member since June 2008
- CityNet
- Community-Led Infrastructure Finance Facility (CLIFF) and Homeless International
- World Bank’s Water and Sanitation Program (WSP)
- World Bank – AusAID partnerships in South Asia and East Asia Pacific Regions for access to infrastructure services
- Global partnership on Output Based Aid (GPOBA)
- UN-Habitat – human settlements activity
- ADB’s Cities Development Initiative for Asia (CDIA)

Responding to the impacts of climate change represents a major challenge to developing countries and is an important focus for Australia’s development assistance. Development pathways need to be designed from the beginning to be robust to climate risks (WB 2008a) and development programs for infrastructure should make sure that all investment plans incorporate a climate-impacts perspective (WB 2008b).

AusAID activity managers need to be aware of how climate change will impact on investments in Australia's international development assistance program and how best to integrate adaptation measures to accommodate current and expected future changes.

In deciding how best to respond to future climate change impacts and infrastructure activity, a judgment will need to be made about the vulnerability of the infrastructure, the cost of adapting and the relative benefits. For instance, activities involving the design of a bridge should almost certainly include measures to adapt to climate change. On the other hand, investment in a climate-proof road may not be justifiable if it is more cost effective to have materials, labour and funding available to mobilise quickly to restore a lower grade road following a climate event

Infrastructure interests

Australian support for infrastructure development focuses on:

- Improving poor people's access to essential infrastructure services such as water supply and sanitation, transportation, energy, solid waste disposal, drainage, adequate housing and health services
- Assisting the creation of enabling environments for both private and public financing and management of infrastructure
- Supporting human resources development, institutional strengthening and capacity building in the infrastructure sector.
- The lack of infrastructure services can have major health implications such as: higher rates of child mortality (MDG 4) in urban informal settlements than in rural poor areas because of water borne infections like typhoid and cholera; vector-borne diseases such as malaria and dengue fever (MDG 6) often increase in urban areas due to insufficient drainage and improper disposal of waste.
- HIV/AIDS, tuberculosis and other infectious diseases are generally more prevalent in urban areas due to higher population density.
- Food security - levels of malnutrition in poor urban areas are often higher than in rural areas, as urban residents tend to buy food locally in small quantities at higher prices. The reliance on markets also means that the urban poor are the most vulnerable communities to food price spikes.

Current infrastructure-related projects:

- Under the Australia Indonesia Partnership for Reconstruction and Development (AIPRD), Australia is supporting a major national roads program, junior secondary school building construction and rural infrastructure.
- supporting the maintenance of economic roads, including the Highlands Highway, AusAID is helping Papua New Guinea improve its processes for the planning and delivery of transport infrastructure.
- In the Greater Mekong, Australia is looking to support infrastructure programs that promote regional integration.
- Australia will continue to help its regional partners address their infrastructure needs through a major Infrastructure for Growth Initiative. To maximise impact and leverage, the initiative will include a partnership with the World Bank and Asia Development Bank, and seek to operate alongside or as part of multilateral-financed interventions in the Asia-Pacific region.
- Provide Australian and international expertise in areas such as public-private partnerships; regulatory reform; improved governance and anti-corruption;

management and maintenance regimes; regional integration; and environmental and gender impacts

- Finance high-priority infrastructure projects through the multilateral development banks and, in some cases, bilaterally for projects that have strong economic and social benefits and where national government, private and development bank finance is not available.

Disaster Risk Reduction

On 15 June 2009, at the Global Platform for Disaster Risk Reduction, Australia launched [Investing in a Safer Future: A Disaster Risk Reduction policy for the Australian aid program](#). The goal of this policy is the reduced vulnerability and enhanced resilience of countries and communities to disasters.

A Global Commitment: Hyogo Framework for Action

Building on the international momentum to save lives and protect development gains following the Indian Ocean Tsunami in 2004, 168 countries and multilateral organisations met in Japan, to draw international attention to the importance of disaster reduction. They adopted the [Hyogo Framework for Action 2005-2015](#) (HFA) which signals a move away from post-disaster response efforts to a more comprehensive approach to reducing disaster risks at all times. Australia supports our partner governments, civil society and multilateral organisations in the implementation of the HFA for reducing disaster losses.

Priorities for action 2005-2015

A. General considerations

B. Priorities for action

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation
2. Identify, assess and monitor disaster risks and enhance early warning
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels
4. Reduce the underlying risk factors
5. Strengthen disaster preparedness for effective response at all levels

Australia-Indonesia Facility for Disaster Reduction (AIFDR)

In late 2008 the Prime Minister of Australia and the President of Indonesia agreed to form a A\$67 million Partnership for regional disaster reduction that will involve Australian and Indonesian collaboration on innovative scientific solutions, risk information and analysis, and training and outreach in support of greater disaster mitigation and preparedness in Indonesia and regionally.

The Goal - Strengthened national and local capacity in disaster management in Indonesia, and promotion of a more disaster resilient region.

Operating Principles

- Disaster Risk Reduction – AIFDR will work to improve the quality of disaster risk reduction and work to increase capacity for risk and vulnerability identification and risk mitigation in disaster planning and implementation.
- Relationships – AIFDR will work collaboratively through the fostering of strong relationships with other key DRR-focused stakeholders.

- Capacity Development – AIFDR recognises the transient nature of development assistance initiatives and seeks to work with Indonesian colleagues and institutions in a sustainable manner.
- Gap-Filling – AIFDR will seek to avoid duplication of the efforts by others, by focusing on indentifying gaps in the current DRR capacity.
- Alignment – AIFDR recognises the excellent work being undertaken by government, bilateral, multilateral and civil society entities, in DRR. It will seek to align its own efforts within existing framework & agreements.
- Integration – AIFDR will seek to link and integrate scientific risk and hazard identification, DRR research and information generation, training and mentoring programs and DRR policy and planning tasks.

APPENDIX B: ALLIED URBAN DEVELOPMENT PROGRAMS

Development organisations working on urban issues in the Asia-Pacific region

World Bank

The World Bank has the primary goal of reducing poverty by providing technical and financial assistance for development programs throughout the world. The Bank's current priorities are focused on what they describe as Five Key Factors for development: 1) Capacity building; 2) Infrastructure creation; 3) Development of financial systems; 4) Combating corruption; and, 5) Promote research, consultancy and training. They view these as forming the basis for a Comprehensive Development Framework that is facilitated directly through World Bank Programs and through multilateral projects to provide loans, grants, advisory and/or technical services. Recently, these objectives have become closely linked with the Millennium Development Goals. The Bank's activities are also supported by researcher through the World Bank Institute and consultancies with other organisations, and through collaboration activities as part of its Global Development Learning Network.

The World Bank has a long history of involvement with urban development. Much of their work on cities has been part of portfolios without a strictly urban focus (e.g., infrastructure projects). However, in 2000 the World Bank issued its Urban Strategy, *Cities in Transition – World Bank Urban and Local Government Strategy* which focused on four interconnected themes for addressing urban development challenges: 1) bankability; 2) competitiveness; 3) good management; and 4) liveability. This strategy has been both praised and criticized on several different fronts, and the Bank has recognized that issues such as climate change, food security, energy, rapid urbanisation, and globalisation need to be considered in its urban policy. Thus, the World Bank is in the process of updating their urban strategy for release in 2009.

The World Bank operates in a wide range of countries in the Asia Pacific region. Currently, their main focus is on China, Indonesia, Philippines, Vietnam, Bangladesh, India, and Afghanistan, with less investment in Gaza and West Bank (Palestine), Pakistan, Russia, Sri Lanka, Tajikistan, Georgia, Iran, Iraq, Uzbekistan, Mongolia, Lebanon, Azerbaijan, and the Kyrgyz Republic. In the past, the Bank has had urban programs in Thailand, Kazakhstan, Cambodia, Malaysia, Republic of Korea, Laos, and Turkmenistan, and in the Pacific, the World Bank currently has one project in the Solomon Islands but has worked on urban issues in the past in Timor-Leste, Papua New Guinea, and Fiji.

Examples of World Bank Urban Projects in the Asia Pacific

- Access to urban services for the poor – Many projects focused on infrastructure including water supply, sanitation, sewerage, waste water, electricity / power sector development, electric utility management, and transportation. Some examples of work on housing and communal services, environmental management, solid waste management, disaster recovery, urban reconstruction (i.e. post-conflict; i.e. Kabul), urban upgrading, and municipal services. Few examples, but some projects on topics such as city transformation (i.e. making Mumbai a world class city), sustainable energy

(Solomons), landfill gas recovery (China), focus on development of medium (China) and small (Kyrgyz Republic) cities and towns, microfinance (Bangladesh), and education development (Lebanon).

- Municipal finance – Projects to help cities achieve fiscal sustainability, fiscal technical reform, public financial management, and more general municipal reform.
- Municipal governance and institution building – Projects to encouraging public private partnerships, facilitate cross-cutting governance (across ministerial /policy portfolios), facilitation of enabling policy environments, capacity building (esp. around strategy and project management / implementation capabilities), institutional reform, negligible evidence of stakeholder involvement / public decision-making (i.e. Vietnam – Coastal Cities Environmental Sanitation Project).
- Other urban development initiatives – In addition to the areas described above, the World Bank has some projects focused on community empowerment in urban areas (Indonesia), cultural heritage and urban environment (Lebanon), and municipal heating (Russia).

Links to World Bank Resources

- The World Bank (WB): <http://www.worldbank.org/>
- World Bank Data and Research: <http://www.worldbank.org/>
- Sustainable Rural and Urban Development: <http://www.worldbank.org/>
- Urban Strategy: <http://www.wburbanstrategy.org/urbanstrategy/>
- Climate Resilient Cities: www.worldbank.org/eap/climatecities
- World Bank Institute (WBI): www.worldbank.org/wbi

Cities Alliance

The Cities Alliance was founded in 1999 by the World Bank and UN-Habitat as a network of cities and development organisations focused on poverty reduction in urban areas worldwide. One of its goals is to facilitate relationships between cities and aid agencies so that successful work on poverty reduction at city scales can be incorporated into broader strategies and be adopted in other places. Unlike many initiatives focused on cities, The Cities Alliance promotes the positive aspects of urbanisation and helps cities and countries to plan for future growth and sustainable development. In addition to the World Bank and UN-Habitat, the Cities Alliance membership includes:

- Asian Development Bank, European Union, UNEP;
- Slum Dwellers International (SDI);
- Australia, Brazil, Canada, Chile, Ethiopia, France, Germany, Italy, Japan, Netherlands, Nigeria, Norway, Philippines, South Africa, Spain, Sweden, United Kingdom and United States of America; and,

- Local authorities, represented by ‘United Cities and Local Governments’ and ‘Metropolis’.

The Cities Alliance works with its members and host countries to provide three principle types of development assistance that they argue must incorporate sustainability, social inclusion, productivity, good governance:

- City development strategies (CDS) – Assistance to local stakeholders to define and develop their vision for their city with regard to economic growth, environment and poverty reduction and then develop clear priorities for actions and investments
- Citywide and nationwide slum upgrading - In accordance with the Alliance’s *Cities Without Slums* action plan and the Millennium Development Goals (Target 11), including promoting secure tenure, shelter finance, and policies to help prevent new slums from forming
- Sustainable financing strategies – To help cities to attract the long-term capital investments needed for infrastructure and other services.

The Cities Alliance is currently focused on activities in China, India, and the Philippines, with some project work in Azerbaijan, Bangladesh, Bhutan, Cambodia, Indonesia, Mongolia, Nepal, Pakistan, and Russia. The Alliance also has a number of projects with more of a regional focus. Some of their activities in the Asia Pacific region include slum upgrading (basic infrastructure, water, and sanitation), developing national, regional and city urban development and management strategies, promoting reforms in land tenure and housing, financial assessments of urban development plans, and capacity building at community and institutional levels.

Links to Cities Alliance Resources

- Cities Alliance (CA): <http://www.citiesalliance.org/index.html>

Asian Development Bank

ADB is a regional development bank established in 1966 to promote economic and social development in Asian and Pacific countries through loans and technical assistance. It has 67 members with 48 from the region, including Australia, and 19 from other parts of the globe. The United States and Japan are the largest shareholders, and the ADB has an annual lending budget of around US\$7 billion. The ADB has a strong interest in urban development and has identified six issues as the main challenges facing urban areas in the region:

- Sustaining urban areas as engines of growth
- Managing rapid urbanisation
- Bridging supply and demand gaps on infrastructure services
- Strengthening urban management capacity
- Decentralizing urban administration, and
- Responding to globalization.

One of the principal ways ADB has pursued these issues is through the formulation of city development strategies for several cities in the region. These seek to incorporate a long term perspective on urban development, linkages between national and city level policies, and an emphasis on social, economic and environmental sustainability. The ADB currently has urban strategies for Bangladesh, Cambodia, Fiji, India, Mongolia, Nepal, Pakistan, China, Sri Lanka and Tonga.

Links to ADB Resources

- Asian Development Bank (ADB): <http://www.adb.org/>
- ADB Asia Regional Information Center: <http://www.adb.org/REMU/aric.asp>
- ADB Asian Development Review: <http://www.adb.org/documents/periodicals/adr/>
- ADB Asian Regional Integration Center: <http://aric.adb.org/>
- ADB Urban Development: <http://www.adb.org/urbandev/default.asp>
- Asian Development Bank Institute: <http://www.adbi.org/>

Other organisations working on urban issues in the Asia-Pacific region

National Development Agencies

- Agence Française de Développement, AFD: <http://www.afd.fr/jahia/Jahia/>
- Australian Agency for International Development (AusAID):
<http://www.ausaid.gov.au/>
- Australia-China Council: <http://www.dfat.gov.au/acc/>
- Belgium Development Cooperation: <http://www.dgdc.be/en/index.html>
- Canadian International Development Agency (CIDA): <http://www.acdi-cida.gc.ca/>
- Danish International Development Agency (DANIDA): www.um.dk/en
- Dutch Ministry of Foreign Affairs (Buitenlandse Zaken; BuZa):
<http://www.minbuza.nl/en/home>
- European Commission – Development Directorate-General:
<http://ec.europa.eu/development/>
- Finland Department for International Development Cooperation (global.finland):
<http://global.finland.fi/>
- Gesellschaft fuer Technische Zusammenarbeit (GTZ - German Technical Cooperation):
<http://www.gtz.de/en/>
- Italian Development Cooperation Programme:
<http://www.cooperazioneallosviluppo.esteri.it/pdgcs/inglese/intro.html>
- Japan International Cooperation Agency (JICA): <http://www.jica.go.jp/english/>
- Korean International Cooperation Agency (KOICA): <http://www.koica.go.kr/>

- Luxembourg Agency for Development Cooperation (Lux-Development): <http://www.lux-development.lu/>
- New Zealand Agency for International Development (NZAid): <http://www.nzaid.govt.nz/>
- Norwegian Agency for Development Cooperation (NORAD): <http://www.norad.no/>
- Polish Aid (Polska Pomoc): <http://www.polskapomoc.gov.pl>
- Portuguese Institute for Development Support (IPAD): <http://www.icp.mne.gov.pt/>
- Spanish Agency for International Cooperation (AECI): <http://www.aecid.es/web/en/>
- Swedish International Development Cooperation Agency (SIDA): <http://www.sida.se/>
- Swiss Agency for Development and Cooperation (SDC): <http://www.deza.admin.ch/en/Home>
- Taiwan International Cooperation and Development Fund (ICDF): <http://www.icdf.org.tw/english/index.asp>
- Turkish International Cooperation and Development Agency (TIKA): www.tika.gov.tr
- UK Department for International Development (DFID): <http://www.dfid.gov.uk/>
- USAID: <http://www.usaid.gov/>

Multilateral Development Organisations

- Association of Southeast Asian Nations (ASEAN): <http://www.aseansec.org>
- ASEAN Australia Development Cooperation Program (AADCP): <http://www.aadcp.org>
- International Monetary Fund (IMF): <http://www.imf.org/>
- Organization for Economic Co-operation and Development (OECD): <http://www.oecd.org/>
- World Health Organisation: <http://www.who.int/en/>
- WHO Centre for Health Development: <http://www.who.or.jp/index.html>
- WHO Urban Settings Knowledge Network: http://www.who.int/social_determinants/knowledge_networks/settlements/en/index.html

Foundations

- Clinton Foundation: <http://www.clintonfoundation.org/>
- Bill and Melinda Gates Foundation: <http://www.gatesfoundation.org>

Development Research and Implementation Networks

- Asian Cities Climate Change Resilience Network: <http://www.rockfound.org/initiatives/climate/accrn.shtml>
- Asia-Pacific Network for Global Change Research (APN): <http://www.apn.gr.jp/en/indexe.html>
- Australian Development Gateway: <http://www.developmentgateway.com.au>
- Cities Development Initiative for Asia (CIDA): <http://www.cdia.asia/>
- City Mayors: <http://www.citymayors.com/>
- Clean Air Initiative for Asian Cities: <http://www.cleanairnet.org/caiasia/1412/channel.html>
- Co-Benefits Hub Asia (Manila observatory): http://www.observatory.ph/co-benefits_asia/
- Deutsches Komitee Katastrophenvorsorge e.V.: <http://www.dkkv.org/>
- Earthquakes and Megacities Initiatives: <http://www.emi-megacities.org/>
- East Asian Development Network (EADN): <http://www.eadn.org/>
- Economy and Environment Programme for Southeast Asia (EEPSEA): <http://www.idrc.ca/eepea/>
- Global Forum for Disaster Reduction (GFDR): <http://www.gfdr.org/>
- ICLEI-Local Governments for Sustainability (ICLEI): <http://www.iclei.org/>
- Cities for Climate Protection Australia: <http://www.iclei.org/index.php?id=2291>
- ICLEI Oceania: <http://www.iclei.org/index.php?id=6112>
- ICLEI Oceania: Adaptation Initiative: <http://www.iclei.org/index.php?id=adaptation>
- United Cities and Local Governments (UCLG): <http://www.iclei.org/index.php?id=7694>
- International Strategy for Disaster Reduction (ISDR): <http://www.unisdr.org/>
- Metropolis International: http://international.metropolis.net/index_e.html
- PURR - Partnership for Urban Risk Reduction: <http://www.emi-megacities.org/purr/index.html>
- Regional Network of Local Authorities for the Management of Human Settlements (CITYNET) <http://www.citynet-ap.org/>
- Shack / Slum Dwellers International (SDI): <http://www.sdinet.co.za/>
- United Cities and Local Governments - Asia/Pacific (UCLG-ASPAC): <http://www.uclg-aspac.org/index.php>

Academic and Think Tanks

- ANU Climate Change Institute: <http://www.anu.edu.au/climatechange/>
- ANU Development Studies Network: <http://devnet.anu.edu.au>

- ANU Indonesia Project: <http://rspas.anu.edu.au/economics/ip/>
- Asia-Pacific Network for Global Change Research: <http://www.apn.gr.jp/en/indexe.html>
- Australian Development Gateway: <http://www.developmentgateway.com.au>
- DAC - Sustainable Cities: <http://sustainablecities.dk/>
- Global Development Learning Network (GDLN): <http://www.gdln.org/>
- GDLN APAC TDLC: GDLN Asia Pacific Association
- Ideas4Development.(BLOG): <http://www.ideas4development.org/en/>
- International Council for Science (ICSU): <http://www.icsu.org/index.php>
- Asia & Pacific: <http://www.icsu-asia-pacific.org/>
- Environment and Sustainable Development: http://www.icsu.org/1_icsuinscience/SUSTSD.html
- International Centre for Sustainable Cities: <http://sustainablecities.net/>
- International Development Research Centre - Southeast and East Asia: http://www.idrc.ca/en/ev-8556-201-1-DO_TOPIC.html
- International Institute for Applied Systems Analysis (IIASA): <http://www.iiasa.ac.at/>
- International Institute for Environment and Development: <http://www.ied.org/>
- Institute for Social and Environmental Transition: <http://www.i-s-e-t.org/>
- National Institute for Science and Technology Policy and Strategy Studies (NISTPASS): <http://www.nistpass.gov.vn/>
- Overseas Development Institute (ODI): <http://www.odi.org.uk/>
- Sustainable Cities: <http://sustainablecities.dk/>

Watchdog Groups

- Bank Information Centre: <http://www.bicusa.org/en/index.aspx>
- AID Watch: <http://www.aidwatch.org.au>
- Essential Action - Campaign Against the IMF, World Bank and Structural Adjustment: <http://www.essentialaction.org/imf/>
- Bretton Woods Project: <http://www.brettonwoodsproject.org/>
- CADTM - Committee for the Cancellation of the Third World Debt: <http://www.cadtm.org/spip.php?article2241/>
- IFIwatch: <http://www.if WATCH.tv/>
- IFIwatchnet: <http://www.if WATCHnet.org/>
- Indonesian Forum for Environment (WALHI - Friends of the Earth Indonesia): <http://www.eng.walhi.or.id/>

- The World Bank Research Observer: <http://wbro.oxfordjournals.org/>
- Oxfam: <http://www.oxfam.org>

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