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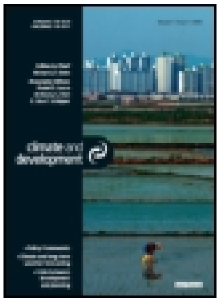

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In support of urban adaptation: a participatory assessment process for secondary cities in Vietnam and Bangladesh

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Vietnam and Bangladesh are countries already impacted by weather-related extreme events. Scientific modelling projections indicate that climate change, and changes to climate variability, will increase risks for both countries in the future. Targeting this challenging contemporary agenda, this paper reflects on the lessons learned from a collaborative research project, funded by the Asia Pacific Network for Global Change Research, which was carried out jointly in the Vietnamese city of Huế and the Bangladeshi city of Satkhira. The focus on secondary cities was intentional as they face unique challenges – a combination of rapid growth and development, adverse climate-related impacts, and in many cases less institutional adaptive capacity than their primary city counterparts. Whilst numerous assessment tool kits already exist, these have typically been developed for rural or natural resource contexts. Therefore, the objective of this action research activity was to develop a flexible suite of participatory assessment tools and methodologies that were refined specifically for the urban context; as well as being easy to use by local practitioners at the city and neighbourhood scales. This paper summarizes the research and stakeholder engagement activity that was carried out before presenting the main findings from each of the case study cities (detailing both climate-related risks and potential adaptation options). This analysis is further extended to include a reflective critique of the assessment process, a comparative analysis of the activity carried out in the two case studies, and the 'South–South' learning process that occurred between project partners. Key findings are then distilled to put forward recommendations in support of climate change assessment activity in secondary cities across the Asia-Pacific region.

Keywords: climate risks; assessment tool kit; adaptation; disaster risk reduction; secondary cities; Vietnam; Bangladesh

Introduction

Bangladesh and Vietnam are amongst a group of countries considered the most seriously threatened by the impacts of a changing climate (Hossain, Reza, Rahman, & Kayes, 2012; Netherlands Climate Assistance Program [NCAP], 2008). Both countries already experience coastal cyclonic storms and annual cycles of flooding/water-logging of the urban environment, punctuated by periodic extreme events. These are projected to increase in frequency and intensity under a changing climate (Intergovernmental Panel on Climate Change [IPCC], 2007; IPCC, 2013). Slower onset impacts such as sea-level rise and saltwater intrusion are also of increasing concern to local communities in these countries (Huq et al., 2004; World Bank, 2010). It is also critical to factor in important socio-ecological linkages as future climate-related impacts will not occur independent of societal changes. In particular, the rapid urbanization of many secondary cities in Asia adds considerable complexity to the goal of sustainable urban development under a changing climate (Cohen, 2006; Huq, Kovats, Reid, & Satterthwaite, 2007; Parnel et al., 2007).

Whilst many different agencies and organizations have developed their own climate assessment tool kits (ICLEI Oceania, 2008; UNDP, 2010) attention has tended to focus on rural areas to date, often relating to natural resources management and the promotion of sustainable livelihoods. Relatively few assessment tools have been developed to explicitly consider the urban dimension of climate risks (Moser & Stein, 2011) and the particular challenges that face rapidly developing secondary cities in Asia (driven by higher concentrations of people and assets, and complex additional development challenges such as a lack

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of formal planning and the resultant outcomes; as evidenced by widespread informal settlements and the urban poor – see: Banks, Roy, & Hulme, 2011).

In response to this knowledge deficit, a multi-country collaborative research project – funded by the Asia Pacific Network for Global Change Research – was conducted to develop, test, and refine an assessment tool kit in two rapidly growing secondary cities in Bangladesh and Vietnam. The tool kit, comprising a portfolio of participatory assessment approaches, was tested in close collaboration with key stakeholders and community representatives in Satkhira (Bangladesh) and Huế (Vietnam) to ensure it was fit for the local purpose. This paper distils the key findings that arose from this study (completed at the end of 2012); not only discussing the assessment tool kit and its application in the case study areas in Bangladesh and Vietnam, but also reflecting on the implications for future assessments (and potential adaptation pathways) relevant to other fast-growing secondary cities in Asia.

Research methodology

Collaborative approaches involving a wide range of different stakeholders are necessary when dealing with the complexity of socio-ecological issues such as global environmental change (Roberts, 2010). Decision-makers not only need to consider the range of potential impacts climate change might have in the future, and where and when these may occur, but also how different parts of a community might respond (Fünfgeld & McEvoy, 2011). Non-climate factors also need to be considered, as future climate change will impact on societies whose characteristics, values and infrastructure are likely to differ substantially from those observed today.

The overarching methodology for the project was one strongly underpinned by participatory action research principles. Such a collaborative approach not only enables the inclusion of local knowledge and skills within the assessment process (climate risks being context and location specific), but also ensures that a broad range of perspectives are given voice in the identification and consideration of locally applicable adaptation responses. Participatory action research therefore seeks to blend learning approaches associated with action research (understanding change) with participatory action learning (empowering change) (German & Stroud, undated; Walter, 2009; Whyte, 1991). Along these lines researchers, key stakeholders and community representatives from each case study were involved in a deliberate process of reflective learning in order to test and develop the participatory assessment tool kit and to contribute to the strengthening of local adaptive capacity. Learning through shared experience between the case studies was an intentional goal of the project from the outset.

Although there is no agreed definition of ‘secondary’ cities (Rondinelli’s, 1983 definition of secondary cities hosting populations of 100,000 excluding national capitals nonetheless applies to both case studies here), assessing the vulnerability of such cities to climate change operates within different structural settings and resource capacities to that of their primary and capital counterparts. Beyond population size (a key driver for policy, resource and research focus), the urban footprint of developing secondary cities is often characterized by a lower presence of highly skilled professionals and tertiary employment sectors, high dependency on primary industry and land use, and a higher level of peri-urban integration with rural hinterlands and land uses such as agriculture (Learner & Eakin, 2011). As a result, an approach integrating participatory methodologies more commonly applied in rural settings with top-down climate and socio-demographic data was developed for the project.

Whilst there is an array of manuals and guidebooks on participatory methods and appraisals in a developmental context, the bulk of these do not deal with urban contexts, while those that do have largely been developed for, tested in and applied to primary or capital – rather than secondary – cities. Additionally they tend to deal with other aspects of development rather than an explicit consideration of adaptation to climate change. Nonetheless, in recent years there is some evidence of an emerging trend of utilizing participatory assessment methods to inform adaptation action (Daze, Ambrose, & Ehrhart, 2009; Regmi, Morcrette, Paudyal, Bastakoti, & Pradhan, 2010). These represent a progression from merely understanding the likely consequences of climate change impacts to utilizing this knowledge to inform locally appropriate agendas of change.

At the outset, the development and testing of a participatory assessment tool kit was framed by three important premises. In the first instance, there needed to be explicit consideration of the synergies and differences between the fields of climate change adaptation (CCA) and disaster risk reduction (DRR) in the local contexts (for a useful overview, see: Thomalla, Downing, Spanga-Siegfried, Han, & Rockstrom, 2006). Second, the development of the assessment methodology was to involve the integration of top-down climate scenarios with bottom-up vulnerability assessments. Finally, the importance of non-climate drivers (for example, urban development processes) in contributing to future risks in both case studies needed to be recognized.

The research methodology also involved a case study approach. The cities selected for study were Satkhira (Bangladesh) and Huế (Vietnam). The rationale for the case study selection is evidenced in Table 1, with the two cities being comparable both to each other and as representative ‘secondary’ cities within their respective national contexts. Additionally, although each country differs in terms of socio-economic, cultural and political setting,

Table 1. Comparable national and city-level demographic data (Bangladesh Bureau of Statistics [BBS], 2012; General Statistics Office of Vietnam [GSOV], 2012).

Metric	Satkhira	Huế
Location	22.35° N, 89.08°E	16.47° N, 107.58°E
Population	460,892 (2011)	338,100 (2011)
Pop. growth rate (decadal avg. of census data)	1.17% p.a.	2.63% p.a.
Regional capital city (pop.)	2.32 m (Khulna)	0.89 m (Đà Nẵng)
National capital city (pop.)	7.03 m (Dhaka)	6.45 m (Hà Nội)
Urban area (Ha)	27.84 km^2	71 km^2
Sub-city divisions	9 wards	27 wards
Classification	Provincial capital	Provincial capital
City-level governance arrangement	Local authority (Provincial Party Committee)	Local authority (District Commission)

both cities are already comparably impacted by climate-related hazards, particularly flooding and water-logging. Without adaptation responses, these impacts are likely to worsen through a combination of continued urban development and a projected increase in the frequency and intensity of extreme events.

The programme of research that was carried out can be broken down into four stages. A core early objective of the research was to review – and make sense of – the latest scientific knowledge and array of different climate assessment tool kits in order to most effectively build on existing knowledge and best-practice guidance. Second, a tool comprising different methodologies, approaches, and user guidance was developed specifically for the application in the urban context. The vulnerability and adaptation assessment carried out for Sorsogon City, Philippines (UN-Habitat, 2008; 2011) was a key resource in this regard. Third, the tools were tested to evaluate their applicability and ease of use by local communities in the two case studies (at both city and neighbourhood levels), which are representative of fast-growing secondary cities in the Asian context. ‘On the ground’ participatory assessment activity was supported by the local research teams. The final stage was then to produce a project report for dissemination to relevant stakeholders to facilitate and empower local adaptation processes and action.

Case study I: Satkhira, Bangladesh

With the exception of the far north and south-east of the country, Bangladesh’s geography is characterized by low-lying floodplains and a dense and extensive network of river systems (Ahmed, 2006). Across the country, annual rainfall averages range from 1200 mm in the west to 5000 mm in the east; resulting in highly variable regional hydrological norms (Master Planning Organization [MPO], 1991; cited in Ahmed, 2006). A number of other contributing factors – such as an average annual surface water flow of 1350 billion cubic metres and 90% of the country being located less than one metre above sea level (Karim & Mimura, 2008) – result in a quarter of the country, on average, experiencing some form of flooding each year (Ahmed, 2006). Adding to this, a contrasting seasonal rainfall pattern (with 80% of rainfall falling during the monsoon season) and volatile inter-annual variation frequently can result in widespread drought. Saline intrusion, a potential consequence of both coastal flooding and drought, acts to further exacerbate existing environmental stresses with adverse consequences for water quality and availability (Hossain et al., 2012).

Satkhira is a municipal town in the lower South West region of Bangladesh. With a population of over 450,000, the town is made up of 9 wards and 31 mahallas (neighbourhood sub-divisions) covering an area of 398.57 km^2 (BBS, 2011). It is part of Satkhira District (Khulna division), which is bounded by Jessore district to the North, Khulna district to the East, Pargana district to the West, and in the South, the Bay of Bengal.

The area of study is part of the High Ganges River Floodplain, made up of a complex relief of broad and narrow ridges and inter-ridge depressions. Whilst the upper parts of the high ridges stand above normal flood levels it is important to note that the lower reaches, and the basin margins, are commonly shallow-flooded on a seasonal basis. Many rivers influence the surface water regime in Satkhira municipality, with Ichamati and Kopotakhi being two of the most important (though they skirt around the town itself). Satkhira Khal (a man-made canal) flows north to south through the centre of the municipality and plays a vital role in stormwater drainage for local communities (Parvin, Takahashi, & Shaw, 2008).

The climatic profile of the case study area itself is strongly influenced by its location – bordered by the Bay of Bengal in the south and the large tract of Gangetic land to the North and West (fertile plains fed by the Ganges River). Three distinct climatic seasons can be distinguished: cool and dry (December–February), the pre-monsoon hot period (March–May), and the rainy monsoon (June–September). October–November is considered the autumn season. The dominant climatic variable for Satkhira is rainfall. The region is subject to pronounced seasonal patterns – the winter season (DJF) is very dry and accounts for only 2–3% of the total annual rainfall, the pre-monsoon hot season (MAM) sees around 15% caused by convective thunderstorms or nor'westers (called 'Kal-baishakhi' locally); whilst three quarters of all annual rainfall occurs during the rainy season. During this period rainfall can vary between 452 and 1733 mm, with July typically the month of highest rainfall (Moniruzzaman, 2012). Outside of this rainy period, the district is highly prone to 'Rabi', a dry season drought, with the far west of the country experiencing these severe conditions on a regular basis (Ahmed, 2006). In addition, Satkhira district is exposed to cyclone tracks and is classified as being at high risk of both extreme wind and inundation impacts (Ministry of Environment and Forests [MEF], 2009).

As with much of Bangladesh, agriculture acts as the main employment source and income provider for local communities, with important agricultural and aquaculture products including shrimp, fish, rice, jute, and wheat. Increasing saline intrusion, however, has led to a significant shift away from crop-based products (predominantly rice) towards the cultivation of 'bagda' (large variety) shrimp; either as the primary product or in conjunction with white fish and/or rotation with paddy fields (Global Facility for Disaster Reduction and Recovery, 2011). However, construction of shrimp/fish ponds creates drainage obstructions, reducing water flow, and exaggerating water-logging and salinity problems (Ahmed, 2008).

Case study II: Huế, Vietnam

A country of 91.5 million people, Vietnam has a diverse range of climatic conditions and geographic settings (Phuong et al., 2012). Whilst Vietnam's climate is characterized as 'tropical monsoon', it has a coastline that stretches for 1662 km (ranging in latitude from 8°27′ to 23°23′N), and hence there is considerable spatial variation in climatic variables. Annual average temperature ranges from 12.8 to 27.7°C and rainfall between 1400 and 2400 mm (Phuong et al., 2012). Due to its geographical attributes, consideration of vulnerability to climate change at the national scale has tended to focus predominantly on coastal impacts; such as saline intrusion, coastal flooding, and impacts associated with typhoons (extreme winds, rainfall, and storm surge) (Adger, 1999; Beckman, 2011).

Situated in central Vietnam, Huế is the largest city in Thua Thien Huế Province. It has considerable historic importance, having once been the national capital and is also well known for the many monuments that remain from the times of the emperor, e.g. Thanh Noi (the Imperial City). Its location is strategically important as it not only links northern and southern regions of the country (National Road 1 and the Trans-Asia Railway being two key transportation routes) but it is also defined as a key economic region as part of the East West economic corridor (Vietnam–Laos–Thailand–Myanmar). The city itself has a population of 338,000 located in an area of 71 km^2 and the population density, 4763 per km^2, is relatively high when compared to other provincial cities in Vietnam.

Since Doi Moi (a series of sweeping economic reforms that were initiated in 1986), Vietnam has undergone rapid socio-economic transformation; resulting in rapid and sustained economic growth, urbanization, global exposure, and an expansion of regional autonomy (Ministry of Natural Resources and the Environment [MONRE], 2010). Re-classification of Huế as a 'national' city by the Vietnamese Government in 2010 (a process coupled with planning for extensive government-led industry and infrastructure investment) is expected to lead to a total urban population of 1,375,000 by 2025. This equates to a projected annual average growth rate of roughly 20% (Vietnam Government, 2010).

Thua Thien Huế province is characterized by a tapestry of many different landscape types; including hills and mountains, areas of flat land, lakes, and rivers. The city of Huế's hydrological system is similarly diverse; evidenced by a high density of rivers, natural and artificial lakes, canals, ponds, and sewers (NCAP, 2008). Within the city boundaries the average height of land is 3–4 m above sea level, however some areas are more than one metre below sea level (source: Peoples Committee of Thua Thien Huế Province) and hence are highly exposed to water-logging and flooding. These impacts can be further exacerbated by upstream riverine flooding, with runoff from the mountain regions flowing into the province's four major rivers: O Lau, Huong, Bo, and Truoi, with the Huong (nicknamed the Perfume River) running through the heart of Huế city. Saline intrusion is particularly problematic for the surrounding agricultural areas, which provide much of the city's income and food production.

Similar to Satkhira, the region is also subject to tropical monsoon conditions though in this case characterized by two distinct seasons: hot-dry sunny season (May–September) and a cold-humid rainy season (October–March). The hottest time is around May and June when the temperature can reach 38–40°C (MONRE, 2010). The cold season sees temperatures drop to an average of 20–22°C, with a humidity of around 85%. Rainfall is also an important climate variable for Huế. The annual rainfall rate is 2500 mm, the majority of this falling between September and February (the peak month for rainfall is November which typically accounts for 30% of the yearly total) (Doouma et al., 2009). Resultant floods over the period 1977–2010 have averaged 3.5/year, with 36% of these rated as either serious or extremely serious. Experience indicates that the period of flood time can last from 5 days up to a week in length (Bubeck, Botzen, Suu, & Aerts, 2012). It is worth noting that there is strong correlation of drought and flood events with El Niño and La Niña patterns (droughts – El Niño-influenced years (e.g. 2003 and 2004), floods – La Nina (2009 and 2010)).

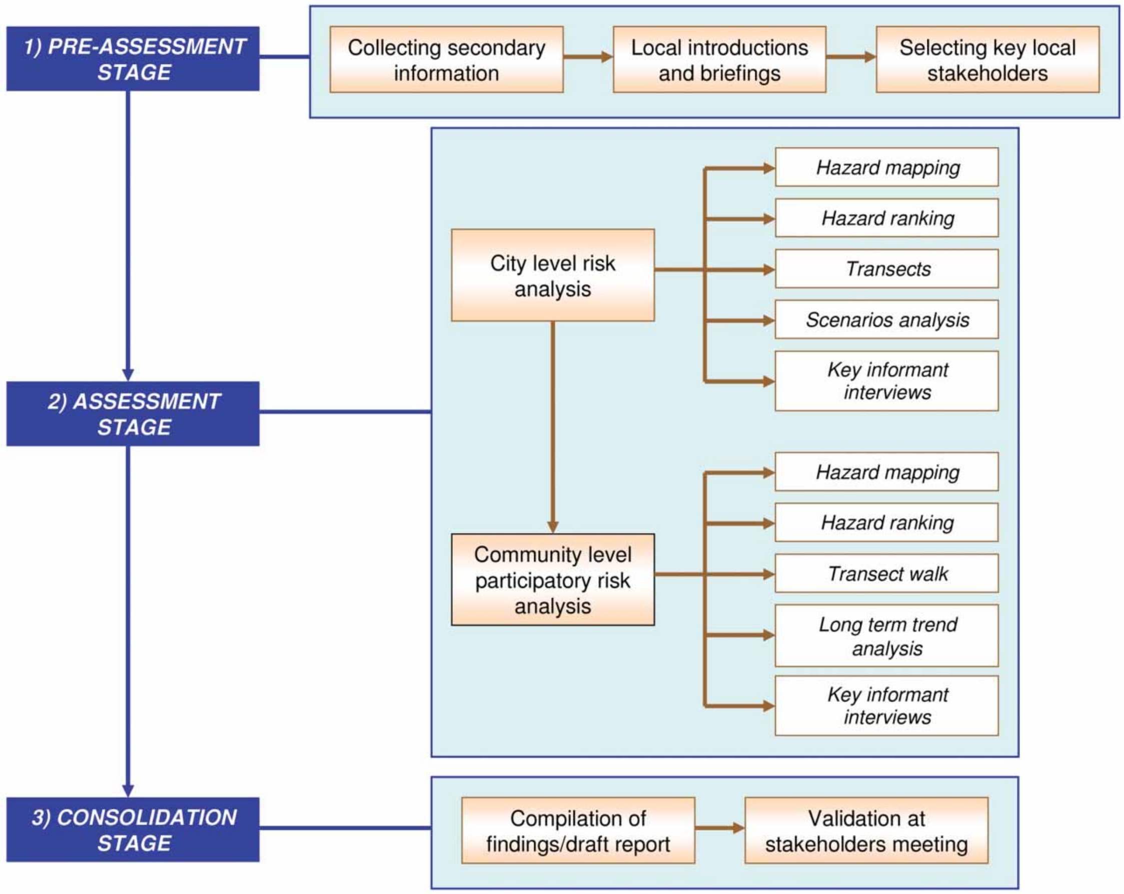

Figure 1. Local assessment framework.

Testing the tool kit

In its final format (as delivered to the local teams for both case studies), the project tool kit assembled a portfolio of different tools and approaches, including guidance on the application of different assessment methodologies. It was underpinned by two discrete, though connected, assessment stages: first, context setting and local assessments (Figure 1); and second, future risk analysis and evaluation. These stages were embedded in a broader support framework that was devised to provide the necessary guidance for those carrying out the local assessment activity.

The operational stages of the tool kit development were:

- pre-assessment (collecting secondary data, local introductions and briefings, and finalizing the key local stakeholders to be involved);
- local assessment (city and neighbourhood-level vulnerability analyses);
- consolidation (compilation of findings into a draft report, with subsequent validation at stakeholder workshops); and
- future climate scenarios (integration of top-down climate scenarios with bottom-up vulnerability assessments for the case studies).

Pre-assessment

For this initial stage, and the subsequent 'assessment' stage, the research team carried out a review of a comprehensive menu of participatory assessment tools that have been developed over the last three to four decades (key sources included: Chambers, 1983; Fals-Borda & Rahman, 1991). Whilst these tools were not specifically targeted at climate adaptation, nonetheless they offered the potential to be adapted. Two key publications (Daze et al., 2009; UN-Habitat, 2011) proved to be valuable resources in offering a palette of relevant participatory tools. However, significant further effort was needed to develop a tool kit that was tailored for the purposes of this project.

The 'pre-assessment' stage was designed to establish the local context for each case study and to encourage preliminary engagement with key stakeholders before the assessment exercises were carried out. This involved three main activities: collecting secondary information, local introductions and briefings, and the selection of key local stakeholders to be involved. This initial scoping activity was intended to identify those agencies that had strong links to the communities and could play a key role in a participatory assessment process, to engage with them at an early stage so that they understood the goals of the research, and ultimately to get their support for, and involvement in, the climate assessment process.

In the Satkhira case study, initial engagement involved a visit to the municipality and a series of meetings with different local actors. Key contacts were then invited to a half-day workshop which was used to introduce and elaborate on the hazard/risk assessment activity and to finalise stakeholder participation. As part of this process, the community group LEDARS (Local Environment Development and Agricultural Research Society) agreed to provide the human resource to support the assessment activity, and many different groups from each of the wards – business people, farmers, fishermen, teachers, health workers, labourers, and transportation workers – agreed to participate. However, representation from government agencies was unfortunately limited in the early stages.

As one of the Huế project partners was a Non-Governmental Organization (NGO) based in the city, the process of identifying key stakeholders was achieved more easily through their existing networks. These local networks were also used for introductions to other key stakeholders identified through a 'snowball' process. Following initial screening, 26 organizations were invited to participate in a kick-off meeting; with 20 people from 16 different agencies attending the event on the day. In this case study, whilst engagement with businesses was recognized as highly desirable, the private sector was not represented. Furthermore, recognizing the time constraints faced by many of the local actors, and the need to make the most effective use of everyone's time, the initial meeting was also combined with the trialling of the assessment tools prepared for the city-level risk analysis.

Participatory tools were explicitly integrated into the tool kit to emphasize the importance of a truly collaborative approach and to ensure that a diversity of perspectives in each case study was accounted for. This proved generally successful, though in hindsight some limitations to the engagement strategy in each of the case studies could still be improved upon. In the case of Satkhira, the regional location (at some distance from Dhaka) meant that access by the scientific team members was intermittent and not as 'embedded' with the local community as might have been the case (though as the project gained momentum there was greater input from local policy-makers, including the mayor of Satkhira). Likewise, whilst the Huế case study benefited from having a key partner present in the city, and hence could bring together some of the major stakeholders more easily, getting 'buy-in' from the business sector proved problematic. Similarly in Satkhira, the key private sector operators (aquaculture entrepreneurs, who were in many cases responsible for causing water-logging by building shrimp/fish ponds) were conspicuously absent from the local assessment process.

Local assessment: city level

This stage drew directly upon the knowledge and experience of local stakeholders. Structured assessment exercises (hazard mapping/ranking, transect walks, scenario and trend analysis, and key informant interviews) were carried out in both workshop settings and in the field to identify vulnerabilities to current day climate-related hazards and to begin to scope out future risks. Assessments were carried out at different spatial scales not only to collate different types of vulnerability information but also to encourage the participation of different stakeholder groups.

At the Satkhira city level, water-logging was identified and ranked as having the highest priority. 2011 was highlighted as particularly devastating, with people recalling water-logging lasting for more than three months (UNDP, 2011 for a more formal analysis of this specific event and its associated drivers). Other important hazards were monsoon flooding (2010), extreme heat (seen as an increasing problem), rainfall variability leading to both flood and drought, and salinity intrusion (though this was also attributed to human causes such as excessive groundwater extraction and the consequences of an upstream dam in India). Cyclones were also identified as an issue, though impacts were felt indirectly as Satkhira city is almost 100 km inland; experienced through the migration of rural people affected by events in 2007 and 2009. Ward 9 was identified as being the most exposed to multiple hazards, as well as being considered the most sensitive both in terms of population and productive sectors.

In Huế, whilst the main hazards affecting the city were identified and ranked with consensus (flooding ranked as the number one hazard and typhoons as the second most important), there was some level of discrepancy between different stakeholder groups when attempting to rank hazards considered less important (drought, sea-level rise, etc.). In general terms it was recognized that the higher land in the west of the city meant it was less exposed to flooding than the lower lying areas. These low-lying neighbourhoods not only house the poorest communities but also tend to have the poorest infrastructure; creating 'double exposure' through enhanced vulnerability to storms for instance. Indeed, poverty, poor infrastructure, old housing stock, and an inadequate sewerage system were all cited as important drivers of vulnerability. In the group discussions, the people of Huế were said to have considerable experience of coping with, and recovering from, extreme weather events; the major flood of 2009 which caused significant damage, and fatalities, being one such illustration. However, climate change is a relatively new and less understood concept for many in the local community (as was found to be the case in Satkhira).

Local assessment: neighbourhood level

Based on the initial city-scale analysis, the next step of the local assessment was to identify a neighbourhood community that had high vulnerability (exposure and sensitivity) to climate-related impacts; and then to support a participatory assessment of climate impacts guided by the tool kit. Similar techniques and tools were used for this community-based assessment at the city scale though future climate scenarios were replaced with structured discussions about previous weather-related trends and their impacts, and consideration of the changes that may take place in the next 10–15 years. A vulnerability-led emphasis therefore provided a shorter and more manageable time frame for local participants to consider climate-related impacts.

The area selected for in-depth analysis in Satkhira was Ward 9. When undertaking the hazard mapping and ranking exercises, participants were grouped according to: (1) farmers and fishermen; (2) teachers, service providers, and business people; and (3) women and children. Water-related issues dominated all groups' priorities and rankings; with water-logging, variability of seasons, and reduced river flow being the top three concerns. Water-logging is a good example of the complex socio-ecological interactions that can lead to adverse impacts – in this case, water-logging was strongly attributed to local drainage systems, often affected by unplanned construction of aquaculture ponds.

Limitations to participants' understanding were encountered when attempting to analyse longer term trends and future climate projections. Therefore, to complete this activity, the local research team substituted a slightly different approach – defining 1990 as a base year, which provided a 'living memory' benchmark for the participants, and then setting targets of 2000, 2012, and 2022, for people to consider recent impacts and possible changes and impacts in the short to medium term. Local input was further encouraged through the use of simple symbols.

The Huế neighbourhood selected for further analysis was Phu Hiep Ward. Four hazards were identified and ranked as high risk: flood, storms, drought, and acidity. Within the Ward, Cluster 6 was considered especially vulnerable to flooding, being low-lying as well as having poor infrastructure (changing seasonality was also noted as an issue by local stakeholders). A transect walk was carried out to complement the workshop activity, with local community members producing a transect diagram that depicted land use, altitude, residency density, environmental issues, and opportunities for improvement. Again, the final component of the local assessment for Huế was the long-term trend analysis. As some of the participants were unaware of the science of climate change this meant that it was difficult for the stakeholders to extrapolate change into the future. That said, important local vulnerability issues were highlighted and discussed; including longer lasting floods, the adverse impact on those living off the land (many residents in the Ward earn their living as farmers), and the planned local policy of relocation for those living in the most at-risk areas.

Future climate scenarios

The interpretation of climate scenarios for the use of local adaptation planning occurred in two stages. First, relevant scenario data were introduced for initial discussion by key stakeholders during the city-level analysis; this was then followed up by interactive discussions at two project workshops held in Huế and Satkhira. These activities sought to integrate a top-down expert-led process with the information collated by the stakeholder-led vulnerability assessment (a hybrid approach to determining future risks). Of all the stages this integration proved the most challenging, and raised some important questions about the most relevant temporal focus of climate assessments for secondary cities in Asia. This is discussed further in the results section.

Top-down future climate change scenarios for the Satkhira area were developed through application of the PRECIS model in 2009, which was conducted in partnership between the Bangladesh Government Climate Change Cell and the Hadley Centre (UK Met Office) (Climate Change Cell, 2009), with the A2 'divided world' emissions scenario used as input to produce rainfall and temperature projections for 2030, 2050, and 2070. Summarizing the scenarios; the model projects a significant increase in rainfall during monsoon and post-monsoon seasons by 2030, with further increases by 2050. This is expected to increase flood frequency and extent, while existing dry season drought conditions – a product of extensive existing rainfall variability – are likely to prevail, and potentially worsen. Although exact projections relating to tropical cyclone frequency and tracking remain uncertain, it is thought wind speeds and storm intensities are likely to increase. Exposure to storm-surge inundation and saline intrusion is also likely to increase through a combination of sea-level rise and enhanced storm surge; compounding water availability/quality issues.

In the case of Huế, the local research team considered three climate scenarios (A2, B2, and B1) as generated by the Vietnamese Government Ministry of Nature Resources and the Environment (MONRE) (note: the Ministry advises local authorities to apply the B2 scenario for planning processes and analysis). Average annual rainfall for the north-east area of Vietnam is expected to increase, with a high emissions scenario (A2) likely to result in a 2.2% increase in annual rainfall by 2030, and a 2.8% increase in annual rainfall by 2050. MONRE modelling of a 'B2' medium emissions scenario projects a similar 2.1% increase by 2030, with a 3.8% increase by 2050. Seasonal rainfall patterns are expected to be enhanced under each of the scenarios, with a drier dry season and more rainfall during the monsoon season. With 78.4% of Huế's rainfall currently falling between August and September, projected changes to the climate are therefore likely to enhance the risk of drought and water shortage during the rest of the year. The Huế research team used a combination of IPCC and MONRE climate change data as the basis for their participatory assessment of future risks, basing their stakeholder activity on the B2 'medium' emissions scenario through to 2050. Impacts were then considered according to human, environmental, infrastructure, and economic categories.

Results and reflections

The intention of this section is to reflect on some of the key lessons learnt from the year-long participatory activity, both from an individual case study and a whole of project perspective. Specific data from Huế and Satkhira are available in the in-country reports.[1] Discussion of the high-level results is usefully structured according to four headings: the design of the tool kit, case study findings, the integration of different approaches, and adaptation options.

Tool kit design and application

Overall, the participatory tool kit was received positively by the research teams and stakeholders in each of the case studies. It proved to be a useful mechanism for local stakeholder input to be integrated with the expert knowledge of scientists; with the output from the different exercises providing valuable contextual information for identifying and prioritizing local exposure/sensitivity to climatic hazards. This knowledge base then acted as a robust platform for the consideration of adaptation options.

Feedback from the stakeholders was welcoming of the opportunity to input local knowledge to the assessment process, with their involvement in activities also helping to raise local community awareness of local climate-related issues. The focus on secondary cities was also greatly appreciated by the local stakeholders involved. Indeed, the exchange of knowledge and cross-fertilization of expertise and ideas between countries; and the positive engagement between scientists, NGOs, policy-makers, and local communities; proved to be one of the major achievements of the project.

Although the assessment tool kit was deliberately designed to be both flexible and easy to use, some of the activities still had to be improvised by the teams when carrying out the ground surveys with local stakeholders (e.g. some participants found several of the tools difficult to apply). These 'modifications' further emphasized the need for ensuring flexibility in the design of tool kits that are intended for use by lay people. Also, as was evidenced from the case studies, each applied the tool kit in slightly different ways. Suggestions for improvements included more preparation time to enable participants to better understand the activities, i.e. pre-tool kit training, and the possibility of breaking down the exercises into smaller, easier steps; with more emphasis on different forms of visualization to enhance communication (e.g. greater involvement of stakeholders in interpreting climate scenarios and the development of narratives that resonate with the local community more effectively).

Field testing of the tool kit also provided some pointers as to how the tool kit could be improved. Two examples were: first, the focus on current day hazards led to the unintended consequence of people equating DRR with CCA. This is not an easy issue to resolve but clarity of purpose clearly needs to be addressed up-front when assessing local climate risks. Second, constructive feedback from both case studies highlighted the need to consider a reordering of the different assessment stages and tools to make most effective use of peoples' input, i.e. greater consideration given to saving time and money in light of local circumstances.

Case study findings

The post evaluation stage highlighted the need for more time and effort to prepare for the initial stakeholder engagement activity. This relates not only to comprehensive stakeholder mapping, and establishing contact with different groups, but also to the time needed to explain and contextualize the tools and activities; and in some cases even to provide basic education on the science of climate change.

Satkhira and Huế are both fast-growing secondary cities subject to similar development patterns, including informal settlements, and are already exposed to flooding and storm event impacts; which are projected to increase in frequency and intensity in the future. Both also face the additional, and increasing, problem of water-logging, exacerbated by inadequate drainage. This resulted in difficulties in separating climate-related impacts from those compounded by human action and intervention; sometimes referred to as 'pseudonatural' hazards (UNDP, 2002). This was challenging in practice as illustrated by the increasing impact of flooding and water-logging which is undoubtedly being influenced by local human drivers in both case studies.

The workshops and site visits in each country contributed to a better understanding of the common issues that are facing communities in the two cities (risks being manifest at the local scale). However, project results stressed the importance of also integrating non-climate drivers in the assessment – both cities face much more immediate development needs and the development of local adaptation responses therefore need to be cognizant of the broader sustainable development context.

The integration of different approaches

As discussed, this study sets out to integrate a bottom-up vulnerability assessment with a top-down expert-led climate risk approach; however for practical reasons the emphasis for the local assessment process in both instances relied heavily on personal experience of climate-related hazards and the identification of current vulnerabilities. This focus resonated more with the local stakeholders as they were able to make sense of current day variability/extreme events much more so than the potential impacts of longer term changes to the climate.

Given socio-economic conditions, and the rapid changes to demographics and the built environment, it was found that more chronic day-to-day concerns had greater immediacy for local communities than some point in the future. However, whilst immediate development needs provide a good starting platform for action, and should be the foundation for adaptation planning, attention to the short term must also be framed by medium and longer term change; with particular consideration to community resilience and avoiding responses that are 'maladaptive' (Barnett & O'Neill, 2010). It is argued by the authors that more climate science and higher resolution scenarios for future decades are not all that is required to move towards more climate-resilient communities; targeting existing vulnerabilities framed by shorter time periods is an equally valuable approach, and arguably more suited to cities such as Huế and Satkhira.

In addition, it would be beneficial if CCA could be better integrated with the concept of DRR as this was found to be more 'accessible' to stakeholders in both case studies, as well as having greater institutional presence in the Asia context. However, greater clarity is needed about the important overlaps and differences between DRR (responding to current day extreme events) and CCA (preparation and planning for future changes to the climate).

Adaptation options

For each of the case studies, an incremental approach which tackles existing climate-related impacts in the first instance through 'win–win' and 'no regrets' adaptation responses will not only have the benefit of addressing more immediate development needs but can also help to build community resilience in the longer term. By focusing on existing problems, it is also likely to be easier to garner political support than dealing with much longer time frames, which are made more complex by issues of uncertainty.

Inadequate infrastructure was identified as an issue in both cities, with engineering options identified as a major adaptation response; however institutional barriers to change were also emphasized by stakeholders. Indeed, a strong statement from the Satkhira workshop was: 'It is not that we don't know the problems, or the solutions, rather the issue is institutional.' Adapting to climate change is therefore not only about engineering outcomes; it is also important to recognize adaptation as a learning process which requires a better understanding of institutional barriers and opportunities affecting change. Learning by doing, and the sharing of knowledge and good practice (in this case, country to country), will be a valuable component in the strengthening of local adaptive capacity. Indeed, workshops and site visits which brought Vietnamese and Bangladesh project partners together was recorded as a positive outcome of the project. This helped to broaden a shared understanding of the different socio-cultural contexts that are so important to shaping future adaptation pathways.

There was a general consensus across the project team that following the testing and implementation of the tool kit there was a need to move beyond an assessment of climate-related risks towards more detailed guidance which supports decision-making and the implementation of adaptation measures. In this regard, a manual on climate-resilient development, specifically targeted for use by local communities, was documented as desirable.

Conclusions

The overarching goal of this project was to develop and test a participatory assessment tool kit that would support communities in fast-growing secondary cities in Asia to identify local climate risks, and to begin the process of informing adaptation planning in the respective case study cities. This activity was strongly influenced by a participatory action research approach. This not only ensured that there was genuine local ownership of the assessment, and that a diversity of perspectives was considered in order to better understand climate risks, but also that potential adaptation responses were identified with the input of local knowledge. In this regard, the tool kit acted as an important mechanism for promoting inclusiveness and ensuring that a range of perspectives was explicitly considered; emphasizing the value of effective stakeholder engagement and the considerable benefits that can arise from knowledge sharing and creating the space for a cross-fertilization of expertise and ideas. This was particularly valued in the context of learning across the case studies where the climate-related hazards were similar in nature, though the institutional context was markedly different.

A key question raised by the research activity was the amount of emphasis that should be placed on the expert-led climate risk approach and the usefulness of climate change scenarios which project change decades ahead. In both cases, a vulnerability assessment targeting current day variability and impacts proved a more effective approach for engaging with local stakeholders, and is arguably more relevant given the socio-economic and development contexts for each of the case study cities. It was found that a hybrid approach which addresses current day vulnerabilities in the first instance then considers the implications of change over longer periods of time was most useful. Indeed, an over-emphasis on the use of climate scenarios was not found to be a useful approach given local needs in the short term.

As noted in the adaptation section, there were requests for more information and guidance on moving beyond the assessment of risks to consider the implementation of adaptation outcomes. This is now the focus of contemporary international research activity, though improved linkage with practitioner communities would clearly be beneficial. Experience from the project has shown that engagement with a wide range of project stakeholders has helped to raise awareness of the climate change issue as well as contributing to a strengthening of local adaptive capacity. Adapting to a changing climate is a complex process and multiple actors all have a role to play in moving towards more climate-resilient, and sustainable, urban environments.

Note

1. Downloadable from: http://www.apn-gcr.org/resources/items/show/1601#.Unw4nDAyZ8E

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