

Risk Management and Spatial Planning – Understanding Rapid Urbanization in Climate Change

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1 ABSTRACT

In the emerging mega-urban regions of Southeast Asia, both planned and unplanned urbanisation into flood prone areas appears to be an unavoidable consequence of socio-economic development. These risks occur, often not due to a lack of risk awareness or weak planning instruments, but seem to be an accepted consequence of maintaining current economic success and social progress. Flood risk protection and implementation of costly mitigation measures are often shifted to a future development cycle, where implementation is not seen to constrain the economic goals. Asian cities located in deltaic settings such as Ho Chi Minh City (HCMC) in Vietnam, exhibit higher exposure levels to flood risk primary as a result of their location, their low elevation and if located in tropical regions, the significant annual variations in climatic and weather extremes they incur, so that a compelling need for dedicated site specific risk assessment and urban planning arises. Disasters like the recent flood in Bangkok in 2011 have shown that this development strategy cannot be justified any longer, especially in the times of a changing climate. Associated economic losses and social implications are simply too high.

Our results are an outcome of a 5 year research project in HCMC funded by the German Federal Ministry for Education and Research, focused on developing adaptation options to climate risks that could then be subsequently implemented into the existing land-use planning framework. Based on the development of core indicators describing future urban structural changes in relation to the changing patterns of risk exposures, spatially explicit planning recommendations were compiled in close cooperation with the responsible city authorities. Our contribution focuses on how to overcome the current limitations in implementing scientifically-founded and evidence-based adaptation planning to flood risks by communicating the importance in realising the present and plausible opportunities to influence future urban land-use.

2 STRATEGIC LAND-USE PLANNING UNDER A CHANGING CLIMATE

To support the potentials of urban land-use planning for adaptation in HCMC, the focus has to be on and towards the evaluation of land conditions and urban development potentials in a more spatially explicit manner than previously undertaken. In the development of planning recommendations to assist master plan adjustments for both land-use and urban development, recommendations need to be both grounded in realistic land-use and urban development scenarios.

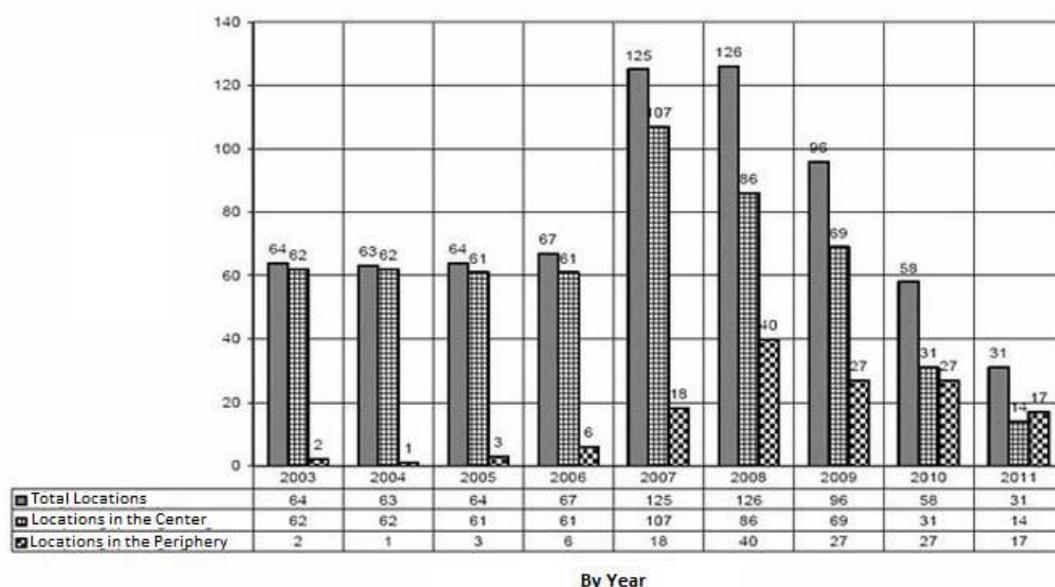


Fig. 1: Number of flooding locations in the central and periphery districts of HCMC 2003-2011 (Source: Ho Chi Minh City Steering Centre for Flood Control, 2011)

These need to in turn consider both the underlying land conditions and site suitability for development and additionally are required to integrate the pressing climate-related issues into HCMC's existing urban planning framework. Following the recent heavy investments seen in storm-water drainage upgrading and expansion, the number of flood-prone areas within HCMC – while remaining fairly constant between 2007 and 2009 at around 100 localities per year – was seen to decrease significantly in the inner-city districts (Ho Chi Minh City Steering Centre for Flood Control 2011). In contrast, districts located in the periphery, which were subjected to the most rapid recent urbanisation, and are located in general in low-lying areas display the largest number of flood events over the same time frame. (Figure 1). This substantiates the need for urban planning and urban management to be more carefully assessed to ensure that both site and off-site flooding considerations have significantly been addressed in planning. Resultantly, there is a pressing need for a risk assessment methodology to integrate the physical aspect of exposure of new urban developments with the environmental impact-related information of built-up areas.

The main factors affecting urban development activities are natural factors, like naturally flood-prone area, topography and soil conditions (Figure 2), and artificial factors, like urban services (water supply, drainage, roads), accessibility to urban centres and land prices. The current urban development situation in HCMC is characterised by a high population density in the existing urban core area, mostly by low-rise housing structures. This has led to an extreme inherent urban compactness (Figure 2), which ensures due to location a good accessibility and short commuting times for the residents. At the same time, however, low-density sprawling into the peri-urban fringe – partly caused by illegal development is visible, resulting in an ineffective infrastructure provision. The current development trends – a continued concentration and densification within city centre and along the major transportation corridors – is highly impractical, yet is mainly driven by small private development projects on the level of the single building or street block. This trend is worrying from an environmental standpoint, as without planning interventions of some degree, such small scale yet high-density developments fail to provide adequately for open space provision and environmental services. The assessment of HCMC's urban development strategy highlights a lack of effective planning and plan enforcement mechanisms for guiding urban growth orientated to the basic underlying natural conditions, against a backdrop of strong market mechanisms that have recently dictated the current development activities.

3 DEVELOPMENT OF RECOMMENDATIONS FOR ADAPTATION PLANNING

The rapid urban growth and expansion of cities into natural areas is not solely the problem of HCMC, but is a global phenomenon presenting an important challenge to both sustainability and adaptation planning. Effective planning policies are required to stem the tide of increasing land-consumptive development into the high-risk flood-prone areas of HCMC. Here, without delay urban containment policies should be considered as a promising adaptation approach to address the current and unfolding spatial risk-patterns of HCMC. Figure 2 highlights clearly that the current urban form and structure of HCMC is strongly influenced by and to some extent constrained by its underlying natural conditions.

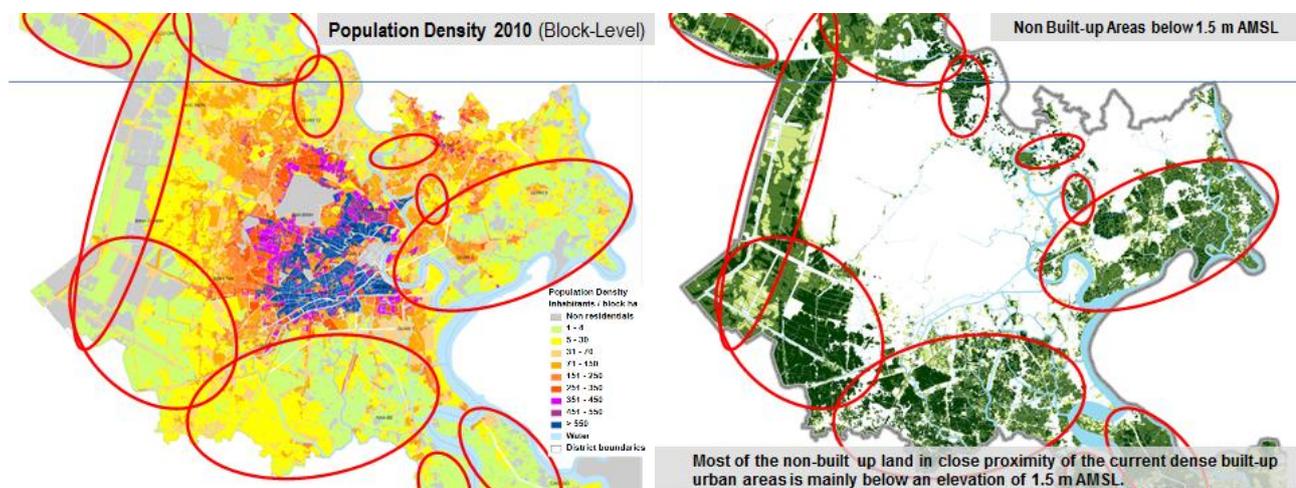


Fig. 2: Non built-up areas at flood-risk (right map) surrounding the densely populated city-core (left map) – (Storch&Downes 2012)

The few remaining open spaces surrounding the extremely dense core –mainly agricultural land–have an elevation below the current high-tide level of 1.5 m AMSL. These spaces currently act as a natural blue and green belt–akin to flood risk zoning by nature–and strongly influence the ongoing inner-city re-densification. Hence only a genuine understanding the interrelationship between urban densification and adaptation processes to current flood risk can aid the guidance the spatial adaptation processes of HCMC in the uncertain times of rapid urban growth and climate change.

During the many meetings in HCMC, final discussions over the location of the main focus areas and the areas of interests with unique impact patterns and development pressures (Figure 3) were held with the Department of Natural Resources and Environment (DONRE) and their land-use planning consultants from the Sub-National Institute of Agricultural Planning and Projection, to aid and facilitate DONRE's consultation activities with the 24 districts of HCMC.

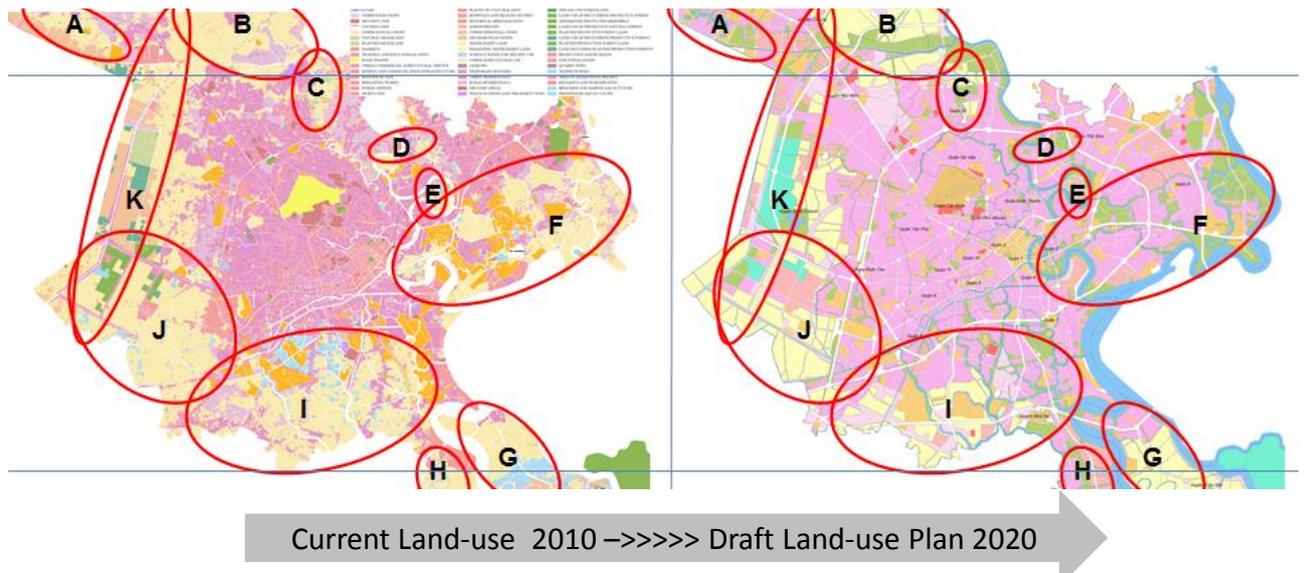


Fig. 3: The defined Focus Areas for Land-use Planning Recommendations (red circles areas A-K) marked on the current-use map derived from our urban structure type approach and a draft version of the land use plan 2020 (Storch&Downes 2012)

Our developed planning recommendations for climate change adaptation focus on supporting the designation of natural flood-prone greenbelts (Figure 2), the most restrictive form of urban containment policy. Utilising the existing flood-prone areas as greenbelts for current and future flood protection measures would additionally provide significant urban environmental benefits including recreational value, protection of open space, agricultural land, natural resources, all in addition to the highly important supporting ecosystem services for storm- and floodwater management and their important function as fresh and cold air production zones to mitigate the urban heat island effect (Figure 4).

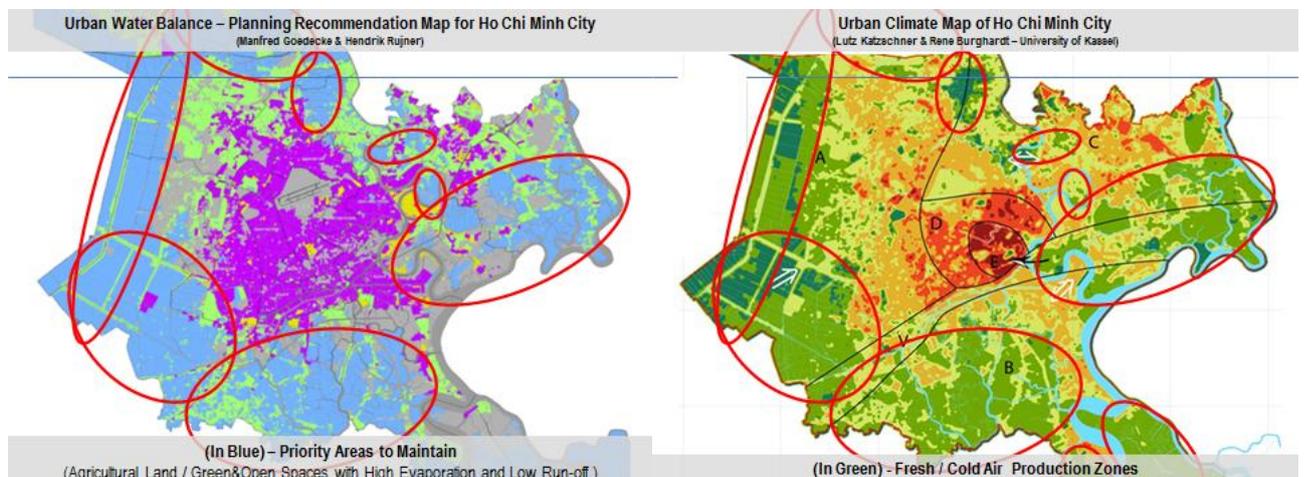


Fig. 4: Urban water balance planning recommendation map (left) and urban climate map of HCMC (right) – (Storch&Downes 2012)

To be ultimately climate resilient, urban development planning need to reconcile and use the already the already existing ecological services at their disposal in adaptation planning. Supported by environmental planning methods and tools land-use planning can protect these environmental services in a systematic manner (Figure 5).

The basic incorporation of Strategic Environmental Assessment (SEA) methods for core climate-related environmental impacts in the thematic areas urban climate, urban floodin and storm water retention highlights the valuable ecological services of open spaces and agricultural land for climate-related risk mitigation. The consideration of multiple types of climate-related hazards can reduce the likelihood that adaptation planning and risk reduction efforts targeting one type of climate-related hazard will increase exposure and vulnerability to other climate impacts, in the present and future (Figure 5).

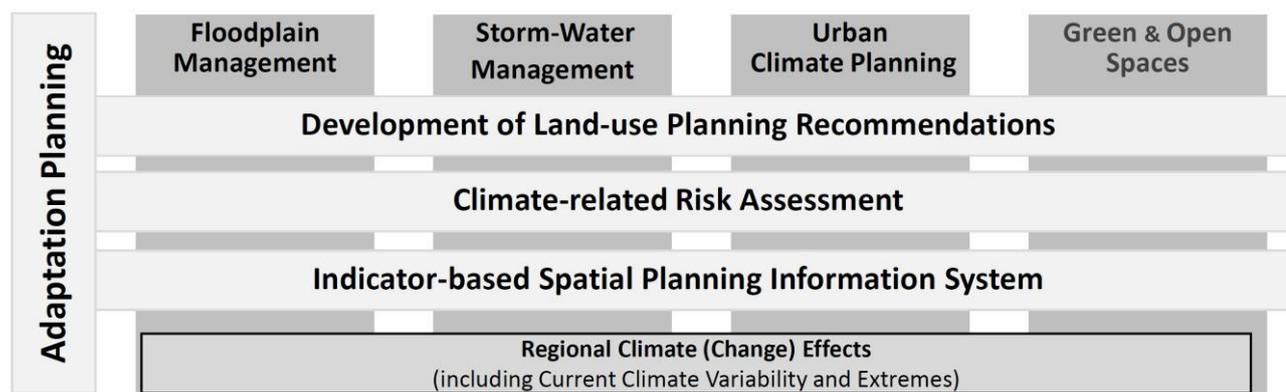


Fig. 5: The environmental planning tools and methods used for the integrated assessment of blue and green infrastructure for an adapted land-use planning in Ho Chi Minh City

For high-dense urban patterns, a larger share of blue and green infrastructure is in general beneficial for adaptation, as it provides space for urban agriculture, natural spaces for retention and detention of storm- and flood water management, and areas to generate and transit cool and fresh air, lowering and offsetting the energy demands for cooling in cities such as HCMC with tropical climates.

The developed planning recommendation maps can be used to assist the application of zoning guidelines for climate-adapted land-use planning (Storch et al. 2012, Storch&Downes 2012). In HCMC the need for adaptation will largely be associated with managing climate extremes – like urban flooding or urban heat waves (Figures 2 and 3). The spatial zoning of adaptation needs in land-use planning must therefore be associated with future urban growth and socio-economic development (Figure 4). By spatial-explicitly examining the rates of socio-economic change at the local level, the demand for adaptation can be assessed. These changes – represented by urban land-use changes – if compared with projected changes in climate extremes can highlight that the rates of socioeconomic change are likely to be greater than those for climate over the next decades (Storch&Downes 2011).

4 SUPPORTING ADMINISTRATIVE INTEGRATION AND IMPLEMENTATION

For high-dense Asian megacities, the inherent complexity of risks and vulnerabilities requires high resolution spatial information, in order to identify hazard patterns, vulnerabilities and risks at a scale that can provide guidance for urban land-use and development planning. Planning for risk and uncertainty for future urban growth will not just be a challenge for high flood prone areas; it will be a broader challenge impacting on the very nature and location of future urban development, particularly in planning for climate change (Labaeye et al. 2012). Here land-use planning that takes into account disaster risks is the single most important adaptation measure for minimising future losses (Storch&Downes 2011). The spatial planning framework and subsequent urban planning decisions, as currently applied, do not attach ample or sufficient importance to the physical exposure, the rate of urban growth and the risk of disaster losses. Generally, urban governments are responsible and have a moral obligation for regulating either construction or development in such a way that minimises risks. Urbanisation does not necessarily have to lead to an increasing hazard portfolio and can, if managed properly, contribute towards risk reduction. However, there are a number of key characteristics of the urbanisation process that do directly contribute to the formation of risk. Solely spatial and physical exposure alone does not explain nor directly lead to increased urban risk. If urban

growth in risk-prone locations is directed by adapted land-use zoning and at the same time guided by adequate building standards, ensuring risk patterns can be effectively managed and mitigated.

Land-use planning is seen as having a key role to play in developing efficient and tailored strategies to climate-proof HCMC (Storch&Downes 2011). As such, our research has not been carried out in isolation but from the outset was foremost intended to assist DONRE with administrative policy making (Figure 6) in making informed decisions underpinned by the latest assessment techniques (Figure 5). The results of our cooperation show the apparent gravity of the grave challenges faced by DONRE with respect to climate proofing past and future urban development.

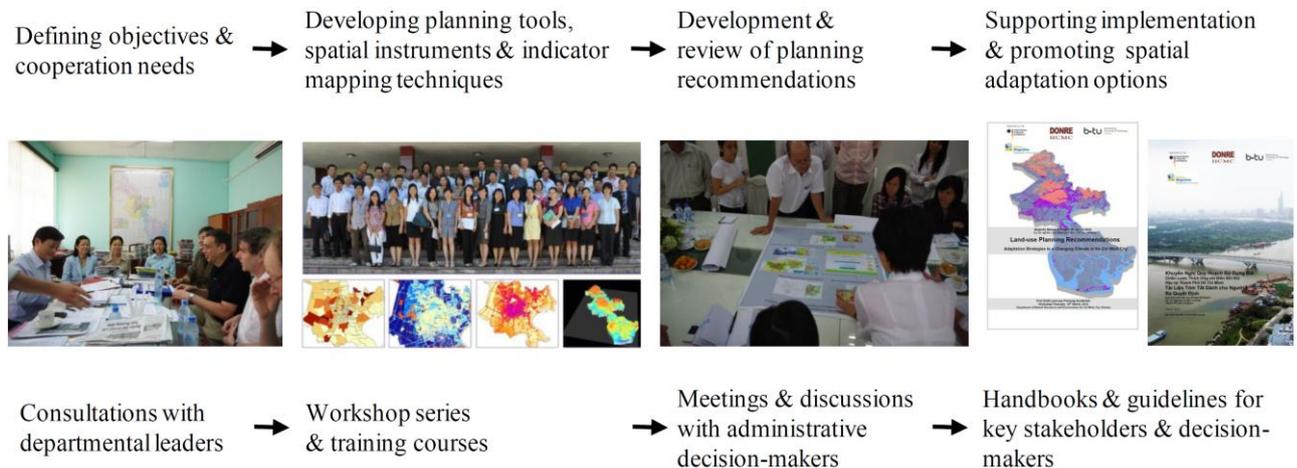


Fig. 6: The cooperation and joint research activities with DONRE in the development and implementation of planning recommendations for adapting HCMC's land-use plan to climate change (2008 to 2013).

Ultimately, DONRE has the task to determine the overall land-use, spatial zoning and environmental quality of HCMC. As such, DONRE possesses executive powers over one of the most important instruments for the adaptation of HCMC to climate change, the steering and management of land-use. To their credit, DONRE has become very conscious of its responsibility in relation to climate change responses and the management of associated impacts. Externally, these matters have gained increasing acceptance and importance within the wider administrative structure of HCMC; while, internally they have reinforced the essential need to adapt their own planning. However integrating climate change considerations into land-use planning in HCMC is inherently a complex decision-making problem, which requires the careful assessment of the current decision situation, related to place and space.



Fig. 7: Meeting and discussion in October 2012 with DONRE and Sub-National Institute of Agricultural Planning and Projection over the unique characteristics and development challenges of each focus area.

Upon the request of the Planning Division of DONRE and with their close cooperation, a workshop entitled "Adaptation Strategies to a Changing Climate in HCMC – Development of Land-use Planning Recommendations" was organised to outline and more importantly discuss, the integration of the research results from the various work packages into consistent, transferable and usable planning recommendations for the revision of the Land-use Plan.

The need to disseminate the project results to the local districts of HCMC was highly stressed prior to the workshop by the Planning Division of DONRE, as a much needed and essential further step. As such, all key stakeholders from district-level were officially invited by Ms. Nguyen Thi Cam Van (DONRE) to the workshop. The workshop promoted the integration of our research results into the existing planning framework respectively to the needs of DONRE’s land-use planning.

At the workshop, the compiled Handbook “Land-use Planning Recommendations – Adaptation Strategies to a Changing Climate in Ho Chi Minh City” (Storch et al. 2012) was showcased and distributed to the administrative stakeholders of the 24 districts of HCMC. With the support of Vietnamese-German University students of the Urban Development Planning master programme, it was possible to translate the whole handbook into Vietnamese. The handbook summarises over 40 pages, the main findings and recommendations for the adaptation of the new Land-use plan (Figure 8). The Planning Guidelines are divided into five chapters, three chapters summarise the strategic environmental assessment of urban surface runoff, exposure to tidal flooding and future sea-level rise and the urban climate situation, while two chapters explain the applied methods for urban structure type mapping, urban growth monitoring and plan conformance assessment.



Fig. 8: Development of Handbooks: Land-use Planning Recommendations (Storch et al. 2012, Storch&Downes 2012)

The discussions with the administrative stakeholders on district-level highlighted the accepted and crucial need to integrate climate-related issues into planning and decision making processes. The workshop was chaired by Dr. Nguyen Van Phuoc, Vice-Director of DONRE and Head of Environmental Management and Director of the strategic program "Ho Chi Minh City Moving towards the Sea with Climate Change Adaptation". Valuable clues and insights were gained into the feasibility of science-based planning recommendations and the exact needs of our Vietnamese partners for future thought-out, sustainable and efficient planning strategies. Emphasis was placed on how to better integrate our gained project results into the land use planning framework in a transparent, usable and comprehensive manner for DONREs land-use planning tasks until end of 2012 and future capacity building needs.

The second handbook (Figure 8) was produced according the demands of DONRE and addresses the cooperation with DONRE in ensuring and facilitating the integration of our research results into the formal and official procedural steps for the development of the Land-use Plan 2020 (LUP 2020), upon request from the Planning Department of DONRE and the Land-use Plan consultants from Sub-National Institute of Agricultural Planning and Projection. Additionally a short summary of 15 central maps explain and support our science –based planning recommendations visually. Again, the whole handbook was translated into Vietnamese language and cross-checked by DONRE and its consultants, reproduced 400 times and distributed to administrative stakeholders and planning institutions by DONRE (Storch&Downes 2012).

5 CONCLUSION – VISIBLE IMPACT OF PROJECT RESULTS

The main visible impact of our intensive cooperation with DONRE to integrate our planning recommendations into the Land-use Plan 2020s administrative procedure, is seen in the integration of our assessment results and core planning recommendations maps for all selected 11 focus areas into DONREs official report for submission of the Land-use Plan 2020 to the Peoples Committee of HCMC entitled “Draft

report of land-use planning toward 2020, land use plan for the 5 years (2011-2015) for Ho Chi Minh City” (DONRE-HCMC 2012).

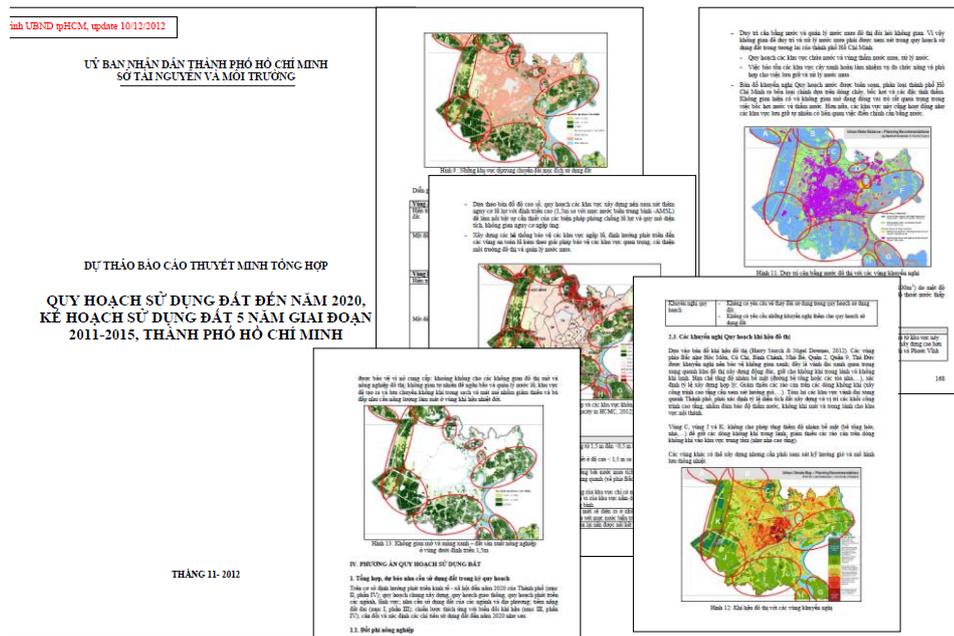


Fig. 9: Impact of the Megacity-Project on Adapted Land-use Planning Integration of the jointly developed Planning Recommendations into the Official Report by DONRE for Submission to the Peoples Committee in December 2012 (DONRE-HCMC 2012)

The joint development and refinement of the planning recommendations for the climate-risk adapted Land-use Plan 2020 has resulted within DONREs Planning Division and the Consultant Institution providing a strong impression of co-ownership. In total our results are integrated within a 20 pages chapter of their official LUP2020 report (Figure 9). The content of our assessment results have been left unchanged, they have been only been shortened and re-edited to the formal administrative requirements.

6 ACKNOWLEDGMENT

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