

Land use planning as a vehicle for building resilient cities to climate change: Qatar Experience

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Abstract

The notion of resilience is gaining increasing prominence across a diverse set of literatures on cities and climate change. However climate resilience must be bundled with efforts to promote urban development. The Qatar National Master Plan (QNMP) continues to promote sound land use planning and express the state interest in the sustainable development of land, resources and infrastructure. There are, however, some new ideas and provisions that are significantly different than any previous Land Use Plans and Policies conducted in Qatar. One new idea established in the QNMP is climate change adaptation through land use planning. Qatar is interested in building communities that are sustainable and resilient to a changing climate. Therefore the QNMP and its new zoning regulations include provisions to encourage communities to anticipate and plan for the impacts of climate change and to implement adaptation strategies through various planning documents and processes.

This paper aims to provide insight into Qatar experience to incorporate the information learned from the vulnerability and risk assessment into land use planning to adapt to the most likely effects of climate change in the region. It reviews QNMP products focusing on the existing planning process. It seeks through a critical evaluation to provide practical recommendations that serve to enhance the implementation of building resilient cities to climate change in Qatar.

1. Introduction

The global climate fluctuates naturally, but recently, climate change has been occurring much more rapidly than normal. Even a change of just a couple of degrees will have huge impacts on a global scale. Climate change has different effects from one part of the world to the next. The Inter-Governmental Panel on Climate Change (IPCC) identified that rising sea levels will pose a significant risk to countries in the Gulf Region including Qatar (MME, 2014). Being more specific the long term effects of climate change, rising sea levels, sand storms and desertification will have long term impacts on Qatar and its regional neighbors. Some of the major findings of the Climate Change in the Coast of Qatar include by 2040 a high erosion impact in beaches located at the west coast, with regard to flooding, medium impacts are predicted for most of the Qatari peninsula except along the southwest coast where the expected level of impact is low, regarding port operability, high impacts are expected for all ports along the Qatari coast by 2040 due to sea level rise while predictions for 2040 show low impacts for structure reliability (MME, 2016a).

Climate change adaptation means adjustment in natural or human systems in response to actual or expected climate change effects, which moderates harm or exploits beneficial opportunities. By contrast, mitigation is intervention or policies to reduce the emissions or enhance the sinks of greenhouse gases (GHGs) which contribute to climate change (Blue. Et al., 2017). Qatar took a robust approach which incorporates both adaptation and mitigation in a most effective way in addressing climate change. The Qatar National Vision (QNV2030) sees a proactive and significant regional role for Qatar in assessing the impact of climate change and mitigating its negative impacts, especially on countries of the Gulf. Qatar

National Master Plan (QNMP) fully supports this initiative and is directed towards achieving a more resource efficient urban development structure and way of life for the people of Qatar. This paper reviews QNMP products and the existing planning process. It seeks through a critical evaluation to provide practical recommendations that serve to enhance the implementation of building resilient cities to climate change in Qatar. Therefore the paper is divided into five sections. First section illustrates a brief overview of the impacts of the climate change on Qatar. The second section shows QNMP products. Then a discussion of QNMP Products is taking place in the third section. The planning process has been addressed in the fourth section. Finally some practical recommendations that could help to enhance the implementation of building resilient cities to climate change in Qatar are provided.

2. QNMP products

In light of Qatar's unprecedented physical, social and economic transformation, the Qatar National Vision (2030) was developed under the patronage of His Highness the Emir to guide all ministries and other governmental institutions of the State, in designing development strategies for all sectors across Qatar. Based on the Qatar National Vision (2030), the Ministry of Municipality and Environment, created the Qatar National Master Plan (QNMP). QNMP is taking into consideration the concept of urban climate change resilience that embraces climate change adaptation, mitigation actions, and disaster risk reduction while recognizing the complexity of rapidly growing urban areas and the uncertainty associated with climate change. This approach places greater emphasis on considering cities as dynamic systems capable of evolving and adapting to survive and even thrive in the face of volatile shocks or stresses. For this reason the QNMP has been prepared as a living plan that has its own framework for updates, changes, or adjustments.

QNMP comprises of 3 parts. The first is the Qatar National Development Framework (QNDF) which includes an integrated set of strategies, policies, guidelines, and regulations applicable to national, municipality, city and town jurisdictions to ensure a higher standard of living for the current Qatari society and for future generations. The second is the Municipality Spatial Development Plans (MSDPs). The MSDP seeks to achieve the orderly planning and development of land and infrastructure across each municipality in response to expected growth. It sets out a clearly defined urban structure and a coordinated development approach for the municipality over the next 20 years. The last part of QNMP is the approach of MME to make the QNMP living plan and to address today's problems while embedding a long-term vision. Being more specific this part of QNMP is the new idea and provision that is significantly different than any previous Land Use Plans and Policies conducted in Qatar. This part consisting of Sectorial Spatial Studies and Strategies that are or will be developed in order to complement the QNDF and update the MSDPs. The next section reviews QNMP products.

3. QNMP products discussion

In this section each component of QNMP will be presented and discussed to highlight the initiatives of building resilient cities to climate change.

4.1 QNDF

The principal strategic plan is the Qatar National Development Framework. It is a plan, for the future, to manage growth and build stronger, sustainable and livable communities. The QNDF establishes the spatial framework to achieve national human, social, economic and environmental goals based on the Qatar National Vision 2030 and the population and economic projections by the Ministry of Development Planning and Statistics.

The key strategies include the establishment of urban growth boundaries to ensure land is utilized in a more efficient manner through the limitation of urban sprawl; the creation of mixed-use urban centers and transit oriented developments to boost commercial and community activities while alleviating traffic congestion; adopting international best practices in planning and design to ensure sustainable growth, and preservation of the natural environment.

The QNDF, through its relevant policies and policy actions, outlines a strong undertaking of adaptation measures to respond to and anticipate the risks posed by climate change.

The Climate change impacts and the actions to build resilient cities to climate change have been addressed in different parts of QNDF this including:

- Objective 14: Ensure risks from climate change impacts are evaluated and mitigation measures are developed and implemented for land use planning and infrastructure development (MME, 2016b).

The QNDF also highlighted the need for preparing a comprehensive strategy to deal with the threat posed by climate change. This strategy will integrate reducing greenhouse gas emissions in addition to adapting to climate change through risk management measures (such as changing building design standards, raising community awareness, enforcing implementation of disaster management plans and business continuity plans) (MME, 2016b). Furthermore the QNDF also developed many policies in order to build resilient cities to climate change this including:

- Policy ENV2: Climate Change Management
Safeguard human life, life, public health, culture, heritage, infrastructure, development, economic activities and the natural environment of Qatar from the potential impacts of climate change in the Gulf region (MME, 2016b).
- Policy ENV4: Integrated Coastal Zone Management
Achieve effective management and use of coastal land and marine environment to protect and sustain the nation's valuable coastal assets (MME, 2016b).

3.2 MSDP

MSDP provides the land use planning framework and regulations for the entire Municipality and the strategic context for growth and change to 2032. The detailed land use zoning maps and the zoning regulations in the MSDP set out the rules against which development will be assessed. The MSDP has full legal force and effect in the assessment, decision-making and enforcement of land use development applications, and the manner in which land use development is undertaken within the municipality (MME, 2018b).

The MSDP is made up of the following parts:

- Strategic Context - The Vision and Development Strategy for the Municipality.
- Zones and Land Use Regulations – land uses and development standards applying in each zone.
- Zone Maps - showing the future land uses across the municipality.

In addition, Action Area Plans (AAP's) is prepared from time to time and progressively added to the MSPD for specific locations within the municipality, in order to provide a more detailed level of planning.

One of the most important and effective product of QNMP and Specifically the MSDPs in order to build resilient cities to climate change is the zones and Land Use Regulations. Being more specific in order to effectively manage development the state of Qatar has been divided into 21 separate land use zones which identify those land use activities considered appropriate and acceptable within these zones. Each zone is shown in Zoning Map for each municipality. In addition to the 21 land use zones there are a number of overlays, protection

zones, regulations and guidance that may have an impact on site development have been developed.

The purpose of the zoning regulations is to implement the spatial strategy for Qatar, by managing the range of land uses permitted in each zone and through the application of zone development control and design regulations. It has full legal force and effect in the assessment, decision making and enforcement of land use development applications, and the manner in which land use development is undertaken in the Municipalities.

The overlays includes many of triggers to ensure the adoption of internationally accepted climate change sensitive land use and infrastructure development standards. One of the most effective overlays is the Coastal Protection Overlay (CPO). In order to control the type, size, bulk and scale of development within Qatar's coastal environment a 2km wide coastal area has been established. This area centers on the high spring tide mark and extends 1km inland and 1km out into the sea (MME, 2018b). The CPO consists of a number of categories of sensitivity. Each category of the overlay will have an increasing degree of control regarding the acceptable land uses in this coastal area and an appropriate level of regulations controlling the physical form and location of the development and protection. All development proposals located within the CPO is considered conditional development and in most cases referred to the Environmental sector for specialist comments prior to any decision or approval being made.

Furthermore flood management overlay is being prepared that anticipate likely flood risk and vulnerability of the population, that reduce the potential impact of future flood events in Qatar (MME, 2016a). In order to develop an effective planning framework that aims to address Qatar's specific flood hazard characteristics, the region's existing flood management related documents have been reviewed. A number of international best practices for flood management have also been reviewed. The outcome of these reviews contributed to the development of recommendations for new and revised contemporary practice planning measures for adaptation and flood management in Qatar. These measures have been developed into a practical implementation framework for integration into the existing Qatari planning and development approval system (MME, 2018b).

3.3 Sectorial Spatial Studies and Strategies

Many of Sectorial Spatial Studies and Strategies are being prepared in order to integrate with the other QNMP products and enhance the updating of the QNDF and MSDPs. Many of this studies took into consideration the climate change effects this including:

- Climate Change Strategy (CCS)

The primary objective of this CCS is to address how urban planning and urban development can be managed to mitigate climate change and reduce its impacts. The focus on urban planning and development is achieved by concentrating on aspects directly or indirectly related to spatial land use in Qatar that influence or can be impacted by climate change. Furthermore within the CCS Climate Change Impact Assessment Tool has been developed. The purpose of the tool is to evaluate the impact of potential projects. The tool estimates annual GHG emissions associated with a new land use (overall emissions and emission intensity) (MME, 2018a).

- ICZM Plan for the State of Qatar

This ICZM Plan for the state of Qatar includes the vision, mission, roadmap, strategic and operational objectives, and actions set out to guide the development in the Qatari coastal zone. The plan has been prepared following up-to-date standards in the industry including international guidelines known in the ICZM field. The study classified and assessed the current risks affecting the coastal zone according to sediment compartment, current and potential erosion, and coastal flooding, where the most important hot spots have been

identified and a set of Urban and Environmental sustainability indicator tools has been prepared to guide specific zoning regulations that help to manage the development in each zone (MME, 2014).

3.4 Synopsis

From the previous discussion it is clearly appear that Qatar has taken into consideration many of the needed actions to adapt to climate and mitigation measures. These actions have been taken in all tiers of the planning in Qatar, from the long term vision of the community to specific implementation tools based on the use of the information from the vulnerability and risk assessment.

4. Planning Process

The Urban Planning Department of the Ministry of Municipalities and Environment (MME) is responsible for the preparation, and / or adoption of all urban plans. In addition, this department conducts the Qatar National Master Plan (QNMP), Qatar urban planning legislation, and other relevant projects, as well as being the main regulator for developing both governmental and private-owned lands in Qatar. Each Municipality in Qatar is responsible for issuing Building Permit (MME, 2017).

The MSDP identifies the categories of development for all land uses within each land use zone. The categories of development are classified as being either:

- Permitted Uses are developments that have negligible impacts on or beyond the site, and raise no policy implications. They are generally suitable and appropriate on each site within the zone and do not require a planning application or approval.
- Conditional Uses are developments that require a development application to be submitted for the proposed Land Use. Conditional Uses can be approved, approved with conditions or refused. Conditional Uses are usually more complex or could potentially result in negative impacts on and/or beyond the site, but which can be mitigated or removed through design, environmental or usage measures. Expert assessment is required to assess the impacts and the provision of conditions to mitigate or remove any negative impacts.
- Prohibited Uses are developments that are not considered appropriate or are likely to result in a detrimental impact in a particular Land Use Zone.

Property owners and developers are required to submit a development application. Application review is performed by the relevant municipality to provide the applicant with information on the allowed use and development for the plot(s) and the next steps to continue with the development approval process. Then Property owners and developers are required to apply for a Building Permit or Master Plan Permit to develop their properties in Qatar. A Building Permit is an approval to proceed with construction to ensure that the development is complying with regulations, guidelines, development control regulations, national / international codes, standards and practices. Building permits also regulate the type of construction allowed.

Through this process many checks for the proposed development are taking place in order to make sure that this development is consistent with the QNDF and the provisions of the MSDP. In forming a decision the assessing entity must have regard to the Zone Purpose Statement, the zone regulations, and the relevant assessment criteria.

5. Conclusion and recommendations

It can be concluded that from the previous sections that Qatar has taken many significant steps towards for building resilient cities to climate change one of the most important step is creating QNMP as a living plan. Furthermore take into consideration the flexibility of land-use planning system that can change, evolve and adopt alternative strategies (in either the short or longer term) in response to changing conditions.

However the way of for building resilient cities to climate change is still too long and should be informed by an iterative, inclusive, and integrated planning process which respond to three interlocking frameworks of analysis, Urban Analysis, Climate Change Risk Analysis, and Vulnerability Analysis, particularly of the urban population that faces high exposure risk to climate change impacts and has limited coping capacity (Karen, 2012).

There is no single action that will make a city resilient to climate change. Resilience is instead achieved through a number of actions, building upon each other over time. These actions would be enhanced and progressed as peoples and institutions learn from past experiences and apply it to future decisions. There are many ways to incorporate the information learned from the vulnerability and risk assessment into land use planning to build resilience to the most likely effects of climate change in Qatar. Embed information from the vulnerability and risk assessment into all steps of the existing planning process: establishing a vision, setting goals, developing and implementing policies, consultation and review. The development plan, secondary plans, zoning by-law and subdivision approval process can be used to help facilitate this. Community consultation and integration with other climate change adaptation activities are also ways for a community to build resilience to the climate change. The following are ways to enhance Qatar own capability for building resilient cities to climate change:

- Promoting appropriate sustainable defenses and locating new development away from areas of highest risk.
- Guide development away from flood prone areas by designating these areas in the development plan for agricultural or recreational uses rather than residential or commercial.
- Ensure different land uses designations in the development plan take changing soil conditions into account, and use a soil survey.
- Consider using development plan policy to direct development to existing settlement centres where appropriate infrastructure exists, or can be more easily and sustainably serviced.
- Consider including policies in the development plan to ensure accessibility to emergency services for the citizens of the region at all times.
- Use the secondary plan as a tool to ensure proper drainage. A secondary plan can include drainage requirements for a planning area, covering many lots.
- Use the zoning by-law to ensure that there is adequate greenspace in existing and new developments. This is a natural way to ease drainage and prevent flooding.
- Use the zoning by-law to re-site infrastructure and routes so that disruption during flooding is minimized
- Use geographic information systems (GIS) and climate models to guide development away from flood prone areas.
- To better ensure adaptation to the effects of climate change, consultation with community members is needed. This will be an opportunity to raise public awareness of climate change adaptation; inform the public of the implications of climate change on residents and property; solicit community input, and; update developers, builders and other citizens of the standards and procedures in place.

Finally Integrating land use planning with other planning activities in a coordinated effort for building resilient cities to climate change ensures that resources are strategically aligned to maximize benefits.

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