Research Paper

CHALLENGES OF SPATIAL PLANNING IN COASTAL REGIONS OF BANGLADESH

A Case for Chalna

Author 1 Muhammad SHAMSUZZAMAN, City Region Development Programme, LGED;
Bangladesh

Abstract

The delta land Bangladesh has a unique coastline where numerous rivers meet the Bay of Bengal, creates a complex net of tidal river estuaries, forming the base for world's largest mangrove forest the Sundarbans. Chalna is small town located at the confluence of Rupsha and Chunkuri rivers, only 9 km north of the Sundarbans, and a well know river port. The Sundarbans, which acts as a buffer between the sea and the human habitats including arable lands. The forest is rich in unique biodiversity and natural resources providing livelihoods of a large number of people living in the towns and villages around it. As the region is near the sea and land morphology is plain and of low altitude it is always vulnerable to natural disasters. Due to global warming and sea level rising the land mass is vulnerable to flooding. The sign of climate change; erratic behavior of rainfall and draught, intrusion of salinity etc., are changing the usual pattern of agriculture and fishing, affecting the livelihoods of the people here. The eco system of this mangrove forest is also threatened by recent policies of the Government and initiatives of private sectors of establishing high risk industrial establishments like thermal power plant, liquid petroleum gas stations etc., around Chalna and its surrounding region in sprawling manner. The potential of running large number of vessels through the rivers and canals of the Sundarbans might have negative impacts of the flora and fauna living there. Popular protests against these harmful interventions are being observed, international public organizations and concerned learned societies are also recommending not let these damaging developments going on. Although there are some promises from the government to the international agencies, there is no sign of management of such developments. This paper systematically investigates the reasons of this phenomenon, identifies the challenges and concludes that; absence of regional spatial planning in Bangladesh, neglecting the values of environment and public goods, defying the regulations in various ways and not accounting public opinions in the decision making process are the core ones.

Keywords

Challenges of spatial planning, planning in coastal regions, natural and man-made disasters

1. Introduction

1.1. Description of the study area: Chalna and its surrounding coastal region

The study area is Chalna, a small municipality town and its surrounding coastal region which lies in Dacope sub-district of Khulna, a south western district of Bangladesh (figure 1). The study area borders protected forest the Sundarbans and the Bay of Bengal at its south. Chalna is a famous river port located at the confluence of Rupsha and Chunkuri rivers, only 9 km north of the Sundarbans. The Sundarbans are the largest mangrove forest in the world, recognised as a natural World Heritage site by UNESCO. They provide a subsistence living to 3.5 million people and offer protection from cyclones in southwest Bangladesh. The mangroves' extensive root systems help stabilise wet land and coastlines, break up storm waves that exceed four metres in height and result in the areas with good mangrove coverage suffering less from wind and wave surges than those areas with less or no mangroves. (Dudley, N., et al. 2010). The major parts of the town inside the Polder built in the 60s and almost whole part of it is flood free.

Figure 1 Location of the study area in the context of Bangladesh and the Sundarbans

Unplanned developments those are not compatible with this location are popping up sporadically posing high risk to the ecology and life of the people living here. Following chapters of this paper delineates the research methodology, forms hypotheses, present the evidences for and against the hypotheses and finds out the core hypotheses. Finally conclusions are made based on the comparisons of evidences with the hypotheses which is called Structured Geospatial Analytic Process. An indication of further research is also given at the concluding chapter.

Figure 2 Google view of Chalna town showing Chalnacanal in the middle

2. Methodology of the Study

2.1. The analytical process

Structured Geospatial Analytic Process has been followed as the study/ research methodology. The main steps of this process are Question, Grounding and Team Building, Hypotheses Development, Evidence Development, Fusion and Conclusions. The *question* defines the broad nature of the spatial and temporal patterns the analyst is seeking to ultimately identify. *Grounding* is the raw evidence that reaches the analyst. *Hypotheses* are the tentative representation of conclusions with supporting arguments. *Evidence* refers to snippets extracted from items discovered in the grounding. The *fusion process* is the comparing of the evidence to each hypothetical geospatial and temporal pattern to determine consistency. The *conclusion* is a proposition about which hypothetical pattern(s) is (are) most consistent with the evidence and answers the question. (University Library 2019)

2.2. Research question

News, publications and personal experience about the natural and man-made disasters, environmental changes vulnerabilities, unmanaged developments etc., in the towns and adjacent coastal region gives us the impression that it is highly vulnerable and complex situation and the planning and management of the developments of the area is not functioning properly. The urban areas are managed by municipal laws and there are environmental laws for managing developments in the ecologically sensitive areas. Still spontaneous and harmful human interventions are escalating the vulnerability of natural disasters and climate change impacts. To search for the explanation of this phenomenon the author naturally raised the following research question;

What are the challenges of spatial planning for coastal settlements/towns of Bangladesh which hinders livable, eco-friendly, disaster and climate change resilient development?

2.3. Hypotheses

From intuition and after analyzing the raw evidences News, publications and personal experiences, the following hypotheses are developed by the author;

- Coastal settlements are vulnerable to natural disasters and climate changes
- Human interventions in the coastal area are escalating the vulnerability
- Soft interventions are performing well
- Weak framework for region spatial planning in Bangladesh
- Developments defying urban and environmental regulations in the study area
- Issues of environment and public goods are overlooked indecision making
- Public opinions are overlooked in development decisions

3. Evidences Related to Hypotheses

3.1. Coastal settlements are vulnerable to natural disasters and climate changes

Bangladesh is one the most vulnerable countries of the world exposed to multiple natural hazards, such as cyclones and floods, particularly in its coastal areas. Over the last few years, coastal area of this part of Bangladesh as well as Chalna town has been greatly affected by extreme natural disasters such as cyclones, storm surges, etc. On 25 May 2009, Cyclone 'Aila' hit the coastal areas of Bangladesh. Aila cost an estimated \$1.7 billion in damages and losses. Cyclones and associated storm surges and floods have led to almost all the nearly 520,000 natural disaster deaths recorded over the past 40 years in Bangladesh. This country is also one of the most vulnerable countries in the world to the effects of climate change. The country's extreme vulnerability to hydro-meteorological hazards, including storm-induced tidal flooding, is likely to increase due to climate change. (GFDDR n.d.)

The nationwide climate vulnerability index Table of Ministry of Environment and Forest of Bangladesh shows, at Dacope Upazila, the sub-district where Chalna is located, increased number of people will be affected by natural disasters, mangrove forest will be depleted, the health of livestock and poultry will be decreased, groundwater quality will be depleted and land available for agriculture will be decreased due to potential climate change. (Ministry of Environment and Forest 2018)

3.2. Harmful human interventions in the study area

Environmental degradation due to infrastructure development at the natural habitats their ecosystem services have been failed. During 1960s a series of coastal embankments were constructed in Bangladesh to protect low lying lands from tidal inundation and salinity penetration. Although the land within the embankments became highly valuable agricultural land the embankments, however, block the drainage of freshwater from the land within embankment to the other side of the barriers after excess rainfall and /or river flooding. Some sluice gates were constructed to regulate the flows of water when necessary, but most of them became inoperable due to various reasons. If sea-levels rise due to climate change as predicted then higher storm surges could also cause over-topping of saline water behind the embankments. OECD warns that, "climate change could be a double whammy for coastal

flooding, particularly in areas that are currently protected by embankments". (Dudley, N., et al. 2010)

Figure 3 Dried up Chalna canal at inner side of the polder due to non functioning sluice gate

Figure 4 Natural Liquid Gas plant at the south of Chalna

IUCN recommended placing the Sundarbans in Bangladesh on the List of World Heritage in Danger to the World Heritage Committee of UNESCO recently according to a press of IUCN, dated 7th June 2019, due to severe threats from coal-fired power plants and numerous industrial activities in close proximity. The site is part of the world's largest mangrove forest, home to the royal Bengal tiger. However, the recommendation was reverted at the last moment. 'Following a joint IUCN-UNESCO mission in 2016, the World Heritage Committee called for the large Rampal power plant project, to be cancelled and relocated. Despite this, its construction has continued without any assessment of its impact on the Sundarbans' World Heritage values. Two additional coal-fired power plants are being constructed on the Payra River, which flows into the same bay as the Sundarbans. Over 150 industrial projects are also active upstream of the site, and their associated shipping and dredging activities further threaten its hydrological and ecological dynamics. The hydrological systems, which drive this dynamics, are very large in scale and vulnerable to upstream impacts.' (IUCN 2019)

According to the EIA of the said thermal power plant project the aerial distances from the plant to Chalna is only 3.18 km northwest. As such, in case of Chalna, there is a possibility of emission flow toward the town city, when prevailing wind flow from southeast to northwest direction. The boundary of Sundarban reserve forest is 10 km south. The 10 km radius boundary from the Sundarban is only 4 km away from the thermal power plant. (Government of Bangladesh 2013)

So three negative forces; natural disasters, climate change impacts and harmful consequences of human interventions coincides at Chalna and its surrounding areas.

3.3. Soft interventions are performing well in the study area

After experiencing two devastating cyclones of 1970 and 1991, Bangladesh has given significant efforts to reduce its disaster vulnerability. Bangladesh is now considered a global leader in coastal resilience due to its substantial long-term investments in protecting lives. (World Bank 2018)

Bangladesh is often cited globally as a positive example for investment in DRM. The Government of Bangladesh has taken significant steps to strengthen disaster risk management (DRM) efforts. These include:

- Endorsing the DRM Act (2012), which outlines the country's legal framework for disaster management; and
- Mainstreaming DRM into a number of development plans, including the National Sustainable Development Strategy (2010-2021). This strategy recommends increased and cross-cutting investment in DRM.

Global Facility for Disaster Reduction and Recovery, GFDRR has helped enable DRM efforts in Bangladesh since 2007 focused on post-disaster reconstruction, risk reduction, and building urban resilience. GFDRR is providing ongoing technical support and capacity building to the Government of Bangladesh. Activities are supporting several technical areas, including provision of ICT for weather and climate services; assessing user needs for weather, water, and climate analysis; and enhancing technical understanding of instruments, modelling, and use of models for generating weather, water, and climate information. (GFDDR n.d.)

3.4. Weak framework for regional planning in coastal regions in Bangladesh

Urban development regulations and environmental regulations do exist in Bangladesh but there is no practice of regional spatial planning. Due to absence of regional planning framework it is difficult to manage developments beyond the municipal areas. However, Bangladesh Delta Plan 2100 Formulation Project have identified two main challenges for urbanisation and settlement with regard to the Delta plan. One of them is 'providing a holistic long term plan combining (amongst others) water management and sustainable spatial and urban development' under which a regional scale planning strategy have been suggested. (GoB 2019)

3.5. Developments defying urban and environmental regulations in Chalna town and in the study region

Although there are urban development regulations and environmental regulations to manage developments in municipal areas and beyond but many evidences have seen harmful developments in the ecologically sensitive areas, particularly in the coastal regions of Bangladesh. Power plants, natural liquid gas (NLG) plants, shrimp farms, brick fields, various types of industries are sprawling around Chalna and other coastal areas of Bangladesh (Fig. 4 & Fig. 5). Sites of such establishments are chosen for easy sea and river transport facility, existence of vacant land and comparatively lower land prices than upland areas. In many cases these developments are occurring defying the urban development and environmental regulations of the country in various ways.

Figure 5 Industries, shrimp far, thermal power plant around Municipality of Chalna

3.6. Issues of environment and public goods are overlooked in decision making

Coastal areas of Bangladesh are ecologically sensitive and provide ecosystem services, natural resources and employments. A major part of coastal area of Bangladesh is the tidal mangrove forest, the Sundarbans, a natural heritage site recognized by UNESCO bordering south of the study area. Utmost care should be taken for any kind of interventions in this ecologically sensitive area. It is evident that developments incompatible with this environmentally fragile location are increasing gradually putting the nature and the local inhabitants at high risk of environmental catastrophes. The value of natural resources and ecosystem services often undermined by the investors and by the decision makers as well. Frequent news about such interventions and protests against them covers in the media.

An example of reluctance for revoking permissions (granted earlier of declaration of ECA zone) to nearly 150 industrial projects located within the ten kilometre area surrounding the Sundarbans, declared as ECA back in 1999. The permissions never revoked despite there are provision to revoke such permission once the area is declared ECA. Ignorance, administrative

negligence and faulty legislation have put the ecologically sensitive sites in serious degradation. The Environment Impact Assessment of the ongoing Rampal Power Plant project, admits that the 142 tons of sulphur dioxide and 85 tons of nitrogen dioxide that will be emitted daily from the plant will increase the concentration of Sulphur Dioxide (SO₂) and Nitrogen Dioxide (NO₂) in the air near the Sundarbans. Popular protests, recommendations and writings against the project is continuing. (University 2016)

In a response to the observations of World Heritage Committee on the Sundarbans, the state party, Government of Bangladesh submitted a report on the state of conservation of the property which assures that,

No environmental clearance or permission has been given to any large-scale industrial projects adjacent to the property.

An overview of current and future development plans until 2041 in the Southwest region of Bangladesh has been undertaken in preparation for the Strategic Environmental Assessment (SEA). A consultancy firm to undertake the SEA was to be shortlisted in January 2019. (UNESCO 2018)

3.7. Public opinions are overlooked in development decision making

Despite tremendous popular protest against the Rampal Power Plant project, the Department of Environment (DoE) of the Government of Bangladesh accepted the project to be feasible. A writ petition filed to stay the project was summarily dismissed by the Supreme Court.

In 2013 a public interest litigation was filed before the High court division praying for a direction upon the respondents to constitute a committee with renowned local and international environment biodiversity and eco-system experts to make impact assessment of the proposed Rampal coal-fired power plant on the environment and ecology, and on the Sundarbans. But the honourable court rejected the petition by saying that -unless things shape up as much as to enable judicial mind to come to a clear conclusion, giving direction for formation of a committee of experts for that matter to suspend a huge development project would be a gratuitous interference by court which is not permissible under law. (Shekh Md Muhibbullah, 2017). An article in DW regarding control of politics in Bangladesh mentions that, 'a limited number of people make decisions in Bangladesh'. (DW 2019)

Figure 1 Save Sundarban protesters in Dhaka on July 28, 2016 (Daily Star photo)

(Source: https://www.sourcewatch.org/index.php/Rampal_power_station Accessed 8 July 2019)

4. Fusion: Comparison of Evidences with Hypotheses

4.1. Matrix of evidences and arguments

The hypotheses/ arguments are placed in columns under the argument heading and the evidences are placed in rows under the evidence heading. Each item of evidence is examined at a time to see how consistent that item of evidence is with each of the hypotheses. Evidences are weighted by using notations. Notations C, I, and N/A standing for consistent, inconsistent, or not applicable evidences. The evidence is weighted by using combinations of CC, II, C, and I.

Table 1: Matrix of evidences and arguments

		Arguments						
		Coastal region is vulnerable to natural disasters & Climate change	Harmful human interventions	Soft interventions are working well	Weak regional Spatial Planning	Defying urban & environmental regulations	Issues of environment and public goods are overlooked indecision making	Public opinions are overlooked/ overruled
Evidences	Natural disasters	CCC						
	Climate Change Forecasts	C						
	Polders in 60s		C					
	Power plants&Industrial development in coastal Sundarbans		CC		C	C	C	C
	CDMP/ DRM Act			CC				
	NGO works/ GFDRR program			C				
	Studies on challenges of urban planning				C			
	Delta Plan 2100				I			
	Unplanned developments				C			
	EIA of Rampal		C			C	C	C
	Not revoking industry permissions						C	
	Dismissal of writ petition						C	
	IUCN advices on Rampal				C	C	C	C
	GoB’s report to World Heritage Committee on the Sundarbans				I	I	I	
	Public protests					C	CC	C
DW News on decision making							C	

Examination of each of the hypothesis one at a time is done by looking down the column to consider each hypothesis as a whole. Generally, the hypothesis with the fewest “I”s is probably the most likely one. The hypothesis with the most “I”s is probably the least likely one.

The first hypothesis, ‘coastal settlements are vulnerable to natural disasters and climate changes’ scored 4 “C”s supported by previous reports of natural disasters and forecast of climate change impacts and it does not scored any “I”s.

The second hypothesis, ‘Human interventions in the coastal area are escalating the vulnerability’ scored 4 “C”s supported by the evidences of construction of embankments during 60s, recent industrial and power plant developments in the study area. It does not score any “I”s.

The third hypothesis, ‘soft interventions are performing well’ scored 3 “C”s which is consistent with the evidences that Bangladesh has enacted a Disaster Management Act in 2012 and the Comprehensive Disaster Management Programme has positive results. There are many national and international NGOs are working with livelihoods, nature conservation, climate resiliency etc., It has no “I”s.

The fourth hypothesis, ‘weak framework for region spatial planning in Bangladesh’ got 4 “C”s and 2 “I”s. Uncontrolled industrial and power plant developments in the study region, studies on spatial planning challenges, findings of the Delta Plan 2100, unplanned urban development and recent recommendation of IUCN to placing the Sundarbans in Bangladesh on the List of World Heritage in Danger to the World Heritage Committee of UNESCO support the hypothesis. However, recommendation for preparing coastal regional plans in the Delta plan 2100 and taking an overview of current and future development plans until 2041 in the Southwest region of Bangladesh has been undertaken in preparation for the Strategic Environmental Assessment (SEA) show some initiatives towards regional spatial making.

The fifth hypothesis, ‘Developments defying urban and environmental regulations in the study area’ scored 4 “C”. Issuing permission of large industries in ecologically sensitive areas around the Sundarbans through loopholes of laws and regulations, approval of the Rampal thermal power plant project despite the harmful emissions stated in its EIA report, inclusion of ‘water infrastructure’ and ‘non-renewable energy facilities’ and others as affecting factors of the Sundarbans in the provisional agenda to declare it as World Heritage in Danger. (UNESCO, 2019..), reports of public protests in the media etc., confirms the relevancy of the hypothesis. The hypotheses scored 1 “I”s, due to assuring undertaking Strategic Environmental Assessment (SEA) of the Sundarbans in a report on the state of conservation of the property.

The sixth hypothesis, ‘Issues of environment and public goods are overlooked indecision making’ scored highest 7 “C” and 1 “I”s only. Recent industrial and power plant developments in the coastal area, issuing permission of large industries in ecologically sensitive areas around the Sundarbans, approval of the Rampal thermal power plant project despite the harmful emissions stated in its EIA report, inclusion of ‘water infrastructure’ and ‘non-renewable energy facilities’ and others as affecting factors of the Sundarbans in the provisional agenda to declare it as World Heritage in Danger, dismissal of writ petition to form expert committee to review Rampal thermal power plant project, reports of public protests in the media etc., shows the consistency of this hypothesis. The hypothesis scored 1

"I"s, due to assuring to undertaking Strategic Environmental Assessment (SEA) of the Sundarbans in a report on the state of conservation of the property.

The seventh hypothesis, 'Public opinions are overlooked in development decisions' scored highest 5 "C" and no 'I's. People raised their concerns during establishment of the major harmful interventions at the study region, EIA reports and international public agencies made their recommendations but those were properly taken care of. Recently published article in DW Bangla indicates that decisions are taken in Bangladesh by a limited number of people having a chance of disregarding the public opinions.

5. Conclusion

From the systematic comparisons of hypotheses with the evidences the most consistent hypotheses have been identified. The core challenges of spatial planning in the coastal region of Chalna, Bangladesh are; absence of strong regional spatial planning framework in Bangladesh, neglecting the values of environment and public goods, defying the regulations in various ways and not accounting public opinions in the decision making process. So, there is a tremendous scope of working with regional spatial plans in Bangladesh, particularly for its coastal regions.

There are further scopes to adopt the climate resilient and blue-green approaches of designing the infrastructures instead of the conventional ones. There is also scope of exploring the local landscape and building cultures that are generated through generations local adaptive wisdoms.

The public authority need to adopt participatory culture in planning, and collaborating with learned bodies, international authorities, private sectors, NGOs to achieve the goal of planning a coastal town like Chalna in adaptive or resilient way.

6. References

- Hardoy, Jorge; Satterthwaite, David (1983) "ISOCARP: Exchange of ideas", Cities, The International Journal of Urban Policy and Planning, Vol. 1 No. 1 (August).
- Dudley, N., S. Stolton, A. Belokurov, L. Krueger, N. Lopoukhine, K. MacKinnon, T. Sandwith and N. Sekhran [editors] 2010, *Natural Solutions: Protected areas helping people cope with climate change*, IUCN WCPA, TNC, UNDP, WCS, The World Bank and WWF, Gland, Switzerland, Washington DC and New York, USA. Available from: Ebook Library. [4 June 2019].
- University Library 2019, The Learner's Guide to Geospatial Analysis, 8 January 2019, The Pennsylvania State University. Available from: <https://www.e-education.psu.edu/sgam/node/1> .[10 July 2019]
- GFDRR n.d., INFORM, index for risk management. Available from: <https://www.gfdr.org/en/bangladesh>. [1 June 2019].
- Ministry of Environment and Forest 2018, *Nationwide Climate Vulnerability Assessment of Bangladesh*, Government of Bangladesh. Available from: https://moef.portal.gov.bd/sites/default/files/files/moef.portal.gov.bd/notices/d31d60fd_df55_4d75_bc22_1b0142fd9d3f/Draft%20NCVA.pdf. [1 June 2019].

- IUCN June 2019, IUCN advises “in danger” status for three World Heritage sites. Available from: <https://www.iucn.org/news/iucn-43whc/201906/iucn-advises-danger-status-three-world-heritage-sites>. [27 June 2019].
- Government of Bangladesh 2013, Final Report on Environmental Impact Assessment of 2x (500-660) MW Coal Based Thermal Power Plant to be Constructed at the Location of Khulna. Available from: <http://www.indiaenvironmentportal.org.in>. [4 June 2019].
- World Bank 2018, Bangladesh Disaster Risk and Climate Resilience Program. Available from: <https://www.worldbank.org/en/country/bangladesh/brief/bangladesh-disaster-risk-climate-change-program>. [1 June 2019].
- Government of Bangladesh 2019, Bangladesh Delta Plan 2100 Formulation Project. Available from: <http://www.plancomm.gov.bd/site/files/0adcee77-2db8-41bf-b36b-657b5ee1efb9/Bangladesh-Delta-Plan-2100>. [4 June 2019].
- University Library 2016, Arpita Shams Mizan, Archaeological Sites and Mangrove Forest as Critical Areas in International Environmental Law: Analysing the Case of Bangladesh, Macquarie University. Available from: https://www.mq.edu.au/media/images/content-pages/macquarie-law-school/ajel/2016/05_2016-AJEL_Arpeeta.pdf. [6 July 2019]
- UNESCO 2018, Government of Bangladesh, Progress Report on the Decisions of 42 COM.7B.25 of the World Heritage Committee on the Sundarbans. Available from: <http://whc.unesco.org/en/list/798/documents/>. [27 June 2019].
- Shekh Md Muhibbullah, 2017, ‘Rampal power plant: Development and environment’, *The Daily Observer*, 17 August, 2017. Available from: <https://www.observerbd.com/details.php?id=90100>. [8 July 2019].
- Who Controls Politics in Bangladesh?, DW Bangla, 4 May, 2019. Available from: <https://p.dw.com/p/3Hvjx>. [8 July 2019].