Coastal urban climate resilience planning in Quy Nhon, Vietnam

Vu Kim Chi
Nguyen Thi Thuy Hang

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Introduction

- The city of Quy Nhon
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The city of Quy Nhơn

- Total area of 285.5 km²
- Population of 283,000 people (2013)
Urban planning

- New urban area...
- New industrial clusters...
- New roads, sea port...
Climate change and sea level rise

- Increasing in mean temperature
- Increasing in mean rainfall
- Sea level rise with 2.5mm per year
- Increasing big events: storms with heavy rainfall
Natural hazards and environment risks

• Increasing the flood problems (eg. the big flood events in 2009 and 2013)
• Lost of mangrove forest
• Coastal erosion
• Sand movement
Where are urbanisation and shoreline modifications taking place? Where they are likely to take place in the future?

What problems are caused by urbanisation and shoreline modification in the context of climate change planning?

From local perspectives, what are possible solutions for climate–resilience planning in Quy Nhon?
Data and methods

- Topographical maps, land use maps
- Methods:
  - Remote sensing: image processing
  - GIS: Urban expansion
  - Spatial analysis: Multiple Logistic Regression
  - Focus group discussion: urban resilience planning
Results and discussions

- Urban expansion
- Population growth
- Prediction of urban expansion
- Shoreline modifications
- Urban resilience planning
Urban expansion (1973 – 2013)

Urban expansion on different land use types

- Production forest: 7%
- Annual crops: 13%
- Grazing land: 4%
- Aquacultural + Mangrove forest: 12%
- Paddy field: 14%
- Unused area: 26%
- Protected forest: 24%

2005 – 2010, urban expansion rate of 432 ha per year.
Urbanization

Năm 1973
Năm 1992
Năm 2000
Năm 2005
Năm 2013
Over the last decade, the population has grown rapidly from 241,830 inhabitants in 2000 to 283,403 inhabitants in 2012. Different communes have different trends of population growth.
Significant variables:
- Elevation
- Slope
- Dist. to roads
- Dist. to major roads
- Dist. to river
- Dist. to the sea
- Land use
Prediction of urban expansion

Future scenario with present road situation

Future scenario with construction of new roads
Shoreline modifications

- Lost of mangrove forest
- Sea dyke construction to prevent soil erosion and storm attached to the village
Focus group discussion on Urban resilience planning

- Provincial Dept. Of Natural Resources and Environment (DONRE)
- Provincial Dept. Of Agriculture and Rural Development (DARD)
- Provincial Dept. Of Construction (DOC)
- City People Committee
- Quy Nhon University
- Climate change office
- …
Urban resilience planning

- In the context of climate change and sea level rise, prior study must be carefully carried out before any construction.

Coast with dyke in Ly Chanh | Coast without dyke in Ly Hung

River dyke in Nhon Binh area | Construction in the coast line
Risks may be caused by human activities rather than climate change
- Construction of new roads
- New urban area
- Dyke construction
Conclusion

• In Quy Nhơn city, urban has been expanded to flood-prone areas, which might accelerate flooding risks in the future. Shoreline modification due to human activities needs to seriously consider any potential impacts in the future. No urban construction should encroach on or replace the mangrove forest area which plays a vital role in the city’s defense against the impacts of climate change.

• Urban systems – including ecosystems and infrastructure – have been developed without considering to the patterns of exposure of climate change and sea-level rise. To build a climate change resilience plan for Quy Nhơn City, a concrete framework must involve all those components, including local people, local authorities and central government.
More information on our research can be found at http://pubs.iied.org/10724IIED.html?c=urban
Thank you for your attention!