

# Nature Based Solutions (Green infrastructure): Climate adaptation

## An inextricable link



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## Designing right or Designing Differently?

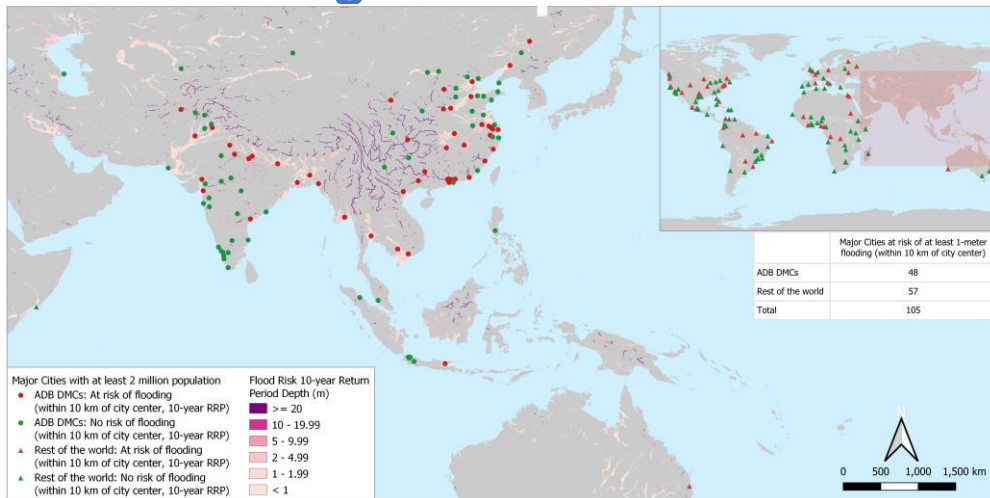
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Resilience Learning Month

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# Scale of Flooding & Sea level rise in Asia-Pacific



Source: Map prepared by Asian Development Bank, based on data from the European Commission, Joint Research Centre and UNDESA, World Urbanization Prospects 2018.



Approach paper, Complete report,

Evaluation in brief, and  
Management response, Available  
online at:

<https://bit.ly/climate-evaluation>

# Key Takeaways on Climate Adaptation

1. Urgent, scaled-up action to improve resilience to climate impacts in Asia and Pacific
  - Results frameworks need strengthening.
  - Climate-proofing infrastructure was mainly through structural measures.
  - TAs & PBLs are enhancing DMCs' capacity to manage climate risks.
  - Project beneficiaries highlighted the importance of community engagement.
2. Improving resilience must be a priority in country strategies and programming.
3. Work upstream and embed climate risk assessments in private sector operations.
4. Adaptation investments should focus on tracking climate outcomes.
5. Greater attention should be given to projects with adaptation as the primary objective

# Coastal Cities and the Environment and Climate Change Conundrum



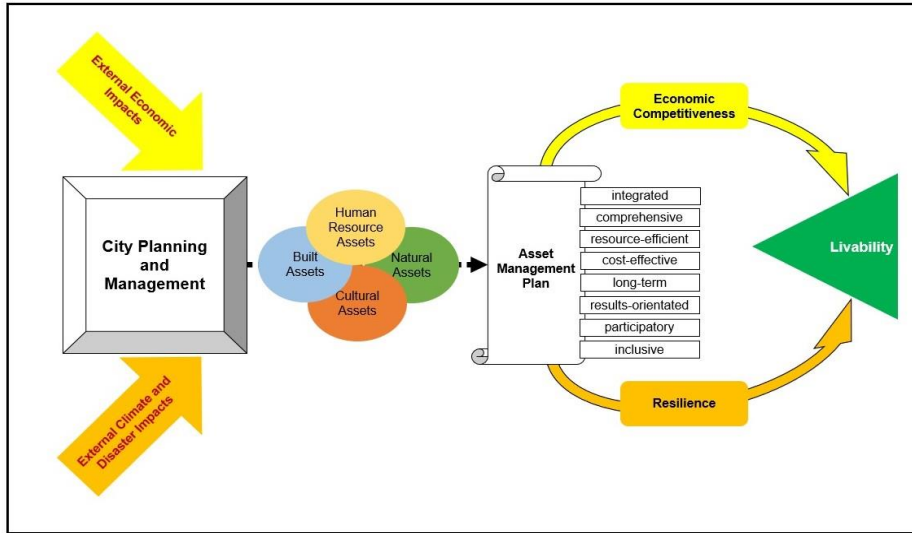
Complex Data ([butleranalytics.com](http://butleranalytics.com))



# Development Problem and Challenge for Policy Makers

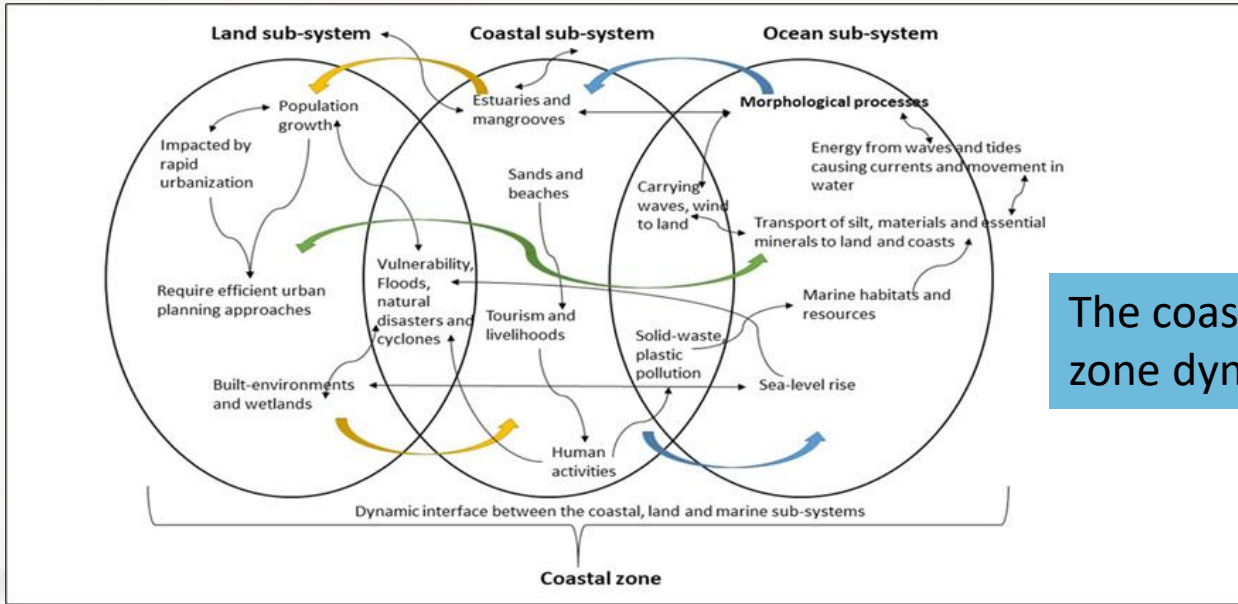
- **Segmented** approach to urban and infrastructure planning has led to loss of natural habitats, degradation of eco-systems; increasing greenhouse gas emissions, water and air pollution levels threatening health standards
- **Exacerbation** from risks of climate change and natural hazards especially across coastal cities, causing irreversible environment damage
- **Interrelations** of natural ecosystems with economic drivers especially tourism

# Total Asset Management



Sandhu, S. C., et al (2016). GrEEEn Solutions for Livable Cities. Asian Development Bank.

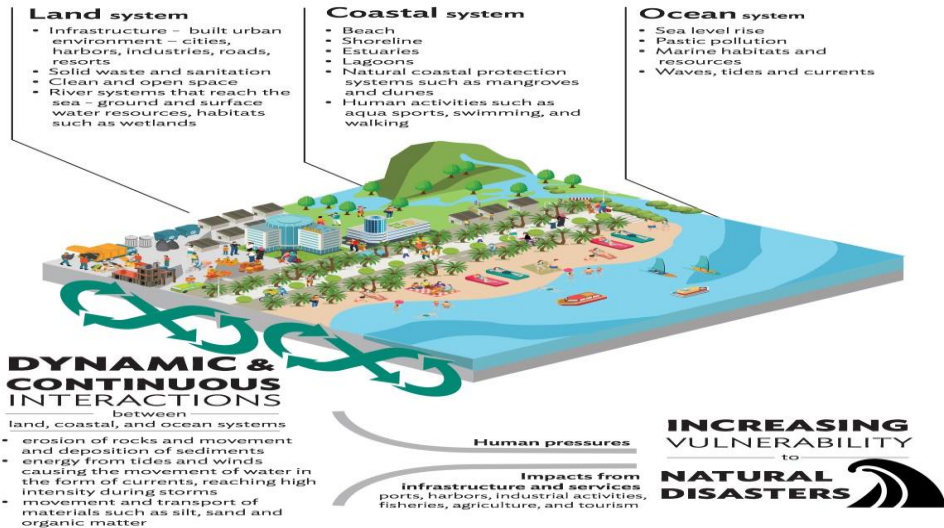
<https://www.adb.org/publications/green-solutions-livable-cities>



The coastal zone dynamics

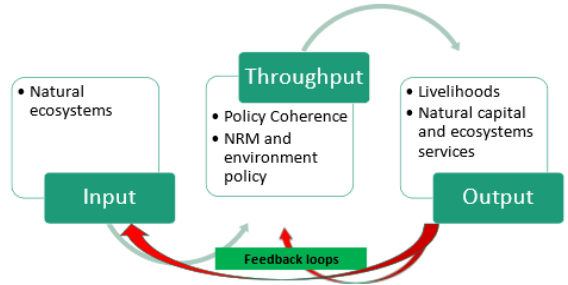
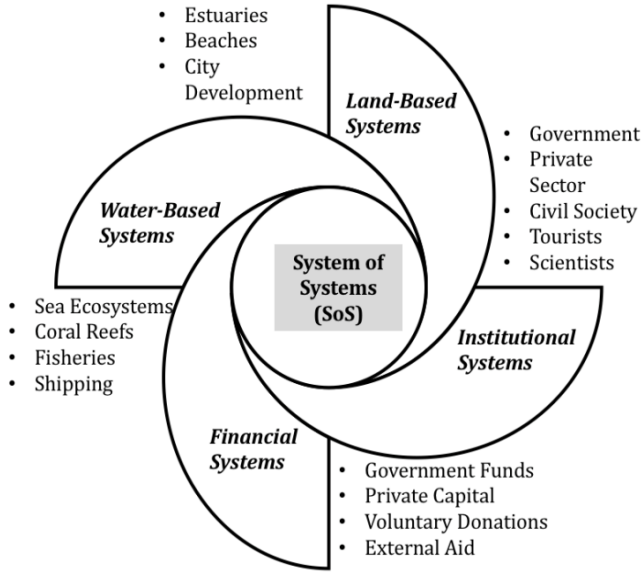
Source: Sandhu. S.C., et al, Resilient Coastal Cities for Enhancing Tourism Economy: Integrated Investment Planning Approaches, ADBI Working Paper Series, 2019

# Coastal Eco-systems are Dynamic

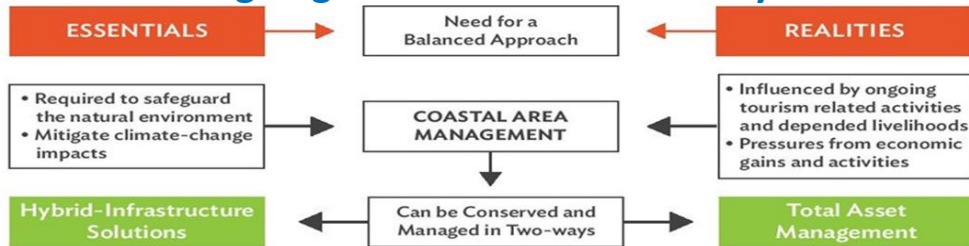




## A Systems of System (SoS) approach for improving coastal city management.



# Designing interventions differently



## Physical Gray-Infrastructure • Nature-based Solutions

Green	Gray	Hybrid
<ul style="list-style-type: none"> <li>Protecting the living shorelines, e.g., through mangroove systems</li> <li>Using natural buffers for flood control eg: seagrass, oyster reefs, sand-dune systems</li> </ul>	<ul style="list-style-type: none"> <li>Using hard-Infrastructure solutions such as sea-walls, canals, pipes, waste-water treatment and filtration plants</li> </ul>	<ul style="list-style-type: none"> <li>Using combination approaches of green, gray and blue infrastructure such as grass and other natural buffers, natural restoration techniques alongside hard solutions like embankments, etc.</li> </ul>

## Built Assets • Human Resources Assets • Natural Assets • Cultural Assets

<ul style="list-style-type: none"> <li>Focused on Operation and Maintenance of built infrastructure</li> <li>Inclusion of ecological and social dimensions</li> <li>Green, gray and hybrid solutions</li> <li>Safeguarding the natural environment</li> <li>Protection of social and cultural heritage</li> <li>Understanding the regulatory environment</li> </ul>	<ul style="list-style-type: none"> <li>Increase economic competitiveness</li> <li>Increase livability and longevity of assets</li> <li>Foster greater resilience</li> </ul>
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**Total asset management (TAM) approach: Use of hybrid solutions for designing coastal infrastructure for climate adaptation and improving resilience**

Arjan L, Sandhu S.C., Rau S. in Susantono, B. Ed., & Guild, R. Ed. (2021). Creating Livable Asian Cities. Asian Development Bank. <https://doi.org/10.22617/SGP210110>

# Nature Based Solutions: 5 principles going forward



**Designing right  
or  
Designing  
Differently?**

- (i) Stakeholder engagement for improved planning
- (ii) Systematic cross-sector collaboration across departments e.g., using systems thinking
- (iii) Innovative project designs which combine nature based solutions and structural measures
- (iv) Continuous capacity development that embeds innovative and integrated thinking
- (v) Digital applications for improved data management for evidence gathering

**Recalibration of institutions for decision making towards a climate-resilient Asia-Pacific region**