Coastal and Ocean Observations for Climate Adaptation

Louis Celliers on behalf of many
Climate Service Center
Helmholtz-Zentrum Hereon, Germany
Answering 3 simple questions

• Why adaptation?
• What are NAPs?
• How do we? (support adaptation and NAPs using observation and climate information services)
The importance of including the coast and ocean in NAPs

Adaptation to support the Blue Economy and reduce loss

Blue Economy Sectors

- Blue biotechnology
- Coastal tourism
- Desalination
- Marine living resources
- Marine non-living resources
- Marine Renewable Energy
- Maritime defence
- Maritime transport
- Ocean energy
- Port activities
- Research and innovation
- Shipbuilding and repair
• The BAD NEWS is the expected Impacts of climate on coasts and urban settlements (WG II, AR6). “Regardless of climate and socio-economic scenarios, many Cities and Settlements face severe disruption to coastal ecosystems and livelihoods by 2050 – and across all C&S by the Sea by 2100 and beyond – caused by compound and cascading risks, including submergence of some low-lying island states”

• “Realising global aspirations for climate resilient development depend on the extent to which coastal Cities & Settlements institutionalise key enabling conditions and chart place-based adaptation pathways to close the coastal adaptation gap”

(IPCC AR6 WG II)
Integrated Coastal (Zone) Management

- Waste
- Nature and Biodiversity Protection
- Environmental Information / Education for Citizens
- Water Supply
- Waste Water Treatment
- Climate Change Adaptation
- Management of Rural Areas
- Environmental Information / Education for Companies
- Protection of Cultural Landscape
- Climate Change Mitigation
- Air-Quality
- Energy
- Green Public Procurement
- Noise
- Mobility
- Land Use Planning

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1. Preparing to adapt
2. Assessing climate risks and vulnerabilities
3. Identify adaptation options
4. Assess adaptation options
5. Implement
6. Monitor and evaluate
Marine Spatial Planning
Contemporary Issue in Academic Literature!


Why & What of NAPs?

• What is the UNFCCC NAP process?
• Why do we believe that there is a need for more guidance on (ocean and coastal) adaptation

• https://unfccc.int/topics/adaptation-and-resilience/workstreams/national-adaptation-plans
• https://www4.unfccc.int/sites/napc/Pages/Home.aspx
The agreed objectives of the UNFCCC national adaptation plan process are:

1. To reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience;

2. To facilitate the integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate.
*map of countries with NAPs as of 08/05/2023

- 48 NAPs
- 32 NAPs coastal countries
- 8 SECTORAL NAPs

GAPS IDENTIFICATION

https://napcentral.org/submitted-naps
Overview of Analysis of the Inclusion of coasts and oceans in existing NAPs (2023)

1. Fully/almost fully neglected [10]
2. Mentioned slightly/elsewhere [13]
3. Integrated throughout [1]
Limitations

1. Planning - Laying the groundwork and 4. Monitoring and Evaluation are largely lacking detail.

- Generic language used across most NAPs.
- Lack of stakeholder identification across most sections.
- Failure to incorporate local knowledge into the creation of NAPs.
- Failure to identify context specific capacity gaps and weaknesses in creating and implementing the NAPs process outside of generalised overviews of poor infrastructure, resources, and funding.

- Limited use of earth observations and climate services.
Coastal and Ocean observations supporting the goals of:

- Integrated Coastal (Zone) Management
- Marine Spatial Planning
- Blue Economy implementation
- Climate Change Adaptation

- Information services, decision-support tools
- Coastal observations, data and information
- Risk and vulnerability
- Capacity development, user-engagement and societal awareness

- Monitoring services, decision-support tools
- Capacity development, user engagement and societal awareness

Preparing the ground for adaptation

Assess risks and vulnerabilities to climate change

Identify and prioritise options

Implement adaptation in planning and procedures

Implement ICM

Secure formal adoption and funding

Assess adaptation options

Issue identification and assessment

Monitor, evaluate and re-iterate

Monitor, evaluate and re-iterate
Coastal and Ocean Observations for Adaptation

A. Lay the Groundwork and Address Gaps

B. Preparatory Elements

C. Implementation Strategies

D. Reporting, Monitoring and Review

NAPS

**Observation Application**

<table>
<thead>
<tr>
<th>Observation Application</th>
<th>Links to Adaptation Options</th>
</tr>
</thead>
</table>
| Optical water types for coastal water quality monitoring | • Food security, nutrition, sustainable agriculture  
• Management of water, quality and quantity  
• Sustainable use of ocean resources |
| Species niche habitat distribution mapping | • Food security, nutrition, sustainable agriculture  
• Sustainable consumption  
• Sustainable use of ocean resources |
| Complementary multi-platform coastal bathymetry | • Conserve and sustainably use the oceans, seas and marine resources for sustainable development |
| Coastal inundation mapping and prediction, and storm surge risk assessment | • Reduce risk to communities  
• Maintain infrastructure |
| Extreme event monitoring | • Drought and flooding management |

(Politi et al 2019; Beneviste et al 2020)
<table>
<thead>
<tr>
<th>Objective</th>
<th>Domain</th>
<th>Variable/Climate indicators</th>
<th>Example sensors</th>
<th>Temporal resolution</th>
<th>Spatial resolution</th>
<th>Sensor types</th>
<th>Potential application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptation</td>
<td>Urban and rural areas</td>
<td>LST, urban green areas/materials</td>
<td>ASTER-TIR, Landsat-TIR, Sentinel-2, Planet, CHIME, ENMAP, ECOSTRESS</td>
<td>Daily to bi-weekly</td>
<td>&lt; 100 m</td>
<td>Thermal infrared radiometers</td>
<td>Urban heat island effect, evapotranspiration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proxies and indices for vegetation (e.g., NDVI)</td>
<td>Landsat, Sentinel-2, Pléiades, SPOT, PRISMA, CHIME, EnMAP</td>
<td>5–15 days</td>
<td>10–100 m</td>
<td>Visible/infrared radiometers</td>
<td>Vegetation status and health</td>
</tr>
<tr>
<td>Coastal areas</td>
<td>Sea state</td>
<td></td>
<td>Altimetry, SWiM</td>
<td>Monthly</td>
<td>100 km</td>
<td>Radar altimetry</td>
<td>Coastal flooding</td>
</tr>
<tr>
<td>Oceans</td>
<td>Ocean roughness</td>
<td></td>
<td>Sentinel-1</td>
<td>12 days</td>
<td>5 m</td>
<td>Radar</td>
<td>Fishing industry</td>
</tr>
<tr>
<td>Snow</td>
<td>Snow extent, snow mass, snow conditions (dry/wet)</td>
<td></td>
<td>VHRR, AVHRR, MODIS, VIIRS, SAOCOM, NISAR, ROSE-L, Sentinel-1, 2, 3, CHIME, SSM/i, CIMR</td>
<td>Daily</td>
<td>1–4 km</td>
<td>Optical, Radar, microwave radiometers</td>
<td>Water resources, seasonal forecasts of drought and flood events, snow tourism</td>
</tr>
</tbody>
</table>
Supplementary Material to the Technical Guidelines

Guidelines for Integrating Ecosystem-based Adaptation into National Adaptation Plans

Addressing Agriculture, Forestry and Fisheries in National Adaptation Plans

LEAST DEVELOPED COUNTRIES

NATIONAL ADAPTATION PLANS

Technical guidelines for the national adaptation plan process

LDC EXPERT GROUP, DECEMBER 2012

CBD - Convention on Biological Diversity
CI - Conservation International
CCAFS - CGIAR Research Program on Climate Change, Agriculture and Food Security
FAO - Food and Agriculture Organization of the United Nations
GIZ - Deutsche Gesellschaft für Internationale Zusammenarbeit
GWP - Global Water Partnership
IFRC - International Federation of Red Cross and Red Crescent Societies
IIED - International Institute for Environment and Development
IPACC - Indigenous Peoples of Africa Coordinating Committee
ITU - International Telecommunication Union

Technical Guidelines

United Nations Framework Convention on Climate Change

UNFCCC - United Nations Framework Convention on Climate Change

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Analysis focus on economic sectors and activities
Based on modern scientific approach and best practices available.

Should enhance the cross-sectoral integration of the sectoral NAPs.

Provide guidance to overcome the identified knowledge gaps and barriers.

How can Earth Observation (EO) help Developing countries in Coastal NAP process?
Thank you