

# Integrated Coastal Zone Management

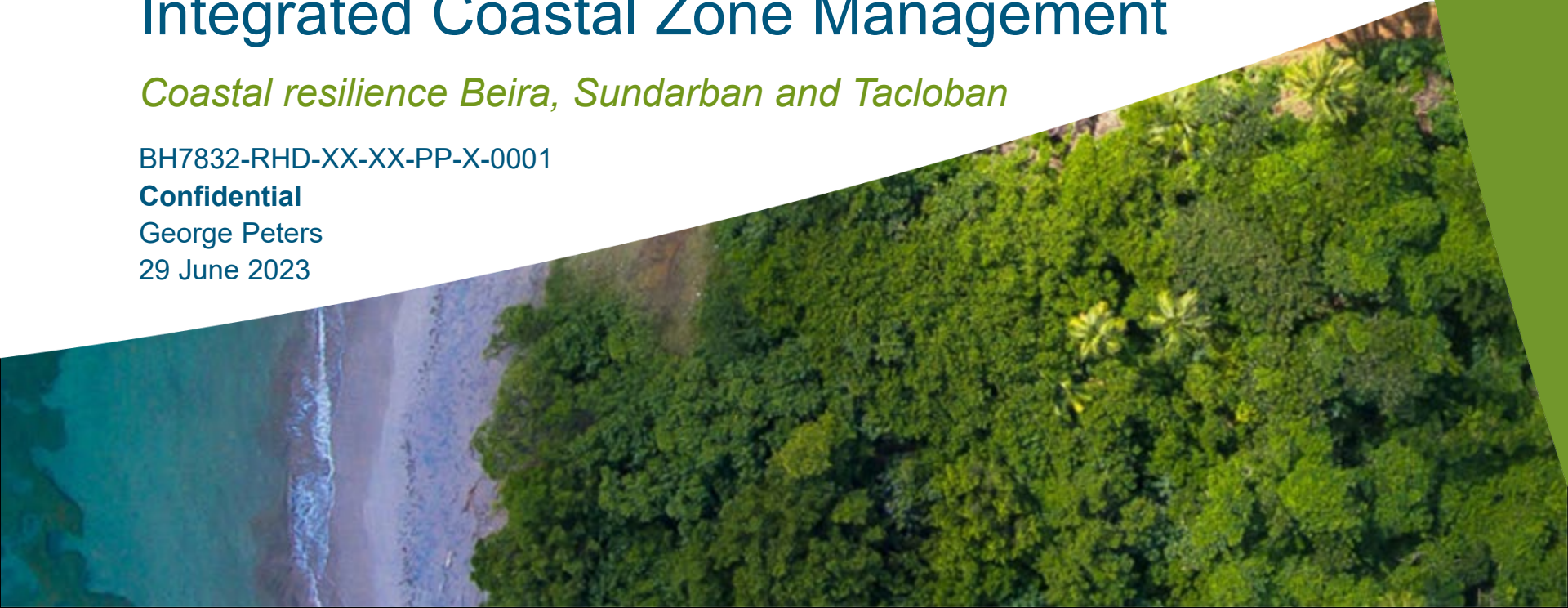
*Coastal resilience Beira, Sundarban and Tacloban*

BH7832-RHD-XX-XX-PP-X-0001

**Confidential**

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29 June 2023



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## Enhancing society together



Requirements of  
stakeholders



Added value to  
client and society



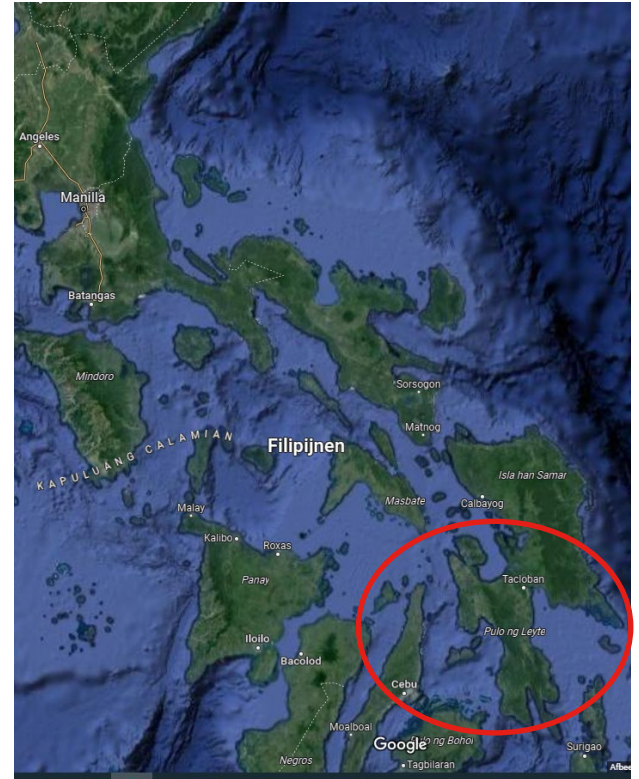
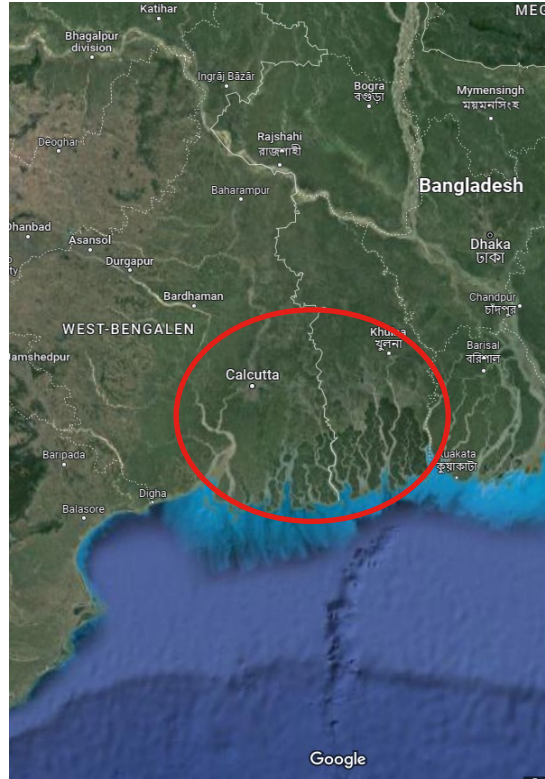
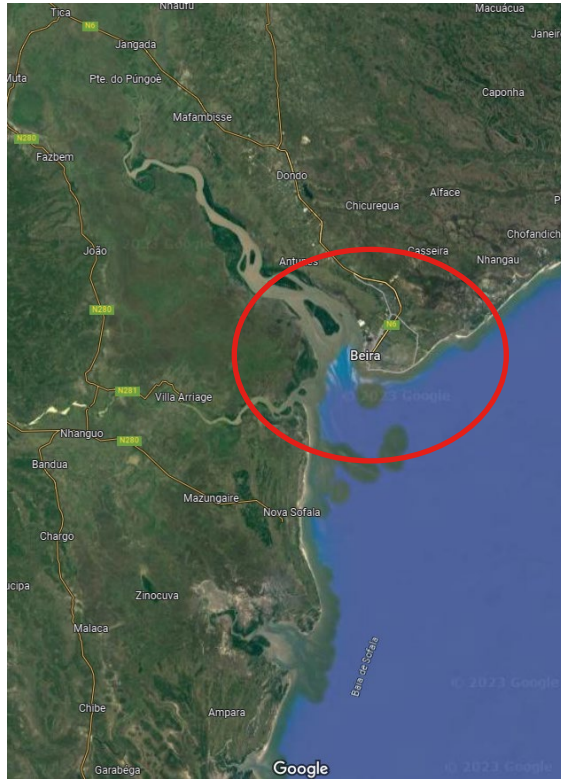
Future-proof



Resources and  
Energy

*Our ambition is to run a financially healthy business by putting our collective intelligence into practice with clients and partners to have a positive impact on people, our living environment and the economy*

# Coastal resilience Beira, Sundarban and Tacloban



# Coastal protection plan for city of Beira, Mozambique

Partners Deltares, Witteveen + Bos and TU Delft University



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# Coastal protection measures Beira

- Natural dune restoration with vegetation
  - Rock revetment
  - Simple flood wall/ L-wall
  - Repairs and strenghtening old seawall
  - Clay dike connecting to higher grounds
- Important generic measures:*
- Early Warning System
  - Nursery and revegetation plan for coastal belt
  - Technisch Assistance/ capacity building O&M



## Final decision after (intensive) stakeholder discussions about effectiveness and O&M efforts:

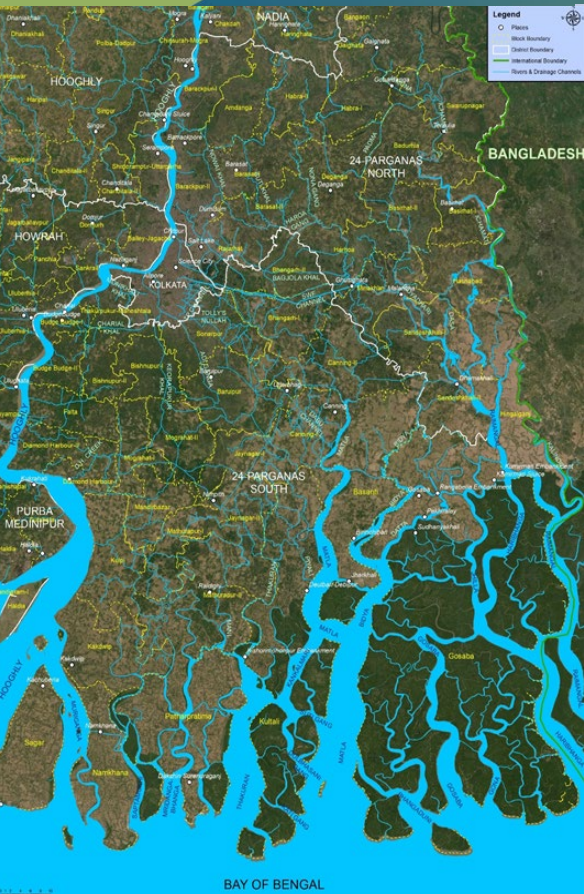
- Natural dune restoration/ strengthening selected as preferred flood protection (yellow line).
- Hard solution a lot more expensive (investment costs), and not considered sustainable/ sufficiently adaptive towards the future (morphological uncertainty).
- Only locally apply hard solutions and only in sheltered area (stretch 2).
- Combined with foreshore nourishment buffer for erosion compensation (25 years buffer).



# Coastal protection plan for Sundarban, India

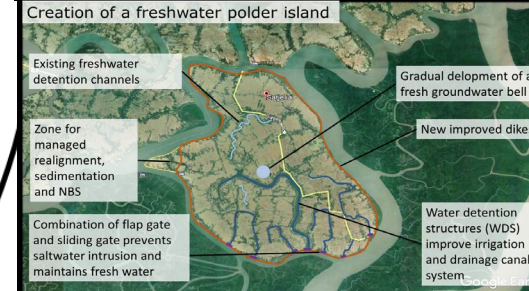
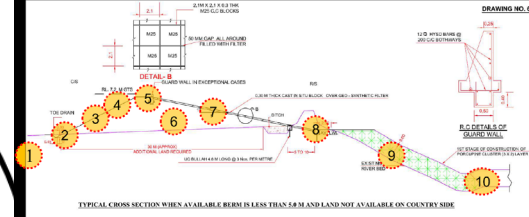
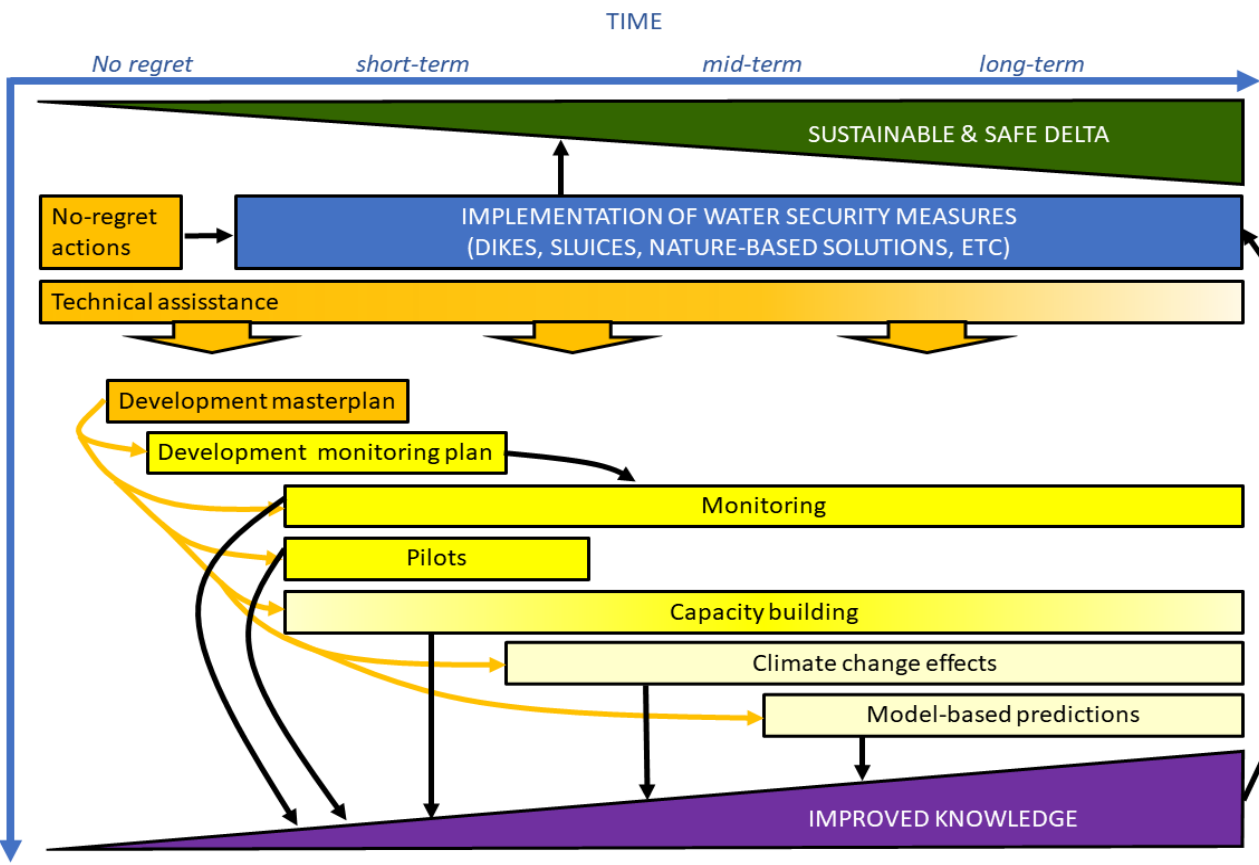
Partners Deltares and Rijkswaterstaat







KNOWLEDGE



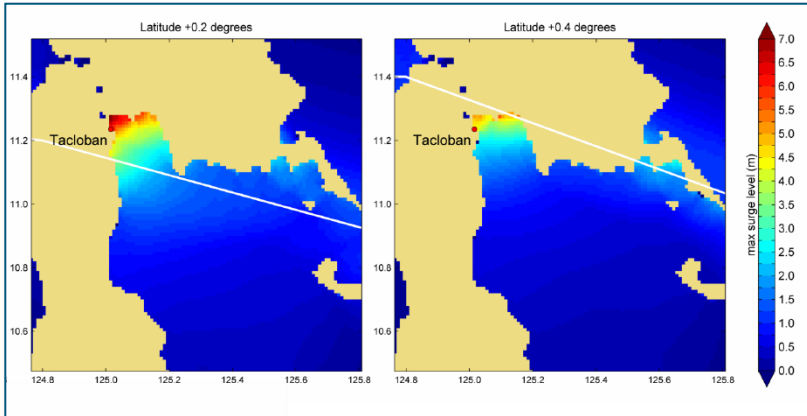
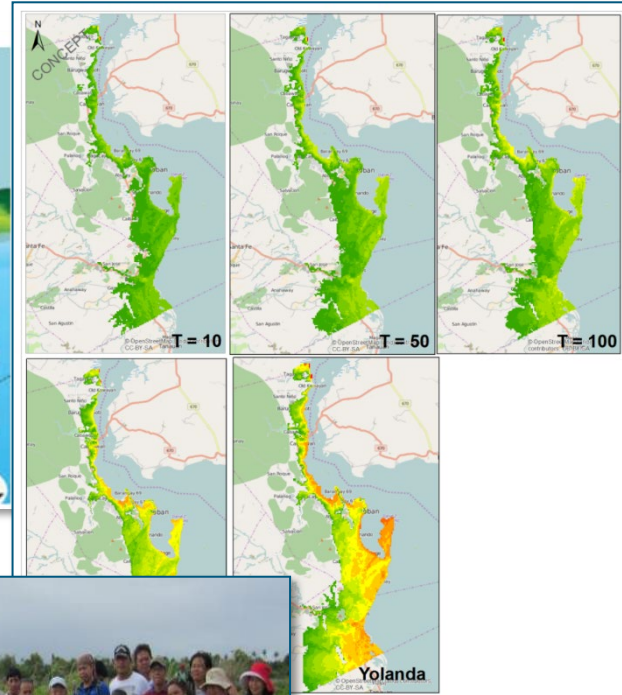
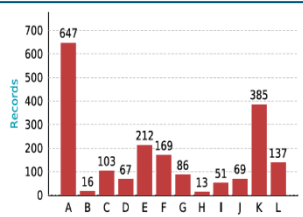
What?	Chapter	By whom?	NR	ST	MT	LT
1 Masterplan for the Greater Sundarban Basin	2.1-2.5	I&WD i.c.w. relevant sectoral ministries, departments	✓			
2 Adaptive Delta Management Plan for Sundarban Delta	2.1-2.5	I&WD i.c.w. relevant sectoral ministries, departments	✓			
3 No regret adaptation in current practice for Flood Resilience	2.2	I&WD	✓			
4 No regret adaptation in current practice for NBS	2.4	I&WD, DoE, DoF, NGO's	✓			
5 Data collection, and planning of monitoring program	2.2-2.3, App-4	I&WD	✓			
6 Risk based vulnerability assessment	2.2	I&WD	✓			
7 Conceptual design of embankments	2.2	I&WD	✓			
8 Short-listing the right NBS for the Sundarban	2.4	I&WD, DoE, DoF	✓			

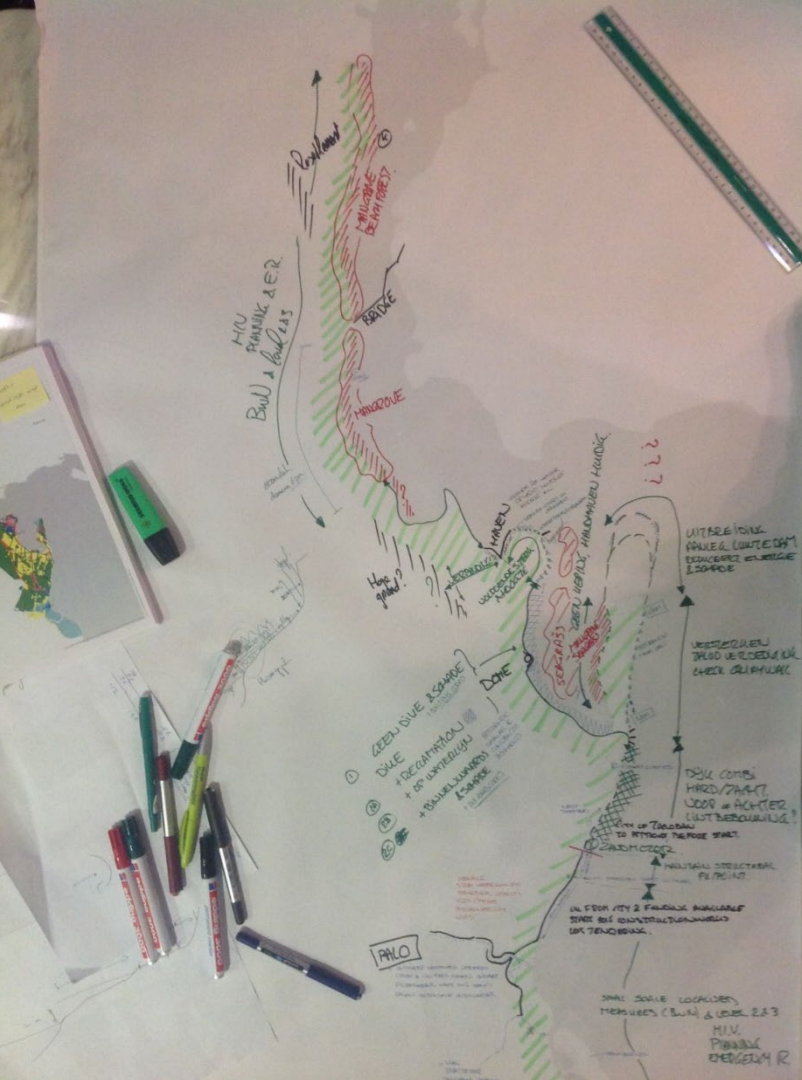
# Coastal protection strategy for Tacloban, Philippines

Partners Deltares, Red Cross, Van Oord, Arcadis, Wetlands International and Rebel Group



Label	Name	Code	Value	%
A	Fisherman	Fisherman	647	33.1
B	Farmer	Farmer	16	0.8
C	Market or street vendor	Market_or_street_vendor	103	5.3
D	Labourer (e.g. in port)	Labourer_e_g_in_port	67	3.4
E	Construction	Constructon	212	10.8
F	Driver	Driver	189	8.6
G	Housewife	Housewife	86	4.4
H	Domestic services (e.g. nanny or cleaner)	Domestic_services_e_g_nanny_or_cleaner	13	0.7
I	Government employed	Government_employed	51	2.6
J	Private service	Private_service	69	3.5
K	Small business	Small_business	385	19.7
L	Other	Other	137	7.0
<b>Total</b>			<b>1955</b>	<b>99.9</b>





# Coastal protection strategy for Tacloban, Philippines



North

Non-structural

Tacloban

Mid

South

Palo

Structural & Non-structural

Structural & Non-structural

Structural & Non-structural

Airport

Bay Hotels, etc.      Bay Boulevard      Bayside Park

aiding road      land traffic

lower, protected road profile

aiding situation

aiding road widened on new levee

retention basin

sea wall, storm gate, storm shelter

MAN-PPMS

aiding situation

# Lessons learnt, major take aways

1. Future proof, scenario thinking, adaptive pathways, let's keep it transparent
2. Measures (both soft where possible and hard where needed) require maintenance
3. Lack of knowledge on the design and effectiveness of soft solutions. Knowledge base is behind on more traditional hard solutions. Need for pilots to validate, fill knowledge gaps!
4. There is no alternative for a project live cycle approach
5. Monetising benefits can be complex, for urban, social and environmental goals
6. Timing of the project is important, are stakeholders ready to start?
7. How about succession planning, cap. building at client side and major stakeholders?
8. Pilot projects are great spin offs, keeping momentum, bridging the (project)gaps
9. Blue print for coastal resilience in Philippines, now used for other areas
10. Roadmaps balance both short and long term goals, there is enough for everyone!

# We look forward to working with you.

For more information visit our website:

<https://global.royalhaskoningdhv.com/climate resilience>



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