

Working together
toward
sustainable
sand mining
and management.



Supported by:



Federal Ministry
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based on a decision of the German Bundestag



SUSTAINABLE SAND MANAGEMENT IN THE VIETNAM MEKONG DELTA PROJECT

INTRODUCTION – SAND BUDGET

○ It is seriously imbalanced in the sand budget of Vietnam Mekong Delta: - (26.5 – 39.5) Million tons (Mt)/year

- ✓ Sand load from upstream: 6.8- 7 Mt/year (MRC, 2020)

- ✓ Sand extracted in VMD: -(27-40) Mt/year (Hackney et al., 2020, Jordan et al., 2019)

- ✓ Sand deposit to sea: - 6.5 Mt/year (Stephen et al, 2017)

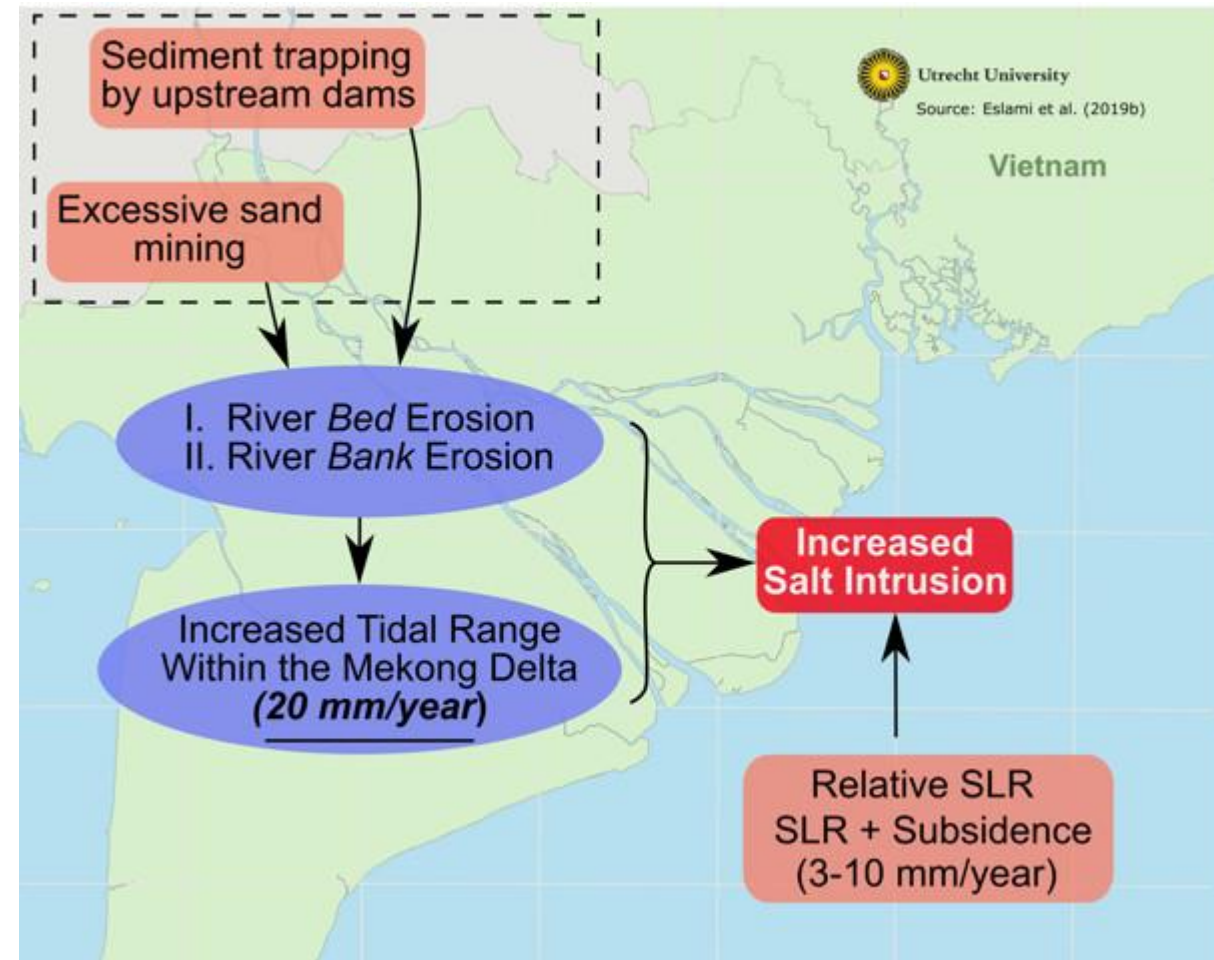
○ Too many hydropower dams built in the upstream led to a drop of sand deposit to the delta over time, in 2040 there is estimated only 4.5 Mt sediment deposited to VMD, of which 10-15% is sand compared to 143.2 Mt in 2007 (MRC, 2018)

○ Sand mining tendency in VMD depends on provincial sand management policies.

○ Sand deposit to sea tends to decrease over time.

THE MAIN CAUSE IS SEDIMENT DEFICIT

- Riverbed incision CANNOT be balanced with the sediment brought by seasonal floods.
- Increased tidal range caused by deeper riverbed incisions.
- Riverbed incision, riverbank / coast erosion caused by sediment trapped upstream and extracted downstream.
- Salt intrusion increases, especially in dry season.



WHAT IS PROJECT DOING?

Where will we go from here?

WWF & partners are **PROMOTING** more **SUSTAINABLE SAND MANAGEMENT** through the support and leadership of:

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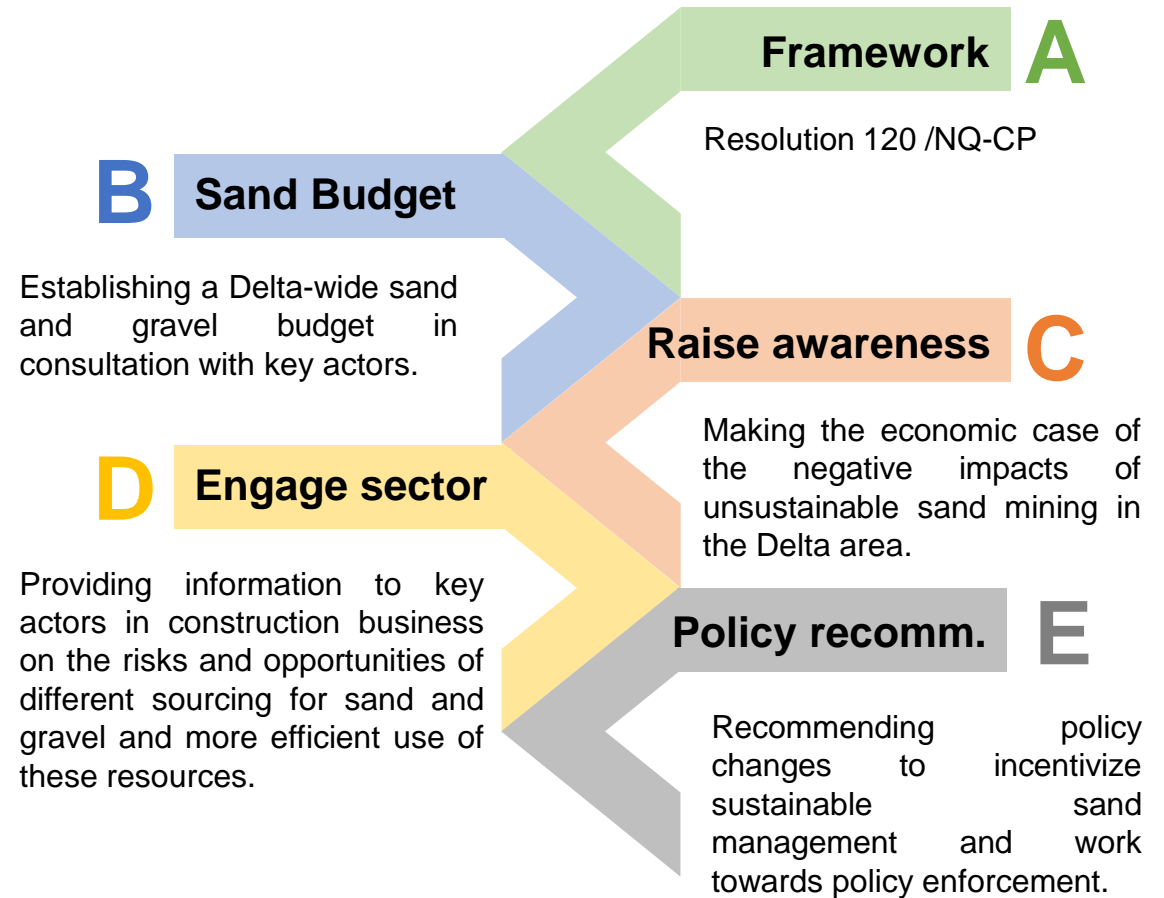


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Undertaking actions to better monitor river sand and use it more efficiently, identify alternative sources, improve policies and practices on sand and gravel mining in order to increase adaptive capacity to climate change in the Mekong Delta.



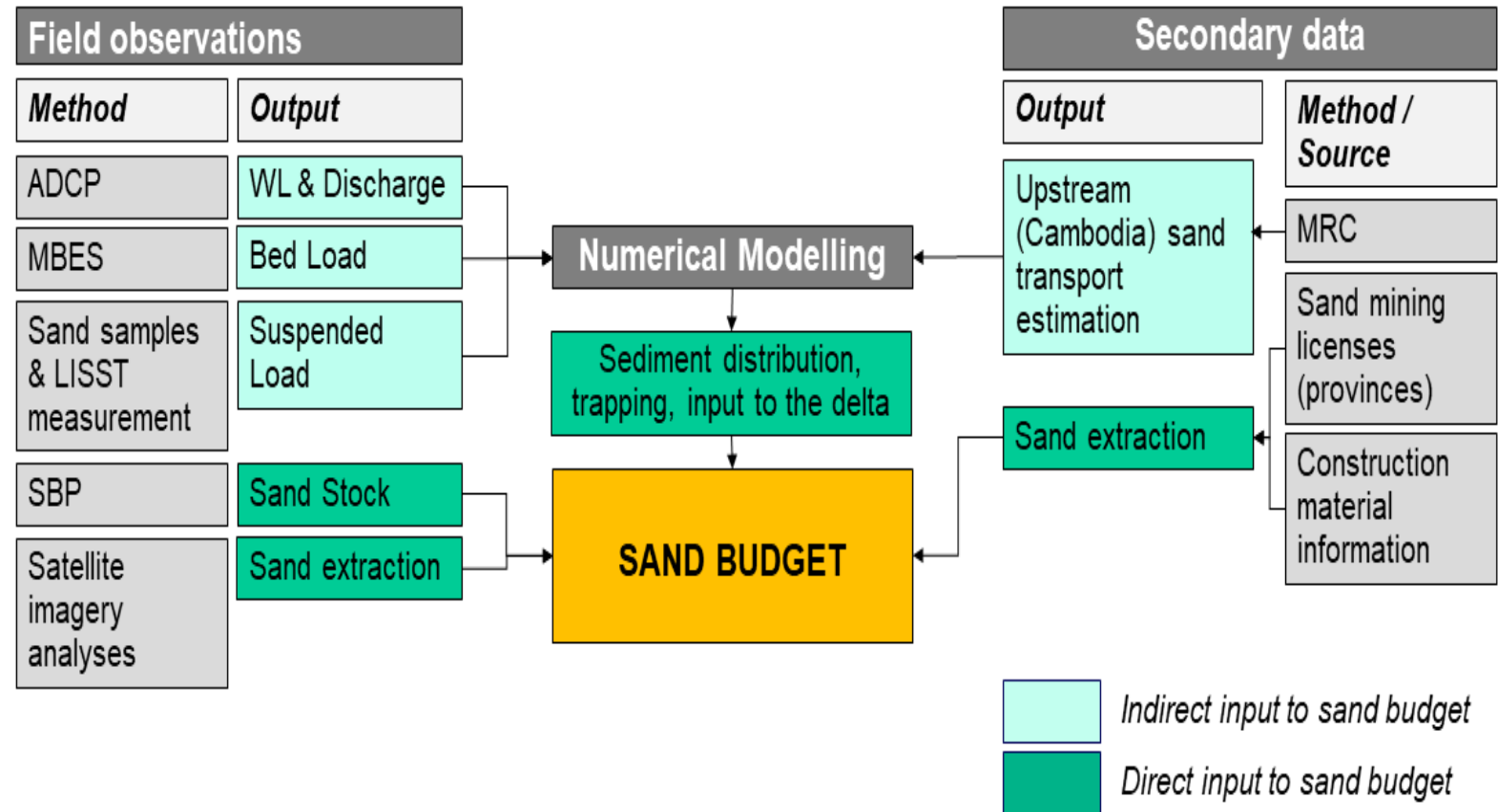
OUTPUT I

DEVELOPMENT OF A DELTA-WIDE SEDIMENT BUDGET (MAINLY SAND)

Aims to

- ✓ Inform the management of sand resources,
- ✓ Serve as a key reference to support the formulation of policies and recommendations,
- ✓ Act as the basis for awareness on sand management and development of training materials.

This package is implemented by WWF and Deltares JVs.



INITIAL SAND BUDGET

- The early conclusion of the study: on the basis of the current extraction rates, the sand stock of the VMD can only last approximately for the next decade.

| No. | Calculation in 2022 by IKI SMP | Million tons |
|-----|--------------------------------|--------------|
| 1 | Sand entering delta | 9 |
| 2 | Sediment exchange with Ocean | ~ 9 |
| 3 | Sand extraction | 40 – 50 |
| 4 | Existing Sand stock | 350-600 |

RESULTS OF ANALYSIS SEDIMENT SURFACE OF THE BOTTOM RIVER 2022

- Through analysis of 168 bottom surface sand samples on 5 upstream locations with a river length of about 110km, most of the sand has an average diameter of <1mm (medium to very fine grade and contains many impurities).

| Area | Sampling area length (km) | Number of samples | d50 (mm) | Number of clean sand samples | Number of samples of sand mixed with alluvium, soil, clay, dust | Number of samples of alluvium, clay and sand | Number of samples completely without sand |
|------------------|---------------------------|-------------------|----------|------------------------------|---|--|---|
| Can Tho | 20 | 25 | 0,1 | 0 | 0 | 14 | 11 |
| My Thuan | 24,6 | 34 | 0,1 | 7 | 10 | 16 | 8 |
| Vam Nao – Bassac | 20 | 33 | 0,2 | 18 | 11 | 4 | 0 |
| Vam Nao – Mekong | 20 | 34 | 0,2 | 16 | 16 | 1 | 1 |
| Tan Chau | 25 | 42 | 0,3 | 21 | 14 | 0 | 7 |

PRELIMINARY RESULTS OF WWF ALTERNATIVE MATERIALS RESEARCH

| No | Application | Alternative materials and % of replacement for river sand | Potential in the Mekong Delta region |
|----|--|---|--|
| 1 | Traditional concrete production | Rice husk slag (30%), Cast sand (20-30%), bagasse ash (20-30%), Copper slag (50%), Blast furnace slag (40-60%), Furnace bottom slag (30) -50%), Fly Ash (50%), Geopolymer Fly Ash Sand (100%), Stone Powder (50%), Granite Powder (30%), Marble Set (10%), Glass Scrap (10-20%), foundry slag (25%), waste rubber (7.5-25%) | Rice husk ash, bagasse ash, furnace slag, and fly ash are potential substitute materials in the Mekong Delta. |
| 2 | Brick production | Rice husk ash (30%), Fly ash and furnace bottom slag (30%), stone powder (100%) | Slag from milled rice husks and ash and slag from operating thermal power plants can replace river sand in brick production. |
| 3 | Production of self-compacting concrete | Casting sand (30%- 48mPA), Bagasse ash (20%), Glass scrap (5-15%), Foundry slag (25%), Rice husk slag (25%), | Bagasse ash and rice husk slag |
| 4 | Production of high strength concrete | Copper slag (40%), Stone set (20%), Rubber scrap (30%) | Scrap rubber can be applied to saltwater environment, seaport works |

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| 5 | Paving the sidewalk | Furnace slag (100%), fly ash (30%), stone powder (30%), scrap glass (70%), scrap rubber (12.5%), | Scrap rubber: Concrete pavements, floors and highways, tunnels and spillways with 25% NaOh |
| 6 | Mortar production | Fly Ash (60-70%), Marble Set (20%), Scrap Glass (20%) | Fly ash from operating thermal power plants can be used for mortar production |
| 7 | Coating the waste landfill | Rice husk ash (50-60%), scrap glass (100%), scrap bricks (50-100%), fly ash (50-80%), construction waste (50-100%), | These materials can be completely used from local sources in the Mekong Delta. |
| 8 | Make the road background | EAF Slag (100%), Blast Furnace Slag (100%), Construction Scrap (100%), Artificial Sand (100%), Cast Sand (50-100%) | |

RESEARCH QUESTIONS 1

Construction and urban development:

- What are the sustainable alternative sources/materials with large stock/production potentials to replace for the traditional sources such as river sand and gravel that are depleted very soon?
- What are the resource-efficient construction designs—consumed less natural resources, energy, carbon emission, ... that are suitable to tropical countries like Viet Nam

RESEARCH QUESTIONS 2

Energy

- What are the new alternative energies that requires lower investment and more the resource-efficient construction designs?
- How to improve the obstacles relating high investment, hard to maintain, and not resource-efficient construction designs to wind turbines/solar panels?

RESEARCH QUESTIONS 3

Climate change

- What is the business model for climate change adaptation in Viet Nam that are stable and attractive for the investment from private sector both from VN and Germany?



Thank
you