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# PRIORITIZING CLIMATE ADAPTATION INVESTMENT IN ACCRA, GHANA

## *From Risk Assessment to Project Identification*

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# Challenge

- Delta as unique geography – sea, river, low-lying geography (similar exposures)
- Climate change is a daily reality in Accra
  - Flooding
  - Coastal Erosion
  - Water Scarcity
- Disproportionate impact on the most vulnerable (e.g. informal settlements)
  - Riverside and coastal communities
  - Flood plains

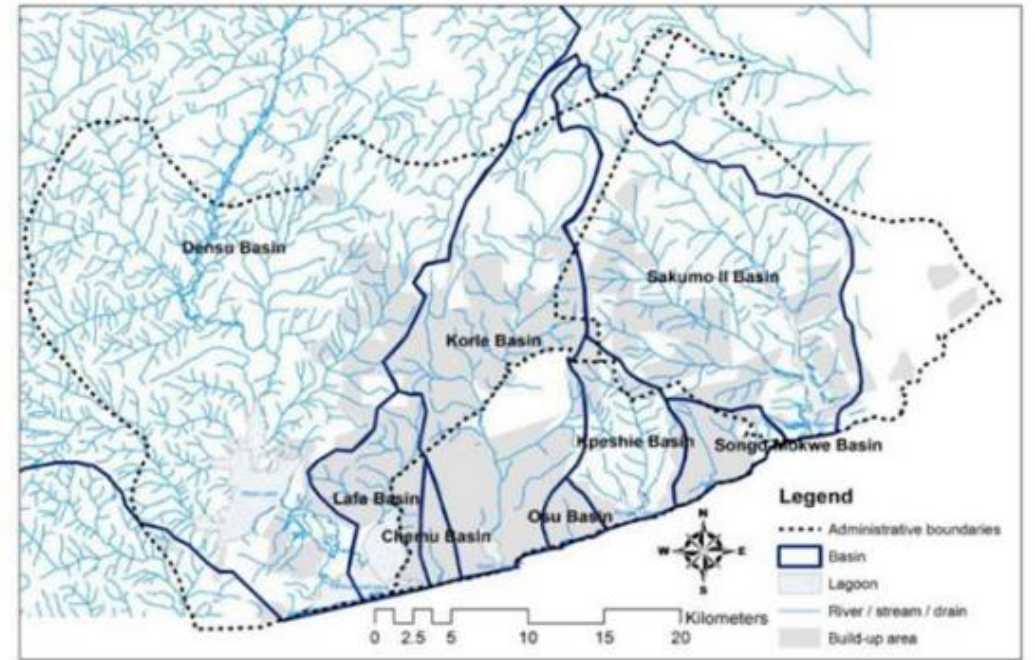


Figure 1: River Catchments of Greater Accra Region



Figure 4: Elevation of (core) of Accra Metropolis



# Climate Vulnerability Stats

## ○ Flooding

- If no intervention in Accra, **expected annual damage (EAD)** due to flooding expected to **increase 16%** (\$106 Million in 2000s → \$124 Million in 2030s)

## ○ Coastal Erosion

- Between 2005 – 2014, **average rate of erosion 0.54 m / year**
- By 2050, 615k+ m<sup>2</sup> will be inundated due to sea level rise (and will increase to 2.1 million+ m<sup>2</sup> by 2080)
- By 2080, shoreline will advance inland 52 m (on average) and some areas 161 m (Glefe Area)



Glefe area eroding over 161 m from 2014 position

## ○ Water Scarcity

- Water infrastructure **highly climate vulnerable** (flooding)
- Sufficient water per capita but projected **climate variability** can jeopardize widespread availability

50-year Return Period (2000s)



50-year Return Period (2050s RCP8.5)



# Process / Timeline



- Climate Analysis (precipitation, temperature extremes)
- Coastal Erosion Modeling
- Flood Modeling
- Hazard Exposure and Risk Estimation of Compound Flooding
- Participatory Hazard, Vulnerability and Capacity Assessment

- Current state and desired state of water-related infrastructure
- Challenges and opportunities in water-related climate adaptation
- Menu of bankable investment options
- Cost-estimation of identified options

- Validation workshops with national and municipal stakeholders
  - Accra Metropolitan Assembly
  - Regional Coordination Council (RCC)
  - National ministries
- Prioritized Climate Adaptation Investment List
- Pitchbook for investors (MDB, donors, private sector)

# Investment Opportunities

## Summary

- Scope: GAMA+ (Greater Accra Metropolitan Area + adjacent river catchment areas)
- 20 project ideas identified, organized into 6 climate adaptation priorities; concept proposals prepared
  - Coastal Protection & Climate Resilience
  - Flood Forecasting & Early Warning
  - Densu River Basin + Delta Adaptation
  - Climate Resilient Water Supply
  - Low-Income Urban Community (LIUC) Revitalisation & Adaptation
  - Urban Drainage & Resilience
- Total investment required: US\$ 466.6 million
- Third-party investment opportunity: US\$ 378 million
- Project development investment: US\$ 23.3 million.

	Project Costs		Investment Opportunity	
	Development Phase	Full Project	Development Phase	Full Project
	million US\$	million US\$	Million US\$	million US\$
1. Coastal Protection & Climate Resilience	7.8	156.2	7.8	130.0
2. Flood Forecasting & Early Warning	0.6	12.9	0.6	8.0
3. Densu River Basin + Delta Adaptation	3.6	72.6	3.6	60.0
4. Climate Resilient Water Supply	5.2	103.5	5.2	80.0
5. LIUC Revitalisation and Adaptation	2.9	57.4	2.9	45.0
6. Urban Drainage & Resilience	3.2	64.0	3.2	55.0
<b>Total (million US\$)</b>	<b>23.3</b>	<b>466.6</b>	<b>23.3</b>	<b>378.0</b>



# 3. DENSU BASIN + DELTA CLIMATE ADAPTATION

## Project rationale

- Soil erosion in upper Densu basin leading to siltation of Weija reservoir → lower storage capacity, water scarcity
- Release of flood waters and encroachment of lower Densu floodplain → increased flood risk of downstream communities

## Strategic Direction

- Need to strengthen upper Densu basin soil erosion control
- Downstream protective measures and adjusted dam releases should be implemented to reduce downstream flood risk.

## Beneficiaries

- People, businesses and assets located in upper and lower Densu basin, especially low-income communities in flood plains.

## Gender considerations

- Reduction of floods in Densu floodplain will positively impact women in the area as impact on households will be less severe.

## Potential climate mitigation co-benefits

- Climate mitigation co-benefits could arise from restoration of floodplain and coastal wetlands and related carbon sequestration in (semi)natural ecosystems.



# 3. DENSU BASIN + DELTA CLIMATE ADAPTATION

<b>Project Parameters</b>			
<b>Project Type</b>	Densu River Basin and Delta Climate Adaptation through IWRM	<b>Size</b>	Densu river basin size: 2,490 km <sup>2</sup> Floods extension: ca. 250 km <sup>2</sup>
<b>Location</b>	GAMA and Densu basin	<b>Development Status</b>	<ul style="list-style-type: none"> <li>• Initial</li> <li>○ Early</li> <li>○ Mid</li> <li>○ Late</li> </ul>
<b>Potential beneficiaries</b>	0.6 million people	<b>Lead Government Agency</b>	Lead: Water Resources Commission Supporting: Hydrological Services Authority, Minister Works and Housing, Ministry Lands and Natural Resources, MMDAs - Metropolitan, Municipal and District Assemblies
<b>Initial Estimated Total Project Costs</b>	CAPEX: US\$ 72.6 million  Development Phase: US\$ 3.6 million	<b>Total External Funding Required</b>	CAPEX: US\$ 60 million  Development Phase: US\$ 3.6 million



# 3. DENSU BASIN + DELTA CLIMATE ADAPTATION

## Description

### **Component 1. Densu Upper Catchment & Weija Reservoir - Reforestation, Runoff & Sediment Control**

- 1.1 Assessment of sources of sediment entering the Weija reservoir (i.e., slopes, farms, farmland, mining areas, riparian zones, river channels) (using DTM, modelling, field surveys)
- 1.2 Pre-feasibility of erosion control and sediment reduction from the main sources of sediment (modelling, field survey)
- 1.3 Feasibility and detailed design of a sediment control programme (i.e., riparian zone conservation, farm run-off control actions, reforestation) and ESIA
- 1.4 Stakeholder consultations and design of community development programme
- 1.5 Implementation of Densu basin erosion and sediment control programme (5 years)

#### **Projected Outcome**

- Enhanced understanding of current and future anticipated opportunities for sediment control options in the upper Densu basin
- Increased climate resilience due to implementation of sediment control measures in the upper Densu basin

### **Component 2. Lower Densu Basin Flood Risk Reduction: Spatial Planning, Enforcement and Nature-based Solutions Infrastructure**

- 2.1 Update spatial planning for Weija Assembly, especially the Densu floodplain
- 2.2 Prepare (pre-)feasibility study for floodplain rehabilitation and protection (incl. ESIA)
- 2.3 Implement key flood defence interventions on critical locations between Weija Dam and Densu Delta Ramsar Site (incl. channel deepening, use of dikes and levees and wetlands for water storage, dump-site lining)

#### **Projected Outcome**

- Enhanced understanding of current and future anticipated opportunities for flood risk reduction in the upper Densu basin
- Increased climate resilience due to implementation of flood control and management measures in the lower Densu basin



# 3. DENSU BASIN + DELTA CLIMATE ADAPTATION

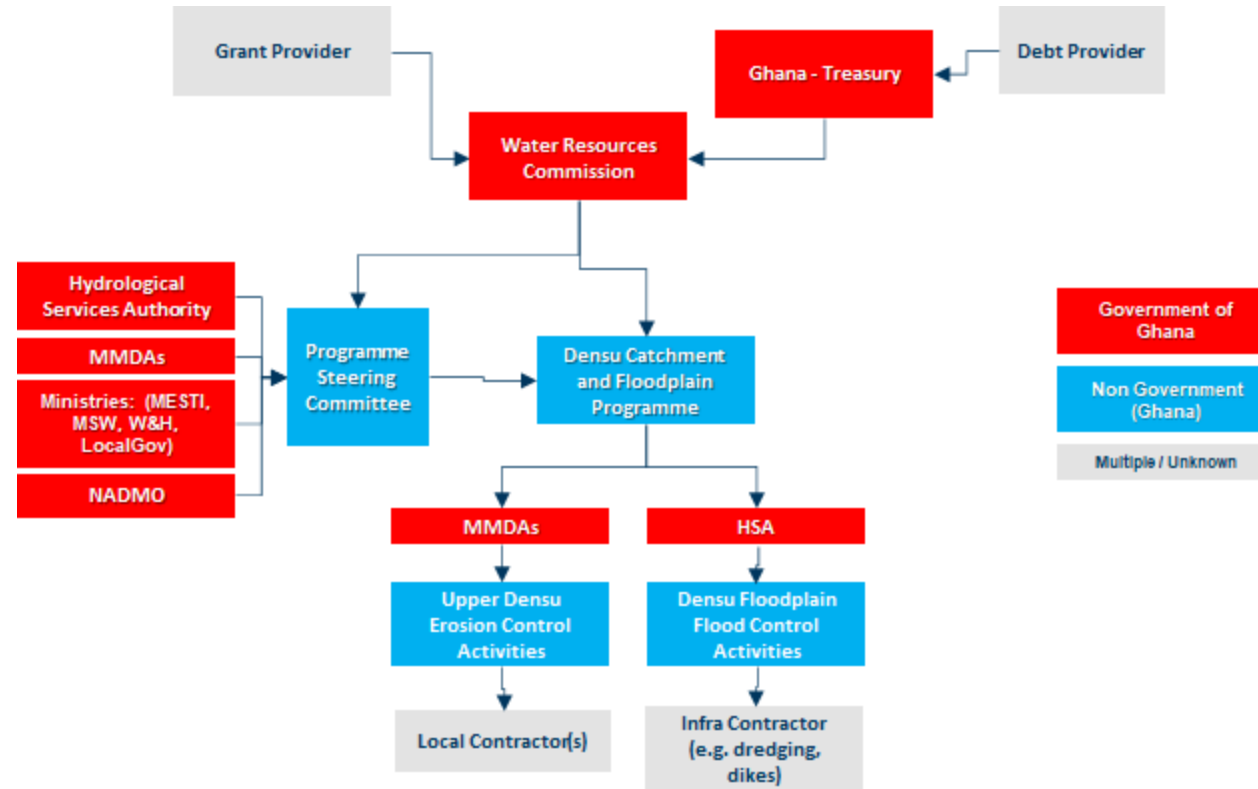
**Budget: US\$ 72.6 Million**

	CAPEX Total	5-Year Running Costs Total	Grand Total
	US\$	US\$	US\$
<b>Component 1. Densu upper catchment &amp; Weija reservoir - reforestation, runoff &amp; sediment control</b>	<b>26,218,800</b>	<b>3,735,000</b>	<b>29,953,800</b>
1.1 Assessment of sources of sediment entering the Weija reservoir	75,000		
1.2 Pre-feasibility of erosion control and sediment reduction	75,000		
1.3 Feasibility and detail design of a sediment control programme and ESIA	250,000		
1.4 Stakeholder consultations and design community development programme	100,000		
1.5 Implementation of Densu basin erosion and sediment control & community development programmes (5 years)	25,718,800	3,735,000	

<b>Component 2. Lower Densu basin: flood risk reduction</b>	<b>37,690,000</b>	<b>450,000</b>	<b>38,140,000</b>
2.1 Update spatial planning for Weija Assembly, especially the Densu floodplain	150,000		
2.2 Prepare (pre-)feasibility study for floodplain rehabilitation and protection (incl. ESIA)	500,000	-	
2.3 Implement key flood-defence interventions on critical locations between Weija dam and Densu Delta Ramsar Site (3 years)	37,040,000	450,000	
<b>Total</b>	<b>63,908,800</b>	<b>4,185,000</b>	<b>68,093,800</b>
Development phase			1,150,000
Management fee		3,404,690	3,404,690
<b>Grand Total</b>			<b>72,648,490</b>

# 3. DENSU BASIN + DELTA CLIMATE ADAPTATION

## Institutional Set-up



## Development Timeline

Milestone	Erosion Sources Study	Pre-Feasibility Studies	Feasibility Studies	Project Design	RFP	Contractor Selection	Contract(s)
Time (month)	6	9	15	15	18	21	24

# Quick Lessons Learned

- **SCOPE:** Deltas relationship with rivers requires understanding and addressing challenges at a basin level
- **GEOGRAPHY:** Similar challenges identified across deltas globally: (a) flooding, (b) coastal erosion, (c) water scarcity
- **JURISDICTIONS:** Involves understanding interlinkage between municipal, regional and national government actors – this often determines ability to access and implement finance. It's not just about money, but often about institutions.
- **FINANCE:** Understanding revenue generation potential of investments help identify appropriate financiers (e.g. government/MDB, donor, private finance).







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