

**Expression of Interest (Eoi)**

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**“Call for Contractors for the Design, Development and Operationalization of Early Warning Systems for 11 Communities in the Volta and Greater Accra Regions of Ghana Under the “Improved Resilience of Coastal Communities in Côte d’Ivoire and Ghana Project.”**

Funded by the Adaptation Fund

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Component Two (2): Implemented by Habitat for Humanity International with ActionAid Ghana

## 1.0 Introduction/Background

ActionAid Ghana (AAG) is a national non-governmental organization and a member of the ActionAid International Federation. The organization is dedicated to promoting social justice, poverty reduction, and human rights, with strategic priorities in climate resilience, youth empowerment, gender equality, and tackling inequalities. As part of the implementation of the “Improving Resilience of Coastal Communities (IRCC) in Côte d’Ivoire and Ghana” project funded by the Adaptation Fund, and coordinated by UN-Habitat, ActionAid Ghana has been contracted by Habitat for Humanity International (HfHI), as the Component 2 executing entity to lead implementation of the intervention in Ghana.

The IRCC project seeks to strengthen resilience against coastal flooding and climate risks across 21 settlements in Ghana and Côte d’Ivoire. Specifically, it focuses on three output areas:

1. Reducing exposure to floods and coastal hazards through Early Warning Systems (EWS).
2. Mitigating risks with engineered and nature-based solutions (NbS).
3. Enhancing livelihoods through climate-resilient income-generating activities.

The Ghana component will be implemented in 11 coastal communities across Anloga, Ada East and Ada West Districts, with emphasis on community-led design, co-ownership, and sustainability of interventions. Early warning systems are crucial for addressing the climate vulnerabilities of these coastal communities, as they provide timely and accurate information that enables individuals, local authorities, and governments to prepare for and respond effectively to extreme weather events such as storm surges, sea-level rise, and flash floods. These systems help reduce loss of life, protect livelihoods, and minimize damage to infrastructure by allowing early evacuation, securing assets, and activating emergency response measures. In the context of increasing climate-related risks, especially in low-lying and densely populated coastal areas, robust early warning systems are a vital component of climate adaptation and resilience-building strategies.

To this end, ActionAid Ghana invites qualified Technical Consultants to submit bids for the design, establishment, and operationalization of community-based Early Warning Systems (EWS) in the eleven project communities.

## 2.0 Objectives

The overall objective of the assignment is to design, develop, and operationalize EWS for eleven (11) coastal communities in three (3) districts in the Volta and Greater Accra Regions of Ghana, in order to strengthen resilience and reduce flood-related risks to lives, livelihoods, infrastructure, and ecosystems. Specific objectives of the assignment are to:

1. Develop integrated and reliable flood forecasting and early warning systems capable of generating accurate and timely flood warnings for the target coastal communities using hydro-meteorological, oceanographic, geospatial, and socio-economic data.

2. Establish effective, inclusive, and accessible warning dissemination mechanisms that ensure timely delivery of actionable alerts to all at-risk populations, including vulnerable and last-mile populations, through multiple communication channels.
3. Enhance community preparedness, awareness, and response capacity through participatory engagement, evacuation planning, simulation exercises, and public sensitization activities that enable communities to take early and informed actions during flood events.
4. Strengthen the technical, operational, and institutional capacities of community-based actors and local authorities responsible for flood forecasting, warning dissemination, emergency coordination, and disaster response management.
5. Support risk-informed disaster planning and decision-making at community and district levels through the development of risk assessments, evacuation maps, forecasting tools, and decision-support systems.
6. Ensure interoperability and integration of the community-level EWS with national, regional, and global early warning systems and disaster risk management frameworks, including alignment with relevant standards, protocols, and platforms coordinated by national agencies and international bodies such as the World Meteorological Organization.

### **3.0 Scope of Work**

The successful firm/consultants will be responsible for the comprehensive design, development, and implementation of the EWS in the selected communities. The assignment will consist of three main phases - preparatory and assessment stage; system design, development and implementation; and capacity building, community engagement, sensitization and sustainability. The proposed approach should integrate the four key elements of an effective EWS: disaster risk knowledge; detection, monitoring, analysis, and forecasting; warning dissemination and communication; and preparedness and response capabilities.

#### **Phase 1: Preparatory and Assessment Stage**

This phase will establish the technical, institutional, and socio-economic foundation for the design, development and implementation of the EWS in the eleven (11) coastal communities. The Consultant shall adopt a participatory, evidence-based, and multidisciplinary approach, consistent with international best practice (including guidance from the World Meteorological Organization and United Nations Office for Disaster Risk Reduction), to ensure that the systems are technically robust, locally relevant, and sustainable. This phase shall entail the following tasks:

##### **A. Stakeholder Mapping and Engagement**

The Consultant shall undertake a comprehensive stakeholder mapping exercise to identify, categorize, and analyze all relevant stakeholders primarily at district and community levels, as well as at national and regional. The objective is to ensure inclusive participation, foster ownership, and lay the groundwork for effective governance and long-term sustainability of the EWS. Key activities shall include:

- Identification of key stakeholder groups, including but not limited to: national and local government institutions; traditional authorities and community leaders; civil society- and community-based organizations; development partners; private sector actors, etc.
- Stakeholder analysis to assess roles, mandates, interests, influence, and capacity related to flood risk management and early warning.
- Development of a Stakeholder Engagement Plan, outlining mechanisms for consultation, communication, and collaboration throughout the project lifecycle.
- Organization of stakeholder consultations (e.g., inception workshops, bilateral meetings) to validate project objectives, confirm roles and responsibilities, and ensure alignment with national and local priorities.

The outputs of this task will inform the design of institutional arrangements, including governance structures for the operationalization of the EWS.

## **B. Identification and Assessment of Major Hazards**

The Consultant shall identify and characterize the dominant hazards contributing to coastal flooding in each of the eleven communities. This assessment will inform the selection and configuration of appropriate forecasting and early warning approaches. The Consultant shall:

- Conduct a comprehensive literature review of existing studies, reports, and datasets on coastal flooding, erosion, storm surge, rainfall patterns, and sea-level trends in the project areas.
- Analyse historical hazard events, including frequency, magnitude, seasonality, and impacts (e.g., loss of lives, property damage, displacement).
- Undertake field-based consultations, including focus group discussions (FGDs), key informant interviews (KIIs), and participatory workshops with community members and local authorities to capture indigenous knowledge and lived experiences.
- Develop hazard profiles for each community, highlighting hazard interactions (multi-hazard dynamics), exposure, and potential impacts.
- Identify and map the primary hazard drivers in each community (e.g., storm surge and high tides; intense rainfall, dam spillage etc.).

The findings of this task will guide the selection of modelling approaches, data requirements, and system design parameters for each community.

## **C. Data and Infrastructure Assessment**

The Consultant shall conduct a detailed assessment of existing data availability, data gaps, and the status of relevant infrastructure required for the development of the FEWS. This assessment shall include:

- Data Inventory and Gap Analysis: Key data categories to be considered include:
  - Hydro-meteorological data (rainfall, temperature, river discharge, etc.);
  - Oceanographic and marine data (tides, waves, sea level, storm surge);

- Topographic and land surface data (e.g., Digital Elevation Models, land use/land cover);
- Socio-economic and demographic data;
- Historical disaster and loss data.
- Evaluation of data quality, temporal and spatial resolution, accessibility, and ownership.
- Engagement with relevant national institutions responsible for data collection and management (e.g., meteorological, hydrological, and coastal management agencies) to assess data sharing protocols and constraints.
- Infrastructure Assessment: This shall include:
  - Review of existing monitoring infrastructure (e.g., weather stations, tide gauges, river gauges);
  - Assessment of communication systems (e.g., mobile networks, radio, sirens);
  - Identification of gaps in observation networks, data transmission systems, and dissemination infrastructure.
- Identification of requirements for new infrastructure, equipment, or upgrades necessary to support the FEWS (e.g., installation of sensors, telemetry systems, data platforms).

The results of this assessment shall guide: the development of data acquisition and management strategies; technical system architecture; conduct of environmental and social safeguards processes; and design and calibration of forecasting models.

#### D. Assessment of Human and Institutional Capacities

The Consultant shall assess the technical, operational, and institutional capacities of organizations and individuals responsible for disaster risk management and early warning at national, district, and community levels. Key activities shall include:

- Identification of relevant institutions and actors involved in forecast generation, warning dissemination, emergency response and evacuation, community-level coordination, etc.
- Assessment of the capacities of identified institutions, including:
  - Technical skills (e.g., data analysis, modelling, interpretation of forecasts);
  - Operational capabilities (e.g., coordination mechanisms, communication channels);
  - Institutional mandates, roles, and coordination frameworks;
  - Resource availability (financial, human, logistical).
- Evaluation of existing early warning practices (if any), including strengths, gaps, and lessons learned.

- Assessment of community-level preparedness, awareness, and response capacity, including the role of volunteers and local leaders.

The findings will inform the design of targeted capacity-building programs, measures to strengthen institutions, and operational protocols to ensure effective and sustainable functioning of the EWS.

### **E. Development of Community Evacuation Maps**

The consultant shall develop maps of evacuation zones and routes for each of the 11 communities. The consultant shall employ both participatory mapping and scientific approaches in the development of evacuation maps.

- Participatory mapping: this will provide community members an opportunity to, based on their experience, draw or delineate zones that often serve as safe havens and routes during flooding events. The pre-requisite will be a base map of the community with key features such as roads, rivers, schools, churches and other landmarks.
- Scientific analysis: Based on the flood hazard type identified for each community, the consultant shall select an appropriate analytical approach to delineate evacuation zones and routes. This will be complementary to the participatory mapping conducted. Recommended approaches include: (i) a simple rainfall-runoff model, e.g., using the Soil Conservation Service Curve Number method for flash floods, (ii) Height Above Nearest Drainage (HAND) for riverine floods, (iii) mapping of actual flood extent from multi-sensor satellite images (e.g., Sentinel-1, 2), and (iv) statistical analysis of an event database.

### **F. Environmental and Social Impact Assessment (ESIA)**

The Consultant shall undertake an Environmental and Social Impact Assessment (ESIA) to ensure that all proposed interventions—particularly the installation of monitoring equipment and any associated civil works—are environmentally sustainable and socially acceptable. The ESIA shall:

- Be conducted in accordance with national regulatory requirements in Ghana (e.g., Environmental Protection Authority) and aligned with international best practices (e.g., World Bank Environmental and Social Framework where applicable).
- Identify potential environmental and social risks and impacts associated with project activities, including installation of monitoring equipment and infrastructure, land use implications, community health and safety considerations, etc.
- Propose mitigation and management measures to address identified risks.
- Prepare relevant documentation required for obtaining environmental permits and approvals from appropriate regulatory authorities.

The ESIA outputs shall guide environmentally and socially responsible implementation in subsequent phases of the project.

## **Phase 2: System Design, Development and Implementation**

This phase focuses on translating the findings from Phase 1 into the design, development, testing, and deployment of a robust, end-to-end Early Warning System EWS for the eleven (11) coastal communities. The Consultant shall adopt a systems-based approach consistent with international best practices, including guidance from the World Meteorological Organization on multi-hazard early warning systems, ensuring interoperability, scalability, and sustainability. The following tasks shall be conducted in this phase:

### **A. Technical Model Requirements and System Specifications**

Building on the outputs of Phase 1, the Consultant shall define the technical architecture and modelling requirements of the EWS. This shall include:

- Conducting technical consultations with relevant national and regional institutions (e.g., meteorological, hydrological, and disaster management agencies) to validate system requirements and ensure alignment with existing frameworks.
- Defining system specifications, including: types of forecasting models required for each community (e.g., rainfall–runoff, storm surge, tidal, or coupled models); data requirements (real-time and historical); forecast lead times and spatial resolution; thresholds for impact-based warnings; communication and dissemination requirements tailored to user needs, etc.
- Identifying appropriate modelling approaches, prioritizing ensemble-based forecasting techniques where feasible to improve reliability and uncertainty quantification.
- Defining system performance criteria (e.g., accuracy, timeliness, reliability, and usability).

This task will result in a Technical Design Document that serves as the blueprint for system development.

### **B. Development of a Central Data Management System**

The Consultant shall design and implement a centralized, integrated data management system to support all components of the EWS. This system will serve as the backbone for data acquisition, storage, processing, analysis, and dissemination. Key components shall include:

#### **1. System Architecture Design**

- Design a modular and scalable system architecture (cloud-based, on-premise, or hybrid) tailored to Ghana’s infrastructure and institutional capacity.
- Ensure high availability, redundancy, and cybersecurity.
- Incorporate interoperability standards to enable integration with national, regional, basin and global-scale EWS.

## 2. Database Infrastructure

- Develop a centralized database system with spatial data capabilities (e.g., PostgreSQL/PostGIS or equivalent).
- Establish secure data storage, backup, and recovery mechanisms.
- Define and implement data governance frameworks, including data ownership, access controls, and sharing protocols.

## 3. Equipment Procurement and Installation

- Based on Phase 1 assessments, recommend specification, procure, and install required equipment, including automatic weather stations; river/flow gauging stations; tide gauges; telemetry systems for real-time data transmission; ICT infrastructure (servers, workstations, backup systems); community-level alert infrastructure (e.g., sirens, public address systems), etc.
- Liaise with client to select vendor for equipment procurement, identify and ensure proper siting, calibration, and commissioning of all equipment.

## 4. Data Collection and Integration

- Establish pipelines for integrating **multi-source data**, including hydro-meteorological and oceanographic data; remote sensing and geospatial datasets; socio-economic and exposure data.
- Enable real-time data ingestion through APIs (Application Programming Interface) and telemetry systems.
- Implement data quality control and standardization protocols in line with international standards (e.g., ISO geospatial standards and WMO data exchange protocols).

## C. Modelling and Forecasting System Development

The Consultant shall develop, configure, and operationalize forecasting models tailored to the hazard profiles of each community. Key activities shall include:

- Selection and configuration of appropriate models, which may include: (i) hydrological (rainfall–runoff) models, (ii) hydraulic/inundation models, (iii) storm surge and tidal models, (iv) coupled or integrated multi-hazard models where necessary.
- Integration of models with the central data management system to enable real-time or near-real-time forecasting.
- Calibration and validation of models using historical data and observed events.
- Implementation of ensemble or probabilistic forecasting approaches where feasible, with simplified deterministic alternatives where data or computational constraints apply.
- Development of user-friendly dashboards and visualization tools for decision-makers.

#### **D. Warning Dissemination System**

The Consultant shall design and deploy a multi-channel, user-centred warning dissemination system to ensure timely and effective communication of alerts to all stakeholders, including last-mile communities. Key features shall include:

- Development or integration of a cloud-based communication platform using API-driven architecture.
- Configuration of multiple, redundant dissemination channels, such as SMS and cell broadcast; Voice calls/Interactive Voice Response (IVR); USSD services; mobile applications and push notifications; messaging platforms (e.g., WhatsApp Business); community-based systems (e.g., sirens, radio announcements).
- Customization of warning messages to be clear, concise, and actionable, including local language options where possible.
- Incorporation of user segmentation and prioritization, ensuring vulnerable groups receive timely alerts.
- Implementation of real-time monitoring tools to track: (i) message delivery rates, (ii) user acknowledgements, (iii) system performance metrics.
- Establishment of feedback mechanisms to continuously improve the effectiveness of alert dissemination.

#### **E. Pre-Operational Testing and Validation**

The Consultant shall conduct comprehensive testing of all system components prior to full deployment.

This shall include:

- Scenario-based simulations using historical flood events and synthetic scenarios to test system performance under different conditions.
- End-to-end testing of the full warning chain—from data acquisition and forecasting to dissemination and user response.
- Evaluation of accuracy and reliability of forecasts, timeliness of alerts, effectiveness of communication channels, and user understanding and response to warnings.
- Identification and resolution of technical, operational, and institutional gaps.
- Documentation of lessons learned and system refinements.

#### **F. Operationalization and System Handover**

The Consultant shall support the transition of the EWS from testing to full operational status.

Key tasks shall include:

- Development of Standard Operating Procedures (SOPs) covering:
  - Data collection and management;
  - Forecast generation and validation;

- Warning issuance and dissemination;
- Emergency response coordination.
- Establishment of maintenance protocols for all system components, including equipment servicing, software updates, and data management.
- Design of a Monitoring, Evaluation, and Learning (MEL) framework to track system performance, user engagement, and impact.
- Facilitation of institutional and management arrangements to ensure clear roles and responsibilities for system operation.
- Support for final system validation and approval by the client and relevant stakeholders.
- Formal handover of a fully functional, integrated, and user-driven EWS, including all hardware, software, documentation, and intellectual assets.

### **Phase 3: Capacity Building, Community Engagement and Sensitization**

This phase focuses on strengthening the human, institutional, and community capacities required for the effective operation, maintenance, and long-term sustainability of the Early Warning Systems (EWS). Effective early warning systems are not solely technology-driven but also dependent on institutional coordination, community preparedness, and sustained ownership. In this regard, the Consultant shall adopt an inclusive and participatory approach that ensures the developed EWS are understood, trusted, and optimally utilized by all stakeholders. The following tasks shall be implemented under this phase:

#### **A. Institutional Capacity Building**

The Consultant shall design and implement targeted capacity-building programs for institutions responsible for forecasting, warning dissemination, emergency coordination, and disaster response at all levels of decision making. These trainings should target local-level staff of key institutions such as NADMO, GMet, HYDRO, WRC, district assembly, etc. Key activities shall include:

- Conducting detailed training needs assessments based on the institutional capacity assessment undertaken in Phase 1.
- Developing tailored training modules and operational manuals for technical and non-technical stakeholders.
- Delivering training programs to designated technical personnel on key topics including: operation and maintenance of monitoring equipment and ICT infrastructure; data management and quality control; forecast generation, interpretation, and validation; warning dissemination protocols and emergency coordination; use of dashboards, visualization tools, and communication platforms, etc.
- Supporting the establishment or strengthening of coordination mechanisms among relevant agencies to enhance information sharing and operational collaboration.

The Consultant shall ensure that training materials are user-friendly and remain available for future institutional use and refresher training.

### **B. Community Engagement and Sensitization**

The Consultant shall undertake extensive community engagement and public sensitization activities to ensure that community members understand flood risks, trust the warning system, and know what to do to appropriately respond to alerts. Key activities shall include:

- Developing a Community Engagement and Risk Communication Strategy tailored to the socio-cultural contexts of each of the eleven communities.
- Designing and implementing awareness campaigns on various aspects of the FEWS such as interpretation of warning messages and alert levels, evacuation procedures and safe haven locations, and roles and responsibilities before, during, and after flood events (contingency plan).
- Disseminating information on the use of the EWS using several communication channels including: community durbars and meetings; local radio stations or information centers; posters, flyers, and visual materials; social media platforms; schools, churches, mosques, etc.
- Ensuring communication materials are accessible, culturally appropriate, gender-sensitive, and translated into relevant local languages where possible.
- Promoting inclusive participation, with particular attention to vulnerable and marginalized groups, including women, children, the elderly, and persons with disabilities.

The Consultant shall further support the establishment or strengthening of community-based disaster preparedness and response structures, including volunteer groups and local emergency focal persons.

### **C. Simulation Exercises and Community Drills**

The Consultant shall, in consultation with the client, organize and facilitate practical simulation exercises and evacuation drills to test community preparedness and operational readiness of the EWS. Activities shall include:

- Designing realistic flood scenarios based on historical events and modelled hazard conditions.
- Conducting table-top exercises and field simulations involving technical institutions, emergency response workers, local authorities, and community members.
- Documenting lessons learned, operational gaps, and recommendations for system improvement.
- Refining operational protocols and communication procedures based on exercise outcomes.

These exercises shall serve both as validation tools and as mechanisms for strengthening public confidence and preparedness.

#### 4.0 Deliverables

The Consultant shall be expected to deliver the following outputs during the execution of the assignment:

1. Inception report detailing the consultant's understanding of the assignment, proposed methodology and implementation approach, stakeholder engagement strategy and workplan
2. Report on preliminary assessments including results of: stakeholder mapping; coastal risk and hazard assessment, capacity needs assessment, data and infrastructure assessment, environmental and social impact assessment.
3. Community evacuation maps showing designated evacuation zones and routes
4. Report on developed operational flood early warning systems detailing technical design and system architecture, centralized data management platform, installed monitoring and communication infrastructure, standard operating procedures and operational manuals, and system testing and validation.
5. Capacity building training materials
6. Report on capacity building and community engagement activities including technical training for institutional and focal persons and community sensitization/awareness creation.

#### 5.0 Project Locations

The EWS interventions will be established and implemented in the following 11 coastal communities in Ghana:

Region	District	Communities
Volta	Anloga	Agorkedzi/Atiteti, Agbledomi, Dzita, Whuti, Woe, Lashibi, Tegbi
Greater Accra	Ada West	Wokumagbe, Akplabanya and Goi
	Ada East	Kewunor/Azizanya

#### 6.0 Duration of Assignment

The consultancy is expected to last **6-8 months** starting from the date the contract is signed, depending on the scope of system development, procurement of equipment and implementation of simulation exercises/community drills.

#### 7.0 Eligibility Criteria

The consultancy is **restricted to Ghanaian consultants or consulting firms**. Interested consultants/firms must demonstrate the following to be considered:

1. Legally registered in Ghana and eligible to provide consulting services.
2. At least 5 years of experience in disaster risk reduction (DRR), Early Warning Systems, or climate resilience programming.

3. Proven record in designing and implementing community-based EWS or similar resilience-building interventions.
4. Strong capacity for community engagement and participatory design approaches.
5. Availability of a skilled, multidisciplinary team.
6. Strong logistical capacity to deliver within the set timeframe.
7. Knowledge of Ghana's National Disaster Management Organization (NADMO) frameworks and other regulatory standards.

Consulting teams could consist of the following suggested key experts:

- Team Leader – Flood Risk Specialist
- Hydrologist / Hydraulic Engineer
- Meteorologist / Climate Scientist
- GIS and Remote Sensing Specialist
- ICT Systems Engineer or specialist
- Community Engagement / Disaster Risk Specialist

### **8.0 Evaluation Criteria**

Submitted bids will be evaluated based on the criteria below:

1. Technical approach/Methodology - 40%
2. Experience of firm or group of consultants - 25%
3. Qualification of experts -25%
4. Financial proposal -10%

### **9.0. Disclaimer**

This Expression of Interest (EOI) does not constitute a contract. ActionAid Ghana reserves the right to accept or reject any application, cancel the process, or amend the requirements without obligation to bidders.

**Issued by: ActionAid Ghana**