

Technical Proposal

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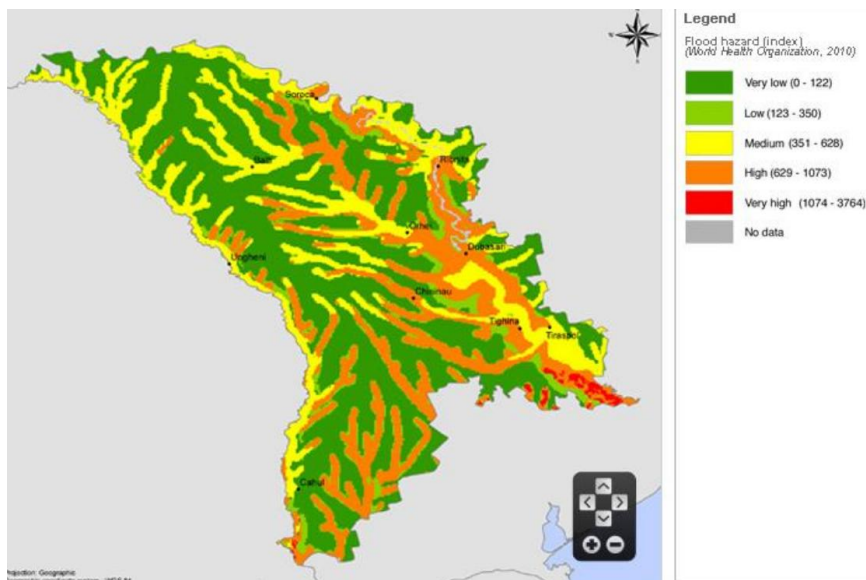
Consultancy Support for the institutional assessment for the establishment of a Flash Flood Warning System

Consultancy Title: International Consultant

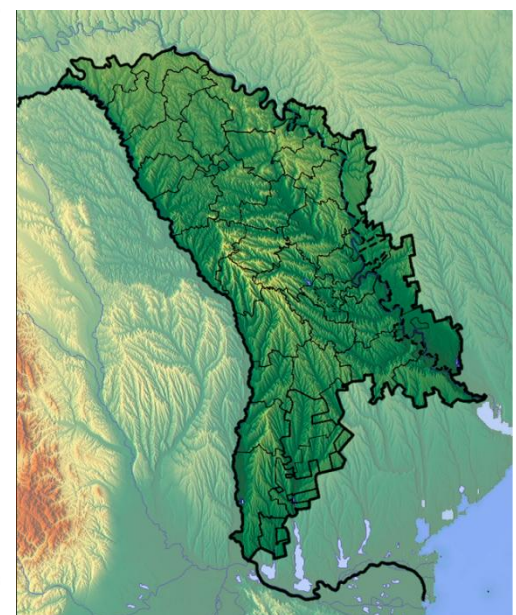
Project : Hydro-infrastructure rehabilitation to mitigate vulnerability to climate-driven extreme events in the Republic of Moldova” Project

1.0 Background :

Moldova has 57 natural lakes, about 3,400 reservoirs, including 90 with a volume of more than 1 million cubic meters¹. The largest water reservoirs are Costesti-Stîncă (735 million m³) on the Prut River and Dubasari (277.4 million m³) on the Nistru River. Moldova is prone to rapid-onset flash flooding and river flooding, which are triggered by spring snowmelt and heavy rainfall during the warm season of the year. Flooding has been a recurring issue in Moldova, particularly in the spring and early summer, when heavy rain and melting snow cause rivers to swell. Many of the country's rivers drain into the Dniester and the Prut, increasing the risk of floods, especially in the southern and central parts, which are situated along major river basins. These floods often result in significant damage to homes, infrastructure, and agricultural land, impacting both rural and urban communities. “Căușeni, a city in the south-east of the Republic of Moldova on the Botna River, a tributary of the Dniester, is an area highly vulnerable to flooding. The most recent took place in 2021, when heavy rains and the rise of the Dniester River submerged over 100 hectares of agricultural land”, says Ghenadie Florea, a rescuer at the Regional Department for Emergency Situations in Căușeni. Heavy rains and flooding in July 2010 have directly affected 12,000 people in Moldova. A total of 3,183 houses in several districts have been flooded, with many of them destroyed. Moreover, several thousand people have been evacuated. The dangerous increase in water level of the Nistru and Prut rivers (within Moldova) is caused by high quantities of water from precipitation or rapid snowmelt in the upper river basins (in Ukraine and Romania). Moldova's population and economy are exposed to earthquakes and floods, with floods posing the greater risk. Approximately half of Romania's population resides in urban areas. Approximately half of Moldova's population resides in rural areas.



Moldova Flood Map



Moldovan topography

On the other hand, Moldova's National Hydrological Monitoring Network (NHMN) operates the lowest density hydrometeorological observation network, which encompasses two hydrological stations and 58 hydrological posts. This network provides insufficient datasets of weather parameters and inadequately provides the precision level of flood

¹ March 2024 -Flood hazard study in Moldova , Academy of Sciences & Institute of Geology and Seismology of Moldova

warnings to the frontline. Additionally, the institutional risk management capacity, which compounds vulnerability to the threat of flooding, is insufficient in local governance institutions for effective flood risk and water resources planning and management at the sub-basin level. Improving Moldova's emergency preparedness and response capabilities is critical for protecting human lives and preventing the loss of its development gains to disasters and climate change events.

2.0 Objective:

Considering the frequency and intensity of rapid-onset flash flood disasters, and the need to develop a robust flash flooding early warning system and emergency operation center, the UNDP has designated an experienced International Consultant to conduct an assessment of the existing institutional and stakeholders capacity of State Hydrometeorological Service (SHS) and upgrade the National Hydrological Monitoring Network (NHMN), enhancing operational capacity of Flash-Flood Detection System and Alert/Warning Center. The assessment of the capability of technical human resources, system upgradation for operating the Alert/Warning Center, and the provision of training for the assigned staff.

Moldova needs to improve the infrastructure of hydrometeorological observation, monitoring, and early warning services, and improve the relevant national and local authorities' ability to respond to floods. Improving hydro-meteorological monitoring network for effective river basin management, setting up & instrumentalizing a national flood forecasting and early warning center, operationalizing the robust flash flood warning system, providing round-the-clock operational flood forecast, and impact-based forecasts to the frontline. Assessment & Mapping of community-level flood risks, Enhance community-level flood hazard management capacity, enhancing the capacity of the local authorities, and empowering community stakeholders to participate actively in governance of integrated water resources management for flood control.

3.0 Scope of work :

The proposed consultancy service aims to support the diagnosis of existing systems, propose a design for system upgradation in the areas of observation, detection, and mining a hybrid network, design and establish the most robust and state-of-the-art Flash-Flood Detection System and Alert/Warning Center, and improve customized forecasting capability.

a) Scope of work for improving the system, tools, and operational capacity

- 1) Implementation of a high-density weather monitoring network: Installation of Automated Weather Stations (AWS) to capture essential weather parameters, including a lightning detector, precipitation measuring instruments, and temperature ECV measuring instruments, to measure the amount of precipitation over spatial and temporal scales, serving the SHS.
- 2) Improvement of surface runoff measurements, telemetric river-gauging stations: Installation of river level sensors in major river sections, lakes, and cement areas to measure river runoff levels and flood levels.
- 3) Develop methodology tools and guidelines for the integrated water resources management (IWRM) approach in 5 key watersheds, aiming to produce knowledge and institutional capacities for the rehabilitation of high-risk hydrotechnical infrastructure, as well as increased participation by local stakeholders in water governance.
- 4) Assessment of Flash-Flood Detection System and Alert/Warning Center: What are the current operational structures, tools, and processes? Assessment of indicative system infrastructures, tools gap, and propose a new design and upgradation.
- 5) Institutional Capabilities: Met-Office/SHS Staffing Structure and Capacity, identify gaps and recommendations
- 6) Assessment of Operational Capability of SHS, National Administration "Apele Moldovei" (NAAM) identify gaps and recommendations
- 7) Reviews the national disaster management and civil protection committee (CPC), identifying gaps, and recommendations
- 8) Reviews the integrated water resource management system (IWRM), identifying gaps and recommendations

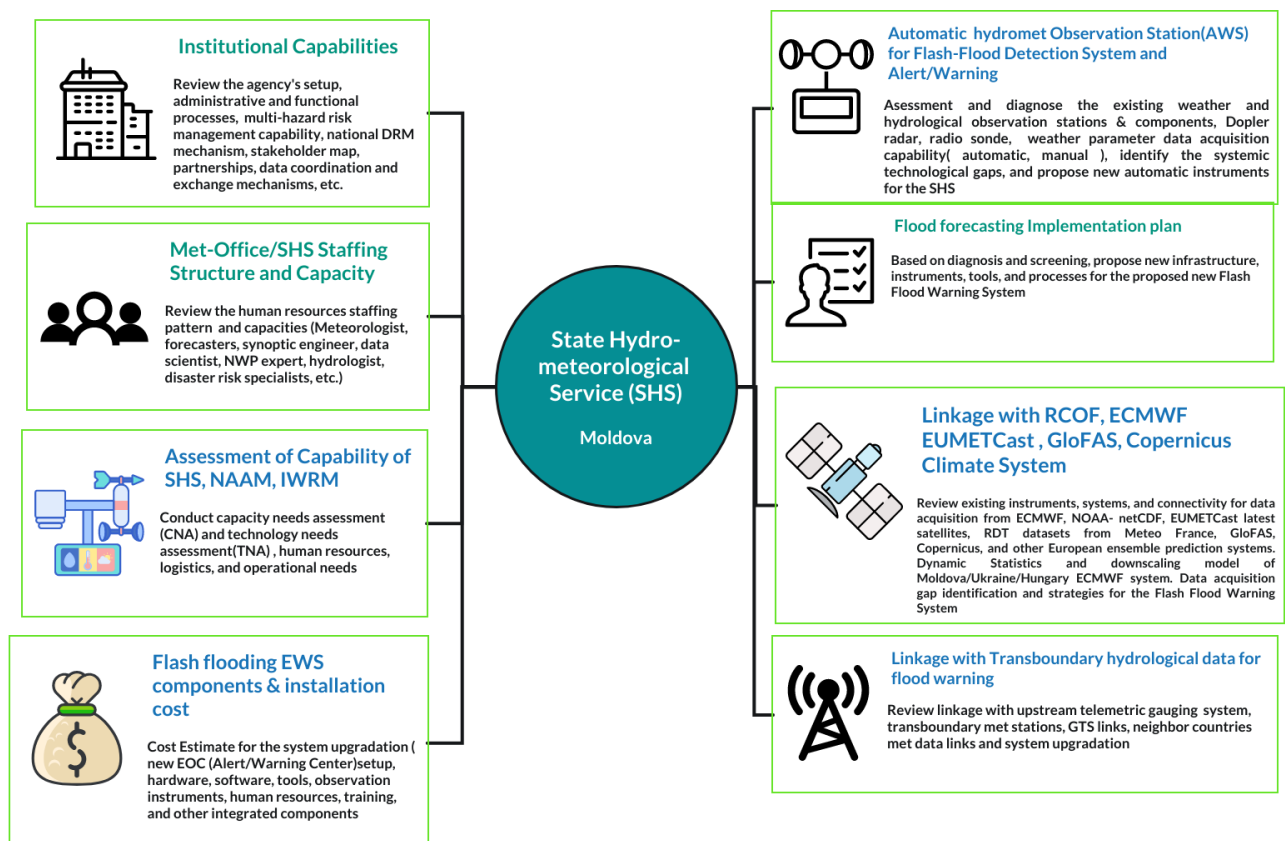
b) Scope of work for improving the policy, strategy, stakeholder capacity and operational

The Consultancy needs to provide the relevant operational modality, irrespective of laws and governmental decisions that establish the responsibilities of all institutions involved in water management in the Republic of Moldova. Review the Water

resources management strategy and Integrated Water Resources Management (IWRM) approach, and ensure that all water resource typologies are taken into account when developing national policies and decisions on water management and (civil) protection. Review strategies and guidelines for the water sector government institutions, identify the policy, programmatic, and operational gaps, and provide recommendations for the relevant governance improvement:

- 1) Assess the Ministry of Environment (MoE) 's policy framework for IWRM, including coordination with neighboring countries for transboundary waters. Identify the policy and strategy gaps and recommendations for transboundary water level data and information sharing.
- 2) Assess the State Hydrometeorological Service (SHS) institutional capacity in monitoring the state and evolution of hydro-meteorological conditions and environmental quality, identifying decisive tools and processes gaps, and recommendations.
- 3) Assess National Administration "Apele Moldovei" led the existing policy on water resources and flood protection, serving as the principal national water management authority with a regulatory framework. It is responsible for identifying and addressing existing gaps and making recommendations.
- 4) Assess the Agency for Geology and Mineral Resources' institutional capacity in monitoring groundwater levels and quality, as well as coordinating groundwater use and protection, to identify and address existing gaps and make recommendations.
- 5) Assess the Environmental Agencies and Environmental Protection Inspectorate in programmatic capability in the Environmental Assessment and Ecological risk management, identify the key gaps and recommendations

a) **Comprehensive assessment of hydromet institutional, tools, process, and service delivery in the following key areas**



4.0 Proposed Methodology

In order to minimize the flash flood risk and establishing Flash-Flood Detection System and Alert/Warning Center, the consultancy intended to devise in such a way that the infrastructure and operability can robustly be capable of tracking weather events, detection of flash floods with hybrid system, manufacture precision level flash flood forecast warning, automated common alerts of impending floods, activation of triggers e.g., forecast based early action protocol, emergency evacuation and preparedness so that the systemic approach can significantly minimize the Loss and Damages (L&Ds) of elements and sectors are well informed. The design outline to contextualize the complete mechanism of designing, implementation, and

operationalizing (one-stop solution) procedure the system, coordination and partnership, standard operating procedure (SOP) of SHS and enabling institutional capacity for running the state-of-the-art integrated nowcasting /common alerting service being disseminated to alarms, alerts, podcasts, national broadcasting networks, media outlets, Telecommunication SMS, IVR, Cell broadcasts in 24X7 operational modality.

a) Strategic methodology for diagnosing/screening of existing system, structure and process, efficiency, and efficacy:

1) Conduct desk review:

- Review of Hydro-meteorological forecasting product, outlook, warning and alerting services,
- Review Numerical weather prediction (NWP) system over the long, medium, and short-range forecasting products.
- Review the existing forecasting capabilities, modeling, ensemble system, and short-range forecasting process and capacities, ECMWF Montenegro, Balkan Region weather forecast,
- Review the sector specific operational forecasting (dynamic statistical and downscaling model for predicting rapidly developing weather conditions) products and services.
- Review reports on the hydrological situation, warnings and forecasts produced by the Institute of Hydrometeorology and Review Damage and Loss assessment tools.
- Review hydrometeorological observations/monitoring systems are in place, data acquisition, collation, management systems and networks and data exchange, preparing multi-hazard analysis and mapping to support risk assessment, multi-hazard Early warning systems.
- Review reports on national climate multi-hazard risk and vulnerability assessment (CRVA), country risk profile
- Review all relevant technical reports, strategies, studies, research and development on extreme weather events(frequency, intensity, landing pattern, trends and future threats, loss and damage category and statistics), multi-hazards and early warning mechanisms of Montenegro.

2) Review Weather observation System (tools, technologies, instruments, data acquisition etc.):

- Diagnose the complete forecasting system, mechanism, weather observation system (number of automatic, telemetric, and manual), geolocation of weather observation system, spatial observation station gaps, number of river gauging stations, number of telemetric stations over the river system for tracking the synoptic conditions of the surface weather system.
- Review the clusters of observation technologies that are currently being deployed, including supercomputers, European Weather Clouds (NWC), limited area numerical models, European ensemble prediction systems (*ECMWF*, *GFS*, *UKMO*, *Meteo France*, etc.) , data analysis, reanalysis, bias-correction, ensemble model prediction, meteorological radars, drone radar technology, access to the latest EUMETCast satellite data system, and other relevant tools
- Review institutional data sharing bottlenecks, access limitations to radar data from neighboring countries, and identify gaps.

b) Strategic methodology for summarizing the deliverables

Workstream	Relevant activities proposed	Consultation process
Detailed Work Plan based on technical meetings with the Project team	<ul style="list-style-type: none"> • Desk review of all relevant documents, issues, policies & strategies, etc. • Define and submit a detailed methodology and work plan in consultation with the Project Manager and Component Officer, UNDP Country Office, UNDP Project Team 	<p>Organize workshops/ Meetings /consultations with the following stakeholders;</p> <ul style="list-style-type: none"> • The Ministry of Environment (MoEnv)-responsible governmental body creating a policy framework for IWRM, including coordination with neighboring countries

Workstream	Relevant activities proposed	Consultation process
Draft inception report	<ul style="list-style-type: none"> • Desk review of all relevant documents, issues, policies & strategies, in climate change and disaster risk management, transboundary risk and vulnerabilities, review of flooding risk assessment reports, technical studies, and disaster risk management framework, prepared by relevant stakeholders • Reviews UN agency reports on disaster risk management of Moldova • Reviews flood disaster risk management plans, risk assessment committee, Post-disaster damage loss and needs assessment (DPNA), • Institutional responsibility assessment towards the maintenance of a Flash Flood Alert / Warning Center • Review the functioning of the Flash Flood Detection System and the Flash Flood Alert/Warning Center. Based on this analysis • Review the inter-institutional collaboration and the assignment of the responsibility for the maintenance of the Flash Flood Warning Center • Review the methodology, tools, and guidelines for data sharing, protocol, and transboundary data sharing protocols • Institutional responsibility assessment towards the maintenance of a Flash Flood Alert / Warning Center • Analysis of laws , legislation, existing institutional collaborations impacting the (potential) functioning of the Flash Flood Detection System and a Flash Flood Alert/Warning Center. • Provide a list of recommendations on improvements in inter-institutional collaboration and the assignment of the responsibility for the maintenance of the Flash Flood Warning Center to the most relevant institution. 	<p>for transboundary waters , Agency for Geology and Mineral Resources , State Hydrometeorological Service (SHS), National Administration “Apele Moldovel , Environmental Agency</p> <ul style="list-style-type: none"> • General Inspectorate for Emergency Situations (GIES) under the Ministry of Internal Affairs, • Consultation with national and local government officials and staff, donors, beneficiaries from the interventions, and community members. • Consultation with relevant UN Agencies , donors, partners • Recurrent team meeting with the project team, •
Develop Assessment templates and conduct assessments	<ul style="list-style-type: none"> • Following through the evaluation questions - Develop an appropriate template • Develop all the required materials for each event, including presentations, surveys, reading materials, and a post-event report. • Review materials and develop a work plan. • Review Documents 	
Report on a country visit to collect available documentation, including from discussions with any relevant stakeholders, for the purpose of assessing the institutional responsibility towards the maintenance of a Flash Flood Alert / Warning Center	<ul style="list-style-type: none"> • Workshop /Meeting / KII / Interview with stakeholders session with the project partners of key government ministries and agencies, SHS, MoE , Apele Moldovel, Agency for Geology and Mineral Resources' CPC Met-Office, NHMN. • Focus Group Discussion (FGD) with community, stakeholders, DRM/CPC committee, local stakeholders, • KII with local government body, local government sector department, local service providers • 	<ul style="list-style-type: none"> • Consultation with SHS, MoE , Apele Moldovel, Agency for Geology and Mineral Resources, CPC Met-Office, NHMN. • Focus Group Discussion (FGD) with community, stakeholders, DRM/CPC committee, local stakeholders, and community members. • KII with local government body, local government sector department, local service providers, and community members.

Workstream	Relevant activities proposed	Consultation process
Report on the assessment of institutional responsibility towards the maintenance of a Flash Flood Alert / Warning Center		<ul style="list-style-type: none"> Focus Group Discussions (FGDs) with key stakeholders & vulnerable communities. FGD & KII with CSO, CBO, development partners, I/NGOs, charities, women-led groups, commercial stakeholders, market promoters, and other relevant enterprises/actors/entities
Guidelines and instructions for the operation of the Flood Alert / Warning Center	<ul style="list-style-type: none"> Synthesize all studies, reviews, stakeholder consultations, field visit outputs, lessons learned reports, process data from field visits, and review results reports - prepare Guidelines and instructions for the operation of the Flood Alert / Warning Center 	
Report on a country visit to perform a training in the operation of the Flood Alert / Warning Center – carried out in person	<ul style="list-style-type: none"> Synthesize all studies, reviews, and recommendations, develop capacity building strategy Prepare a capacity building manual and provide training in the operation of the Flood Alert / Warning Center – carried out in-person 	
National workshop	<ul style="list-style-type: none"> National workshop for sharing reports with UNDP, Partners, and other relevant stakeholders, and capturing recommendations 	
Final activity report (including details on all stages passed, achieved results, conclusions, and recommendations for subsequent activities) – submitted and approved by the Project	<ul style="list-style-type: none"> Synthesize all recommendations and final evaluation reports 	

5.0 The work plan

Deliverables/Outputs	Timeline 2025																											
	Jul				Aug				Sep				Oct				Nov				Dec							
	W 1	W 2	W 3	W 4	W 1	W 2	W 3	W 4	W 1	W 2	W 3	W 4	W 1	W 2	W 3	W 4	W 1	W 2	W 3	W 4	W 1	W 2	W 3	W 4				
Detailed Work Plan based on technical meetings with the Project team																												
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Submitted by: Z M Sajjadul Islam