### Background

In order to assist worldwide during water related crises, the Dutch government has mandated the Dutch Risk Reduction and Surge Support (DRRS) programme with the responsibility to assist foreign governments and international organizations with expertise on water. Over the last 10 years innovative approaches have been found, and many partnerships have been build. A recent interesting initiative has been applied to Ukraine and Libya, leading to the idea of further focusing on near real-time iterative flood modelling.

### Overall mission specifications

* 1. **Scope and objectives**

To be part of a group of standby experts, who in the case of an activation by RVO can form an ad hoc team to deliver flood predictions within hours to days after request. A more detailed description can be found in annex C.

* 1. **Activities**

The proposed DRRS project team should be on constant standby to provide RVO and with input on separate but interlinked topics:

1. Determination of relevant scenarios in cooperation with RVO and partners
2. Estimation of the pluvial, fluvial and coastal parameters
3. Selection of correct modeling tools
4. Visualization of the Resulting Flood Event
5. Socialization of the results with RVO and relevant partners
	1. **Deliverables**

Specific deliverables are to be agreed upon on initiation of the deployment with the partner organizations. They will most likely encompass the following items:

1. Modeled results
2. Document describing assumptions underlying the model
3. Visualization of the Dam Failures and Resulting Flood Event
4. Final presentations
	1. **External communication about the project**
* Deliverables that are part of the assignment, such as reports and other products, are public information and will be made available through the IATI-website and the RVO website;
* A set of 2 licence-free high-resolution images (photos and/or other visuals) related to the project, which are available for use in any project- and/or programme-related outreach, online and offline;
* At least one social media post should be shared during the intervention. Posting should be checked with RVO before it is being shared;
* Project or project scope related communication initiated by the contractor or subcontractors needs to include a reference to the Government of the Netherlands.

### Required expertise

Based on the available information, the necessary expert profiles will be drafted together with the selected team leader:

The team will be supported (where possible) by a local government official, to assure ownership, and a Netherlands embassy staff member.

*General requirements (applicable for all for all team members):*

* Able to rapidly assess situations and data and provide conceptual and practical solutions;
* Experience in and knowledge of international (water) crisis context;
* Ability to be a relevant sparring partner for the local officials and to provide feedback on the existing plans and ideas, as well as provide input for suitable alternatives;
* Excellent presentation and reporting skills in English;
* Willing to work outside of office hours;
* Be available all days of the week to respond to questions by phone or refer to a colleague with similar skill set in case of absence;
* Good communication skills in English.

*Hydrologist / flood management specialist:*

* Expertise on hydrological/flood modelling;
* Solid international experience;
* Ability to connect hydrologic tools to weather forecast databases (such as GFS, ECMWF, CHIRPS, etc);
* Expertise on the use of several modelling solutions e.g. Tygron, FastFlood, SFINCS, etc;
* Ability to summarize results in clear overviews such as maps (using GIS) and combining that with other available relevant GIS data sources.

*Dam expert:*

* Senior expert on dam safety;
* Solid international experience;
* Directly involved with the ICOLD;
* Access to a network of dam specialists through e.g. ICOLD.

*Coastal flooding expert:*

* Senior expert on coastal flooding;
* Able to make a quick assessment anywhere in the world on the expected coastal water levels due to storm surge events and cyclones in the future 1-2 weeks;
* Solid international experience;
* Access to a broader network of coastal experts.

*GIS and RS/EO data expert:* (already filled)

* Senior expert on remote and open source data gathering;
* Experience on water related data sets (precipitation, DEMs, DTMs, geology, more);
* Experience with APIs;
* Able to very quickly integrate environmental datasets, clean them, and get them ready to be used on the modelling solutions applied;
* Ability to work with ArcGIS, QGIS.

*Back-end expertise:*

* Relevant back end expertise on the software being used in the specific deployment (e.g. Modelling software, social media monitoring software, etc).

### Budget

DRRS programme is a facility that supports foreign governments and international organizations in addressing water-related disasters.

Each individual expert is expected to provide an all-inclusive detailed budget, including the fees and expected expenditures in order to conduct this assignment. While presenting a total budget for this assignment, the following items must be specified:

* Number of working days and applicable fee. See attached ‘Dutch Risk Reduction & Surge Programme – Contracting Conditions’.
1. **Timing**

The period of the DRRS intervention will initially be from the April 2025

until the end of November 2025.

An estimated time schedule would be:

|  |  |
| --- | --- |
| **Role** | **Input [days]** |
| Hydrologist / flood management specialist | 10 |
| GIS and RS/EO data expert | N.A. |
| Dam expert | 5 |
| Coastal expert | 5 |
| Back-end expertise for modelling tools | N.A. |

1. **Contracting and reporting**

Contracting of the experts will be conducted by Netherlands Enterprise Agency (RVO.nl). All documents should be sent to drrs@rvo.nl and gertjan.vanderende@rvo.nl.

### Annexes

**Annex A: Official request**

**Annex B: DRRS programme**

Many countries around the world face severe water threats. Often, these countries are in urgent need of expert advice on how to prevent a disaster or how to recover from a calamity. For instance, when a country has been struck by severe flooding and the first emergency relief workers have gone, the need for advice on how to build a sustainable and safer water future arises.

To meet these needs with a swift response, the Dutch government (Ministry of Foreign Affairs and the Ministry of Infrastructure and Environment) has initiated the Dutch Risk Reduction and Surge support (DRRS) programme. This programme mobilizes a team of experts that advises governments on how to resolve urgent water issues related to flood risks, water pollution and water supply, to prevent disasters or to rebuild after water related disasters. The DRRS programme enables a foreign government to take action on the basis of sound advice and expertise. The DRRS programme is coordinated by the Netherlands Enterprise Agency (RVO.nl).**Annex C: Near real-time iterative flood modelling (2 pager)**

Near Real-time iterative Flood Modelling
A tool for effective response during flood crises

# Background

In order to assist worldwide during water related crises, the Dutch government has mandated the Dutch Risk Reduction and Surge Support (DRRS) programme with the responsibility to assist foreign governments and international organizations with expertise on water. Over the last 10 years innovative approaches have been found, and many partnerships have been build. A recent interesting initiative has been applied to 4 crises in the last 2 years, leading to the idea of further focusing on near real-time iterative flood modelling.

Figure 1: Hydrodynamic model for the Kakovka Dam breach (source: Tygron)

# Situation

The tool is aimed at:

* the moment **close to and just after major flood** events
* where central **authorities are not (yet) equipped with flood models** and/or advanced flood early warning systems

# Goal

The goal is to provide **accurate information on water levels** and flow velocities in the weeks following the flood event. More specifically:

* When and **where will water recede**

Figure 2: Model results for Derna after the breach of Derna and Abu Mansour dam

* Which **roads are usable**, or will become dry and which point in time
* Which other **vital infrastructure** (hospital, pumping stations, food distribution etc) will be inundated and when

And to make this information available for the right groups:

* First responders
* Emergency planning on a provincial or higher level with a time horizon of days to weeks

# Methods

Hydrodynamic model and user interface: Tygron[[1]](#footnote-1), FastFlood[[2]](#footnote-2) or similar software

* GIS-based Modeling: The Tygron Engine can quickly build a hydrodynamic model from scratch anywhere in the world, using **global open source data** enriched with locally available data where possible
* Fast (GPU-powered) simulation: Enables the **simulation of floods in seconds to minutes**, a stark contrast to the hours or days required by traditional methods.

Calibration and validation using

* Users can log in using a standard internet connection, zoom in to their area of interest and provide feedback to improve the model (**iterative**)
* FloodTags: Analyses social and news media to collect real-time information on flood water levels and critical changes (failures) in key water infrastructure. Global coverage. Online community response (through linkedin, cluster, informal networks)[[3]](#footnote-3)
* Satellite based inundation data once available (UNOSAT, Copernicus, etc)

# Examples

Successfully applied in response to the Kakovka Dam disaster[[4]](#footnote-4), the Derna Dam disaster in 2023[[5]](#footnote-5), the 2024 floods in Kazakhstan and in 2025 in Gaborone Botswana.

# Why innovative?

* **Very quick**: results can be published in less than a day, with further improvements in the days following
* Easy access for anyone
	+ User can **zoom in to his/her area and moment** of interest
* **Iterative** approach together with the community: All online information will be used to improve (calibrate and validate) the model
	+ **Feedback** from users and actors on the ground
	+ Pictures on social media/news

# Needs and costs

In order to effectively implement this, the following is needed

* Creating the model and resulting maps (supported by DRRS programme in the pilot phase)
	+ A skilled hydrologist, coastal expert, dam expert, GIS, other (depending on situation)
	+ Potentially tech support from model provider and FloodTags team
	+ Coordination
* Dissemination of results to stakeholders on the ground:
	+ To local authorities (on ad hoc basis, depending on how quick we can find the right people)
	+ First responders (UNDAC, Red Cross, WASH cluster and other)

**Annex D: Needs for Social Media Monitoring**

Below a list is formulated with the general needs that should be covered by the solution applied for the monitoring of social media and other internet based sources.

The goal of the monitoring of social media is firstly to provide calibration points for flood modelling.

The data should have the following characteristics

* Overview pictures with a specific timestamp that show the flood extend and identifiable landmarks which can be place in space. The picture(s) should allow the modellers to verify the model results in both space and time.
* Depth approximations showing
	+ Location (lat/lon)
	+ Timestamped
	+ Depth approximation with precision in order of 0.1m, ideally better
	+ Points distributed over the flood area
	+ Ideally 5-10 points, or more

More generally:

* All relevant internet sources should be monitored
	+ X
	+ Blue sky
	+ Facebook
	+ News outlets
	+ And more
* Results are to be shared near real-time. So the lag between availability and disclosure to the modelling team should be minutes to hours, not days.
* Flexibility to respond to changing needs
* Availability for questions and (additional) requests all days of the week.
1. https://journals.open.tudelft.nl/jcrfr/article/view/7538 [↑](#footnote-ref-1)
2. https://fastflood.org/ [↑](#footnote-ref-2)
3. Also used by national water services such as the UK Met Office [↑](#footnote-ref-3)
4. <https://www.tygron.com/nl/blog/2023/06/09/khakhova-dam-break-simulation/> [↑](#footnote-ref-4)
5. Worldbank-DRRS-UNESCO-ICOLD report on Derna, Libya (scheduled to be published Q4 2024) [↑](#footnote-ref-5)