



## TERMS OF REFERENCE – Dutch Risk Reduction and Surge Support (DRRS) – Phase 2: Bali, Indonesia (January 2026)

### Introduction

The Government of Indonesia has requested the support of the DRRS programme to support the flood risk management in Bali, Indonesia.

### Context

Torrential rains have caused severe flooding across most of the island of Bali, Indonesia, in the month of September. Homes have been submerged, and roads have been shut by landslides. Flooding in Bali has become increasingly problematic due to a combination of natural and human factors. The island's rivers are short and flow quickly to the delta, leaving little time or space for water to drain naturally. Over the past ten years, rapid urbanization has replaced rice fields with houses and infrastructure, significantly reducing the land's ability to absorb rainwater. During periods of intense rainfall — which have become more extreme due to changing weather patterns — this lack of space causes rivers to overflow. Additionally, the rivers are often filled with waste and plastic, clogging drains and filters, which further worsens the flooding situation.

During the DRRS scoping deployment to Bali (25 October–1 November 2025), a joint Indonesian–Dutch expert team conducted a rapid assessment of the September 2025 flood event through meetings with national and provincial authorities, site visits in Denpasar and Badung, technical discussions with local water authorities, and participatory sessions including a focus group discussion and a youth workshop. The deployment reviewed the performance of the primary water discharge system, examined maintenance and operational constraints, assessed flood risk management practices and early warning arrangements, and reflected on the role of spatial planning, climate change, and integrated water resources management.

In this follow-up deployment, the DRRS programme is looking for a multidisciplinary team of experts to build on the findings of the initial scoping deployment. The team will work with Indonesian counterparts to review and update existing master plans in light of climate change and the September 2025 floods; strengthen hydro-informatics and system-level modelling to identify critical weak points, support flood early warning, and enable risk-based investment decisions; and identify no-regret and low-hanging-fruit measures, including improved maintenance, targeted physical interventions (such as pump effectiveness), and enhanced flood early warning and community preparedness, to restore flood safety and support longer-term resilience.

### Expected output

#### **a. Scope and objectives**

RVO is requesting a small team of experts for a second deployment in January 2026 to build upon the results of the initial scoping and further conversations with local and national stakeholders regarding flood risk management and resilience.

#### **b. Activities**

- 1. Review and update flood risk master planning**  
Review existing flood risk and water management master plans and assess their adequacy in light of recent flood events and climate change.
- 2. Oversee and scope pumping system infrastructure**  
Oversee the assessment of infrastructure related to pumping systems and explore feasible options for a first implementation phase of a pumping station, including its role within the wider flood management system.
- 3. Apply fit-for-purpose modelling to support system design**  
Focus on practical, simplified modelling approaches and work closely with the Balai Wilayah Sungai Bali-Penida (BWS) modelling expert to address current and future knowledge needs, explore alternative software tools, and develop a basic reservoir model to support pumping system design.



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### **4. Link technical analysis to flood risk management and spatial planning**

Apply modelling outcomes to flood risk management, master planning, and spatial planning.

#### **c. Deliverables**

1. A concise report for RVO, with clear findings, conclusions, recommendations following the above analyses.
2. Follow up call to present the findings with the Indonesian government, Netherlands Embassy, RVO and other relevant stakeholders

With regards to the report, the following standards are maintained:

- The findings and recommendations shall be presented in a reader friendly and professional manner, and may include illustrations and photos;
- The report will be made up according to the standard DRRS-Team format/lay-out. The standard formats will be made available;
- Peer review using the DRRS Think Tank is to be part of the process;
- The report will be written in the English language;
- The report shall be concise and include a summary.

#### **d. Required expertise**

##### **'Pumping Expert' – International and national**

A 'pumping system expert' who can oversee the entire infrastructure related to pumping systems. We propose pairing an international expert with an Indonesian expert, so that together with the Balai Wilayah Sungai Bali-Penida (BWS) experts, both experts can explore possibilities for the first phase of a pumping station at the Tukad Mati long-storage reservoir.

- Knowledge of basic hydrological calculation methods to estimate river discharge and water levels, which allows for calculation of the required pump capacity.
- Experience in developing a technical plan for a discharge pumping station, including advice on suitable pump types and a global estimation of costs for construction and O&M. Ability to advise on innovative and sustainable technologies, such as solar-powered or energy-efficient pumps.
- Knowledge of operational management of a pumping station.
- Capable of developing the contours of an implementation plan, including timelines, milestones, and logistics.
- Basic knowledge of environmental impact assessment. Able to identify and address environmental considerations in the design and implementation of the pumping station. Understanding of the impact of a newly constructed pumping station on the immediate surroundings, including adjacent mangroves.
- Additionally for international expert: experience with knowledge exchange. Proficiency in the Indonesian language is considered an advantage.
- Additionally for national expert: familiarity with Indonesian regulations, procedures, and design standards for hydraulic installations.

##### **'Modelling Expert' – International**

A 'modelling expert' who will initially focus on simple methods to establish Q-h relationships based on available data. This expert will also collaborate with BWS modelling expert to explore alternative software tools that can effectively address current and future knowledge needs. Furthermore, the modelling expert will support the pumping expert in developing a basic reservoir model to support the design of the pumping station. We expect the modelling expert to establish online contact prior to deployment with the counterpart within BWS to develop a solid work plan.



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- Knowledge of globally available numerical models for rainfall-runoff assessments in complex, small-scale river basin systems, including tidal influences. Familiarity with a range of modelling software (e.g., HEC-RAS, SWAT, MIKE SHE, InfoWorks) and ability to select the most appropriate for local challenges.
- Experience in deriving Q-h (discharge-water level) relationships based on available field measurements.
- Experience in setting up and validating rainfall-runoff models, including an existing HEC-RAS model.
- Capable of designing additional field measurement campaigns to gather data needed for improved model setup and calibration.
- Experience in simulating the effects of ecosystem-based interventions (e.g., wetlands, reforestation) on flood risks and water management.
- Experience with knowledge exchange.
- Proficiency in the Indonesian language is considered an advantage.

We consider it essential that modelling is not conducted in isolation, but is applied to spatial planning, master planning, and flood risk management. Demonstrating these benefits in Bali could create opportunities for scaling up across Indonesia. This task is for the team leader, who will also support the other team members during the deployment.

### Timing

Deployment is currently foreseen for 26-30 January 2026 (excl international travelling).

### Budget

Kindly use the (attached) 'financial proposal' when submitting an offer. The maximum budget for this deployment is conform DRRS tariffs. Contracting of the experts will be conducted by Netherlands Enterprise Agency (RVO.nl).