



Kingdom of the Netherlands



Dutch Risk Reduction Team:  
*Reducing the risk of water related disasters*

## **DRR-Team Mission Executive Summary**

Myanmar

## **Netherlands DRR-Team Mission - Executive Summary**

In July/August 2015, Myanmar experienced the most severe flooding in decades. Flood Affected Areas maps, such as the ones prepared by UN-OCHA, showed the enormous scale and severity of the situation.

Myanmar and the Netherlands share a long history of dealing with floods. In the aftermath of the July/August flood disaster, Minister Schultz van Haegen together with her Dutch colleague Minister Ploumen, offered to send a Disaster Risk Reduction Team (DRR) to Myanmar. The government of Myanmar accepted this offer. Following the signing of a Memorandum of Understanding on integrated water resources management between both countries in 2013, the DRR activities are fully aligned with the other related Dutch MoU activities.

Dutch Risk Reduction Teams in general aim to reduce the risk of water related disasters. 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.

The DRR-team visited two regions in Myanmar in the period 30 August – 6 September, namely the dike protected areas in the upper and middle parts of the Ayeyarwady delta, and Kalay / Monywa in Sagaing Region. The objectives of these visits were to:

- Indicate the necessity for immediate action in the visited areas;
- Give suggestions for Modernization of techniques, tools and approaches;
- Provide on-site capacity building to the accompanying Myanmar Experts (from irrigation Department and DWIR);
- Provide hands-on assistance on data management, including early warning systems;
- Suggest ways to prioritize required measures.

In this executive summary, the first findings and recommendations on the delta and the Kalay/Monywa area are described.



### **Summary of Findings Subteam "Delta"**

Embankment issues as well as river dynamics issues were discussed following largely the route Yangon – Nyaung Done – Zalun – Hinthada – Pathein. At each of the visited locations the team provided hands-on training on the following topics: management of dikes (inspection and improvement), controlling river dynamics (in particular meander cut-offs), applying the risk approach to prioritize measures and (briefly) the necessity to involve local communities.

The overall conclusion is that although the situations have been serious during the recent high water events, no breaching or unexpected disasters happened. This is mainly due to the excellent field operations carried out by the experts from the Irrigation Department and their many helpers in the field. The inspected dike sections appeared strong enough to also withstand similar high waters in the (near) future. This is true under the assumption that the staff from the Irrigation Department stays equally alert and properly equipped.

However, if conditions get worse, then the stability of the embankments may be seriously in danger. This is particularly true for a situation with overtopping of the crests. At many locations, the stability of the crest and the inner slopes will be in danger once water flows over the dike. This asks for a major initiative to at least improve the quality of the surfaces of the embankments and to bring the Existing Crest Level to the Authorized Crest Level.

A plan to increase the height of the dikes in the delta with 5 feet has been discussed as well. It was noted that without knowing the subsoil conditions of the dike cross-sections, slope instability and settling may occur when raising the crest. This may jeopardize the dike itself as well as adjacent areas. It was further noted that it may be good to raise the height with, for example 5 feet, near Hinthada (while extending the width of the dike profile accordingly) and gradually less towards the two ends of the U-dike. It is recommended to first assess local water levels under extreme conditions and potential reduction in flood risks, before starting an expensive and complex dike improvement project as proposed.

Regarding another idea to extent the dike along the Patheingyi river in downstream direction, it was noted that this will affect the upstream water levels, which could worsen the situation there (overtopping, more piping/leakages). Numerical modelling and environmental/social impact studies will help to optimize the process of decision making by providing cost effective measures and prevent implementing measures that are (socially) counterproductive.

The situation at Nyaung Done was considered dangerous as the lives of hundreds of people depend on the strength of a dike, that seemed poorly engineered, poorly maintained and wrongly used (e.g. using the dike as a pathway, trees, markets) which is undermined by river dynamics as well. Although there is no need for immediate emergency action, the recommendation is to develop a rational behind the protection of this town to prevent future disasters.



### **Summary of Findings Subteam “Kalay / Monywa”**

At each of the visited locations the team provided hands-on training on the following topics: management of dikes (inspection and improvement), controlling river dynamics (dredging new channels, removing obstacles, meander cut-offs and training works), and early flood warning systems.

The situation at Kalay remains critical as a structural solution to avoid inundation under similar extreme conditions cannot easily be developed and implemented. It is recommended to first establish the probability of flooding, on the basis of which actual current safety levels can be assessed.

The field trip to Monywa showed the excessive erosion at the toe of the quay wall and the poor state of maintenance of dike sections. A toe protection by filter and stable rock cover would be a good first step to avoid failure of the wall under new extreme conditions.

A variety of proposed river improvement projects were discussed and considerations on how to optimize these plans were given. For example, removing the bottlenecks in the Myittha river between Kalay and Kalaywa will affect the water levels, flow velocities and morphology along the majority of the river. These hydro-morphological changes need to be assessed first by numerical modelling before starting such a complex and expensive project. The costs for carrying out numerical modelling can be defended by the savings that can be achieved with an optimized design. Considerations are provided in the DRR report also for projects such as protecting Kalay by a new dike, and dredging secondary channels or meander cut-offs at various river bend locations.

Elements of early warning systems were discussed in detail. The associated activities will require limited time and effort and will lead to a considerable advancement in forecasting and early warning capabilities. The result is an extension of the forecast lead time, of the number of forecast locations and suggestions for putting these improved forecasts to use.



### **Summary of suggested follow-up activities**

This report gives concrete suggestions for ongoing support, aiming to make the Myanmar approach towards water management more *proactive*. The suggestions cover a wide palette of topics, which could be initiated by Myanmar government and/or together with Netherlands government or other donor organisations. The suggestions include:

- Dike inspection tool: Prikstok (short term)
- Dike design tools: Ground drill and gouge (short term)
- Dike design tools: Upgrade numerical methods (medium term)
- Dike management tools: data storage and inspection *app* (medium/long term)
- Dike management: review of existing guide (short term)
- River monitoring: improve data management system (long term)
- River management: improve predictive capacity (river impact studies such as at meander cut-off at Zalun or impact of dike extension at Tabaung) (medium/long term)
- River monitoring: Van Veen grab (short term)
- Early warning: flood forecasting system (long term)
- Risk approach: prepare flood hazard maps (medium term)
- Risk approach: apply pilot method at Nyaung Done Township (incl. stakeholder management) (medium term)

No ranking has been applied to these suggested DRR follow-up activities, since it is up to the Myanmar government to prioritise and decide on the relevance of the measures. Final choices will depend on own funding and/or possible matching funds from other running or expected initiatives. It is recommended to start exploring options for such co-funding as soon as possible.