

**MINISTRY OF NATURAL RESOURCES,
ENVIRONMENT AND CLIMATE CHANGE
DEPARTMENT OF IRRIGATION AND DRAINAGE
NATIONAL FLOOD FORECASTING AND WARNING
PROGRAMME**

Main Points

**What we
examined?**

- Department of Irrigation and Drainage (JPS) has been tasked with coordinating and monitoring the implementation of the National Flood Forecasting and Warning Programme (PRAB). PRAB is carried out in three phases. PRAB Phase 1 began in 2015 and will continue until 2024 in three major river basins, namely the Kelantan River, Terengganu River, and Pahang River. As for PRAB Phase 2, it commenced in 2018 and is expected to be completed by 2025, involving 38 river basins across the country, including Sabah and Sarawak. JPS is also planning to expand PRAB to other river basins in Sabah and Sarawak for implementation in PRAB Phase 3.
- PRAB provides effective and efficient flood forecasting and warning services to the public. PRAB encompasses four main integrated components, which are as follows:
 - Developing a hydrological data tracking system;
 - Establishing a database system and ICT infrastructure;
 - Developing flood forecasting and modelling systems; and
 - Enhancing warning and dissemination systems.
- This audit covers two main areas of assessment, which are performance and management of PRAB Phase 1, encompassing the components of monitoring, forecasting, ICT infrastructure, database, and warning systems. The programme's performance is evaluated based on two aspects, namely output achievement and outcome.
- The output achievement in terms of infrastructure includes the performance of PRAB Phase 1 implementation, which encompasses the construction of Telemetry Hydrology Stations, Siren and Communication Network, the development of the Integrated Forecasting Operation System (iFOS), as well as

warning and dissemination. The output achievement in terms of system performance encompasses all three objectives within PRAB Phase 1.

- The success outcome is assessed based on the effectiveness of PRAB management in delivering efficient and effective flood forecasting and warning services to the public, with the goal of minimising the social and economic impacts resulting from floods.
- The assessment of PRAB management includes project management, financial performance, procurement management, contract administration, system management, safety evaluation, data management, and equipment maintenance.
- PRAB assists the JPS in providing effective and efficient flood forecasting and warning services to the public, with the aim of minimising the social and economic impacts caused by floods.
- This audit is conducted to assess whether PRAB has been implemented in a cost-effective, efficient, and effective manner to achieve the following objectives:
 - Developing a system capable of forecasting monsoon flood events seven days in advance based on weather forecast data from the Malaysian Meteorological Department;
 - Enhancing the capability of the monsoon flood warning and dissemination system from six hours to two days in advance to relevant agencies and residents affected by floods; and
 - Improving the accuracy of monsoon flood warnings by reducing the forecasted vs. actual water level difference from over one metre to less than 0.5 metres.

Why it is important to audit?

Conclusion

Overall, PRAB Programme assists JPS in making flood forecasts and warnings. PRAB management in terms of infrastructure construction output achievement is good. However, the output achievement in terms of delivering the programme's objective services is less satisfactory regarding issuing flood warnings and alerts two days in advance and improving the accuracy of flood warnings to within 0.5 metres of actual events.

NO.	AUDIT ISSUES	IMPACT	RECOMMENDATION FOR SOLUTIONS
1.	The measurement outcome for PRAB remains inconclusive as it is currently in the implementation phase, which is projected to continue until 2030.	The programme's outcome cannot be evaluated.	JPS should establish performance indicators to assess the achievement of the PRAB so that the objectives of flood forecasting and dissemination can be met, thereby minimising the impact of floods on the public.
2.	Preventive measures are not being maintained in accordance with contract requirements.	If malfunctioning equipment is not repaired, there is a risk of financial loss for the government.	Monitoring of telemetry hydrology stations, sirens, or web cameras and implementing maintenance actions according to the plan to ensure that stations and equipment function properly.
3.	JPS has never performed preventive maintenance on any of the 204 stations after the warranty period expired.		
4.	Data for 118 equipments was not received at the gateway for three months consecutively, resulting in RM110,570 in equipment costs.	This puts risk to the accuracy of the flood forecasts.	JPS should determine the best method to ensure more stable data transmission from telemetry hydrological stations to the gateway after the discontinuation of the 3G network to ensure the PRAB objectives are met.
5.	46.5% of the rainfall data and 58.7% of the water level data displayed on the Public InfoBanjir Portal are not from PRAB RTU data.	This situation has an impact on the availability of RTU data for flood forecasting.	
6.	The rainfall data recorded at the gateway for Kelantan, Terengganu, and Pahang is less than the expected volumes of data required.	The situation poses a threat to the accuracy of the flood forecasts.	Management and data cleaning processes from RTU to the Forecast Data Centre (FDC) should be monitored to ensure that no errors occur in the output generated from the ETL process.

