

Afulilo Water Storage Outlook Module (AWSOM)

James Sturman¹, Alan Porteous¹, and Matt Wilkins¹

¹National Institute of Water and Atmospheric Research, NZ

November 21, 2022

Abstract

In consultation with the Samoa Electric Power Corporation (EPC) and the Samoa Meteorology Division (SMD), the Afulilo Water Storage Outlook Module (AWSOM) that was developed as a manually operated spreadsheet application during COSPPac-1, has now been redeveloped as an automated web application (AWSOM-2). The Afulilo Hydropower Scheme is the largest renewable power scheme in Samoa and is central to Samoa's goal of becoming 100% renewable in the energy sector by 2025. AWSOM-2 draws on weekly, monthly, and seasonal rainfall forecast products from the ACCESS-S forecasting system, as well as weather and climate forecasts from global models. Additionally, AWSOM-2 draws on rainfall observations from the dam, dam level measurements conducted by EPC and the Samoa Water Resource Division, and power generation rates being operated by EPC. The model incorporates physical relationships derived from studies of how the reservoir responds to rainfall, water runoff from the upper catchment, and losses from evapotranspiration and seepage. Samoan Met staff operationally review model outputs, add interpretive commentary from local knowledge and perspectives, and then forward the reservoir storage outlook report to EPC. This enables EPC to consider options for water use for power generation and optimise water use while maintaining a guaranteed electricity supply. AWSOM-2 has been coded in python by NIWA, through funding from the NZ Ministry of Foreign Affairs and Trade. The application is run on the CliDEsc server at SMD.

STURMAN & others

Afulilo Water Storage Outlook Module (AWSOM)

James Sturman², Alan Porteous¹ and Matt Wilkins²

¹NIWA Taihoro Nukurangi, Private Bag 14901, Wellington 6241, Aotearoa New Zealand

²NIWA Taihoro Nukurangi, PO Box 8602, Christchurch 8440, Aotearoa New Zealand

Email: james.sturman@niwa.co.nz, alan.porteous@niwa.co.nz, matt.wilkins@niwa.co.nz

Abstract for STAR 2021 Land Use, Energy and Infrastructure Development on Pacific Islands theme, 25-26 November 2021, submitted by NIWA with acknowledgements to Samoa Electric Power Corporation, Samoa Met Division, and COSPPac-2

In consultation with the Samoa Electric Power Corporation (EPC) and the Samoa Meteorology Division (SMD), the Afulilo Water Storage Outlook Module (AWSOM) that was developed as a manually operated spreadsheet application during COSPPac-1, has now been redeveloped as an automated web application (AWSOM-2).

The Afulilo Hydropower Scheme is the largest renewable power scheme in Samoa and is central to Samoa’s goal of becoming 100% renewable in the energy sector by 2025.

AWSOM-2 draws on weekly, monthly, and seasonal rainfall forecast products from the ACCESS-S forecasting system, as well as weather and climate forecasts from global models. Additionally, AWSOM-2 draws on rainfall observations from the dam, dam level measurements conducted by EPC and the Samoa Water Resource Division, and power generation rates being operated by EPC. The model incorporates physical relationships derived from studies of how the reservoir responds to rainfall, water runoff from the upper catchment, and losses from evapotranspiration and seepage.

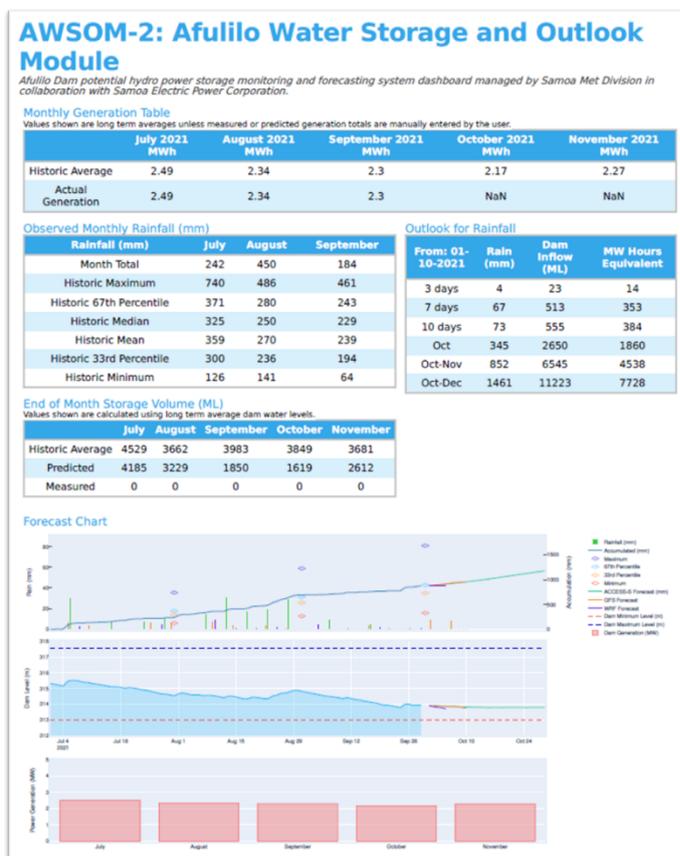


Figure 1: Example AWSOM-2 automated report

Samoa Met staff operationally review model outputs, add interpretive commentary from local knowledge and perspectives, and then forward the reservoir storage outlook report to EPC. This enables EPC to consider options for water use for power generation and optimise water use while maintaining a guaranteed electricity supply. AWSOM-2 has been coded in python by NIWA, through funding from the NZ Ministry of Foreign Affairs and Trade. The application is run on the CliDEsc server at SMD.