APPENDIX 01

Assessment of Morphological Dynamics in Ibajay, Aklan Coast using Delft3D Numerical Simulation

Table 1. Summary of collected data for this study

Data	Source	Acquisition Date	Description	Purpose
Bathymetry	Field survey	November 2017	Bathymetric survey using a single beam echosounder	Input to nearshore model
Water level	Field survey	February 2018	Water level observations at a bottom mounted point, O1, 100 m off the study coast every 10 minutes	Calibration
Bottom velocity	Field survey	February 2018	Hourly measurements of bottom velocity at a bottom mounted point, O1, 100 m off the study coast	Calibration
Wave	Field survey	February 2018	Hourly measurements of wave height and period at a bottom mounted point, O1, 100 m off the study coast	Calibration
Sediment	Field survey	February 2018	1 kg sand sample collected at the location shown in Figure 1d. Sample underwent sieve analysis to determine the grain size distribution and median diameter of sand	Input to the nearshore model
Tide	Downloaded online from TPXO 8.0 database in Delft Dashboard	March 2018	Astronomic tide constituents at open boundaries	Input to the regional model
Bathymetry	Downloaded online from GEBCO 2014	March 2018	15-second arc resolution	Input to the regional model
Water level	Downloaded online from IHO database in Delft Dashboard	March 2018	Water level forecasts at 2 IHO stations, Capiz Landing (CL) and Looc Bay (LB) every 10 minutes	Calibration
Bathymetry	Requested online from NAMRIA	December 2018	Based on hydrographic survey of the agency	Input to local model
Wind	Requested from DOST-ASTI	December 2018	Wind speed and direction data at Kalibo Capitol (KC) every 15 minutes from January 2012 to January 2019	Input to the local and nearshore model
Wind	Downloaded online from the database of GFS	January 2019	3-hourly wind information at a point in Sibuyan Sea (SS)	Input to the local model

Data	Source	Acquisition Date	Description	Purpose
Wave	Downloaded online from WaveWatch III database of NCEP	January 2019	3-hourly wave data (height, period, direction) at a point in Sibuyan Sea (SS)	Input to the local model
Stream discharge	Requested from a BlueCARES project component	January 2019	Daily average flow of the stream based on long-term SWAT simulation of its watershed	Input to the nearshore model

Table 2. Summary of properties of the computational domains

Computational Grid	Number of grid points	Spatial resolution	Dimensionality	Models
Regional	356 x 96	2 km x 2 km	2D	Hydrodynamic
Local	236 x 107	500 m x 500 m	2D	Hydrodynamic + wave
Nearshore	72 x 102	25 m x 50 m < 1 km from the coast 40 m x 50 m > 1 km from the coast	3D with 3 layers (25%, 50%, 25%)	Hydrodynamic + wave + sediment transport

Table 3. Summary of relevant physical parameters

Parameter	Model	Value	Reference
Bed roughness, n	Regional	0.10 when $h \leq 0$ m (land) 0.05 when 0 m < h < 50 m 0.09 when $50 \leq h$	Calibration
Wind input	Local	Magnitude: 3-hourly average of data in SS and KC Direction: data at KC	Calibration
Whitecapping Formulation	Local	Komen	Komen et al. (1984)
Directional Spreading	Local	10^o	Calibration
Wind drag coefficient, C_D	Nearshore, local	See Figure 4	Zijlema, et al. (2012)
Bottom friction coefficient (wave dissipation)	Nearshore, local	0.038	Zijlema, et al. (2012)
Bed roughness, n	Nearshore	0.040 when $h \leq 0$ m (land) 0.032 when 0 m < h < 20 m 0.026 when $50 \leq h$	Calibration
Horizontal Eddy Viscosity (HEV)	Nearshore	5 m^2/s	Calibration

Table 4. Performance guidelines for hydrodynamic and wave models [24]

Parameter	Root-Mean-Square Error (RMSE) value
Water level	≤ 0.10 m or within 10% and 15% of spring and neap tidal ranges
Current speed	≤ 0.20 m/s or within 10% to 20% of the measured speed
Significant wave height	≤ 0.4 m

Table 5. Summary of results of calibration and validation in the nearshore model

Parameter	Calibration or Validation	Simulation Period	Root-Mean-Square Error (RMSE)
Water level	Calibration[a]	September 7-22, 2017	0.0937 m
	Validation[b]	January 20, 2018 – February 1, 2018	0.1025 m
Bottom velocity magnitude	Calibration[c]	September 8-11, 2017	0.0299 m/s
	Validation[d]	January 30, 2018 – February 2, 2018	0.0244 m/s
Bottom velocity direction	Calibration[e]	September 8-11, 2017	94.4852°
	Validation[f]	January 30, 2018 – February 2, 2018	72.0108°
Significant wave height	Validation[g]	January 1-31, 2018	0.1464 m
Significant wave period	Validation[h]	January 1-31, 2018	0.5638 s