Influence of manmade effects on geomorphology, bathymetry and coastal dynamics in a monsoon affected river outlet in Southwest coast of Sri Lanka

G.P. Gunasinghe[1,2,*], Lilani Ruhunage[3], N.P. Ratnayake[1], A.S. Ratnayake[4], G.V.I. Samaradivakara[1], Ravindra Jayaratne[5]

[1]Department of Earth Resources Engineering, Faculty of Engineering, University of Moratuwa, Moratuwa, Sri Lanka.

[2]Department of Spatial Sciences, KDU Southern Campus, Nugegalayaya, Sewanagala, Sri Lanka (Present Address).

[3]Coast Conservation and Coastal Resource Management Department, Maligawatte, Colombo, Sri Lanka.

[4]Department of Applied Earth Sciences, Faculty of Applied Sciences, Uva Wellassa University, Passara Road, Badulla, Sri Lanka.

[5]School of Architecture Computing and Engineering, University of East London, Docklands Campus, 4-6 University Way, London E16 2RD, UK.

* Corresponding Author:
E-mail Address: prasadh@kdu.ac.lk (G.P. Gunasinghe)
Postal Address: Department of Spatial Sciences, KDU Southern Campus, Nugegalayaya, Sewanagala, Sri Lanka (Present Address).

Table 1: Date and monsoon season of beach boundary surveys

Date	Monsoon Season
2018-12-16	Northeast monsoon
2019-01-27	Northeast monsoon
2019-03-24	1st inter-monsoon
2019-05-26	Southwest monsoon
2019-07-21	Southwest monsoon
2019-08-18	Southwest monsoon

Table 2: Meta data of downloaded wave climate data

Information \ Data Set	Data set 01 (SW side, proximity to model domain)	Data set 02 (NW side, proximity to model domain)	Data set 03 (At near shore area)
Location	6.33°N, 79.50°E	7.16°N, 79.58°E	6.50°N, 79.83°E
Depth	600 m (Approximately)	500 m (Approximately)	15 m (Approximately)
Wave climate parameters	Hs, Tp, Dir	Hs, Tp, Dir	Hs, Tp, Dir
Resolution	03 hrs	03 hrs	03 hrs

Table 3: Nested wave model parameters

Parameter	Adopted Value
Directional space (Circle) and number of directions	36
Frequency space (Lowest frequency, Highest frequency, # of frequency bins)	0.05, 01, 24
Nested grids	Available
Directional spreading (Cosine power)	15
Obstacles	Not available
Direction convention	Nautical
Wave setup	Activated
Depth induced breaking	Alpha – 1, Gamma – 0.73
Bottom friction	JONSWAP (0.067 m^2s^{-3})
Wind growth, Quadruplets, Whitecapping (Komen et al.), Refraction, Frequency shift	All activated
CCD & CSS	0.5

Table 4: Variation of sand spit volume, area, and perimeter

Date	Sand Volume (m^3)	Area (km^2)	Perimeter (km)
2018-12-16 (NE)	107,012	0.14	3.95
2019-01-27 (NE)	149,458	0.12	4.34
2019-03-24 (1^{st} inter monsoon)	109,224	0.13	4.01
2019-05-26 (SW)	100,688	0.12	4.03
2019-07-21 (SW)	200,972	0.17	4.34
2019-08-18 (SW)	135,985	0.18	4.50