



Supplementary Materials

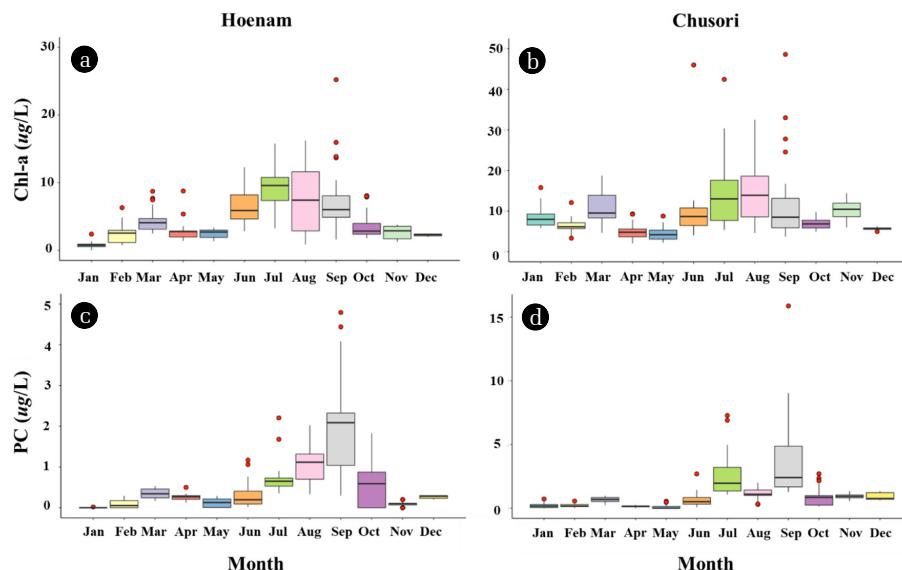


Fig. S1. Box plots for temporal distribution of Chl-a and PC concentrations. (a) and (c) indicate Chl-a and PC concentrations in Hoenam, respectively. (b) and (d) indicate Chl-a and PC concentrations in Chusori, respectively.

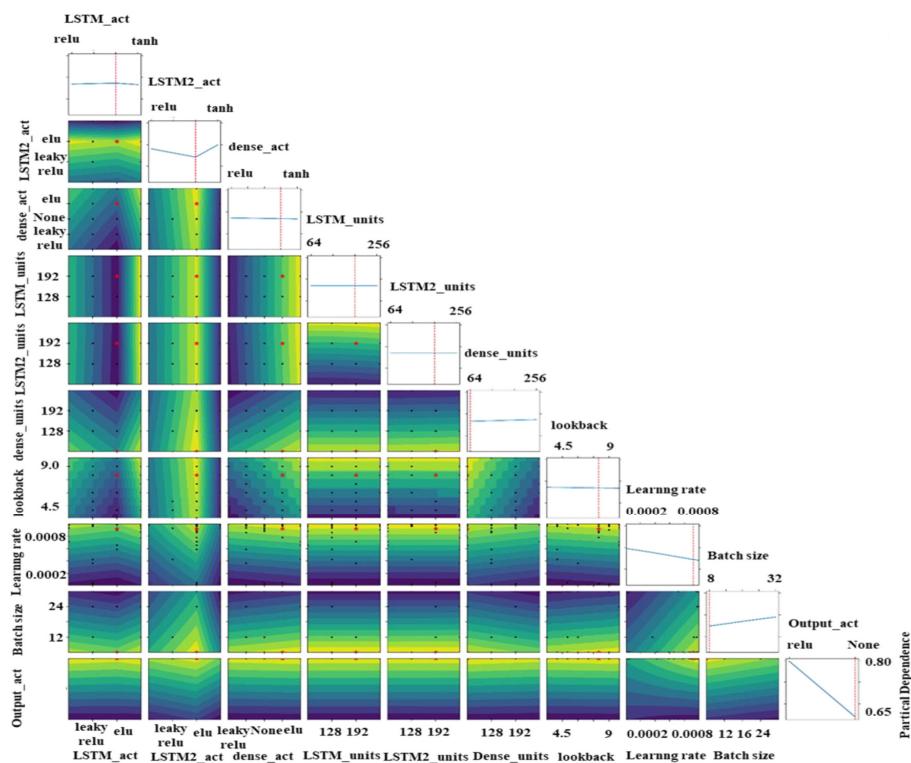


Fig. S2. Objective plot of Bayesian optimization for the model in Hoenam.

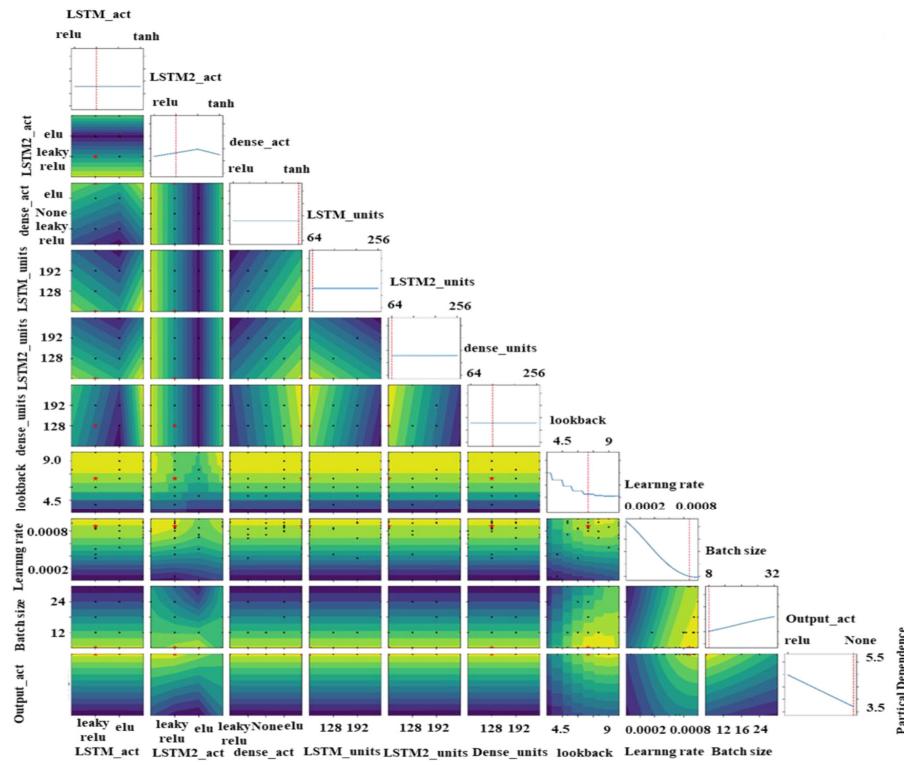


Fig. S3. Objective plot of Bayesian optimization for the model in Chusori.

Table S1. Descriptions of Water Quality, Meteorological, and Hydrological Data in Daechung Reservoir

Variable	Hoenan				Chusori				Unit
	Min	Max	Mean	Number of data	Min	Max	Mean	Number of data	
Water temperature (WT)	6.87	31.83	18.23	312	5.88	31.68	18.02	316	°C
pH	6.60	9.87	8.13	312	7.14	9.96	8.48	316	
Dissolved oxygen (DO)	58.7	188.5	104.7	312	66.9	241.0	113.6	316	%
Conductivity (Cond)	0.08	0.17	0.14	312	0.11	0.26	0.18	316	mS/cm
Turbidity (Turb)	0.00	85.26	3.522	312	0.23	258.83	5.81	316	FNU
Total nitrogen (TN)	0.81	2.59	1.35	356	1.05	0.01	2.20	282	mg/L
Total phosphorus (TP)	0.00	0.08	0.02	320	4.06	0.20	0.04	229	mg/L
Inflow	0.0	4590.3	160.9	366	0.0	4590.3	160.9	366	m ³ /s
Outflow	24.2	3274.1	166.3	366	24.2	3274.1	166.3	366	m ³ /s
Precipitation (PRCP)	0	135	4	366	0	171	4	366	mm
Wind speed(WS)	0.7	4.1	1.4	364	0.2	2.5	0.9	355	m/s
chlorophyll-a (Chl-a)	0.00	25.21	4.47	312	2.04	97.56	9.51	316	µg/L
phycocyanin (PC)	0.00	24.23	0.07	312	0	31.37	1.32	316	µg/L

Table S2. Descriptions and Ranges of Hyper-parameters

Hyperparameter	Range
Hidden units	64 – 256
Activation function	Relu, Leakyrelu, Elu, tanh, None
Batch size	8 – 32
Lookback	3 – 10
Learning rate	1e-5 – 0.001

Table S3. Optimal Hyperparameters for Simulating Chl-a and PC Concentrations

Parameter	Hoenam	Chusori
LSTM 1 unit	192	64
LSTM 2 unit	192	64
Dense unit	64	128
Activation function 1	Elu	LeakyRelu
Activation function 2	Elu	LeakyRelu
Activation function 3	Elu	Tanh
Activation function output	None	None
Batch size	8	8
Lookback	8	7
Learning rate	0.0009	0.0008