Figure S1. Average annual precipitation map of Saudi Arabian (1960 to 2014) (Basahel and Mitri 2017).

Figure S2. (a) Flow direction and (b) stream orders of the watersheds.

Figure S3. Lineament detection in the watersheds.

Figure S4. Urbanization distribution in selected study area.

Figure S5. (a) Soil textures and(b) Land use land cover of the study area (modified after Mallick 2016).

Figure S6. (a) Bands 6, 5, and 4 composites, and (b) NDVI distribution.

Figure S7. (a) Vegetation differences in 2016 and 2020 and (b) vegetation zone areas.

Figure S8. Storage, perimeter, dam site, and outlet boundary.

Figure S9. Inflow Hydrograph of watershed area as a storage condition in HEC-RAS.

Table S1. Summary results of the Wadi Al Akkas, Wadi Abha, and outlet point (1-5 Apr2020).

Wadi Al Akkas

Project: Project 2
Simulation Run: Run 1 Subbasin: 1B

Start of Run:	01Apr2020, 15:23	Basin Model:	WMS Watershed
End of Run:	05Apr2020, 15:28	Meteorologic Model:	WMS Meteorologic Data
Compute Time:	21Sep2021, 11:33:31	Control Specifications:	WMS Control Info

Volume Units: (●) MM ( ) 1000 M3

Computed Results

Peak Discharge :	1978.6 (M3/S)	Date/Time of Peak Discharge :	02Apr2020, 07:13
Total Precipitation :	520.00 (MM)	Total Direct Runoff :	445.33 (MM)
Total Loss :	74.67 (MM)	Total Baseflow :	0.00 (MM)
Total Excess :	445.33 (MM)	Discharge :	445.33 (MM)

Wadi Abha

Project: Project 2
Simulation Run: Run 1 Subbasin: 2B

Start of Run:	01Apr2020, 15:23	Basin Model:	WMS Watershed
End of Run:	05Apr2020, 15:28	Meteorologic Model:	WMS Meteorologic Data
Compute Time:	21Sep2021, 11:33:31	Control Specifications:	WMS Control Info

Volume Units: (●) MM ( ) 1000 M3

Computed Results

Peak Discharge :	2776.3 (M3/S)	Date/Time of Peak Discharge :	02Apr2020, 07:33
Total Precipitation :	520.00 (MM)	Total Direct Runoff :	457.45 (MM)
Total Loss :	62.55 (MM)	Total Baseflow :	0.00 (MM)
Total Excess :	457.45 (MM)	Discharge :	457.45 (MM)

Outlet point

Project: Project 2
Simulation Run: Run 1 Junction: 3C

Start of Run:	01Apr2020, 15:23	Basin Model:	WMS Watershed
End of Run:	05Apr2020, 15:28	Meteorologic Model:	WMS Meteorologic Data
Compute Time:	21Sep2021, 11:33:31	Control Specifications:	WMS Control Info

Volume Units: (●) MM ( ) 1000 M3

Computed Results

Peak Outflow :	4741.4 (M3/S)	Date/Time of Peak Outflow :	02Apr2020, 07:23
Total Outflow :	452.56 (MM)		