RICCAR

Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-Economic Vulnerability in the Arab Region

Extreme climate indices in selected basins (Wadi Diqah, Nahr Al Kabir, Medjerda)

Ihab Jnad

The Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD)

High Level Conference on Climate Change Assessment and Adaptation in the Arab Region – Beirut, Lebanon – 26-28 September 2017

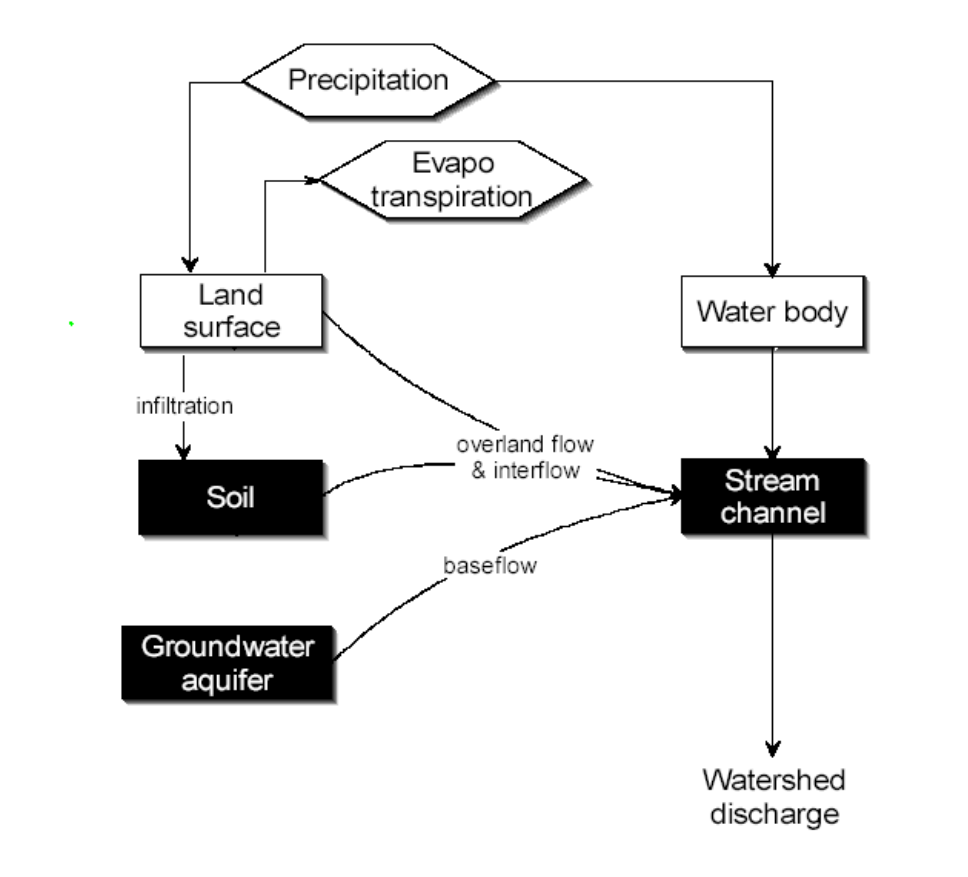
objective

- The objective of this study is to provide insights to extreme events over the coming decades due to climate change in three hydrological basins in the Arab region.

Hydrological modeling

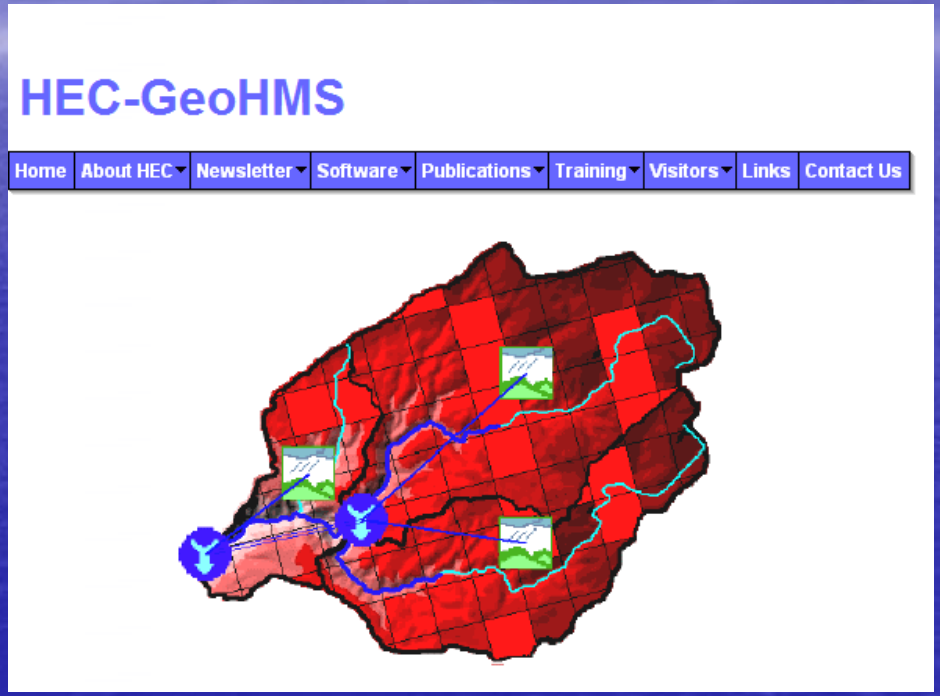
HEC-HMS

- HEC-HMS, HEC-HMS is GIS-based semidistributed rainfall-runoff model developed by Hydrologic Engineering Centre (HEC) of United States Army Corps of Engineers (USACE),



Hec-GeoHMS

- Hec-GeoHMS : is an Arc GIS extension developed by the U.S. Army Corps of Engineers (USACE)
- Hec-GeoHMS is used for computing the flow direction, flow accumulation, stream delineation, watershed delineation, drainage networks derivation



Input data

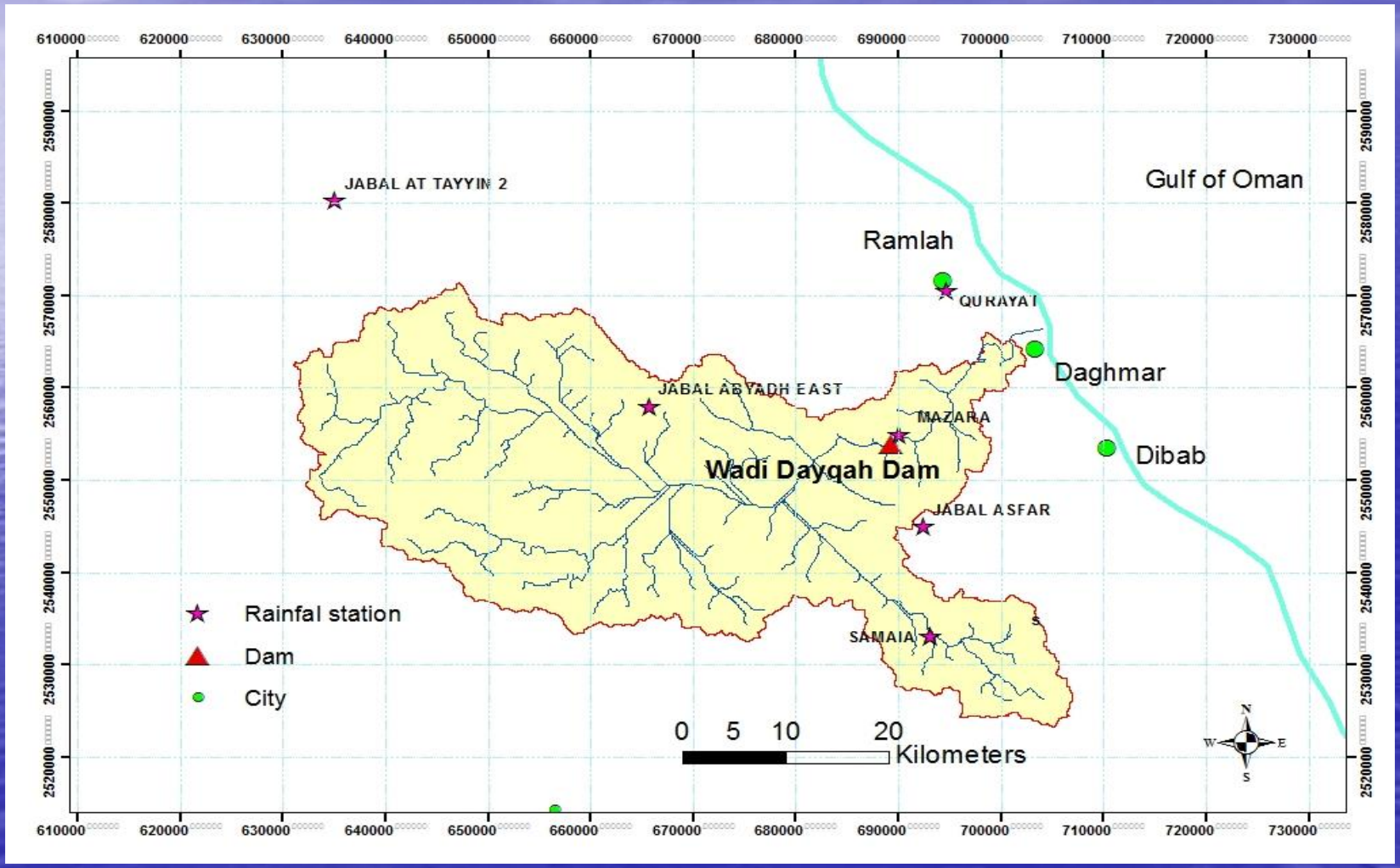
- Land use data
- Soil data
- Topographic data
- **Streamflow Data (for model calibration and validation)**

Mejerda basin– Tunisia

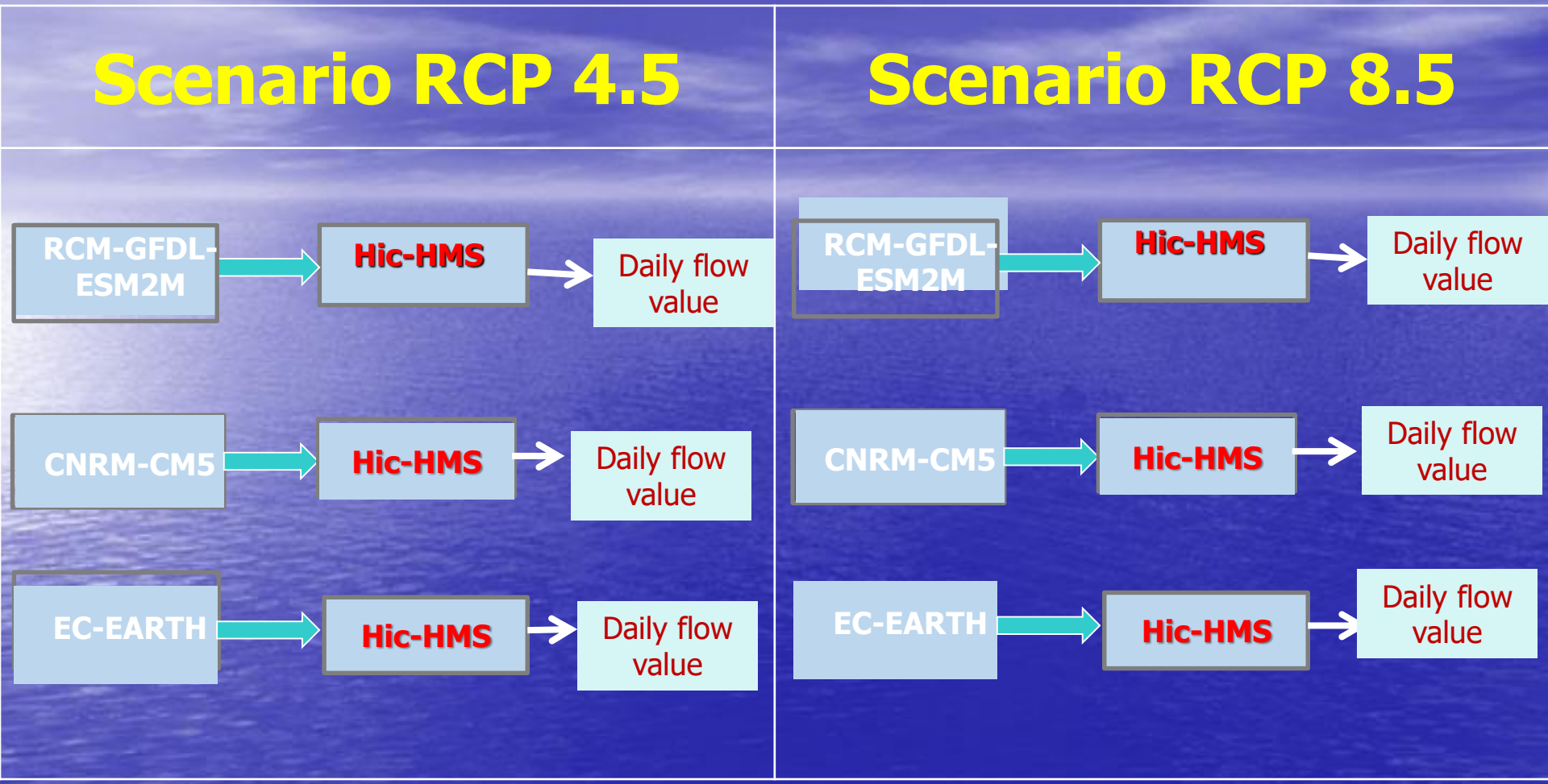
WADI DAYQAH -SULTANATE OF OMAN

located 60 km southeast of Muscat

Rainfall station



Nahr el Kabir Al-Junoubi-Syria


Scenario RCP 4.5
Scenario RCP 8.5
RCM-GFDL-ESM2M
Hic-HMS
Daily flow value
CNRM-CM5
Hic-HMS
Daily flow value
EC-EARTH
Hic-HMS
Daily flow value
RCM-GFDL-ESM2M
Hic-HMS
Daily flow value
CNRM-CM5
Hic-HMS
Daily flow value
EC-EARTH
Hic-HMS
Daily flow value

Linking RCM data to HEC-HMS

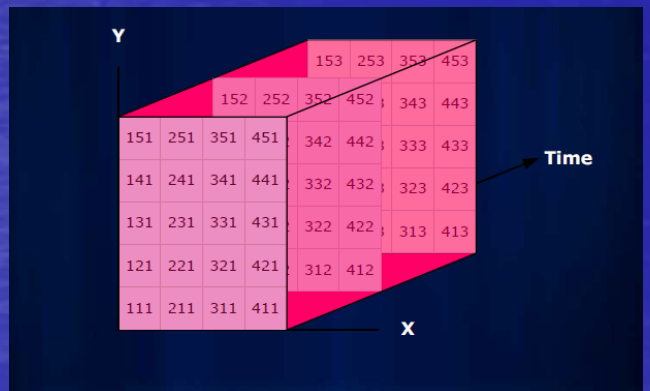
- The outputs of the RCM are in NetCDF format

ta200_MNA-22_ICHEC-EC-EARTH_rcp85_r12i1p1_SMHI-RCA4_v1_day_20960101-21001231.nc

What is NetCDF?

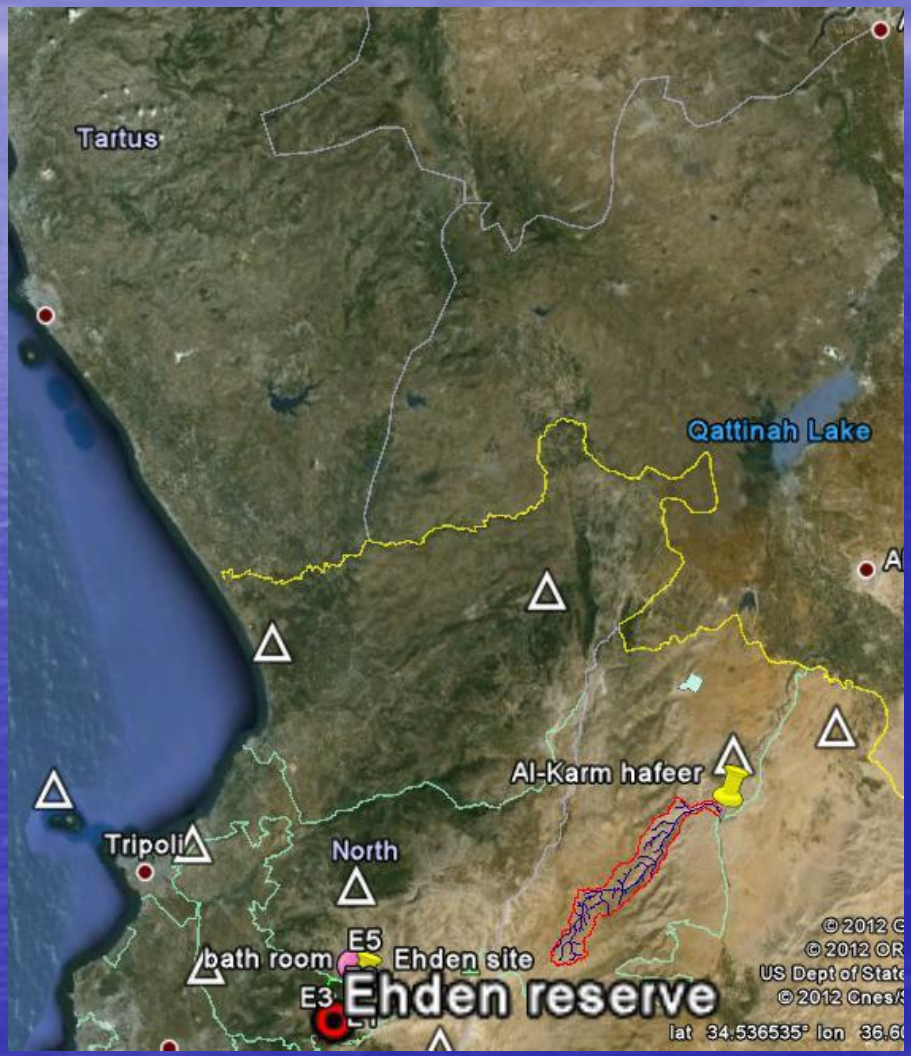
- NetCDF (network Common Data Form)

A platform independent format for representing multi-dimensional array-orientated scientific data.



results

Nahr el Kabir Al-Junoubi

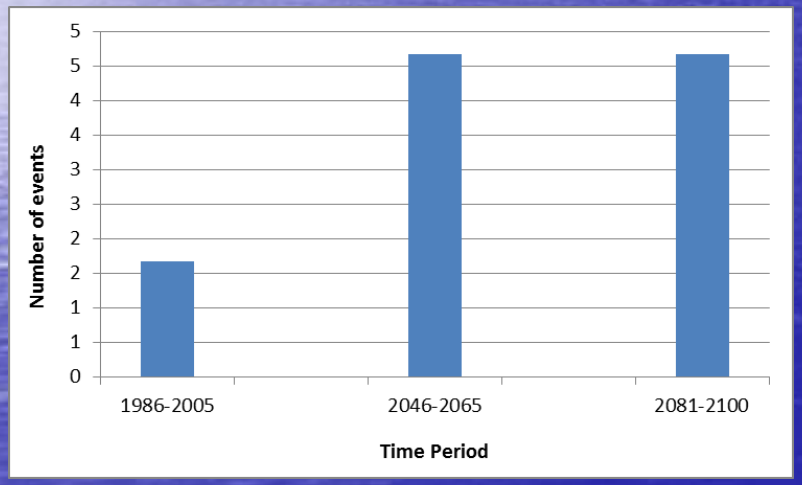


Changes in Hydro extreme Indices

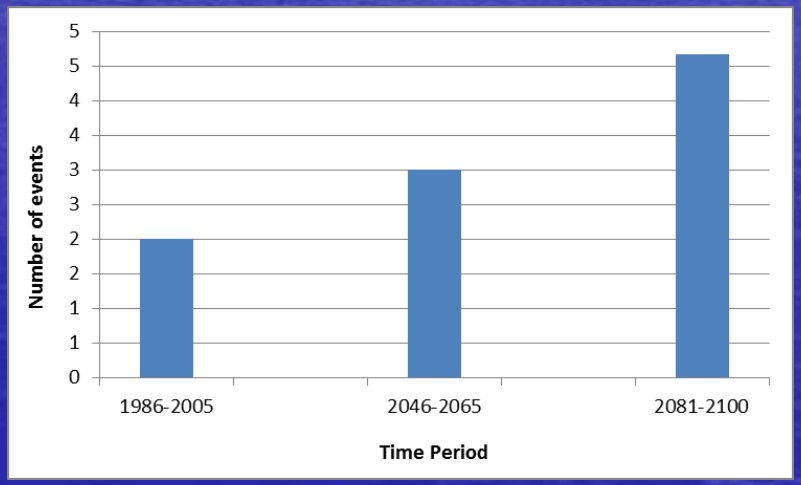
Nahr el Kabir Al-Junoubi basin

Number of extreme flood exceed 90th percentile of maximum daily value

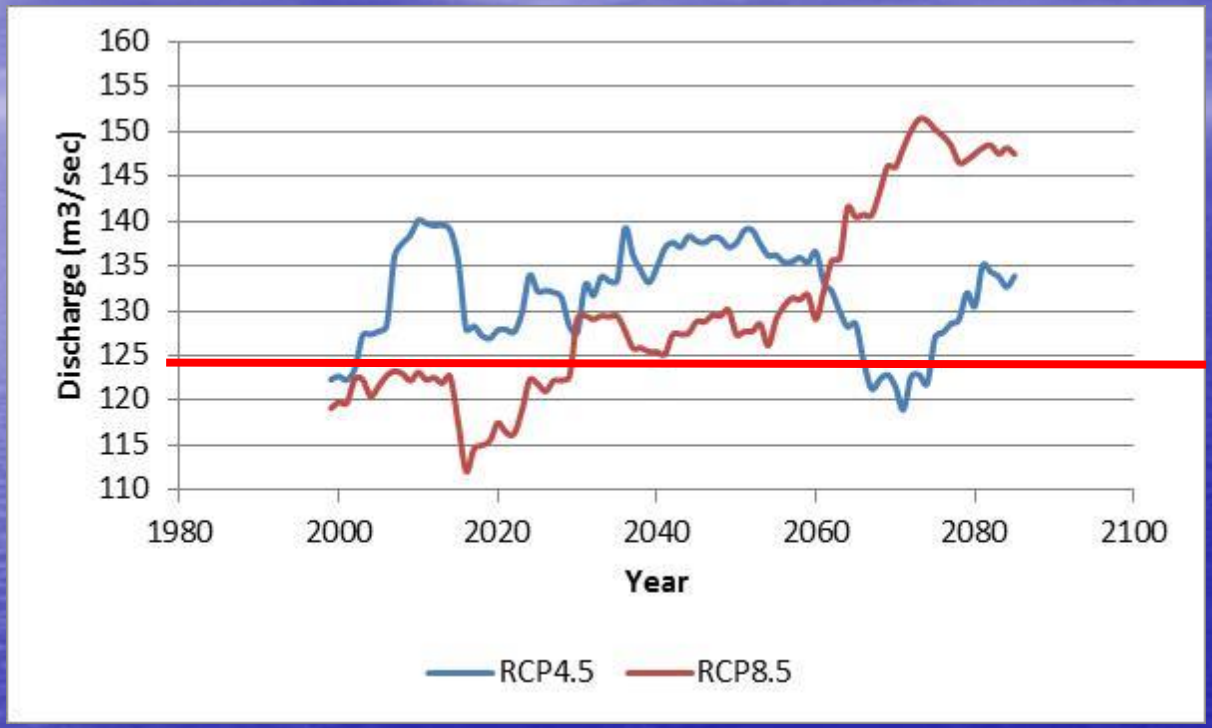
Scenario RCP4.5



Scenario RCP8.5



Mean ensemble change values for 100-year return period flood



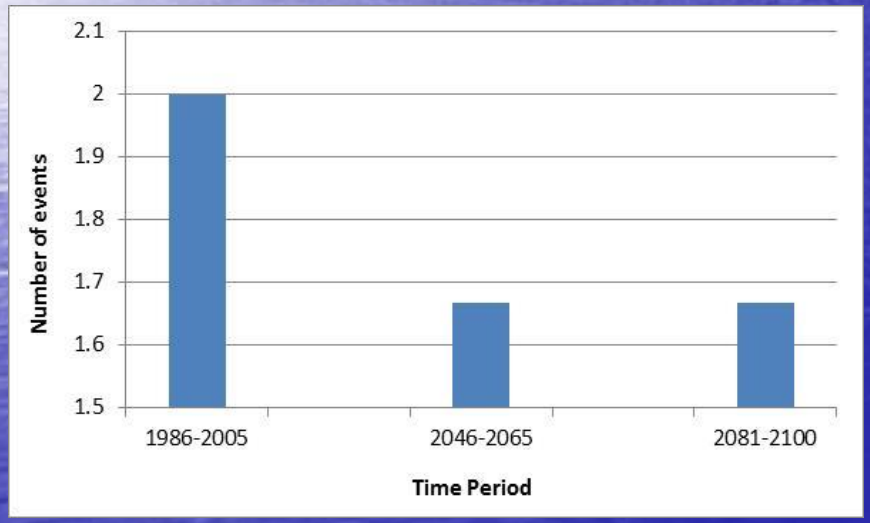
scenario	1986-2005	2046-2065	2081-2100
RCP4.5	126	136	128
RCP8.5		131	149

Medjerda River Basin

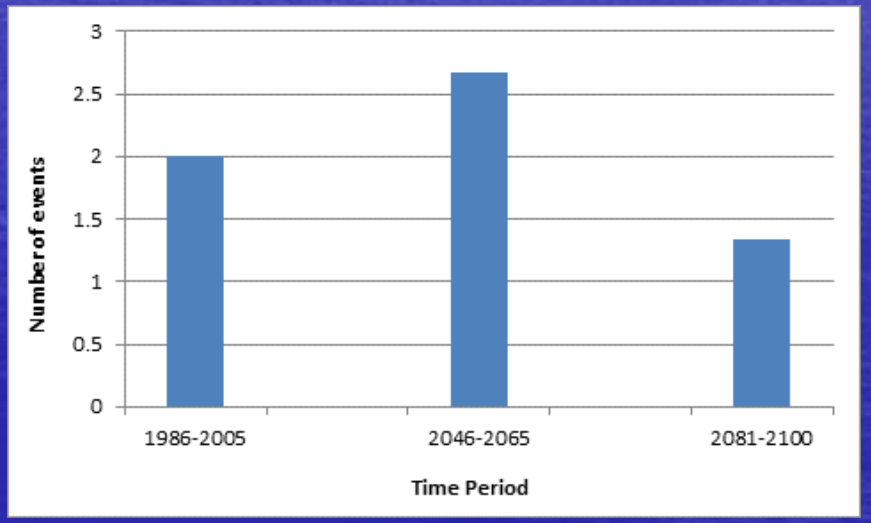
Medjerda River Basin

Number of extreme flood exceed 90th percentile of maximum daily value

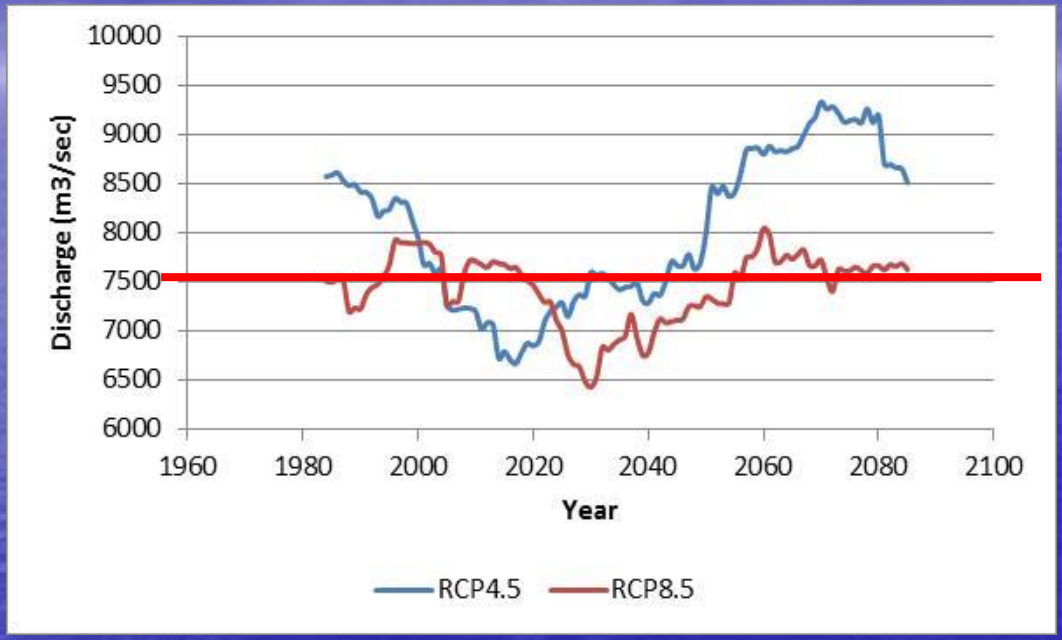
Scenario RCP4.5



Scenario RCP8.5



Mean ensemble change values for 100-year return period flood for Medjerda River Basin

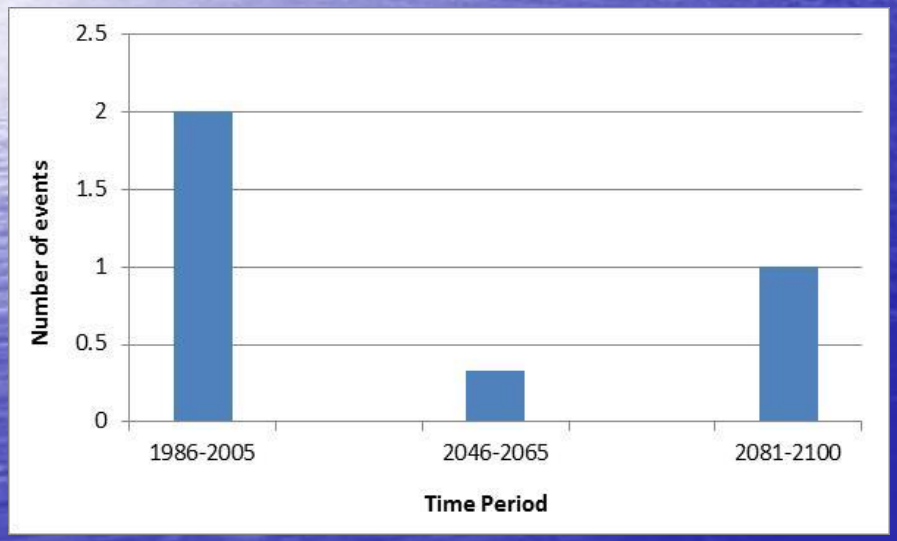


	1986-2005	2046-2065	2081-2100
RCP4.5	7890	8436	9031
RCP8.5		7535	7627

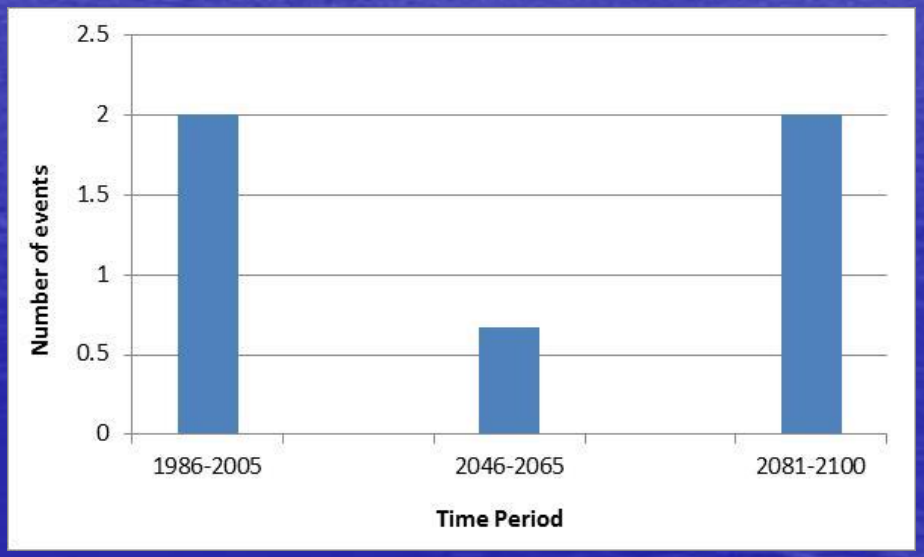
Wadi Dayqah Basin

Number of extreme flood exceed 90th percentile of maximum daily value under

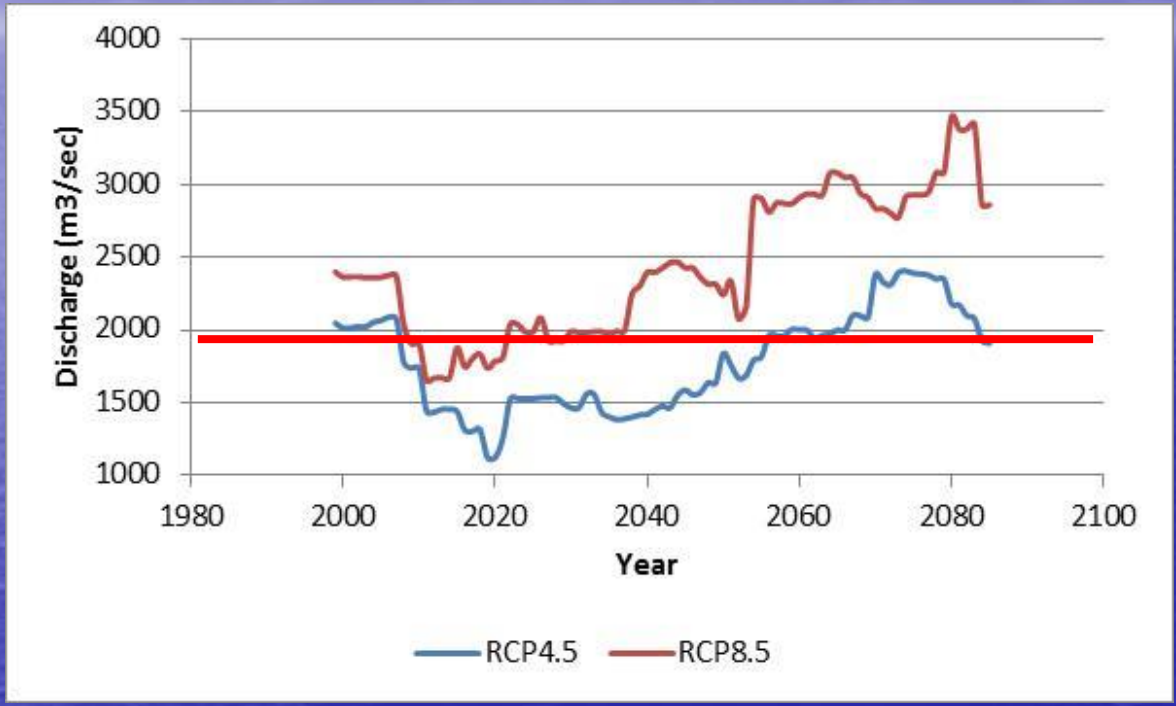
Scenario RCP4.5



Scenario RCP8.5



Mean ensemble change values for 100-year return period flood for Wadi Dayqah Basin



Scenario	1986-2005	2046-2065	2081-2100
RCP4.5	2150	1836	2275
RCP8.5		2667	3043

SUMMARY

- Wadi Dayqah Basin is likely to experience a progressive increase in the magnitude and peak flow
- Mejerda Basin is likely to experience an increase in the magnitude of peak flow for moderate emission scenario together with decreasing in the number of extreme flood. However, for high emission scenario, the magnitude of peak flow is projected to decrease.

SUMMARY

- Nahr el Kabir Al-Junoubi basin is likely to experience an increase in the magnitude of peak flow and flood frequencies over the 21st century under both climate change emission scenarios..

Thanks