

Basic Hydrologic Sciences for the Asian Region (2017)

Final Written Assignment

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- Meteorological Department in (Directorate General of Civil Aviation) of Kuwait.

Option B) Report about my local hydrological conditions in Kuwait.

Abstract:-

-Kuwait is characterized by flat land with no mountains or highlands

-Kuwait is mostly desert land except for populated areas and a few of the cultivated areas

-Soil is mainly sandy

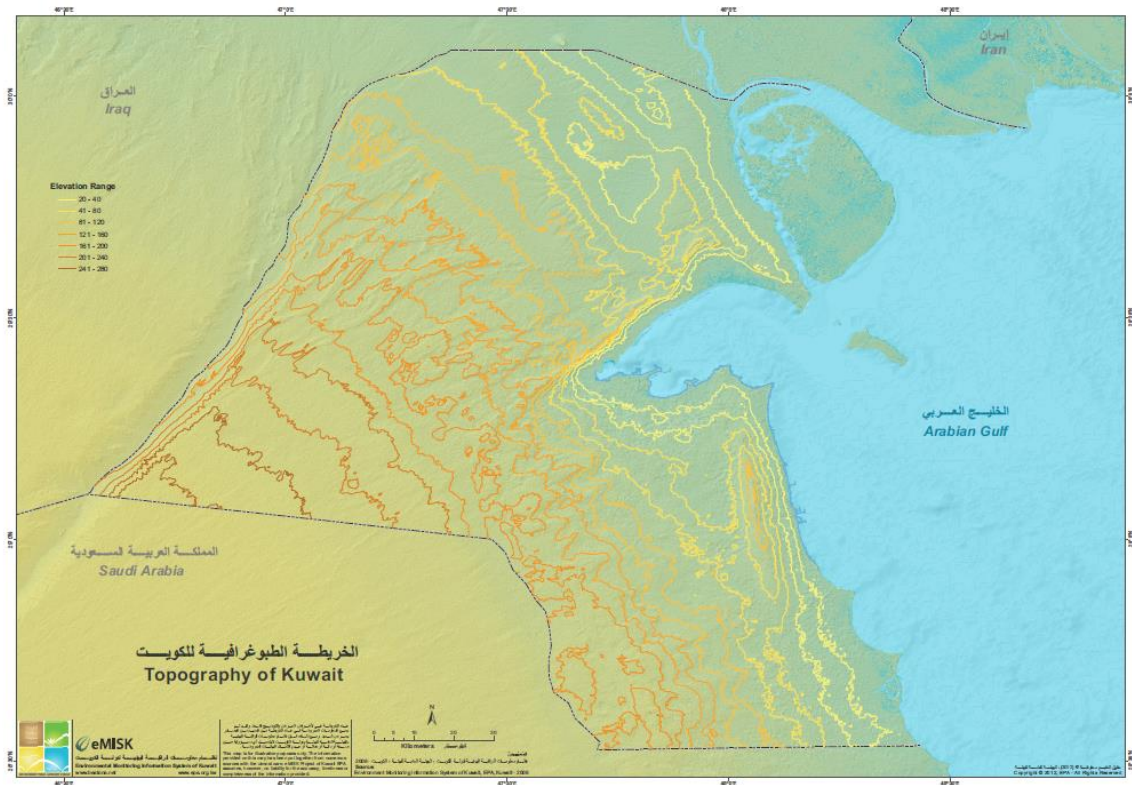
-Groundwater: Fresh and brackish groundwater is the only natural source of water in Kuwait. The availability of this water has been one of the most important factors attracting the population to Kuwait in the past.

-Fresh water is found in several fields, the most important field of Rawdatin, which was discovered on the first of April 1960, and is located in the area of Rawdatin north of Kuwait, an area with an environment characterized by its natural history and geological phenomena.

- The Meteorological Department in (Directorate General of Civil Aviation) of Kuwait monitors all factors and weather phenomena through different observing devices and systems. It also has a modern climate database and prediction systems that are being developed for the best.

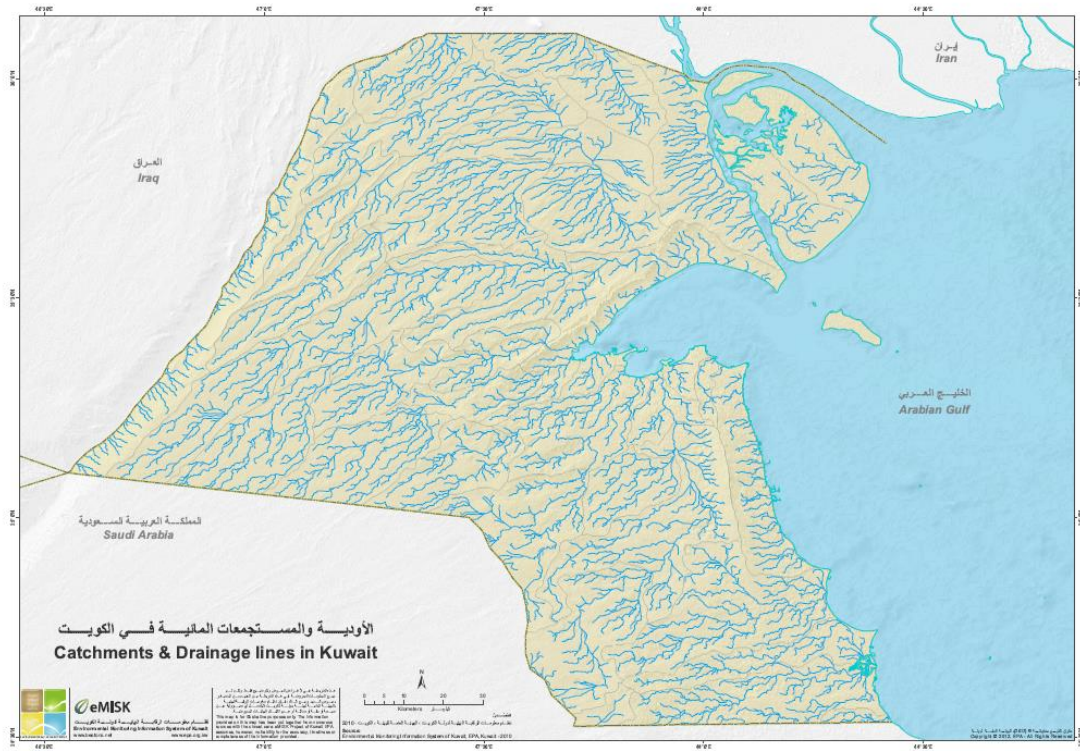
1- Topography of Kuwait

- The State of Kuwait is a country located in the Middle East of Southwest Asia, defiantly in the northwestern corner of the Arabian Gulf bordered to the east, bordered to the north and west of the Republic of Iraq and the South of Saudi Arabia, with a total area of 17,818 square kilometers.



Map (1): Topography of Kuwait

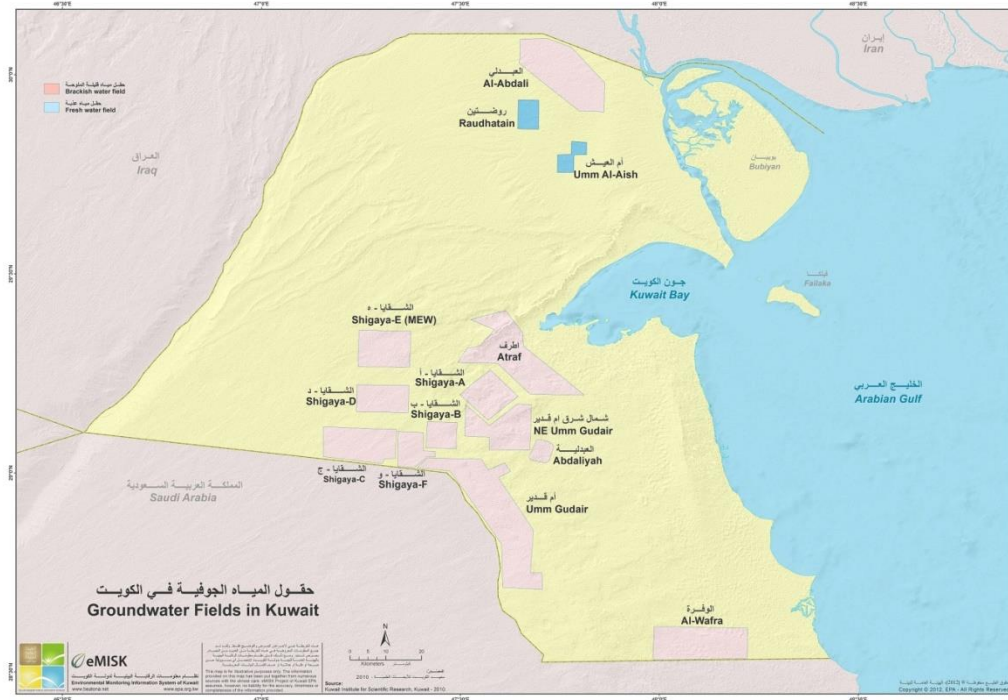
- We can see from the map(1) The terrain of Kuwait does not include any type of highlands (mountains - hills - plateaus) as well as plains and valleys, which leads to no formation of rivers in which water is run off through also the nature of the sandy soil and desert nature in general .



Map (2): Catchments & Drainage lines in Kuwait

- Illustrated from the map (2) Some Catchments and Drainage lines in which the water takes place in the rainy seasons, which are generally few and because of the nature of the soil, the flow of water has a short time in any case and in the case of heavy rains that rarely occur and remain for some days only in the shallow Catchments and then infiltrate into the underground reservoirs and evaporate much of it due to the dry nature of the desert environment in Kuwait

2- Groundwater



- Fresh, brackish groundwater is the only natural sources of water in Kuwait. This water supply has been one of the most important factors attracting the population to Kuwait in the past and fresh water is available in several fields.

- In Kuwait the most important are two fields of fresh groundwater, namely Umm Al-Aish and Al-Rawdatain, located in the north of Kuwait. The most important of these is the Rawdatain field, which was discovered on April 1, 1960. It is located in Al-Rawdatain area, north of Kuwait.

- Rawdatain field is located 120 km from the capital and occupies a wide low area of about 50 km square and takes a rectangular form extending from east to west between 4-5 km, the length from north to south Faisal to about 15 km, and ends to the low several valleys Supplied by the rain water that falls on the area and extract the water of the field from the formations Aldabdaba one of the configurations of Kuwait Geological Group.

- The origin of the source of this water to the stormy rain water and reefs, especially those dating back to the era of Baliostosin is the date of formation to 4 and 5 million years, and rain water still supplies this reservoir from time to time with quantities of rainwater leaking to it.

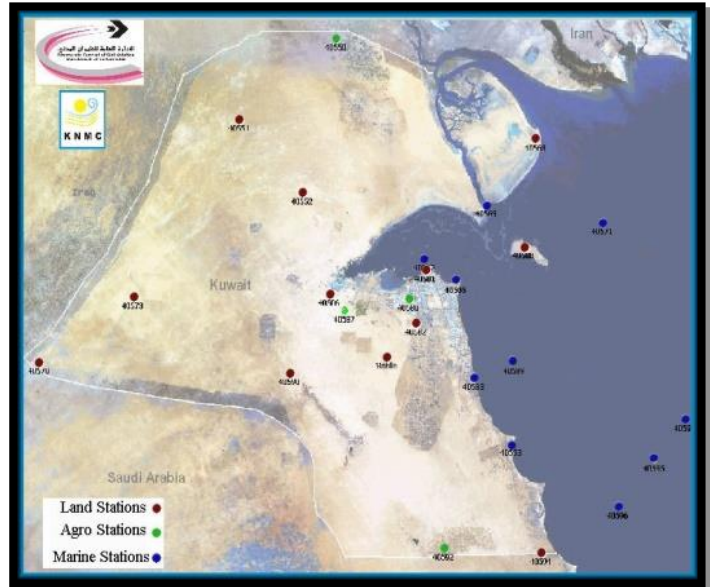
- The water of the field is of a high quality, although its salinity varies according to distance or proximity to the basin center, as well as depth

3- The Meteorological Department (Directorate General of Civil Aviation) in Kuwait monitors all factors and weather phenomena through different observing devices and systems.

- Automatic Stations in Kuwait

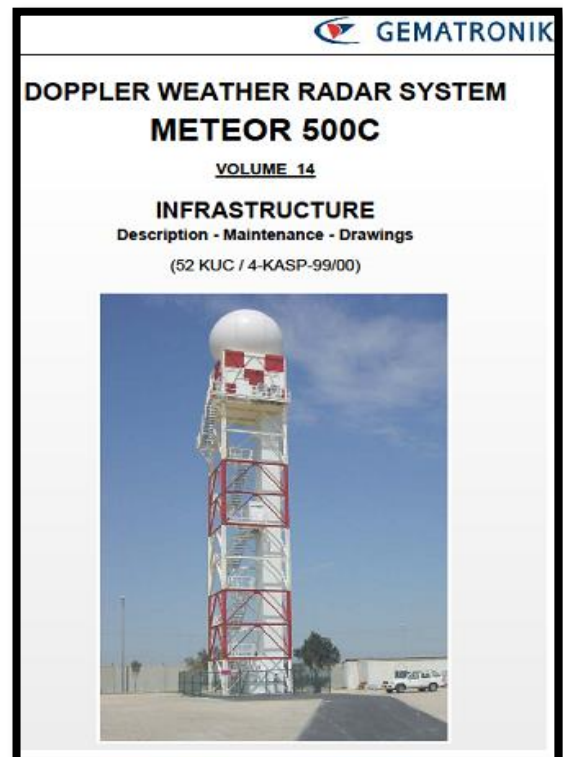
We Have 27 stations

- 12 land stations
- 10 Marine stations
- 4 Agriculture stations
- 1 Mobile station

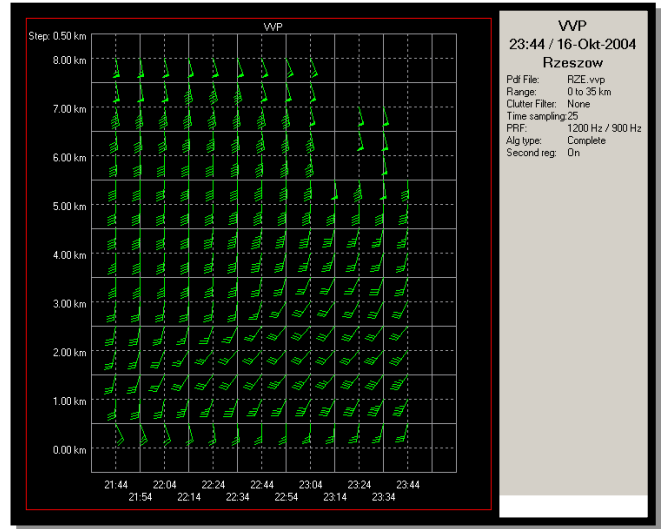
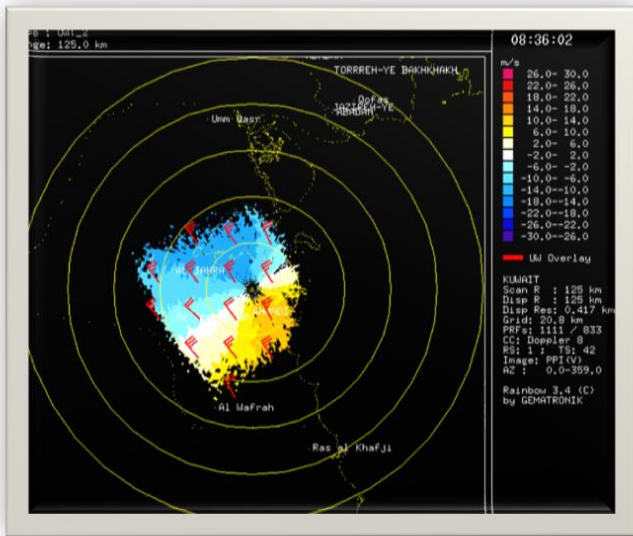


Weather Radar

- Doppler weather radar was installed 2000 .
- It is updated to Dual-Polarization Weather Radar 2014

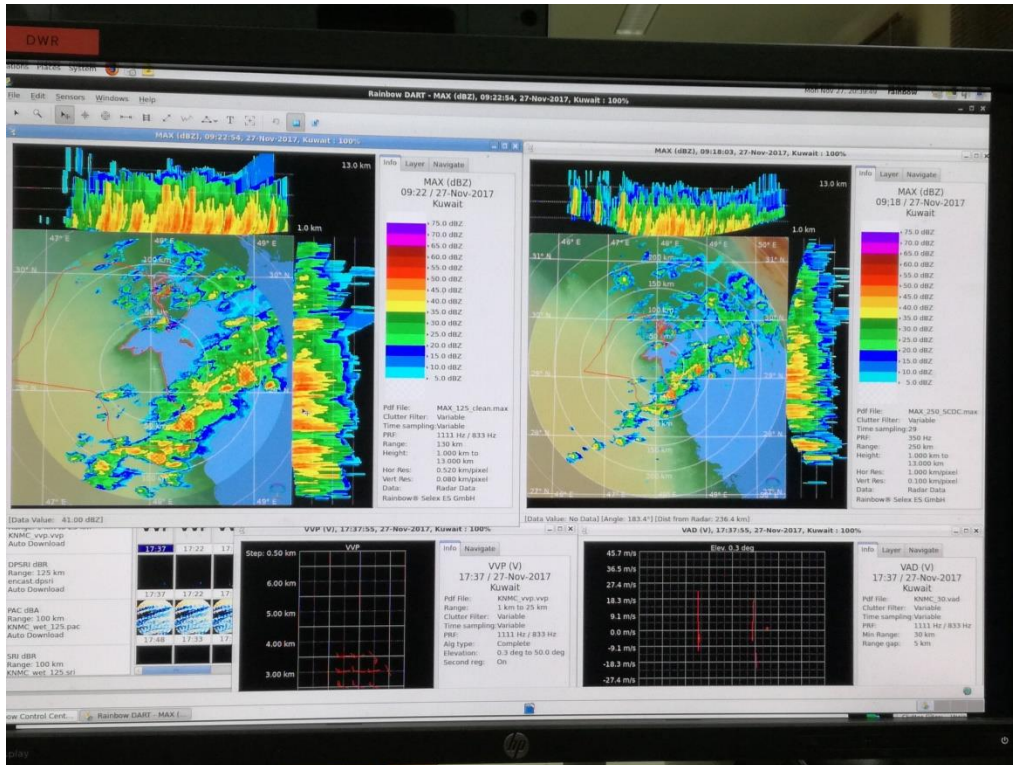


- RADAR PRODUCTS



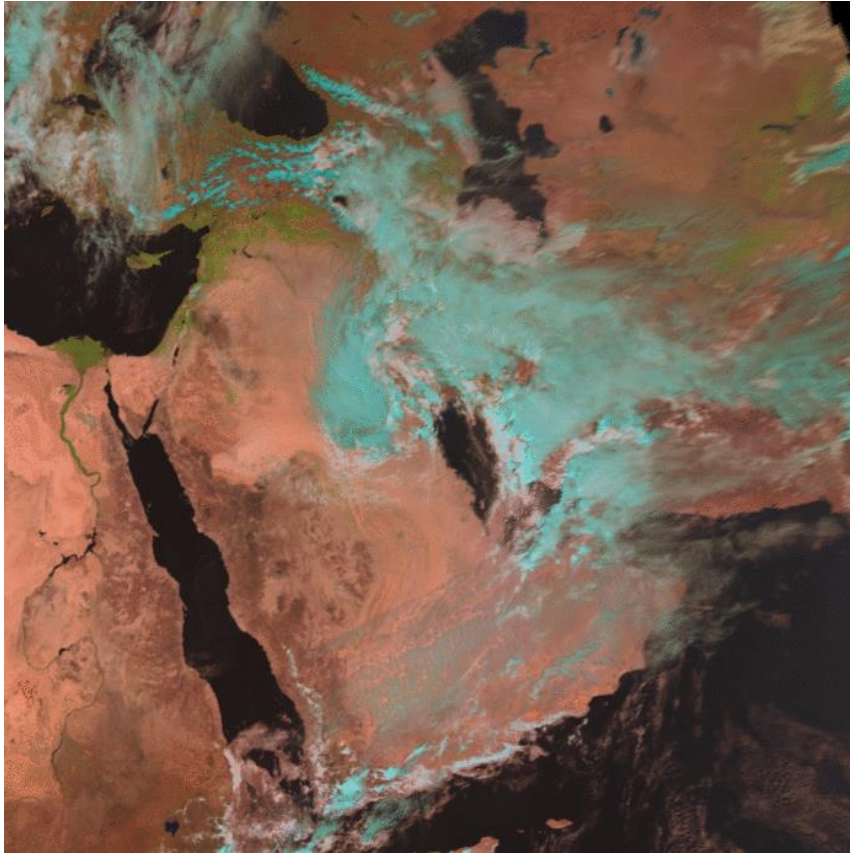
Vertical wind speed and direction

Horizontal win speed and direction



Clouds: Range 250 km and 130 km

Satellite imagery system



- Kuwait Meteorological Department has the most infrastructures necessary to provide weather, climate, hydrological and related environmental services for the protection of life and property, economic planning and development, and the sustainable use and management of natural resources. In addition, we produce daily weather reports and weather warning in case of dangerous phenomena includes heavy rains and flash flood that cause damage infrastructure and danger on human safety, on our site www.met.gov.kw. And as fax reports for official sites, also in social media and phone applications.

- Rain and flash floods in Kuwait

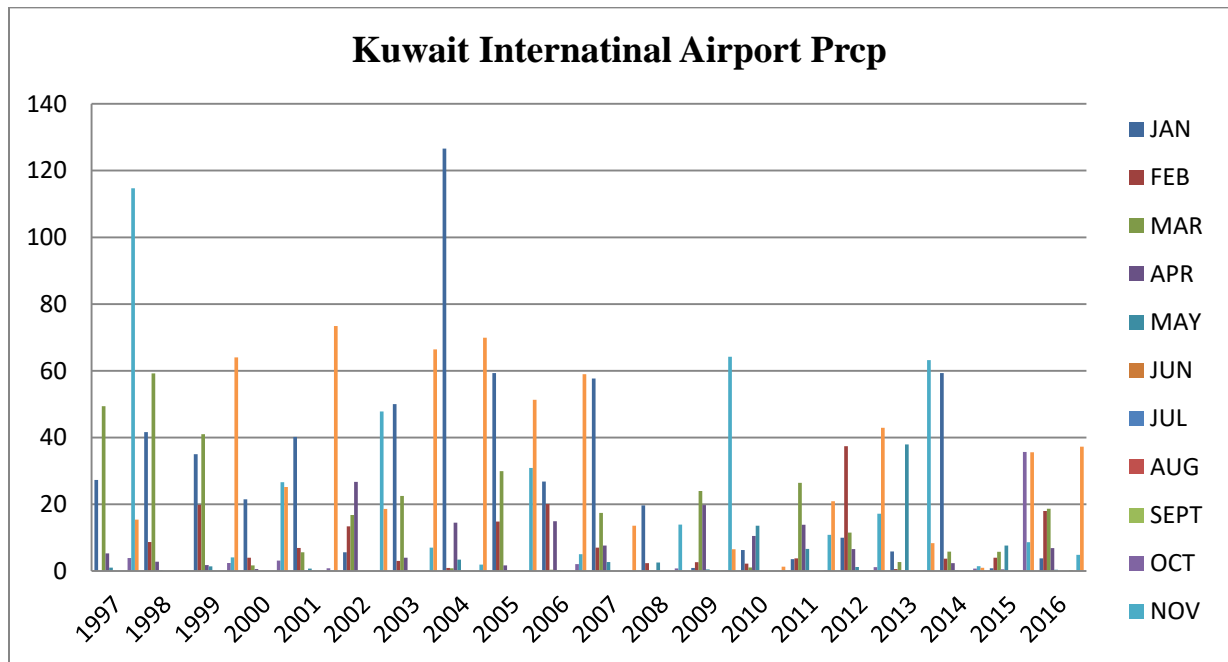
In general, rainfall is concentrated in Kuwait during the winter months, especially during the months of November, December and January, no rain in summer (Jun, July and August) and the temperature may be more than 50C°.

The quantities and times vary from place to place in Kuwait.

In general, rainfall is low and cannot be leads to formation of rivers or relied upon in the process of agriculture except in limited areas, but only benefit from the part that leaks into the groundwater.

Heavy rain affects only populated areas where urbanization affects soil surface changes, which helps in the surface runoff rainwater and causes problems on roads, especially highways, paved roads, tunnels and bridges, which sometimes endanger lives, causing disruption of roads, sinking cars(as we can see in the next photos)

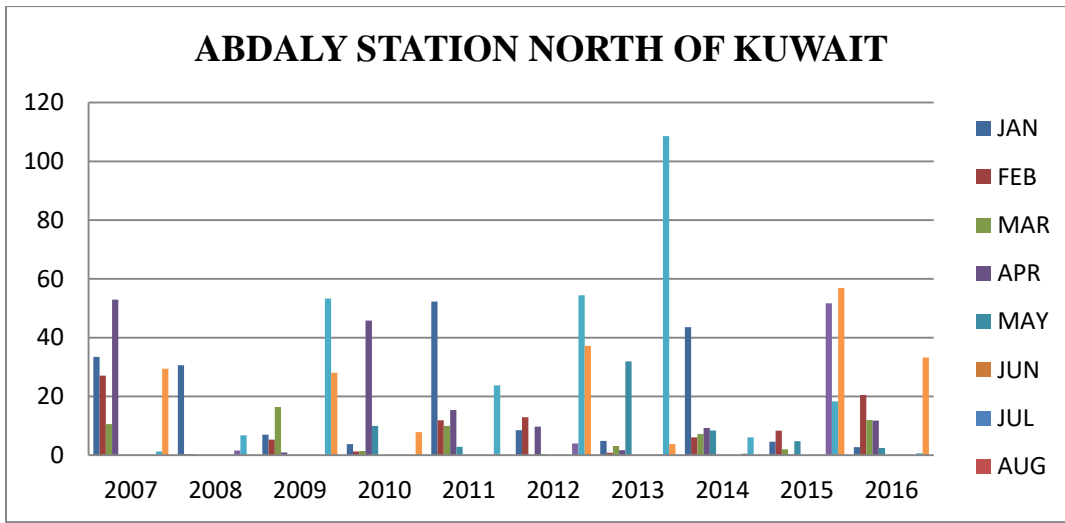
The following graphs show rainfall amounts and seasons on selected stations of the regions of Kuwait



Monthly Precipitation of Kuwait airport station

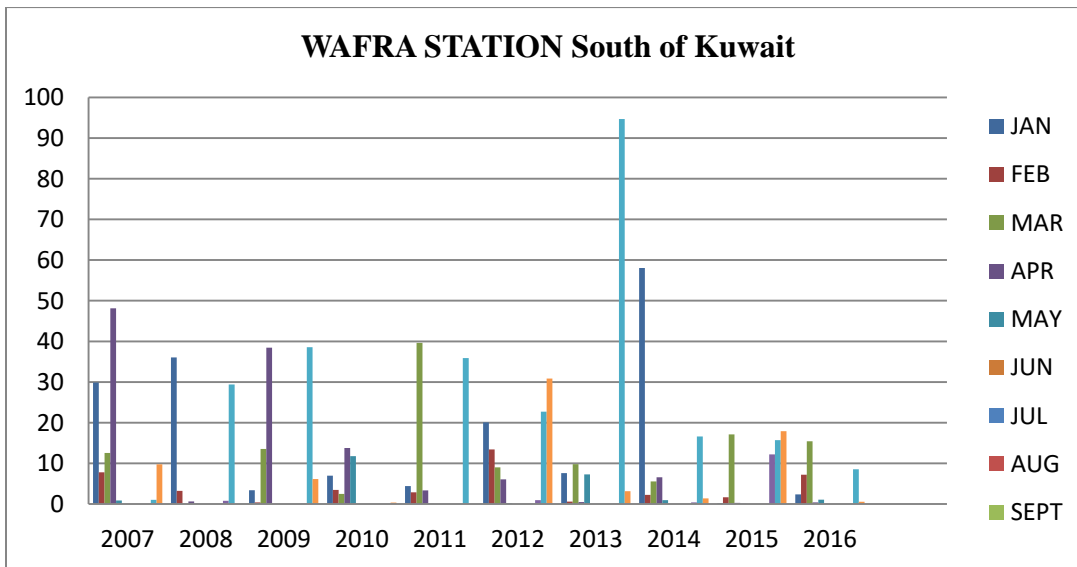
Monthly Precipitation of Kuwait airport station from climate data base through 20 years:-

We can see from the chart that the rate of precipitation mostly dry but we can see few years have a high rate of precipitation specially as in November1997 and January 2004 , we had more than 120 mm in one station and we had flash flood in the urban areas (1997 and 2004).



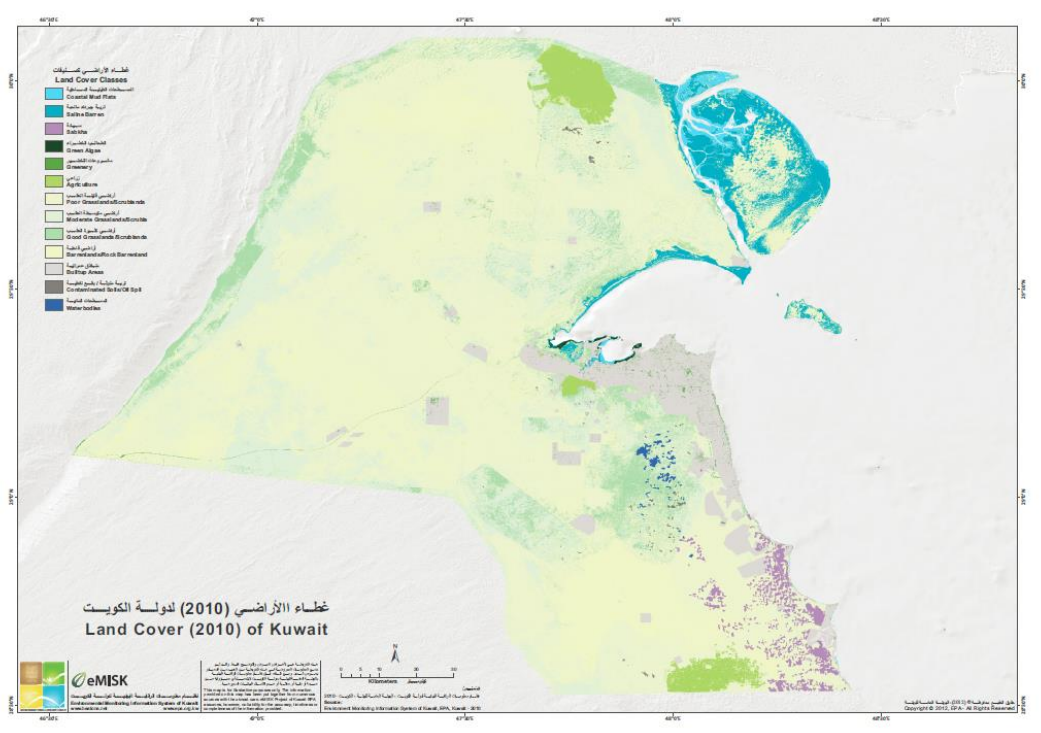
Monthly Precipitation of Abdaly station north of Kuwait

- We can note only one peak in November 2013 more than 100mm through 10 years.



Monthly Precipitation of Wafra station south of Kuwait

- We can note only one peak in November 2013 more than 90mm through 10 years.



Land cover(2010) of Kuwait (Very small areas in north and south of Kuwait) Areas cultivated in green (only in Abdely and Wafra



We can see from this photo that, the effect of heavy rain is only on the road



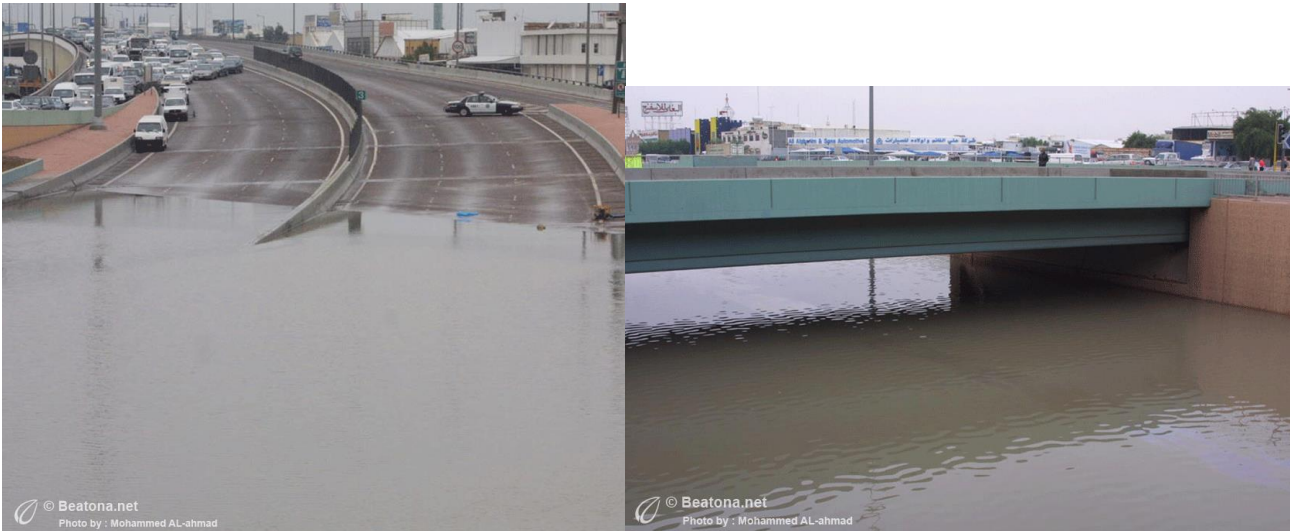
Al - Sabahiyah Kuwait today 24-3-2017



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Snapchat: ABDULLAH_ASIDAN
Twitter: ABDULLAH_ASIDAN

الطريق الساحلي - مقابل هيلتون المنقف
الجمعة 24/3/2017 #أمطار_الكويت

We can see from this photo that, the effect of heavy rain is only on the road



Tunnels and bridges, disruption of roads.

References

1) From this course:-

a) http://www.meted.ucar.edu/hydro/basic_int/runoff/index.htm

2) Other:-

http://www.beatona.net/CMS/index.php?option=com_content&view=article&id=1113&lang=en&Itemid=84

http://www.beatona.net/CMS/index.php?option=com_content&view=article&id=1702&Itemid=84&catid=37%3Aarticles&lang=ar

http://www.beatona.net/CMS/index.php?option=com_gallery&view=map&Itemid=140&lang=ar

Data base of Meteorological Department in (Directorate General of Civil Aviation) of Kuwait.