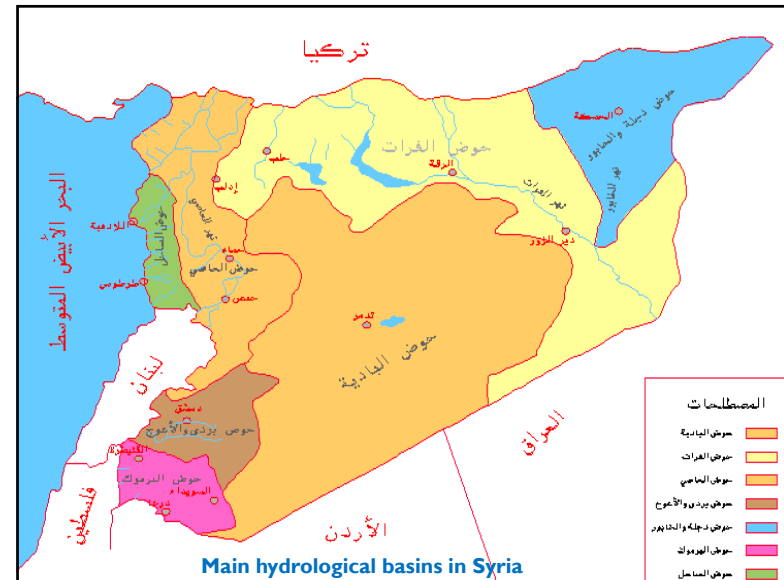
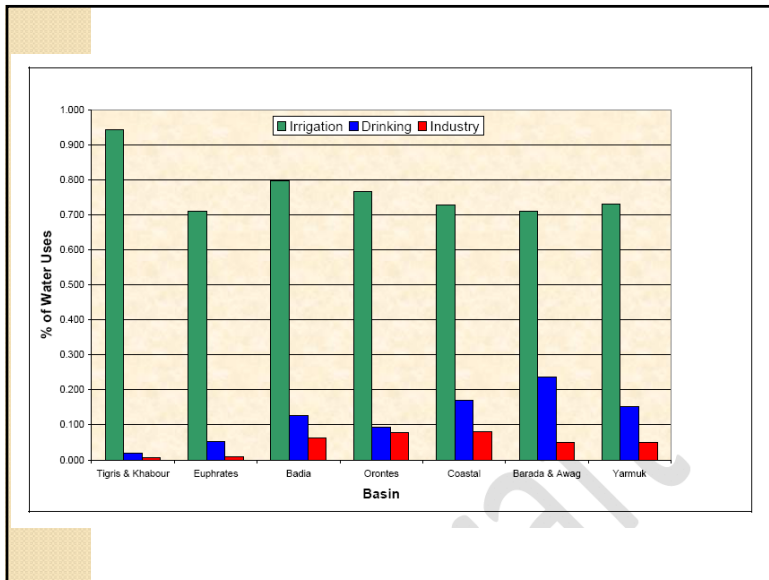


Impact of Climate Change in Syria

Submitted to
The Climate Change Indicators and Renewable Energy in Arab Countries workshop
 Lebanon – Beirut
 23-25 January 2009

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 General Commission for Environment Affairs
 Syria



Water Resources

Precipitation:

- All predictions indicate that climate change **will reduce** the overall amount of rain by **20%** and will increase variability making it much harder to manage.

Climate Change

Climate change studies indicate that Syria and Eastern Mediterranean countries will experienced **extreme weather events**.

- **Changes in precipitation**, combined with:
- **Rising atmospheric temperature** and
- Reduced snow cover.
- **Water quality and quantity**, requiring water managers to incorporate climate change in their water policy .

Water Resources

Precipitation:

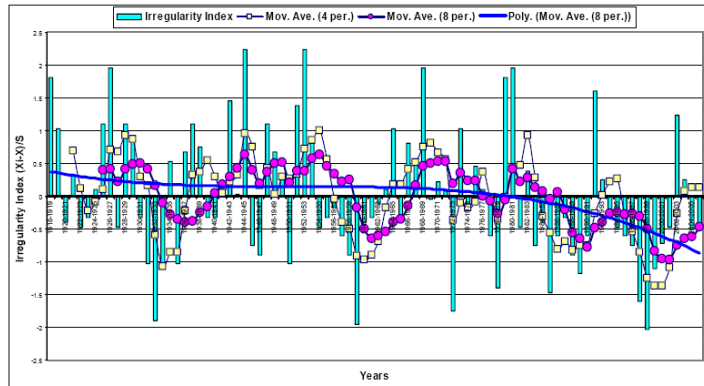
- The higher value of about **360mm** , was observed in **1945** and **1953** and the lowest **60mm** was in **1999** .
- There is some equilibrium between wet and dry years, but it seems that there is **some trend towards the drought** in the region starting from **1982** .

Water Resources

Precipitation:

- A recent study , 2007 of the rainfall variability on **Damascus** meteorological station from **1919** to **2006** shows:
- The annual average of rainfall for the station is **212** mm .

Rainfall Precipitation of Damascus

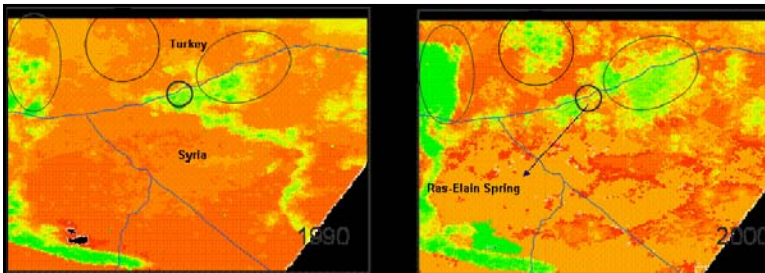


The irregularity of rainfall precipitation of Damascus station
Mov. Moving average 4, and 8 years – Poly : polynomial line 3rd. degree(Abou Zakhem and als. 2007)

Water Resources

Precipitation:

- In conclusion : the annual average will be about **180 mm** within the **coming 25 years**.



Satellite images showing agriculture development(green areas) in Turkish and Syrian side between 1990 to2000 (ACSAD,2002).

due to over pumping from the aquifer feeding the springs from both sides (Turkish and Syrian) for irrigation development ,the discharge of the spring and consequently the river flow has decreased to almost null (fig.7).In this figure we can see that decreasing in the discharge has started really in the 1990.

Water Resources

Surface Water:

- Climate change may reduce Euphrates and Tigris flow 30-50% (ESCWA, 2008)

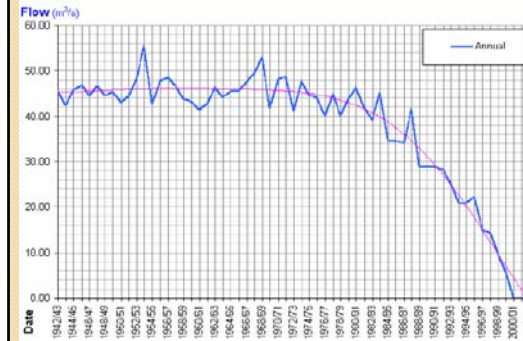
Water Resources

Ground Water:

ANNUAL DISCHARGES OF KHABOUR RIVER AT RAS AL AIN

وسطى التصريف السنوية لنهر الخابور من 1942 حتى 2001

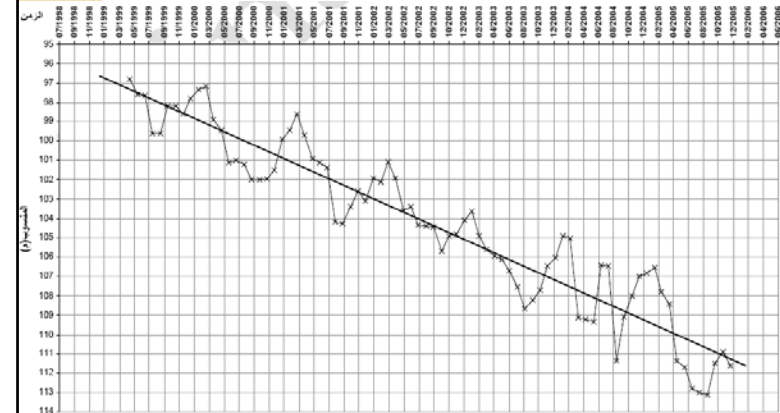
المعدل الوسطي السنوي لإخفاض تصريف نهر الخابور للتغيرات التالية:



Annual discharge of Khabour river at Ras El Ain (IFAD,MAAR,2004)

Water Resources

- Limited water supplies due to climate change would restrict agricultural productivity and threaten the food security in Syria.



بنز مراقبة لمناسيب المياه الجوفية بالقرب من القامشلي (وزارة الزراعة والاصلاح الزراعي والصندوق الدولي للتنمية الزراعية ٢٠٠٤) .

Agriculture

- The climate changes will result in increasing water use by about 9.1%, 9.6 %, 8.2 % , and 10% for irrigated wheat, rained wheat, cotton, and olive tree , respectively, compared with crop water use under current conditions.

Agriculture

- A recent study undertaken for assessing the impact of climate change on main crops grown in Syria shows:
- By the year 2099 the temperature is expected to increase in Syria between 2.6 °C and 4.1 °C.
- At the same time rainfall is expected to decrease between 6 and 24 %
- This change in climate will have substantial impact on agricultural production in the country.

Syrian forests

- It is expected that the Mediterranean forest ecosystems are among the forest ecosystems that are most affected by climate changes.
- It is widely accepted that increases in atmospheric temperature by 2 oC will lead to substantial changes in plant cover. These changes will include:
 - desert expansion.
 - Savannah expansion at the expense of maquis, and
 - increases in the areas occupied by deciduous broad-leave forests at the expense of conifers forests (Climate change, 2007)

Agriculture

- At the same time, increasing temperature and reducing precipitation under climate change conditions will cause yield reduction, by about 10 %, and 14 %, 5 %, 5% for irrigated wheat, rained wheat , cotton, and olive tree

Adaptation Policies and Measures

- No extension in irrigated areas up to the year 2027
- A national programme to promote modern irrigation and assist irrigation water users to convert their inefficient traditional on-farm irrigation systems to advanced modern systems has been launched.
- Only 13% of the traditional systems have been converted to modern irrigation since 2001, despite extensive efforts over the last decade.

Adaptation Policies and Measures

- According to the recent national water strategy adopted for the country water security is considered as one of major concerns.

Recommendations

- Water policy should focus on demand management rather on supply management
- This means more efforts are needed regarding the enforcement of water legislation, awareness, integration of land and water management through the implementation of integrated water resources management concept (IWRM).

Adaptation Policies and Measures

- Changing crop types and introducing more efficient irrigation systems can provide significant win – win options for water conservation to offset the projected impacts of climate change in the country .

Recommendations

- **Even in urban areas, the poor live in marginal settlements which is lacking most of the time the necessary infrastructure (sewage system ,drinking water network) which expose them to floods, and make them more vulnerable to climate change . Adaptation measures should also take into consideration livelihood needs of the poor in these areas .**

Recommendations

- **The poor usually are the most vulnerable to the effects of climate change and have the least means to adapt. Therefore, the top priority for adaptation in the water sector would be the reduction in the vulnerabilities of people (particularly the poor and disadvantaged) living mainly in rural areas(about 50% of the Syrian population) and has as main activity the agriculture.**
- **This means that in Syria ,this sector which utilize more than 80% of the total water withdrawals annually will be the most vulnerable to climate change impacts.**