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

Impacts of climate change on agricultural productivity in selected crops

اثر التغيرات المناخية في إنتاجية بعض المحاصيل الزراعية

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

Climate Change Adaptation Solutions for the Green Sectors NENA Region

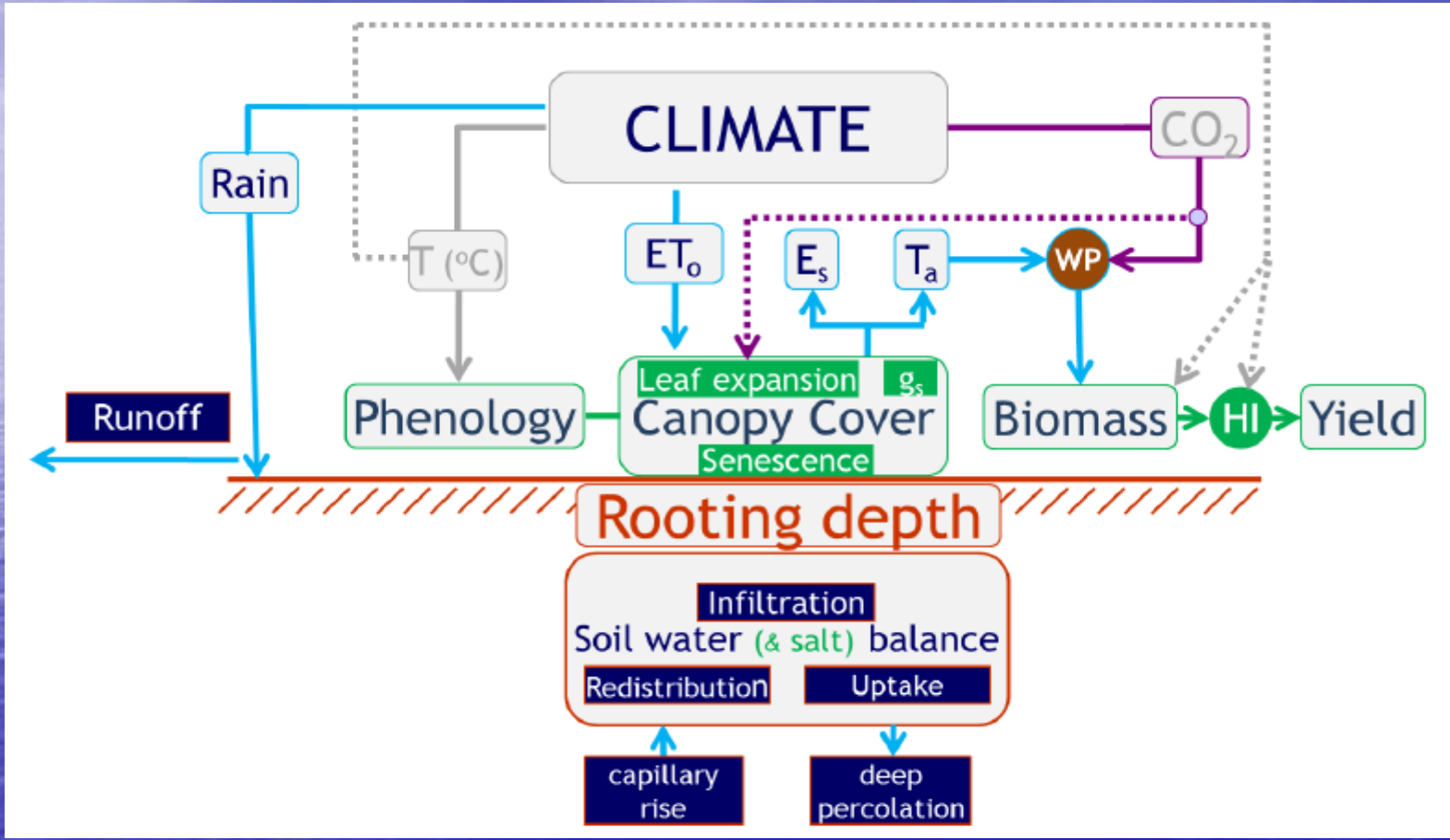
ACCWAM

- This project implemented in a partnership among GIZ , FAO, ACSAD, and ESCWA

pilot area

- North Delta of Egypt, Irrigated agriculture zone
- Karak governorate of Jordan, Rainfed agriculture
- Orontes watershed-Lebanon, Mixed agriculture

AquaCrop model

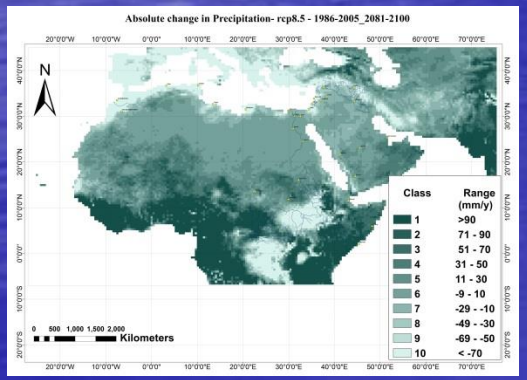


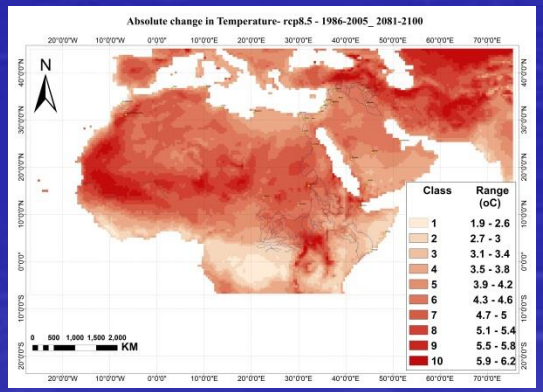
Developed by FAO

Dirk RAES, Pasquale STEDUTO, Theodore C. HSIAO, and Elias FERERES

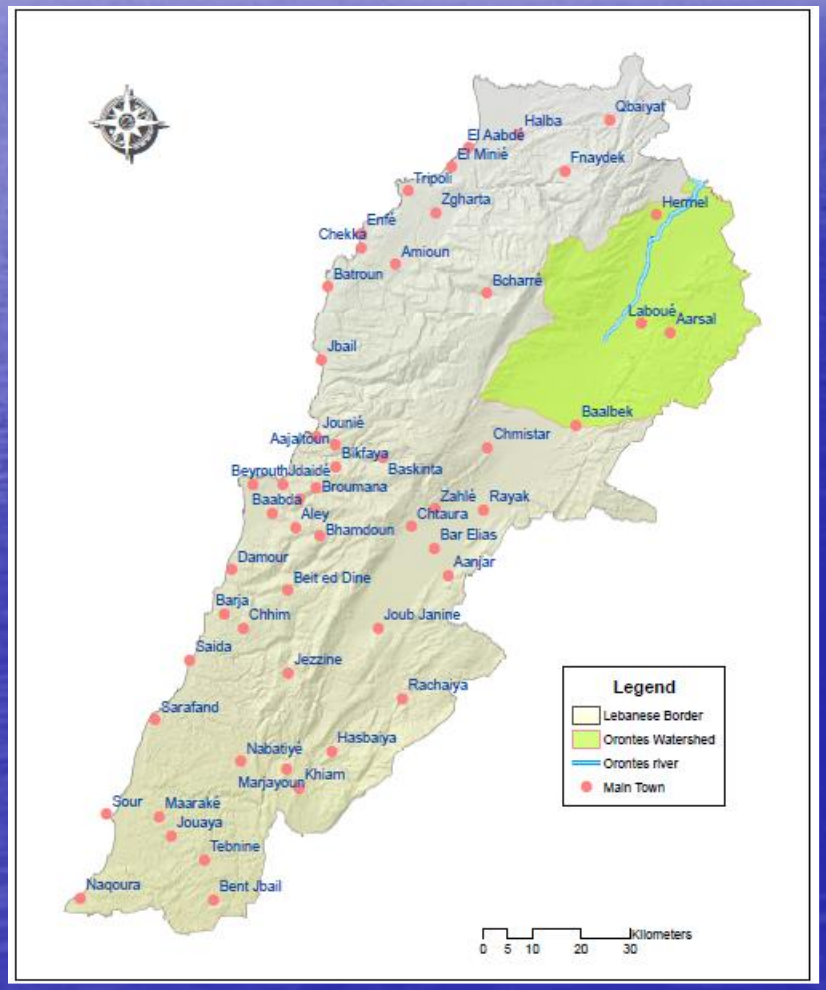
Climate change data from RICCAR outputs

- **Change in Temperature :** daily temperature for three Rcp4.5 and RCP8.5 projection
- **Change Precipitation :** daily precipitation for three Rcp4.5 and RCP8.5 projection





Orontes Watershed (Lebanon)



Projected Climate change in _Orontes watershed –Lebanon

RCP4.5

	At the mid-of century	at the end of the century
	2046-2065	2081-2100
Precipitation (mm)	2.3	-33.1
Maximum temperature (ºC)	1.6	2.0
Minimum temperature (ºC)	1.3	1.5

RCP8.5

	At the mid-of century	at the end of the century
	2046-2065	2081-2100
Precipitation (mm)	-26.1	-50.7
Maximum temperature (ºC)	2.2	4.3
Minimum temperature (ºC)	1.7	3.4

Impact on the yield of eggplant

Average baseline yields of eggplant and predicted average change in it according to the RCP4.5 scenario without inclusion of elevated CO2 effects

	Average change at midcentury (2046-2065)	Average change at the end of the century (2081-2100)
Baseline Yield (ton/ha)	1.42	
Absolute change (Ton/ha)	-0.1	-0.2
Relative change (%)	-9.4	-13.3

Change in growth cycle

the duration of growth cycle of eggplant at the baseline (1986,2005) , mid centaury (2046-2065), and at the end of the century under RCP4.5 scenario

	Baseline 1986-2005	mid centaury 2046-2065	end of the century 2081-2100
Duration of the growth cycle (days)	118	104	101

14 days

17 days

impact of climate Change on eggplant water requirement

the reference Evapotranspiration and actual Evapotranspiration of eggplant at the baseline (1986,2005) , mid centaury (2046-2065), and at the end of the century under RCP4.5 scenarios

	Baseline 1986-2005	mid centaury 2046-2065	end of the century 2081-2100
Reference Evapotranspiration (mm)	673.0	633.1	623.8
Actual Evapotranspiration of eggplant (mm)	465.4	-6.3% 436.0	-6.8% 426.4

Impact on the yield of eggplant

Average baseline yields of eggplant and predicted average change in it according to the RCP8.5 scenario without inclusion of elevated CO2 effects

	Average change at midcentury (2046-2065)	Average change at the end of the century (2081-2100)
Baseline Yield (ton/ha)	1.42	
Absolute change (Ton/ha)	-0.1	-0.3
Relative change (%)	-9.8	-27.3

Change in growth cycle

the duration of growth cycle of eggplant at the baseline (1986,2005) , mid centaury (2046-2065), and at the end of the century under RCP8.5 scenario

	Baseline 1986-2005	mid centaury 2046-2065	end of the century 2081-2100
Duration of the growth cycle (days)	118	102	86

16 days

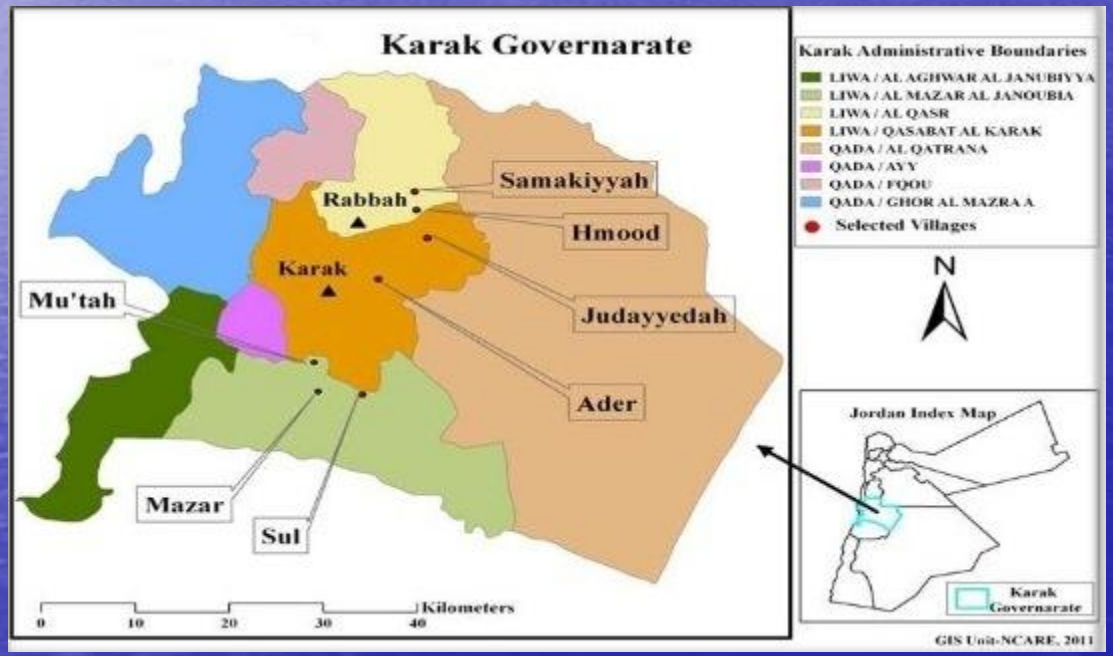
32 days

impact of climate Change on eggplant water requirement

the reference Evapotranspiration and actual Evapotranspiration of eggplant at the baseline (1986,2005) , mid centaury (2046-2065), and at the end of the century under RCP8.5 scenarios

	Baseline 1986-2005	mid centaury 2046-2065	end of the century 2081-2100
Reference Evapotranspiration (mm)	673.0	622.8	592.6
Actual Evapotranspiration of eggplant (mm)	465.4	-8.6% 425.4	-18.9% 377.6

Karak governorate of Jordan



Projected Climate change at Karak governorate

RCP4.5

	At the mid-of century	at the end of the century
	2046-2065	2081-2100
Precipitation (mm)	-10.0	-27.9
Maximum temperature (ºC)	1.3	1.7
Minimum temperature (ºC)	1.1	1.4

RCP8.5

	At the mid-of century	at the end of the century
	2046-2065	2081-2100
Precipitation (mm)	-27.7	-47.2
Maximum temperature (ºC)	1.9	3.6
Minimum temperature (ºC)	1.6	3.1

Assessing the impact of climate change on Rainfed wheat at Karak governorate

Impact on the yield of wheat

Average baseline yields of wheat at Karack Governorate and predicted average change in it according to the RCP4.5 scenario without inclusion of elevated CO2 effects

	Average change at midcentury (2046-2065)	Average change at the end of the century (2081-2100)
Baseline Yield (ton/ha)	1.41	
Absolute change (Ton/ha)	-0.02	-0.20
Relative change (%)	-1.5	-15.5

Impact on the yield of wheat

Average baseline yields of wheat at Karack Governorate and predicted average change in it according to the RCP8.5 scenario without inclusion of elevated CO2 effects

cnrm	Average change at midcentury (2046-2065)	Average change at the end of the century (2081-2100)
Baseline Yield (ton/ha)	1.41	
Absolute change (Ton/ha)	-0.1	-0.8
Relative change (%)	-5.2	-55.3

Number of failure years

	Baseline 1986-2005	mid centaury 2046-2065	end of the century 2081-2100
Number of failure year	3	6	8

North Delta of Egypt

Projected Climate change at North Delta of Egypt

RCP4.5

	At the mid-of century	at the end of the century
	2046-2065	2081-2100
Precipitation (mm)	-4.2	-0.9
Maximum temperature (ºC)	1.1	1.4
Minimum temperature (ºC)	1.1	1.4

RCP8.5

	At the mid-of century	at the end of the century
	2046-2065	2081-2100
Precipitation (mm)	-9.2	-10.0
Maximum temperature (ºC)	1.5	2.9
Minimum temperature (ºC)	1.6	3.0

Impact on the yield of wheat

Impact on the yield of wheat

Average baseline yields of wheat and predicted average change in it according to the RCP4.5 scenarios without including elevation of atmospheric CO2 concentration

cnrm	Average change at midcentury (2046-2065)	Average change at the end of the century (2081-2100)
Baseline Yield (ton/ha)	6.50	
Absolute change (Ton/ha)	-0.3	-0.4
Relative change (%)	-4.1	-5.7

Impact on the yield of wheat

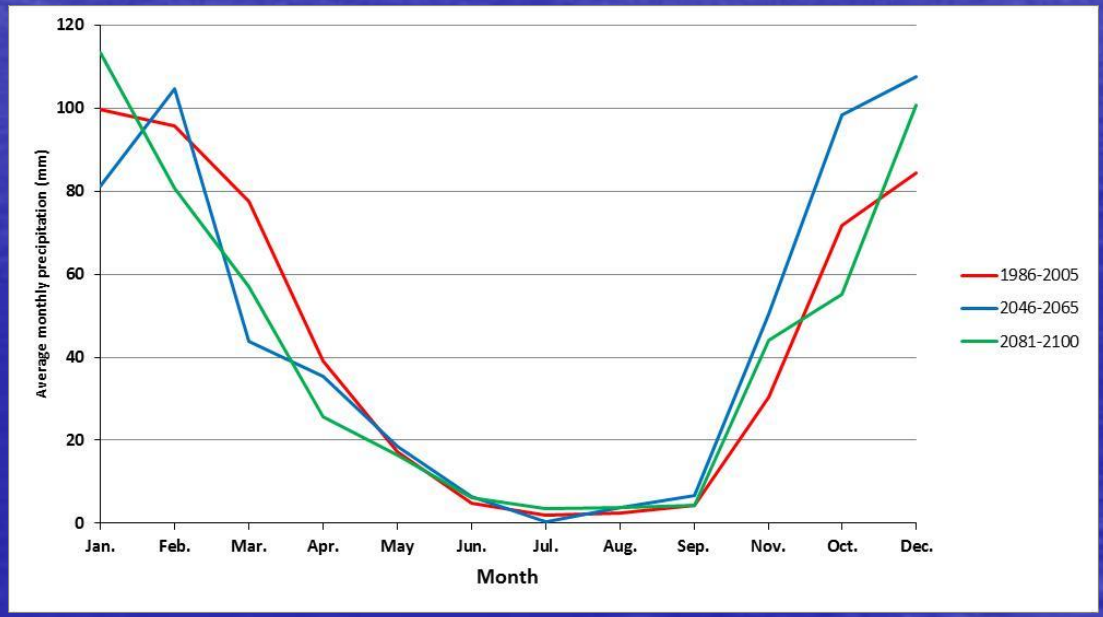
Average baseline yields of wheat and predicted average change in it according to the RCP8.5 scenarios without including elevation of atmospheric CO2 concentration

	Average change at midcentury (2046-2065)	Average change at the end of the century (2081-2100)
Baseline Yield (ton/ha)	6.25	
Absolute change (Ton/ha)	-0.4	-0.7
relative change (%)	-4.9	-10.3

adaptation measures

Proposed adaptation measures

– adjust **sowing dates** according to temperature and rainfall patterns,



Proposed adaptation measures

- use **crop varieties** better suited to new climate conditions (e.g. more resilient to heat and drought)

ACSAD developed wheat and barely verities resilient to heat and drought

1- :

تمّ في اكساد استنباط العديد من الأصناف، وتطوير الكثير من السلالات من القمح والشعير المتحملة للإجهادات اللاأحيائية (الجفاف، والحرارة المرتفعة، والملوحة، والصقيع)، والمقاومة للإجهادات الأحيائية (الأمراض، والحشرات)، وعالية الإنتاجية.

Proposed adaptation measures

- Apply conservation agriculture:
  - Minimum tillage + land cover + crop rotation
  - CA increase soil moisture and OM content

Water harvesting

تعزيز الأمن الغذائي والمائي من خلال التعاون وتنمية القدرات في المنطقة العربية

تقييم آثار تغير المناخ وتقلبات وفرة المياه على الإنتاج الزراعي في الدول العربية

- الجهات المتعاونه : FAO - ACSAD - ESCWA
- يهدف المشروع الى بناء قدرات الدول العربيه في مجال تقييم اثر التغيرات المناخيه على إنتاجية المحاصيل الزراعيه

الأنشطة التي سيتم تنفيذها:

- إعتماد منهجية التقييم التي تم تطويرها بناءً على نتائج النماذج المناخية ونموذج تقييم الانتاج الزراعي (AquaCrop)
- تحديد فرق العمل الوطنية المشتركة (قطاعي الزراعة والمياه)
- التدريب والإشراف وتقديم الدعم الفني للفرق الوطنية

المخرجات المتوقعة (خلال المشروع):

دراسات تقييم وطنية

المخرجات المتوقعة (بعد المشروع):

سياسات تكيف مناسبة على المستوى الوطني والإقليمي

Thanks