



**International
Finance Corporation**
World Bank Group

Climate Change and Agriculture in Europe and Central Asia

Implications and Opportunities for the Private sector

Patrick Avato

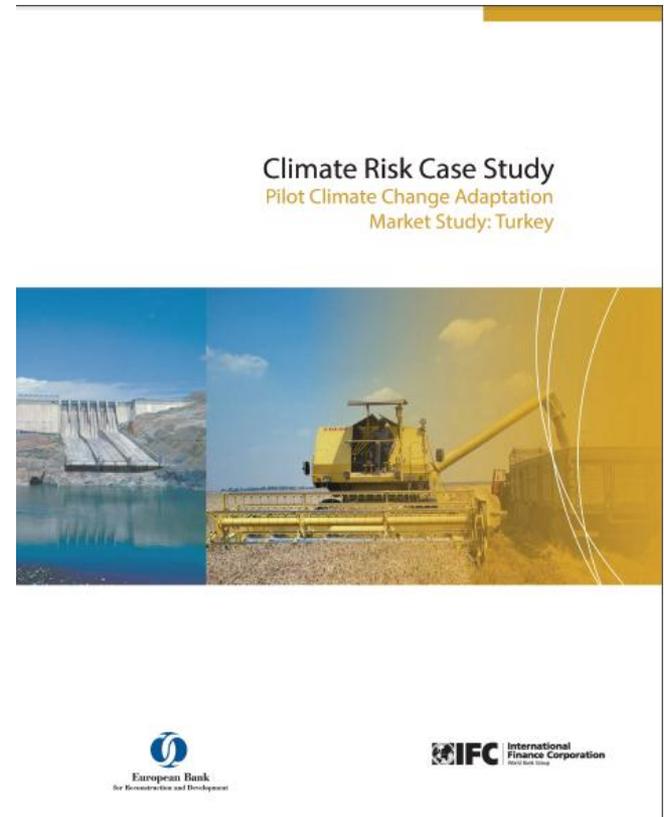
Lead, Climate Business

Europe & Central Asia

EastAgri | Belgrade | 19 June 2014

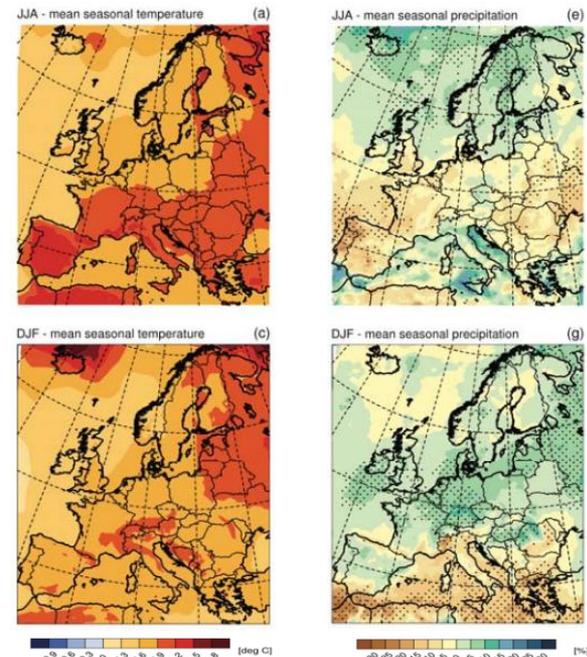
Climate Change and Agriculture in ECA

- What effect is climate change expected to have on agriculture and food production in ECA?
- What are the options for adaptation?
- Are these options financially viable?



Projected Climate Changes in Europe during 2020s

- **Significantly higher temperatures** during summer (**0.9-1.5 °C**) and winter (**0.3-1.2 °C**).
- **Changing precipitation patterns** with significant decreases during summer (**-20% to 0%**) and significant increases during winter (**0 to 15%**) in most of the region.
- **Increase in extreme weather events**, including storms, floods, droughts etc.
- Overall, **complex effects interactions between temperatures and precipitation patterns**: Rainfall, evaporation, groundwater infiltration, snowfall and melting of glaciers etc.

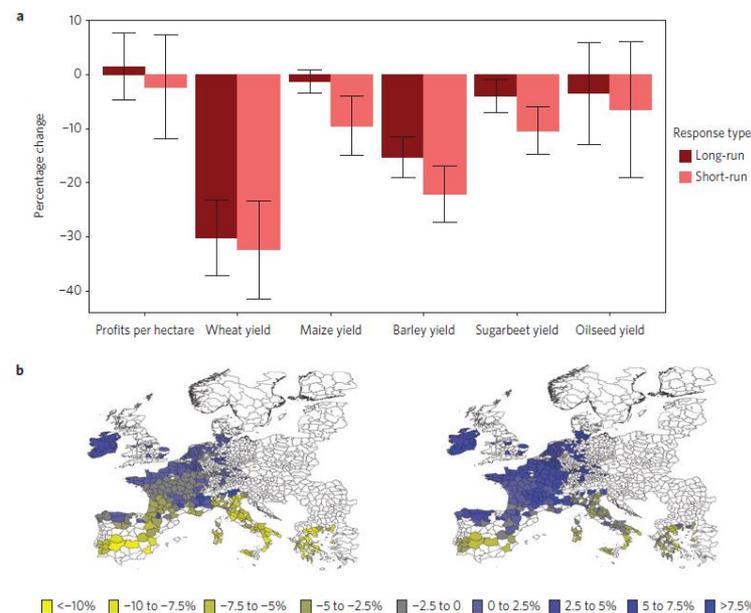


European-scale projections from the ENSEMBLES regional climate modelling project for 2016-2035 relative to 1986-2005, with top and bottom panels applicable to JJA and DJF, respectively. For precipitation, projected changes (%) are displayed in terms of ensemble mean changes of (e, g) mean seasonal precipitation.

IPCC. Working Group I Fifth Assessment Report. The physical Science Basis.

Climate Change Effects on Agriculture

- Three effects on yields/cost of production:
 1. Direct climate effects: e.g. shorter or longer growing seasons
 2. Indirect climate effects: pests, storms, droughts etc.
 3. Changes in precipitation: likelihood of short term crop failures (e.g. floods/droughts) and long-term productivity (e.g. irrigation)
- Crops are affected differently:
 - Wheat and barley are very sensitive to temperature, a 2°C warming projected for 2040 results in 15-30% yield reductions.
 - Maize, sugar beet and oilseed yields are less sensitive to temperature, especially if irrigated.
- UN estimates average farm profits across Europe would decline by 2.3% without adaptation, but increase 1.5% with adaptation.



a) Effects of warming on profits and yields. b) Maps of projected changes in farm profit by 2040 (2030-2049 mean) under the A1B scenario for growing regions included in the statistical model. The left map shows projections made using the short-run response function without adaptation and the right shows projections made using the long-run response function that includes private farm-level adaptation.

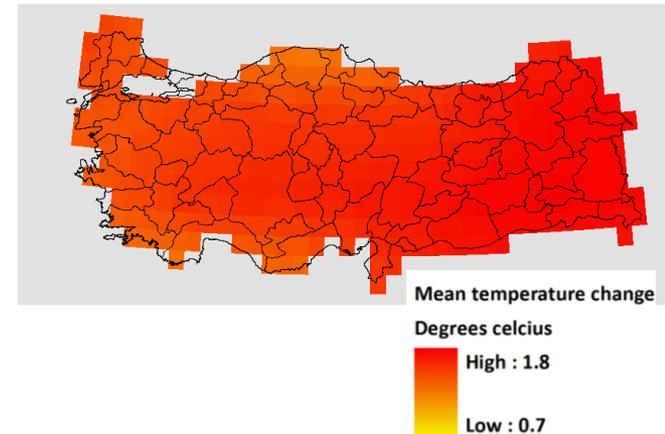
NATURE. "Adaptation potential of European agriculture in response to climate change." 18 May 2014.

What does adaptation mean for the private sector?

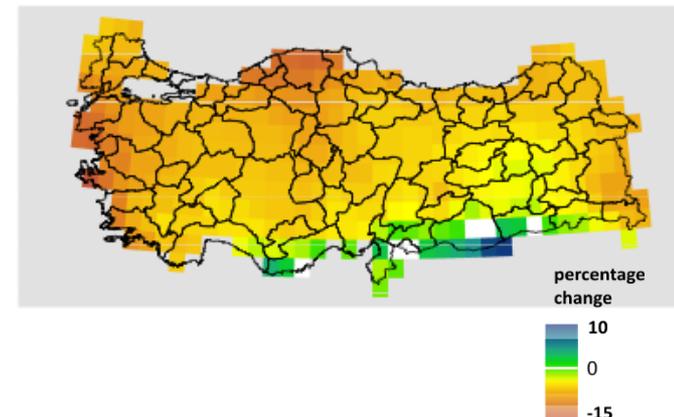
Turkey Case

- IFC together with EBRD conducted the first comprehensive **Climate Change Adaptation Study for Turkey** in 2013 - 120+ firms participated
- **Turkish companies are concerned about climate change** - 70% raised climate change as an issue of “high” or “fairly high” concern for their business, primarily:
 - Availability of sufficient water
 - Impact of warmer and dryer climate
- **But they have little understanding of their options for action** - 65% admit to have little or no understanding of adaptation solutions

June - August



June - August



Investment Options for Climate Resilience

The study reviewed 4 key types of adaptation investments in agriculture

1. Water efficient drip irrigation
2. Re-use/recycling of water
3. Rainwater harvesting
4. Draught-resistant seeds

and assessed their

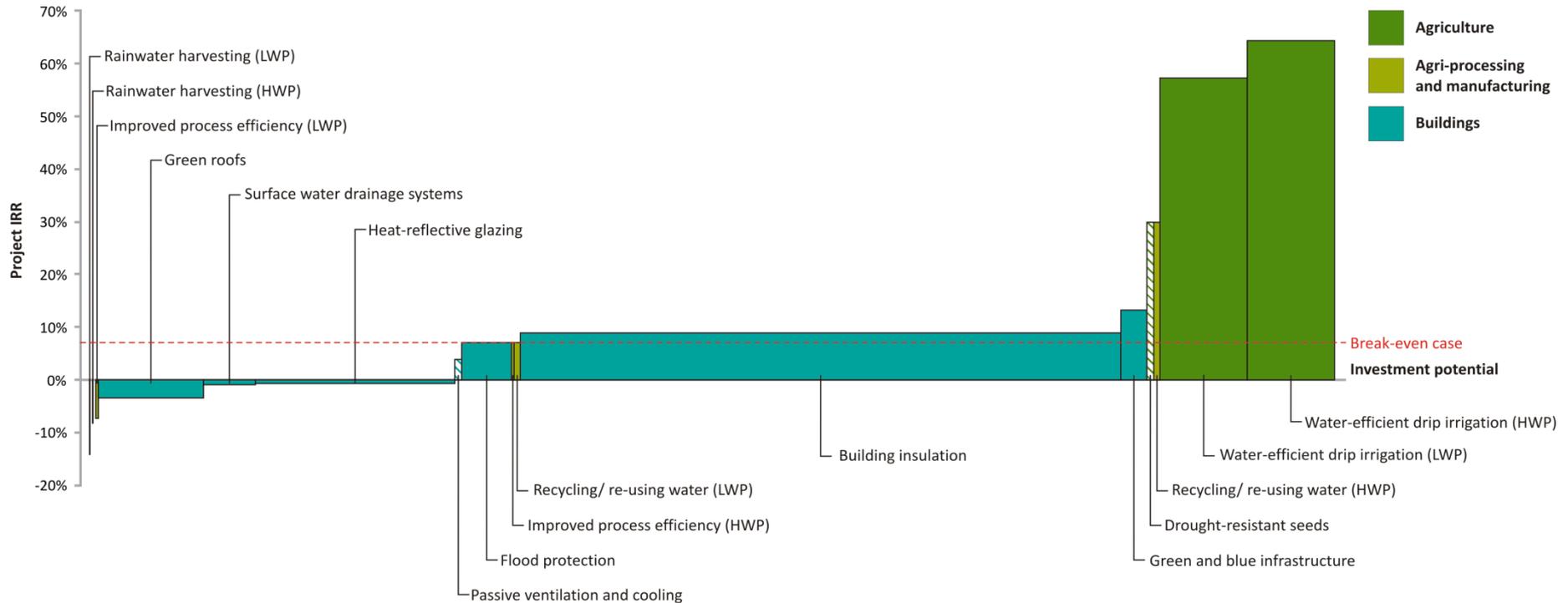
- i) economic viability (IRR) and
- ii) investment potential (market size)

Water constraints are key for the analysis:

- Physical or regulatory limits on water intake
- Cost of water



Summary of market analyses



Summary: Adaptation measures in agriculture

- Investments with a savings / investment ratio close to or above ‘break even’ case (IRR = 7.1%) could be suitable for financing under commercial terms:
 - Water efficient drip irrigation:
 - Low water price IRR = 57.3%
 - High water price IRR = 64.4%
 - Drought resistant seeds IRR = 29.9%
- Potential investment of \$2,520 million p.a. in drip irrigation and \$234 million p.a. in drought resistant seeds.



Summary: Adaptation measures in agri-processing

- Investment performance is highly sensitive to water price:
 - Improved process efficiency
 - Low water price (USD 0.19/m³) IRR = -7.3%
 - High water price (USD 0.29/m³) IRR = 7.2% (break-even)
 - Recycling and reusing process and grey water
 - Low water price (USD 0.11/m³) IRR = 7.2% (break-even)
 - High water price (USD 0.19/m³) IRR = 30.1%



Conclusions

- Climate Change effects on agriculture expected to be significant
 - Higher temperatures, more variable precipitation, extreme weather events
- Technical solution exist and promise attractive investment returns
 - Efficient irrigation, water recycling, drought resistant seeds etc.
- But companies rarely invest in adaptation because of:
 - Limited understanding of solutions and their viability
 - Limited access to finance
 - Other?

→ Role for governments and IFIs?

Thank You!

Climate Risk Case Study
Pilot Climate Change Adaptation
Market Study: Turkey



www.ifc.org/climatebusiness

