Agriculture expansion in Argentina in a context of climate change

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Argentina as a global breadbasket

140 mill. tons (2020)
corn 42%; soybean 35%
wheat 14%

4° corn producer worldwide

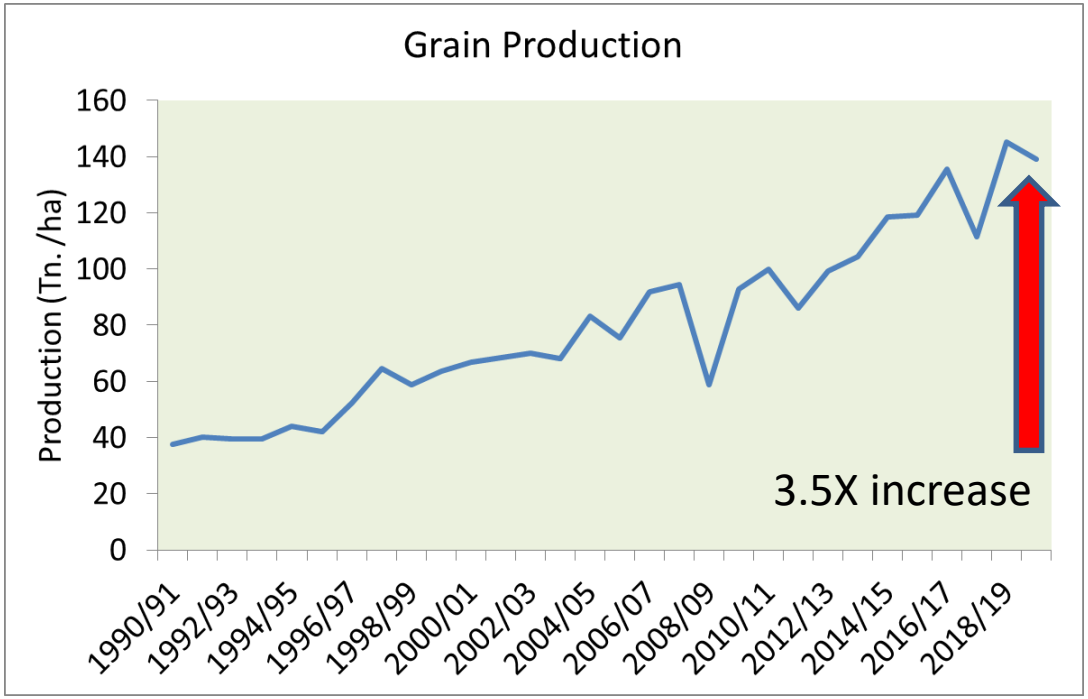
3° soybean producer worldwide

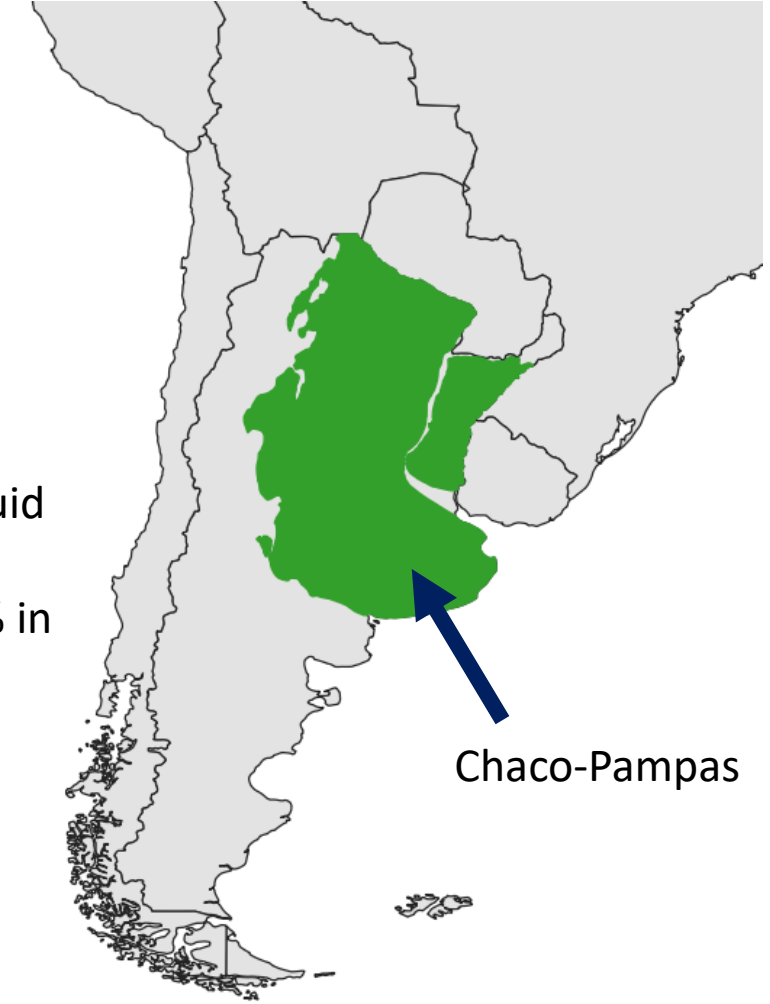
1° exporter of soybean oil
and meal worldwide

The Chaco-Pampas Plain

Particular features of the region:

- **Rainfed agriculture** (irrigation < 3%, vulnerability to drought)
- **Sharp increase in agricultural production**
- **Very flat region** (no clear watershed boundaries; liquid water evacuation constrained)
- **Still preserve large areas of native vegetation** (>50% in Chaco)





MAGyP, 2021

Drivers of grain production expansion

- Technological innovations (e.g. new cultivars, no-tillage)
- Increased rainfall (agriculture now possible in marginal areas)
- Increased global demand and prices of commodities (profitability)
- New infrastructures (e.g. paved roads)

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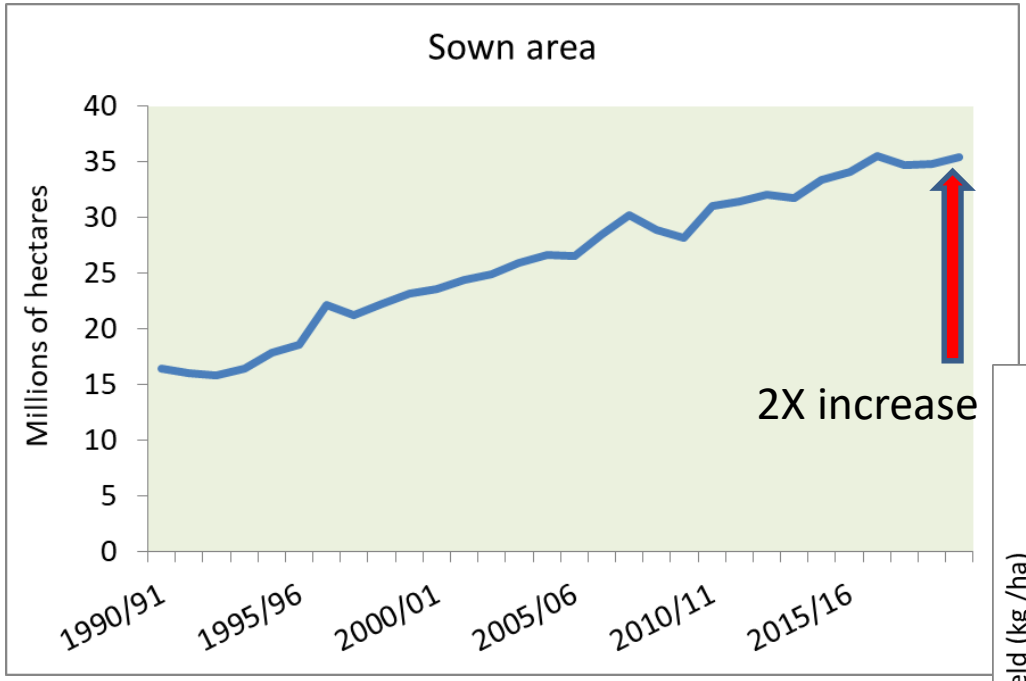
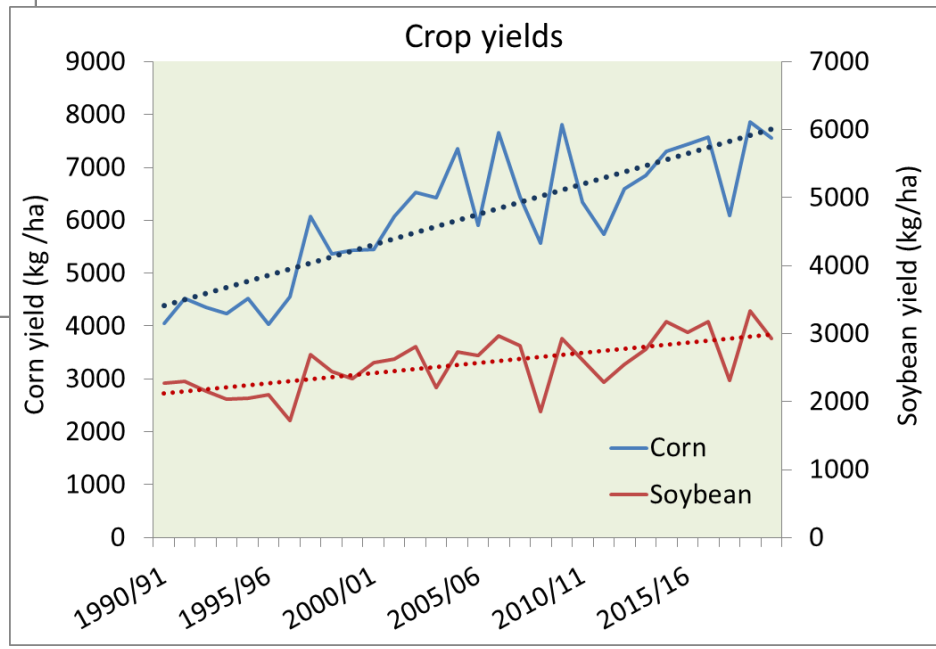
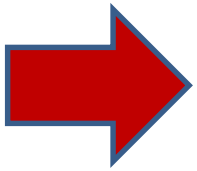




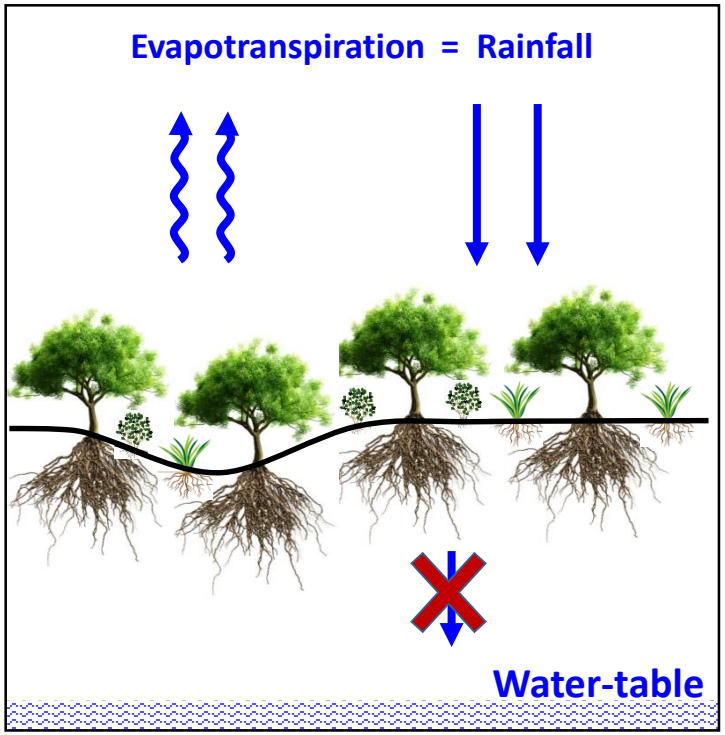
MAGyP, 2021

Hidrological impacts of agriculture expansion

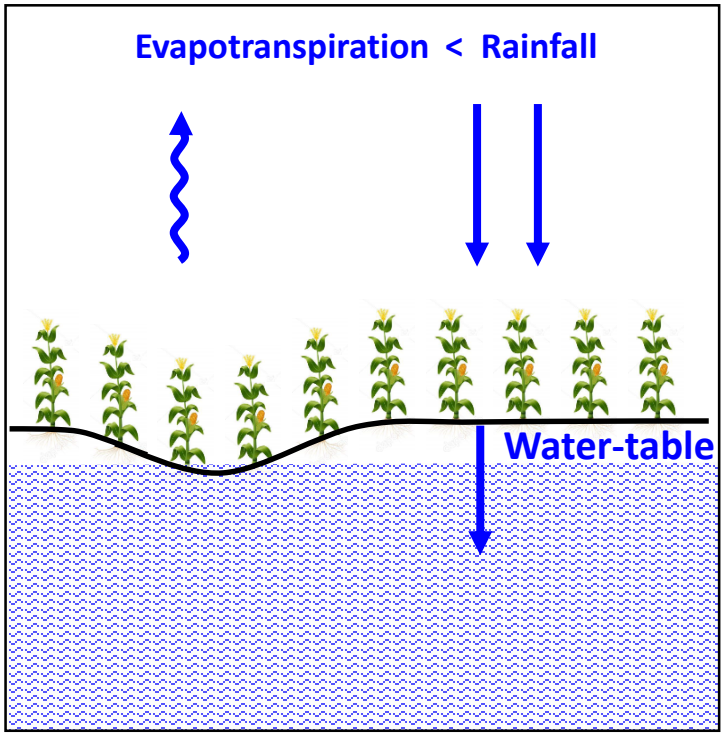


Hidrological impacts of agriculture expansion

Native vegetation

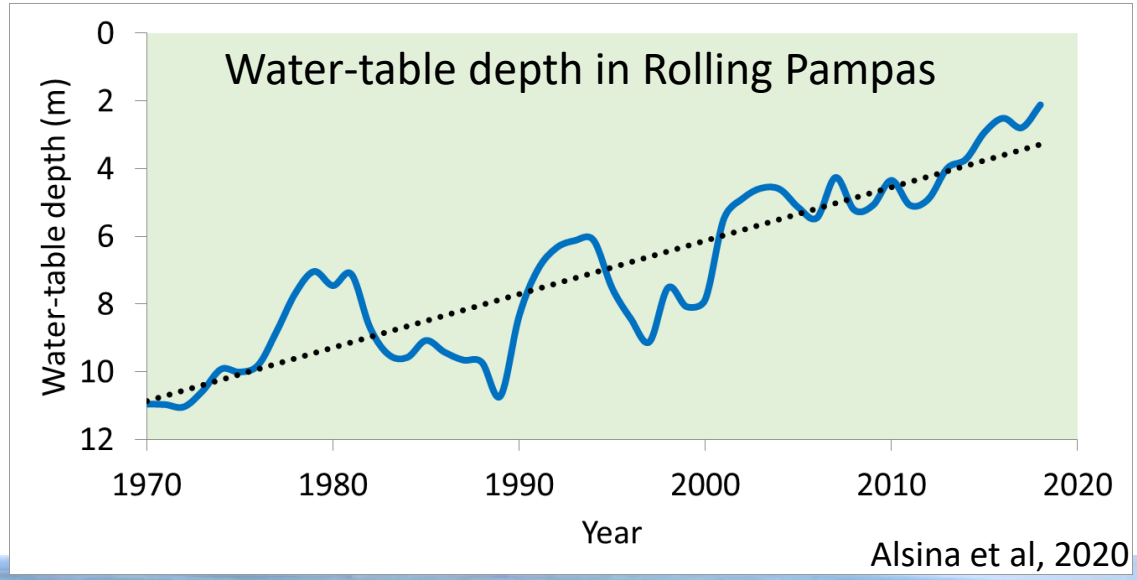


Annual crops



Hidrological processes observed in the region

Shallower water-tables
Flooding
New rivers development
Salinization



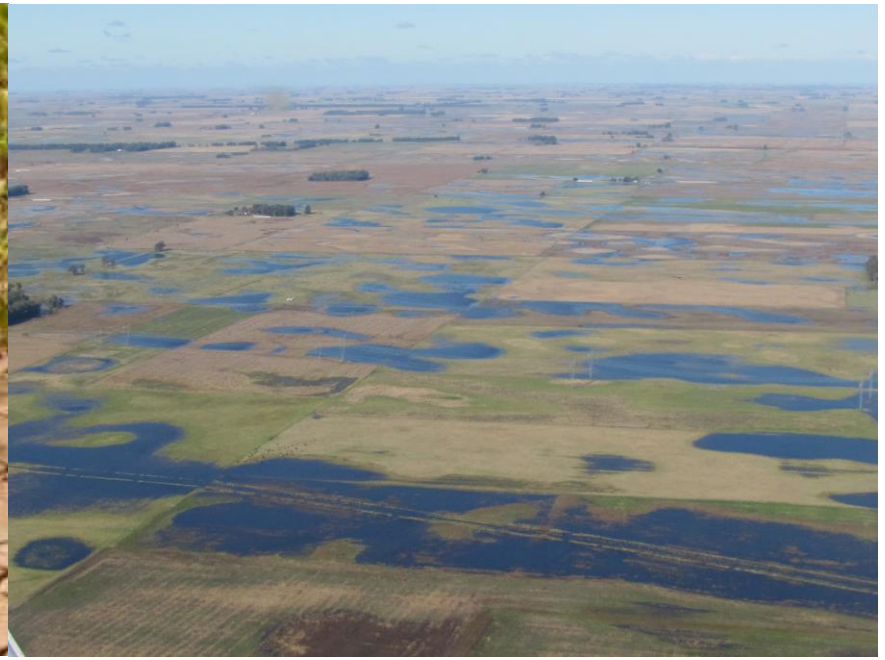
Alsina et al, 2020

New climate-change related challenges for agriculture and food security

New hydrological scenario for the region:

Droughts

waterlogging/flooding processes

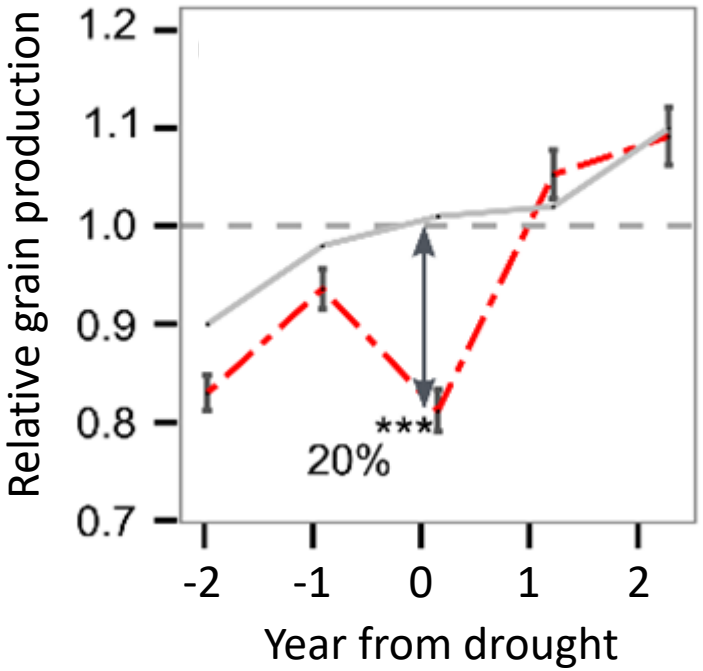


New climate-change related challenges for agriculture and food security

New hydrological scenario for the region:

Droughts

Decline in grain production



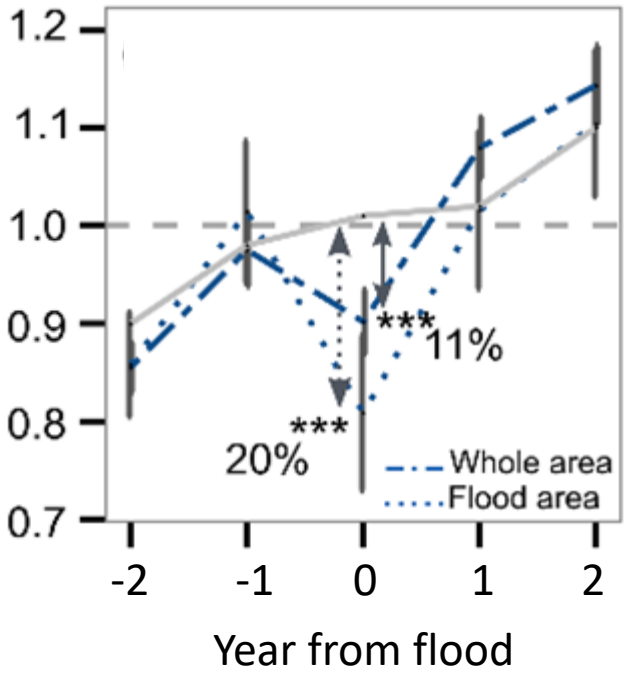
- **17%** grain yields
- **2%** harvested area

Whitworth-Hulse, 2021

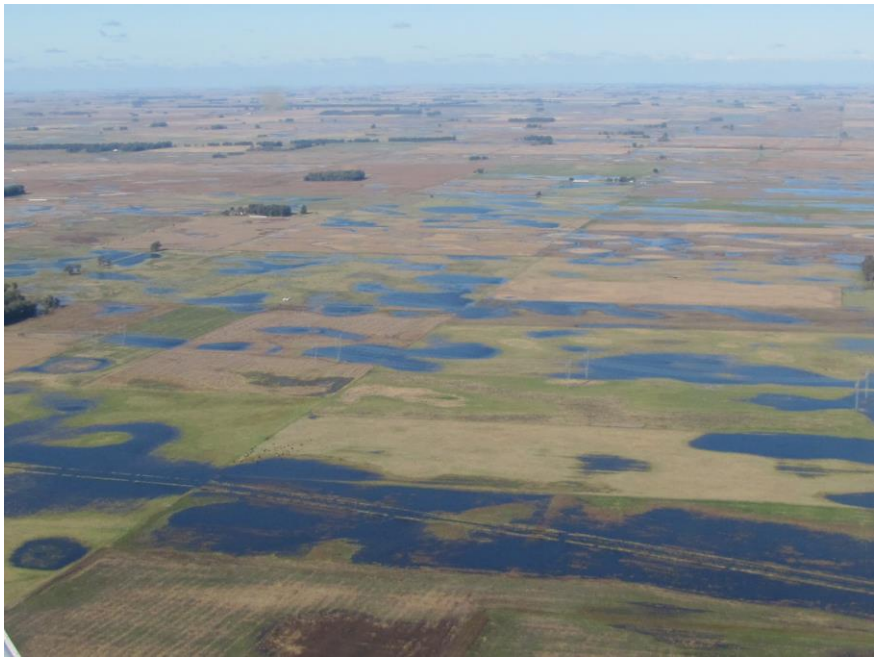
New climate-change related challenges for agriculture and food security

New hydrological scenario for the region:

Decline in grain production



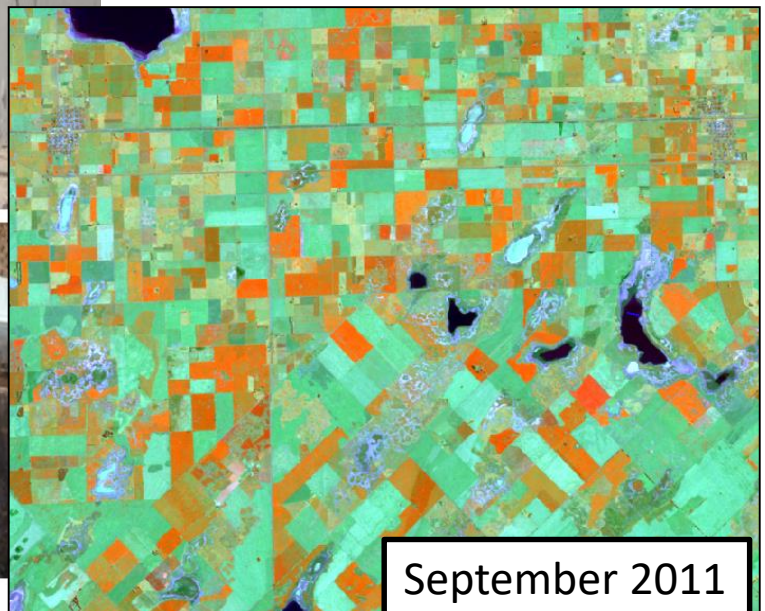
waterlogging/flooding processes

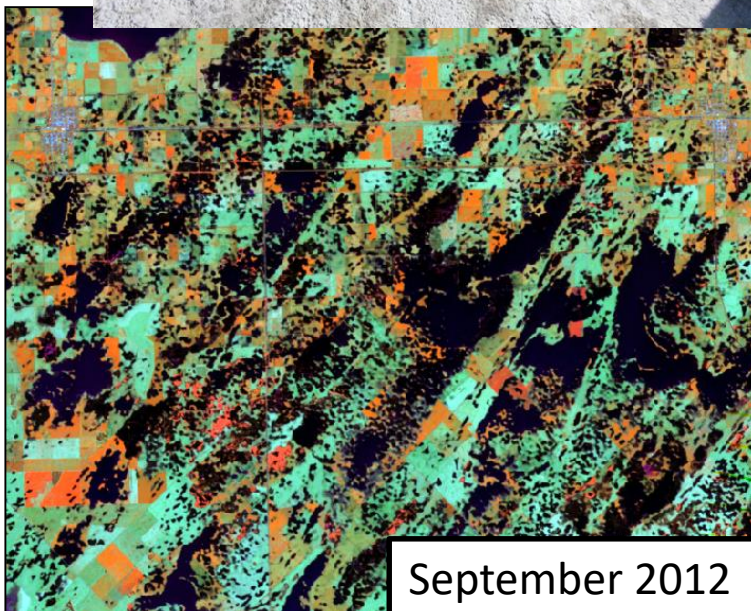


- **7%** sown area
- **4%** harvested area

Whitworth-Hulse, 2021

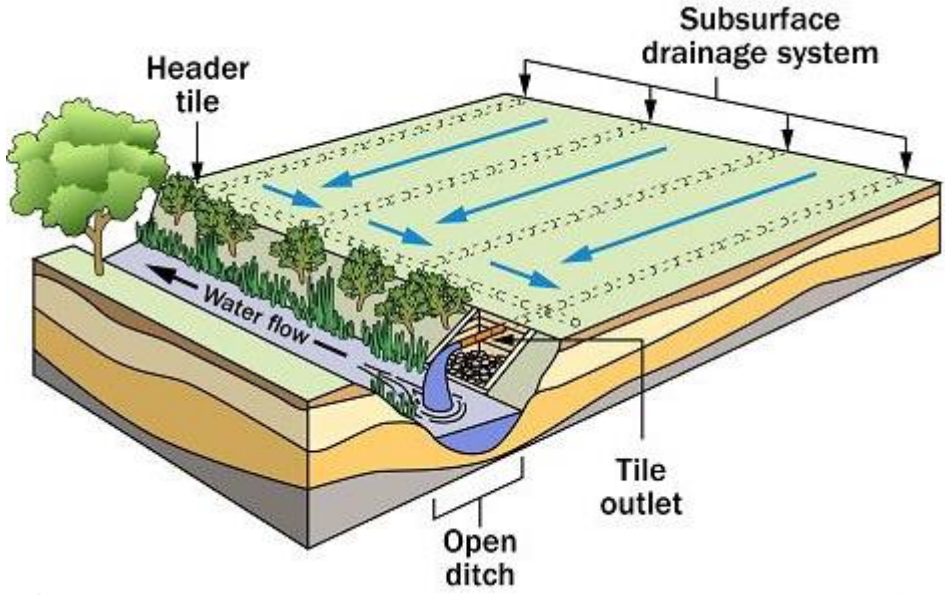
Water excesses problems in the Chaco-Pampas plain





What can we do to mitigate and/or adapt to water-excess problem?

A) Hydraulic solutions
(e.g. tile drains, open ditchs)



B) “Green” solutions (e.g. agriculture intensification, perennial pastures, agroforestry, protecting native forests, irrigation, etc)

Conclusions

- Very strong increase in grain production in the last decades (yields and sown area)
- The expansion of agriculture triggered several hydrological problems (new scenario)
- Droughts + Water excesses → challenge agriculture
- Hydraulic + Green solutions → to mitigate and to adapt to the new scenario
- Opportunity to continue increasing agricultural production BUT broad-scale and science-based policies are needed to take this opportunity

Thank you!

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