El Acuífero del Valle de Mexicali y su relación con los acuíferos de Imperial y Yuma

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Outline:

- Something about Colorado River delta evolution
- Colorado River flows, the water source
- Mexicali, Imperial and Yuma aquifers
- An integral groundwater system
- Principal remarks
Aprox 800,000 hectares of wetlands
Colorado River Delta formation process

- Deposits of marine sediments due to sea transgressions.
- Continental sediment deposits from Colorado River.
- Actual delta’s crest was probably constructed during middle Pliocene.
- Divided the delta in two areas.
  - Salton basin to the north
  - Colorado delta to the south in connection with Gulf of California
- Discharge to the Gulf but occasionally veered to the northwest discharging to Salton basin (last time was at the beginning of the XX century)
Data from The Colorado River at the Southerly International Boundary (USGS gage 09522200; 1950–2018)
Colorado River Hydrograph:
natural vs controled flows

Colorado River Delta Hydrograph - Natural vs. Controled Flows
(1902-03, 1950-51, 2005-06)

Colorado River Hydrograph: natural vs pulse flow 2014

Modified from Mueller et al, 2017
Colorado River Courses

Modified from Mueller et al, 2017
Aquifer responses to CR flows

Extracted Volume (X10^6 m³/año)

Groundwater depth (m)

Colorado River discharge (X10^6 m³/año)

From Ramirez-Hernández, 2004
Groundwater level contours for 1972

Black dashed = measured

red = modelled

Taken from Rodríguez-Burgueño, 2012
Aquifer wells field

Source: CONAGUA
Wells location

Taken from Rodríguez-Burgueño, 2012
Valle de Mexicali and Yuma aquifers

Groundwater level contour composition with data from:
Lesser, 2006
USBR, 2015

Taken from Kennedy, Rodriguez-Burgueño and Ramírez-Hernández, 2017
Groundwater Drawdown along CR

Modified from Ramírez-Hernández et al., 2018.
Imperial aquifer

90% of water is produced in the upper basin section. From Yuma, 1965 from Olmsted et al. (1973)
Delta Geohidrological System

Water level countors composition:
- Coachella Valley from Swain (1978)
- Yuma, 1965 from Olmsted et al. (1973)
- Mexicali, 1972 from Díaz-Cabrera (2001)
Recharge and extraction are dynamic in all the system

Groundwater monitoring

Water recharge = water extraction

Aquifer sustainability
Principal remarks

- Colorado river is no longer the water source
- Recharge is due mainly because infiltration from irrigation channels, return of irrigation water and horizontal flows.
- Efforts for reducing ag volumes because of pressure of others sectors (outside the basin) are reducing the recharge.
- Water balance must define water exploitation politics in order to reach a sustainable use of water.
- Actually there is no data to evaluate the recharge.
- The delta groundwater system must be managed in a integrate way
BEFORE

(March 23, 2014)

AFTER

(May 12, 2014)

DURING

(March 27, 2014)

Thanks...
Aquifer actual situation

- **Water abstraction**
  - Water pumping is not measured
  - SLRC valley increased volume

- **Water recharge**
  - Vertical recharge is dimishing by channel linning (i.e. AAC)
  - Optimization of irrigation water volume
  - Water transfer out of the basin