Influence of groundwater-surface interactions on groundwater salinity in the Senegal River Delta

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Study area and problematic

- Large amount of available water thanks to the River
- 150 000 ha of exploitable land for agriculture
  ⇒ Big potential for the development of agriculture
Study area and problematic

The development of agriculture is threatened by soil salinization due to:

• High evapotranspiration rates
• The presence of a very shallow salty aquifer
Management of the river with two dams (~ 1980):

- Large amounts of fresh water available throughout the year and increase of irrigation
- No more seawater intrusion in the river
- Increase of river levels and expected increase of lateral recharge to the groundwater

⇒ Do we observe a freshening of groundwater?
⇒ What is the extend of this freshening?
Method: two scales of work to study the superficial aquifer

Regional scale:
- Groundwater level surveys
- Hydrogeochemical surveys

Local scale:
- Geophysical surveys
- Hydrogeochemical surveys
Regional scale: Groundwater level surveys

Away from river

Close to river
Regional scale: Hydrogeochemistry

Statistical multivariate analysis with SOM's
**Regional scale: conclusion**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Away from River</th>
<th>Close to River</th>
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</table>
| **Outside irrigated plots** | Groundwater levels influenced only by rainfall  
High mineralisation   | Groundwater levels influenced by River levels  
Low to middle mineralisation |
| **In irrigated plots**  | Groundwater levels influenced only by rainfall and irrigation  
Middle to high mineralisation | Groundwater levels influenced by river levels and irrigation  
Low to middle mineralisation |

(Gning et al 2017, Journal of Hydrology: Regional studies)
Local scale: Geophysical survey
Local scale: Hydrochemistry

\[
\begin{align*}
&\text{CE} \approx 65000 \mu\text{S/cm} \\
&\text{CE} \approx 37000 \mu\text{S/cm} \\
&\text{CE} \approx 8000 \mu\text{S/cm}
\end{align*}
\]
Local scale : Hydrochemistry
General conclusions
Acknowledgment:
Any questions?

**Groundwater Quality 2019**

The next IAHS conference on Groundwater Quality (GQ 2019) will be held in Liège (Belgium) on 9-12 September 2019!

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More information: [aimontefiore.org/GQ2019](http://aimontefiore.org/GQ2019)

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