# Soil salinization: worldwide risks of irreversible soil degradation

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## 1.5 billion people, living with soil too salty to be fertile



https://news.un.org/en/story/2021/10/1103532



## global extent of salinization / sodification





Wicke (2011)

## 1)

## statistics

- 10% of all the world's arable land is affected by soil salinity and/or sodality 25–30% of all irrigated lands are salt-affected
- more than two thirds of global salt-affected soils are found in arid and semi-arid climatic zones
- great uncertainty regarding data

Shahid (2018) Ghassemi (1995) Szabolcs (1989)



## causes of the problem



Salts remain behind (part accumulates in the rootzone and part moves down)



Plants take up water along with negligible amount of salts



## causes of the problem



### FAO: Global map of salt-affected soils



### FAO: Global map of salt-affected soils launched: 10-2021



### FAO: Global map of salt-affected soils launched: 10-2021



🗙 No Data NONE Slightly Saline Moderately Saline Strongly Saline Very Strongly Saline Extremely Saline Saline-Sodic Slightly Sodic Moderately Sodic Strongly Sodic Very Strongly Sodic



## can soil salinity / sodicity be IRREVERSIBLE? (yes, it can)





## soil degradation cause by salinization/sodification



McNeal & Coleman, 1966



## soil degradation cause by salinization/sodification



McNeal & Coleman, 1966



## soil column experiments



Kramer, I., Bayer, Y., Adeyemo, T., & Mau, Y., "Hysteresis in soil hydraulic conductivity as driven by salinity and sodicity-a modeling framework." HESS, 2021



## take-home message

- soil is a non-renewable resource, our lives depend on it
- because of salinization, we might be irreversibly degrading soils

we can do better! 🚿 we need:

- knowledge
- political will





## Thanks!

## soil column experiments; SAR=20



Adeyemo, T., Kramer, I., Levy, G. & Mau, Y., Forthcoming, 2021

## soil column experiments; SAR=50



Adeyemo, T., Kramer, I., Levy, G. & Mau, Y., Forthcoming, 2021

## weight functions



conductivity as driven by salinity and sodicity-a modeling framework." HESS, 2021

## weight functions





Kramer, I., Bayer, Y., Adeyemo, T., & Mau, Y., "Hysteresis in soil hydraulic conductivity as driven by salinity and sodicity-a modeling framework." HESS, 2021

### weight function widget lacksquare



