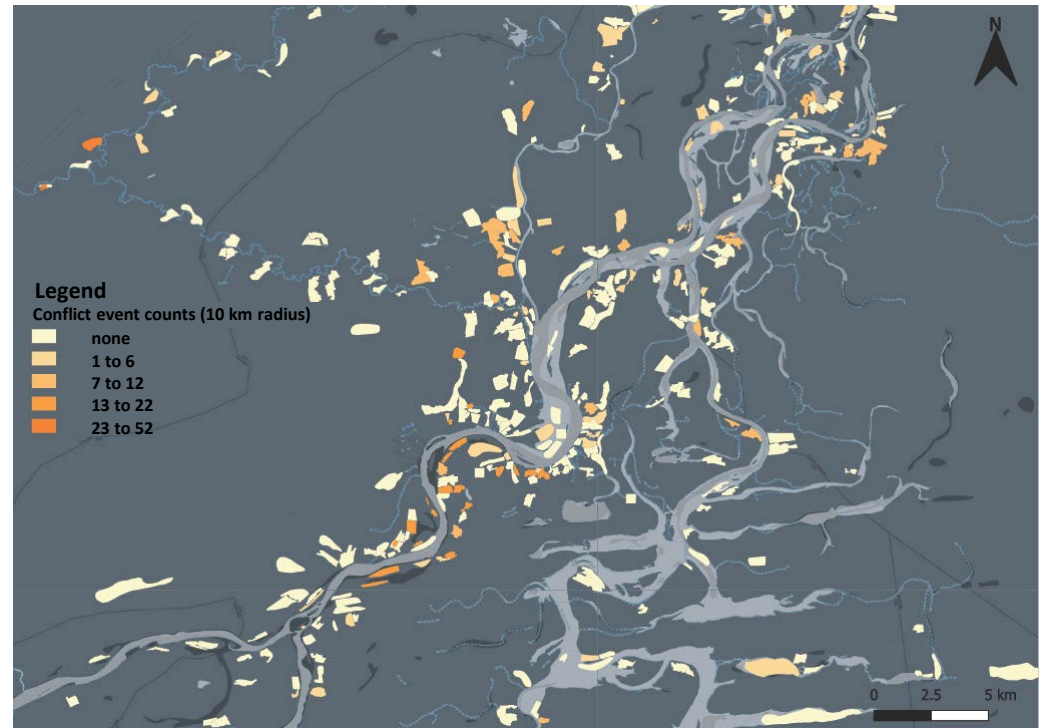


Does irrigation
strengthen climate
resilience?

A geo-spatial impact
evaluation of
interventions in Mali



IEG Symposium: Unlocking the Potential of Geospatial Analysis for Evaluation, Washington DC, April 2024

Dr Mascha Rauschenbach (DEval)

Joint work with: Ariel Ben Yishay, Rachel Sayers, Kunwar Singh, Seth Goodman; Madeleine Walker; Souleymane Traore; Martin Noltze




Background & research questions

Background & research question





Measuring climate resilience

Economic resilience

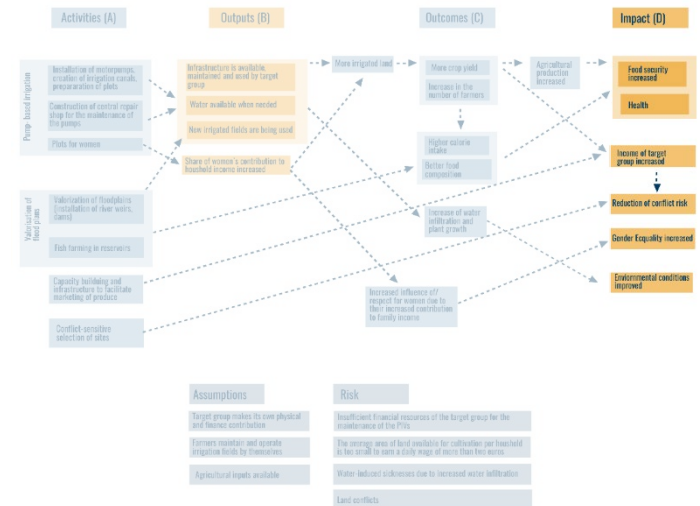
-  Agricultural production
-  Food security
-  Income

Social resilience

-  Women empowerment
-  Peace & Conflict

Environmental resilience

-  Wind erosion
-  Soil moisture
-  Biodiversity



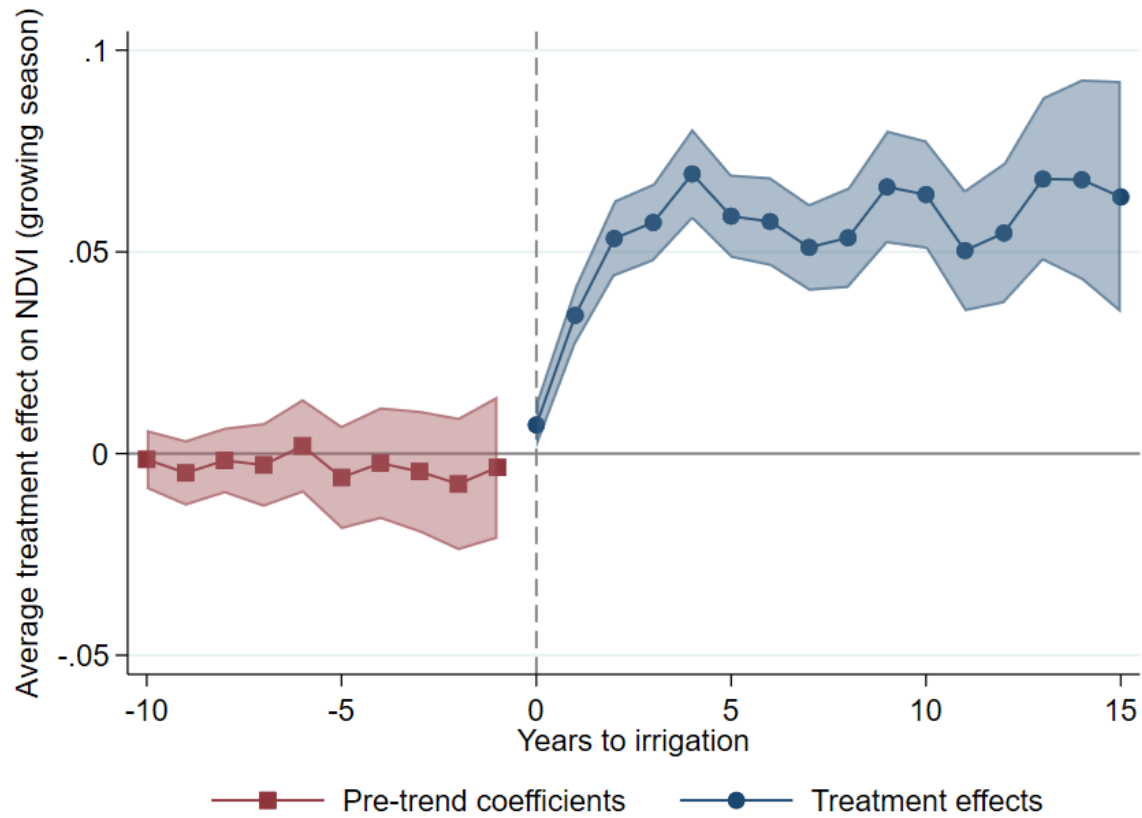
Methodology

Identification

- Quasi-experimental roll-out design

$$AgOutcome_{irt} = \alpha + \sum_{y=-10}^{10+} \beta_y YearToTreatment_{irt+y} + \gamma Precip_{irt} + \lambda Temp_{irt} + D_i + D_{rt} + \epsilon_{irt}$$

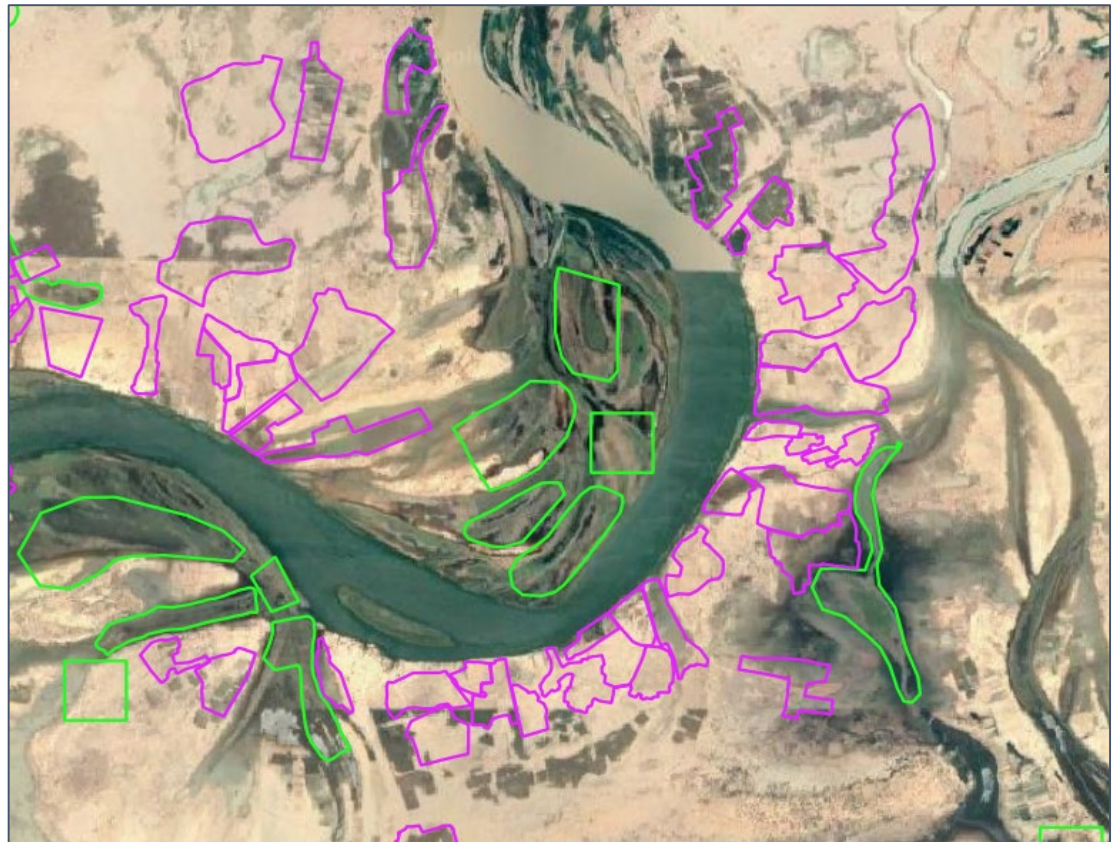
- i indexes polygons, r regions, t year
- Identifying assumption: outcomes not otherwise correlated with roll-out timing
 - Conditional on polygon-specific means, region-year means, and weather
- Confirm robustness to dynamic T effects via Borusyak et al (2021), de Chaisemartin and D'Haultfoeuille (2020)



Borusyak et al
(2021) estimator

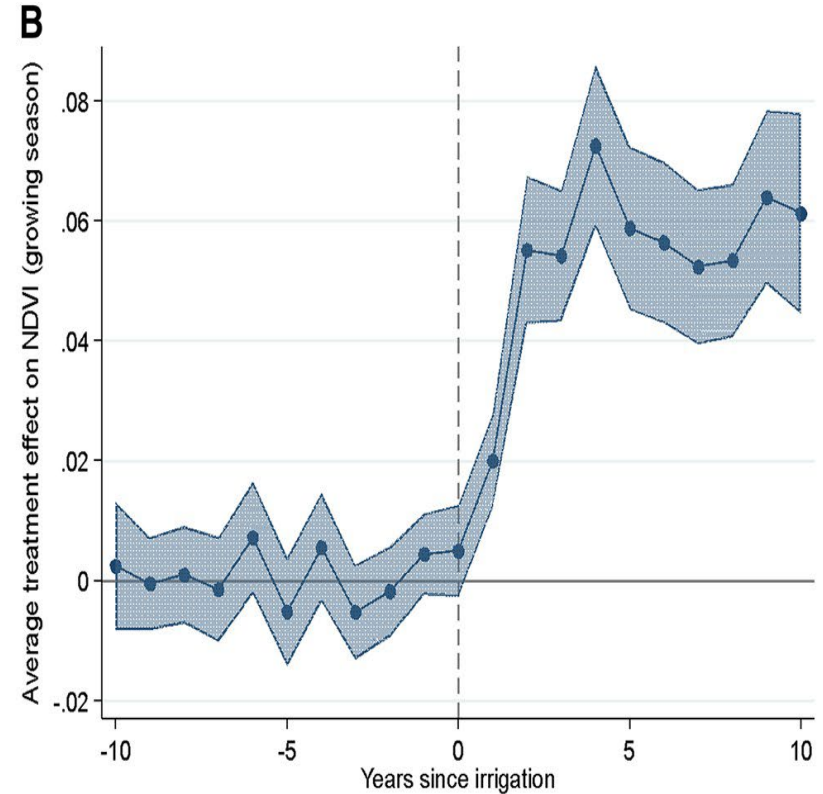
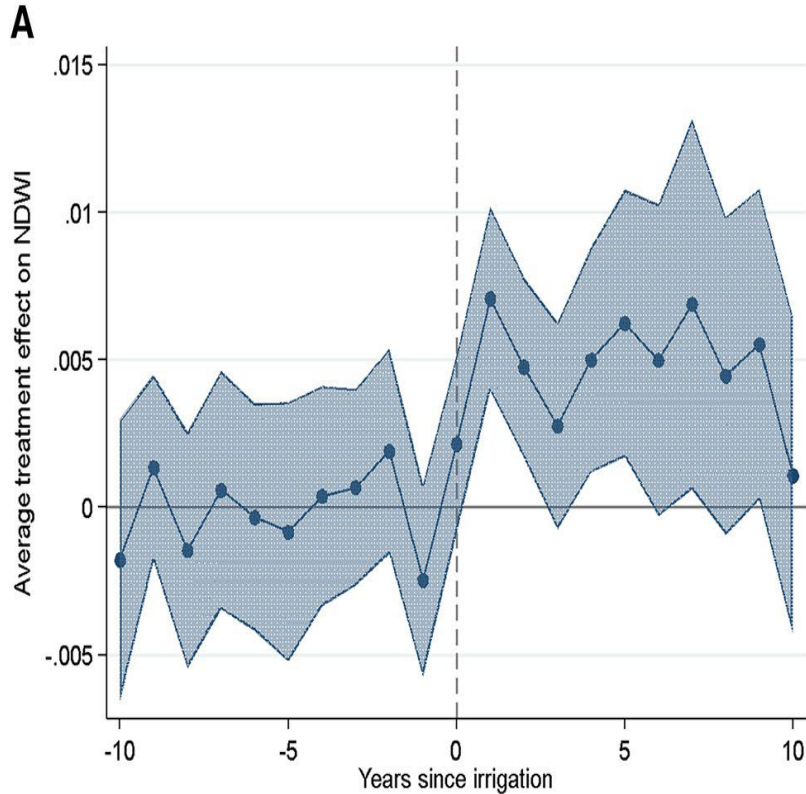
Data sources

1. Project data
2. Climate variables
3. Landsat
4. Survey data
5. Conflict event data
6. High resolution

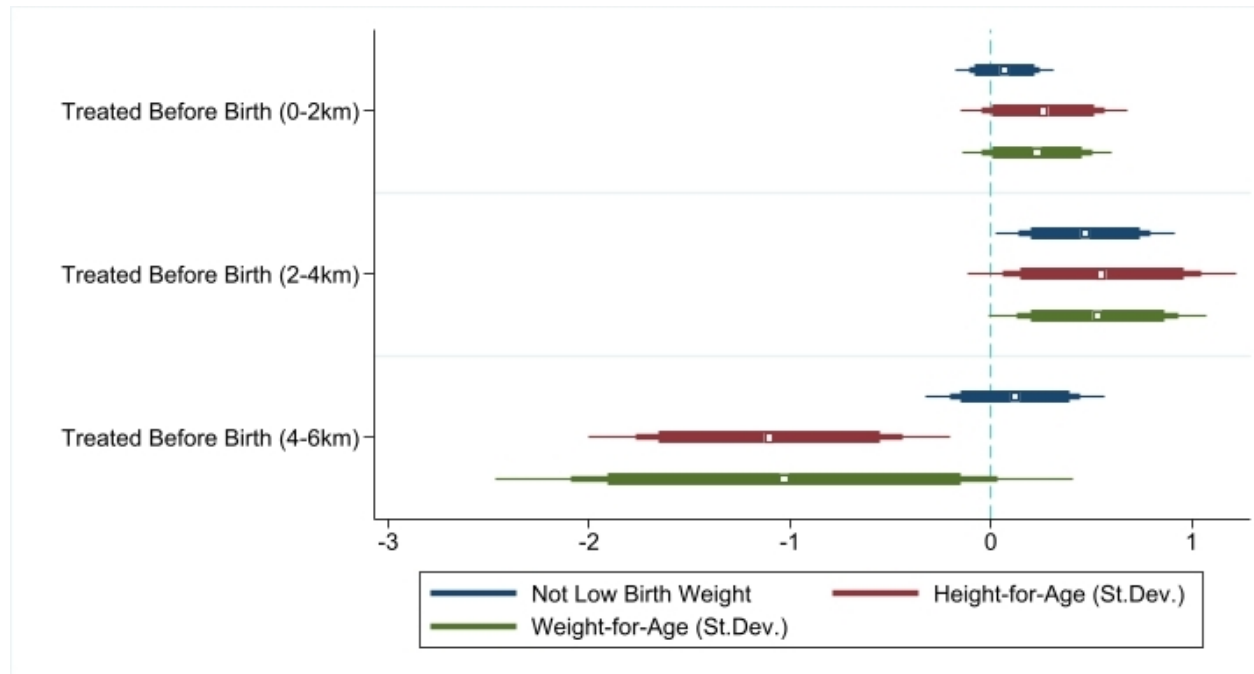


Findings

Agricultural production



Child Health & Nutrition: Results



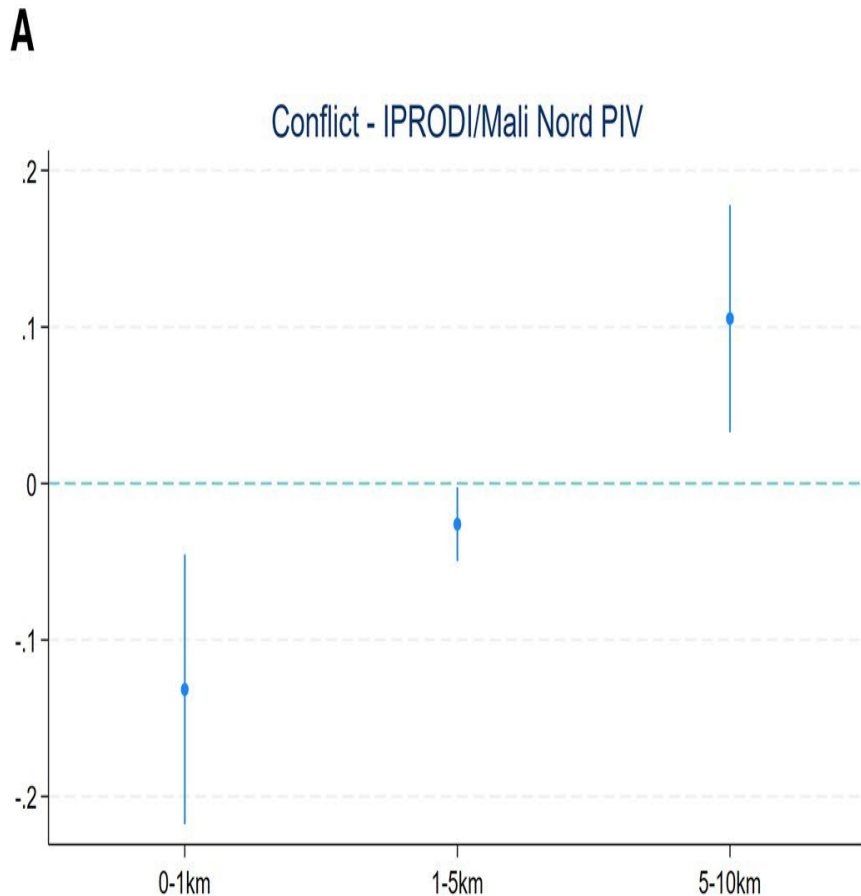
Sample share
within band:

67%

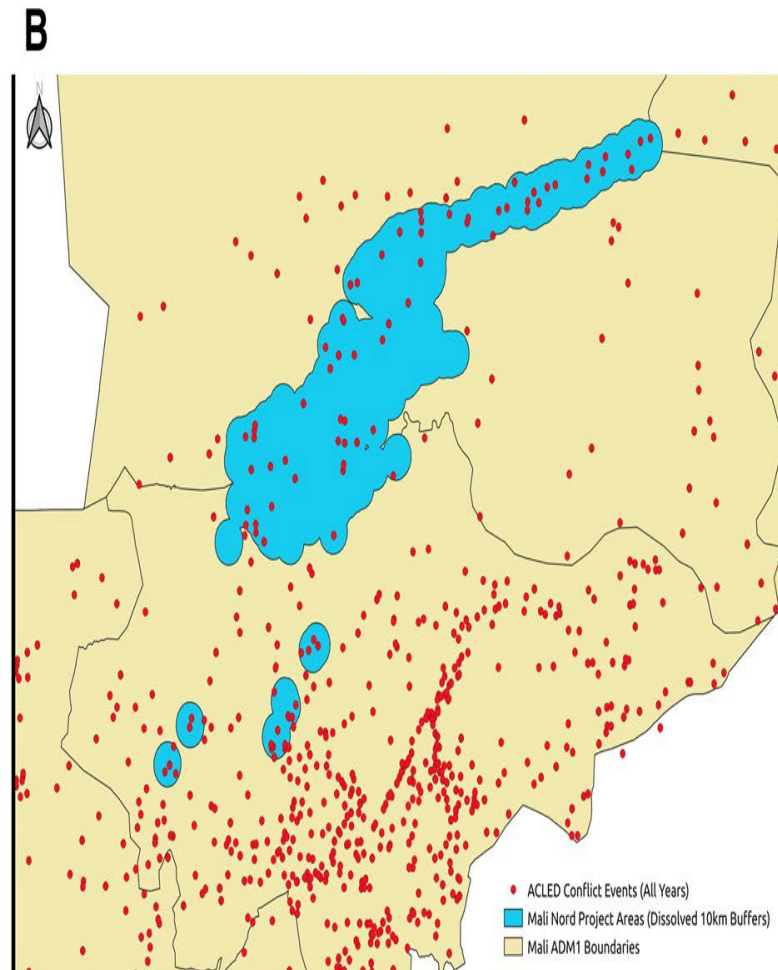
17%

16%

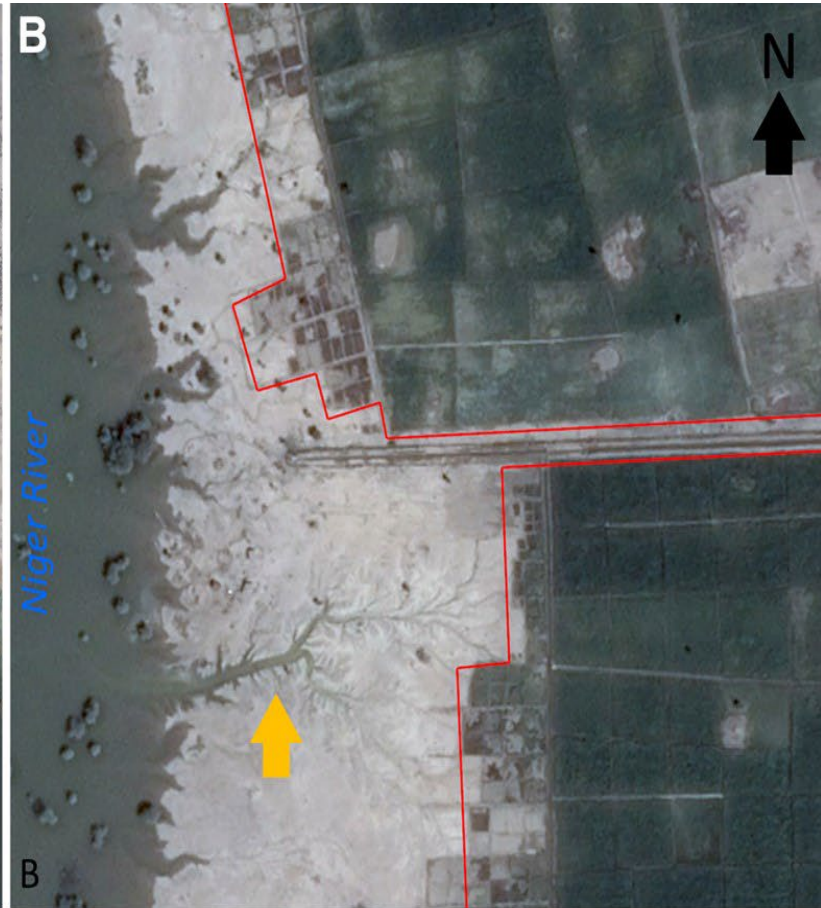
Conflict



Graph shows effect of treatment at various distances, using 95% confidence levels.



Ecological impacts



Take aways



Findings

Pump-based irrigation had long-lasting positive effects on agricultural production & child health



Lessons for GIEs

Suitable approach if intervention has a geospatial dimension

Requires high quality data on site locations and boundaries

Suitable if access to the field is limited (pandemic, conflict)

Suitable if baseline data absent

Final sample selection and compiling of polygon data time-intensive



Way forward for development evaluation

Continued monitoring of projects with geodata

Repository of evaluations using geodata