Some thoughts:

* Can we identify a set of indicators that indicates elevated risk of conflict in certain locations?
  + Maybe this set is different for different locations/basins (Yousif et al paper)
* Resource inequality among different groups -> things like food burden
  + Income decile per state
* Really is a mixed bag of findings- it may lead to more conflict, may lead to more opportunities for cooperation (if we go from Wolf’s perspective), but still is important to note where all of these overlap
* Definuitely going to recommend getting as close as possible to the Pardee Rand Index

Gilmore et al (2017)

* Linkages beyond conflict and climate
  + Will climate lead to a more violent world? What are the paths of climate to conflict?
  + These pathways are often conditional (ie agricultural conflict)
  + A number of moderating factors such as governance, adaptive capacity, institutions
  + Conflict can increase vulnerability to climate
  + Conflict can emerge as a result of mitigation and adaptation policies (land use arguments)
* Forecasting conflict
  + Has a long academic legacy and also has been controversial
  + Statistical and data-mining examples
    - structural: “models of correlates of conflict (e.g. GDP/capita, population, education, infant mortality rate, etc…)” to investigate if trends of conflict reduction will continue with mitigation and adaptation policies
    - Short-term early warning models: often machine-learning with auto data (twitter observation as conflict predictor) (lacks inclusion of all actors)
    - ABM and game theory: attempts to investigate the mechanisms
    - Expert elicitation (interviews)
* 4 projects explored in the paper
  + a) Projecting conflict along the SSPs;
  + b) Using conflict modeling to inform the SSPs;
  + c) Improving the coupling of conflict and governance modeling and
  + IAMs; and
  + d) Coupling short-term models to capture near-term, sub-national, disaggregated violence with the long-term forecasts.
* Projecting conflict along the SSPs
  + Makes projections for armed conflict according to Uppsala data: population, gdp per capita, educational attainment, years since conflict, years since independence
  + Predictions of population and education from IIASA and OECD
  + Assesses how these change in each SSP and the outcomes
* Conflict modeling to inform SSPs
  + Conflict predictions based on GDP per capita
  + Optimistic economic growth means optimistic conflict projections
  + Conclusion: not meaningful since they miss political constraints
  + Explores other models- loses classification power in the 2000s
* Couple with IAMs
  + Looks at International Futures (IF) and GCAM
  + IF incorporates a lot more political elements in their forecasting (unclear how this model works though)
  + Uses IF model to forecast through 2050
    - Illustrates decreasing risk due to development and shifts towards democracy
  + Figure to the right shows risk of ‘anacratic regimes’
  + 2 ways to incorporate GCAM:
    - Effects of armed conflict on GDP along 5 SSPs -> implications of those GDPs on GHGs
      * Conflict slows economic growth and hampers adaptation and mitigation efforts
    - Conflict risk from changes in economic performance (e.g. mitigation costs), oil production and revenues, potential financial transfers for carbon permits”
  + Recs, challenges, and opportunities
    - Improve synthesis and understanding of climate-conflict pathways across scales
    - “Expand the modelling of governance and other elements of state fragility and failure as an important intersection of climate policy and conflict”
    - Improve our understanding of this complexity
    - “Explore the indirect links between climate change, conflict, and cooperation.“
    - “Improve the integration of the forecasting models and results with decision and policymaking needs”
      * Provide policy suggestions that won’t exacerbate conflict risks

Abbott et al (2017). Examining the food-energy-water and conflict nexus

* Demonstration between FEW security and political stability
  + Reviews how each of these resource insecurities affects political and social stability
  + Uses Pardee RAND ‘FEW Index’ as a cumulative metric of FEW insecurity and political instability
    - FEW Index
      * Three sub-indices for food, energy, and water reflecting availability and accessibility
      * Food
        + Food price level index
        + Share of dietary supply from non-starchy foods
        + Dietary energy supply relative to minimum dietary energy requirement
      * Energy
        + Electrification rate
        + Percentage using modern fuel for cooking and heating
        + Electricity consumption over energy requirements
      * Water
        + Percentage access to improved drinking water and sanitation
        + Municipal water use over population water requirements
        + Per capita water resources
    - These are integrated using an unweighted geometric mean
    - Indicators collected from a variety of data sources (the normal -> WB, UN, EIA, WHO)
    - World bank’s political stability indicator is used for political instability indicator
* Results indicate that the FEW index has an rsquared of .332, food is not useful, energy and water subindexes are statistically significant
* Food and conflict
  + Analysis in retrospect implicate food shortage as a cause of revolutions
  + Emerging quantitative studies that conflict is more likely in areas with limited agricultural production capability
  + Local conflict emerges from chronic food insecurity
  + Natural disaster food price increases have a casal effect on social unrest
  + Increase in food prices can deteriorate democratic institutions
    - This might be a threshold rather than a relationship
  + Tends to be more extreme in societies characterized by inequality
* Water and conflict
  + Water stress is a driver of social and political instability
  + Transboundary water can highlight tensions
  + Water governance can overcome risks of scarcity
* Energy and conflict
  + Oil exporting nations have higher risks of civil war
  + There is an oil-related causal mechanism in 25-50% of interstate conflicts between 1973-2013
  + Rapid changes in fuel price trigger instability
  + Inadequate supply of energy and electricity also can also trigger conflict

Dahm et al (2023) What climate? The different meaning of climate indicators in violent conflict studies

* Explores operationalization of climate-related indicators in violent conflict research
* Relationships between clmate and ciolent conflict are complex
* Paper analyzes 32 studies on these
* Categorizes indicators into 5 clusters and evaluate them
* Climate representations as a source of ambiguity
  + Limited evidence to link between climate and violent conflict
  + Often look at neo-Malthusian theories on abundance and scarcity
    - Resource curse
  + ‘a combination of structural and triggering conditions were needed for these conflicts to spiral into violence’
  + Scales of violence- groups can have various abilities to cope with climate change induced problems
  + Time dependency on these as well
  + Variety of approaches to study this
    - Qualitative comparative analysis
    - Regional case studies
    - Social media analysis
    - Surveys
  + Projects also look at short-term prediction (Hegre) and projections under climate change and socioeconomic pathways (Hoch et al 2021)
  + Bias introduces from countries with historic or active conflict -> focus towards conflict over peace studies
    - There are instances where scarcity drives cooperation
    - Lots of political economy work here
  + Problems
    - Weak understanding of pathways
    - Simplification of metrics
  + This paper will clarify some of this work
* Methods and sample
  + 32 total papers to be analyzed
  + Groups of civil war, major civil war, non-state violence, and violent events
  + Databases used in majority of papers were
    - UCDP/PRIO Armed conflict dataset
    - UCDP Geogreferenced event dataset
    - ACLED dataset
    - UCDP Non-state Conflict
    - Social Conflict in Africa (SCAD)
    - Political Instability Task Force (PITF)
* Results
  + Climate indicator clusters
    - Climate related natural disasters
    - Basic climate variability
    - Advanced climate variability
    - Freshwater availability
    - ENSO (El nino)
  + CRND looks at connections between disasters and violent conflict
  + BCV or ACV on precipitation variability
  + Water deserved more attention and looking into availability from freshwater and groundwater
  + enso can trigger other climate variability
* shifting spatial and temporal patterns
  + 18 studies used an index while 10 focused on the year of conflict emergence
  + Indicators tended to be scaled to longer term indicators
  + 36 database utilizations
  + Shift towared spatialy distributed databases
  + Trend towards finer resolutions
* Results
  + Shows super mixed results of these findings
  + More work needs to be done (and specific work)

Hegre, Karlsen, Nygard, Strand, and Urdal. Predicting Armed Conflict, 2010-2050. International Studies Quarterly (2013)

* Likely that future armed conflict will be reduced
* Definition of armed conflict: ‘contested incompatibility between government and an organized opposition group causing at least 25 battle-related deaths during a calendar year’
* Predictions based on a statistical model using socioeconomic and demographic characteristics and a history of conflict
  + Use explanatory variables that IIASA and UN have forecasted to 2050
* Authors state that these predictors ‘cover most important structural factors that explain the onset, risk, and duration of armed conflict’ -> cite a bunch of other early 2000s papers
* Paper is better at predicting steady-state outcomes than those that change (obviously…..)
* Country-level predictions are bad, but it does better on regional or global level predictors
* Paper runs on theory that if I reduce infant mortality or education, etc, then conflict will decrease
* Authors emphasize the uncertainty in the models
* Simulation methodology
  + Probabilities are dependent on conflict history -> a statistical model
  + Goal: predict conflict state for all countries
  + Transition matrix gives probability of changing between no conflict, minor conflict, and major conflict
  + Simulation setup
    - Specify and estimate Logit statistical model
    - Make assumptions about values for exogenous predictors and their future change
    - Start simulation, do this a lot
  + Not going to dig here -> not so applicable to us
* Conflict predictors
  + Conflict history
  + History of neighbors (conflict nextdoor) with spatial and temporal lags
  + Population
  + Education
  + Youth bulge
  + Infant mortality
  + Ethnic dominance
* They then run the models

Koubi, Spilker, Bohmelt, and Bernauer (2014). Do natural resources matter for interstate and intrastate armed conflict?

* Review of papers
  + Links land degradation, freshwater scarcity, and deforestation to conflict deaths
  + Land scarcity and pop growth to conflict
  + Land degradation and ecological suitability for agriculture, freshwater to civil conflict
  + Some linkage of water scarcity and land degradation to conflict
  + Scarcity of agriculturally productive land is positively correlated with the risk of civil conflict when agricultural wages decline, when the rural population is growing at a high rate, and when the agricultural yield is low
  + Water scarcity does not increase the probability of conflict, but water scarcity increases conflict risk if political institutions are bad
  + Some evidence for diamonds and oils
* Resource curse? Is it real? Mixed evidence

Vesco et al (2020)

* Three theories:
  + Neo-classical: abundance increases risk of conflict
  + Neo-malthusian: scarcity increases risk of conflict
  + Political ecology: inequality increases the risk of conflict
* Renewable resources are mostly linked to violence through scarcity
* Abundance of minerals and drugs increases conflict risk

Yousif, El-joumayle, Baban. (2023). Exploring the Water-Energy Food nexus in the context of conflict in Iraq

* Discussion of qualitative links (most of which are pretty straightforward and make sense)
* Then, they use the Pardee-RAND Food-Energy-Water Security Index and WED nexus index (requires uniform data on country level)
* Note that the nexus is rapidly becoming unsustainable: declining waater means food and oil production cannot be continued
* Conflict can hinder food security -> these ties obviously go both ways…..
* “both structural and political factors necessitate a radical rethinking and restructuring of the relationships between water, energy and food production.”
* Paper overall focuses on qualitative relationships of FEW elements, only as they pertain to Iraq

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Metric | Components | Findings | Use | Citation |
| Pardee-RAND Food-Energy-Water-Security Index | Food price level index, % dietary supply non-starchy foods, dietary energy supply to relative minimum, electrification rate, % modern fuel for cooking and heating, electricity consumption/energy requirements, % access to improved drinking water and sanitation, municipal water use/population water requirements | R^2 of .322 to correlate with conflict (Abbott paper) | Development to test linkages to conflict, used to explore explanatory use of the index in the context of Iraq | (Abbott et al., 2017; Yousif et al., 2023) |
| Hegre Model (no formal name) | Conflict history, history of neighbors’ conflicts, population, education, youth bulge, infant mortality, ethnic dominance | Some success in regional predictions | Hege (PRIO + Oslo work) to identify conflict patterns through 2050 (uses projections for chosen components) | (Hegre et al., 2013) |
| Hauge and Ellingsen (1998)  FIND THIS PAPER |  |  | Economic and political factors affect conflict most strongly, but environmental and demographic factors do have an impact |  |