

# How do we assess vulnerability to climate change in India? A systematic review of literature

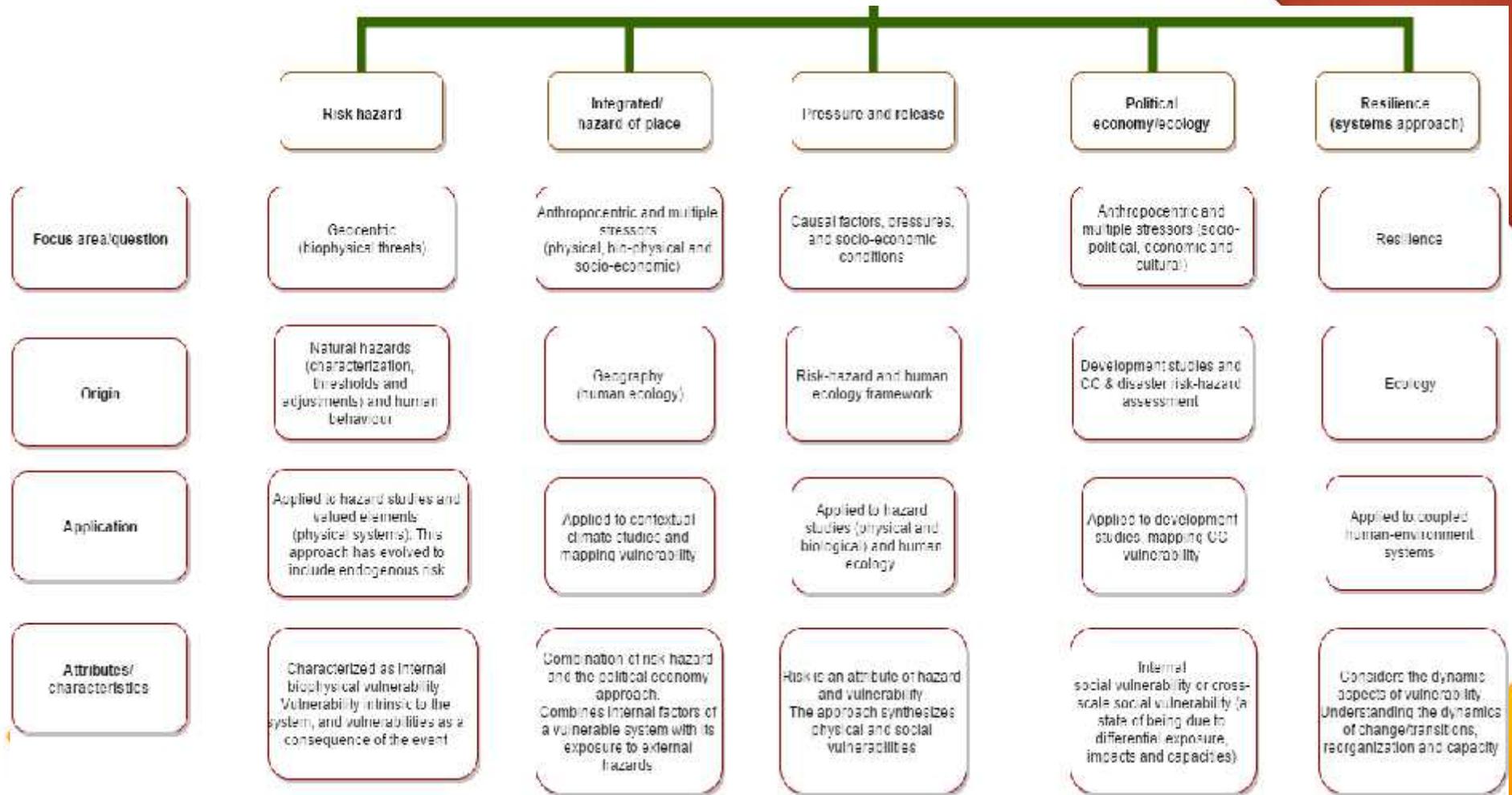
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## Context: why vulnerability assessments (VAs)?

- ❖ The ASSAR project: examining the barriers and enablers to effective, sustained and widespread adaptation.
- ❖ Typically, VAs are a prerequisite to adaptation projects
- ❖ VAs help (1) identify drivers what makes systems, people, places vulnerable, (2) explore differential adaptive capacities, (3) prioritise adaptation funding.
- ❖ In India, VAs have been carried out at various scales, by various actors, towards various goals.
- ❖ Limited interrogation on whether the methodologies used have evolved with evolving definitions of vulnerability.
- ❖ Conducted a systematic literature review (SLR) to identify the span of methodologies used to assess climate change vulnerability in India and locate gaps between vulnerability conceptualisation and assessment.

# Multiple conceptualisations of vulnerability



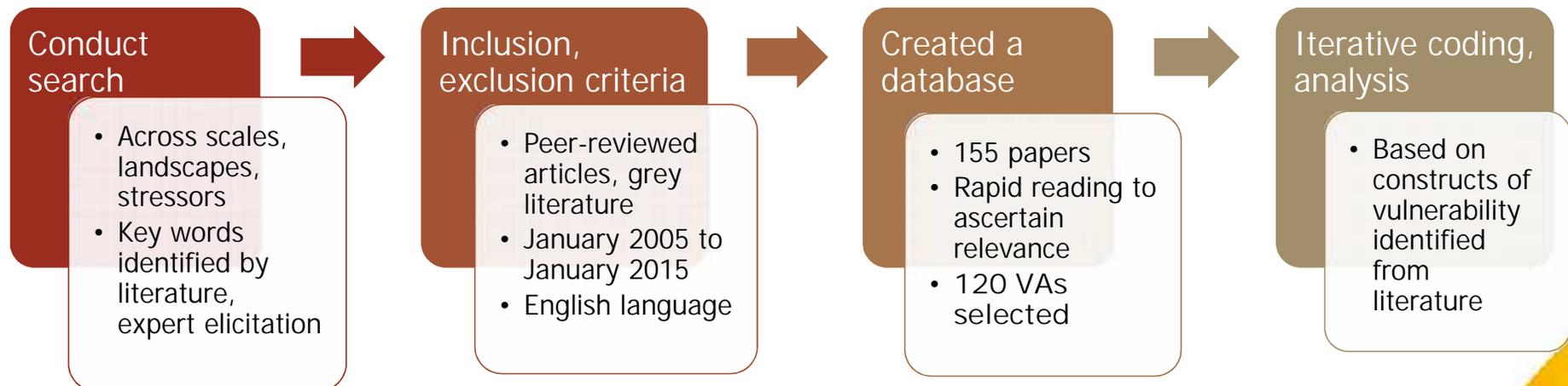
## Research questions

In VAs conducted in India,

- ❖ How is vulnerability conceptually framed?
- ❖ Who is assessing vulnerability?
- ❖ How is vulnerability assessed and what scale?
- ❖ What are the outcomes of these assessments?

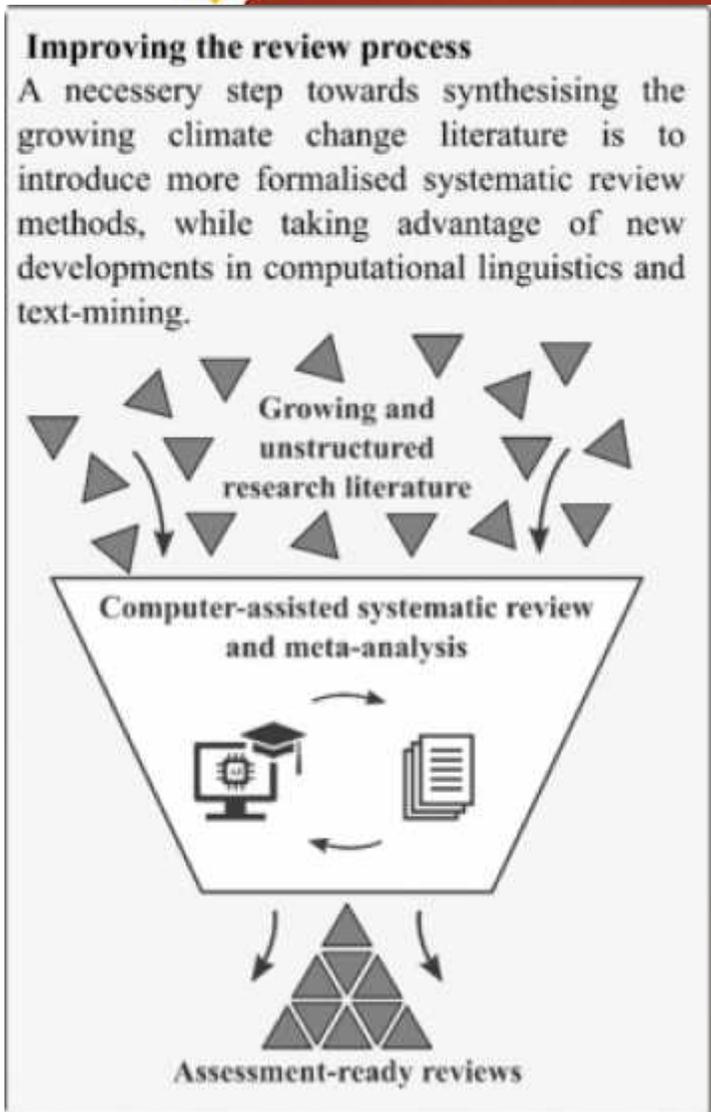
# Methodology: systematic literature review

- ❖ SLR is widely used for identifying, assessing, and interpreting the state of knowledge on a specific topic
- ❖ Involves reviewing literature using rigorous and replicable steps, well-defined inclusion and exclusion criteria that minimise opacity and allow replication



## Methodology: why SLR?

- ❖ The 'big data challenge': CC literature is doubling every 5-6 years (Haunschild et al., 2016), growing at 16%/year (Minx et al. 2017)!
- ❖ In the SR1.5, Chapter 4 alone draws on 603 unique references to assess the feasibility of 23 adaptation options relevant to 1.5C.
- ❖ At this rate, the literature to be reviewed for the IPCC's sixth assessment (AR6) will span between 270,000 and 330,000 publications (Minx et al. 2017).
- ❖ Articles highlighting adaptation have more than doubled between 2008 and 2011 and grown by 150% from 2011 to 2014 (Webber 2016).
- ❖ SLR can help synthesise and make sense of this literature in a robust, transparent manner (Berrang-Ford et al., 2015)

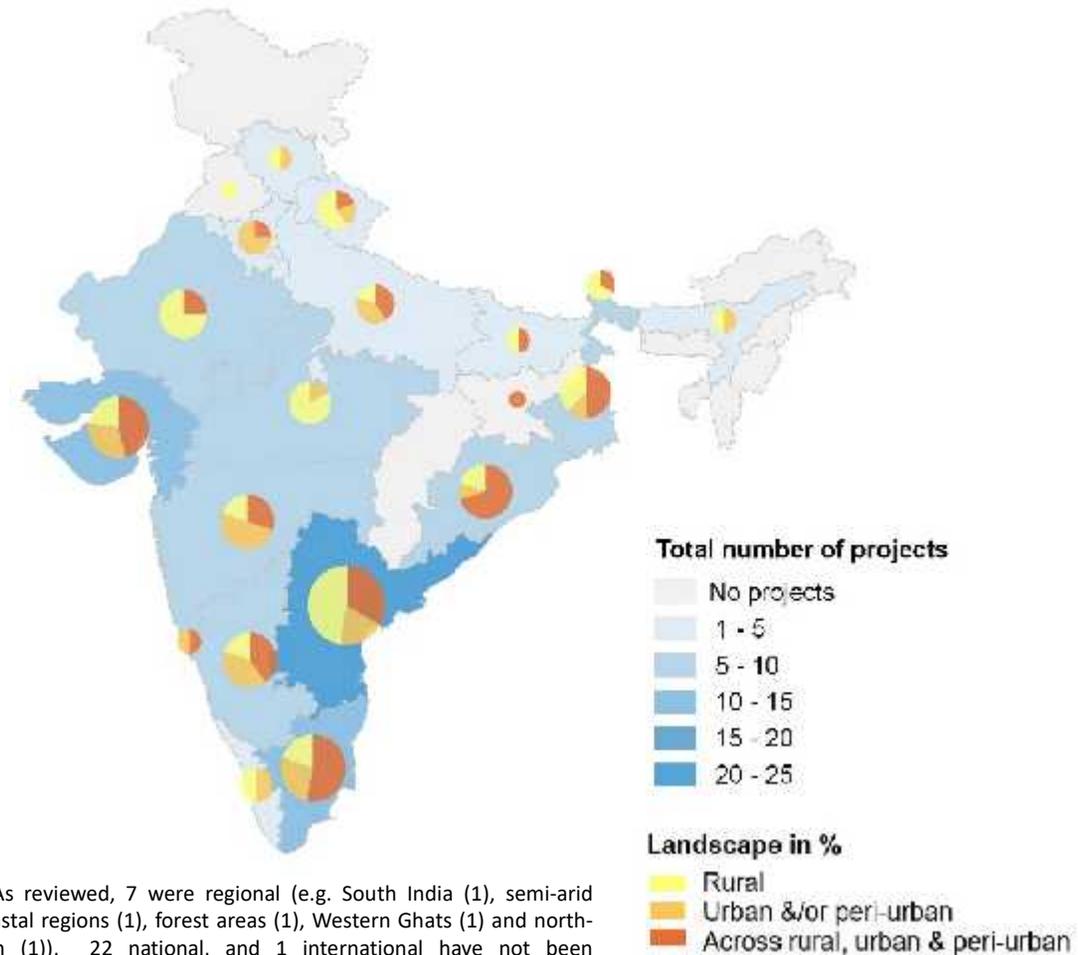


## Results: Where are VAs done in India?

- Most VAs were in coastal regions, peninsular India
- Northern and north-eastern states see lowest representation.
- Fewer VAs in arid and semi-arid regions despite being climate hotspots
- Focus on areas vulnerable to external hazards, lesser emphasis on how structural drivers and endogenous risks interact with these external hazards.
- More rural VAs, several spanning landscapes
- Few in conflict-ridden states (red belt, J&K, NE)

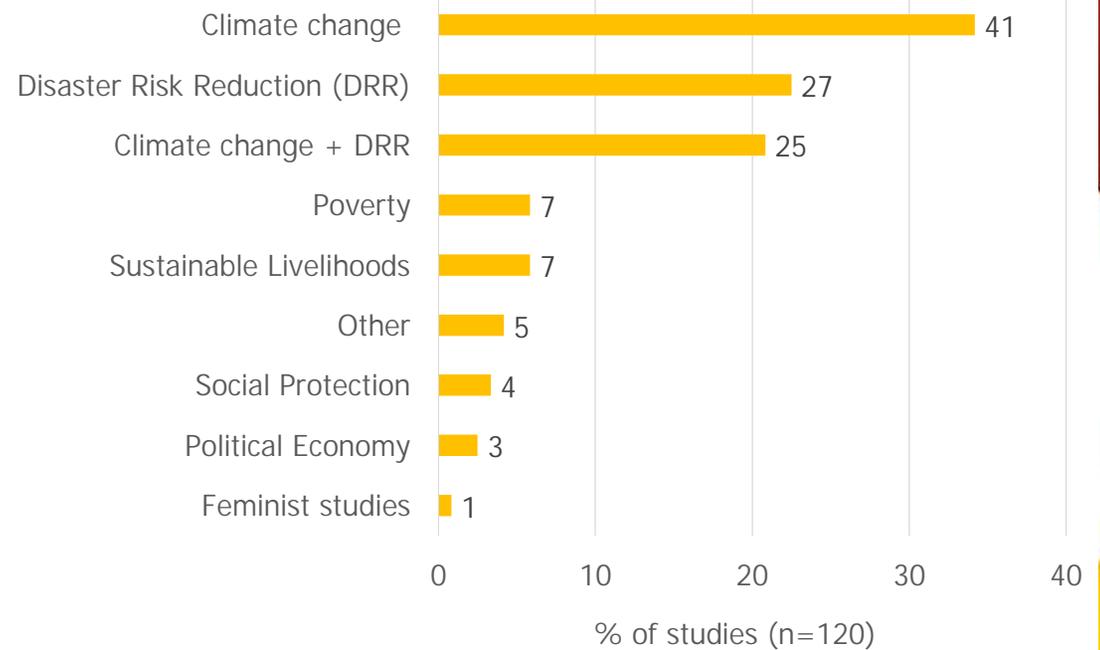


Of the 120 VAs reviewed, 7 were regional (e.g. South India (1), semi-arid tropics (2), coastal regions (1), forest areas (1), Western Ghats (1) and north-eastern region (1)), 22 national, and 1 international have not been represented on this map. Thus, the total number of VAs mapped above are 90.



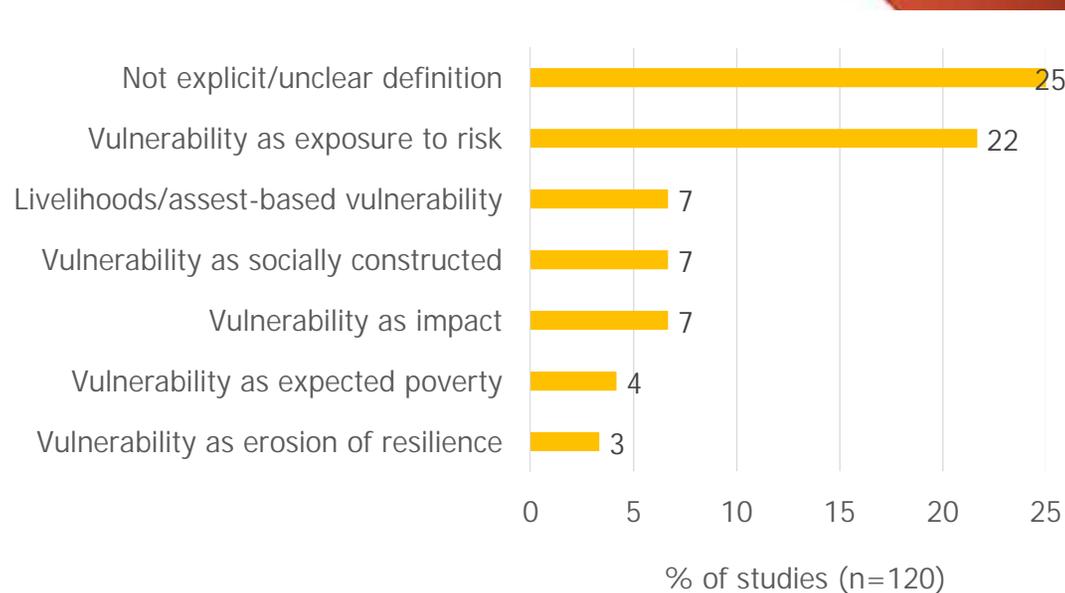
## Disciplinary approaches used

- ❖ VAs in India remain rooted in certain disciplines such as hazards management, disasters risk reduction
- ❖ Fewer VAs in poverty and development studies, livelihoods research, and gender studies (though this is shifting)
- ❖ This disciplinary dominance favours certain methodologies and conceptions of vulnerability.



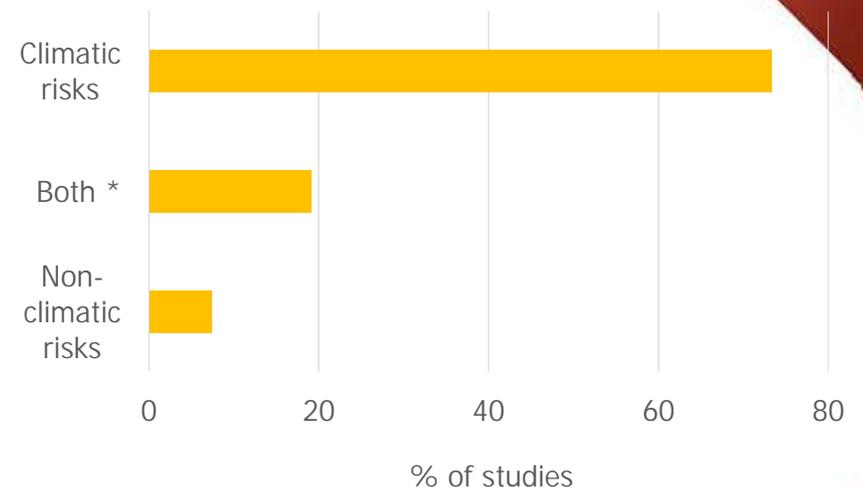
# Conceptual approaches to assess vulnerability

- ❖ Latest IPCC definition (2014) not included in any VA
- ❖ In 25% papers, vulnerability was not clearly defined!
- ❖ Risk-based definitions are significant because of DRR-centric VAs
- ❖ Vulnerability as 'erosion of resilience' or as 'expected poverty' was least reported (3% and 4% respectively).



# Vulnerability to what?

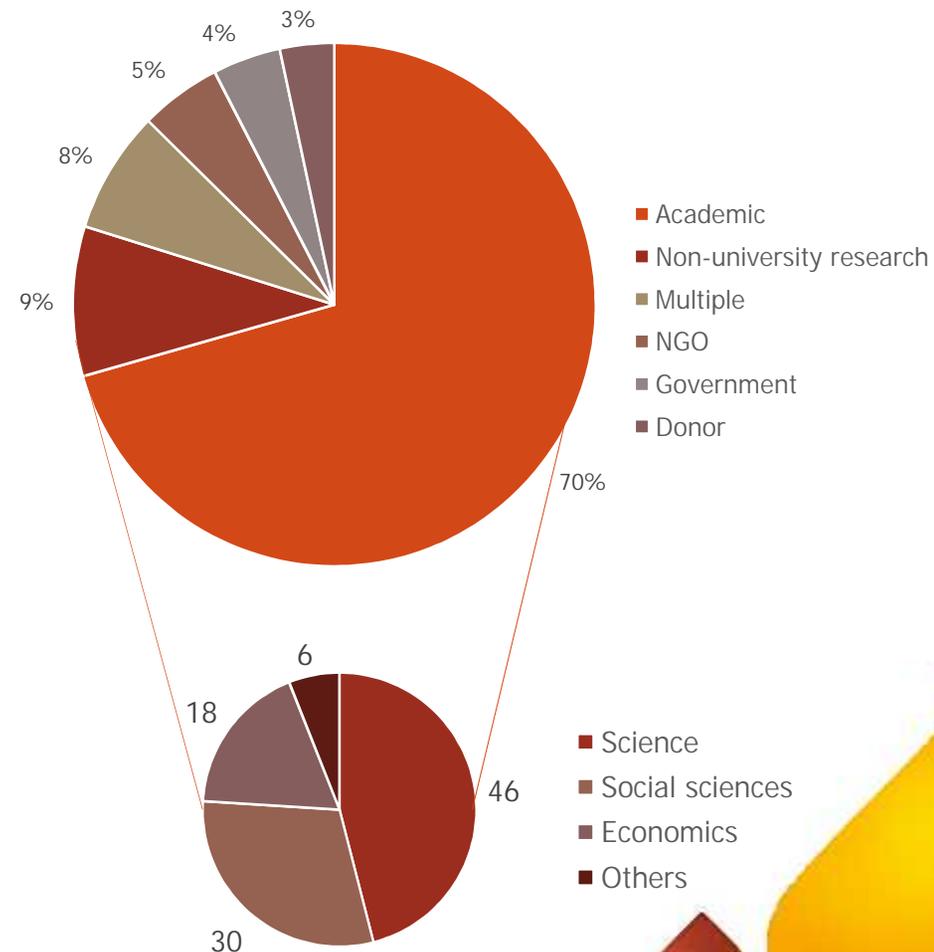
- Most VAs (76%) studied vulnerability shaped by climatic risks.
- Only 19% studies assessed vulnerability to both climatic and non-climatic risks. Few studies take a systems approach which recognises how multiple stressors shape vulnerability.
- Studies focussing on how governance and issues of power shape vulnerability were very few (notable exceptions include Shah and Sajitha 2009; Khan and Kumar 2010; Santha et al. 2015).



\* Both- climatic and non-climatic risks

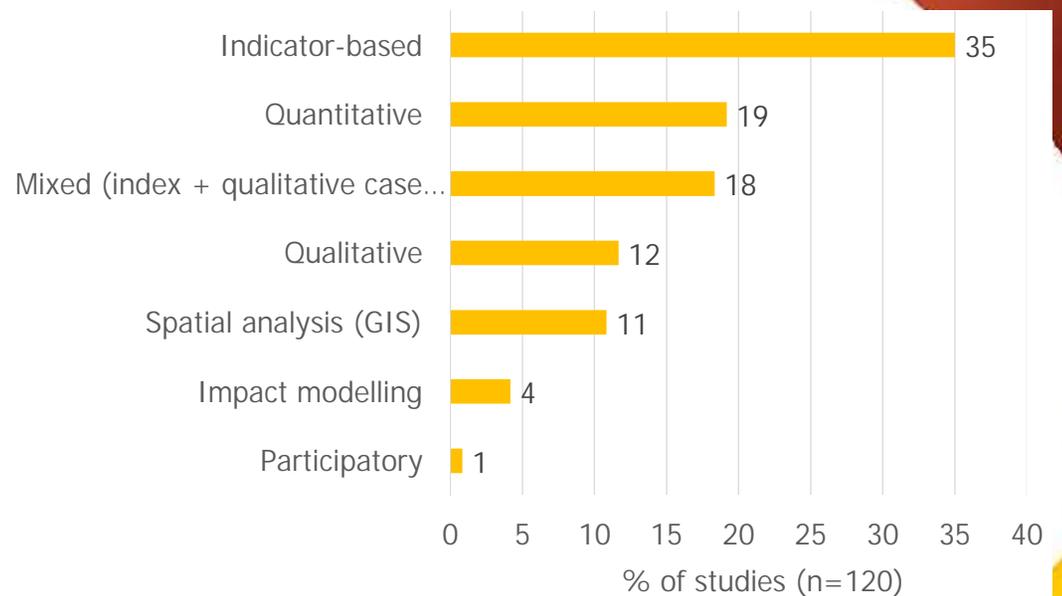
## Who assesses vulnerability?

- 65% were peer-reviewed literature while 35% were grey literature (learnings from practitioners may get overlooked!)
- ~80% researchers
- Dominance of one disciplinary perspective potentially overshadows other methodologies and ways of identifying who is vulnerable.
- Involvement of donors and multilateral bodies, government agencies and NGOs was significantly lower
- Results could be skewed because most VAs undertaken by multi-stakeholder partnerships, commissioned by governments or donors.



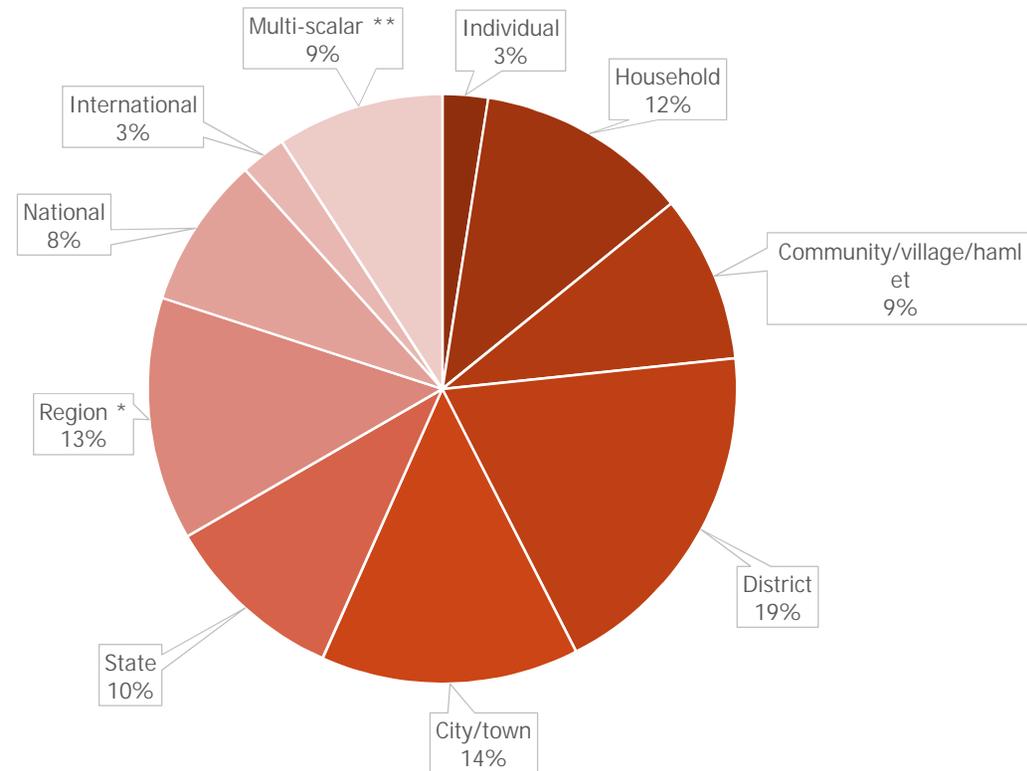
# Methodological approaches

- ❖ Dominance of indicator-based methodology
- ❖ Least reported: participatory methods (1%) followed by impact modelling studies (4%) which mainly came from papers modelling crop vulnerability to future climate change impacts.
- ❖ Continued dominance of the use of quantitative and indicator-based methods with lower use of qualitative methods (12%).



# Scale of assessment

- ‘District’ was the most commonly used unit to assess vulnerability (intermediate unit that reflects dynamics at wider scales and finer scales, unit relevant to development planning, availability of biophysical and socioeconomic data).
- Only 3% at the individual scale, which showed that intra-household dynamics are understudied.
- Only 9% assessed vulnerability at multiple scales.
- Four papers used a temporal analysis



\* Region- basin/catchment/coastal/forest

\*\* Multiscalar- more than one scales

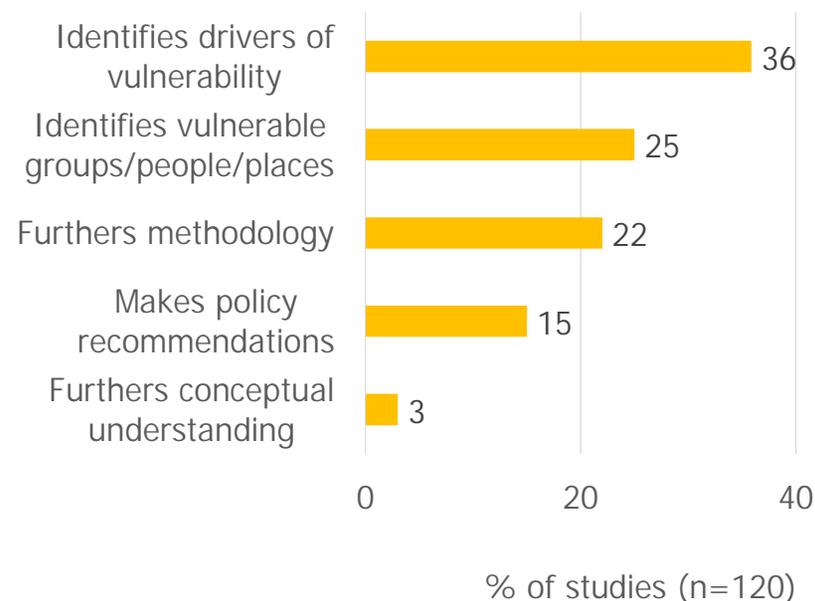


## Landscape focus of VAs

- ❖ 41% span multiple landscapes (rural, urban, and peri-urban). This can be attributed to the predominance of assessments at the district level, which may contain urban and rural areas.
- ❖ 34% VAs in rural landscapes: dissonant with India's urbanising context.
- ❖ Skewed because multilateral agencies and NGOs have a larger focus on rural areas
- ❖ Only 2% of the VAs mentioned peri-urban areas possibly because the conceptualisation of the peri-urban, especially in highly dynamic developing country contexts, is still under-studied.

# Types of findings from VAs

- 36% VAs focussed on identifying current drivers of vulnerability. Most studies using DRR approach identified gaps in resilience building to climate change.
- 25% VAs categorised who is vulnerable by mapping vulnerable regions, sectors, and people (e.g. caste-driven vulnerability by Boshier et al. 200, gendered vulnerability by Garikpati 2008).
- 22% furthered methodological practices to assess vulnerability.
- Although most studies made policy recommendations, only 15% VAs explicitly considered policymakers as their primary end users. Key questions on usability of VAs.
- Only 3% of the studies discussed the implications of their findings on vulnerability conceptualisation. Case of global south providing empirics for theory building in the north?



## So what?

Different conceptualisations of vulnerability are predisposed to certain methodological approaches and have significant implications on who and what is rendered vulnerable.

- ❖ Conceptual conservatism: 26% VAs used the IPCC framework despite calls for expanding indicator-based approaches to more relational, context-based inquiries.
- ❖ Methodological myopia: innovations in vulnerability research (role of risk perception in shaping adaptive capacity, multi-scalar interactions shape local vulnerability, socio-cognitive constraints) have yet to percolate into reported VAs in India.
- ❖ Temporality ignored: Past trajectories of change and their drivers are often missing. How do existing rules and values shape differential vulnerability, unpack seemingly homogenous categories of 'high', 'medium' and 'low' vulnerability
- ❖ Absent audience: Few VAs explicitly mentioned targeted or potential end-users

## Ideas for future research

- ❖ How are existing and future vulnerabilities perpetuated and (re)created in places of transition such as at **peri-urban interfaces**?
- ❖ How do how relatively passive drivers (climate variability, natural resource degradation) interface with highly political and contested factors (changing caste dynamics, rising inequality, or political will and fund allocation)?
- ❖ How does vulnerability change over time – **temporality**
- ❖ SLR for **urban adaptation**

# Thank you!

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