The economic and financial risks of implementing the '30x30' Global Biodiversity Framework targets

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* This presentation reflects the opinions of the authors and does not reflect the views of the World Bank or its partners

Background

- Global Biodiversity Framework (GBF) signed by 195 countries aims to halt and reverse nature loss
- ’30x30 targets’ aim for a rapid shift in land uses to protect nature:
  - **Target 2: restore 30% all degraded ecosystems by 2030**
  - **Target 3: conserve 30% all land, waters, and seas by 2030**
- Yet, land use patterns are far from where they need to be to reverse nature loss (Díaz et al., 2019)
- Footprint analyses suggest conservation and economic land uses coming into competition: 1.4 million km^2 cropland is in PAs, of which 22% in strictly protected areas (Vijay and Armsworth, 2021)
- The most highly biodiverse ecosystems mainly located in developing and emerging economies, often also dependent on primary commodity exports from land-intensive economic activity
- Meeting 30x30 targets may present significant disruptions to economic activities in some regions over a short time frame.

Literature review

- Only a few studies look at *economic consequences of* nature conservation policies – mainly using integrated assessment models (IAMs)
- Johnson et al. (2021) estimate opportunity cost of implementing 30x30 (vs developing land to most profitable use) is $115 billion globally by 2030 (0.1% global GDP)
- Naso et al. (2022) model reducing agricultural land use by 37.5% over 15 years and find social welfare losses to represent around 1% global GDP
- DNB (2023) 'half earth scenario' (50% earth as protected area) would lead to 17% increase in agricultural product prices but only limited GDP declines globally.
- Waldron et al. (2020) did a cost-benefit analysis of 30x30: finds agri, forestry, fisheries sectors would benefit from increased revenues ($64-454bn by 2050) with costs of implementation at $103-178bn
- Overall, these studies don't find significant macroeconomic impacts from 30x30 targets

Problems with existing studies (1)

- Land scarcity → relative price effects → labour/capital allocation shifts to agriculture
- 'Weak sustainability' perspective of substitutability of land with human forms of capital → highly contested:
  - Fixed supply and location-specific qualities of land (Smith, Ricardo, Stuart Mill, etc)
  - Improving agri yields cannot compensate v large reductions in agricultural land availability
  - Agri yield increases achieved over 20th century (Green Revolution) unlikely to be replicated – e.g., due to land degradation, physical risks of climate change
  - Additional agri intensification has diminishing returns, can exacerbate water scarcity, soil infertility
  - Capital & energy intensity of "landless" food production innovations (vertical farming, hydroponics)
  - Environmental rebound effects
- Elasticities of substitution are highly sensitive parameters but are quite arbitrarily chosen
- Exogenous scenario narratives (SSPs) assume rapid pace of technological development is not affected by nature shocks

Problems with existing studies (2)

- Models resist representation of alternative imaginations (Täger, 2022)
- Notably, policy analysis focuses on marginal changes rather than structural/transformative reforms
- Estimate economic impacts *at point of equilibrium* – economy assumed to have priced in all changes implied by policy shock and adjust supply/demand in all markets smoothly
- Not captured:
  - Economic dynamics resulting from short-term adjustments to policy shock
  - Hysteresis effects
- This ‘blind spot’ matters for understanding macrofinancial dynamics of 30x30 targets

Research motivations

1. What kinds of macroeconomic and financial risks might arise from rapid shifts in land use to meet the 30x30 targets?
2. Which economies and regions might be most affected?

Our analysis makes some simplifying assumptions:

- We assume *a priori* that 30x30 targets will be achieved → abstracts away from various political, institutional, structural challenges that might prevent that happening
- We assume for simplicity that land uses for maximising economic development are broadly incompatible with nature conservation and restoration → reality is more complex and 'messy'

30x30 targets as source of transition risk

- 30x30 targets are <u>not</u> compatible with large-scale, intensive commercial activity – even if managed "sustainably". *Sustainable use* provision is limited to low-impact subsistence level activities.
- **Implies increased competition between economic land uses and nature conservation.**
- 'Hard stop' of some agri/mining/forestry activities at commodity frontier to meet 30x30 targets
- Unfavourable dynamics influencing demand for and 'supply' of *productive* land

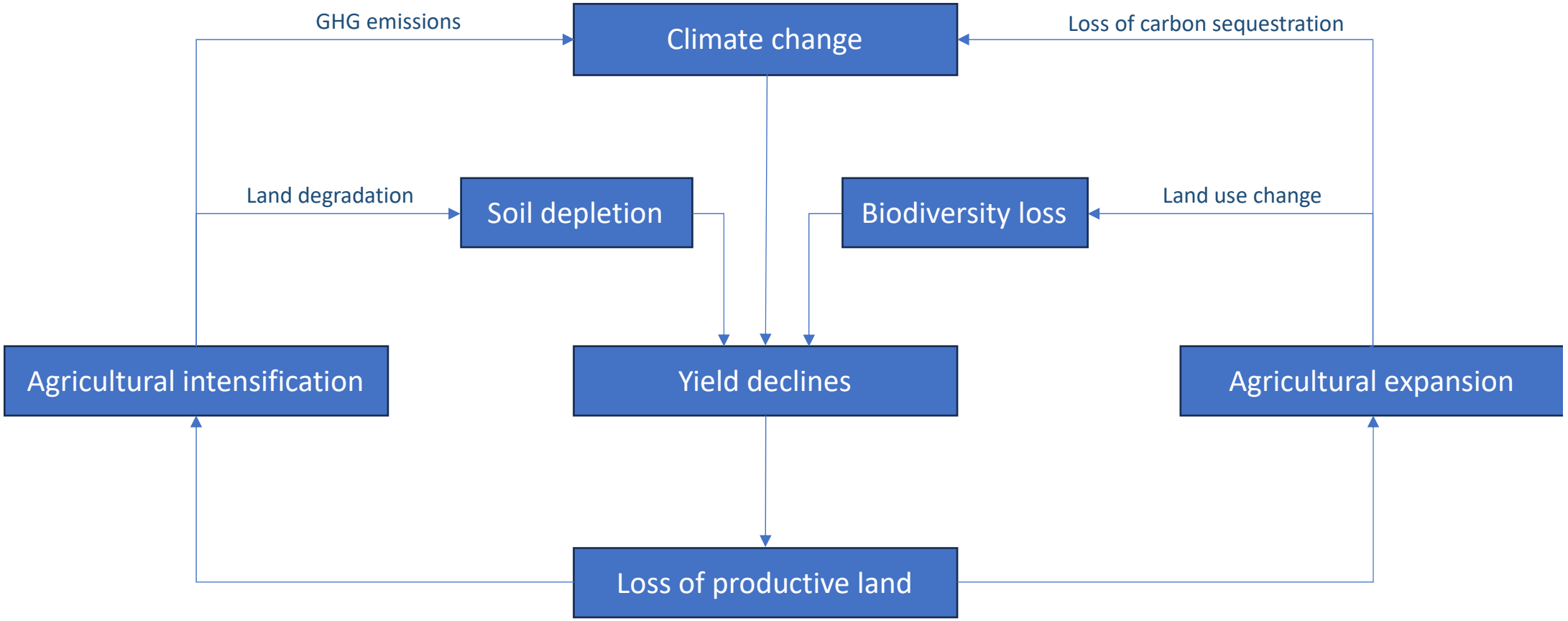
Demand side

- Future food demand
- Land-based CO_2 removal & BECCS
- Urbanization
- Mining (e.g., for critical minerals)

Supply side

- Effects of climate change (rainfall, temperatures, water scarcity)
- Land degradation, loss of pollinators
- Sea level rise

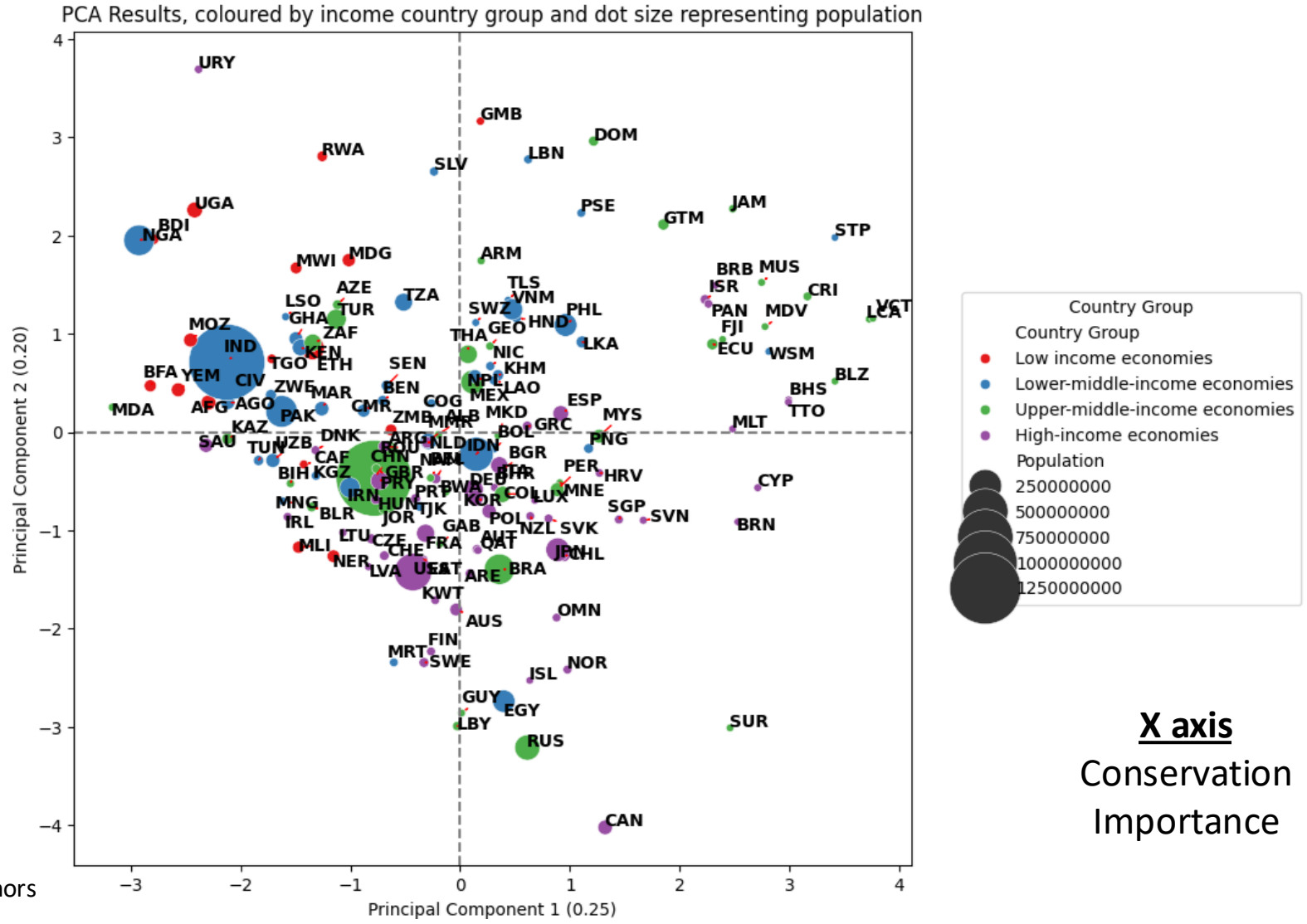
30x30 targets as source of transition risk



Source: figure adapted from Benton et al. (2021).

Which countries might be affected by competition btw conservation/ economic land uses?

Y axis
Land Competition Pressures



Source: authors

X axis
Conservation Importance

Macroeconomic risk transmission channels

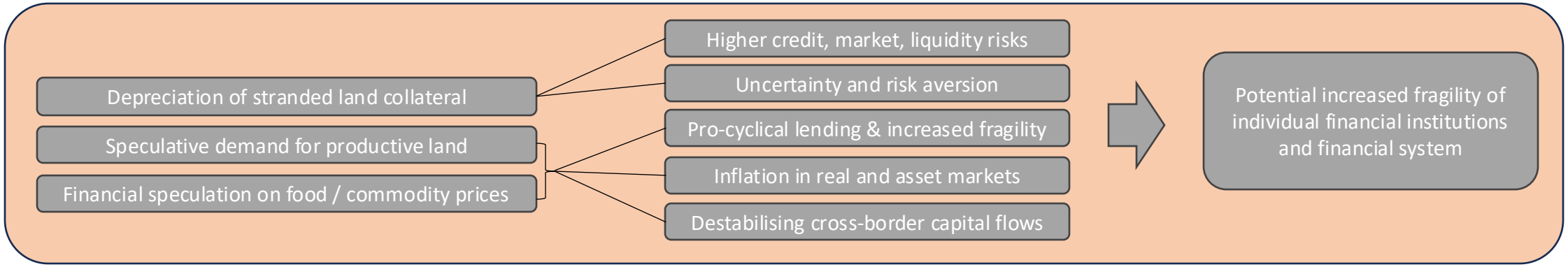
- Economies dependent on primary commodity exports: balance of trade, current account, fiscal revenues, access to dollar liquidity → increase in external vulnerability
- In land-scarce countries:
  - Tricky trade-offs allocating land between domestic food production and export commodity production
  - Higher prices/rents of productive land outside of conservation zones → inflationary pressures
- Food price shocks → fiscal stress for food importers → cascading effects across regions (export bans, hoarding)

Micro effects: Stranded land assets

- Recent efforts to reduce deforestation-linked commodities (e.g., EU Deforestation Regulation)
- Implies future increases in **stranded land assets :** undevelopable land holdings / mining concessions
- Adverse consequences for land-intensive firms operating at commodity frontier – whether write-down assets or continue to develop them (market and litigation risks)
- Lack of disclosures on extent of potential stranded land: some estimates of 29% oil palm concessions incompatible with NDPE standards in Indonesia (6.1 million ha).
- 'Nature markets' as a solution?
- Lack of empirical evidence of conservation effectiveness, high greenwash risk (difficult to demonstrate additionality), ongoing challenges to implementation/scalability (zu Ermgassen et al. 2019)

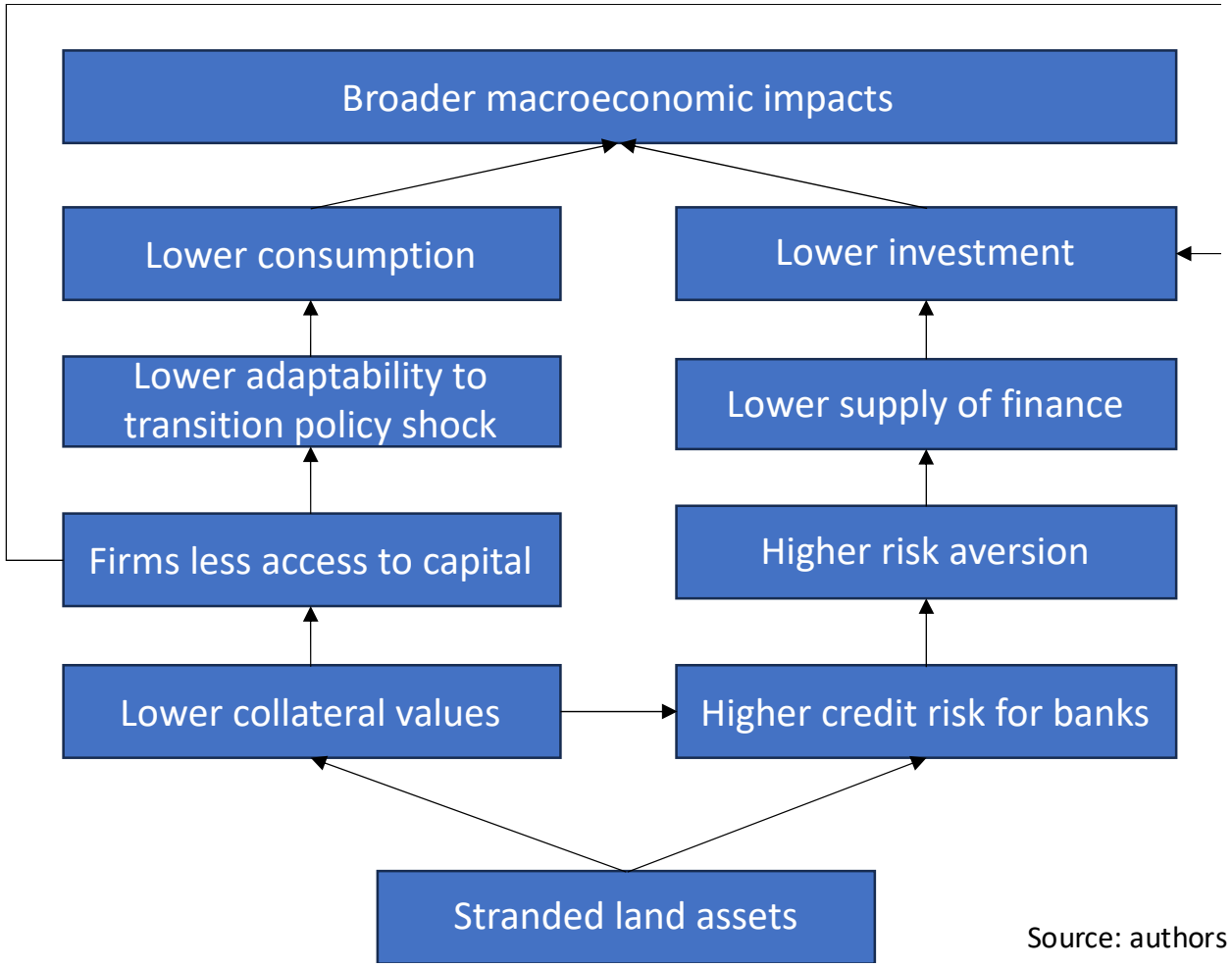
Macro-financial effects

- 'Special' role fulfilled by land in financial system could result in additional feedback effects
- As well as *productive* use value, land has:
- *Speculative* value: land values tend to appreciate relative to other assets and growth over long run (Knoll et al., 2017) → role as "safe" portfolio asset
- *Liquidity* value → role as "reliable" collateral for financial system



Stranded land & collateral effects

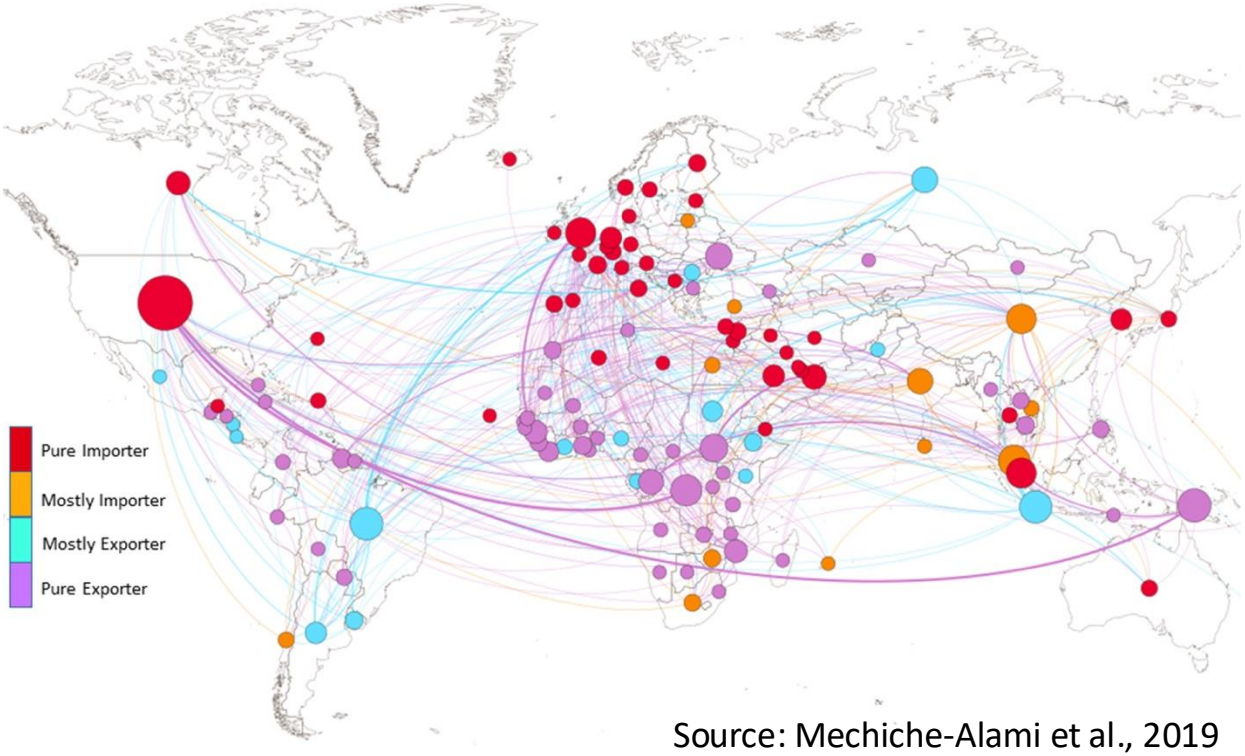
- Stranded land = depreciating collateral
- Exacerbate real economy shock through increased risk aversion & less access to finance
- These effects well-documented for residential housing assets (e.g., Schmalz et al., 2017)
- Same dynamics for agricultural land or land-based concessions???



Source: authors

Land scarcity & speculation/grabbing

- Increasingly scarce productive land = appreciating asset
- Interaction of fixed supply of land & more elastic supply of credit = source of pro-cyclicity (Ryan-Collins, 2021)
- Speculative rush for agricultural land in Global South early 2000s
- 76% LSLAs non-domestic actors with financial institutions prominently involved (Mechiche-Alami et al., 2019)
- On the horizon: “green grabbing” – carbon/biodiversity offsets and credits



Source: Mechiche-Alami et al., 2019

Conclusions

- **Aims**: integrating key insights from ecological economics ('strong sustainability') and post-Keynesians (speculative & liquidity use values of assets) to explore macrofinancial implications of supply-side constraints (as called for by Michell 2023) implied by Global Biodiversity Framework.
- Land-use related transition policy shocks may impose additional and distinct risk transmission channels compared to climate-related policy shocks
- PCA suggestions low- and middle-income countries disproportionately potentially exposed to emergence of land competition pressures in areas of conservation importance
- Many risk transmission channels identified also potentially skewed to low/middle income countries: connection between deforestation-linked primary commodity exports and external vulnerability.
- Supports the case for (i) distributional measures, fiscal support; (ii) involvement of financial policymakers to help manage development/conservation trade-offs
- Important data gaps: e.g., magnitude and exposures to stranded land assets
- Key role for ecological macroeconomic models to explore identified dynamics further in scenarios.

Thank you – questions?

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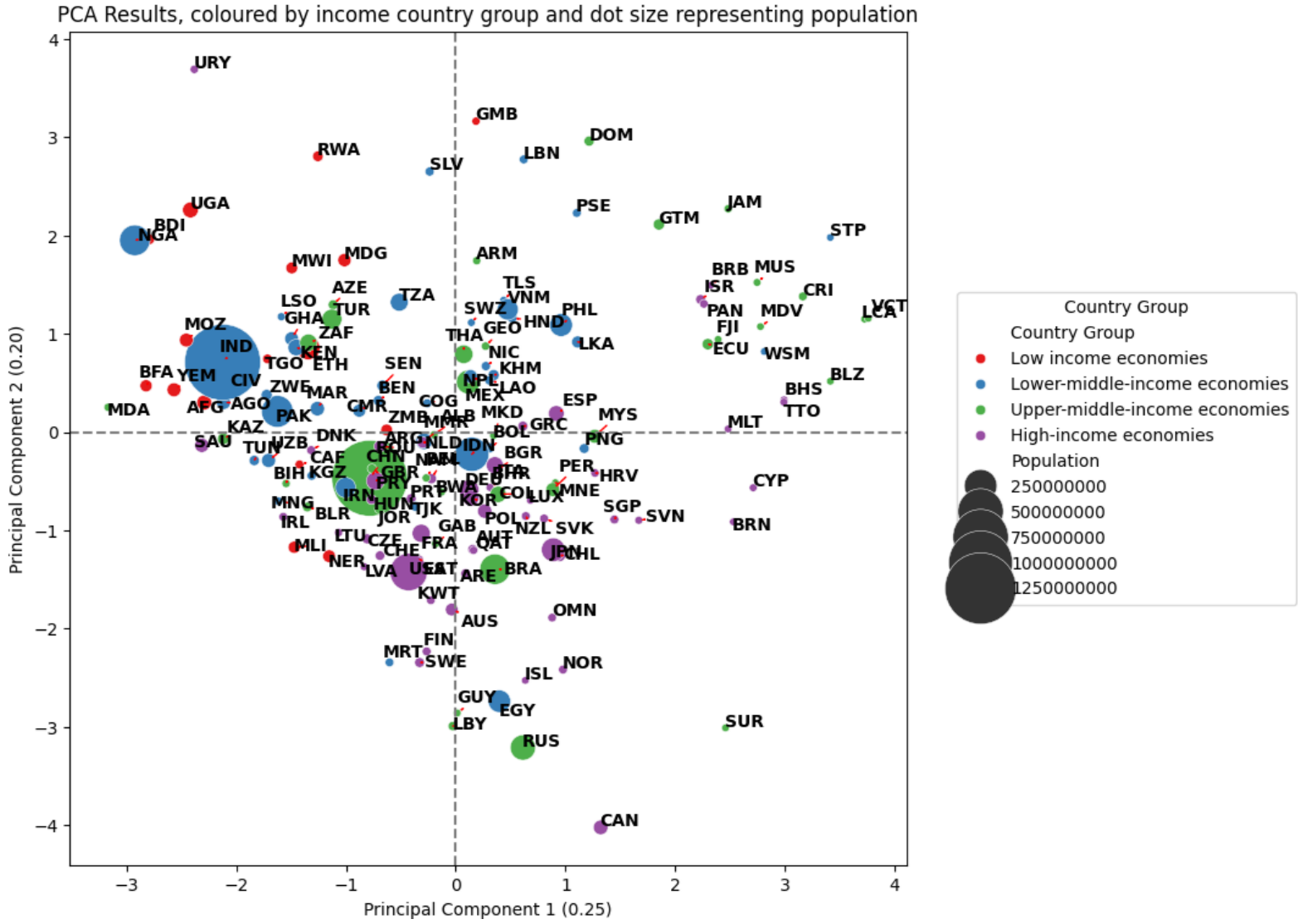
Country-level cluster analysis

- Which countries and regions are likely to be most affected by increased competition between conservation/economic land uses?
- Identified key indicators:
  - Extent of land in each country identified as important for conservation: existing PAs plus Key Biodiversity Areas (KBAs), Ecologically Intact Areas (EIAs), and 'New Priority' conservation areas → Allen et al., (2022)
  - Area of conservation-priority land projected to be at risk of habitat conversion by 2030 (under SSP2 scenario)
  - Extent of agricultural land area (as % total area); share of population employed in agricultural sector
  - Food system resilience: food insecurity of population
- Coverage of 150 countries across 9 variables
- All data normalized → performed Principal Component Analysis

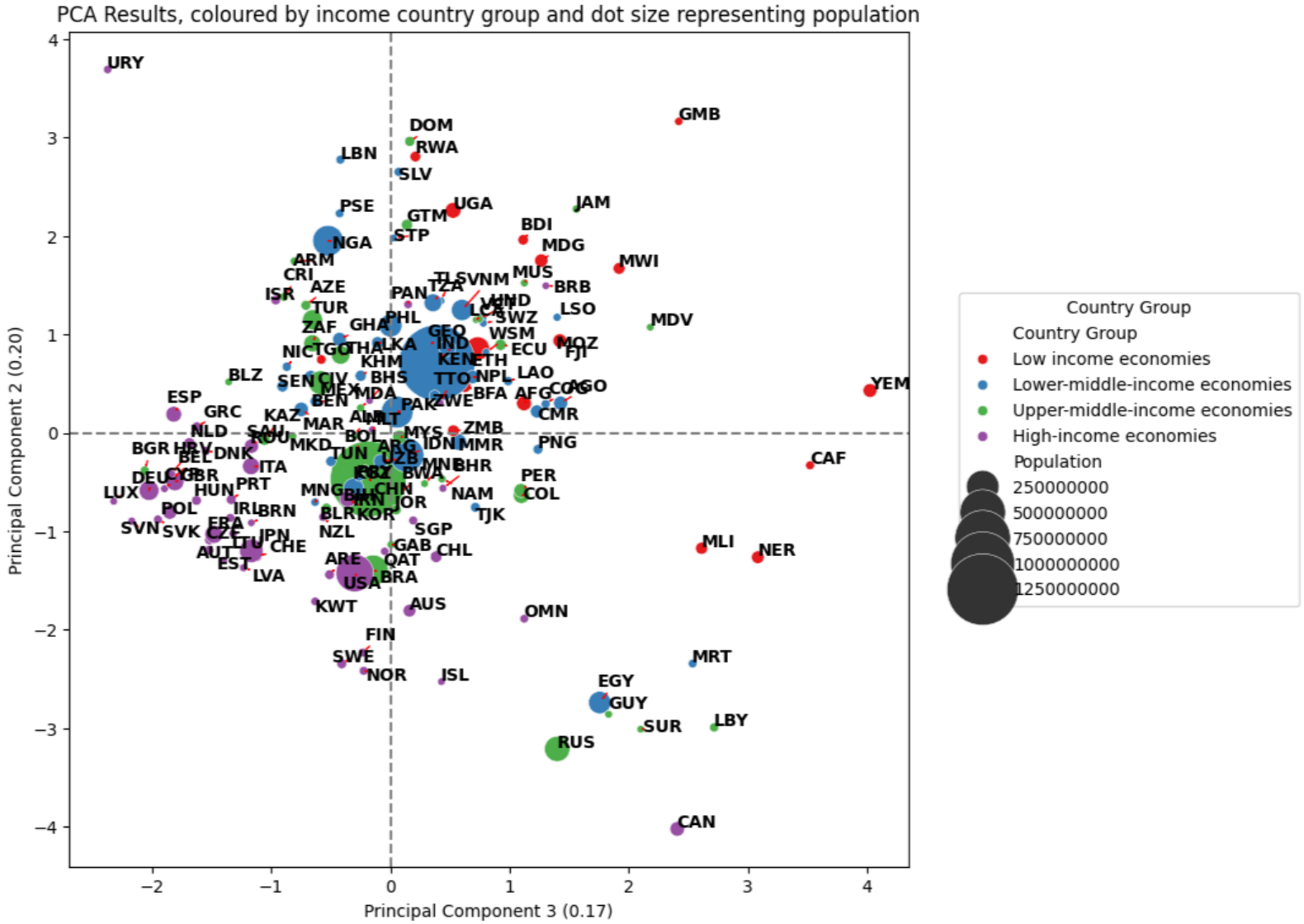
Correlation factors for principal components

Data code	Description and reference year of underlying data	PC1: "Conservation Importance"	PC2: "Land competition"	PC3: "Economic Adaptability"	Data source
	Variance explained by the PC	25%	20%	17%	
PA	Existing Protected Areas, (% of country land area) (20.5 Mkm²) (Yr. 2020)	0.22	-0.06	-0.39	Allan et al. 2022
KBA	Key Biodiversity Areas (% of country land area) (11.6 Mkm²) (Yr. 2020)	0.43	0.28	-0.18	Allan et al. 2022
EIA	Ecologically Intact Areas, (% of country land area) (35.1 Mkm²) (Yr. 2020)	0.04	-0.46	0.42	Allan et al. 2022
New P	Additional Conservation Priorities to promote species persistence, (% of country land area) (12.4 Mkm²) (Yr. 2020)	0.36	0.43	0.28	Allan et al. 2022
Cons	Total land defined as important for conservation (PA + KBA + EIA + New P removing overlapping areas) (% of country land area) (64.1 Mkm²) (Yr. 2020)	0.56	0.19	0.28	Allan et al. 2022
HabLoss30	Proportion of intact land requiring conservation in each country projected to be at risk of habitat conversion by 2030 under SSP2 (middle-of-road)	-0.16	0.46	-0.18	Allan et al. 2022
AGRI_EXT	Extent of agricultural land area (% of country land area) (Yr. 2021)	-0.39	0.38	-0.22	World Bank
Emp Sh	Employment in agriculture (% of total employment) (Yr. 2021-2022)	-0.31	0.28	0.39	World Bank (modelled ILO estimate)
Food Ins	Prevalence of severe food insecurity (% population) (Yr. 2021)	-0.21	0.20	0.50	World Bank Food Security Outlook

Conservation Importance (PC1) vs Land Competition (PC2)



Land Competition (PC2) vs Economic Adaptability (PC3)



Summary of PCA findings

- Low- and middle-income countries disproportionately potentially exposed to emergence of land competition pressures in areas of conservation importance
- For some lower-middle and low-income countries, land competition pressures also coexist with lower potential adaptability of agri-food system to rapid changes in land use
- First step, high level analysis aimed at exploring where transition risks related to 30x30 might emerge

Important limitations of PCA

- We don’t account for potential mitigating role of technology and closing yield gaps
- Due to lack of broad global data coverage on yield gaps (particularly small island states)
- PCA doesn’t consider interconnections between countries: trade, cross-border financial dynamics
- Top-down approach abstracts from diverse institutional and geopolitical contexts

Loading charts for PCA