



FULBRIGHT
UNIVERSITY
VIETNAM

FULBRIGHT SCHOOL OF
PUBLIC POLICY AND MANAGEMENT

Sustainability and Climate Change

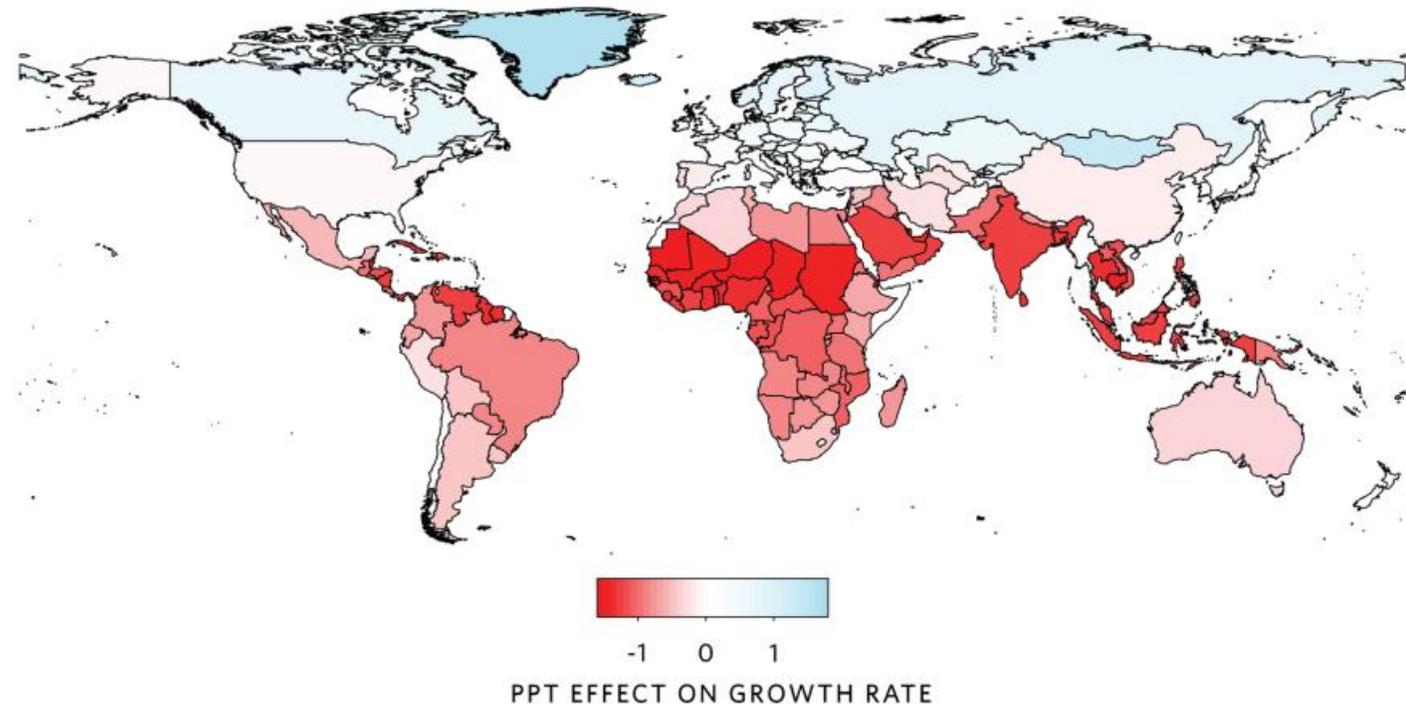
Development Policy
Summer 2023



Climate change and development

- Climate change, caused by rich countries, will slow development in the rest of the world
- Rise in the number of poor people in poverty as food prices rise

Estimated Change in Economic Growth Associated With a 1 Percent Increase in Average Temperatures



Source: Carnegie Endowment for International Peace



Sustainable development

- World Commission on Environment and Development (1987)
- Sustainable development define as “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”
- Per capita consumption should not decline over time.
- Intergenerational equality



Sustainability and the Hartwick Rule

- Three kinds of capital
 - Reproducible capital: Roads, irrigation systems, buildings, factories, etc.
 - Human capital: Knowledge and skills
 - Natural capital: Nonrenewable resources, ecosystems
- If these forms of capital are substitutes, then sustainability requires that:
 - Investment in reproducible and human capital is at least equal to the resource rents from the depletion of natural capital
 - $I^G \equiv I - D - R \rightarrow$ Genuine investment is approximately equal to investment less depreciation and the extraction of resource rents

Substitutability



- Ecosystems provide unique services that cannot be replaced by reproducible and human capital, e.g. forests and climate change
- “Weak Sustainability”
 - Reproducible and human capital can substitute for all forms of natural capital
 - Hartwick Rule provides a rule of thumb
- “Strong Sustainability”
 - The Hartwick Rule must be modified to leave ecosystems intact
 - Uncertainty over how future generations will value irreplaceable ecosystems reduces our ability in the present to deplete them



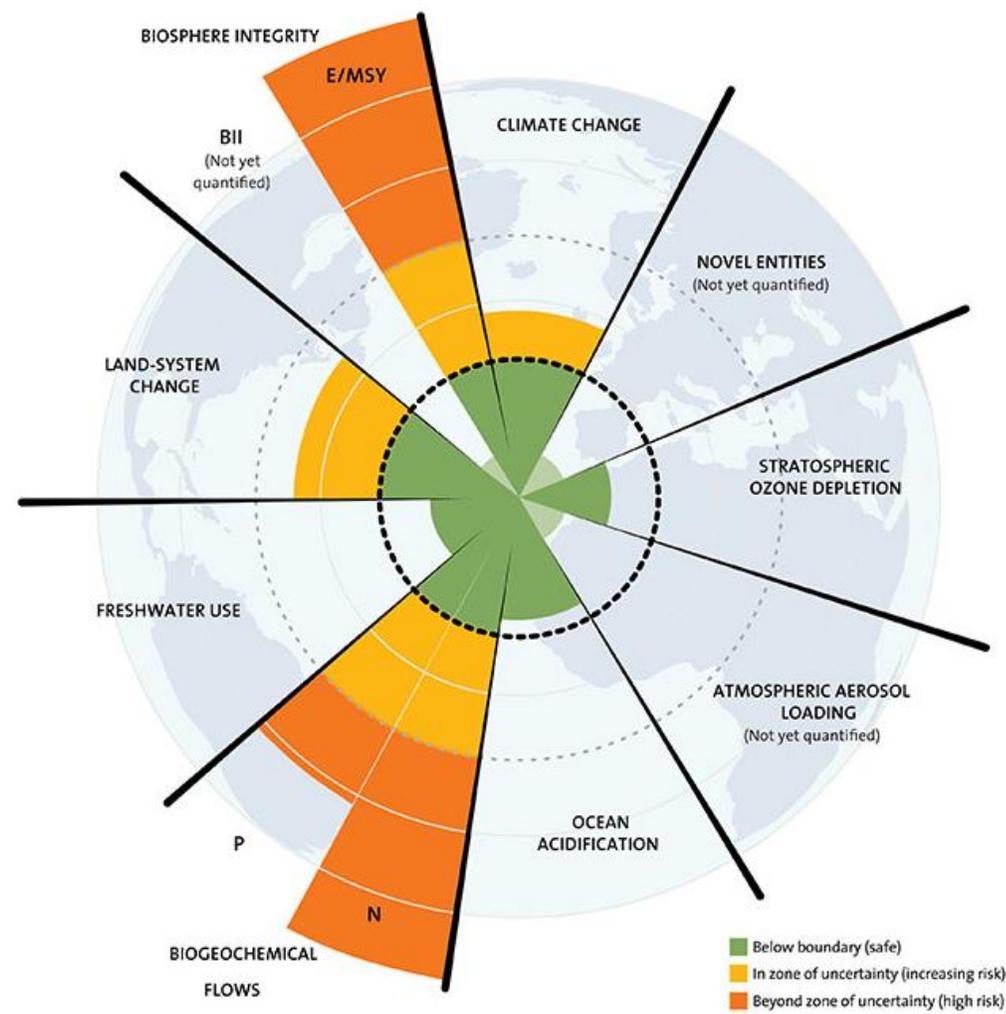
Threshold effects

- At some point ecological damage becomes irreversible: for example, overfishing to the point of extinction of species or destruction of the ozone layer
- At these tipping points environmental degradation becomes a threat to human survival
- “Planetary boundaries” necessary because uncertainty about the impact on future generations of exceeding these thresholds
- But many of these ecosystems are in developing countries: Who will pay to protect them?



Nine tipping points

1. Climate change
2. Biodiversity loss and extinctions
3. Overuse of chemical fertilizers (nitrogen and phosphorus flows)
4. Stratospheric ozone depletion (Montreal Protocol)
5. Ocean acidification
6. Freshwater availability and consumption
7. Arable land availability
8. Chemical pollution and release of novel entities
9. Atmospheric aerosol loading (particulate matter air pollution)



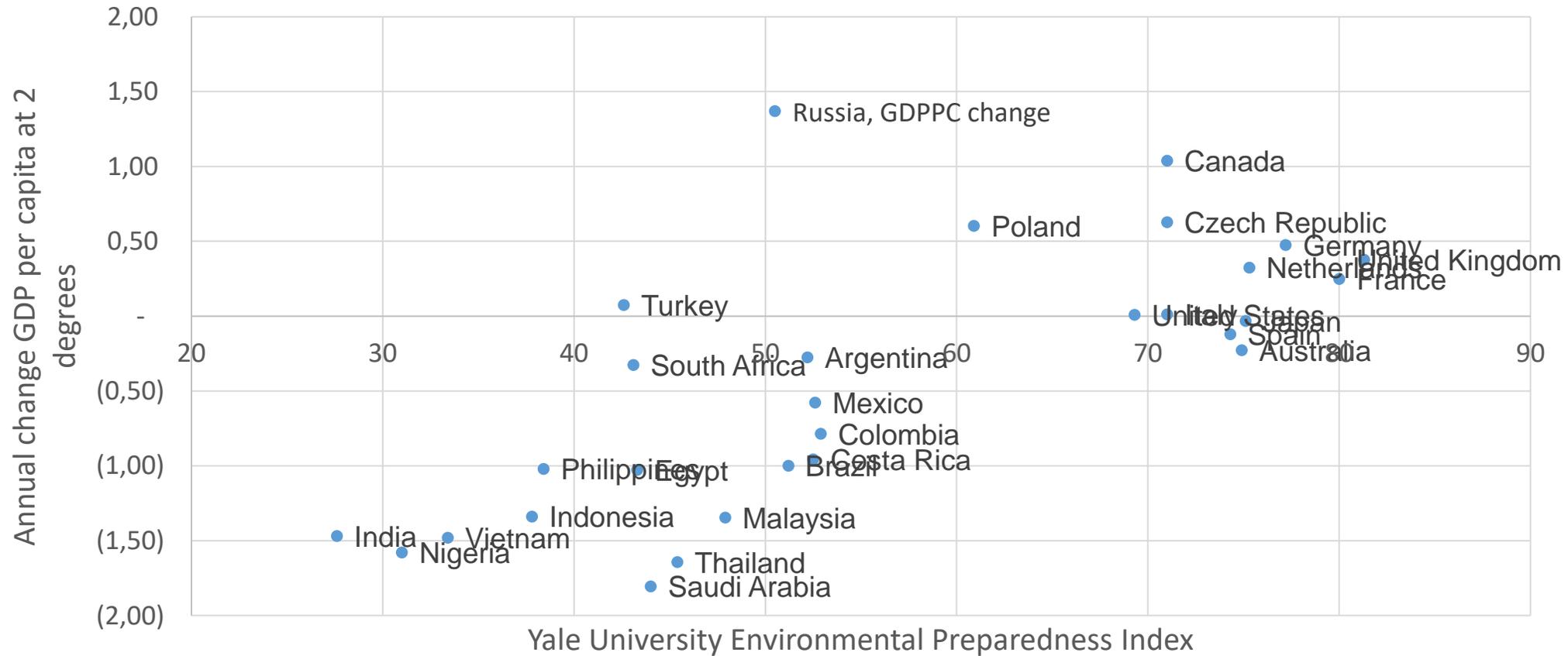


Climate change

- To stabilize temperatures below 2° rise (2015 Paris Climate Accord) we will need to reduce emissions of GHG by 20% from business as usual over the next two decades
- Need to achieve net-zero emissions (sources of GHG equal to sinks) in the second half of the century
- A 3-5° rise would lead to profound changes to human and physical geography due to floods, droughts, sea level rise



The most impacted are the least well prepared





Global climate risk 2021

- Four Southeast Asian countries in top 8 worldwide for climate risk
- Storms, floods, droughts, heat, saline water intrusion
- Typhoons decreasing in frequency but increasing in intensity

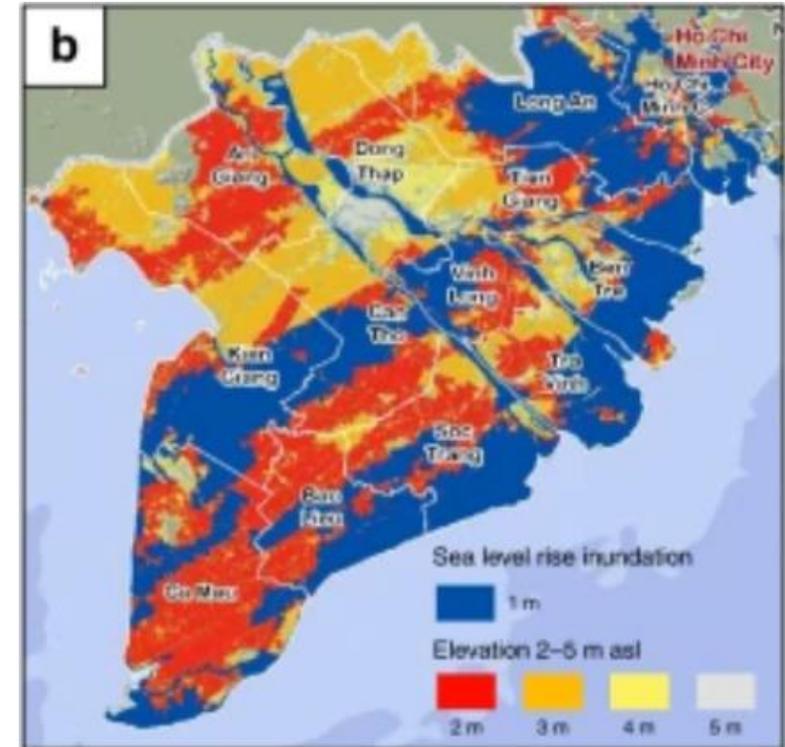
Rank	Country	Deaths	Deaths per 1,000	Losses % GDP	Events
1	Puerto Rico	149,900	4.09	3.8%	25
2	Myanmar	7,052,400	14.29	0.8%	55
3	Haiti	274150	2.81	2.4%	78
4	Philippines	869800	0.96	0.6%	317
5	Pakistan	499450	0.30	0.5%	152
6	Vietnam	285800	0.33	0.5%	226
7	Bangladesh	577450	0.39	0.4%	191
8	Thailand	140000	0.21	0.9%	147

Source: Germanwatch.org



Coastal zones at risk

- 270 million people living in rural low elevation coastal zones, 84% in Asia
- Poverty-environment traps: over-reliance on marginal lands and resources → saline intrusion, floods, sea level rise
- One meter rise in seas levels would inundate 74,000 km² in Asia, including 10% of Vietnamese population (Mekong Delta)
- Development of alternative incomes including migration, but managed to prevent costs of migration falling only on the poor

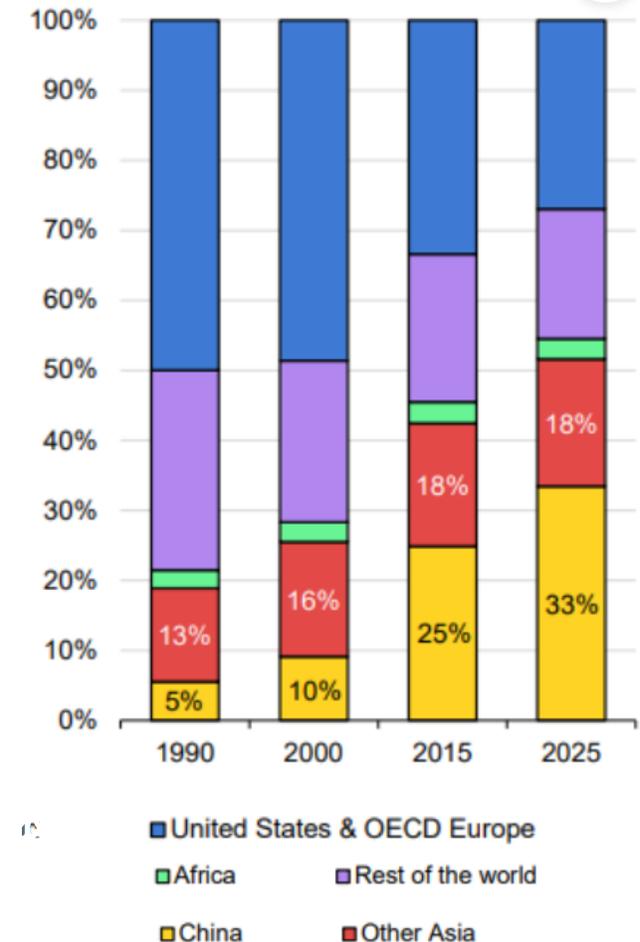


Source: Minderhoud et al 2019



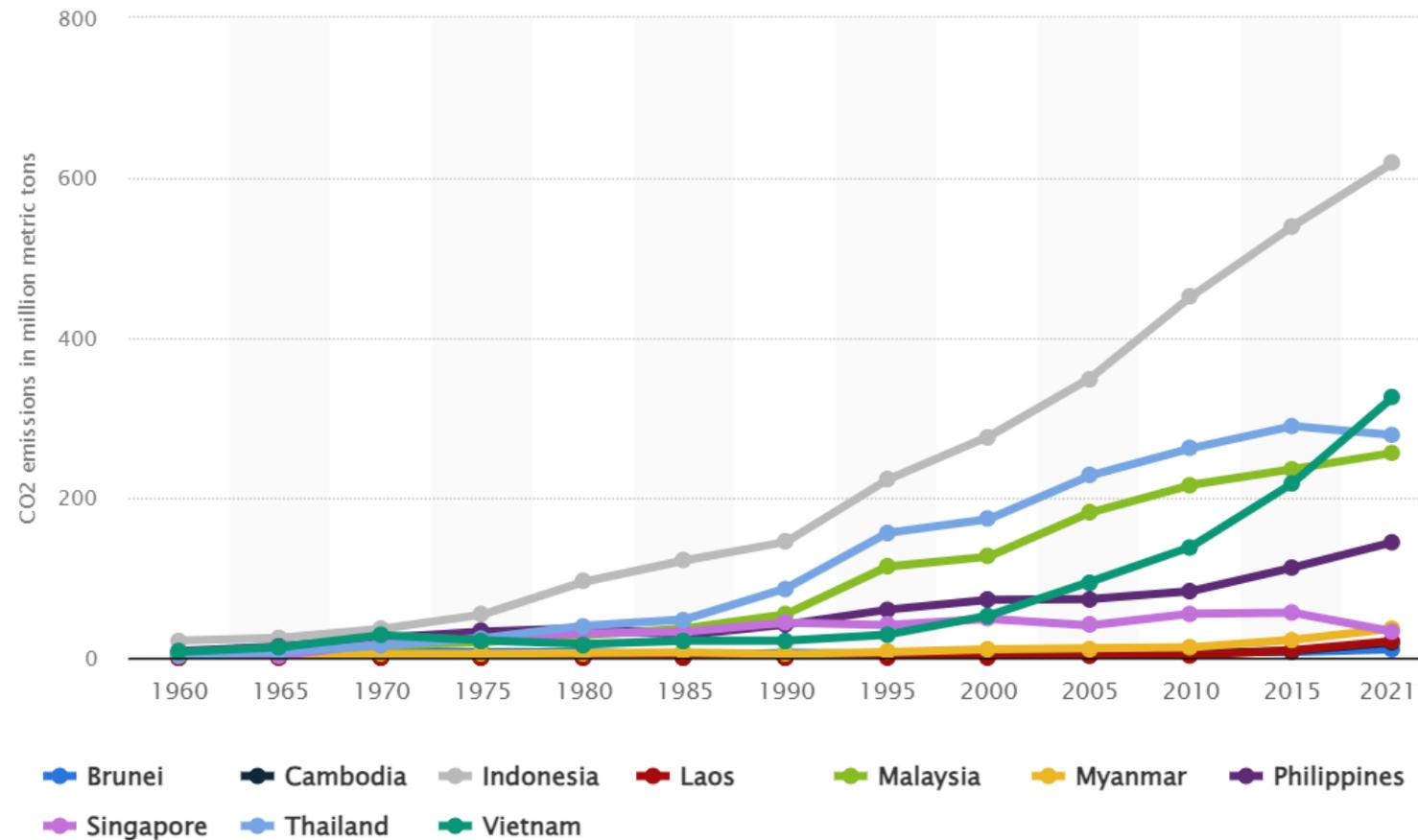
Climate change mitigation

- For the 2^o scenario countries must reduce their 2030 emissions to 2000 levels
- Renewable energy was 18% of final consumption in 2017 and 26% of electricity production in 2018 (solar, wind, hydro, marine, geothermal, biomass and biofuels)
- Fuel switching (coal to gas) and increasing efficiency
- Carbon capture: Afforestation (especially in the tropics) and bioenergy carbon capture and storage
- Southeast Asian countries have agreed to slowing down growth of GHG emissions by 2030



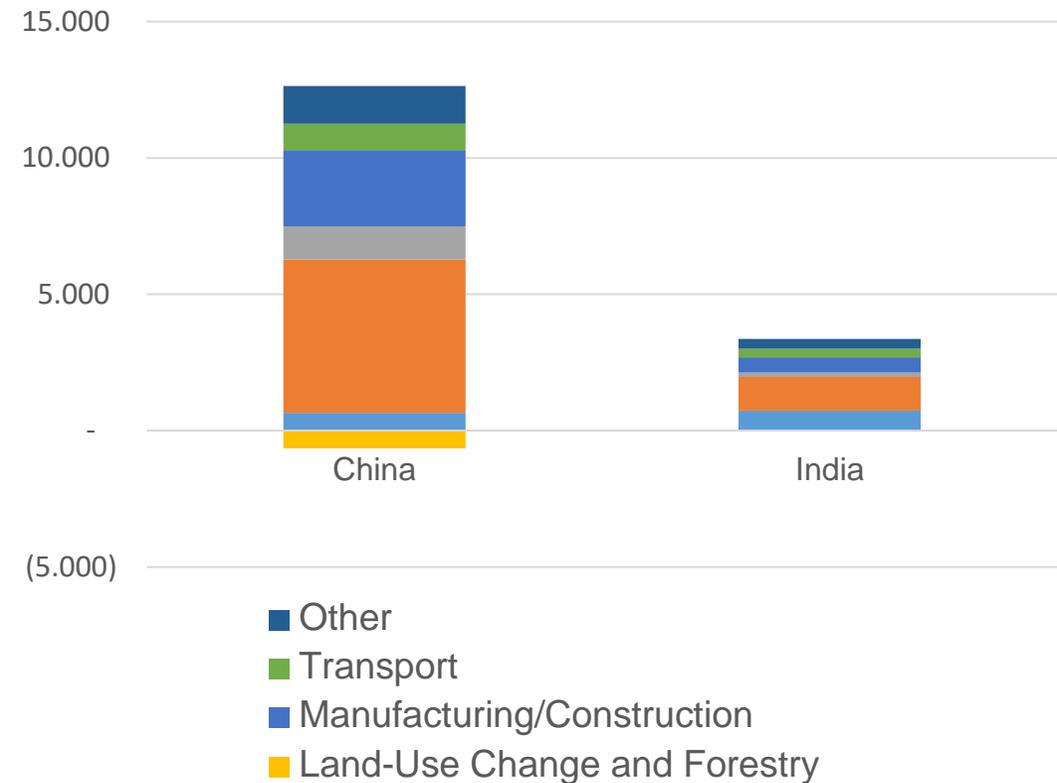
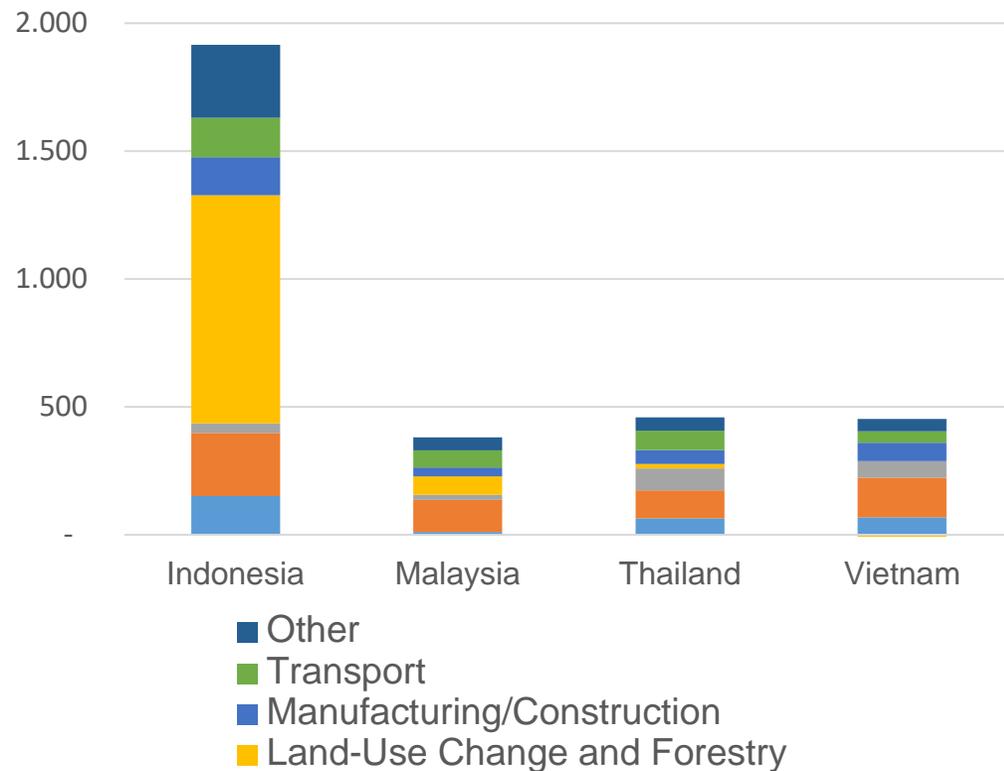


Greenhouse gas emissions over time



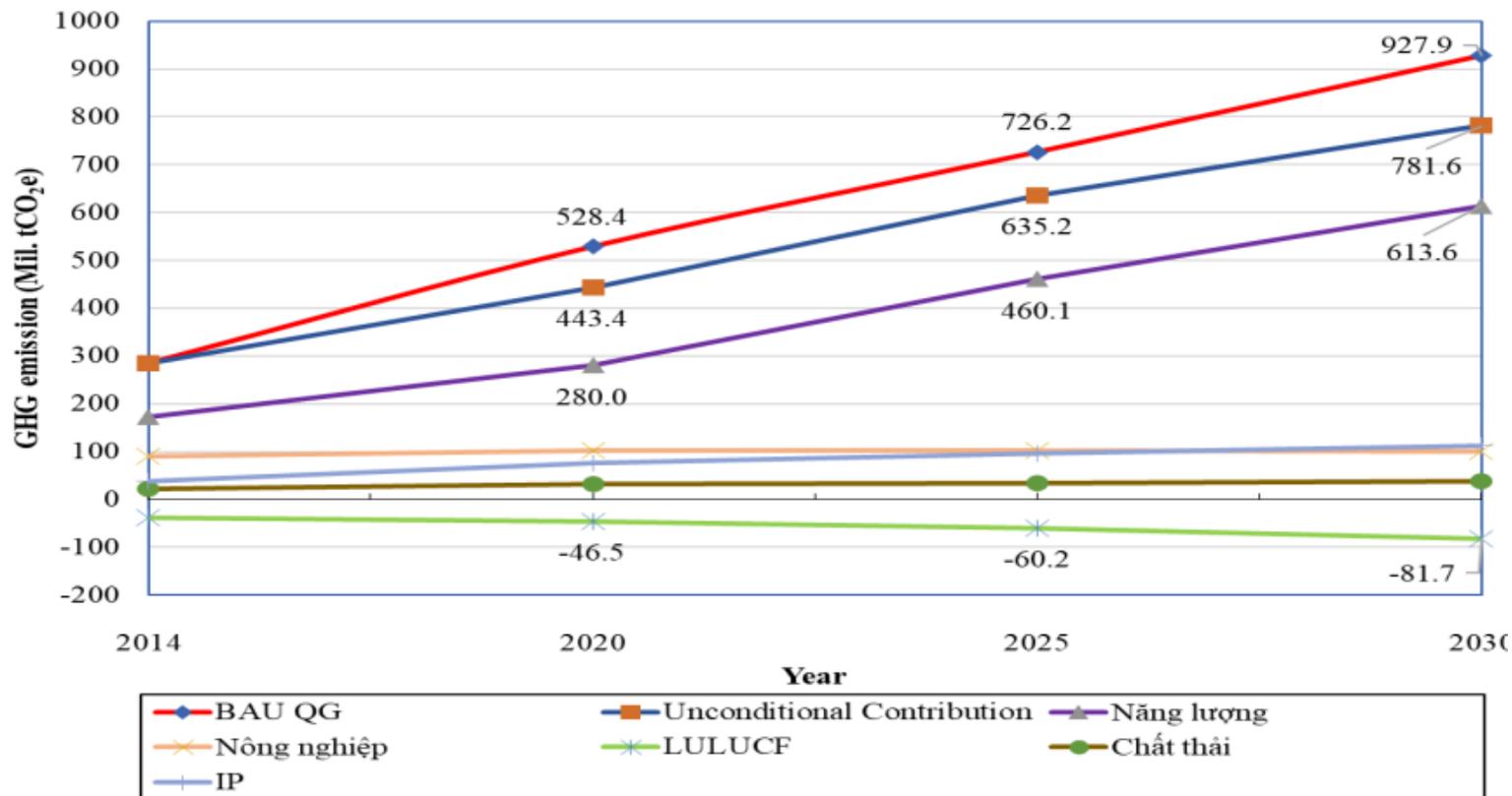


Greenhouse gas emissions 2019, GT





Vietnam's climate commitments (2022)



- Achieve net zero emissions by 2050
- reduce methane emissions by at least 30 percent below 2020 levels by 2030
- stop building new coal power plants and phase out coal power by the 2040s
- reverse and prevent deforestation by 2030



Just Energy Transition Partnership (JETP)

- December 2022 Vietnam and the International Partners Group (IPG) agreed to form a Just Energy Transition Partnership (JETP).
- IPG committed 7.75 billion public sector finance in the initial period of three to five years, and work with Viet Nam to mobilize at least USD 7.75 billion from private international financial institutions.
- World Bank estimates that Vietnam will need 15-30 billion dollars per year for energy transition through 2030.



Policy implications

- Externality: a cost (or benefit) resulting from production that is incurred by (received by) the producer. How can we deal with global externalities?
- Sustainability has usually meant replacing natural resources with man-made resources
 - But environmental tipping points: are some ecosystem services irreplaceable?
 - Climate change could increase poverty and destroy assets on a scale that we are not ready for.
- The international response to climate change is still far from adequate and we are likely to fail to contain temperature rise to 2 or even three degrees Celsius.



Discussion questions

- Why is Vietnam still building coal fired power plants?
- Define sustainability and discuss the implications of your definition for development policy