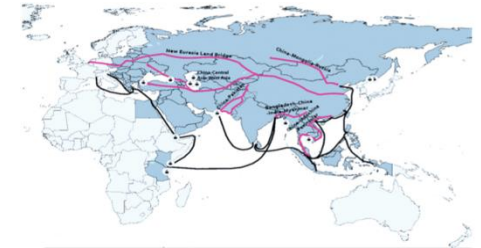
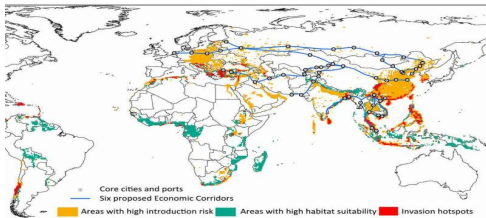
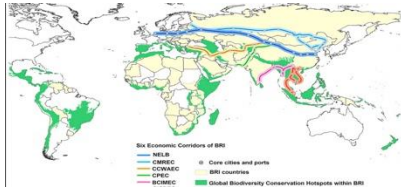


China's Belt and Road Initiative: Planetary Health Disaster or Planetary Health Opportunity?



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University of Oxford
& Oxford in Berlin
www.andrewfarlow.com

3 November 2019

Oxford Martin School

About Us

The Oxford Martin School at the University of Oxford is a world-leading centre of pioneering research that addresses global challenges.

We invest in research that cuts across disciplines to tackle a wide range of issues such as climate change, disease and inequality. We support novel, high risk and multidisciplinary projects that



Current Programmes



Affordable Medicines



Ageing Populations



Biodiversity



Carbon Investment



Climate Partnership



Collective Responsibility for Infectious Disease



Complexity



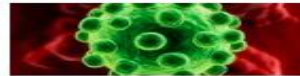
Cyber Security



Deep Medicine



Economics, INET Oxford



Emerging Infections



Food



Geoengineering



Human Rights



Illegal Wildlife Trade



Inequality and Prosperity



Mind & Machine



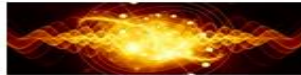
Natural Governance



Our World in Data



Post-Carbon Transition



Quantum Technology



Renewable Energy



Science & Society



Sustainable Oceans



Technological & Economic Change



Technology & Employment



Tidal Power

Former programmes



Armed Conflict



Cancer Therapy



Cities



Climate Change



Computational
Cosmology



Computing



e-Horizons



Economic
Development



Environmental
Change



Future Technology



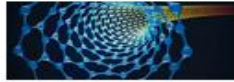
Global Health



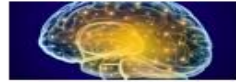
Humanity's Future



Migration



Nanomedicine



Neurodegeneration



Nuclear Materials



Oceans



Plants



Resource
Stewardship



Science & Ethics



Solar Energy



Stem Cells



Transport



Tropical Forests



Vaccines



World Education



Freie Universität Berlin



LONDON SCHOOL OF HYGIENE & TROPICAL MEDICINE



ROBERT KOCH INSTITUT



KLUG Deutsche Allianz Klimawandel und Gesundheit

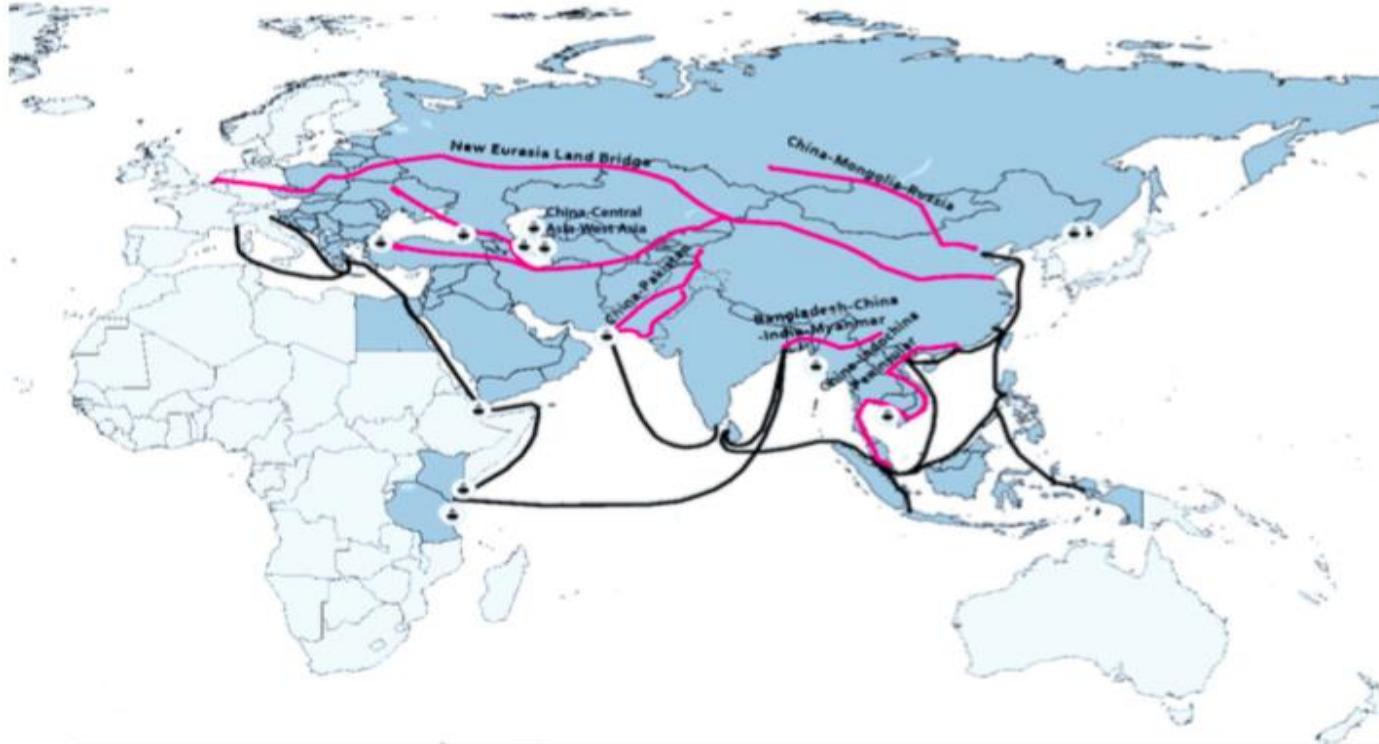


Oxford-Berlin-LSHTM Dialogue Healthy Planet – Healthy People 24th October 2019

Oxford's global health network



BRI

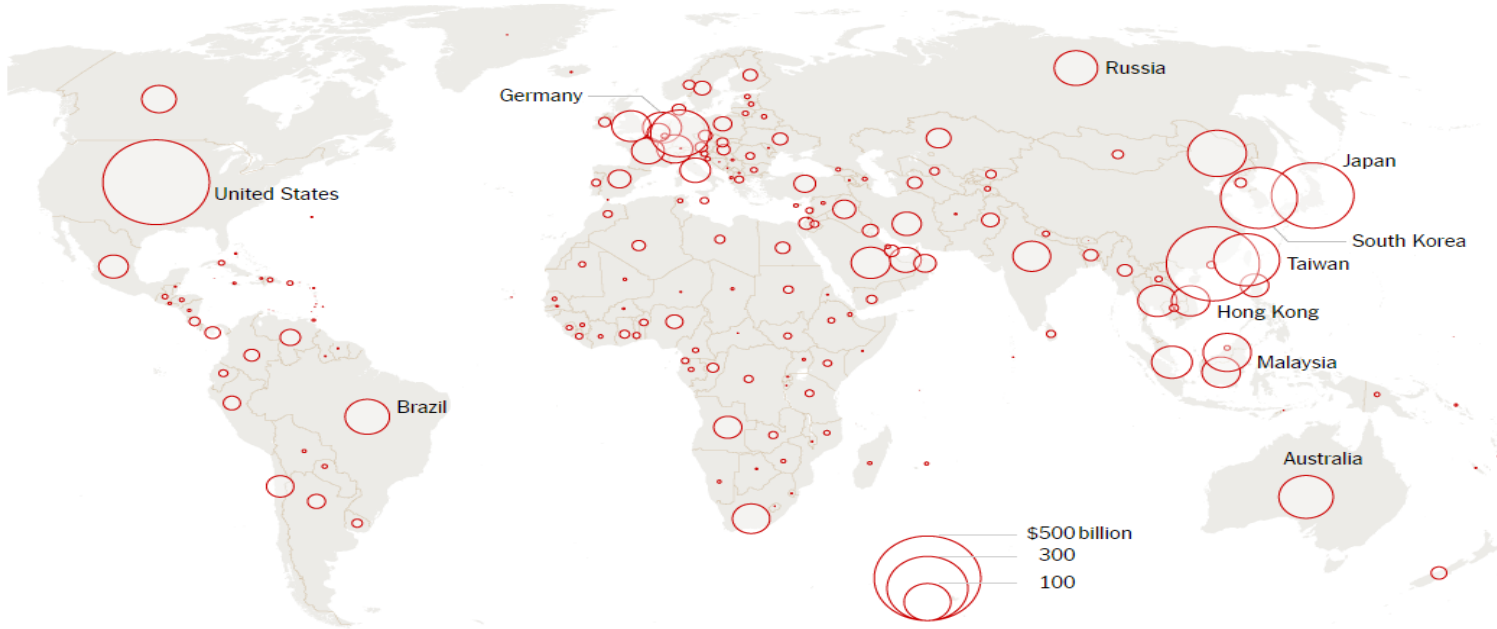


- Economies colored in blue are those along the BRI transport corridors. They have not necessarily signed collaboration agreements with China.

BRI and US-China trade flows

China's 2013 trade with each country

Total value of imports plus exports



US = 17%

China's outward direct investments

China's accumulated outward direct investment with Belt and Road Initiative countries (\$m)



China dominates world of development finance (global US\$bn assets)



WB view of BRI

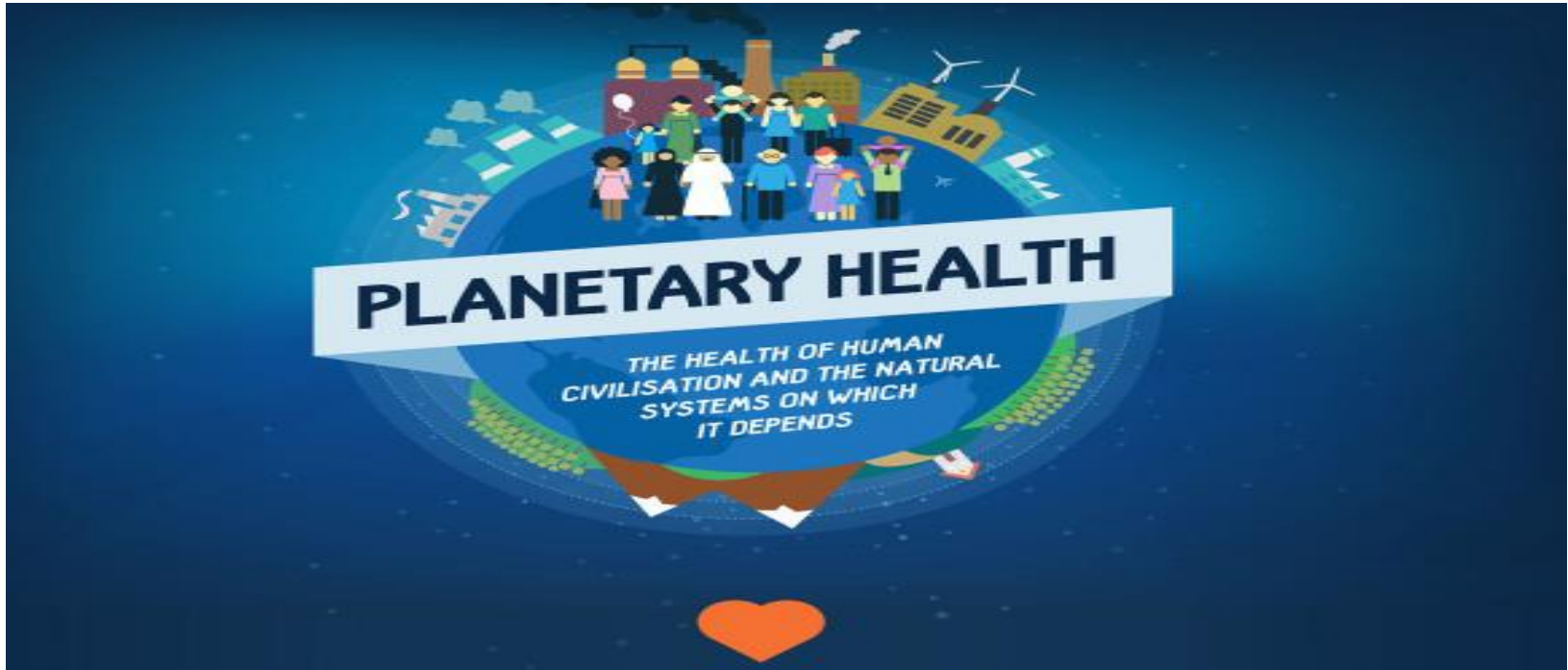
- Reduce travel times along economic corridors by 12%
- increase trade: between 2.7% and 9.7%
- increase income: up to 3.4%
- lift 7.6 million people from extreme poverty
- WB focused on 71 economies geographically located along BRI transport corridors, including China. In 2017, these economies received 35% of global foreign direct investments and accounted for 40% of global merchandise exports.



PLANETARY HEALTH

A NEW DISCIPLINE

Traditionally, medical science is based on systems within the human body. Planetary health broadens health research to include the external systems that sustain or threaten human health.



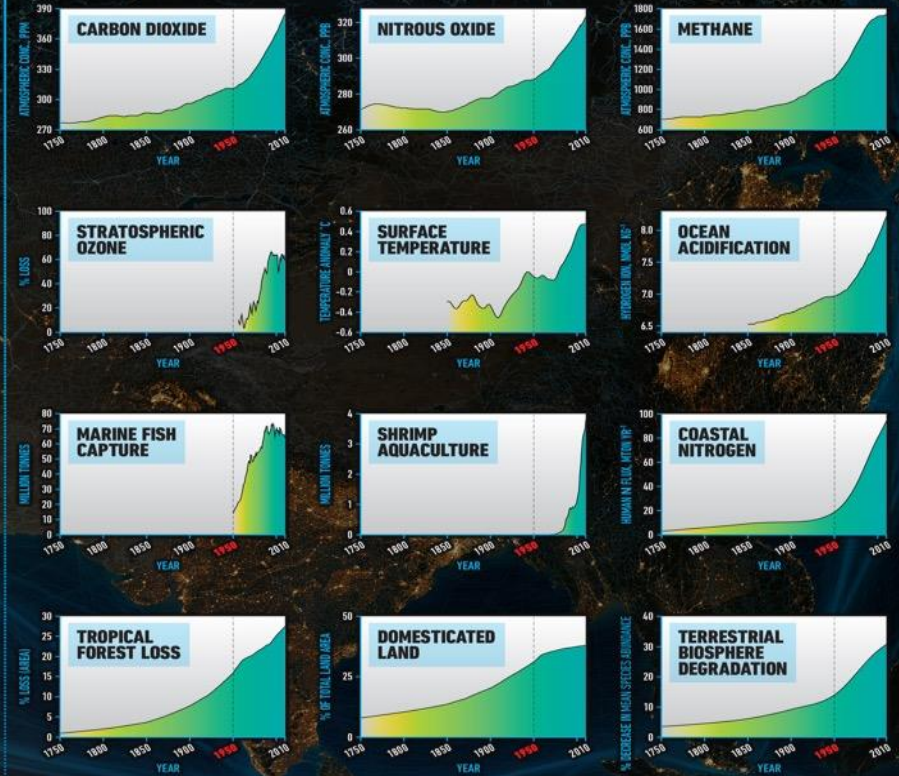
- Horton, R., (2014) Planetary Health, a Manifesto. Lancet; 383:847.
- Whitmee, et al. (2015) Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health The Lancet; 386:1973-2028

THE GREAT ACCELERATION

SOCIO-ECONOMIC TRENDS

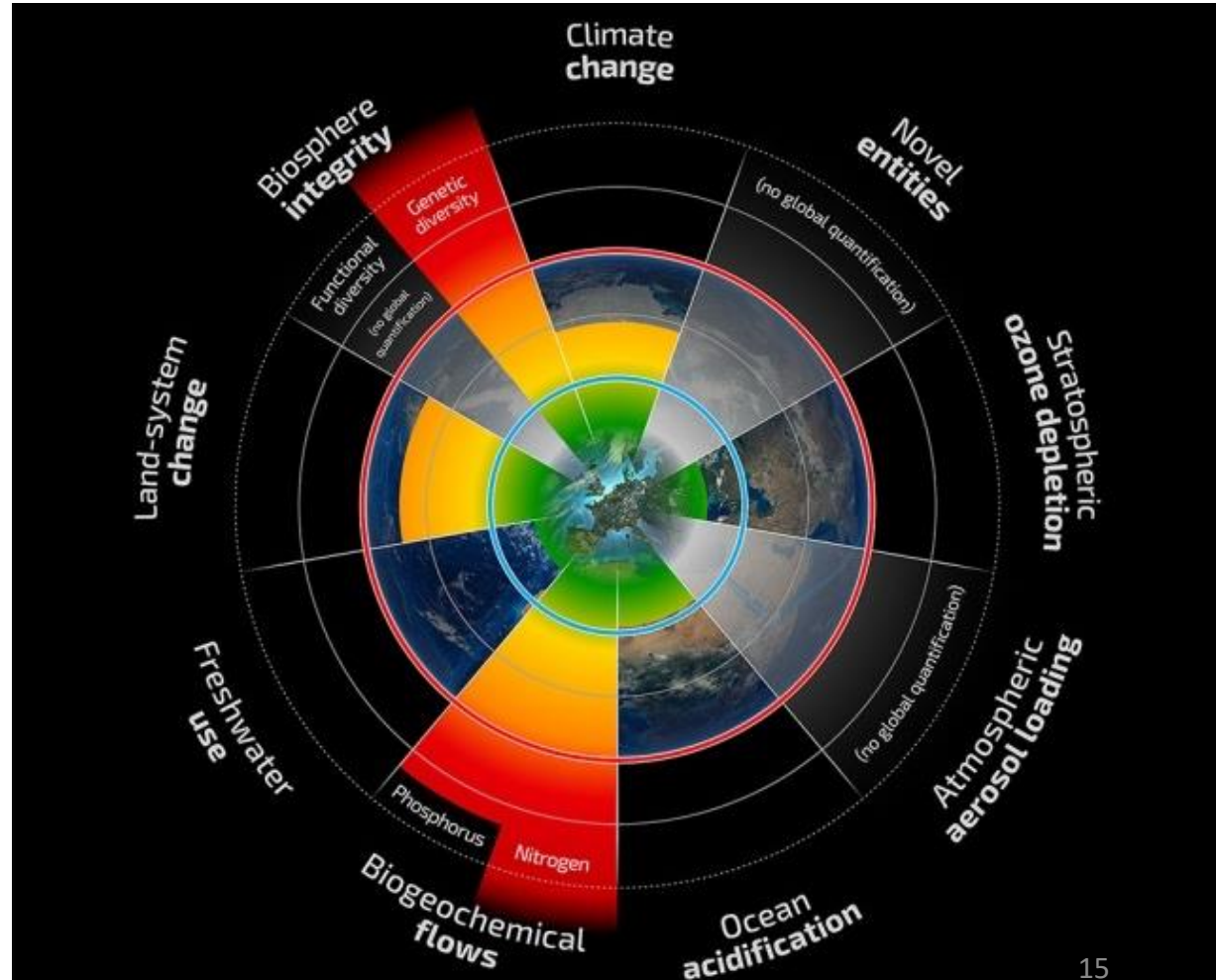
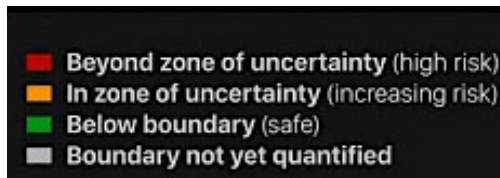


EARTH SYSTEM TRENDS



Planetary Boundaries

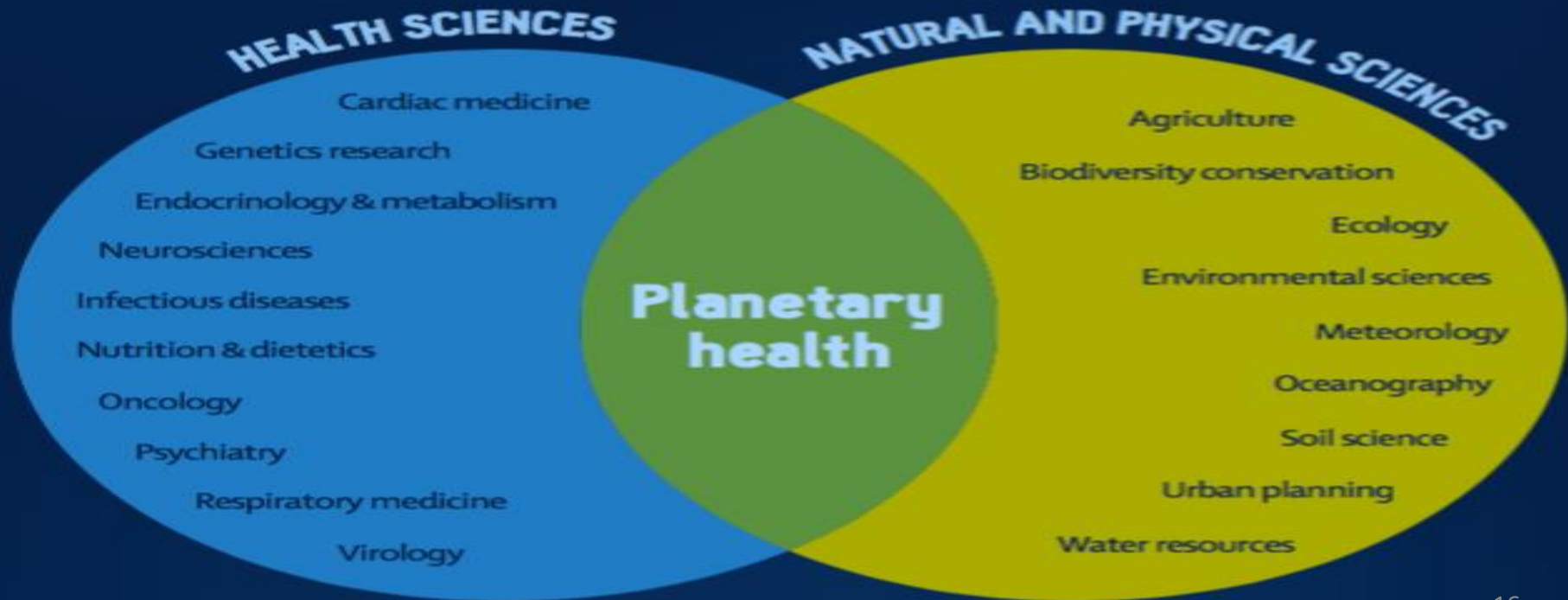
Steffen et al. Planetary Boundaries: Guiding human development on a changing planet, Science, 16 January 2015



INTERSECTING DISCIPLINES

While human health has progressed, the depletion of our natural systems threatens our ability to maintain these improvements.

Planetary health brings together a wide range of existing disciplines to ensure a healthy and sustainable future.

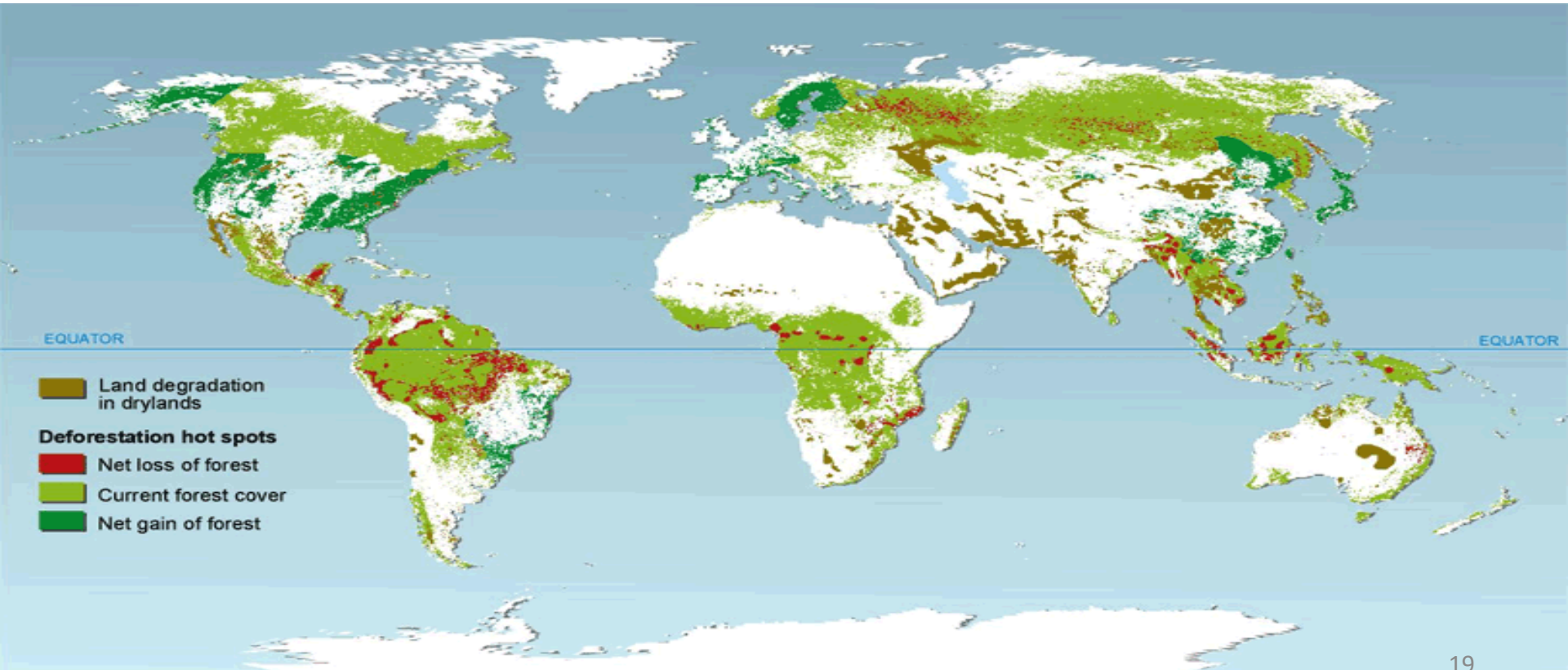




BRI's planetary health impact (3 of many areas)

- Land-use change, biodiversity impact, natural capital
- Climate, heat
- Carbon/coal

Deforestation and land degradation



Belt and Road corridor economies: forest cover, forest loss, forest gain



Forest loss

- Nations with greatest annual forest loss (2010-2015)
- 1. Brazil 984
- 2. Indonesia : 684
- 3. Myanmar : 546
- 4. Nigeria : 410
- 5. Tanzania : 372
- 6. Paraguay : 325
- 7. Zimbabwe : 312
- 8. DR Congo : 311
- 9. Argentina : 297
- 10. Venezuela : 289
- (Unit: thousand ha)

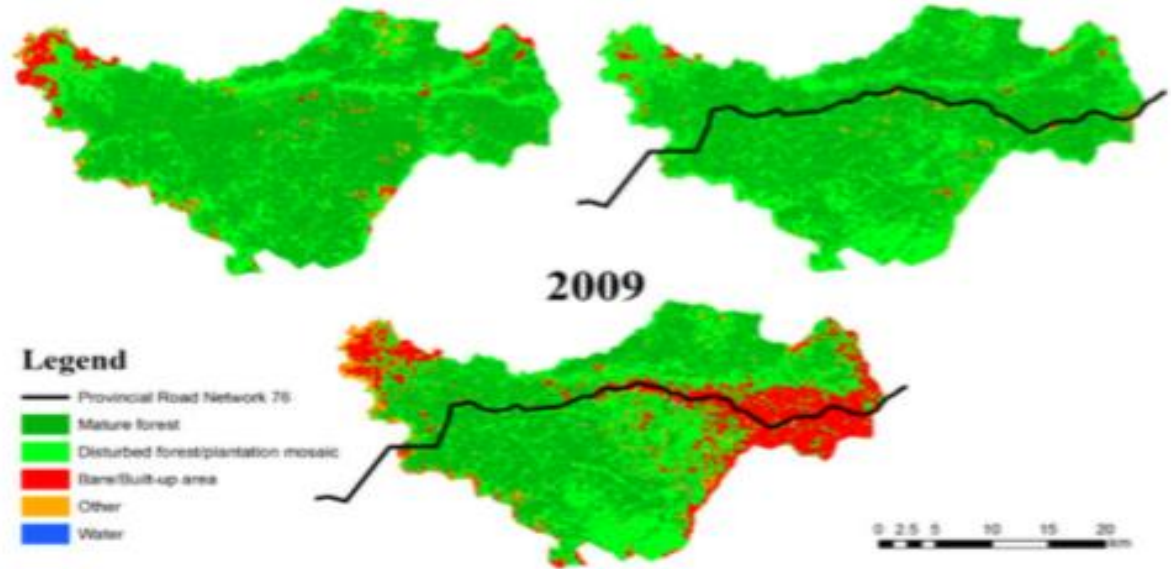
Forest gain

- Nations with greatest annual forest gain (2010-2015)
 - 1. China : 1,542
 - 2. Australia : 308
 - 3. Chile : 301
 - 4. USA: 275
 - 5. Philippines : 240
 - 6. Gabon : 200
 - 7. Laos : 189
 - 8. India : 178
 - 9. Vietnam : 129
 - 10. France : 113
- (Unit: thousand ha)

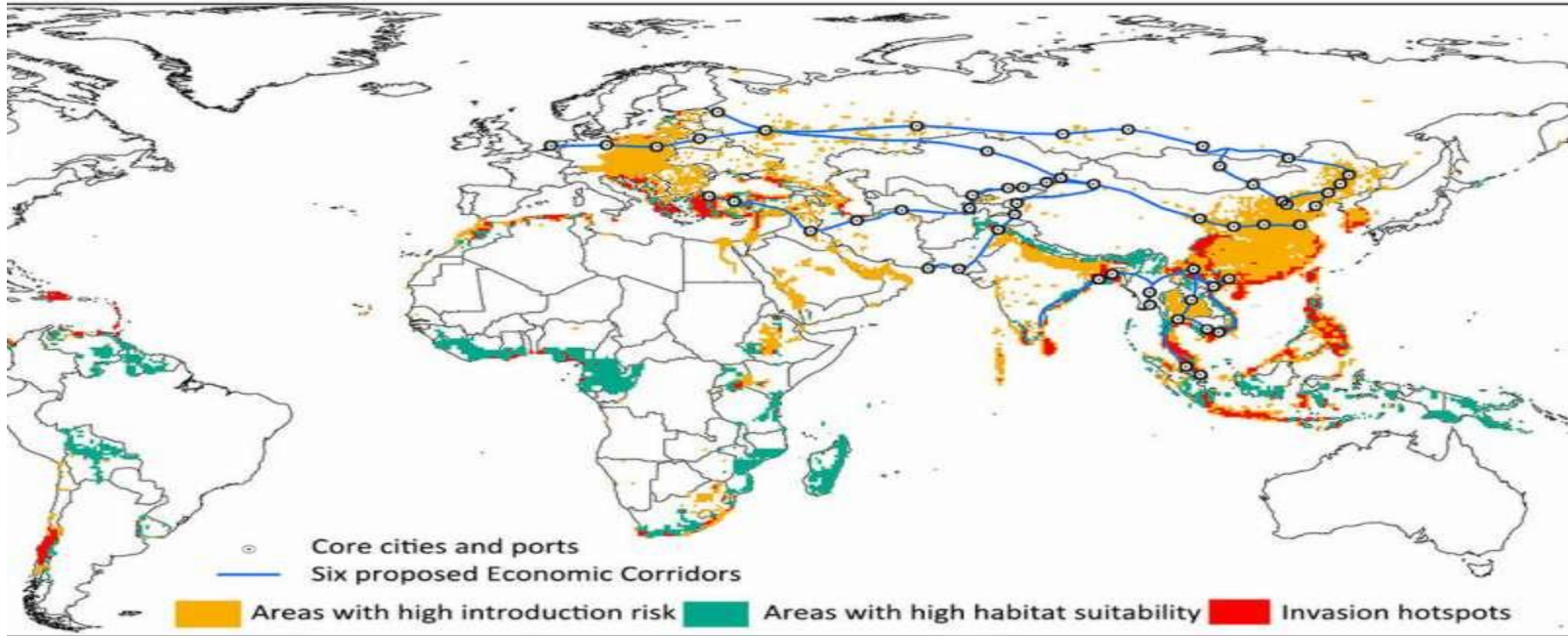
What roads do....

- Landsat images Snuol Wildlife Reserve, Cambodia.
- 1990, 2001, 2009

(Clements, et al. 2014)

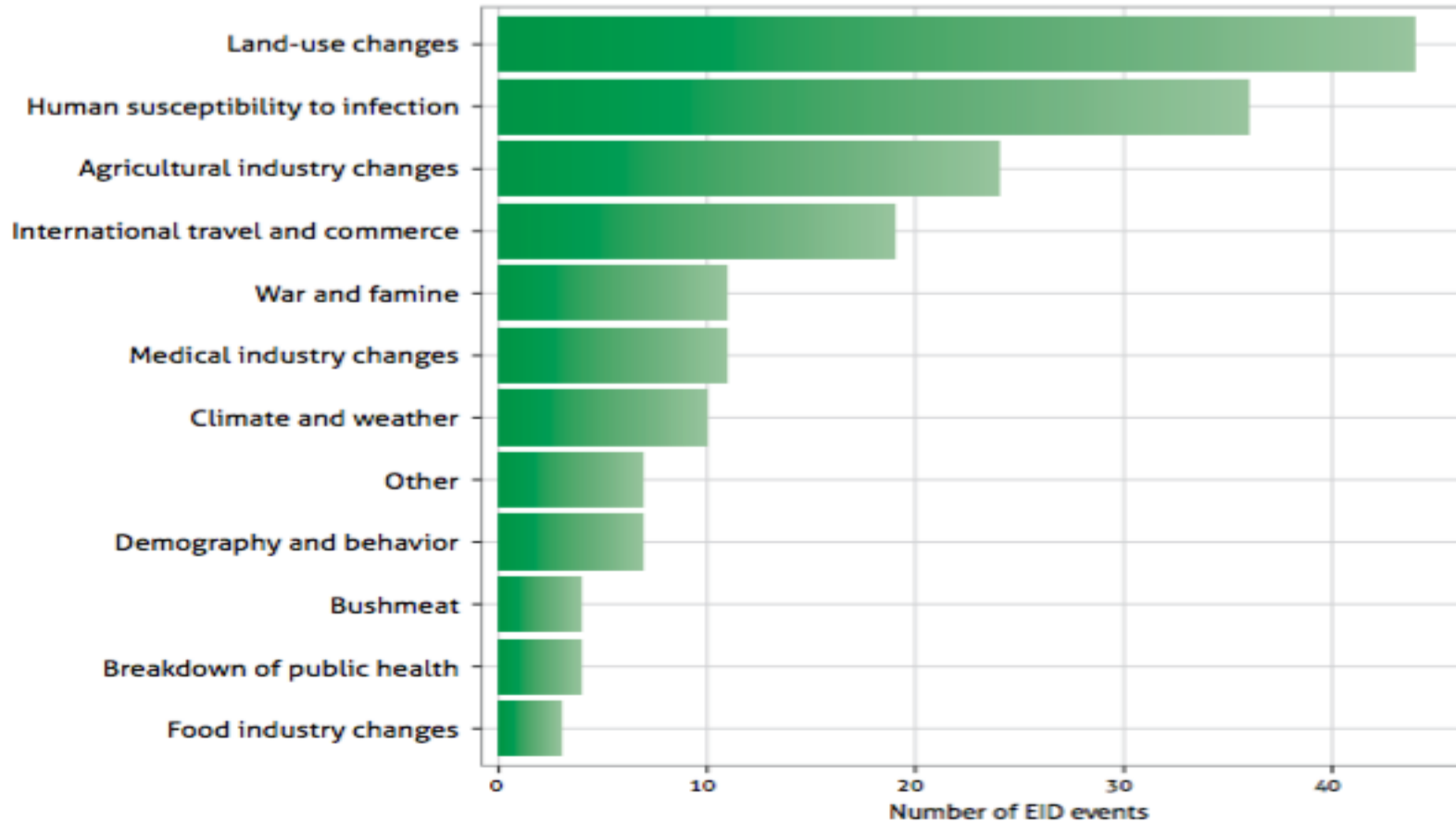


Risk of introducing invasive species

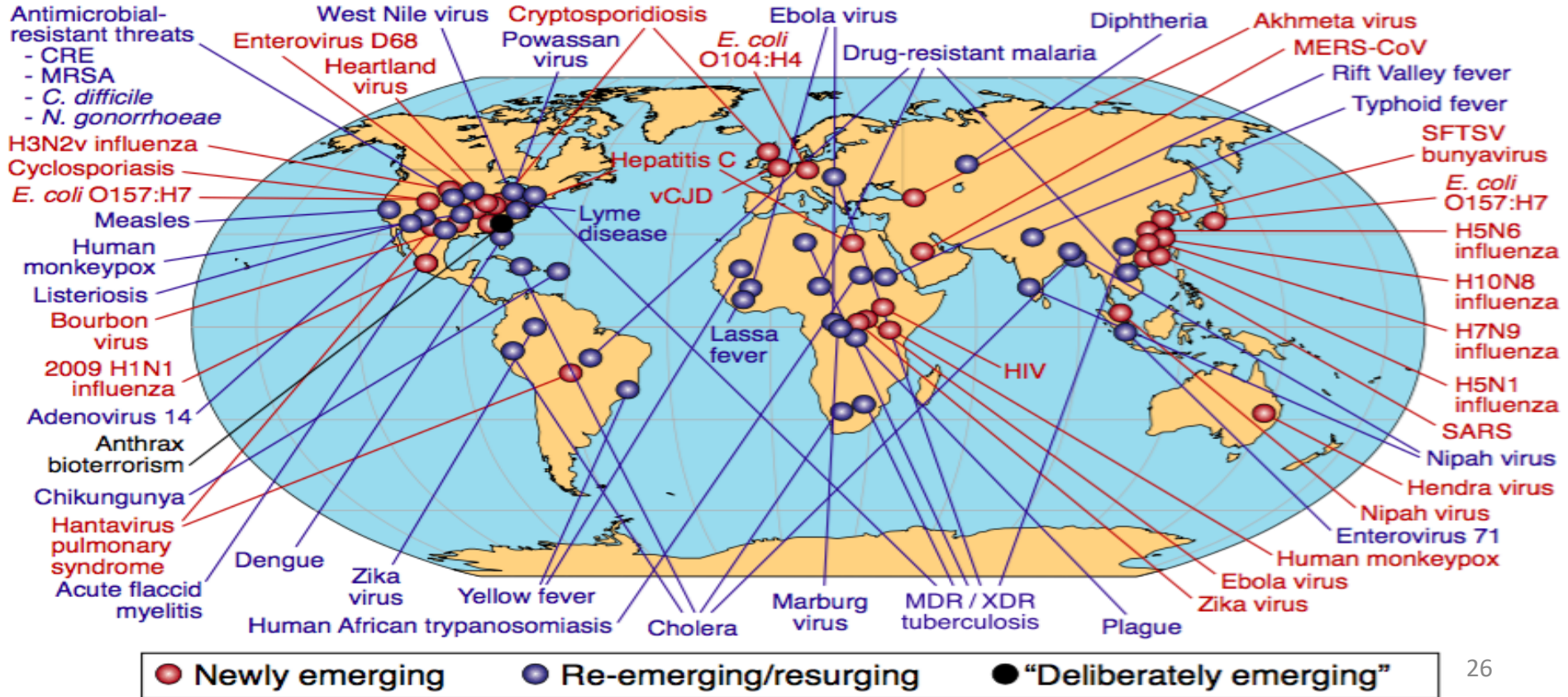


About 15 percent of areas in BRI countries have high overall introduction risks of new vertebrate species as people and cargo move about

Drivers of emerging infectious diseases



Examples of emerging and re-emerging diseases



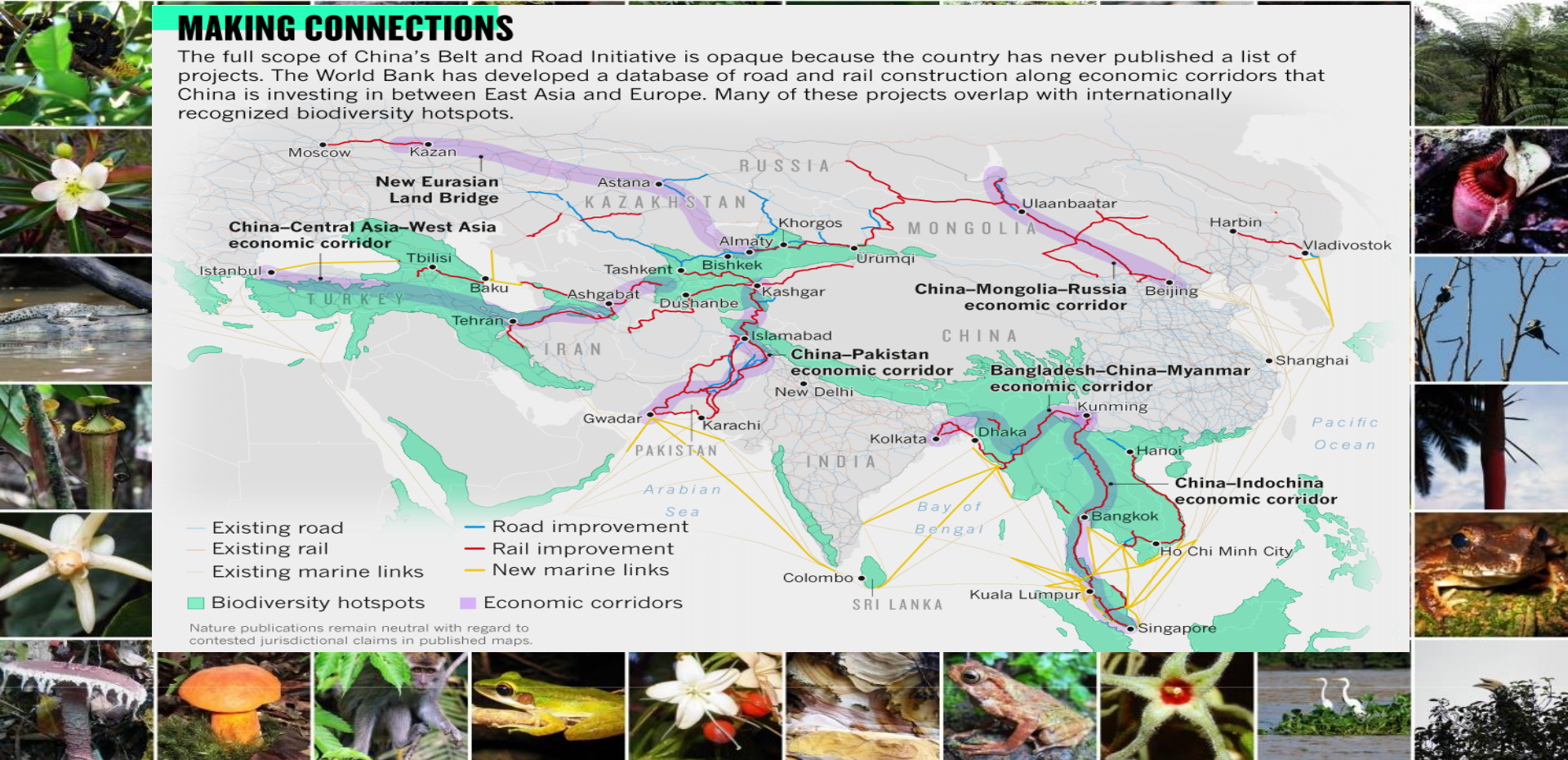
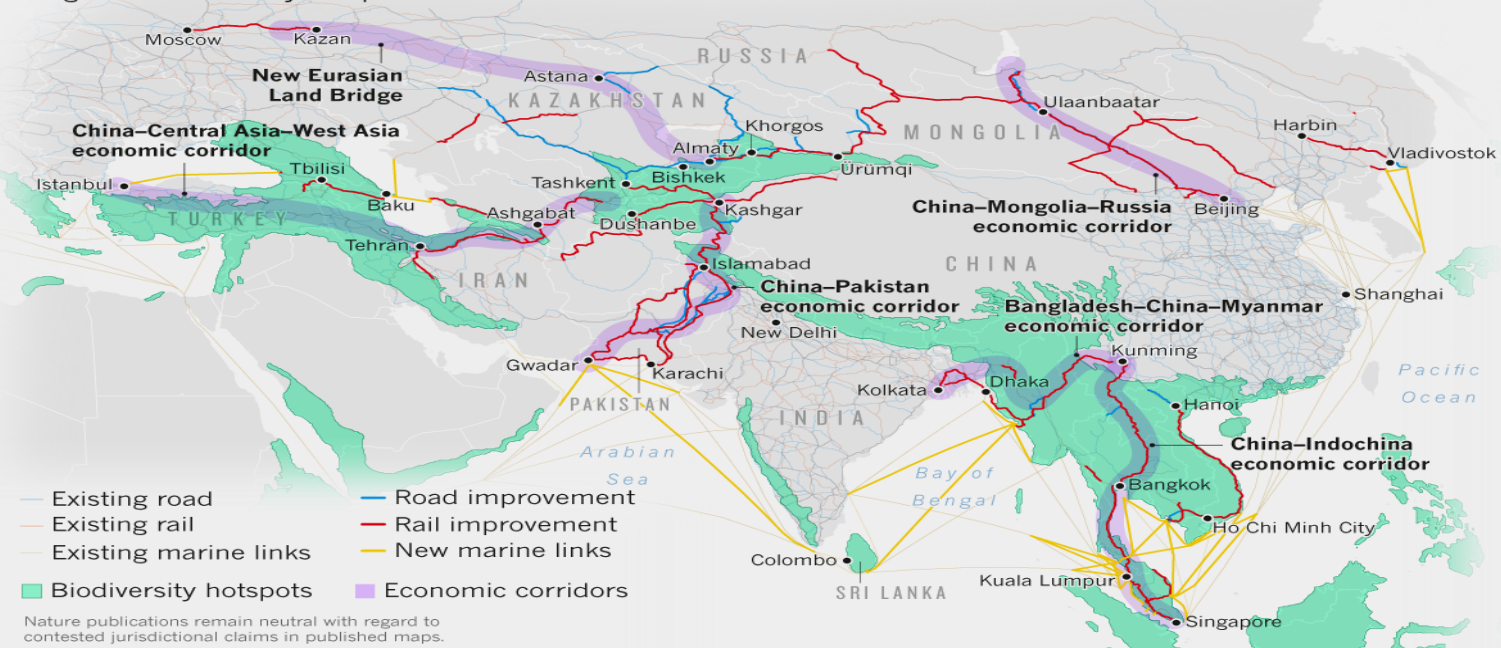
Biodiversity and ecological impact

- WWF, corridor overlaps the range of 265 threatened species (saiga antelopes, tigers, giant pandas)
- Cuts through 1739 designated important biodiversity areas or key biodiversity areas and 46 biodiversity hotspots

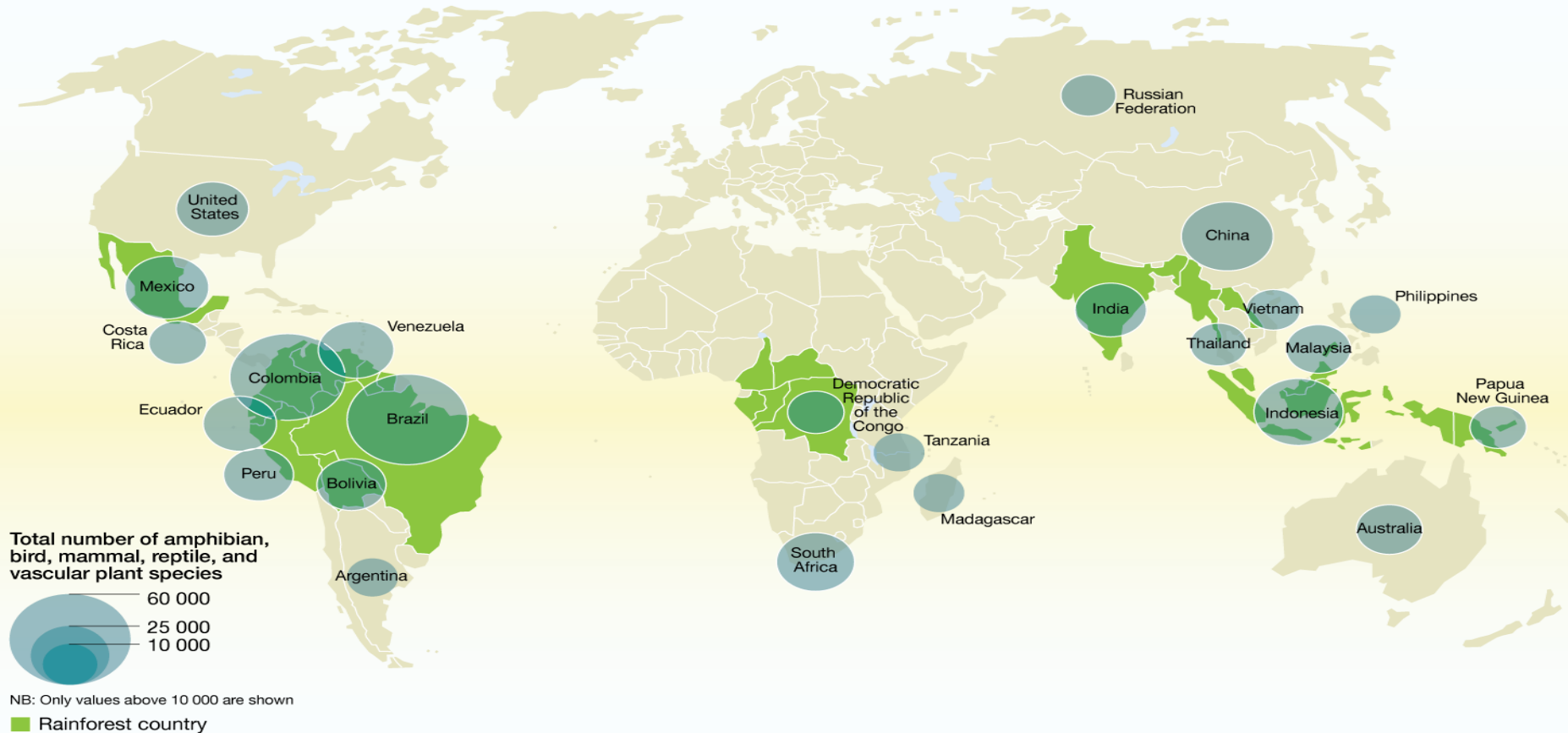


MAKING CONNECTIONS

The full scope of China's Belt and Road Initiative is opaque because the country has never published a list of projects. The World Bank has developed a database of road and rail construction along economic corridors that China is investing in between East Asia and Europe. Many of these projects overlap with internationally recognized biodiversity hotspots.

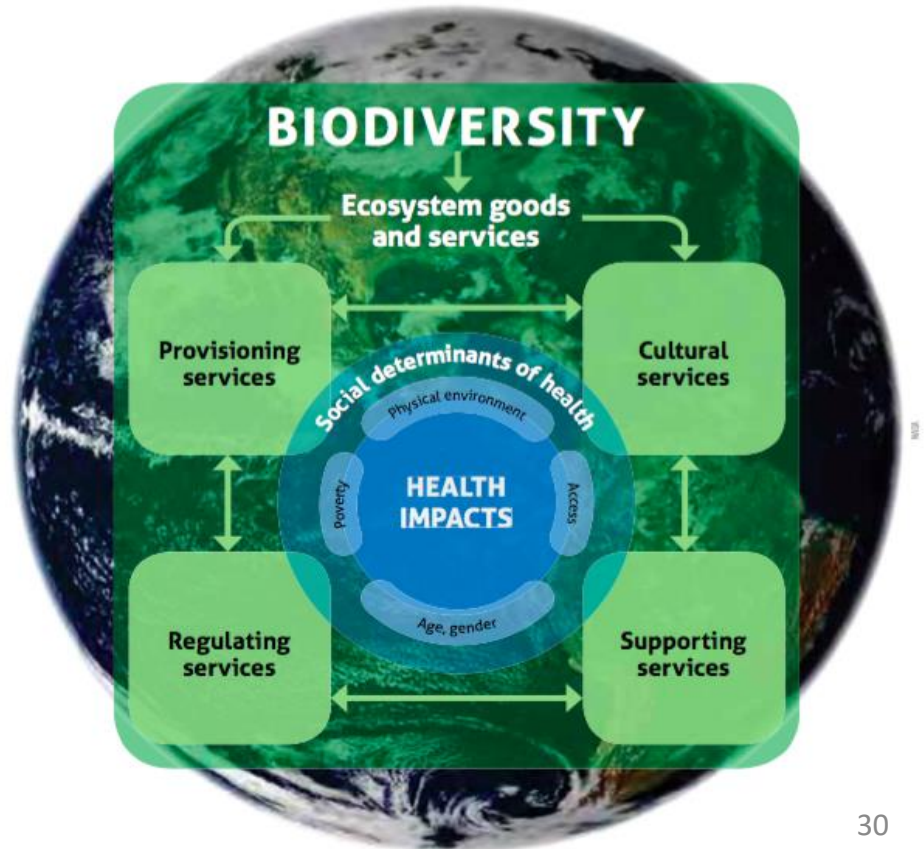


Biodiversity is concentrated in the rainforest



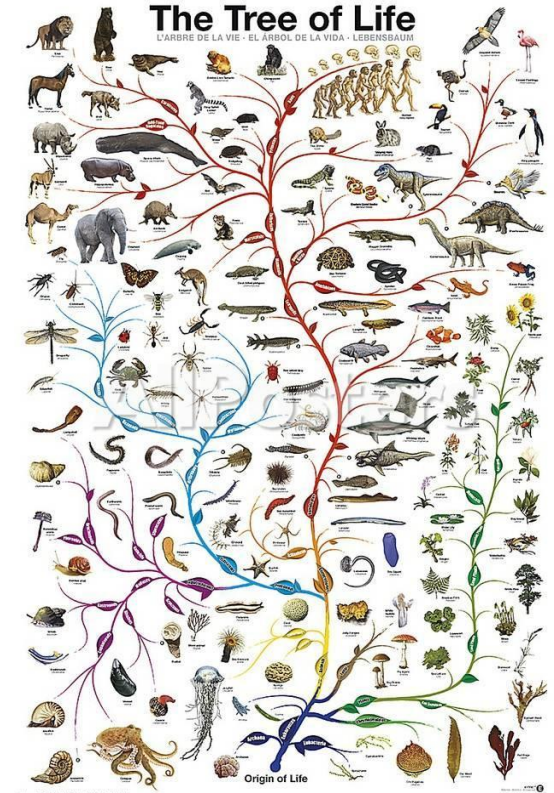
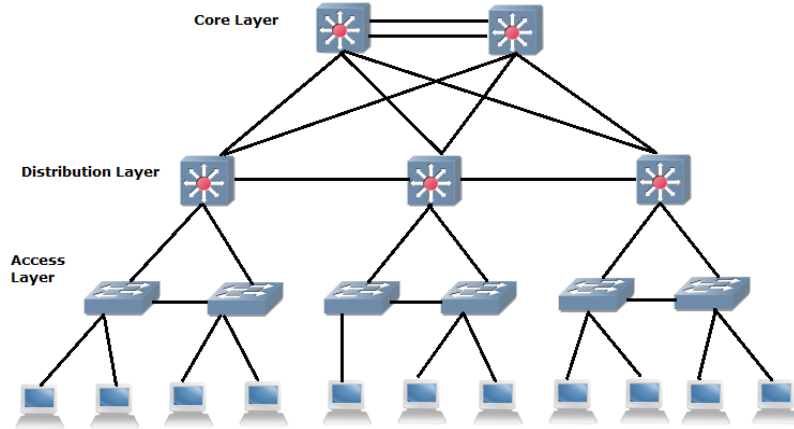
Biodiversity and human health

- **Protecting forests and wetlands:** to secure and regulate water supplies, support production of forest products, and protect communities and infrastructure from floods, soil erosion and landslides
- **Coastal ecosystems** (mangroves, reefs and salt marshes) to protect communities and infrastructure from storm surges, salt water intrusion and erosion
- **Bringing green and blue infrastructure into cities to tackle heat island effect,** flood prevention, air pollution, other health benefits

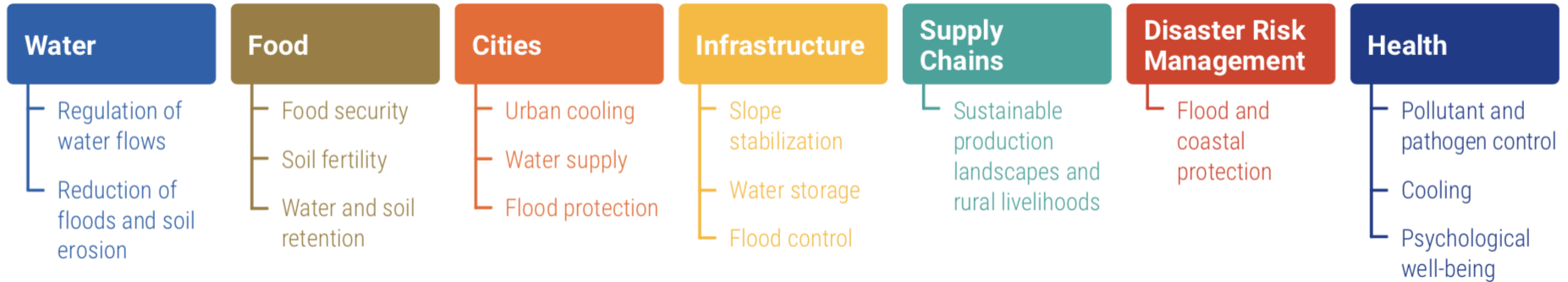


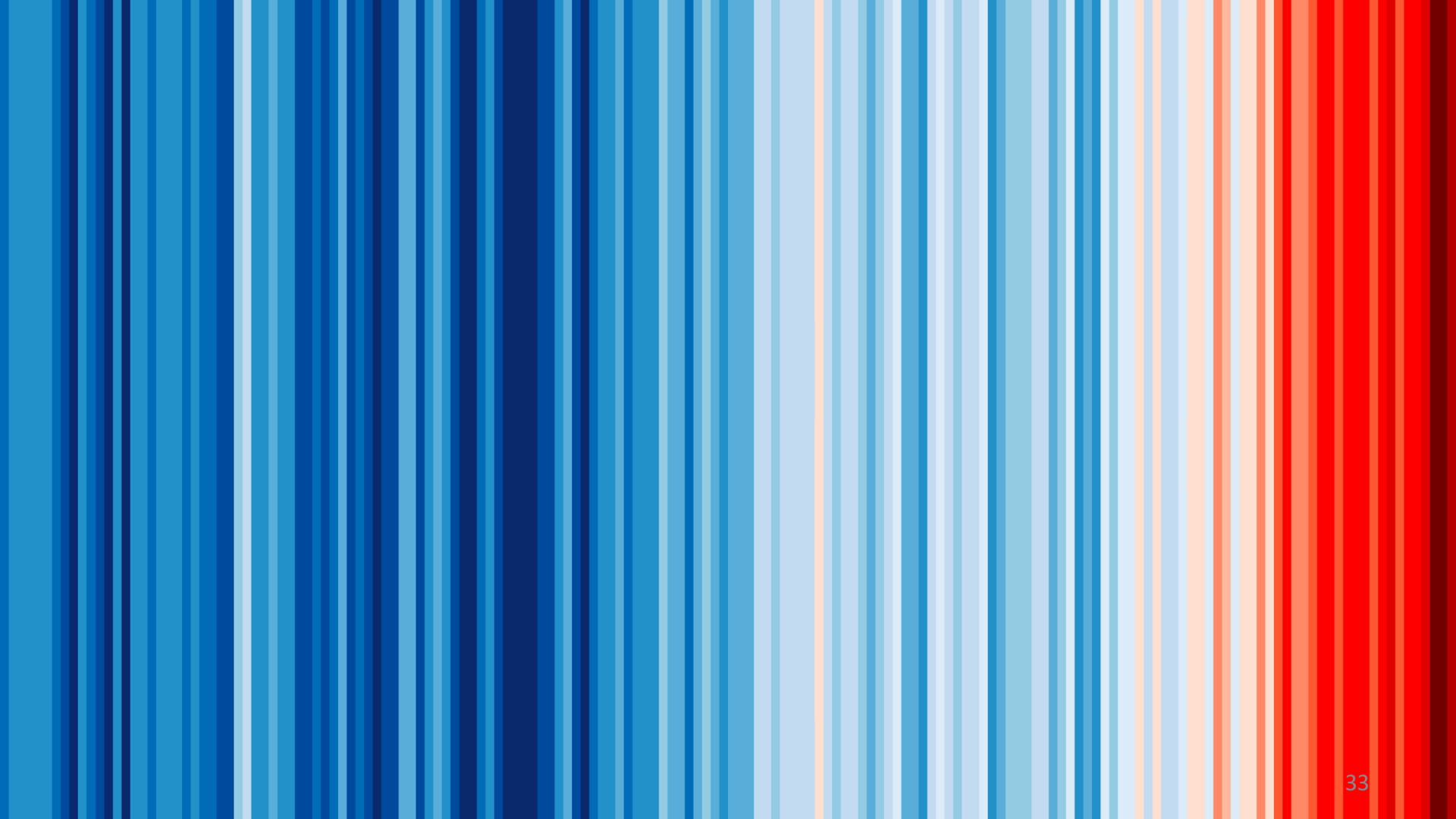
Systems, risk and resilience in evolution

- Systems approach to risk
- Managing risk (biological systems)
- Redundancy and resilience
- Adaptive capacity

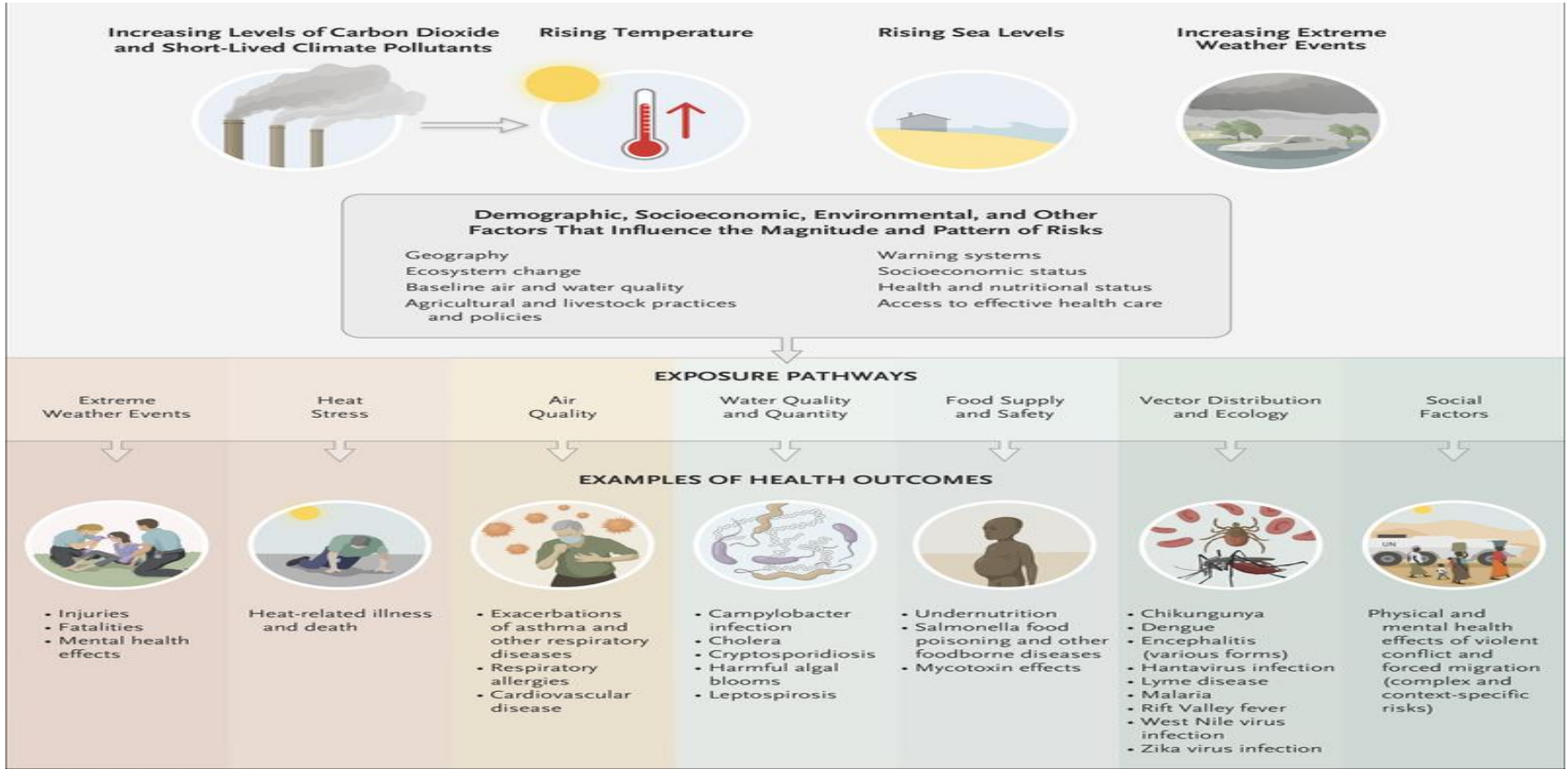


Nature reduces vulnerability across sectors at relatively low cost





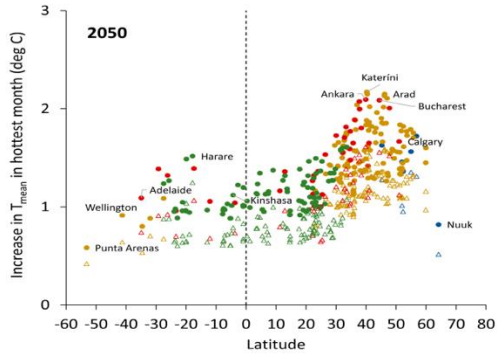
Climate change pathways



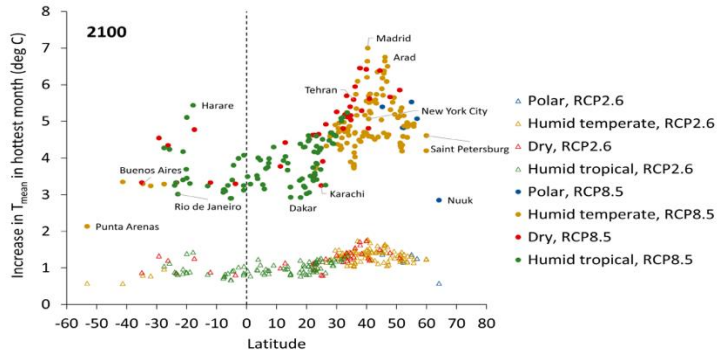
Overheating risk especially high in cities

Average Temperature increases in the hottest month 2050 and 2100

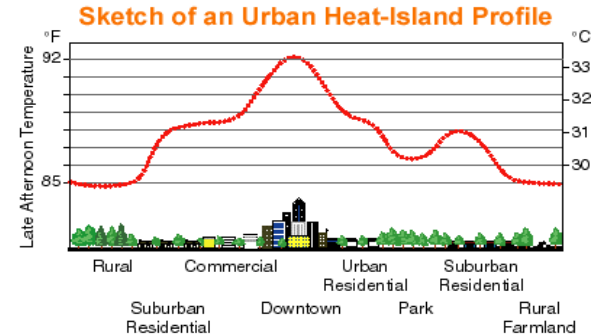
(Milner et al Climate 2018)



(a)

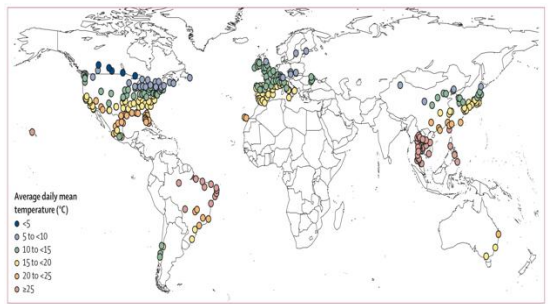
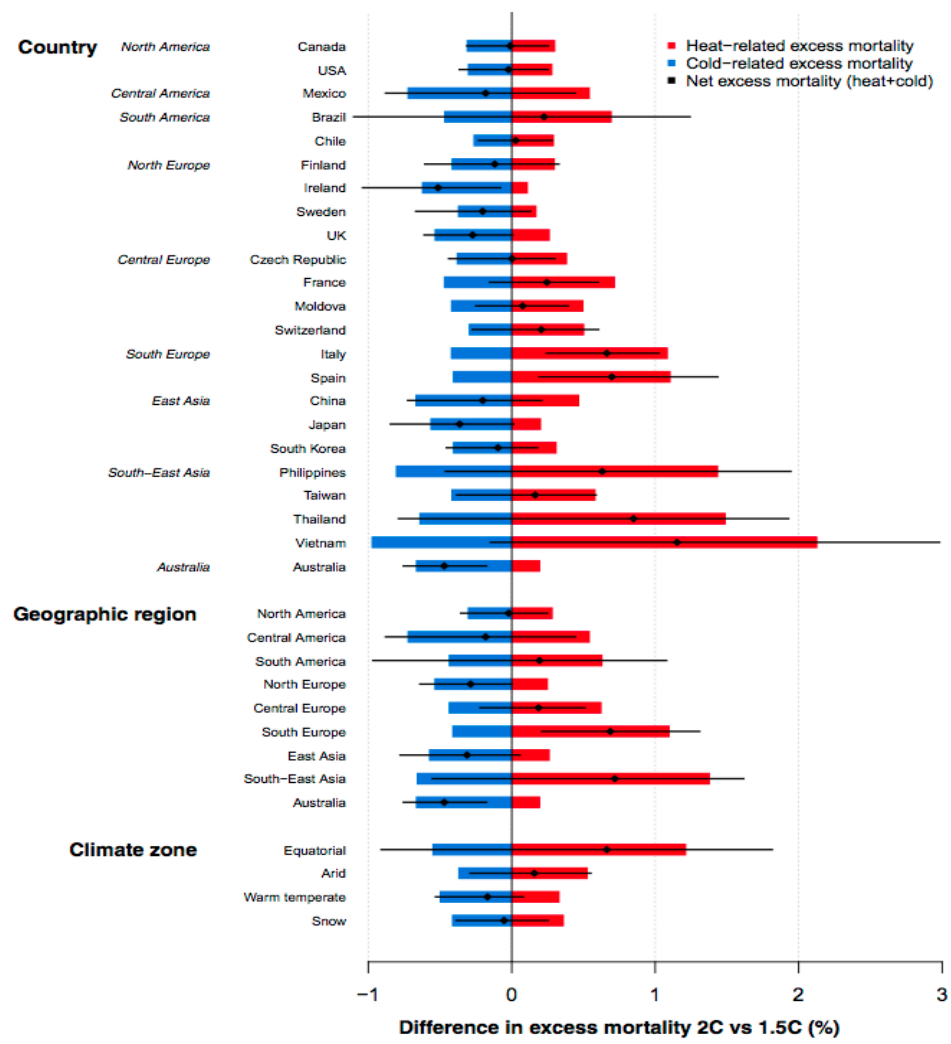


(b)



Interactions between urban heat island and air pollution

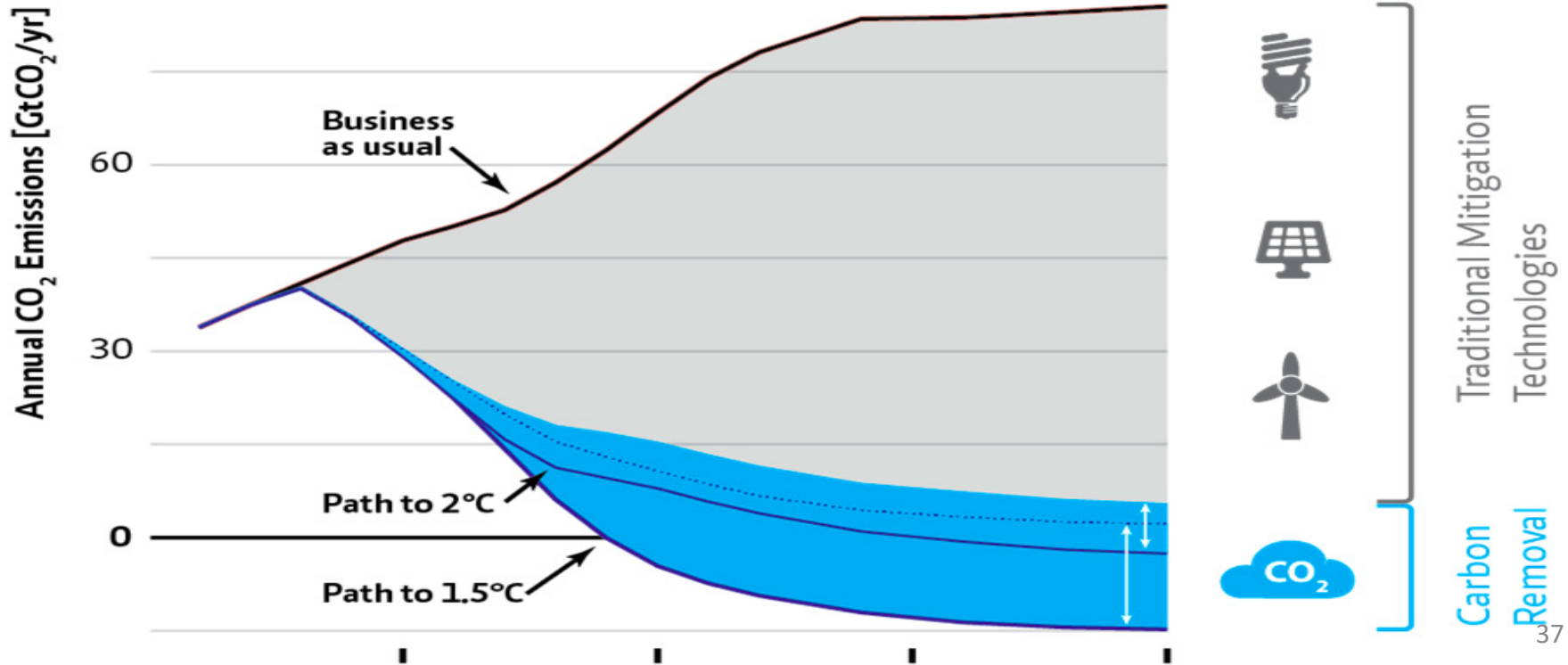
Projected temperature-related mortality



Gasparrini *et al.* (2017)0

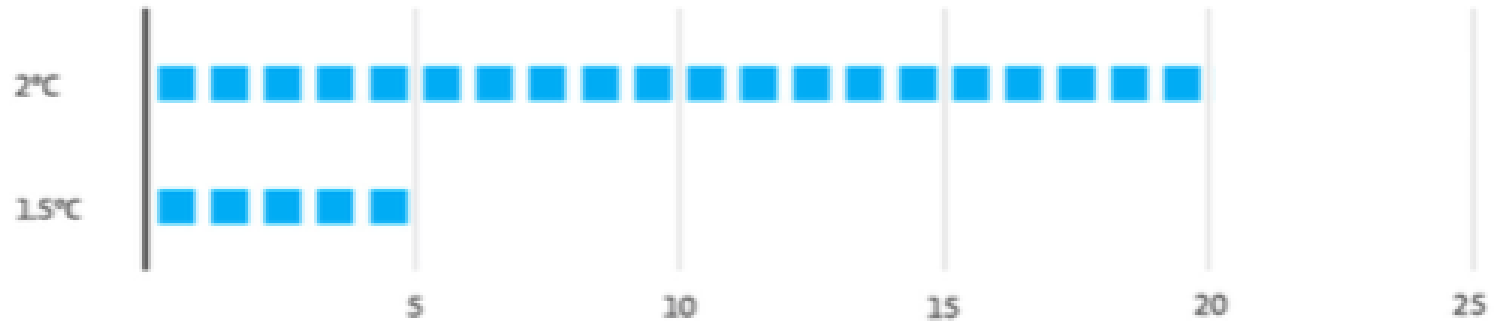
Vicedo-Cabrera *et al.* (2018)

We have got to talk about carbon (and coal, and air transport, etc.)



Carbon budget

Climate policy goals limit the remaining CO₂ emissions allowance:

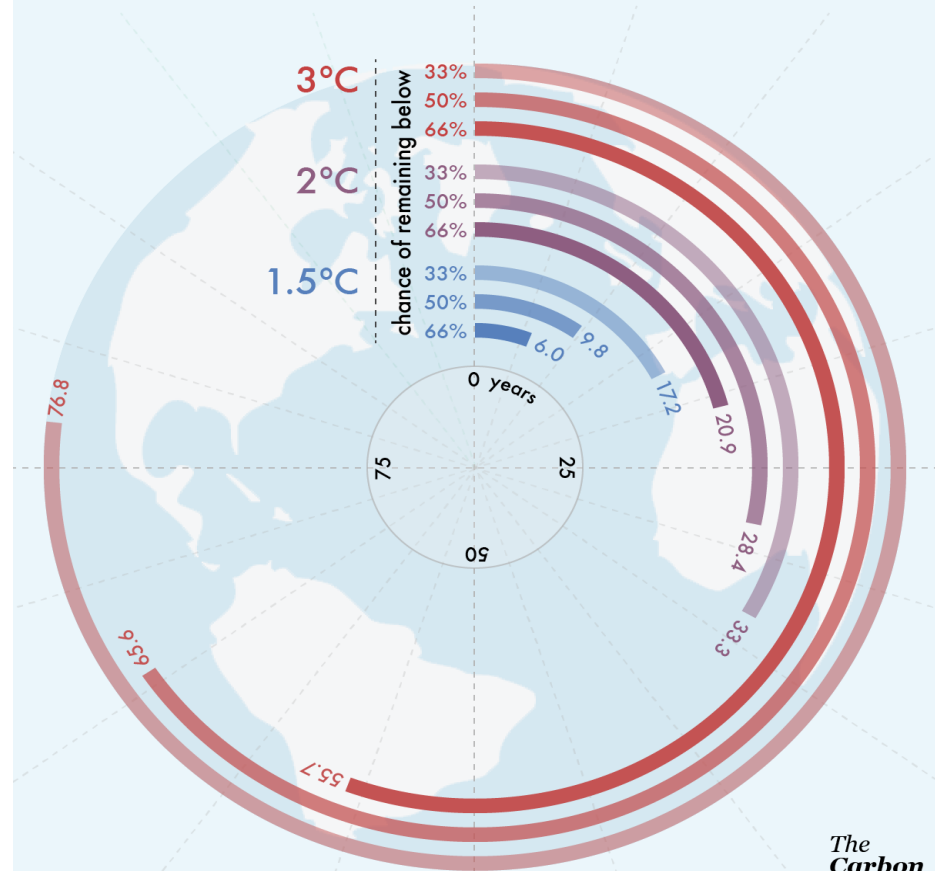


Maximum number of years of CO₂ emissions released at current levels (40Gt/yr) until CO₂ budget for climate policy goals is exhausted.

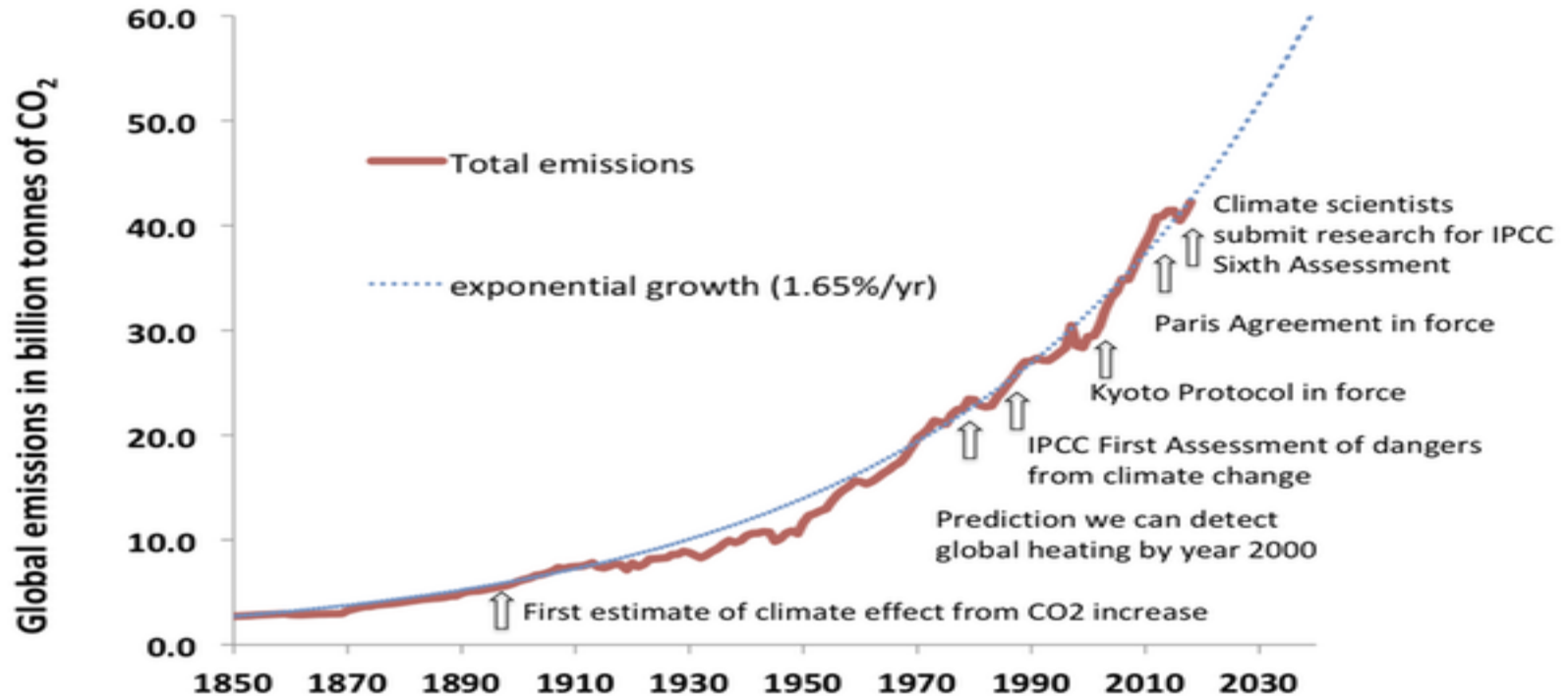
Juggling our carbon budget

Carbon Countdown

How many years of current emissions would use up the IPCC's carbon budgets for different levels of warming?



For all the efforts....



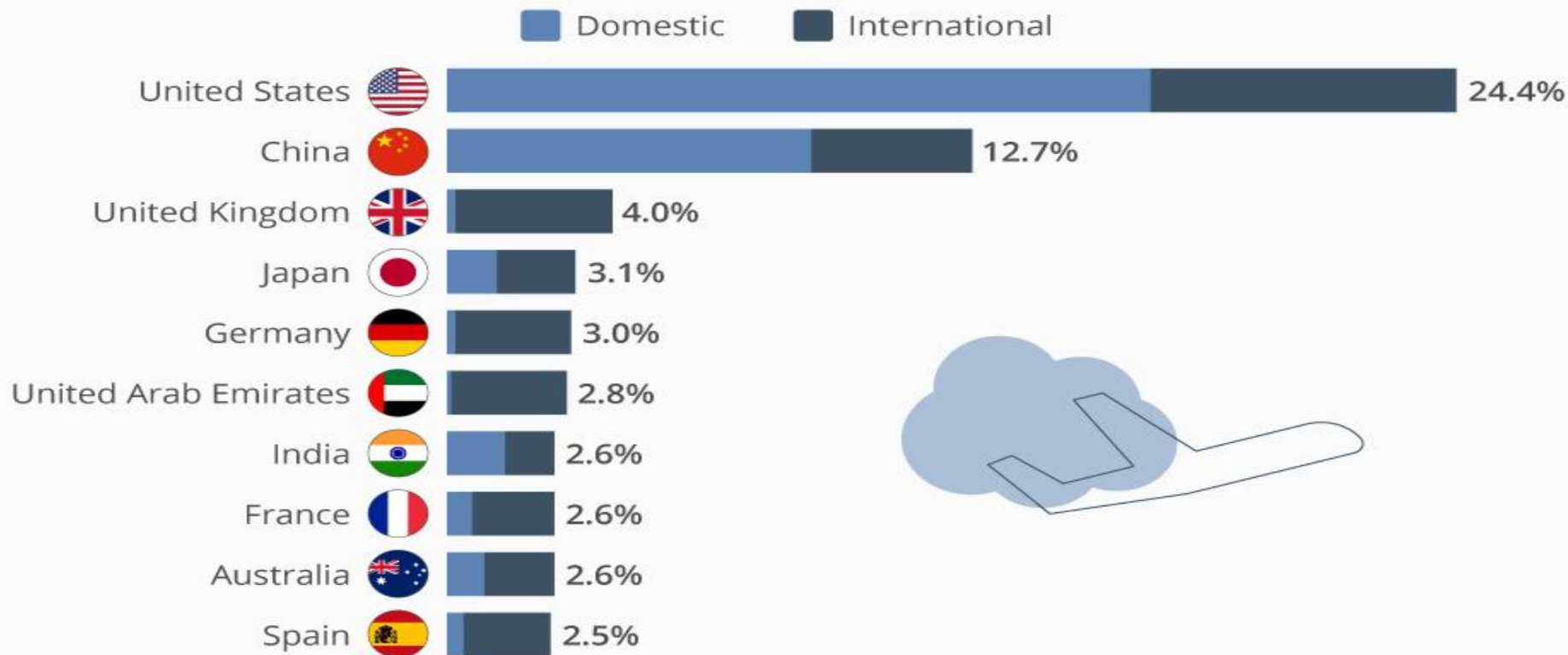
Avoid	<p>Plan routes to avoid vulnerable environments.^a</p> <ul style="list-style-type: none"> • Identify alternative route options that avoid the sensitive areas. • Conduct a social cost-benefit analysis (considering economic, environmental, and social impacts) to guide selection between alternative routes. This analysis should consider transboundary impacts to mitigate contamination of invasive species, contamination of water resources, protection of cultural heritage and other intangible heritage, contaminated land, landscape, associated facilities, or linked projects. • This should be done at the micro level, for large portions of the BRI, and for the BRI as a whole, to account for the interdependence of locations, investment impacts, and affected environments.
Reduce	<p>Mitigate impacts through environmentally conscious engineering and complementary policy. Options include:</p> <ul style="list-style-type: none"> • Wildlife crossings (bridges and underpasses, with mechanisms to “funnel” wildlife to crossing), sound barriers, pointing lights downward to reduce light pollution, retention of trees, timing construction to avoid important times for animal migration or mating. • Tunnel-bridge-tunnel engineering to reduce landslide and erosion risks. • Regulation, enforcement, and incentives to reduce deforestation, poaching, and vulnerable species trade. This may include the creation of protected areas near transport corridors, addressing weaknesses in enforcement capacity, and making incentive/compensatory payments to landowners or local governments in return for maintaining forests and ecosystems. Protected areas should be coordinated along the BRI, to ensure that they reduce, rather than displace, harmful activity. • Apply social cost-benefit analyses in selecting transport options (road categories, rail versus roads, electric versus standard rail, regulation on vehicle emissions and maintenance. These raise the case for favoring rail over roads—particularly high-speed electric—due to lower pollution, and reduced encroachment on frontier landscapes due to fewer access points and their concentration in already dense cities.
Restore	<p>Take remedial action to repair damage inflicted by the construction process. For example:</p> <ul style="list-style-type: none"> • Stabilize damaged slopes. • Replant vegetation. • Repair disrupted waterways or wetlands.
Offset	<p>Compensate for environmental damage that cannot be avoided, reduced, or restored, through investments in off-site locations that ensure net neutral or net positive environmental outcomes overall. Internationally-recognized offset programs offer standards by which BRI projects could evaluate themselves.^b Examples include:</p> <ul style="list-style-type: none"> • Carbon offsetting, and, following harm to biodiverse areas, enhancing alternative comparable biodiverse locations elsewhere (with similar endemic species or ecosystem functions). • Mechanisms include Payment for Ecosystem Services (PES), biodiversity compensation funds into which projects must pay, biodiversity banks selling offsetting credits, and more ad hoc project-by-project solutions, all supported by national or local offsetting laws. Early biodiversity risk screening, through tools like the integrated biodiversity assessment, can help planners compile and evaluate data prior to project implementation, further mitigating harms. Offsetting is proposed as a last resort, as this suffers inherent distribution challenges (gains are felt in locations and communities not suffering the costs), while impact assessments have revealed mixed results.

Avoid, reduce, restore, offset

- BRI transport projects => CO2 emissions go up worldwide by around 0.3%
- Considerable heterogeneity across countries and regions, given the changes in economic activity and the composition of production

The Worst Offenders For Air Travel Emissions

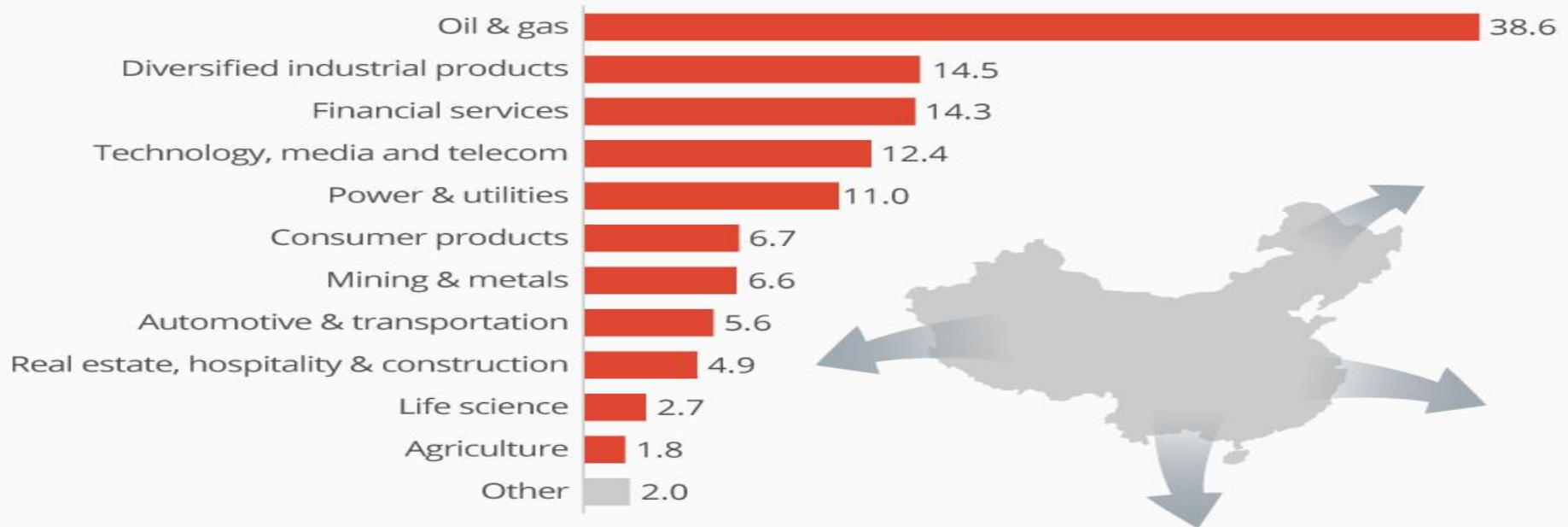
Estimated global share of commercial air travel CO₂ emissions in 2018



China investment priorities

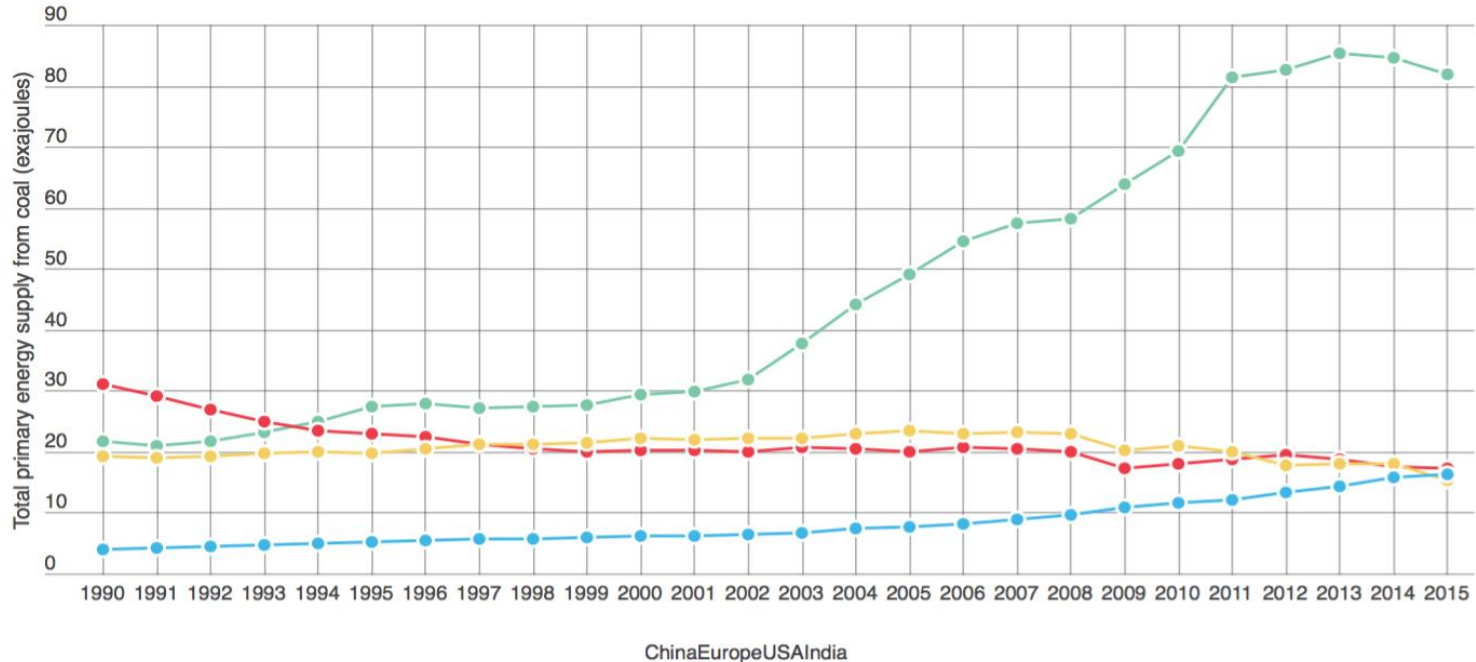
Where China's 'Belt and Road' Priorities Lie

Value of China's M&A activity in 'Belt and Road' countries 2005–2016, by sector (in billion USD)*



Energy from coal (China is in green)

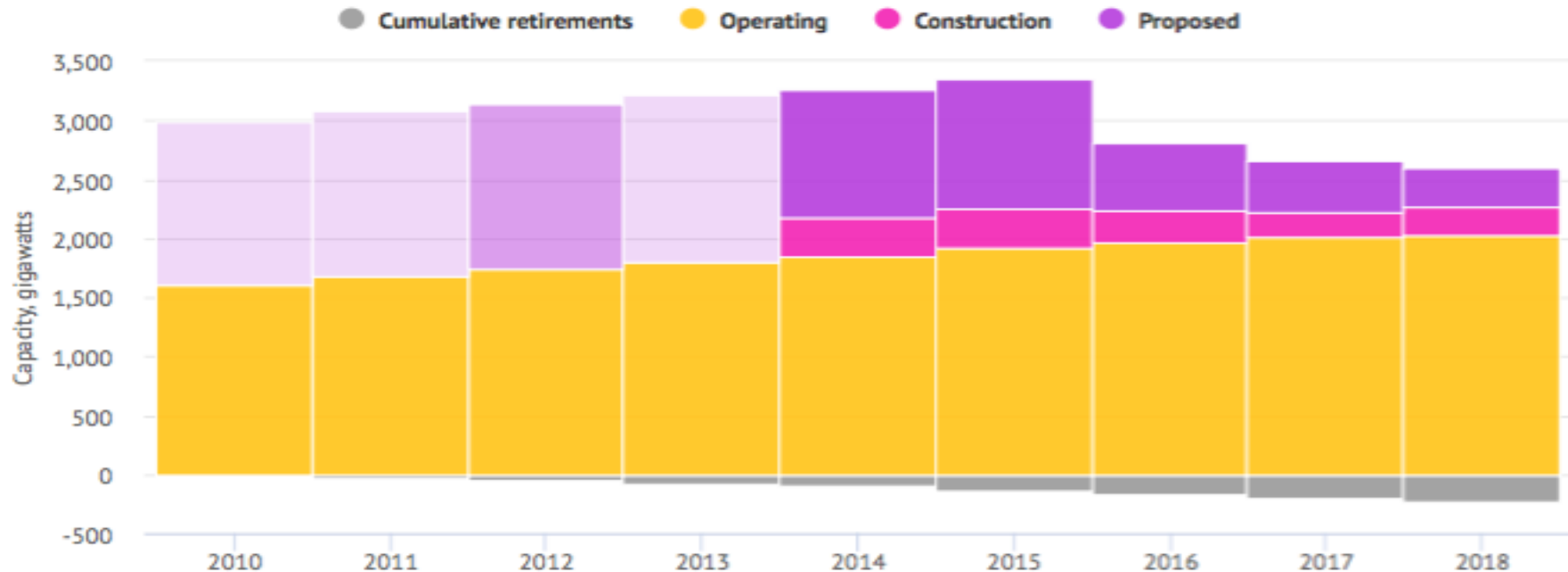
Coal is the largest contributor to greenhouse gas emissions of all fossil fuels, causing severe air pollution and affecting human health. While coal use increased globally since 1990, it appears to have peaked in 2013 and is now declining.



Some good news...

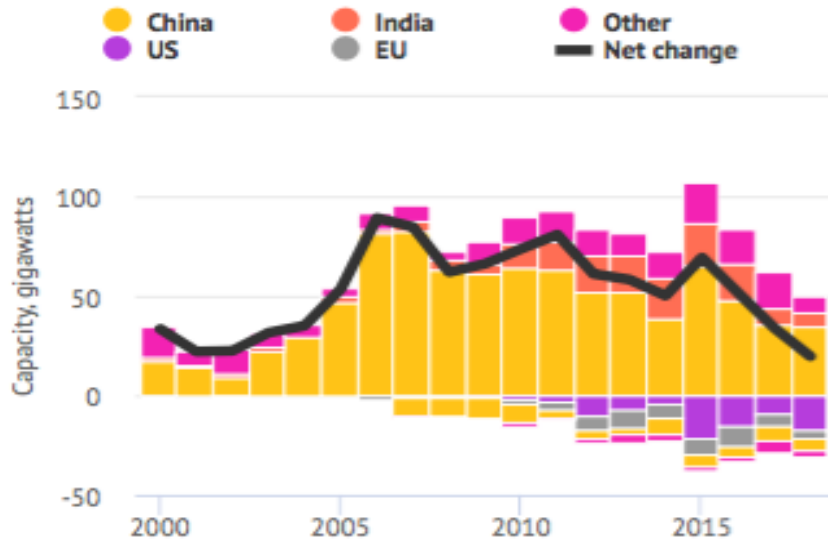
Global coal power capacity is still rising, but the pipeline of new plants is shrinking fast

The 336GW pipeline of proposed capacity is now less than one third its size in 2015

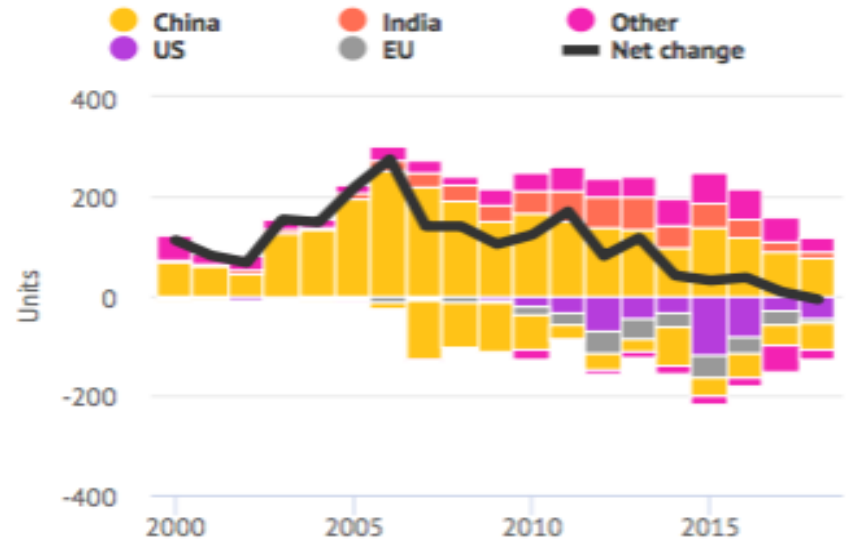


Coal capacity and coal units

Global coal capacity grew at its slowest pace this century in 2018



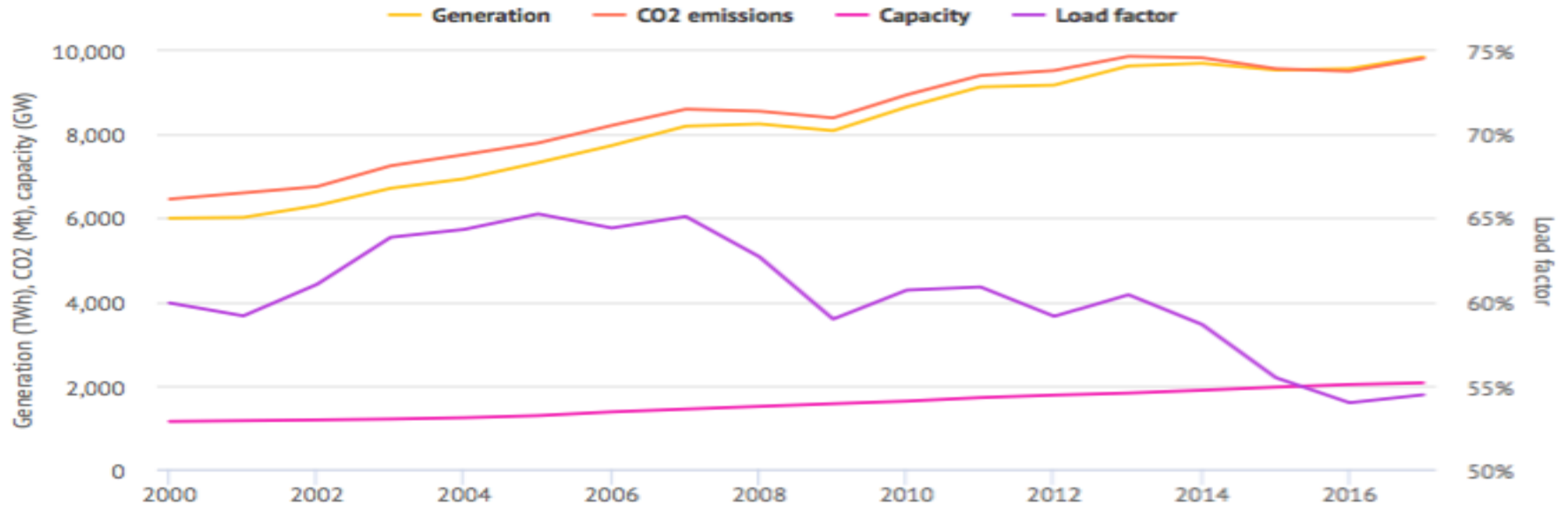
The number of coal units around the world fell for the first time in 2018



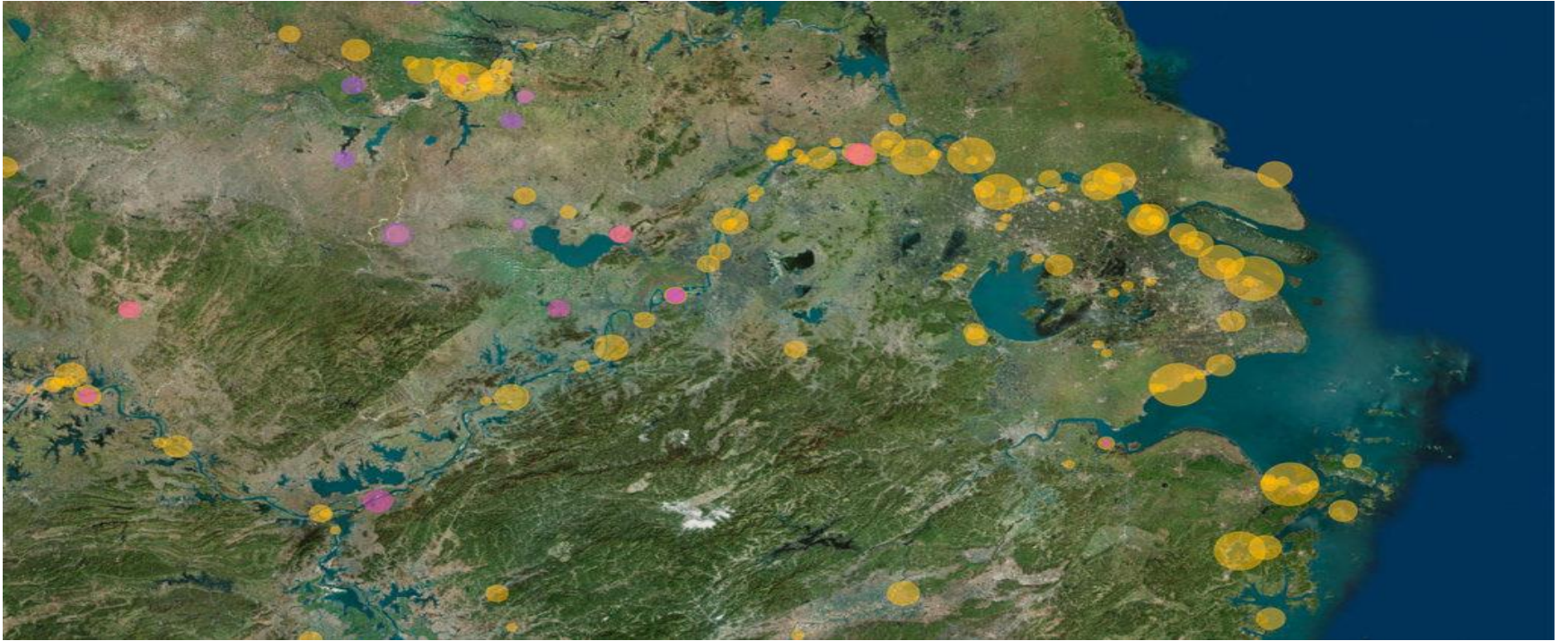
Coal generation of CO2...

Global coal generation and CO2 emissions have levelled off

Rising capacity means fewer running hours and lower profits



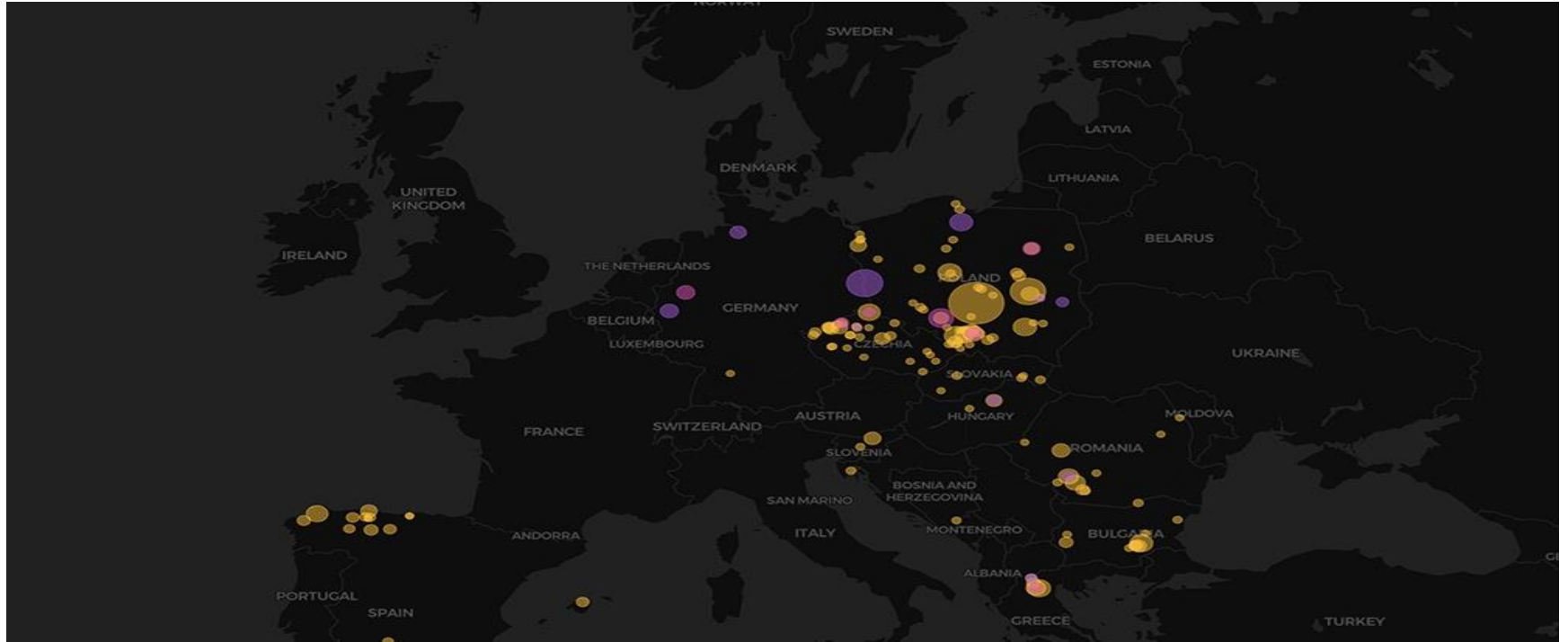
Yangtze coal



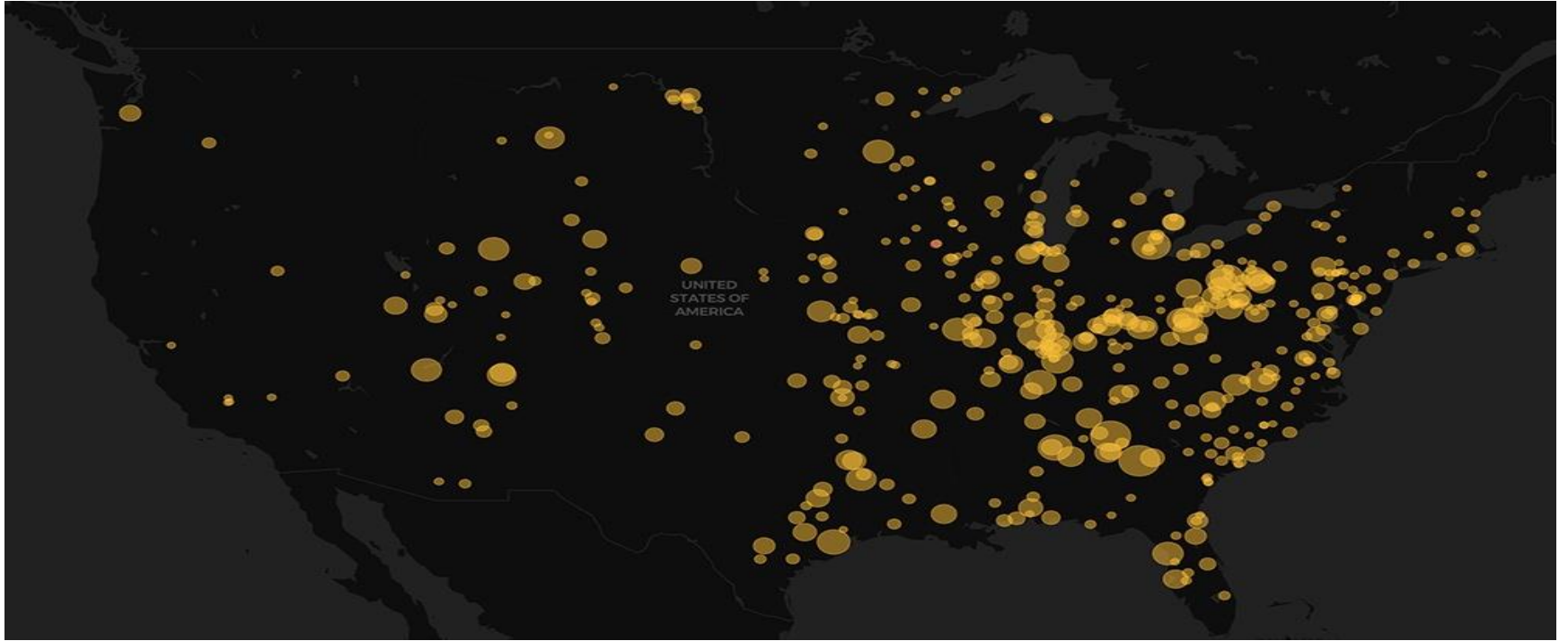
Europe 2000



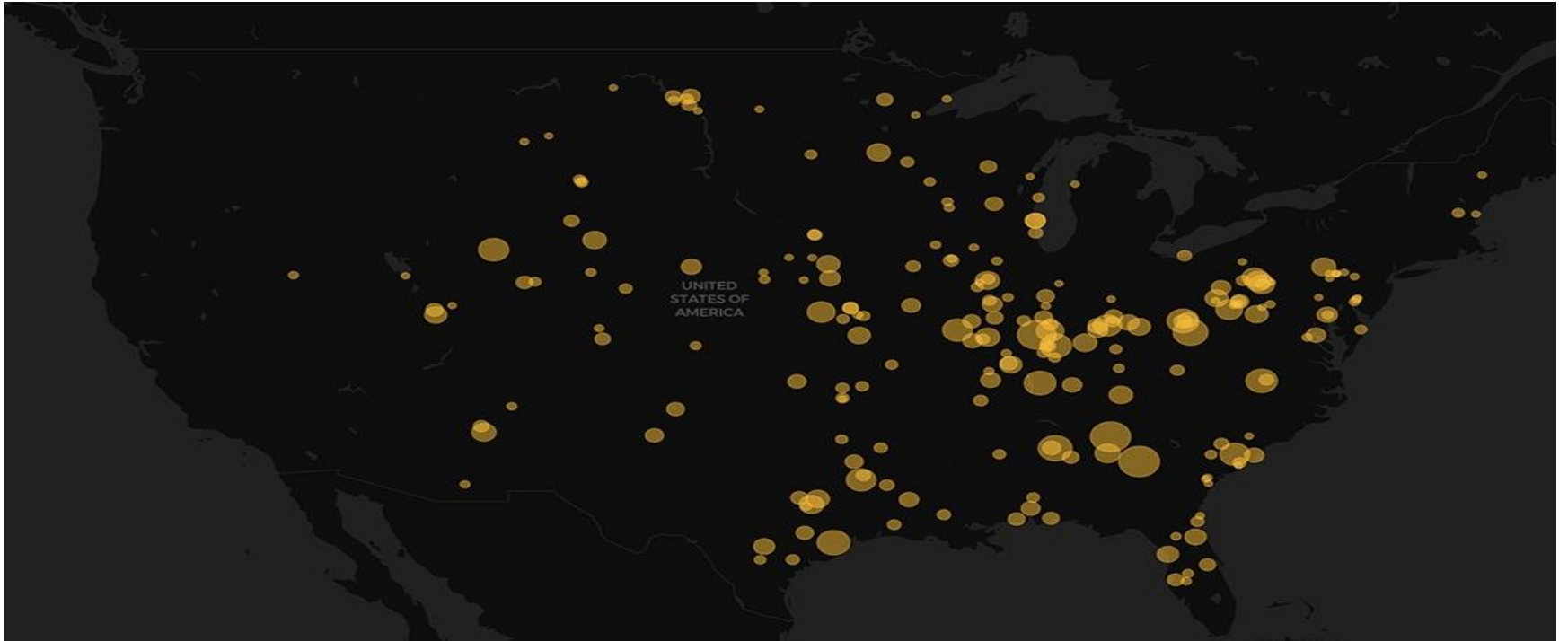
Europe Future



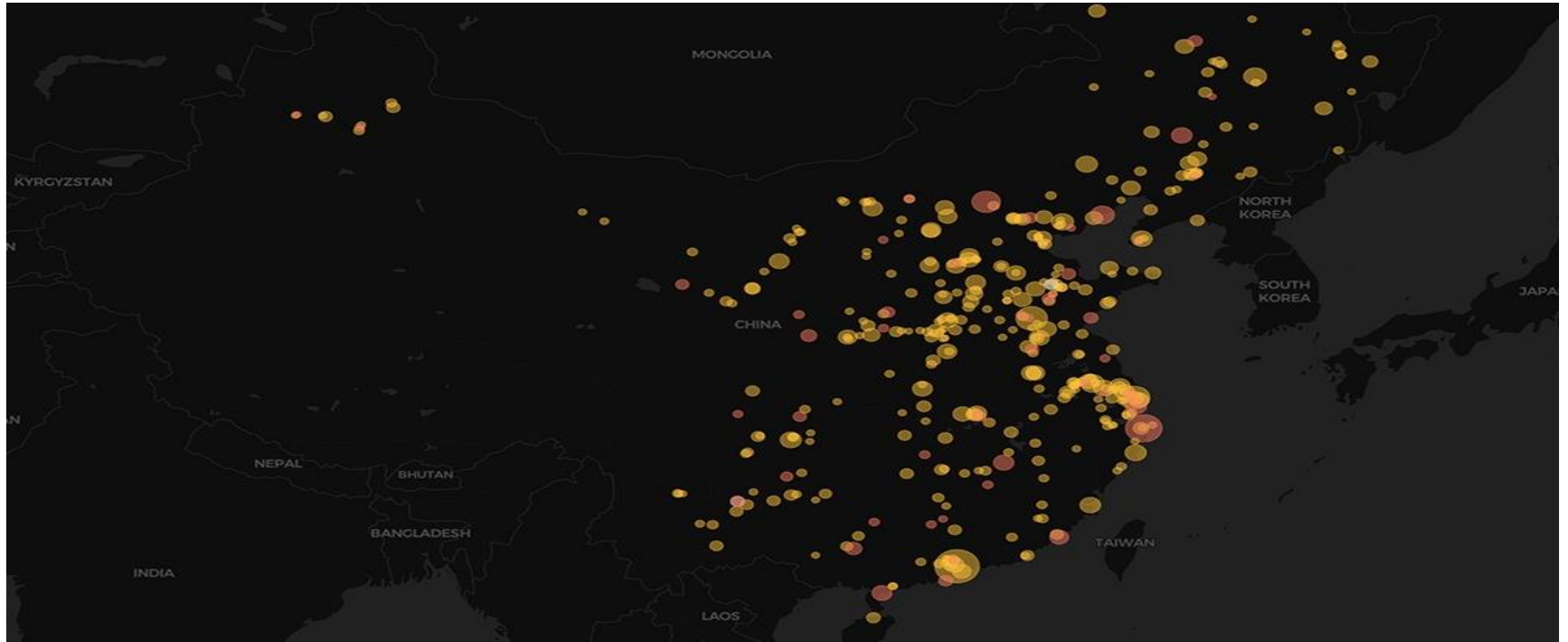
US 2000



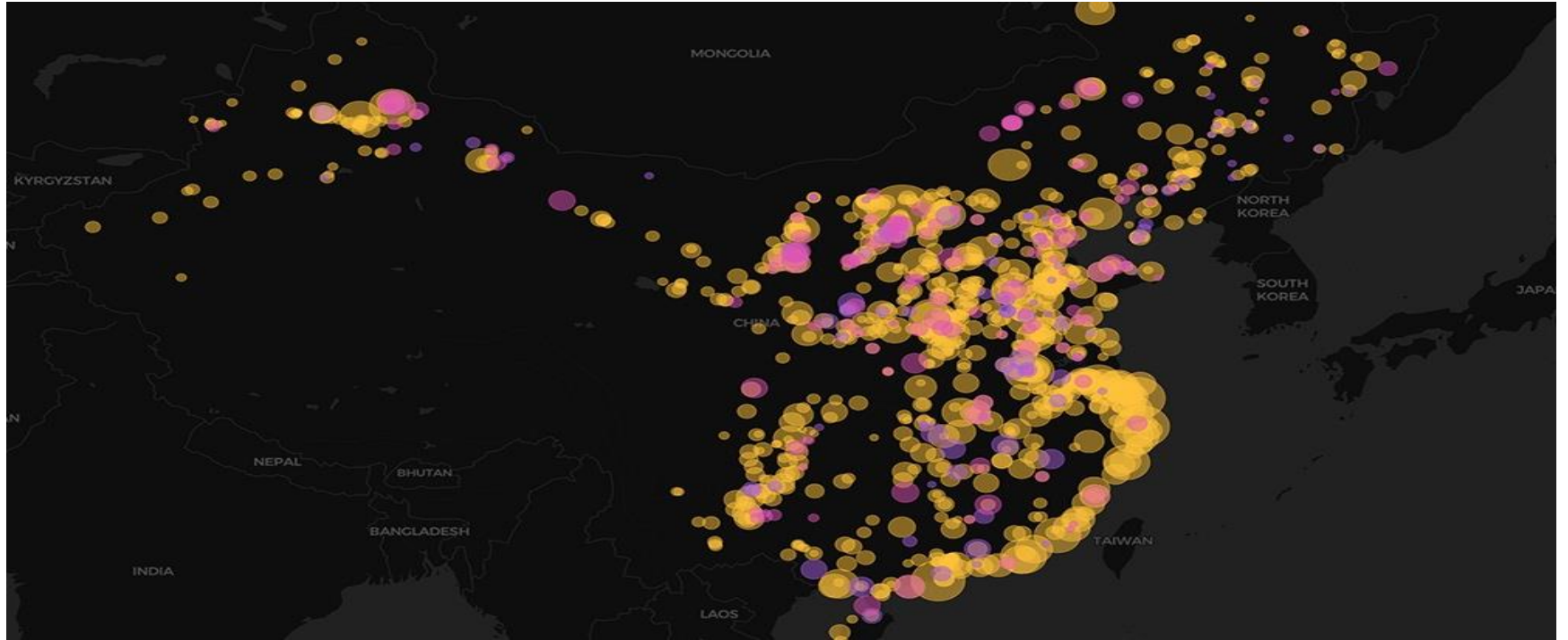
US future



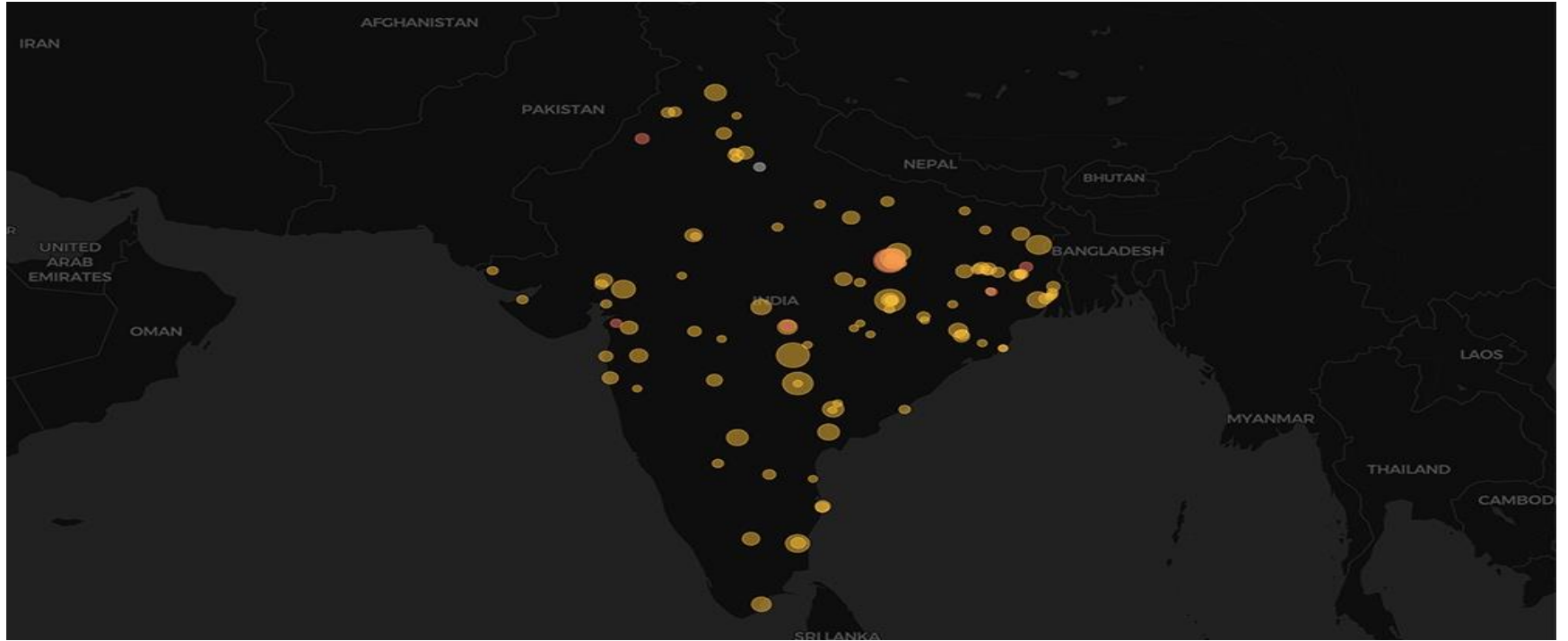
China 2000



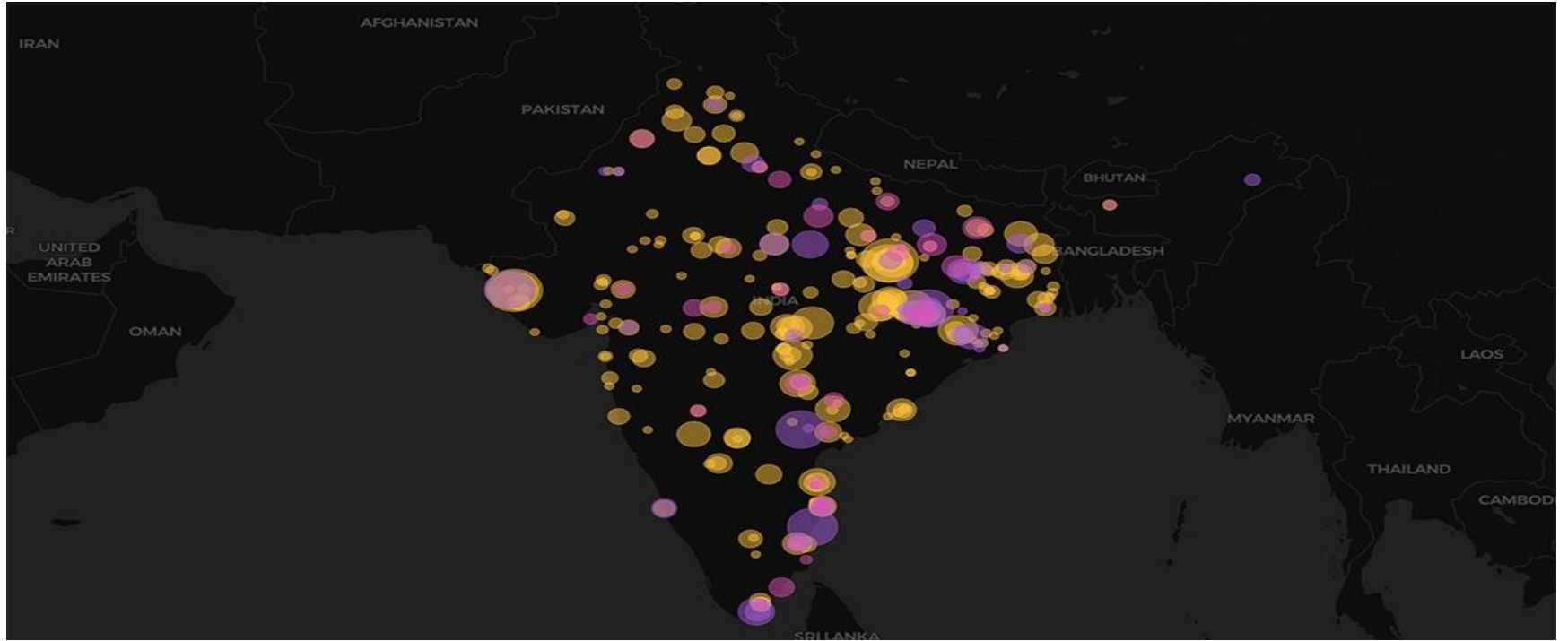
China future coal



India 2000



India Future



Top 10 for coal capacity

Country	Operating (MW)	Share	Country	Pipeline (MW)	Share
China	972,514	48%	China	198,600	35%
United States	261,037	13%	India	93,958	16%
India	220,670	11%	Vietnam	42,215	7%
Russia	48,463	2%	Turkey	37,466	7%
Germany	48,275	2%	Indonesia	24,691	4%
Japan	45,568	2%	Bangladesh	21,364	4%
South Africa	42,281	2%	Japan	15,308	3%
South Korea	37,064	2%	South Africa	14,192	2%
Poland	29,625	1%	Egypt	13,240	2%
Indonesia	29,307	1%	Philippines	12,618	2%

86% of the total currently operating

82% of plants in the pipeline



President Xi Jinping claims BRI
“aims to promote green
development.”

So, why is China building
hundreds of coal-fired power
plants in other countries?

Locked into unsustainable
infrastructure, technology, and
resource extraction => long-
lasting negative environmental
and climate change
consequences

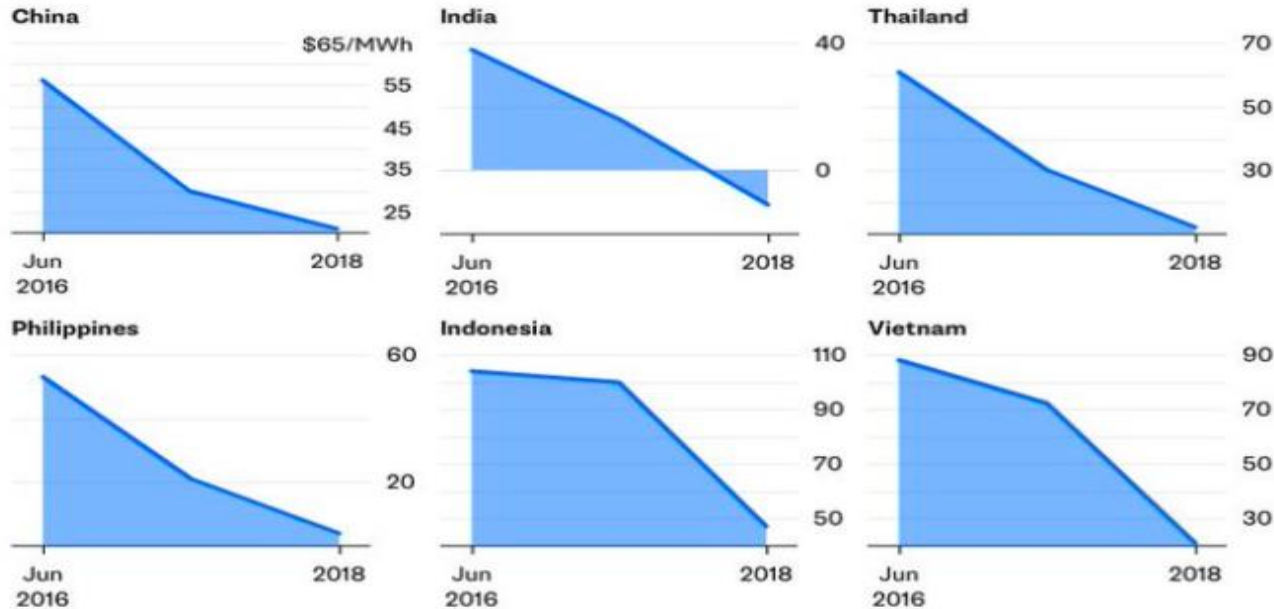
The ‘gift’ that keeps on taking

A Chinese-backed power plant under construction
in 2018 in the desert in the Tharparkar district of
Pakistan's southern Sindh province.

It's bad investment advice (and China's ironic role in solar panels)

Negative Charge

The price premium for new solar generation over coal in Asia has slumped, and gone negative in India



Source: Bloomberg New Energy Finance

Note: Shows levelized cost of electricity for solar minus LCOE for coal in each country. Coal LCOE ranges from \$46/MWh (China) to \$88/MWh (Philippines)



Needs fundamental change

- China claims BRI a blueprint for responsible development
- Many of the overseas enterprises are poorly controlled by Chinese (or any) government
- Firms take advantage of weak environmental controls especially in developing countries in Africa

This is not a new problem

- Same struggle with Western aid and Asia first movers Japan and South Korea
- Same challenge to conduct and act upon effective environmental impact assessments
- Host countries carry out assessment
 - Deliberations on site selection, consultation, social impact, displacement, and long-term impacts like air pollution from coal plants have little in common across the BRI.
 - Effective enforcement of existing policies likewise varies, revealing the BRI as a strategic initiative that may have some continuity in its geo-economic objectives, but little in its operations
 - wholesale dependence on local regulations leads to poor environmental outcomes and accountability

If done well: China a world leader in sustainability?

- Currently China doing much better at safeguarding environment inside China than outside China
- Help or hinder ability of countries to meet their targets for 2030 Agenda for Sustainable Development
- China mountain of green documents and promises about BRI
- Is BRI just a brand?
- Broad catchphrase to describe almost all aspects of Chinese engagement abroad

BRI and green development

- Twenty-seven investment players, including all major Chinese banks involved in the BRI, signed up to Green Investment Principles.
- Minister of Ecology and Environment Li Ganjie signaled convened a Thematic Forum on the Green Silk Road.

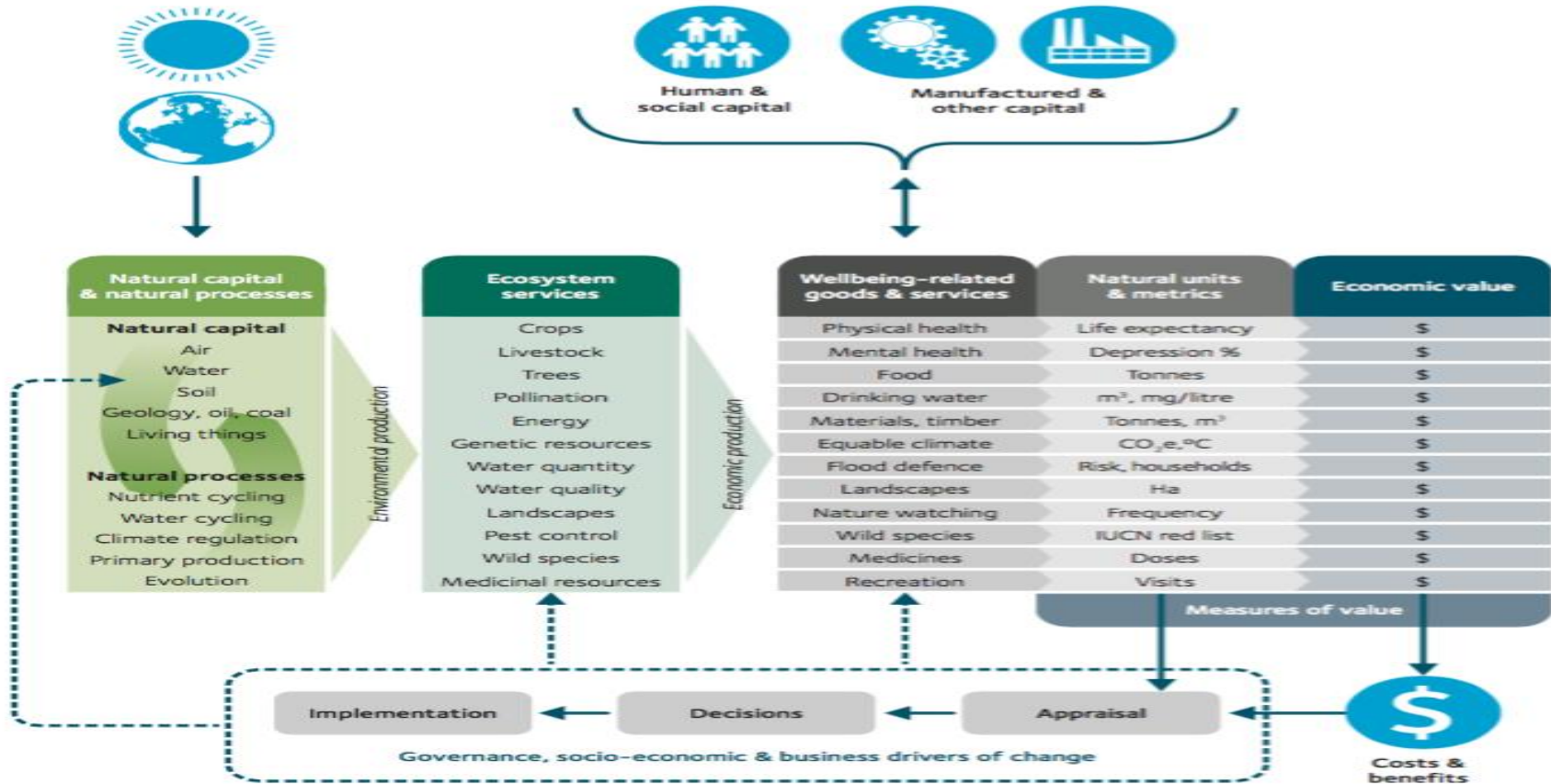
UN BRIGC

- 20 UN agencies, including UN Environment, have signed cooperation agreements with the Government of China on the BRI.
- Common desire to create synergies between the BRI and the SDGs
- UN convening power to bring together stakeholders to collaborate and make BRI sustainable
- With right policies, BRI can play a big role in country efforts to achieve SDGs and 2030 Agenda

Need for concrete principles

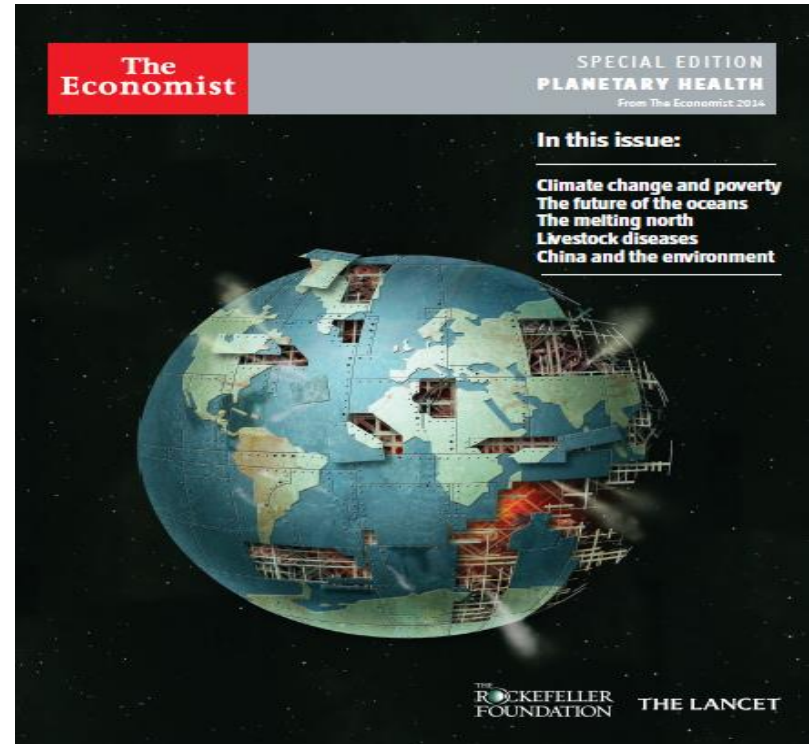
- Need more concrete principles. Not just aspirational/branding statements
- E.g. ~~caps on~~ BANNING coal development
 - Coal-based energy = short term industrial gains, but long-term health and environmental damage
- More nuanced site selection for transportation that take s account of ecosystem services
 - Road and rail that compromise watersheds will link markets more quickly, but at the long-term expense of worse rural and urban prospects
- China increasingly understands this at home... but what about applying this abroad?
- How to deal with local (and global) vested interests?
- Write 'green' and 'health impact' into the rules and practices of development finance

Natural capital/value approach



A little thought experiment

- Increasing time horizons of capital...
- Venture capital exits
- 10-20 year horizons?
- So imagine you cashed in a \$20 bill for rolls of pennies. You stack those pennies up, into a single 4m-high. That represents the investable capital in the world today
- Only the final penny is at work in the 10-year investment range
- BRI could be the badly-needed 'patient capital'



THANK YOU

