INAF U6164:

Political Economy of Development:

Africa and the World

Week 3: Geography and initial conditions

Instructor: Chris Blattman

Announcements

- Auditors
- Keeping up with readings
- Assignment 1 due Feb 8

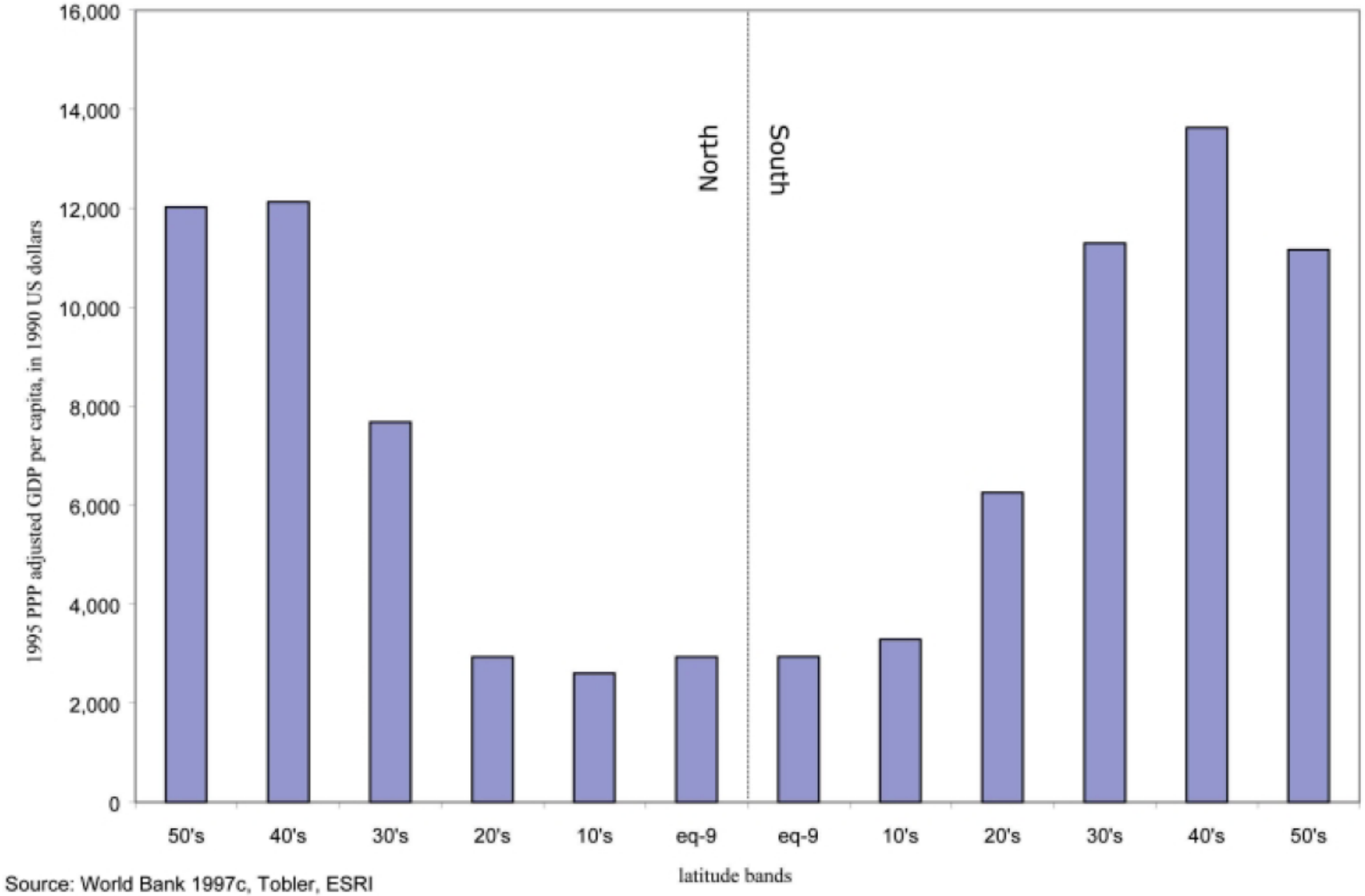
It's time to play…
Name that developing country President!

You get 5 clues:

1. His election was marred by fraud and intimidation;
2. Three of the disputed regions were under military occupation at the time by the President's supporter;
3. The inauguration ceremony was held in secret because of fears of an insurrection by the opposition;
4. During his reign, his troops massacred dozens while quelling protests; and
5. Half his children died of disease before reaching their second birthday

The 19th President of the USA,
Rutherford B. Hayes (1877-81)

GDP per capita by latitude



Source: World Bank 1997c, Tobler, ESRI

Sachs, Jeffrey. 2000. "Tropical Underdevelopment." CID Working Paper No. 57.

Heat and lethargy?

A long tradition in philosophy and science of linking temperature with temperament

"In countries like India, Pakistan, Indonesia, Nigeria and Ghana I have always felt enervated by the slightest physical or mental exertions, whereas in the UK, France, Germany or the US I have always felt reinforced and stimulated by the temperate climate… And I know that all tropical peoples visiting temperate countries have had a similar experience."

-Bangladeshi diplomat

Quoted in Landes (1999), p.15

Climatic determinism

The importance of an enervating climate

- Famous proponent: Yale's Ellsworth Huntington
  - Taught geography 1907–1915
- Intermixed with racial theories of development
  - Ellsworth was President of the American Eugenics Society, 1934–1938

"He was so impressed by the connections between physical environment and human activity that he attributed more and more to geography, starting with physical influences [i.e. racial] and moving to cultural.

In the end, he was classifying civilizations hierarchically and assigning the best… to the favors of climate.

Huntington taught at Yale University and not coincidentally thought New Haven, Connecticut, had the world's most invigorating climate….

The rest of the world went down from there, with the lands of the peoples of color toward the bottom of the heap."

— Landes, *Wealth & Poverty of Nations*, p.3

We can probably do better

- Direct effects of geography on growth
  - **From trade costs (Sachs, Landes, Smith, Collier)**
  - **From disease environment to health and labor productivity (Sachs, Landes)**
  - **On endowments and basic "technology" (Diamond)**
  - Climate and agricultural productivity (Sachs)
  - The commodity lottery and linkages (Hirschman, Innis, Diaz-Alejandro)
  - Blessing of natural resources (many)

- Indirect effects on state strength and institutional choice
  - **On population density and state formation (Herbst, Diamond, Landes, Alsan)**
  - **Of endowments on institutional choice (Engerman & Sokoloff)**
  - **Of disease environment on institutional choice (AJR, Alsan)**
  - The natural resource curse? (Many)

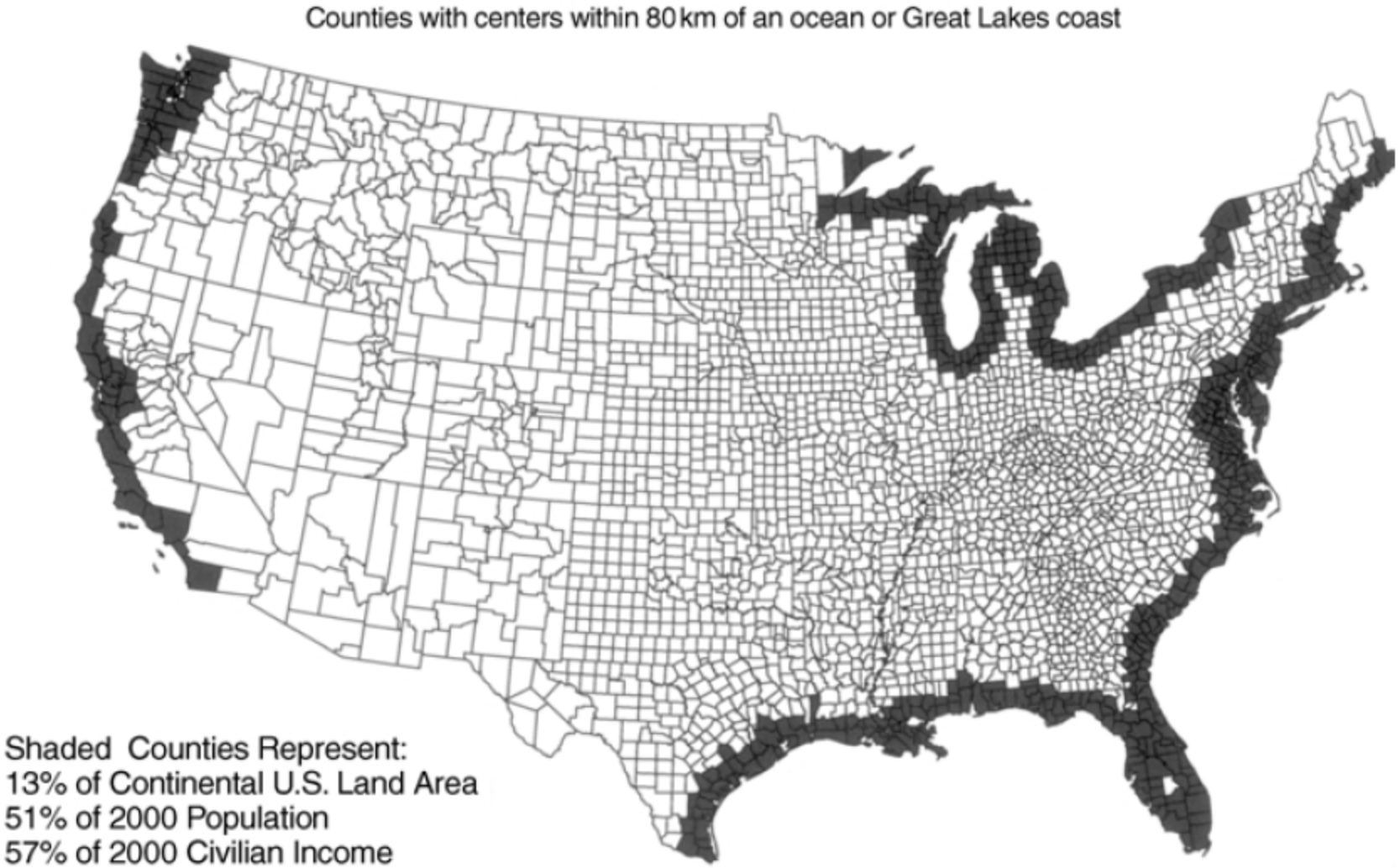
Geography, Trade, and Growth

Coastal access

Navigable rivers

Smooth terrain

Proximity to markets



Rappaport, Jordan, and Jeffrey Sachs. 2003. "The United States as a Coastal Nation." Journal of Economic Growth 8 (1):5-46.

"As by means of water carriage a more extensive market is opened to every sort of industry than what land carriage alone can afford it, so it is upon the sea-coast, and along the banks of navigable rivers that industry of every kind begins to sub-divide and improve itself, and it is frequently not till a long time after that those improvements extend themselves to the inland part of the country."

-Adam Smith, The Wealth of Nations (1776)

Market integration and growth

Navigable rivers,
Coastal access
Near trading partners
Smooth terrain

→

Low transport costs, increased trade

→

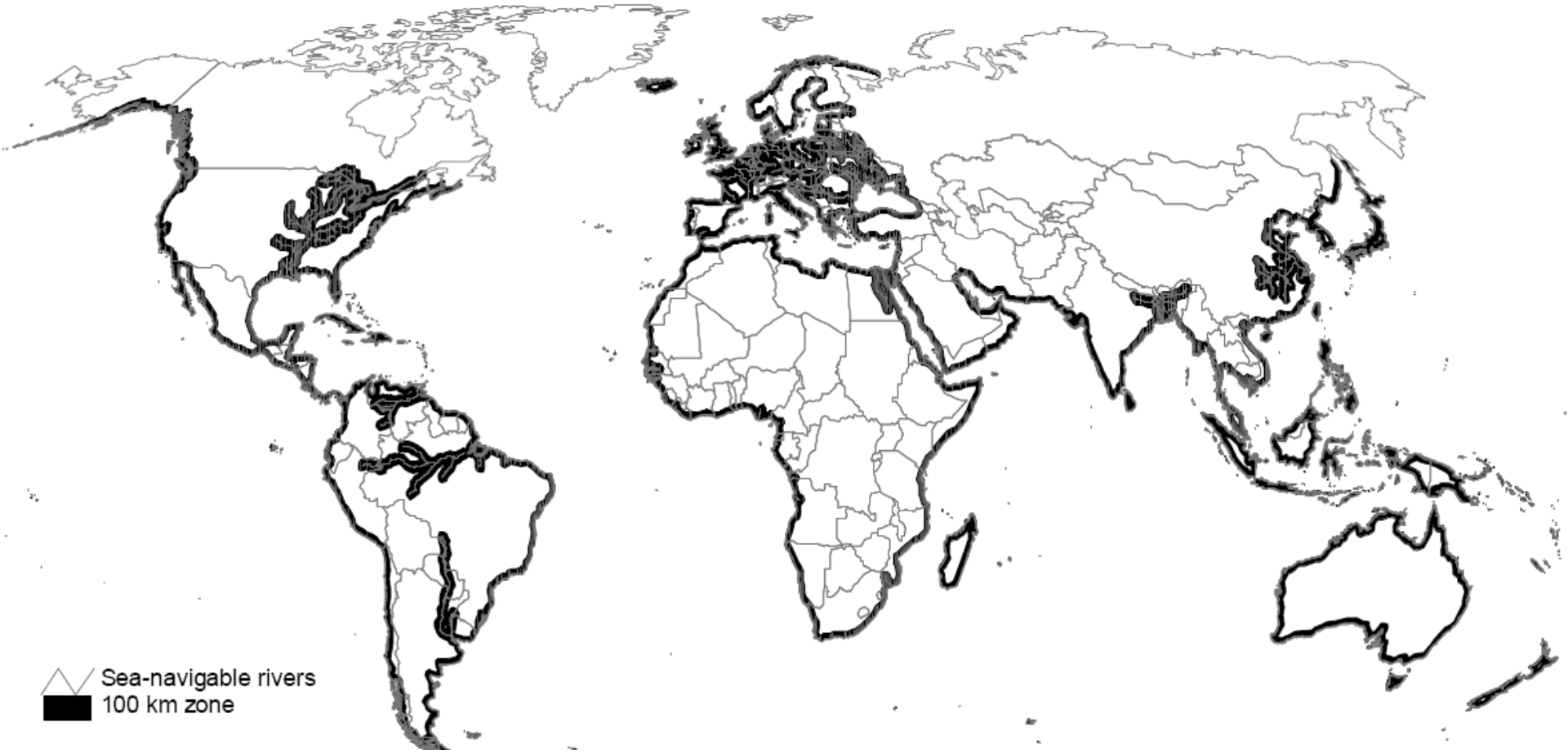
Specialization

Diffusion of technology & ideas

→

Economic growth

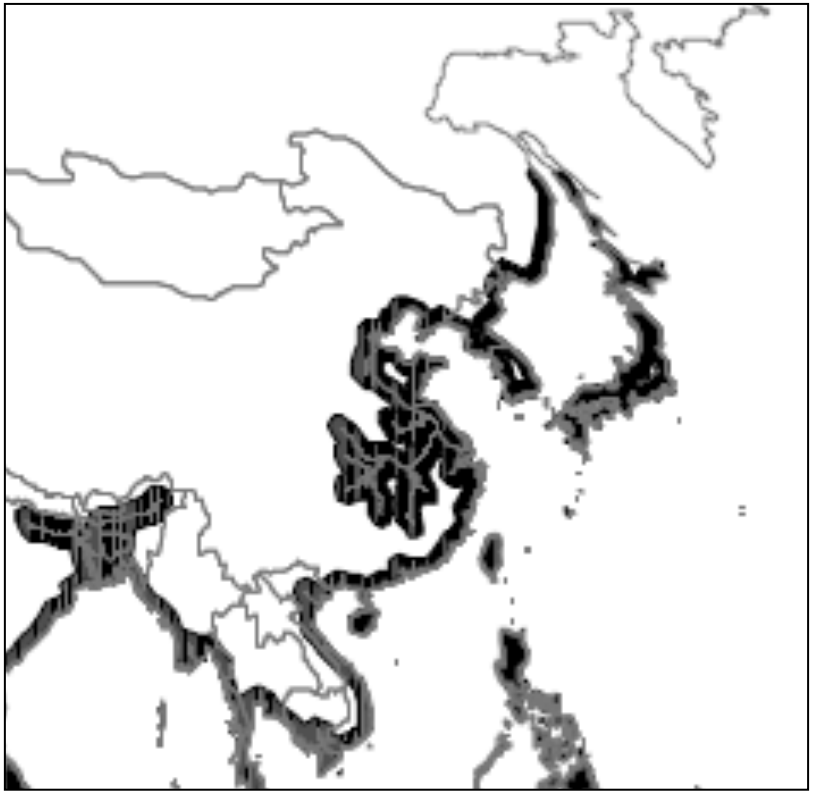
Figure 3. Land within 100 km of an ice-free coast or sea-navigable river



Mellinger, Andrew D., Jeffrey Sachs, and John L. Gallup. 1999. "Climate, Water Navigability, and Economic Development." *CID Working Paper No. 24.*

Europe

China & Japan



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Mellinger, Andrew D., Jeffrey Sachs, and John L. Gallup. 1999. "Climate, Water Navigability, and Economic Development." *CID Working Paper No. 24.*

"All the inland parts of Africa, and all that part of Asia which lies any considerable way north of the Black and Caspian Seas... seem in all ages of the world to have been in the same barbarous and uncivilized state in which we find them at present...

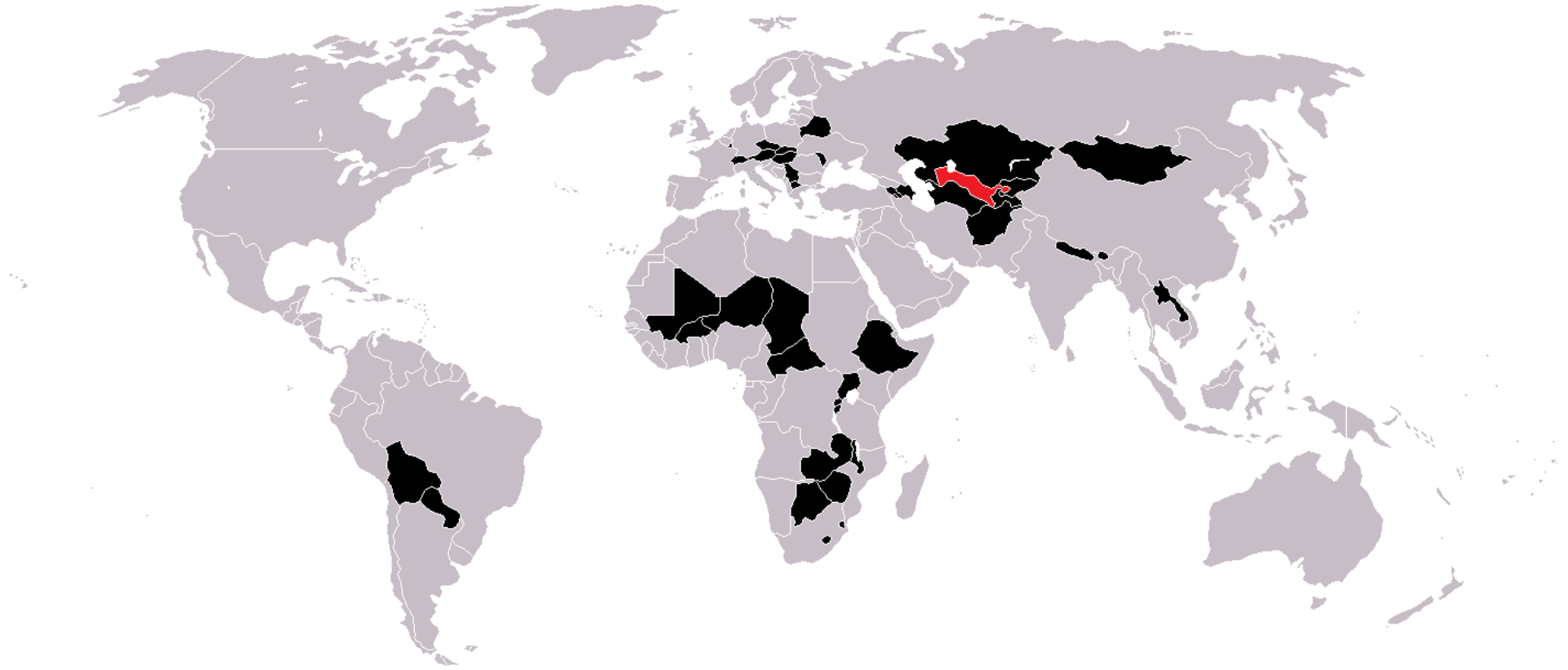
There are in Africa none of those great inlets ... to carry maritime trade into the interior parts of that great continent..."

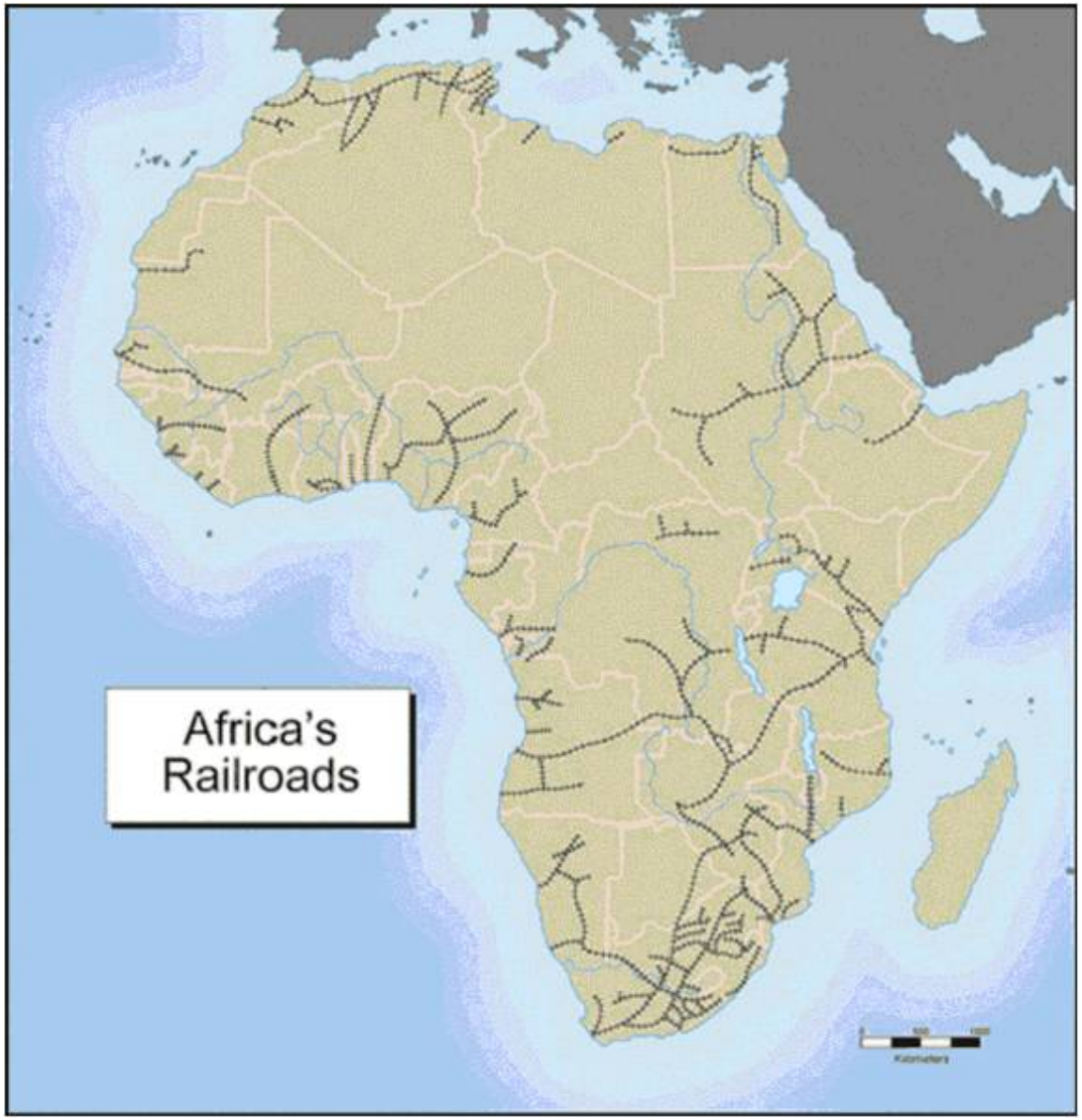
-Adam Smith, The Wealth of Nations (1776)

World landmass within 100 km of the sea:	17%
World's GDP is produced within 100 km of the sea:	68%
World landmass in temperate climates:	39%
World's GDP is produced within 100 km of the sea:	67%
World landmass: temperate and near the sea:	8%
World's GDP production: temperate and near the sea:	53%

Mellinger, Andrew D., Jeffrey Sachs, and John L. Gallup. 1999. "Climate, Water Navigability, and Economic Development." *CID Working Paper No. 24.*

Landlocked nations

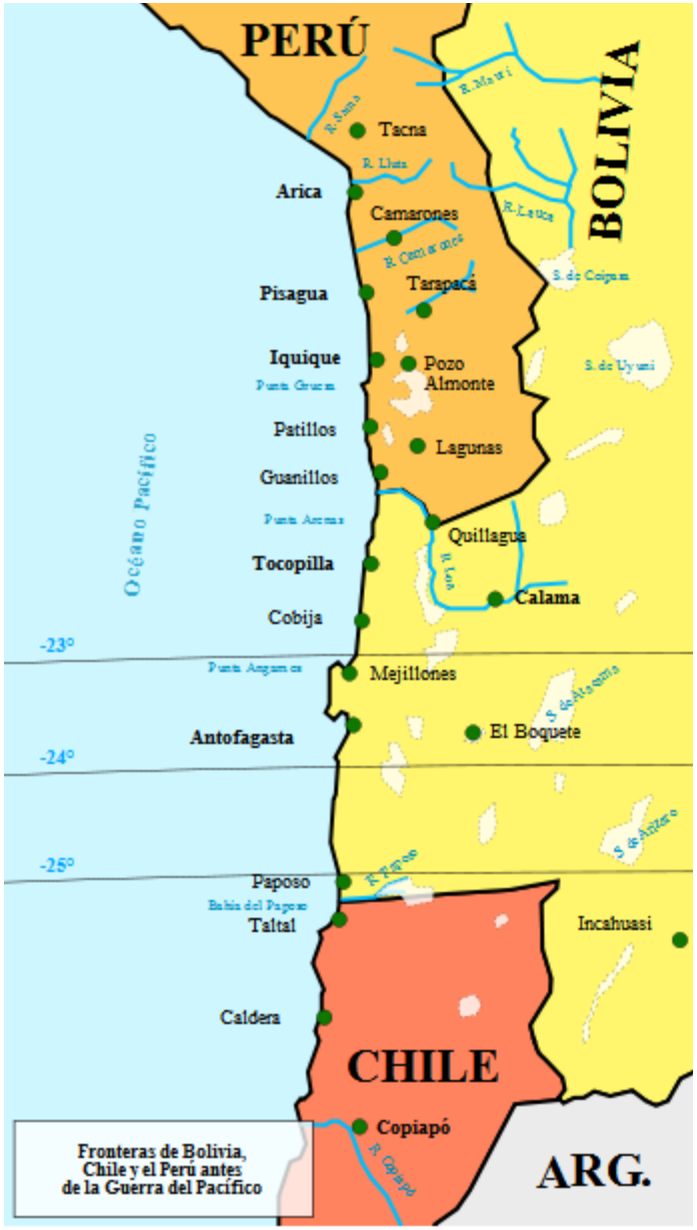



Africa's
Railroads

Consequence of landlockedness

- High transport costs
  - Raise cost of living
  - Reduces trade
  - Raises cost of inputs into production
  - Reduces information flows

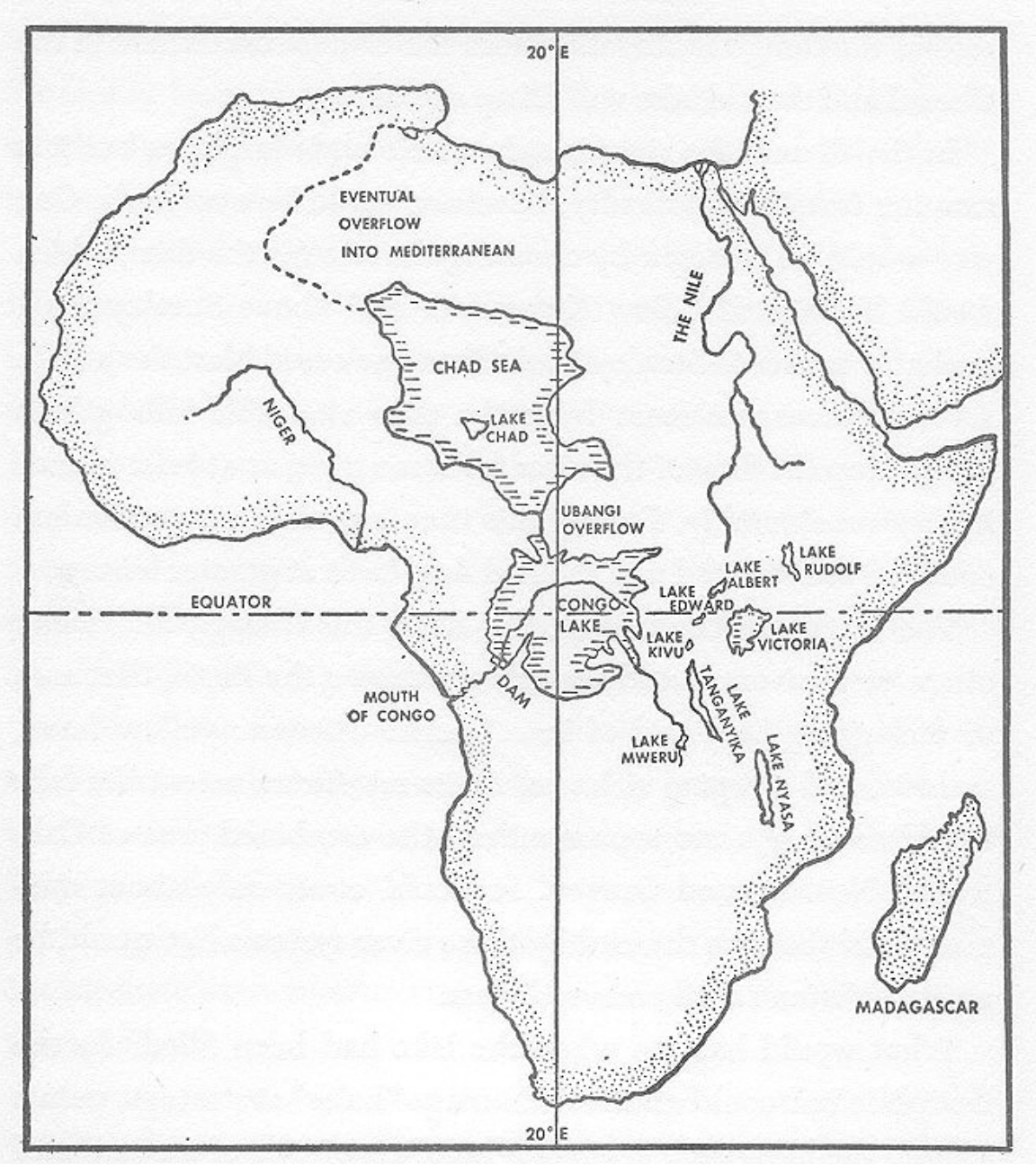

Peru
Bolivia
Chile
Argentina


PERÚ
BOLIVIA
Tacna
Arica
Camarones
Tarapacá
Pisagua
Iquique
Pozo Almonte
Patillos
Lagunas
Guanillos
Quillagua
Tocopilla
Calama
Cobija
Mejillones
Antofagasta
El Boquete
Paposo
Taltal
Incahuasi
Caldera
CHILE
Copiapó
ARG.
Océano Pacífico
-23°
-24°
-25°
Fronteras de Bolivia, Chile y el Perú antes de la Guerra del Pacífico

What are the policy options for landlocked nations?

Invade your coastal neighbors?

Dredge rivers?



Ley, Willy. 1954. *Engineer's Dreams: Great Projects That Could Come True: Viking Press.*

What can a landlocked country do? (Collier)

- Domestic
  - Reduce costs of trade and doing business
  - Specialize in high-value services and agriculture
  - Reduce costs of air transport
  - Encourage remittances

- Regional
  - Improve regional transport infrastructure
  - Increase the openness of neighbors
  - Regional integration

(But what incentives does the coastal country have?)

East African Community (EAC)

Caution: Trade access is not everywhere and always a good thing

Regions (ethnic groups) most affected by the slave trades

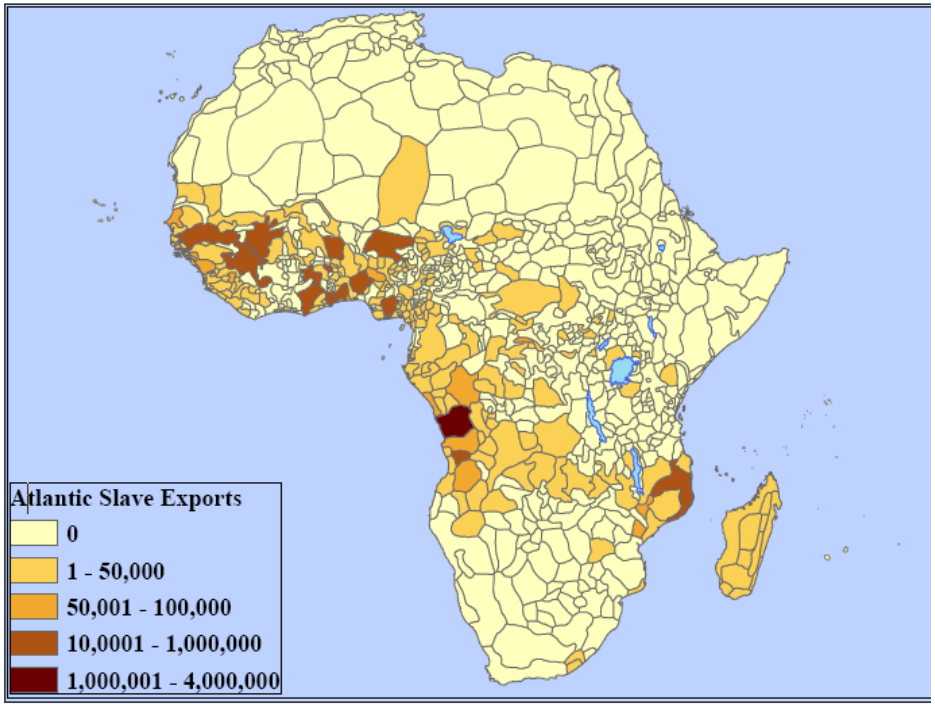


Figure 2. Ethnicities Shipped During the trans-Atlantic Slave Trade.

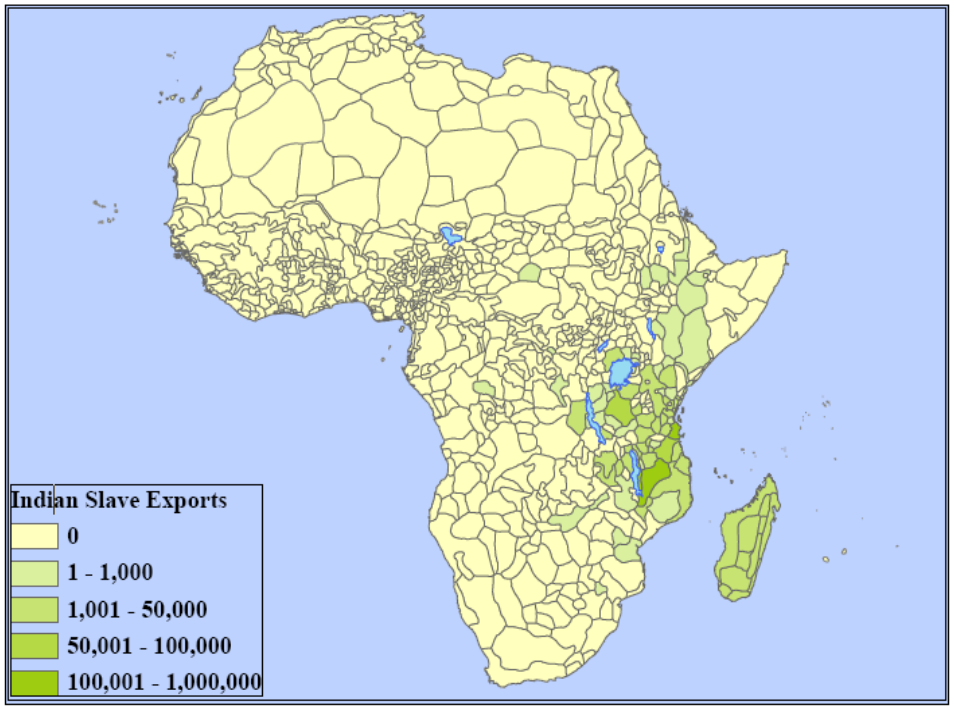


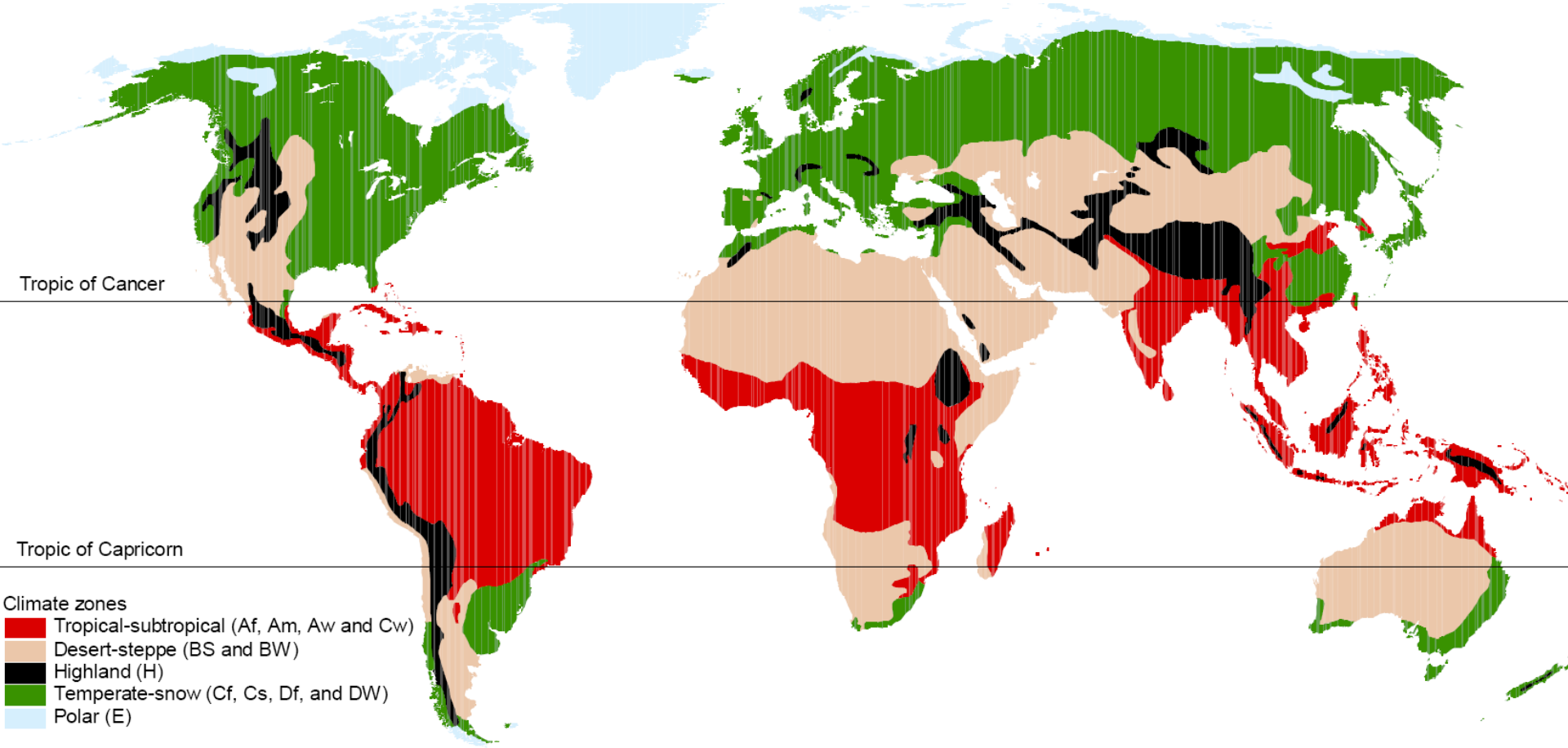
Figure 3. Ethnicities Shipped During the Indian Ocean Slave Trade.

Nunn, Nathan, and Leonard Wantchekon. 2008. "The Trans-Atlantic Slave Trade and the Evolution of Mistrust in Africa: An Empirical Investigation." Unpublished working paper, Harvard University and NYU.

The disease environment

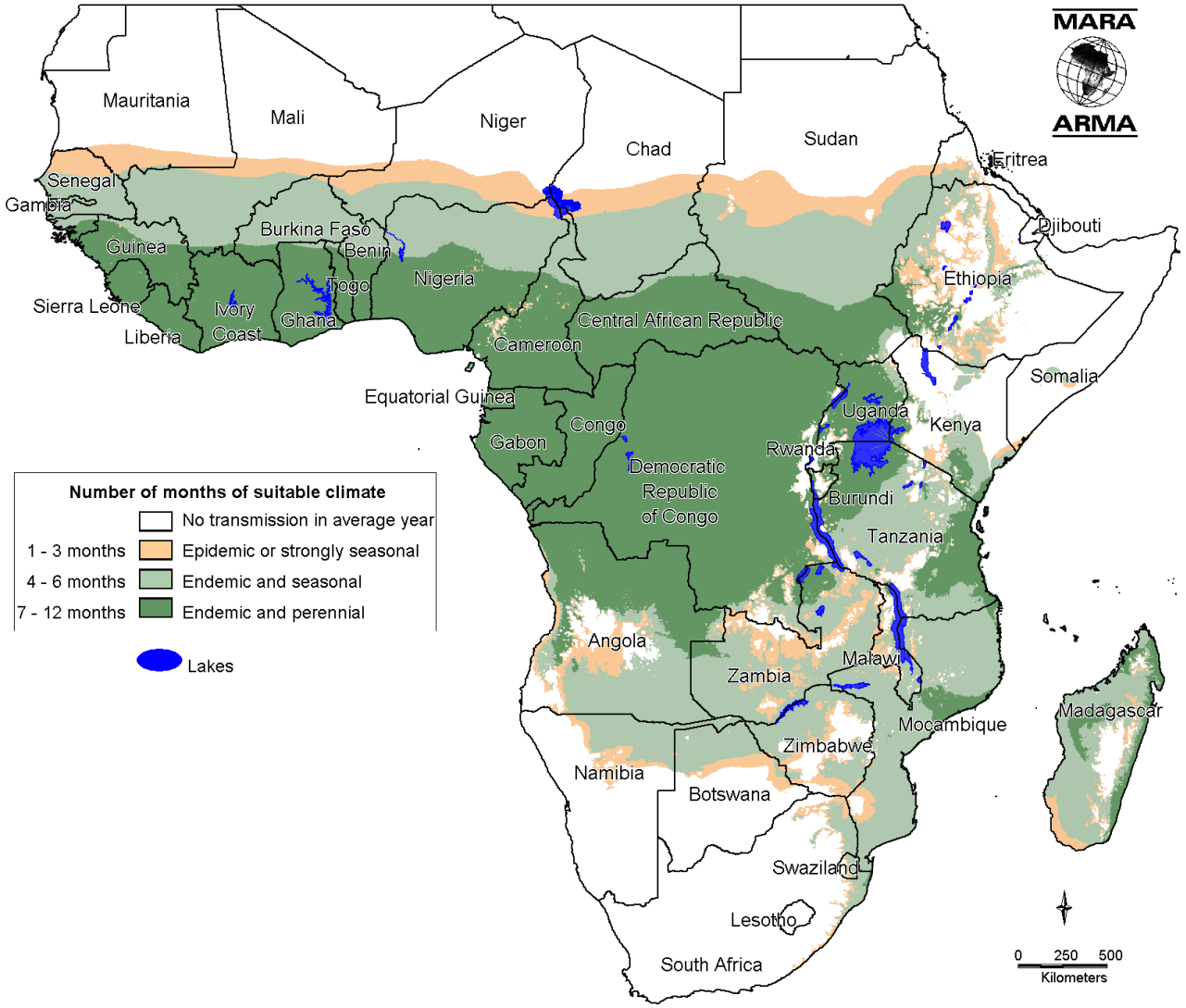
The cradle of humanity is also the cradle of human disease and parasites.

Climatic zones may matter for more reasons than the diffusion of technology



Sachs, Jeffrey. 2000. "Tropical Underdevelopment." CID Working Paper No. 57.

Duration of the Malaria Transmission Season



This map is a product of the MARA/ARMA collaboration (http://www.mara.org.za). July 2001, Medical Research Council, PO Box 17120, Congella, 4013, Durban, South Africa

CORE FUNDERS of MARA/ARMA: International Development Research Centre, Canada (IDRC); The Wellcome Trust UK; South African Medical Research Council (MRC); Swiss Tropical Institute, Multilateral Initiative on Malaria (MIM) / Special Programme for Research & Training in Tropical Diseases (TDR), Roll Back Malaria (RBM).

Malaria seasonality model: Tanser, F et al. 2001. Paper in preparation.

Topographical data: African Data Sampler, WRI, http://www.igc.org/wri/sdis/maps/ads/ads_idx.htm.

Distribution of actual and potential malaria transmission stability

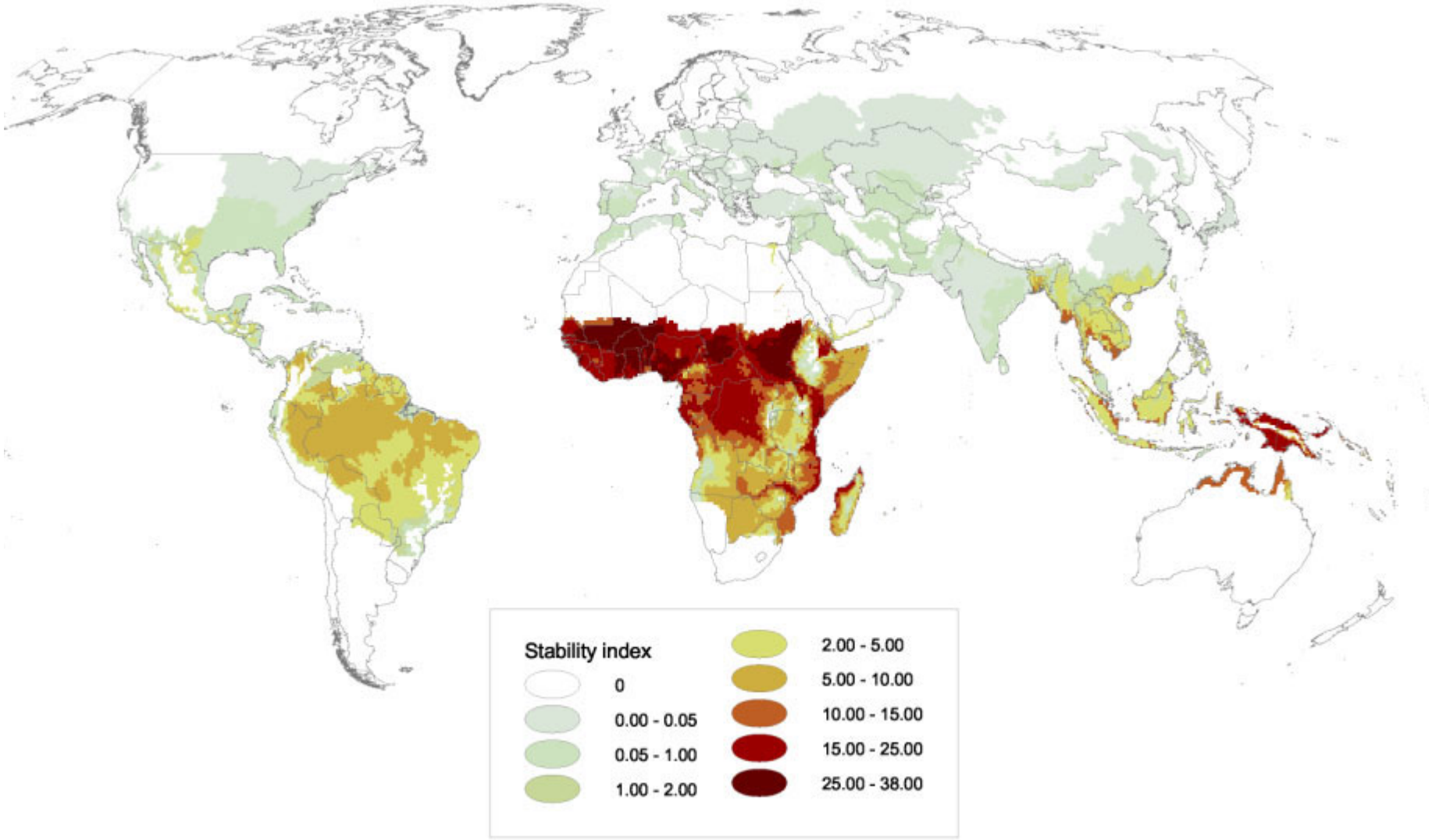


Figure 1 from Anthony Kiszewski, Andrew Mellinger, Andrew Spielman, Pia Malaney, Sonia Erlich Sachs, and Jeffrey Sachs. **A Global Index Representing The Stability of Malaria Transmission**. Am J Trop Med Hyg 2004 70:486-498.

Sachs: "Malaria represents broad economic and social costs"

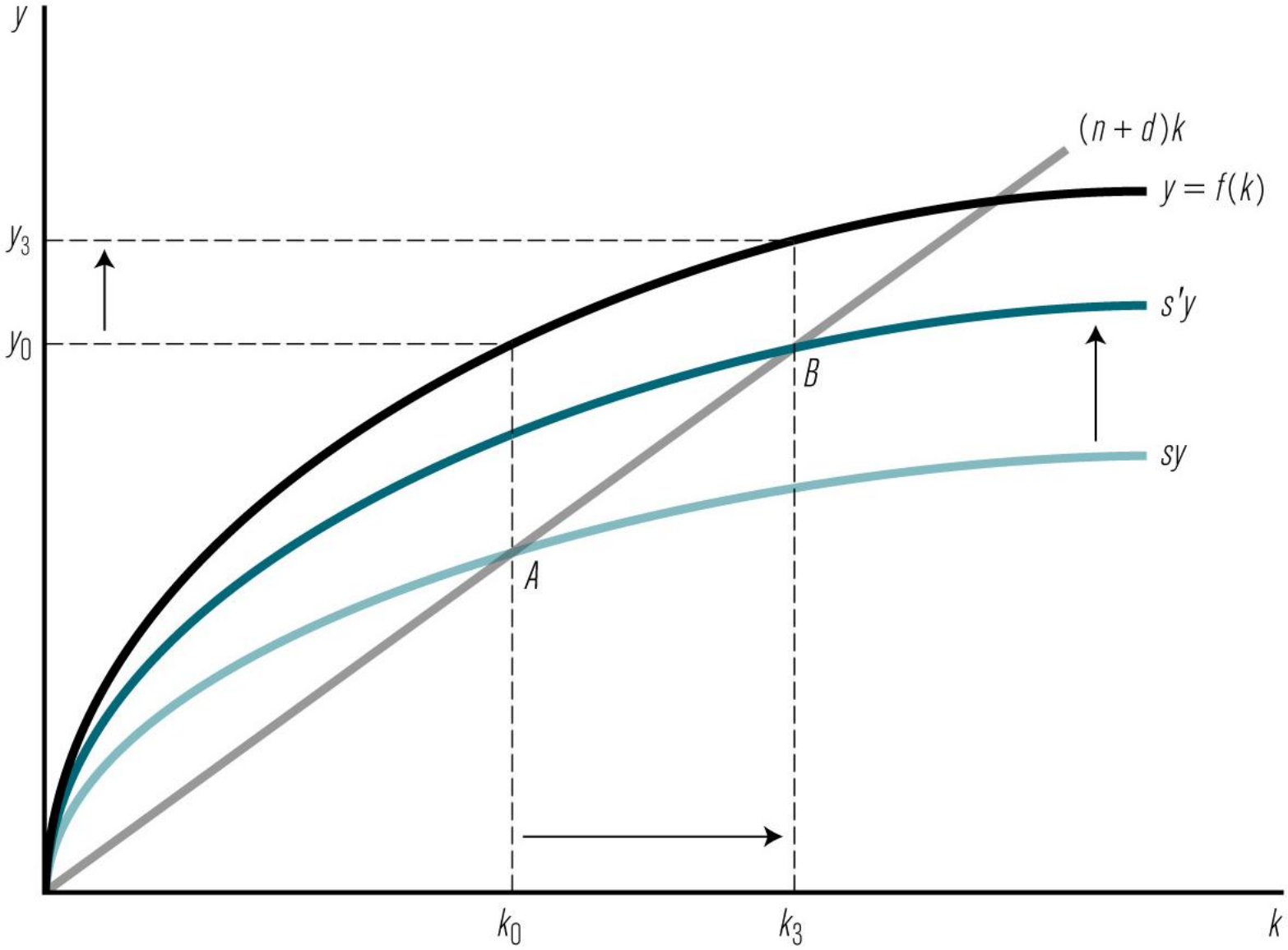
- Direct costs
  - Public and private medical costs associated with the disease roughly 1% of GDP

- Potentially much larger indirect cost: **Reduces incentives to invest in human and physical capital**
  - Direct demographic consequences: death, especially children under 5
  - May contribute to higher fertility rates and fewer investments per child
  - School absenteeism
  - Possible cognitive effects of in utero and preschool exposure
  - Reduces incentives to save?

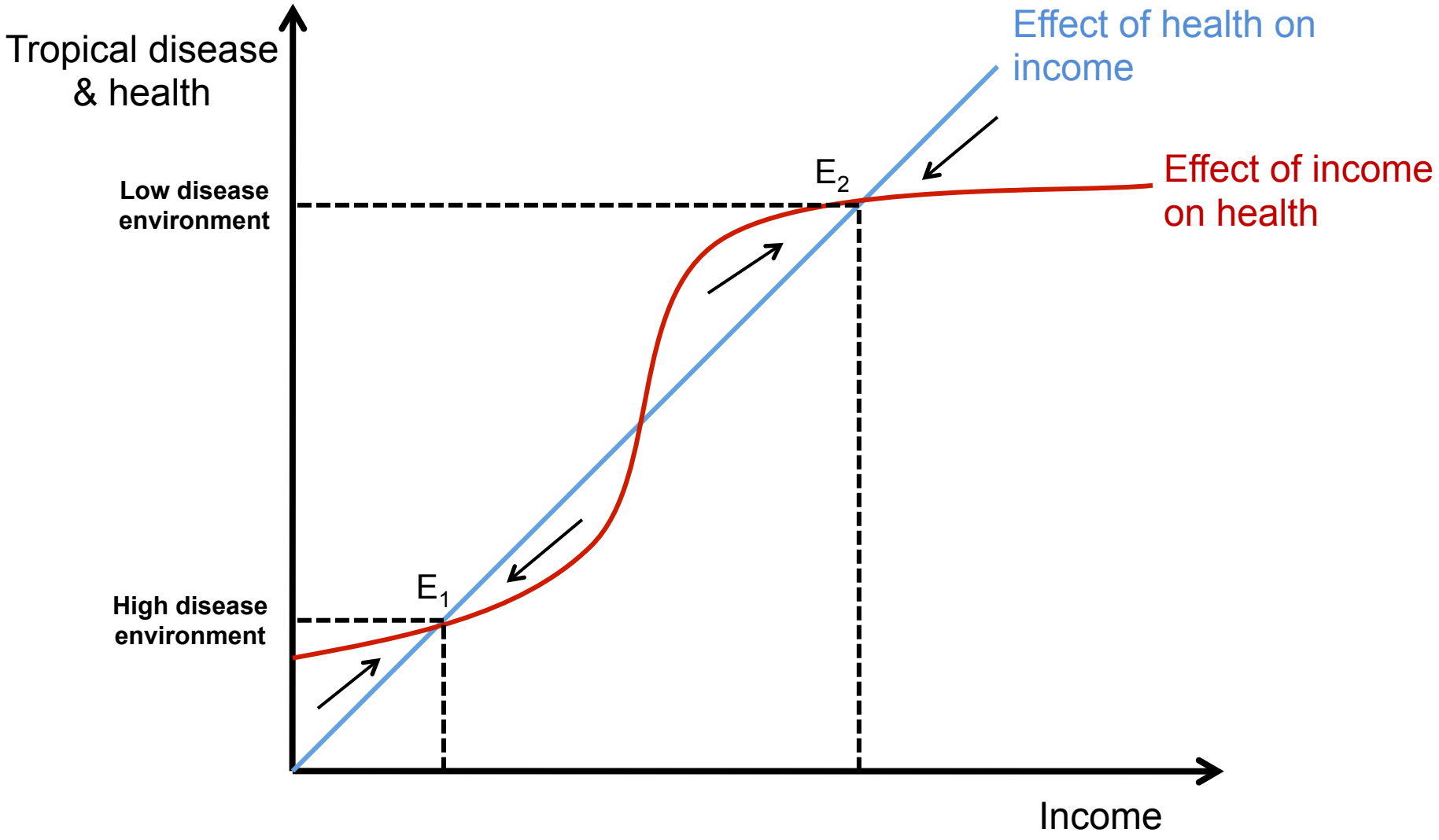
Sachs: “Malaria represents broad economic and social costs”

- Cross-national correlations suggest large effects:
  - Countries in which a high proportion of the population lived in regions of *P. falciparum* malaria transmission in 1965 had annual economic growth rates that were 1.3% lower than other countries

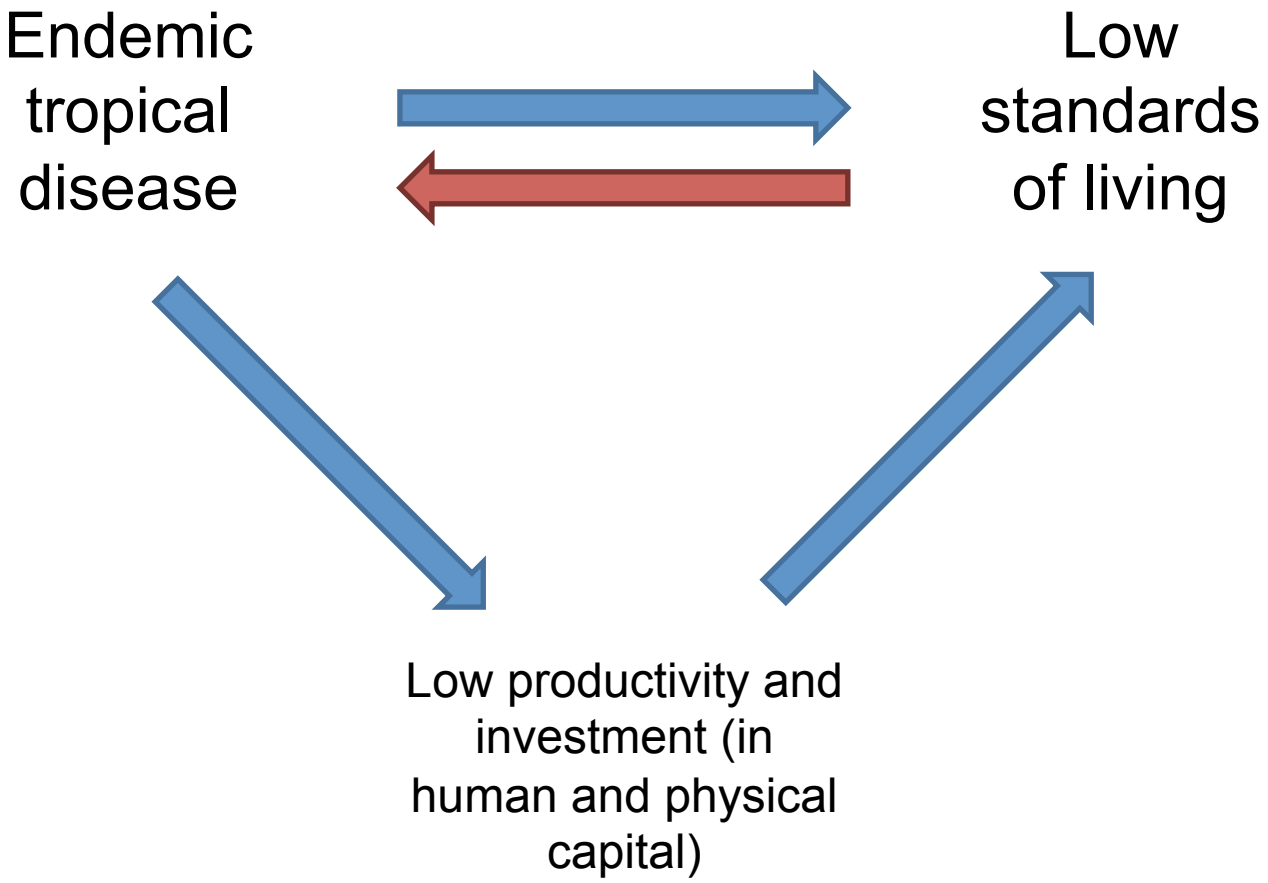
Would malaria eradication simply increase the savings rate?



Or is this a case of multiple equilibria?

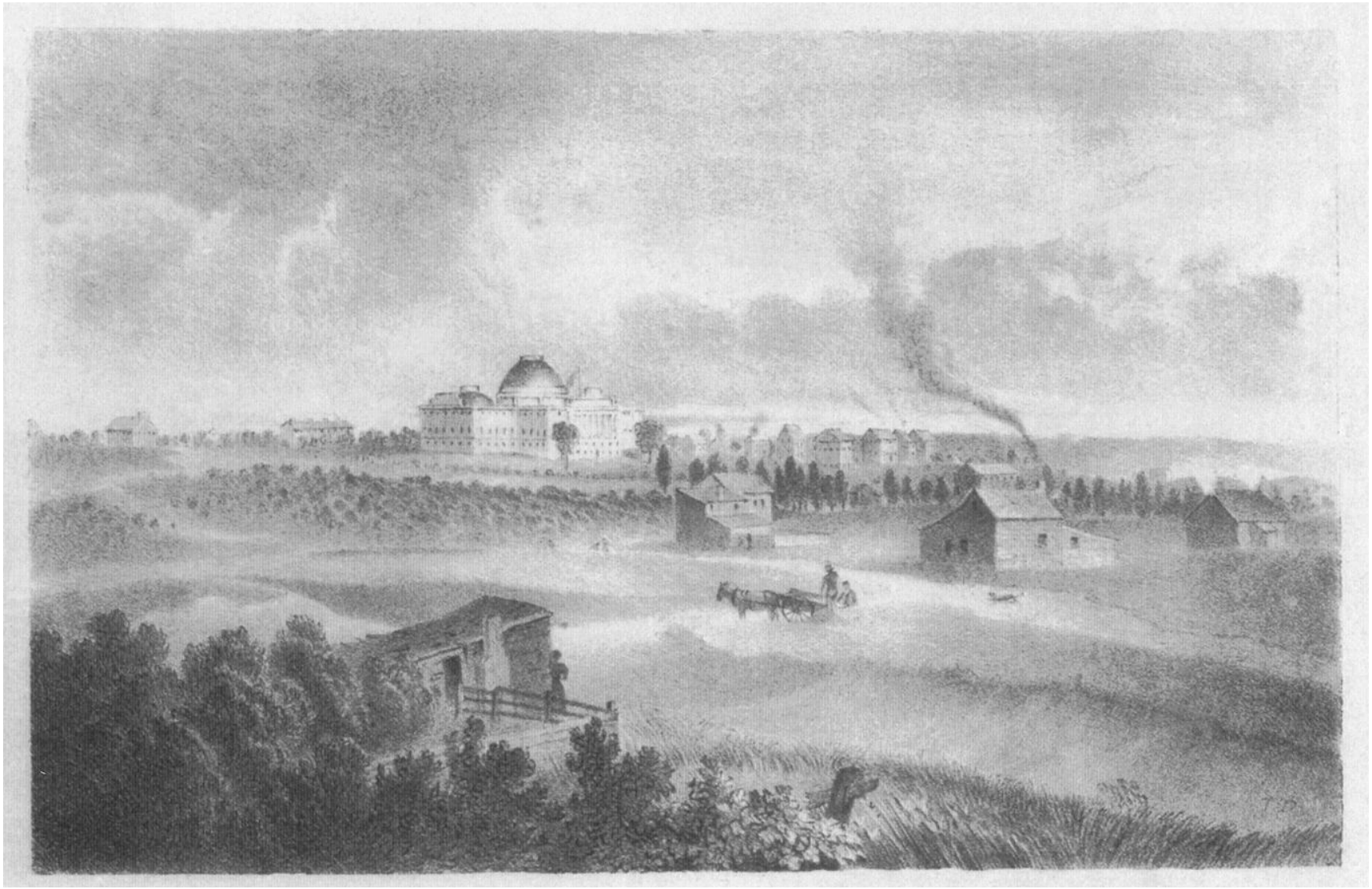


One hypothesis: from disease directly to underdevelopment (e.g. Sachs)



Problems with the evidence

- Existing evidence thin
  - Size of impact on fertility, child investments, school absenteeism, or savings rates unknown
  - Theoretically plausible but mostly speculative
- Meanwhile, correlations in the data plagued with causal issues
  - Reverse causality
  - Omitted variables
    - Determinants of disease (weak historical states, tropical environments) affect development through other channels

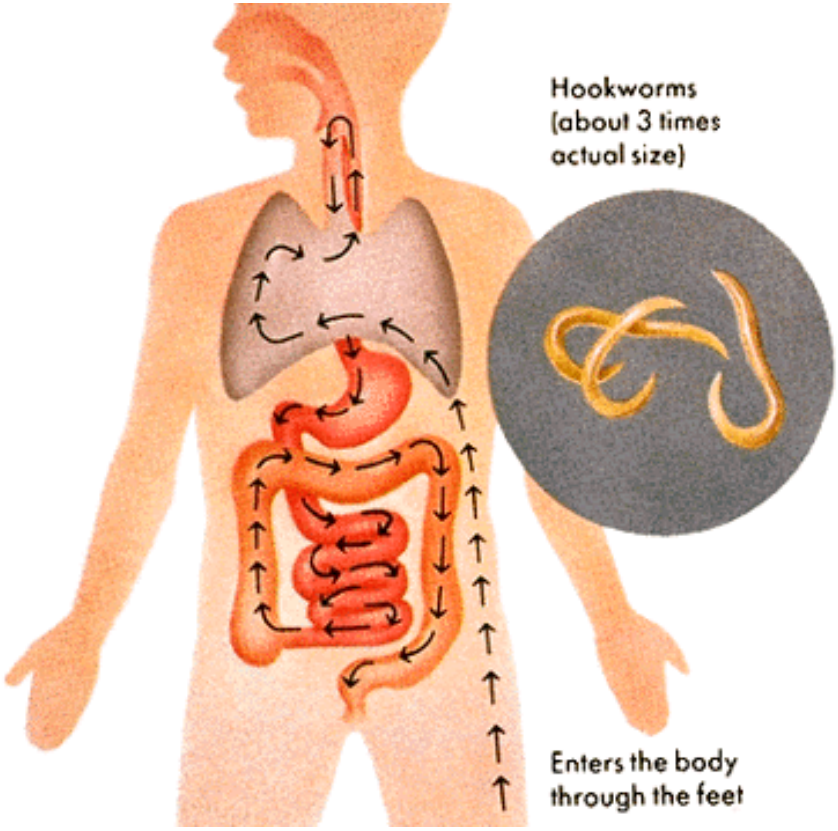


Capitol Building, Washington DC,1832

Zachary Taylor, 12th President of the U.S. (1849-1850)

- Three of his five children died of malaria in Tennessee
- He died of acute gastroenteritis – a bacteria like Salmonella or Staph – just 16 months into his term

Hookworm

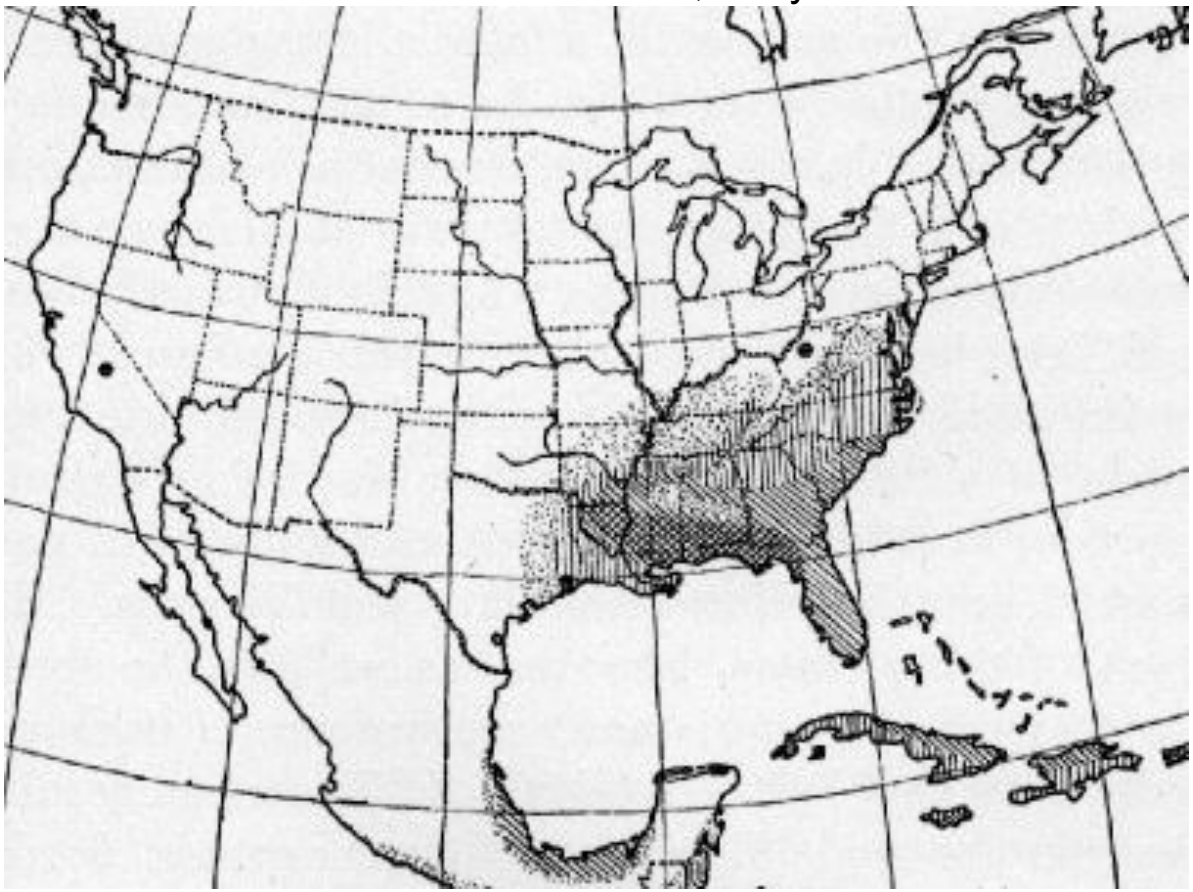


- Common among children
- Common symptoms
  - Listlessness, anemia, and stunting of growth
- Plausible that hookworm would would depress the returns to human-capital investment in children.
  - Because schoolwork is an energy-intensive activity

Not just a poor world problem:

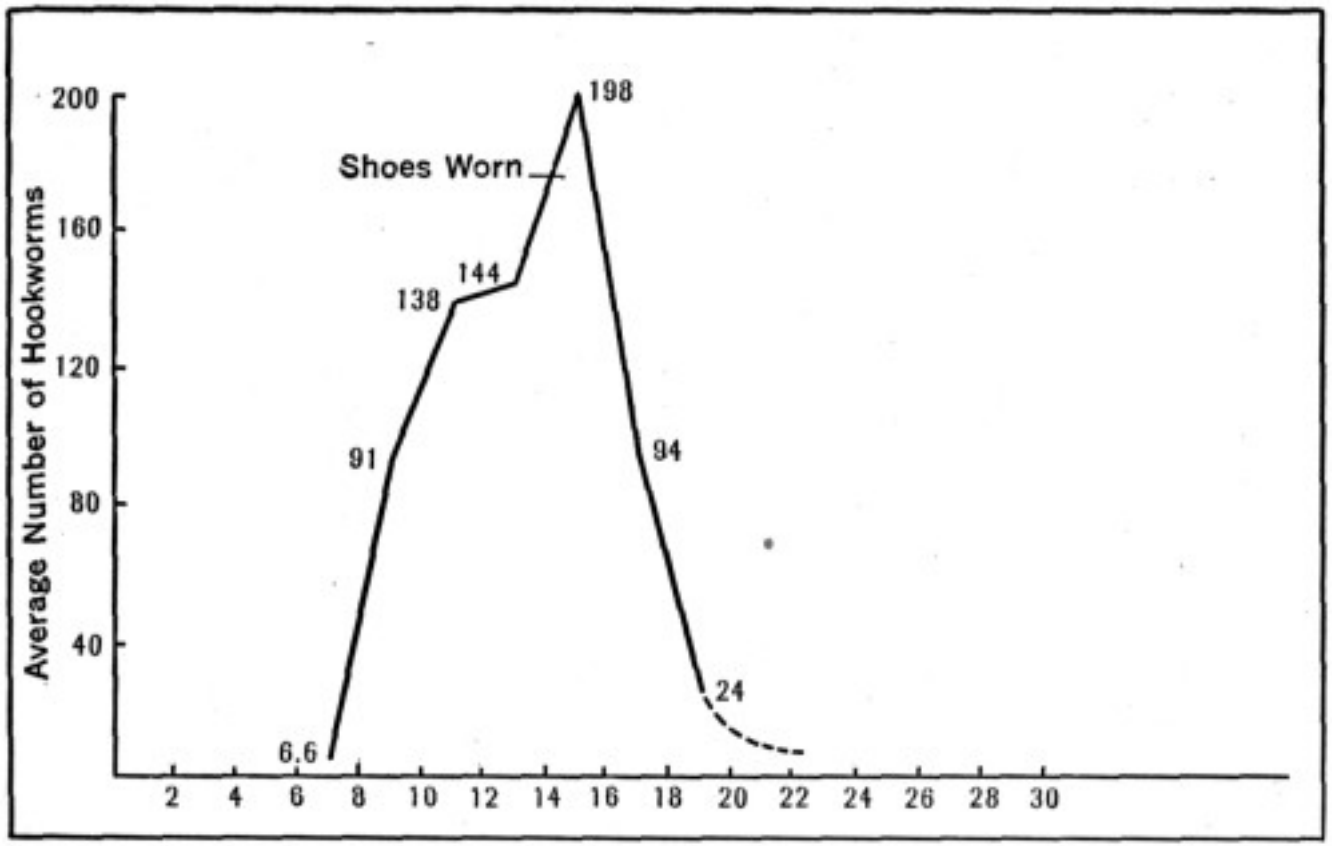
In early 1900s, approx. 40% of school-aged children in American South infected

Occurrence of Hookworm, early 1900s



Hookworm Disease – Its Distribution Biology, Epidemiology, Pathology, Diagnosis, Treatment and Control" by Asa C. Chandler (New York: The Macmillan Company, 1929

Hookworm infection by age, Alabama 1925



Hookworm Disease – Its Distribution Biology, Epidemiology, Pathology, Diagnosis, Treatment and Control" by Asa C. Chandler (New York: The Macmillan Company, 1929

Impacts of a hookworm-eradication campaign (1910–1915)

Estimates can account for around half of the literacy gap between South and North

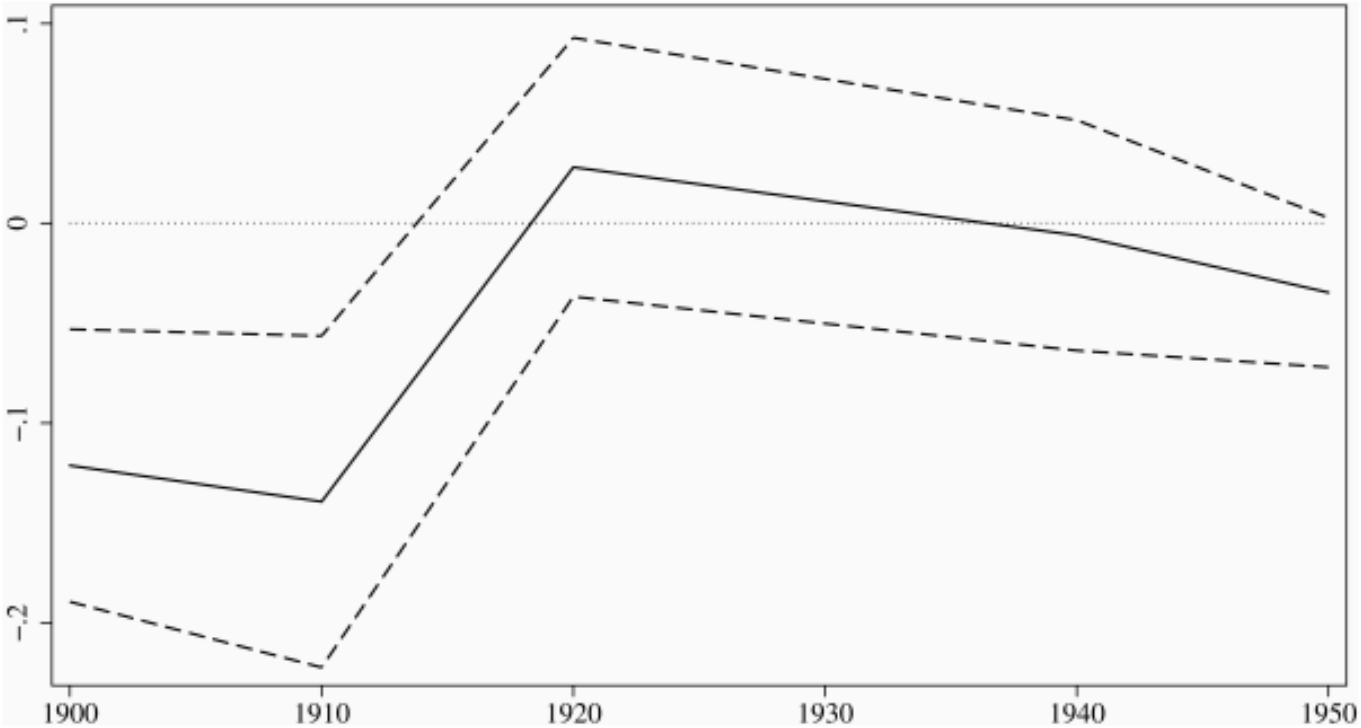


FIGURE II
Hookworm Eradication and School Attendance, 1900–1950

Bleakley, Hoyt. "Disease and development: evidence from hookworm eradication in the American South." QJE 122.1 (2007): 73-117.

Estimates infection throughout one's childhood led to a reduction in (later in life) adult wages of ~40%

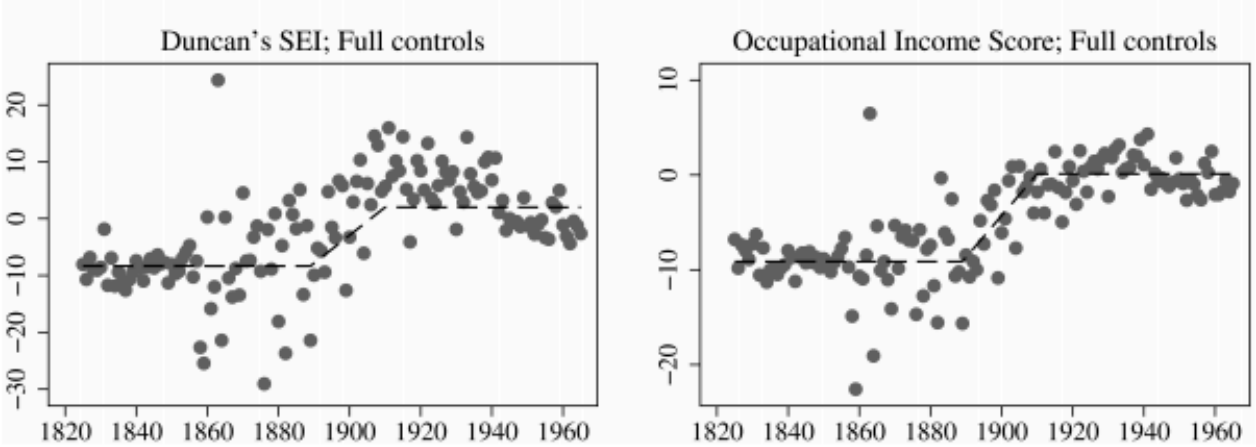


FIGURE III
Cohort-Specific Relationship Between Income and Pre-Eradication Hookworm

- But the estimated effect is approximately an order of magnitude too small to be useful in explaining the global income distribution.

Bleakley, Hoyt. "Disease and development: evidence from hookworm eradication in the American South." QJE 122.1 (2007): 73-117.

What are the policy implications if disease directly diminishes development potential?

- Bolsters the case for spending in:
  - Deworming programs
  - AIDS and malaria treatment
  - Child and maternal health
  - Research on tropical vaccines
- If a poverty trap, aid will ignite growth
  - In the long run, these are investments, not aid

Could disease have deeper impacts on development?

On technology and social organization, rather than simply current health and productivity

"It seems reasonable to suppose that for hundreds of years tsetse dictated that the economy of the African should be based on the hoe and the head-load..."

Entomologist T.A.M. Nash (1969)

The TseTse is the "greatest curse" nature laid upon Africa and the "value of the country would be centupled" in its absence

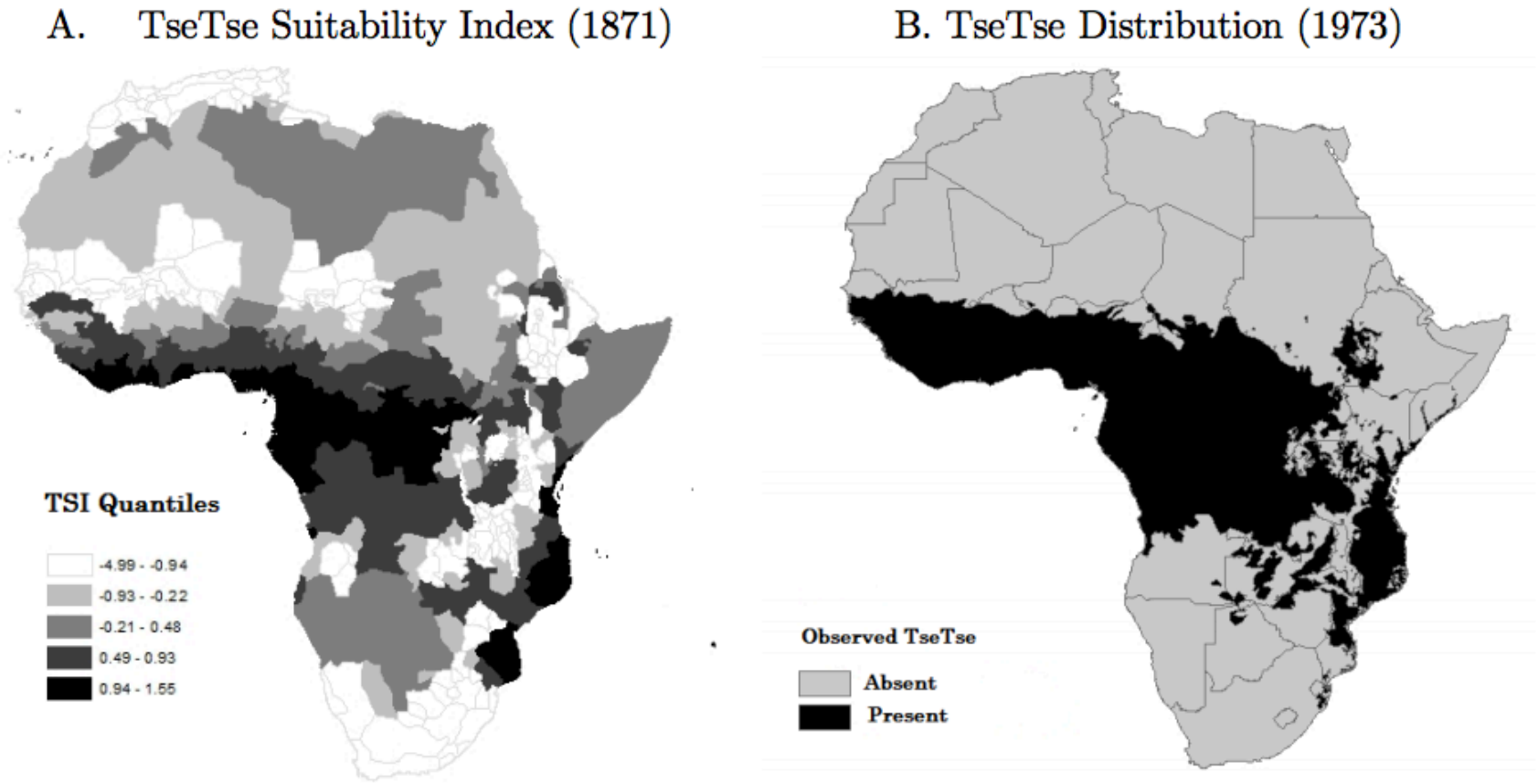
Commissioner H.H. Johnston (1894)

"The presence of Tsetse-fly preclude the animal transport by carts, which in the interior is the great incentive for road-making. In Witu, for instance, …the bullocks employed for the waggons on it all died, and the old wretched system of human porterage has still to be resorted to for transport."

Sir A. Harding (1897)

Marcella Alsan (2012). "The Effect of the Tse Tse Fly on African Development"

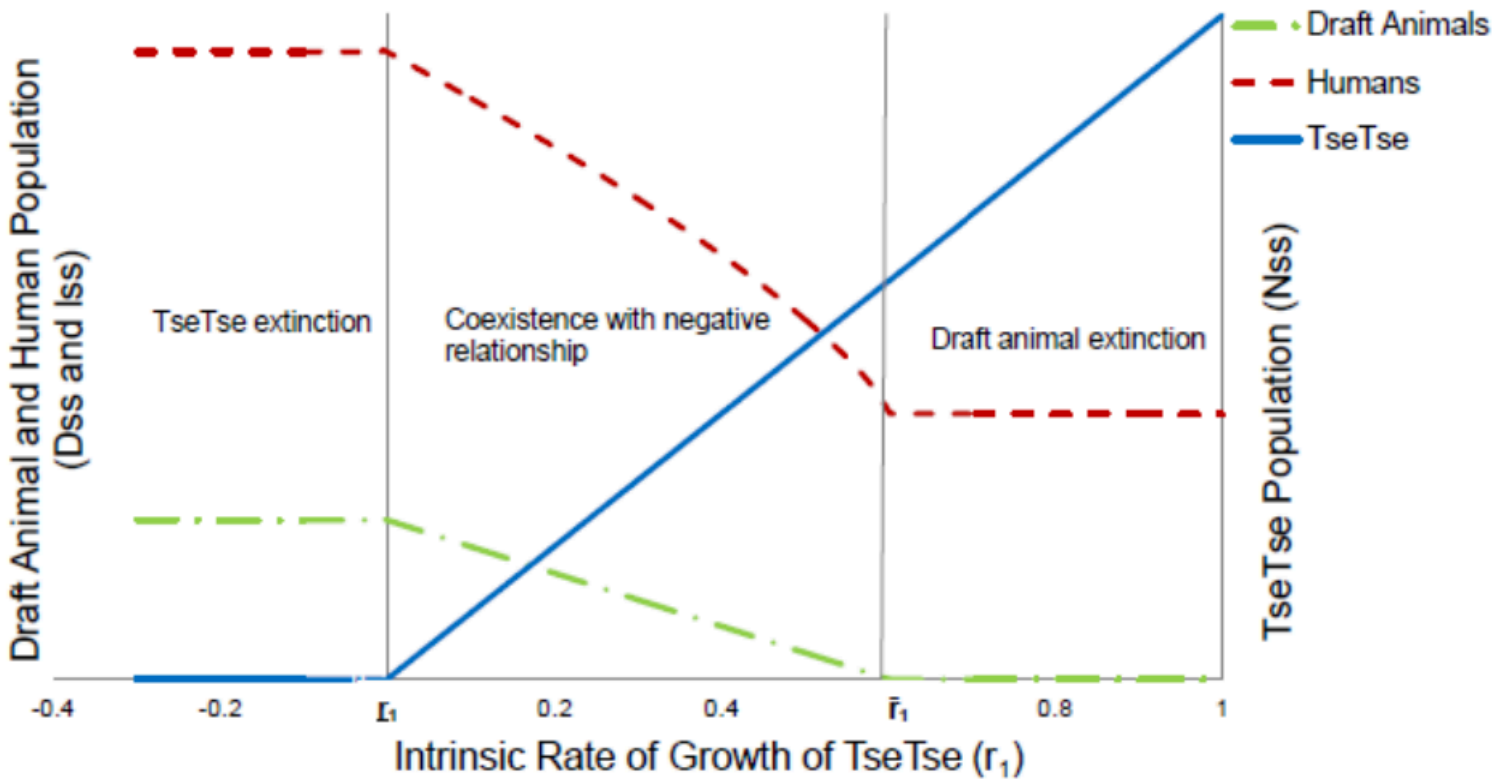
Figure III: TseTse Suitability Index Versus the Observed TseTse Distribution



Notes: Panel (A) shows the historical TseTse suitability index created using climate data from NOAA's 20th century reanalysis for the year 1871. Panel (B) shows the observed TseTse distribution in 1973 (Ford and Katondo, 1977).

Marcella Alsan (2012). "The Effect of the Tse Tse Fly on African Development"

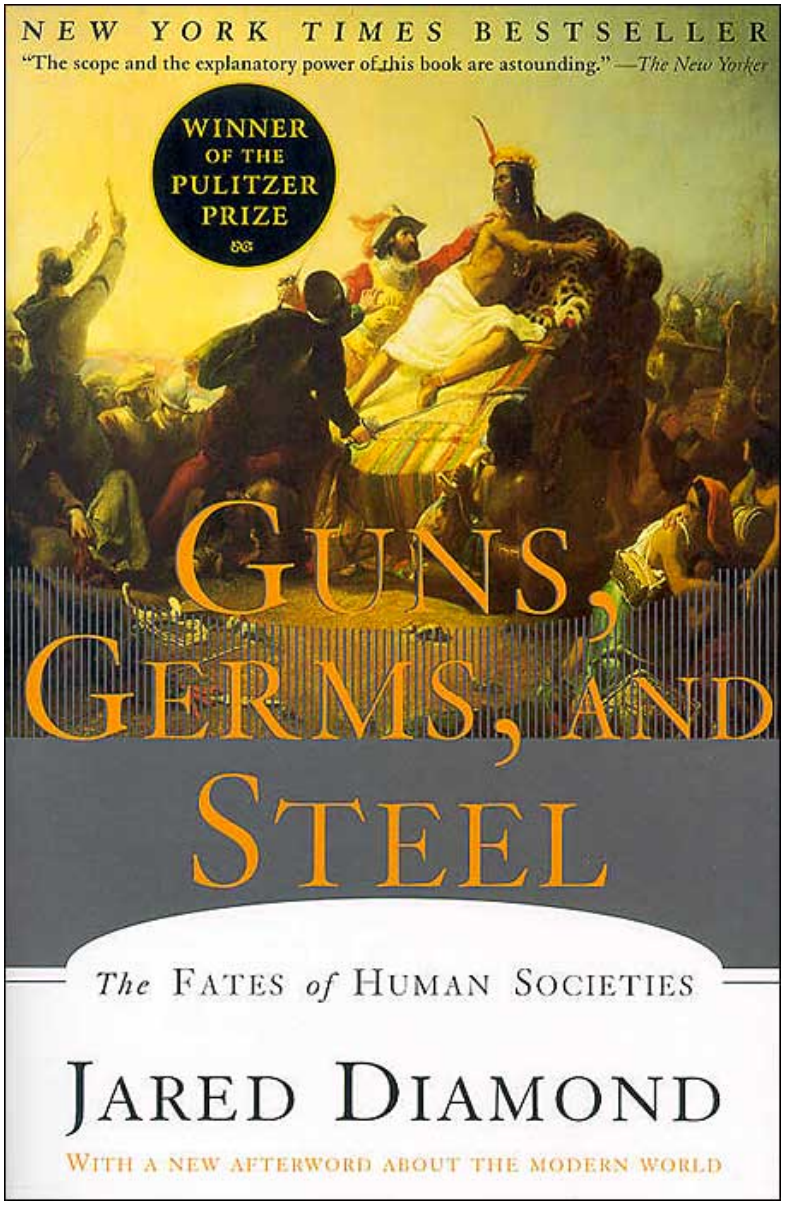
Figure IV: TseTse, Draft Animal and Human Steady State Populations



Marcella Alsan (2012). "The Effect of the Tse Tse Fly on African Development"

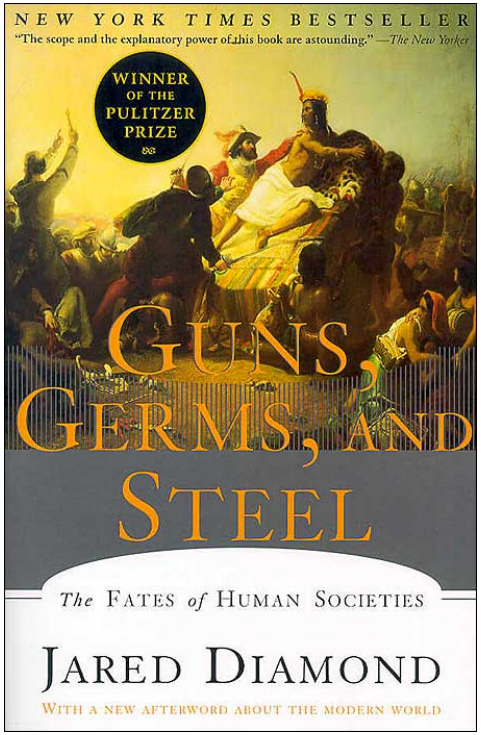
Alsan: The precolonial impacts of just one disease

- A one standard deviation increase in the TseTse suitability is associated with:
  - 21 percentage point (pp) decrease in the likelihood an African ethnic group had large domesticated animals
  - 9 pp decrease in intensive cultivation
  - 6 pp reduction in plow use.
  - 45% reduction in population density in 1700
  - 11 pp increase in the likelihood an ethnic group used slaves
  - 8 pp decrease in the probability state was centralized



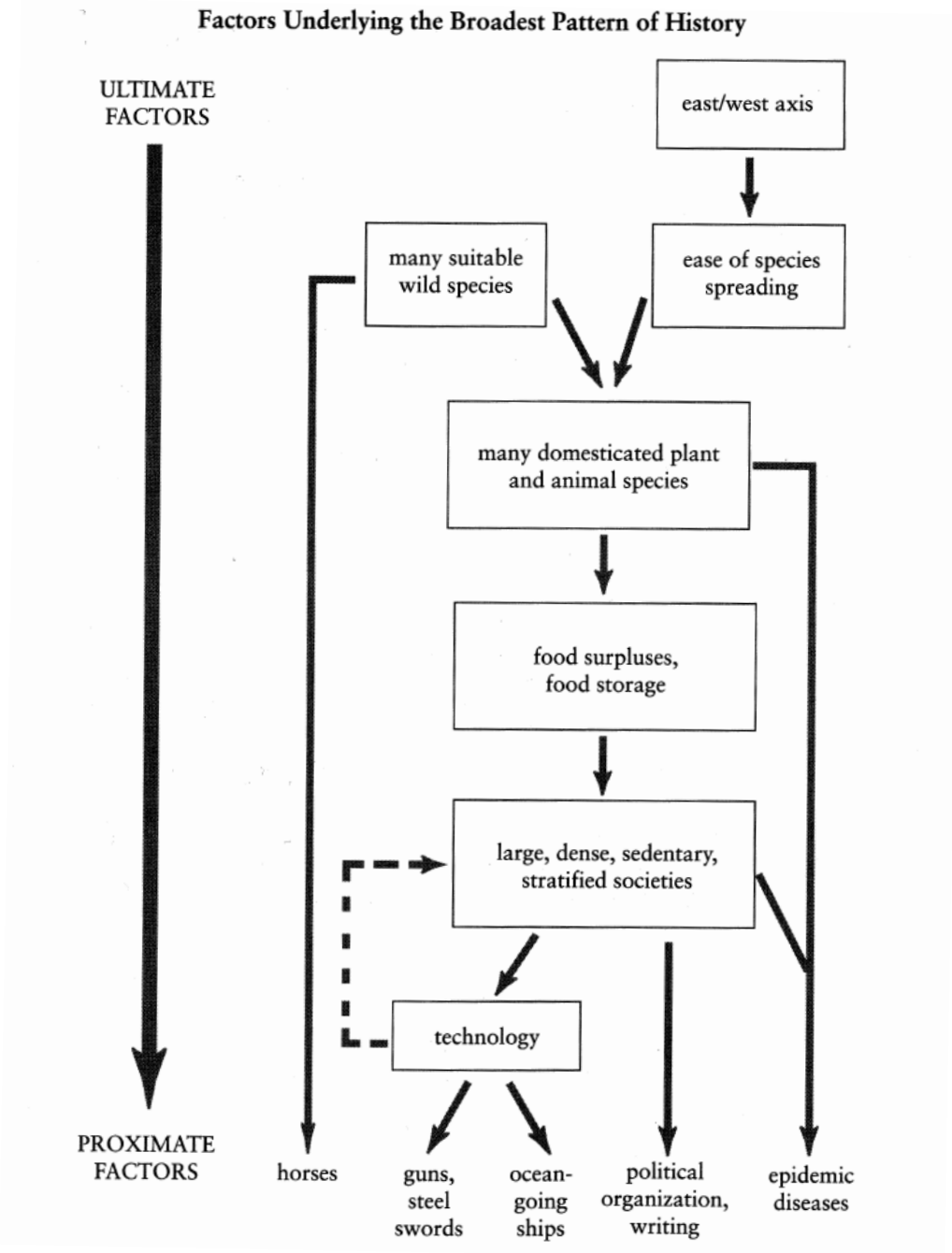
By the 1600s and 1700s, why was Europe economically and technologically ahead?

Why were places like the Americas and Africa behind?



(p.87)

Inequality in world income in 1600 (or so) driven by how endowments shape technological advancement



The diffusion of endowments and technology

Diamond: An east-west orientation facilitated a broad diffusion of technologies across a shared ecological space

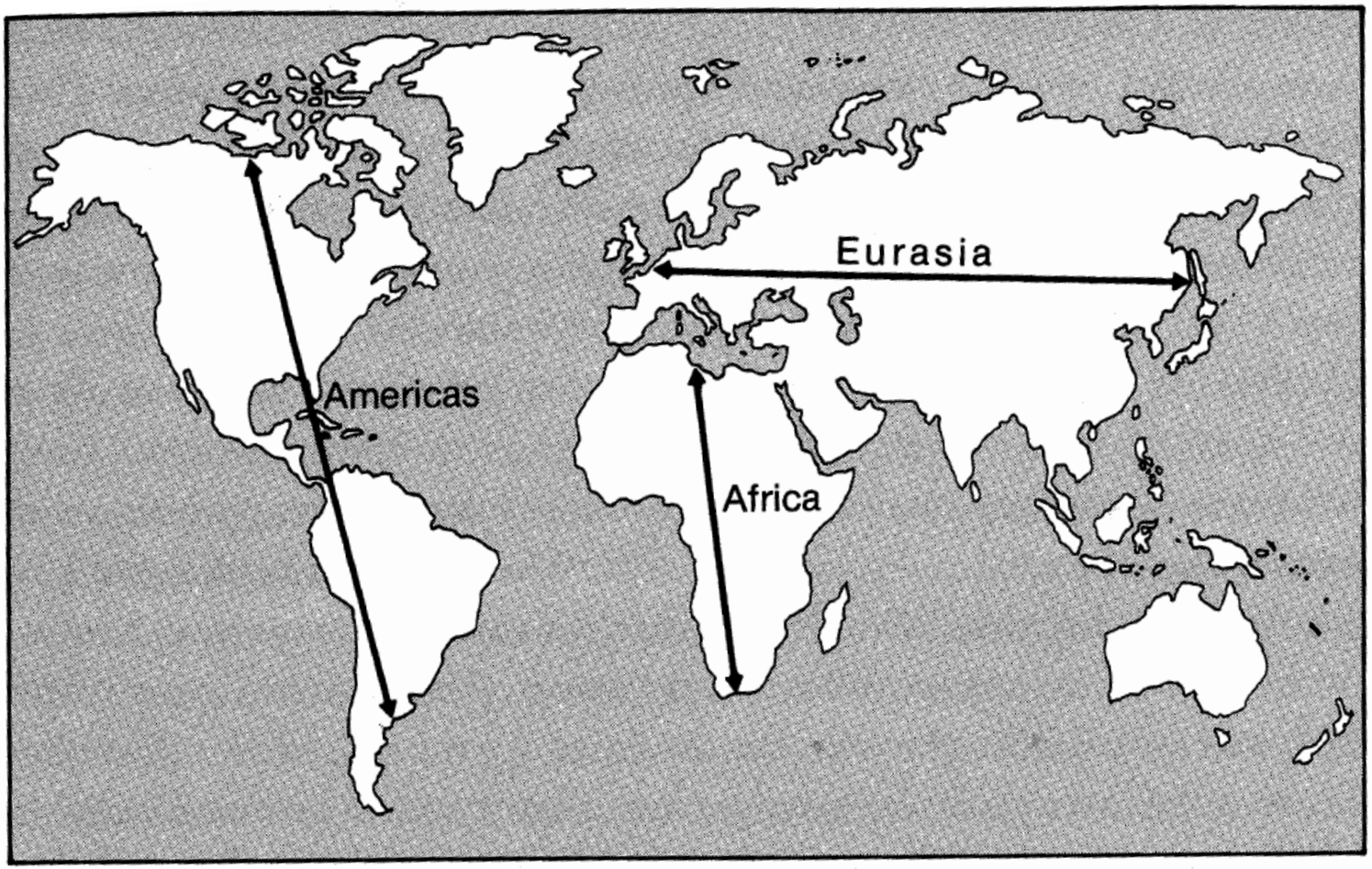
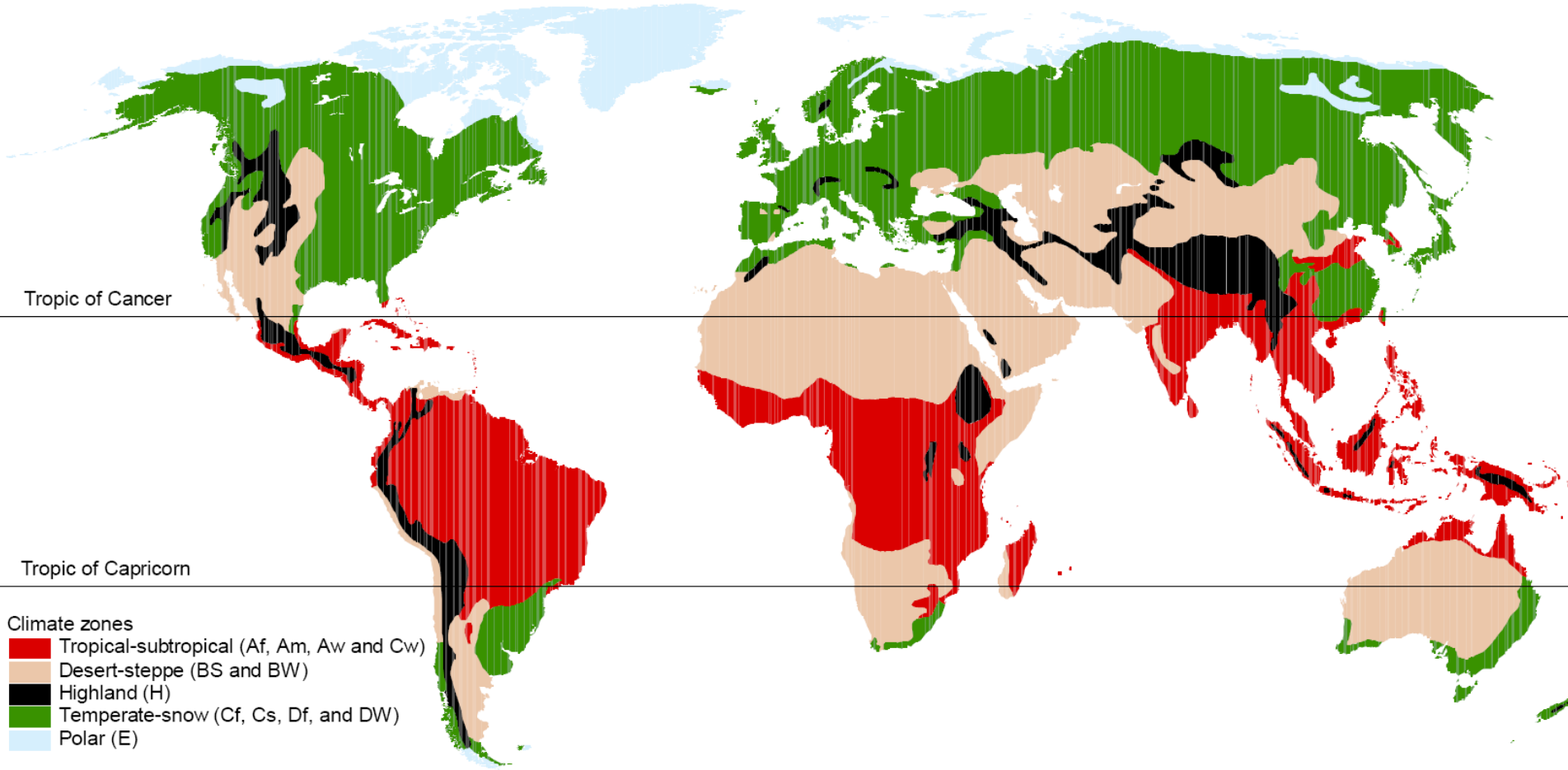


Figure 10.1. Major axes of the continents.

Diamond, Jared. 1999. "Guns, Germs and Steel".

Climate zones

The technologies of pre-industrial civilization were largely agricultural (and ecologically specific) ones.



Sachs, Jeffrey. 2000. "Tropical Underdevelopment." CID Working Paper No. 57.

Africa: Low endowment of domesticable animals

TABLE 9.2 **Mammalian Candidates for Domestication**

	Continent			
	Eurasia	**Sub-Saharan Africa**	**The Americas**	**Australia**
Candidates	72	51	24	1
Domesticated species	13	0	1	0
Percentage of candidates domesticated	18%	0%	4%	0%

A "candidate" is defined as a species of terrestrial, herbivorous or omnivorous, wild mammal weighing on the average over 100 pounds.

Diamond, Jared. 1999. "Guns, Germs and Steel".

Low endowment of nutritious grains

TABLE 8.1 World Distribution of Large-Seeded Grass Species

Area	*Number of Species*	
West Asia, Europe, North Africa		33
Mediterranean zone	32	
England	1	
East Asia		6
Sub-Saharan Africa		4
Americas		11
North America	4	
Mesoamerica	5	
South America	2	
Northern Australia		2
	Total:	56

Diamond, Jared. 1999. "Guns, Germs and Steel".

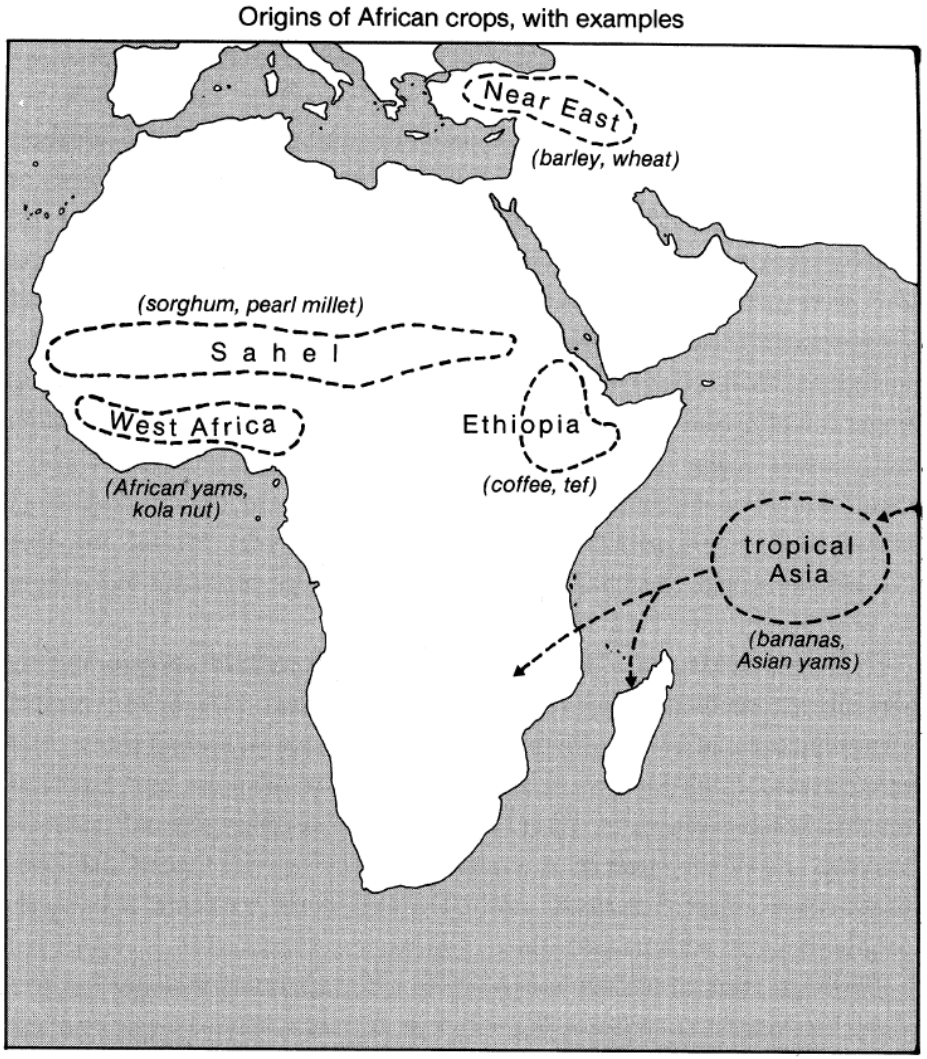
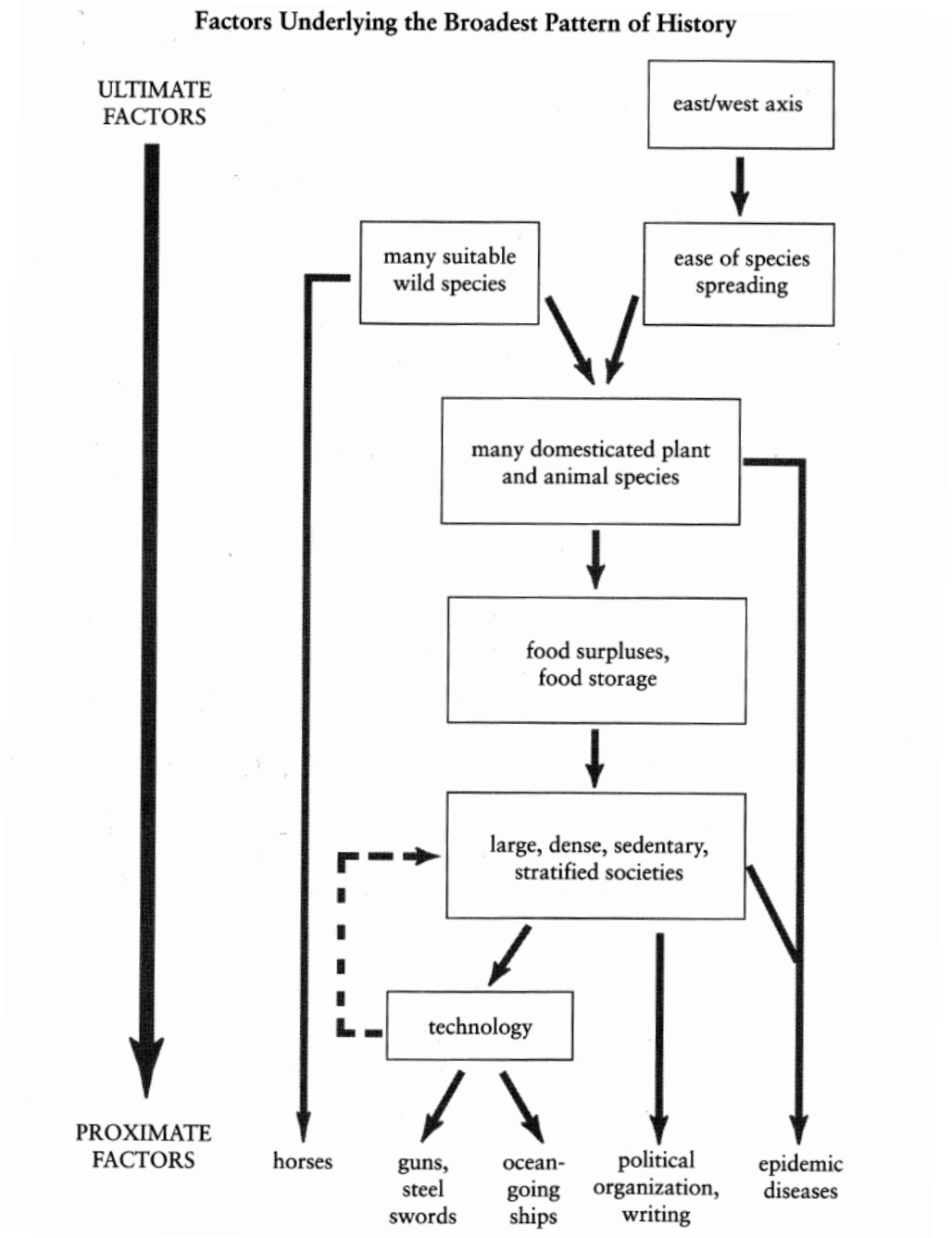


Figure 19.3. The areas of origin of crops grown traditionally in Africa (that is, before the arrival of crops carried by colonizing Europeans), with examples of two crops from each area.

Consequence:

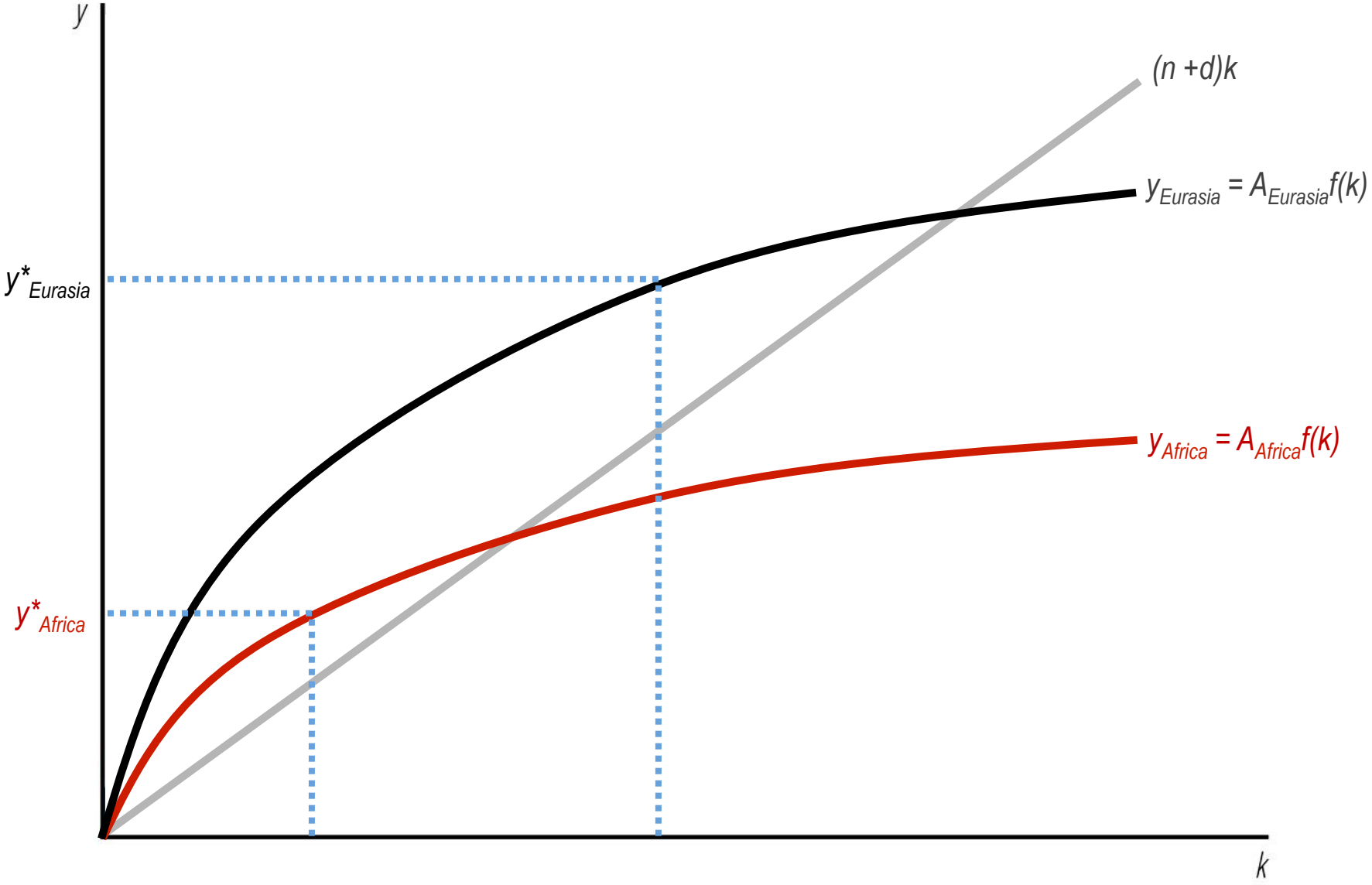
By 1700s, temperate-zone technologies more productive than tropical-zone ones.

(health, agriculture, energy, military….)

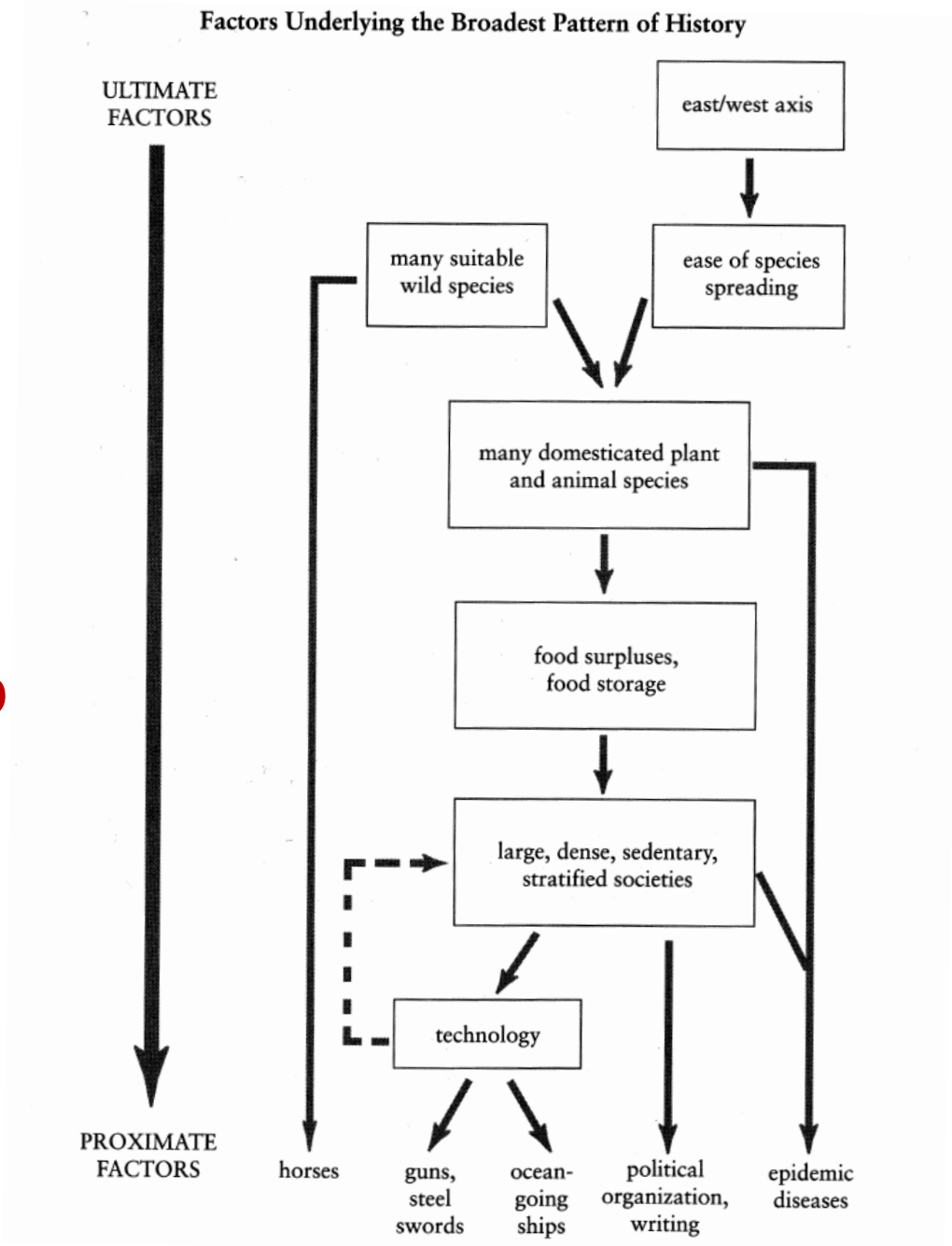


Explaining income differences in 1500

Is Diamond's model is fundamentally about different "technology"?



Could you apply the poverty trap model to Diamond?



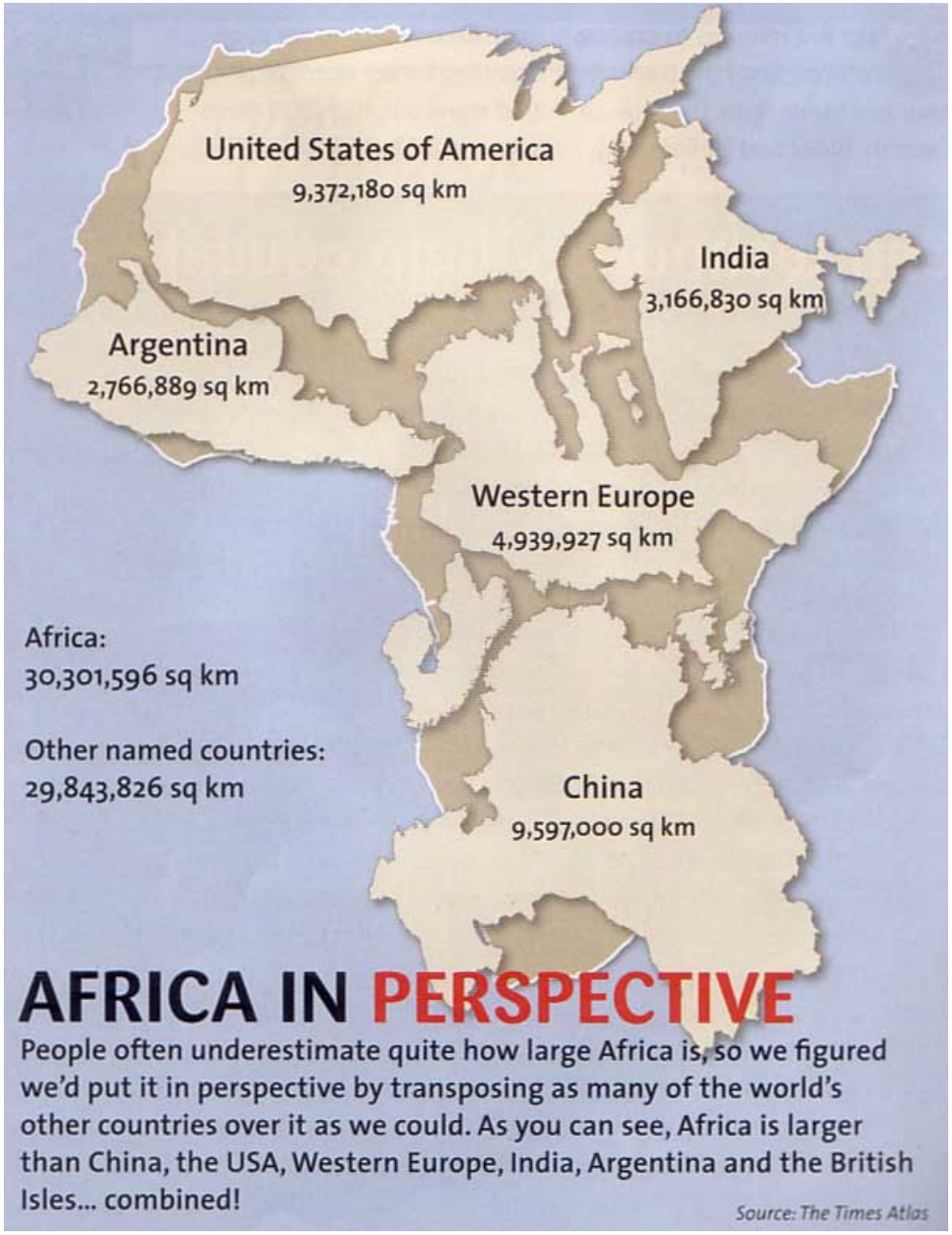
Related: Jeffrey Herbst and state development in Africa

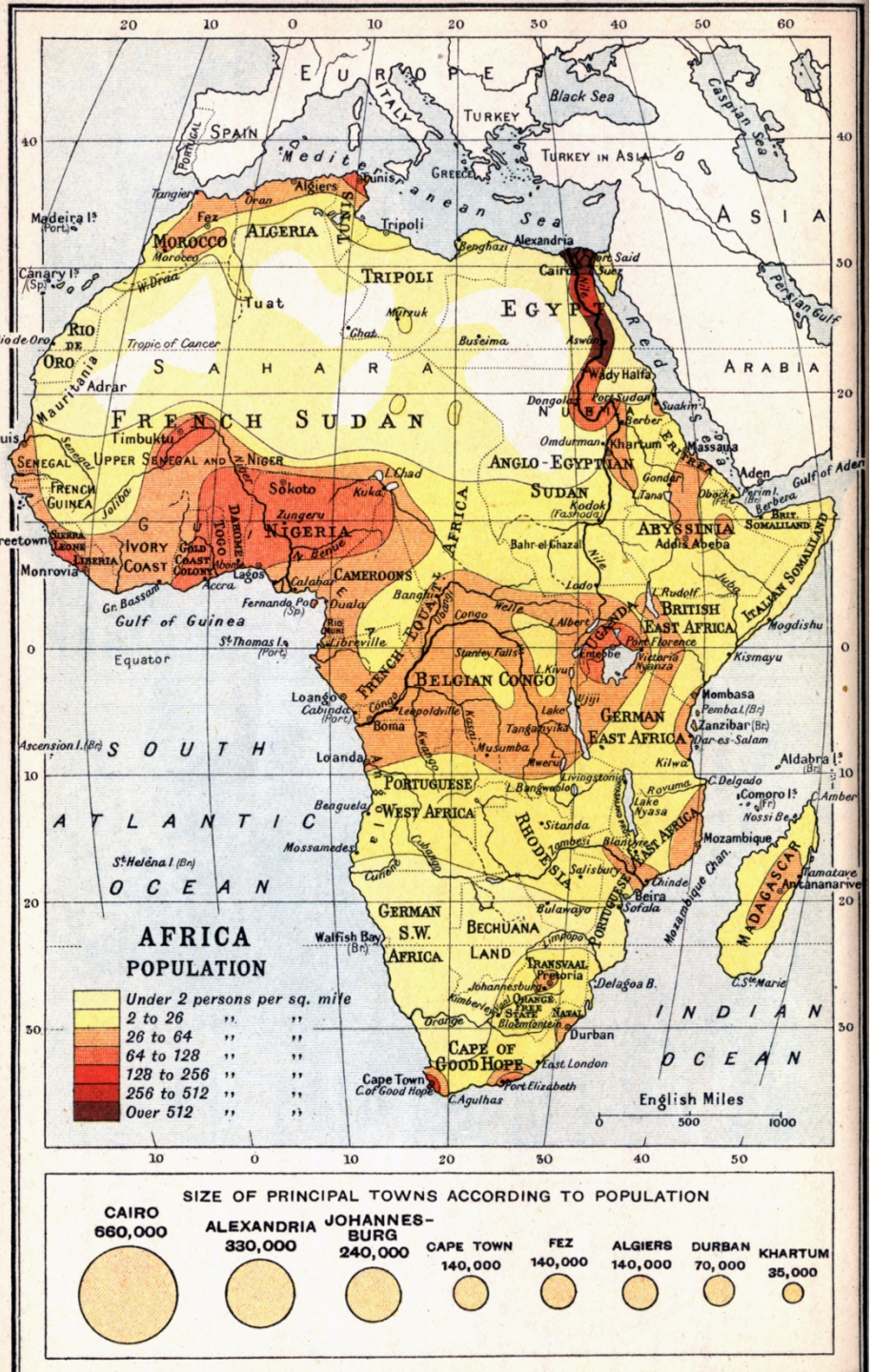
Population density limits the broadcast of power

Africa:

18% of the world's surface area

But 6-11% of the world's population before 1750




AFRICA
POPULATION
Under 2 persons per sq. mile
2 to 26 ,, ,,
26 to 64 ,, ,,
64 to 128 ,, ,,
128 to 256 ,, ,,
256 to 512 ,, ,,
Over 512 ,, ,,
SIZE OF PRINCIPAL TOWNS ACCORDING TO POPULATION
CAIRO 660,000
ALEXANDRIA 330,000
JOHANNES-BURG 240,000
CAPE TOWN 140,000
FEZ 140,000
ALGIERS 140,000
DURBAN 70,000
KHARTUM 35,000
English Miles
EUROPE
ASIA
SAHARA
ARABIA
ATLANTIC OCEAN
INDIAN OCEAN
FRENCH SUDAN
ANGLO-EGYPTIAN SUDAN
NIGERIA
ABYSSINIA
BELGIAN CONGO
BRITISH EAST AFRICA
GERMAN EAST AFRICA
PORTUGUESE WEST AFRICA
RHODESIA
GERMAN S.W. AFRICA
BECHUANA LAND
CAPE OF GOOD HOPE
MADAGASCAR
Gulf of Guinea
Equator
Tropic of Cancer


Africa's Kingdoms and Empires
Carthage
Classical Egypt
Kush
Axum
Ethiopia
Wolof
Ghana
Songhay
Mali
Kanem-Bornu
Ashanti
Yoruba
Buganda
Rwanda
Luba
Congo
Lunda
Malawi
Lozi
Kilwa
Monomotapa
Merina
Zulu Kingdom
Kilometers

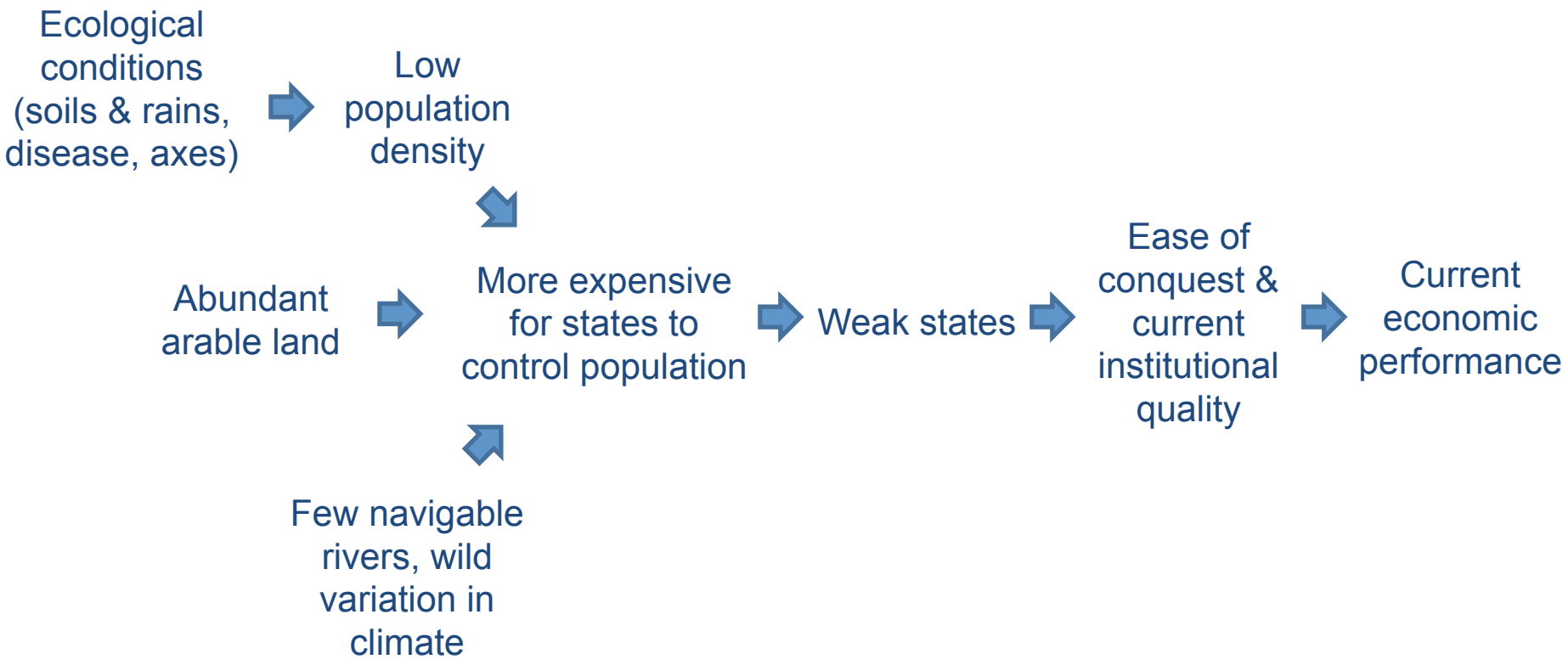
TABLE 1.1
Comparative Population Densities over Time (People/Sq. Km)

Region	*1500*	*1750*	*1900*	*1975*
Japan	46.4	78.3	118.2	294.8
South Asia	15.2	24.1	38.2	100.3
Europe	13.7	26.9	62.9	99.9
China	13.4	22.2	45.6	91.1
Latin America	2.2	0.8	3.7	16.3
North Africa	1.6	2.2	9.4	14.1
Sub-Saharan Africa	**1.9**	**2.7**	**4.4**	**13.6**
Former U.S.S.R. area	0.6	1.6	6.1	11.6

Herbst, Jeffrey. 2000. *States and Power in Africa. Princeton: Princeton University Press., p.15*

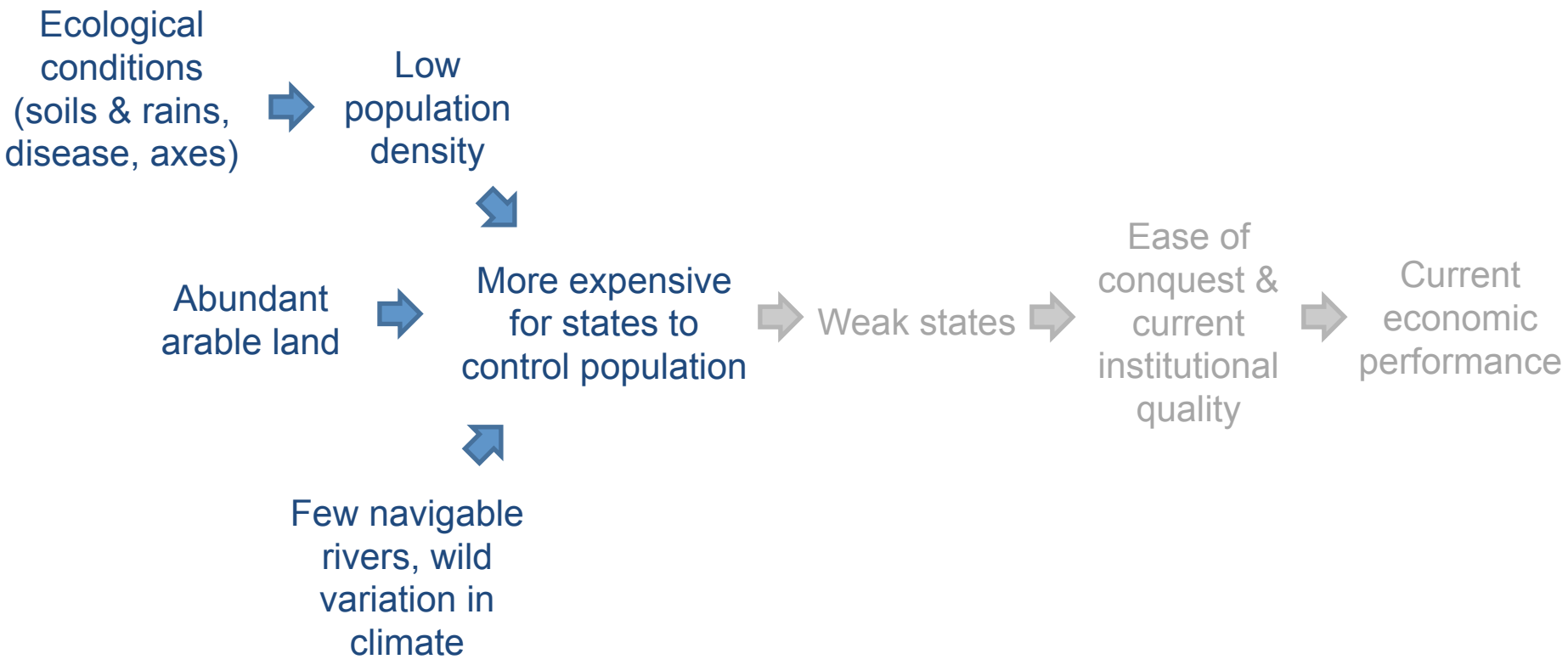
Herbst:

Geography can limit the broadcast of power



Herbst:

Big link 1: Determinants of population density and control



Herbst:

Big link 2: The roots of state weakness

Fundamental assumption:
States are forged in iron and blood

Threat of war: Rulers forced to defend borders → Increase tax collection and military recruitment → Expand representative rule and bureaucracy → Strong states survive; the weak perish

DER DEUTSCHE BUND
1815–1866


Boundary of the Holy Roman Empire
Burgundy
Swabia
Bavaria
Carinthia
Hungary
Kingdom of Lombardy
Genoa
Marquisate of Verona
Venice
Marquisate of Tuscany
Romagna
Pentapolis
Republic of Venice
Croatia
Zara
Spalato
Pisa
Corsica (disputed)
Papal States
Rome
Duchy of Spoleto
Principality of Benevento
Principality of Capua
Giudicato di Sardinia (disputed)
Duchy of Amalfi
Principality of Salerno
Byzantine Empire
Emirate of Sicily
Syracuse
Italy
1000

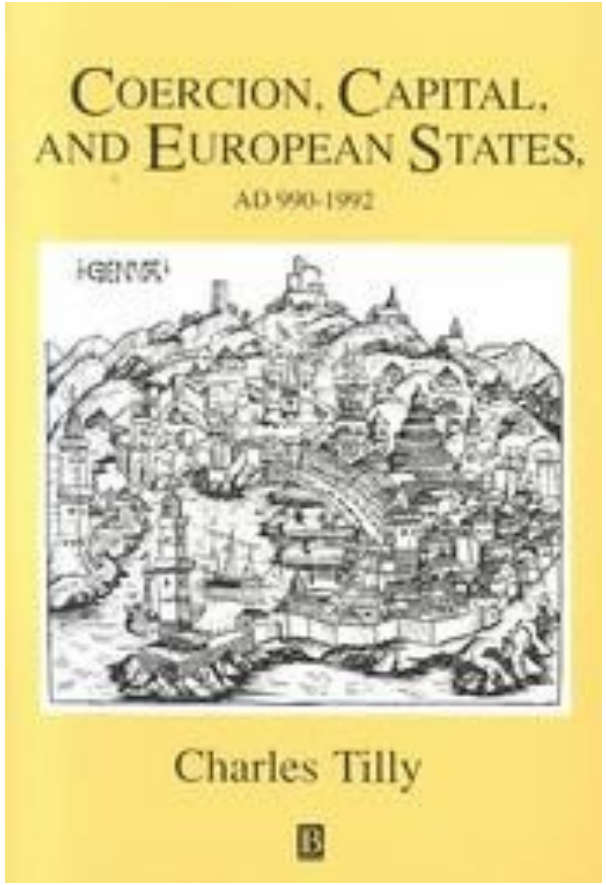
1859

1860

1861

1870

Herbst: Rooted in models of European state development



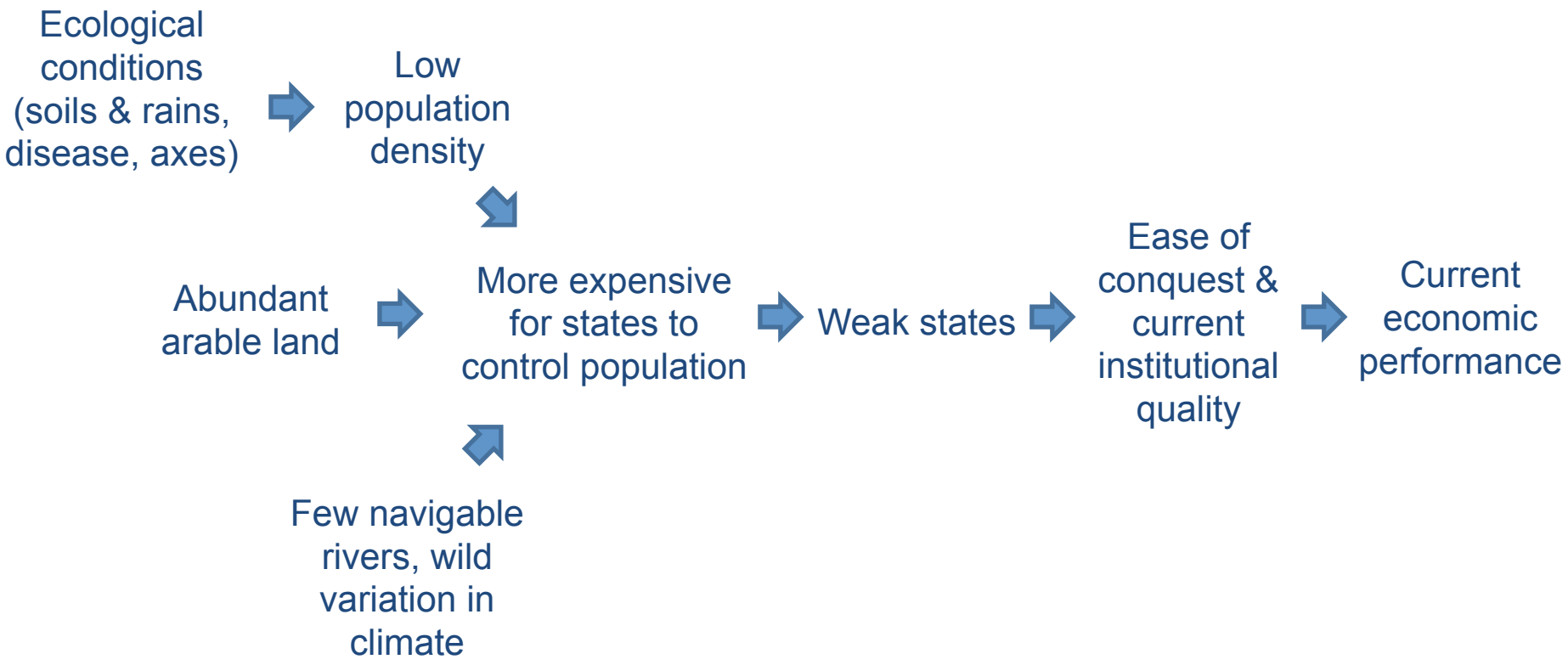
Different riches, different states

- **Capital rich areas:** merchant-dominated states
- **Capital poor:** Princely, coercive states extract wealth from citizenry
- **In between:** Princes must bargain with merchants and exchange protection for resources

War is a selective survival mechanism

- Technology growth → War increasingly capital intensive and expensive
- States need large bureaucracies to administer ever more complex wars (and organize recruitment and taxation)
- Nation states based on ‘capitalized coercion’ (the in between case) dominated
  - Better able to raise taxes and fighters due to the prince-mrchant bargain

In Herbst's approach, we never even reach competing states because ecology does not support large populations




Africa's Kingdoms and Empires
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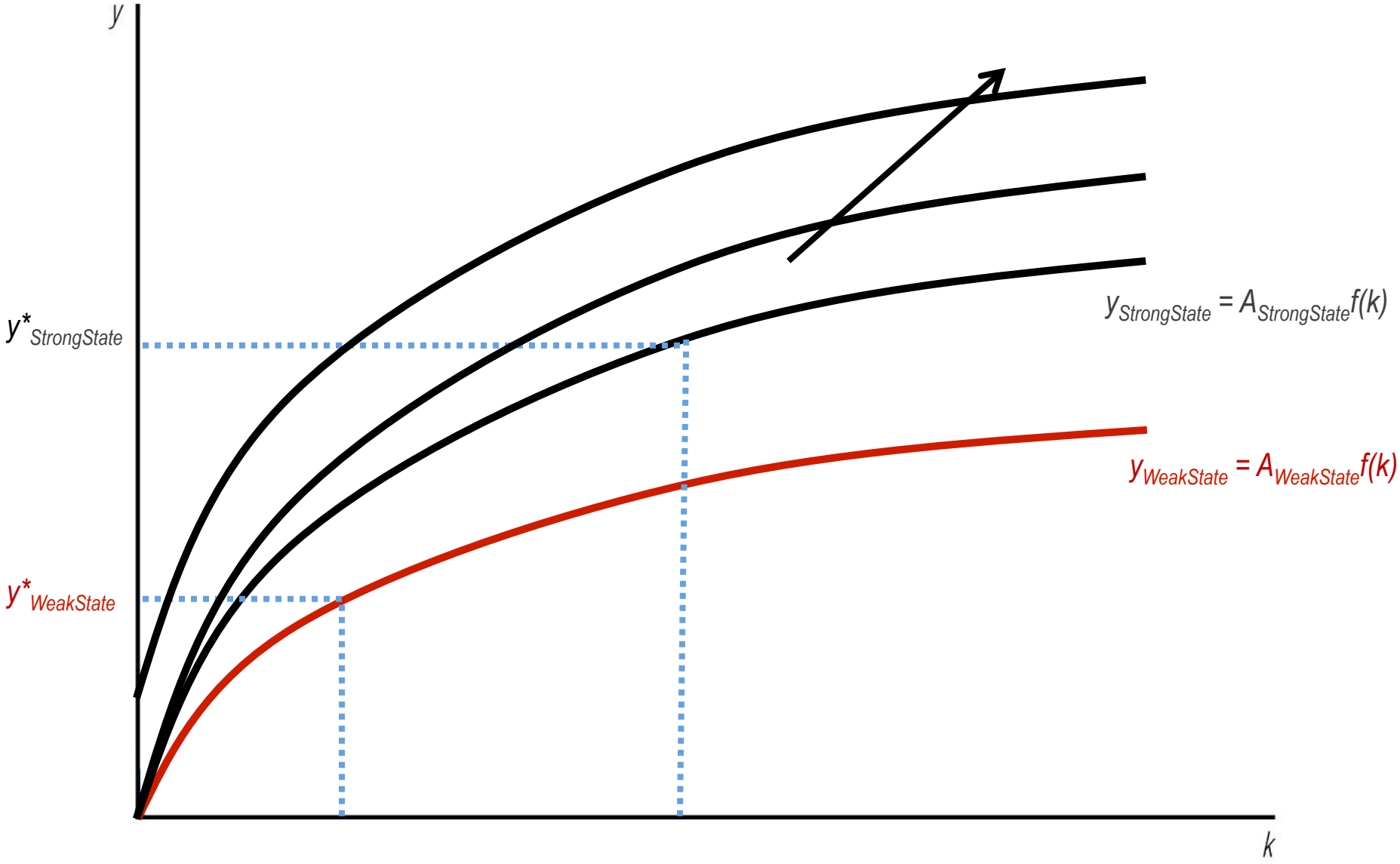
Merina
Zulu Kingdom
0
500
1000
Kilometers

Explaining income differences in 1500

Population → War & State development → Growth



Or is this a case of multiple equilibria?