



The FUTURE of [COMPATIBLE] MINING ADIAT - 2017

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J. David Lowell Institute for Mineral Resources

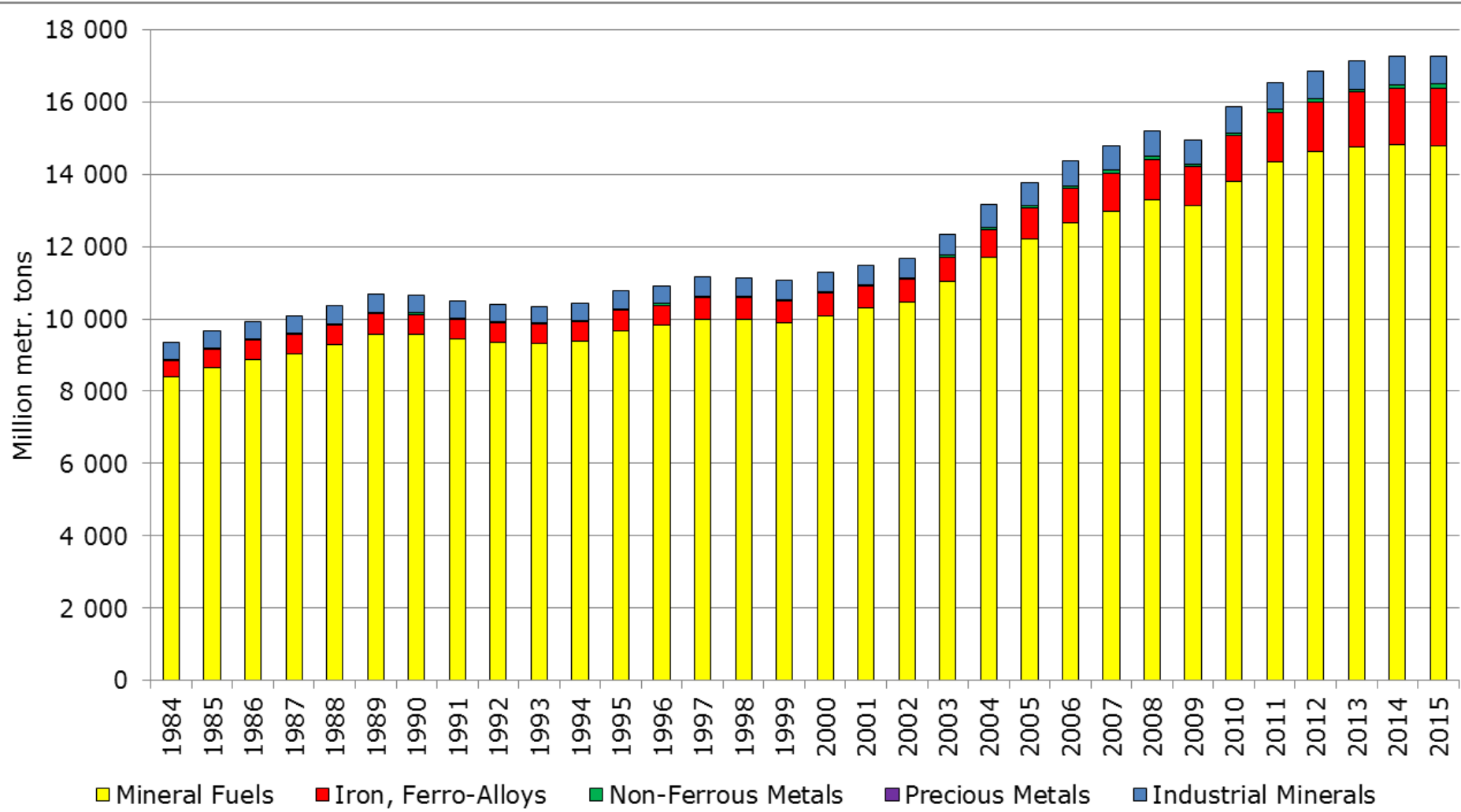


Perceptions of Mining

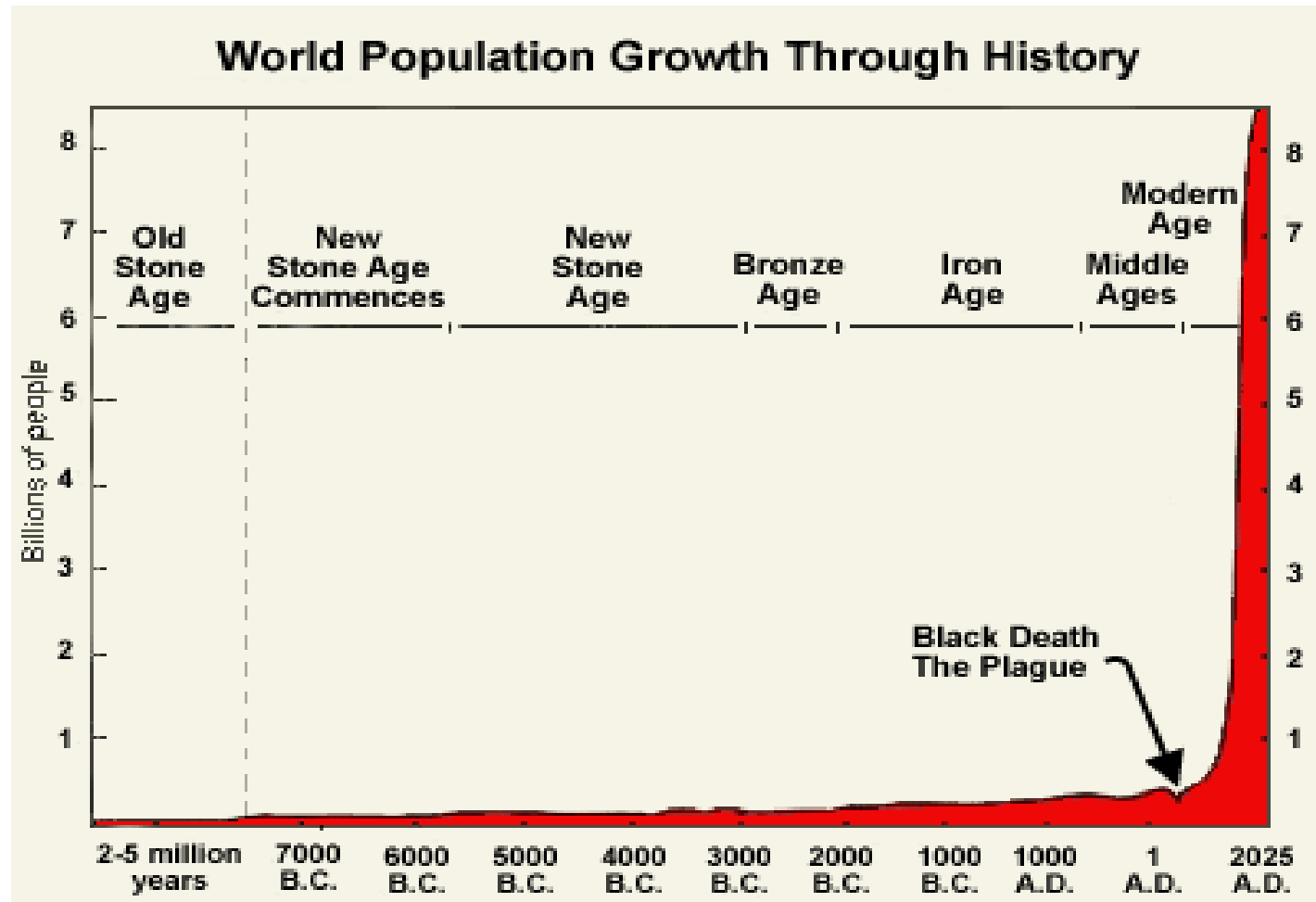


World Mining Production 1984 - 2015

(without construction materials)



Time of Change



World population growth through history. Source: United States Census Bureau, Population Reference Bureau, McEvedy and Jones, et. al.

320 Ton Haul Truck



Modern Facilities

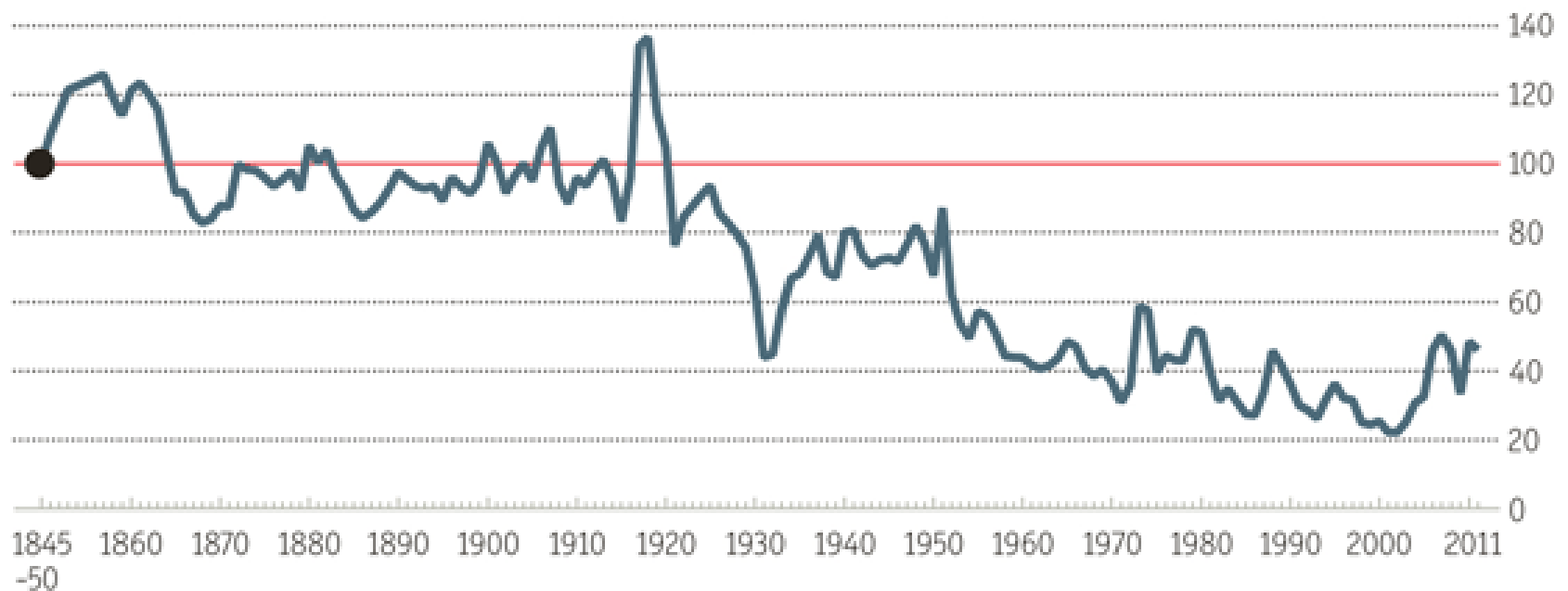


Vista nocturna. Unidad Milpillas, Sonora

Metal detector

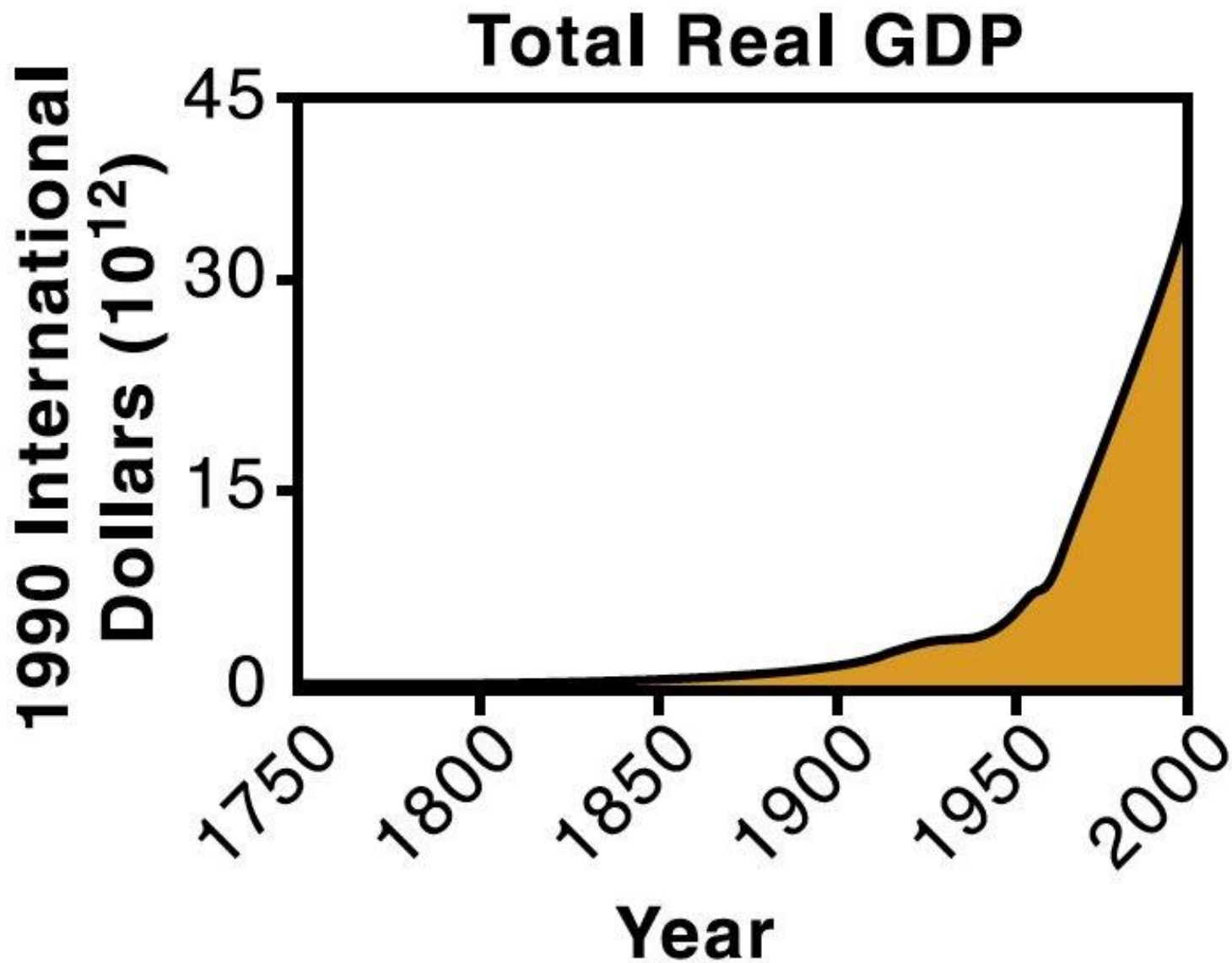
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The Economist industrial commodity-price index, real* \$ terms, 1845-50=100

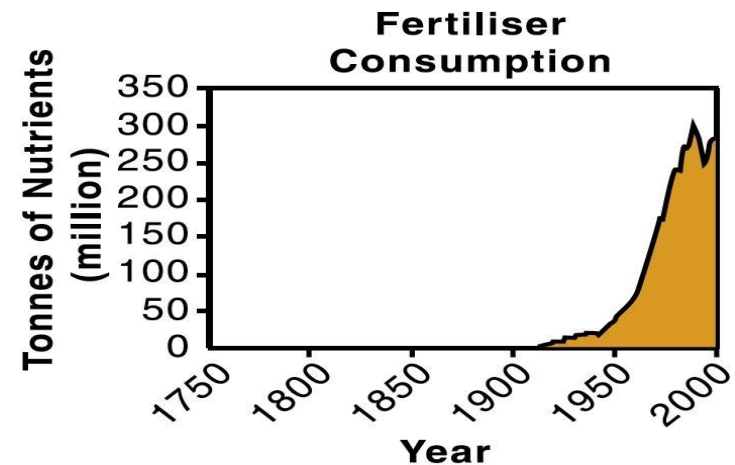
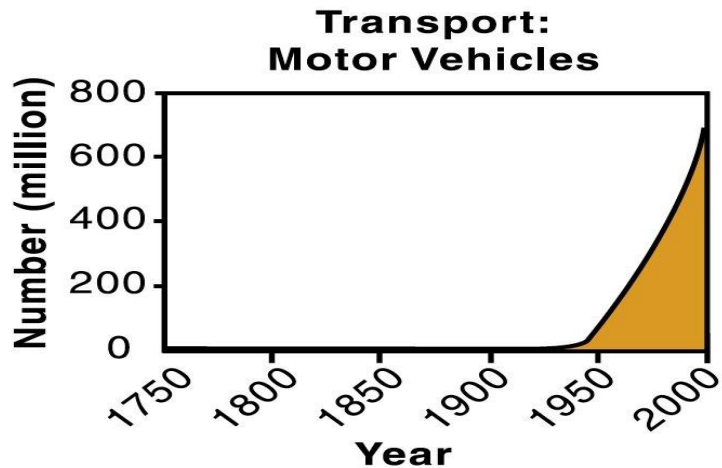
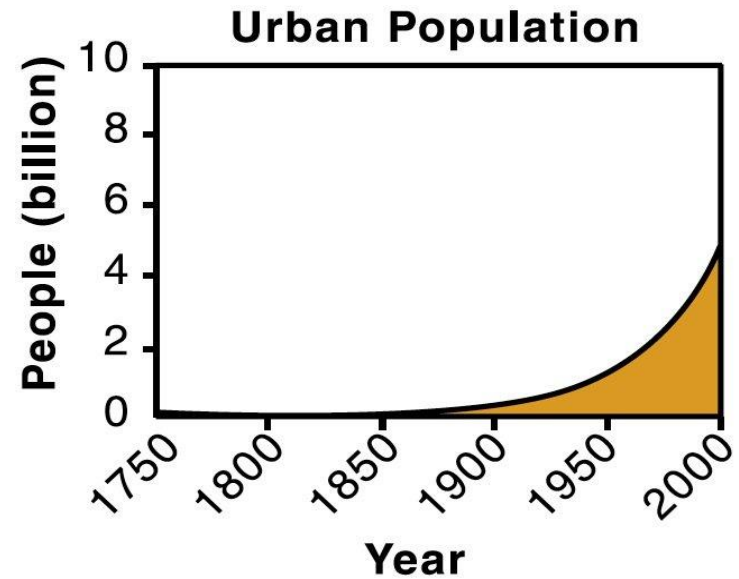
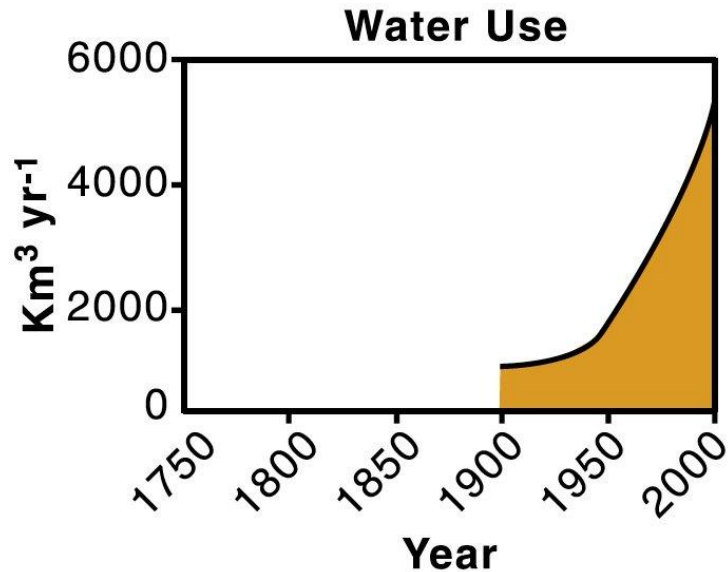


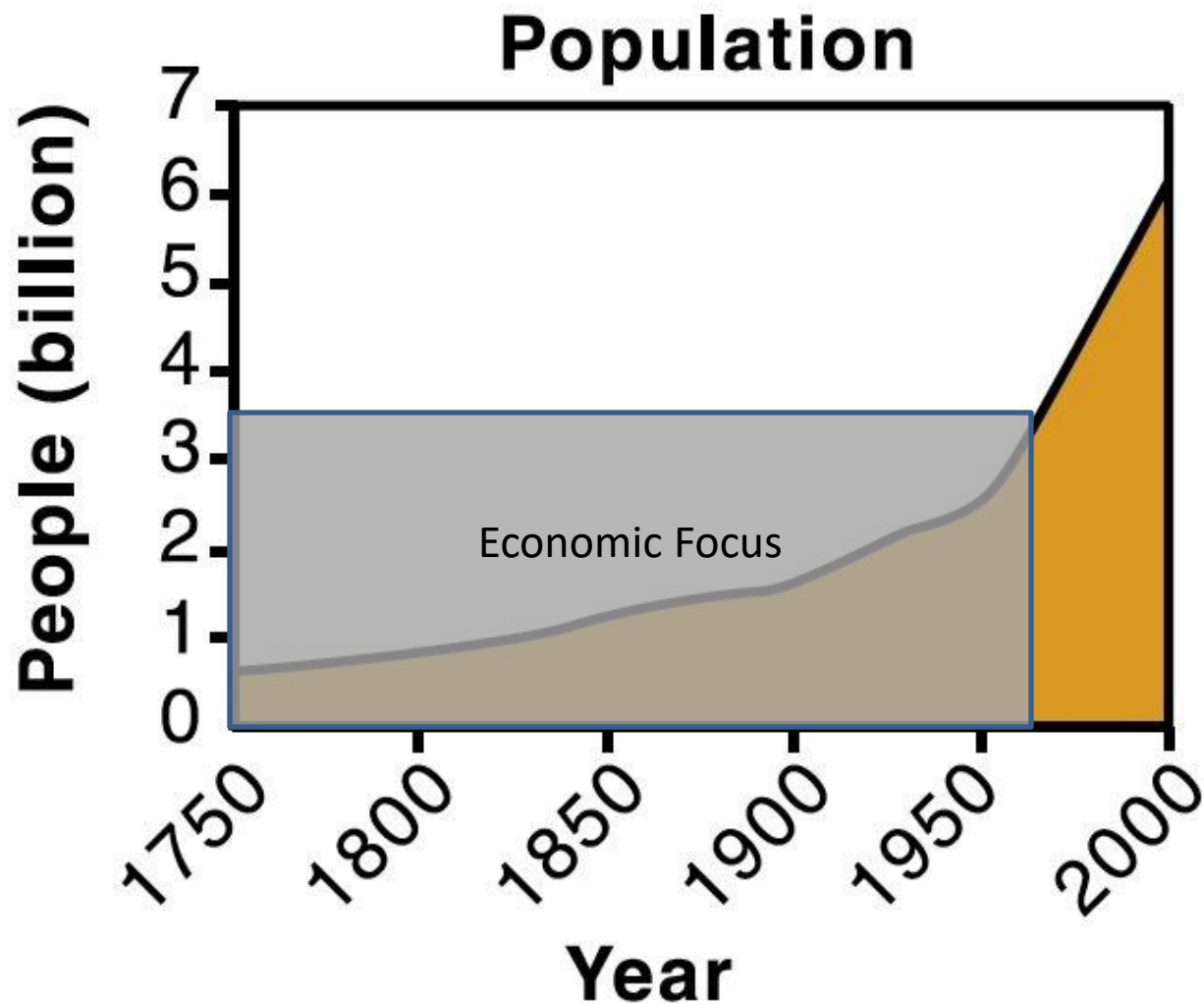
Sources: *The Economist*; Thomson Reuters

*Adjusted by US GDP deflator

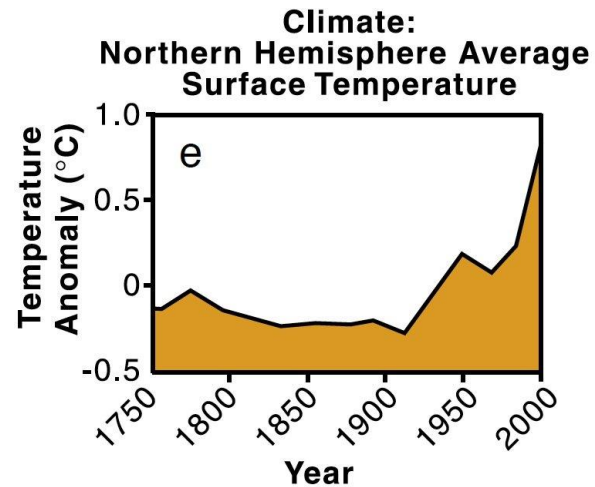
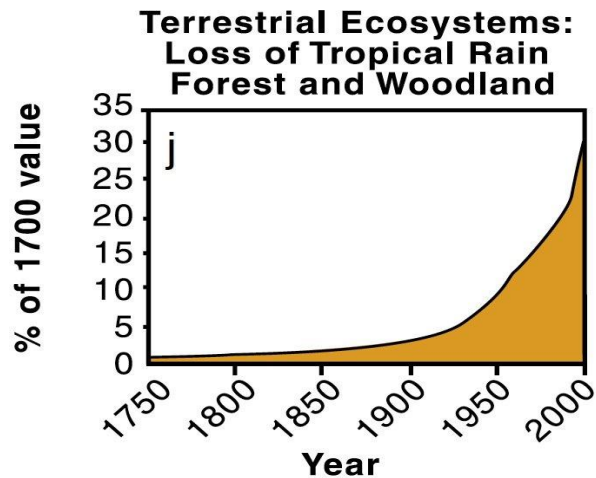
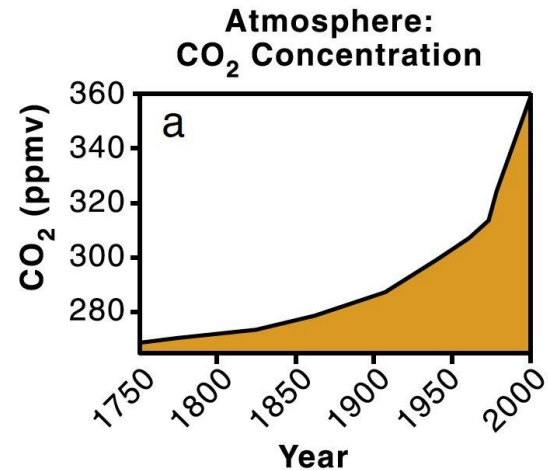
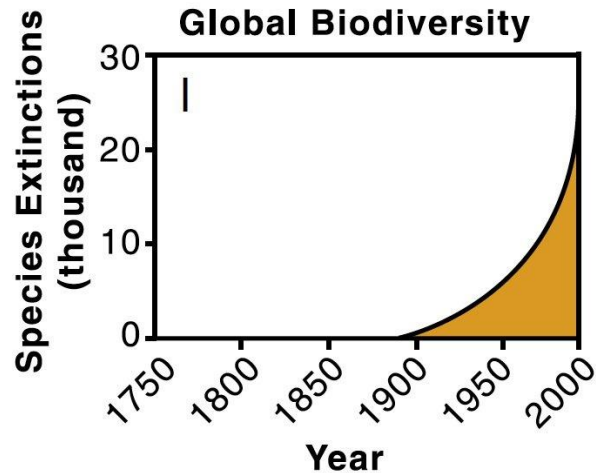


Changing consumption

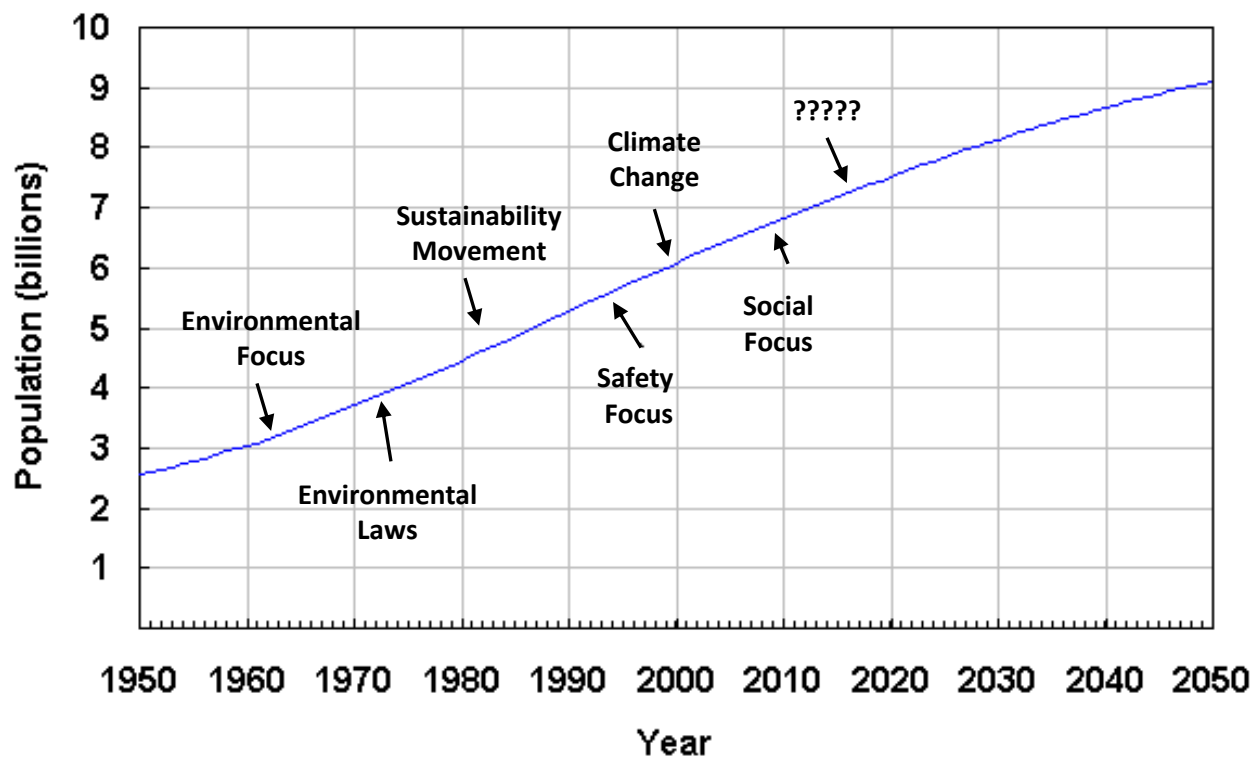




Increasing impact



World Population: 1950-2050



Source: U.S. Census Bureau, International Data Base 5-10-00.

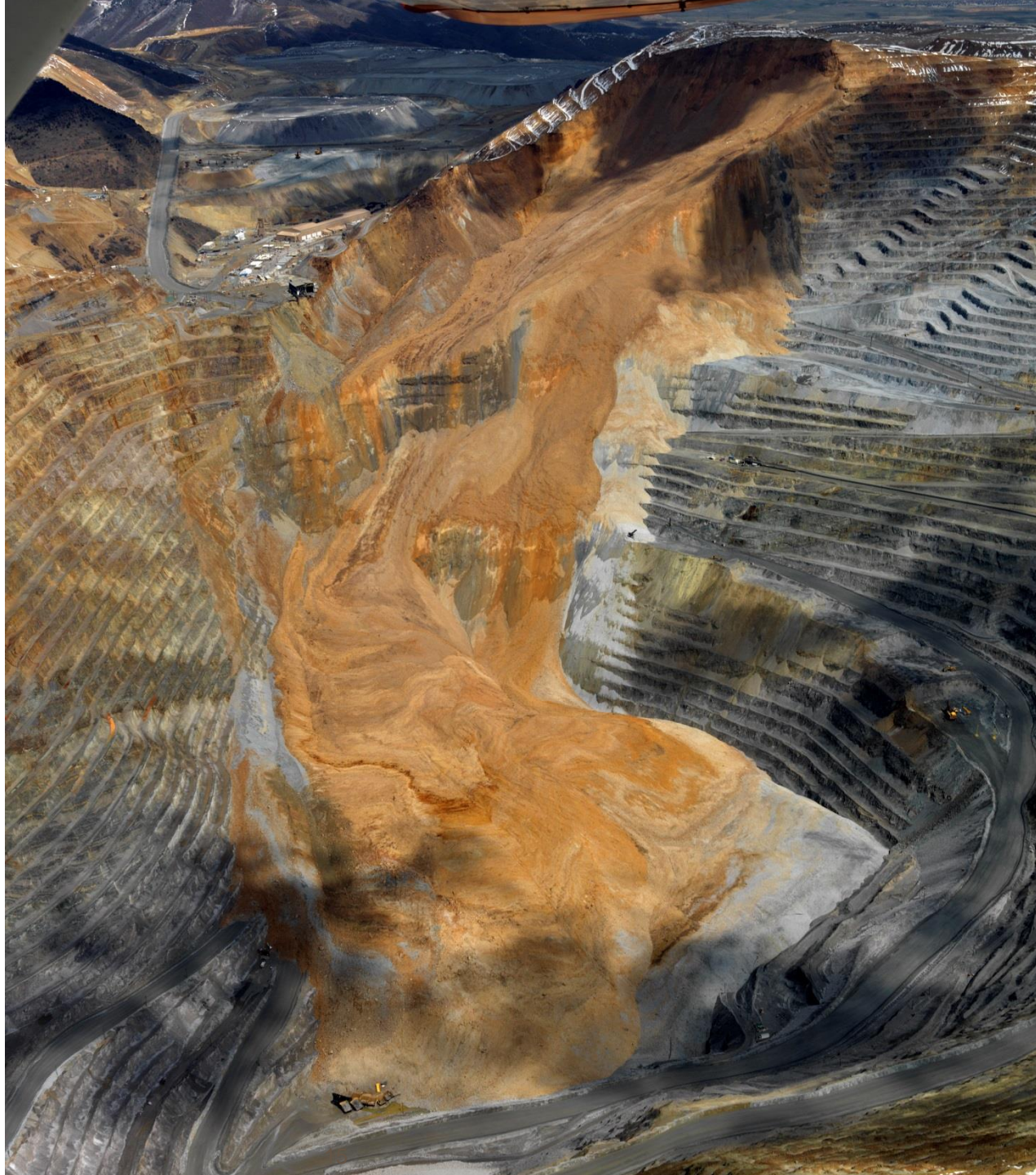


The logo of the Pan-American Hub for Compatible Mining

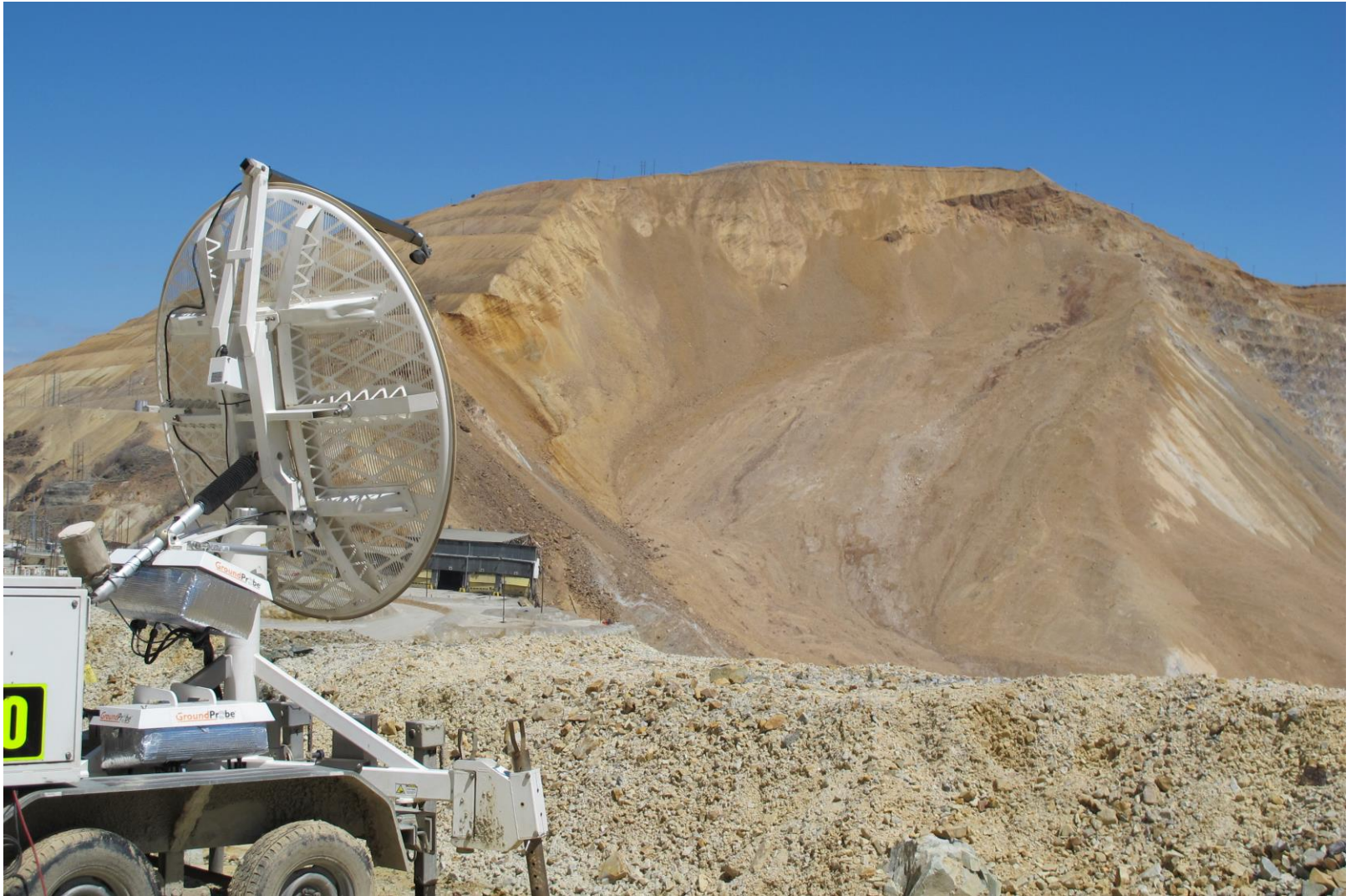
the empowerment of communities, civilians, governments, and the private sector to collaborate in a way that minimizes and prevents the environmental and social impacts of mining

Large Scale Mining





Monitoring Equipment



Water and Mining



Panorámica de planta. Unidad Tizapa, Estado de México.



Arid Lands



Vista de planta. Unidad Bismark, Chihuahua.

Processing Methods



Vista de molinos y planta de beneficio. Unidad Madero, Zacatecas.

Water Quality



Controlling Acid Mine Drainage

Before



Environmental commitments
Mine site reclamation:

- \$50 million project
- Rehabilitate 1,500 acres
- Local contractors = Jobs

After



Tailings Impoundments



Cortina de presa de jales. Unidad minera rentada. Zimapán, Hidalgo.



Bento Rodrigues



Dry Stacked Tailings





Power and Mining



Bagdad Mine – Recurrent Energy

Sandfire Resources – 20% of Electricity Requirements



Reclamation



Presa de jales. Velardeña, Durango

Revegetation



Unidad minera cerrada en proceso de restauración. Cuale, Jalisco.

Reclamation

*A line drawn
in the earth*

Last free lunch on the old frontier," it's been called—the Mining Law of 1872. Designed to encourage settlement of the West, the law does not require hard-rock mining companies to pay royalties to the U. S. government and allows them to obtain title, or patents, to public lands for between \$2.50 and \$5 an acre—the price set 120 years ago.

In Montana a company has applied for patents to 2,300 acres of platinum and palladium deposits worth billions of dollars. Cost of the patents: \$10,000. Foreign companies can also benefit from the lenient law. A Canadian venture has been mining almost half a billion dollars a year in gold from a site in Nevada.

Taxpayers will incur further losses as bills come due for cleanup of abandoned sites. The Mineral Policy Center says it may cost 70 billion dollars to reclaim non-coal mines that pose health and environmental problems. The 1872 Mining Law is now under review by Congress.

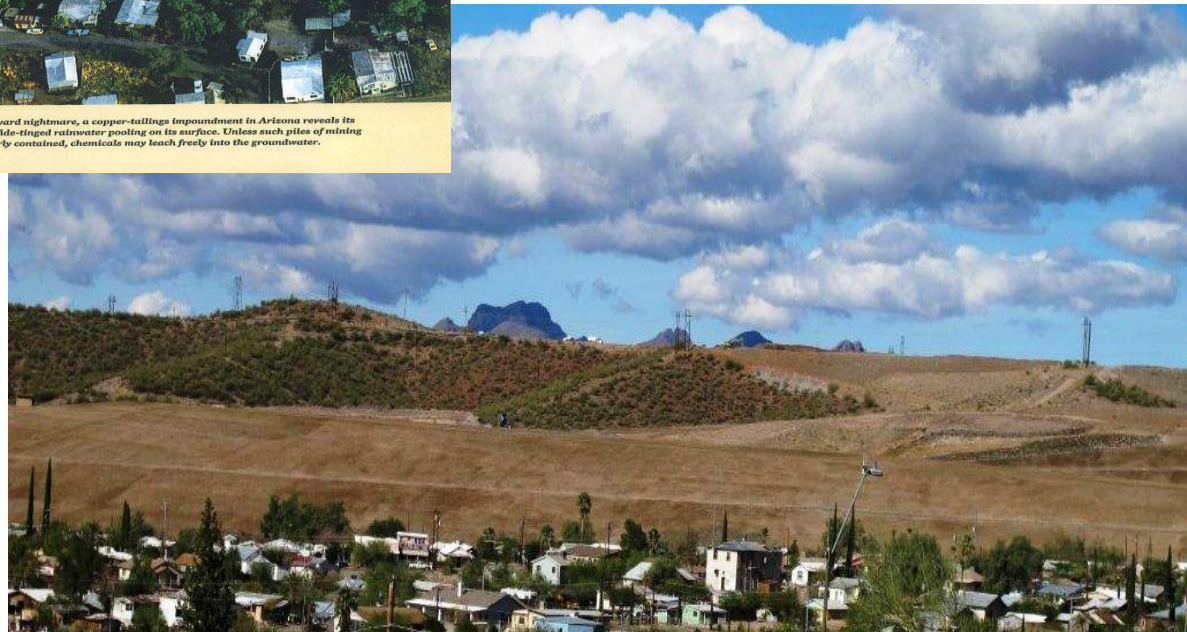


ARIZONA Backyard nightmare, a copper-tailings impoundment in Arizona reveals its toxicity in the sulfide-tinged rainwater pooling on its surface. Unless such piles of mining residue are properly contained, chemicals may leach freely into the groundwater.

National Geographic Article –

2011 Reclamation

- Re-contoured to natural landform
- Cross ripped along contour
- Placement of cover
- Prepared for reseeded



Building a Future



Preparación de labores en interior mina. Unidad Madero, Zacatecas.

Autonomous Mining



Changing Technology



Faster – Less Expensive



Stratolite



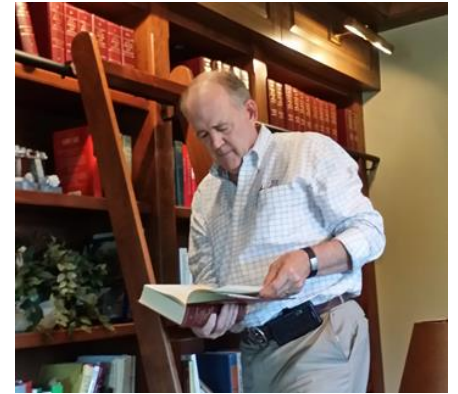
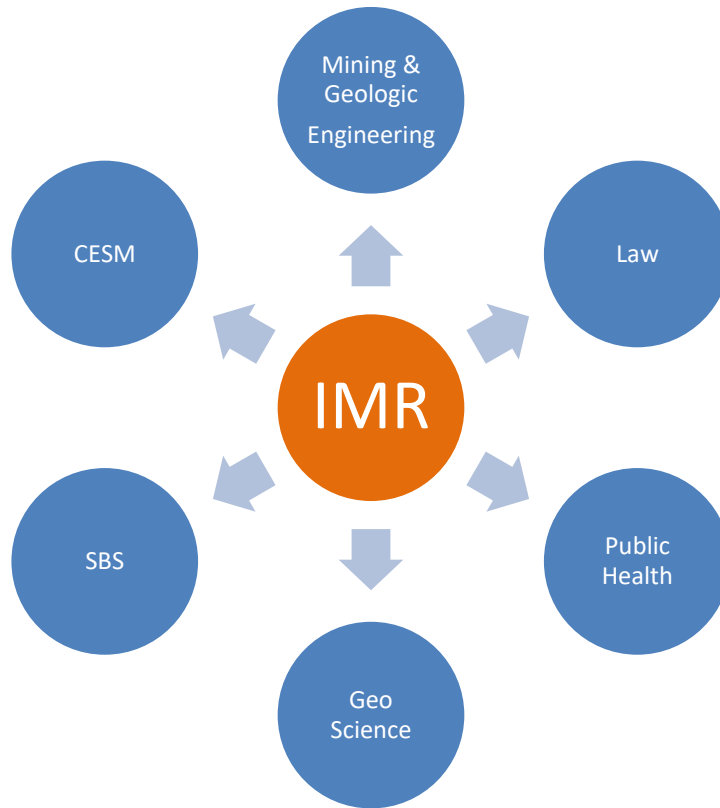


THE UNIVERSITY
OF ARIZONA

The University of Arizona, Tucson



Lowell Institute for Mineral Resources



Outreach Engagement

Application:

- Engage students, communities, governments, professionals worldwide

Approach:

- Education modules
- K12 activities
- Leadership training
- Safety competency
- Legislative briefings
- Pan American Hub for Compatible Mining

Wins:

- Lower social risk
- Capacity building in community
- Government engagement



The logo of the Pan-American Hub for Compatible Mining

Gracias!

