



AMAZON SEMINAR COURSE: INVITED SPEAKER ON MINING

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University of Florida, TCD Program
Gainesville, 12th October 2015

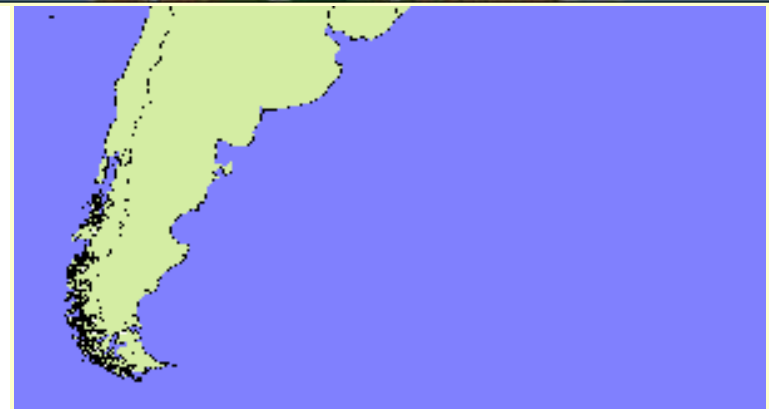
Content of Presentation


- Context of Amazonia
 - ▣ Socio-Ecological Drivers

- Mining Extraction in Latin America
 - ▣ Case Study Peru – Madre de Dios
 - ▣ Amazon Gold Video / Carnegie Institution for Science
 - ▣ Where do we go from here?

Amazonia

- ~50% of remaining tropical forest
- of critical importance
 - ▣ Climate regulation
 - ▣ Biodiversity conservation
 - ▣ Biogeochemical cycles
 - ▣ Ecosystem services





TROPICAL FORESTS ARE DISAPPEARING
AS THE RESULT OF MANY PRESSURES,
BOTH AT THE LOCAL AND REGIONAL
LEVEL, ACTING IN VARIOUS
COMBINATIONS IN DIFFERENT
GEOGRAPHICAL LOCATIONS

Socio-Environmental Changes in Tropics

Other Extractive Activities (Timber, Gas and Oil, Soybean, Palm Oil, Cacao, Coca)

Mining

Infrastructure Expansion

Urbanization (Migration)

Agricultural Expansion

Cattle Ranching

Drivers

Social



Economic



Institutional / Policy



Cultural

[Globalization]

[Property Rights]

[Unconcern about forest]

Causes

Fuente: Chávez Michaelson, A; Bejar Chura, N., Valera Tito, F., Alarcón, G. (2011). Vision Global y Nacional sobre la Deforestación y Degradación.

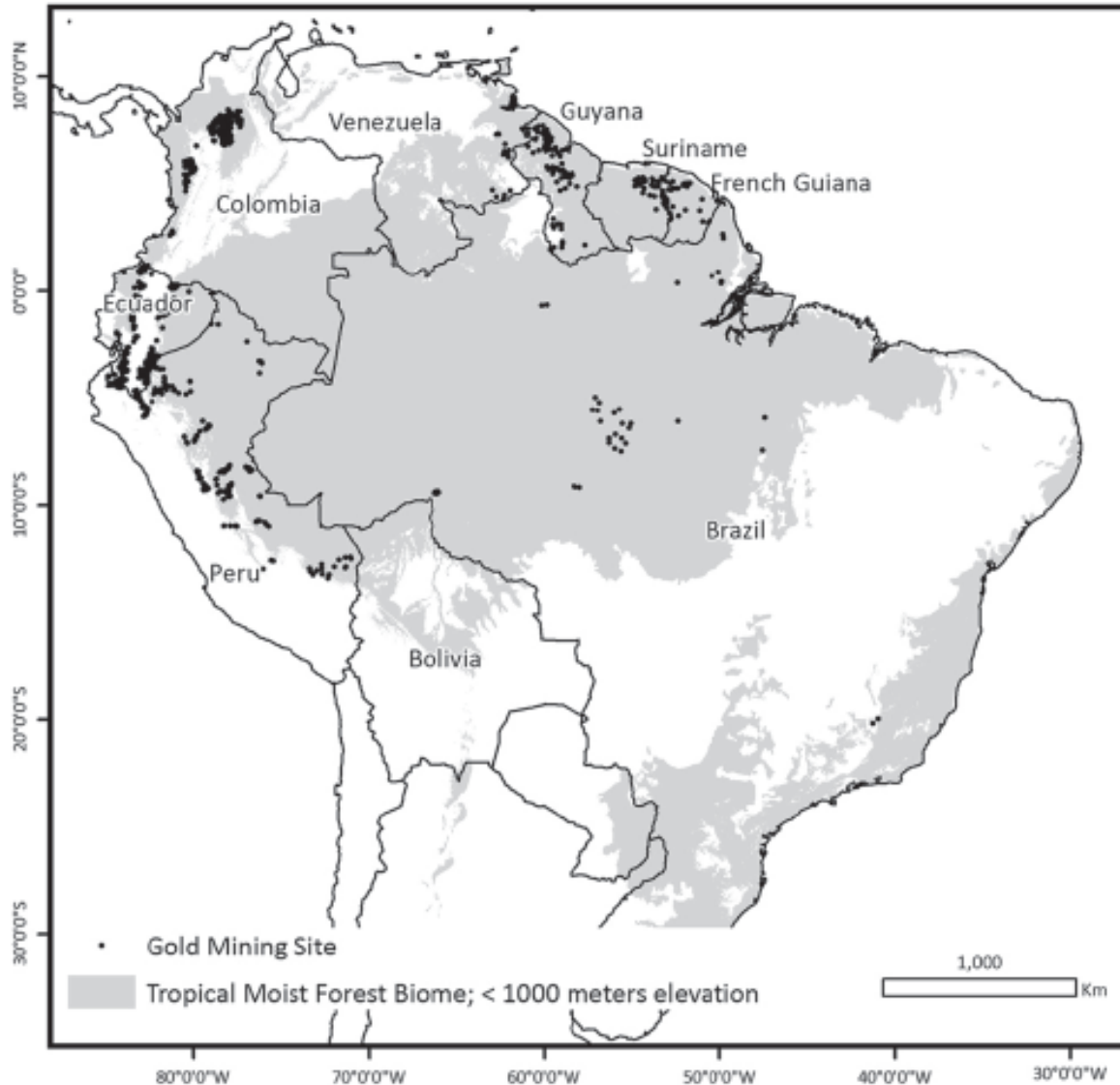


Figure 2. The study site encompasses the tropical and subtropical moist broadleaf forest biome (Olson *et al* 2001) with elevations <1000 m. Black dots indicate epicenters of active and potential gold mining sites (i.e. geographical centroids) based on literature reviews and government and private mining databases.

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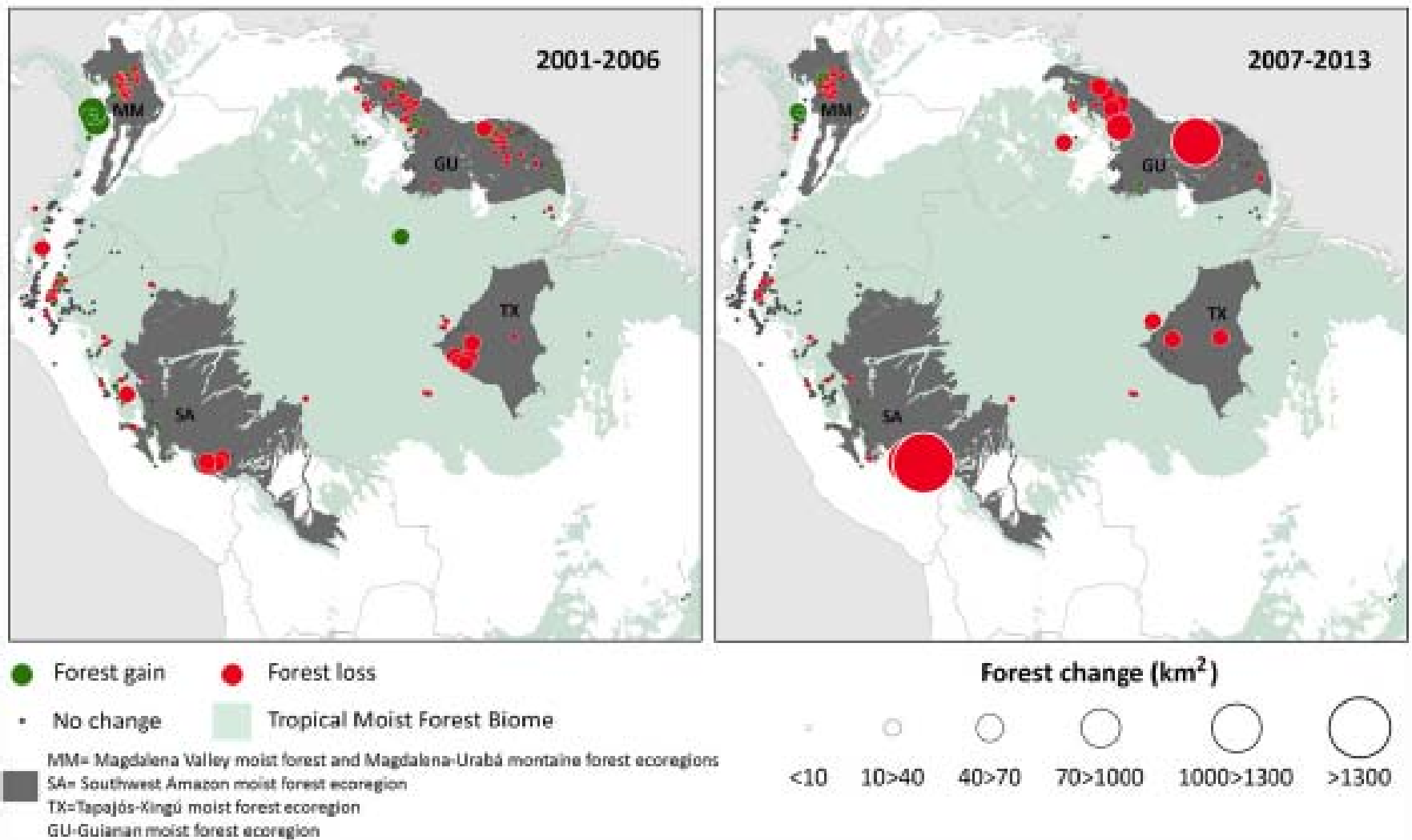


Figure 3. Distribution of gold mining sites with significant change in forest cover (km²) in periods 2001–2006 and 2007–2013. Green dots represent an increase in forest cover, red dots represent a decrease in forest cover, and gray areas indicate no significant change in cover.

Gold and the global context

- Over the last thirteen years, the price of gold has increased from **\$250/ounce in 2000 to \$1300/ounce in 2013** (World Gold Council 2012). This rise in global demand and the price of gold have stimulated new gold mining.
- The high price of gold has made it feasible to extract gold from areas that were not previously profitable for mining, including low-grade deposits underneath tropical forests (Swenson et al 2011). In many cases, the mining of these deposits is characterized by **unorganized occupation of lands and uncontrolled mining operations**, causing significant forest loss and environmental impacts (Villegas et al 2012).

Informal Mining

- **“Informal”** refers to artisanal miners that operate illegally without paying taxes or holding permits and/or formal title to their claims and without environmental impact analysis or miner education. Artisanal gold miners are typically the poorest and most marginalized in society, and therefore are difficult to target and regulate with education and incentives.
- Major environmental threats caused by gold mining in the developing world include **deforestation**, acid mine drainage, and air and water pollution from arsenic, cyanide, and mercury contamination. Artisanal miners are directly exposed to liquid mercury as well as to vapors during gold processing, which releases mercury directly into sediments, waterways and the atmosphere.

Mining Challenges – The case of Madre de Dios

FACTS: Peru is the largest gold producer in Latin America, 6th largest in the world. These statistics do not include the country's illegal mining sector

Elevated rates of gold mining in the Amazon revealed through high-resolution monitoring

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Contributed by Gregory P. Asner, September 30, 2013 (sent for review September 14, 2013)

Gold mining has rapidly increased in western Amazonia, but the rates and ecological impacts of mining remain poorly known and based on the establishment and expansion of these three largest mines. Most importantly, their study correlated an increase in

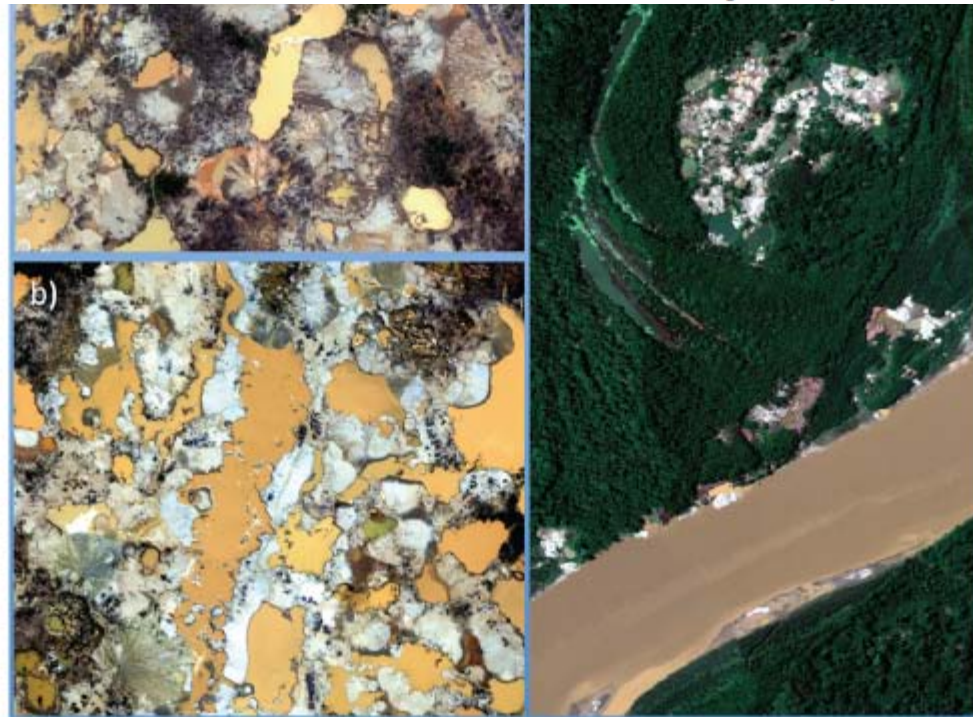


Fig. 1. (A and B) Typical examples of the interior conditions of the large Guacamayo and Huepetuhe mines. (C) Examples of small-scale mining on and set back from the edge of the Madre de Dios River. In all cases, mines are dominated by extensive, intermixed areas of bare soil and standing pools of water resulting from the mining process.

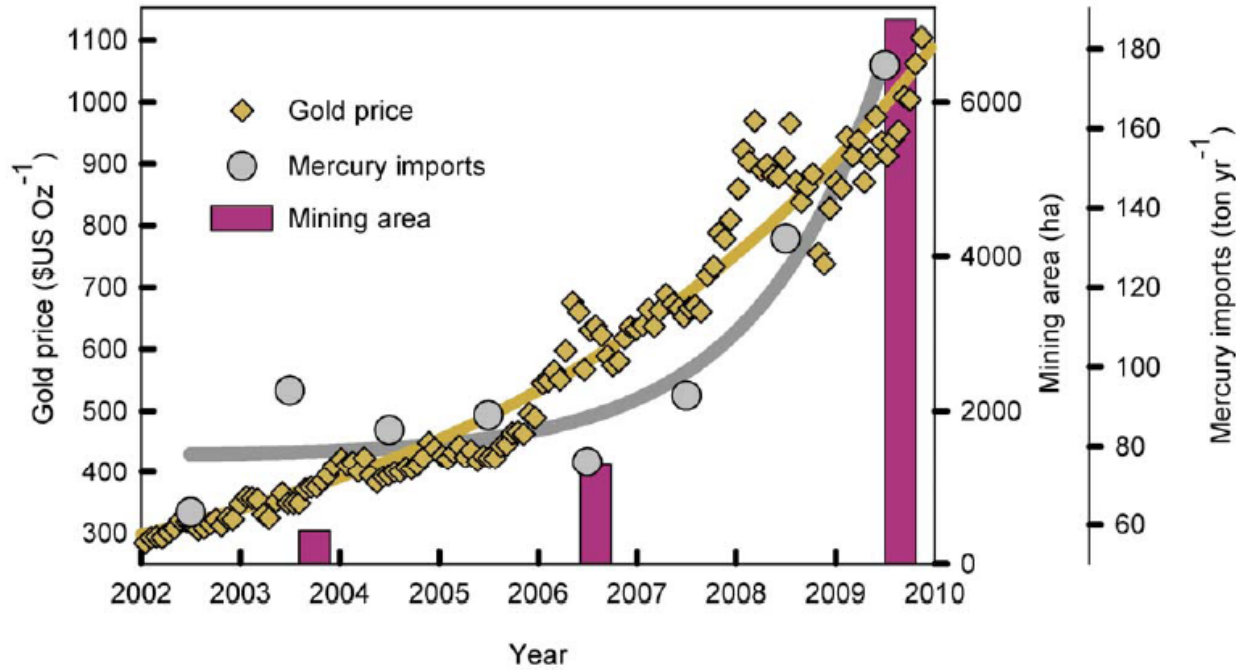
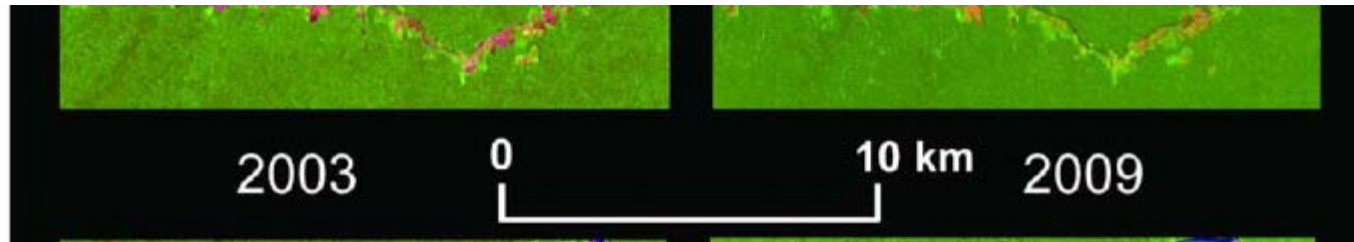


Figure 3. Gold, deforestation, and mercury import increases over time. International biweekly gold prices [4], forest conversion to mining area (Figure 2A and B) and annual mercury imports to Peru (Superintendencia Nacional de Aduanas del Perú [14,9]). Mercury imports for 2009 were recorded to September and projected for last quarter. Gold price had risen to >\$1400/oz at the time of this article's publication [4].

doi:10.1371/journal.pone.0018875.g003

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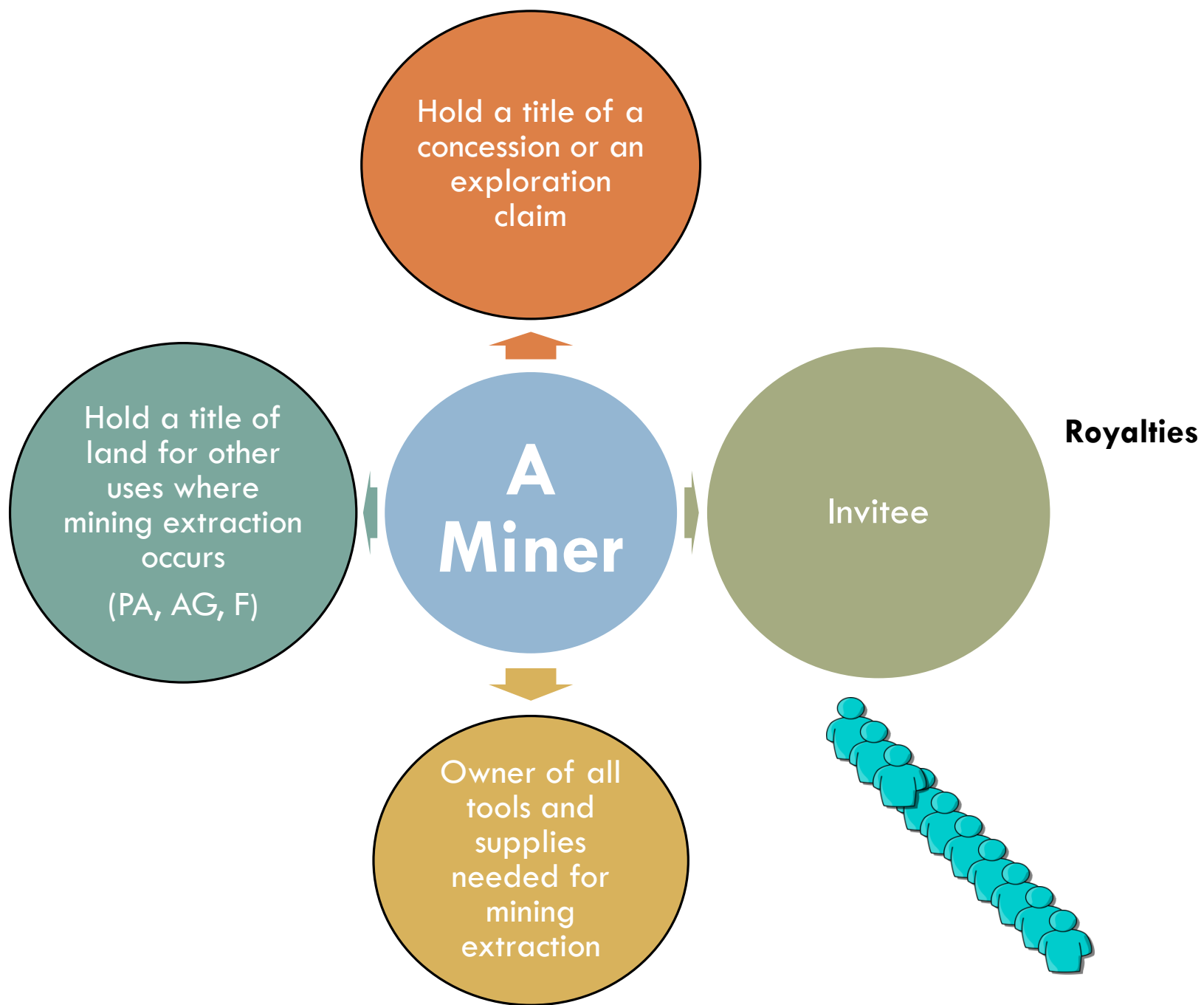
Gold Mining in Madre de Dios region of the Peruvian Amazon

- River-based gold mining increased **400%** from 1999 to 2012.
- Deforestation for gold mining now **exceeds** all other forms of forest loss combined, including ranching, agriculture, and logging (**40% higher** than expected)
- The average annual rate of forest loss as a result of gold mining **tripled** in 2008 following the global economic recession (rapid increase of gold prices)
- Small clandestine operations now comprise **more than half of all** gold mining activities throughout the region.

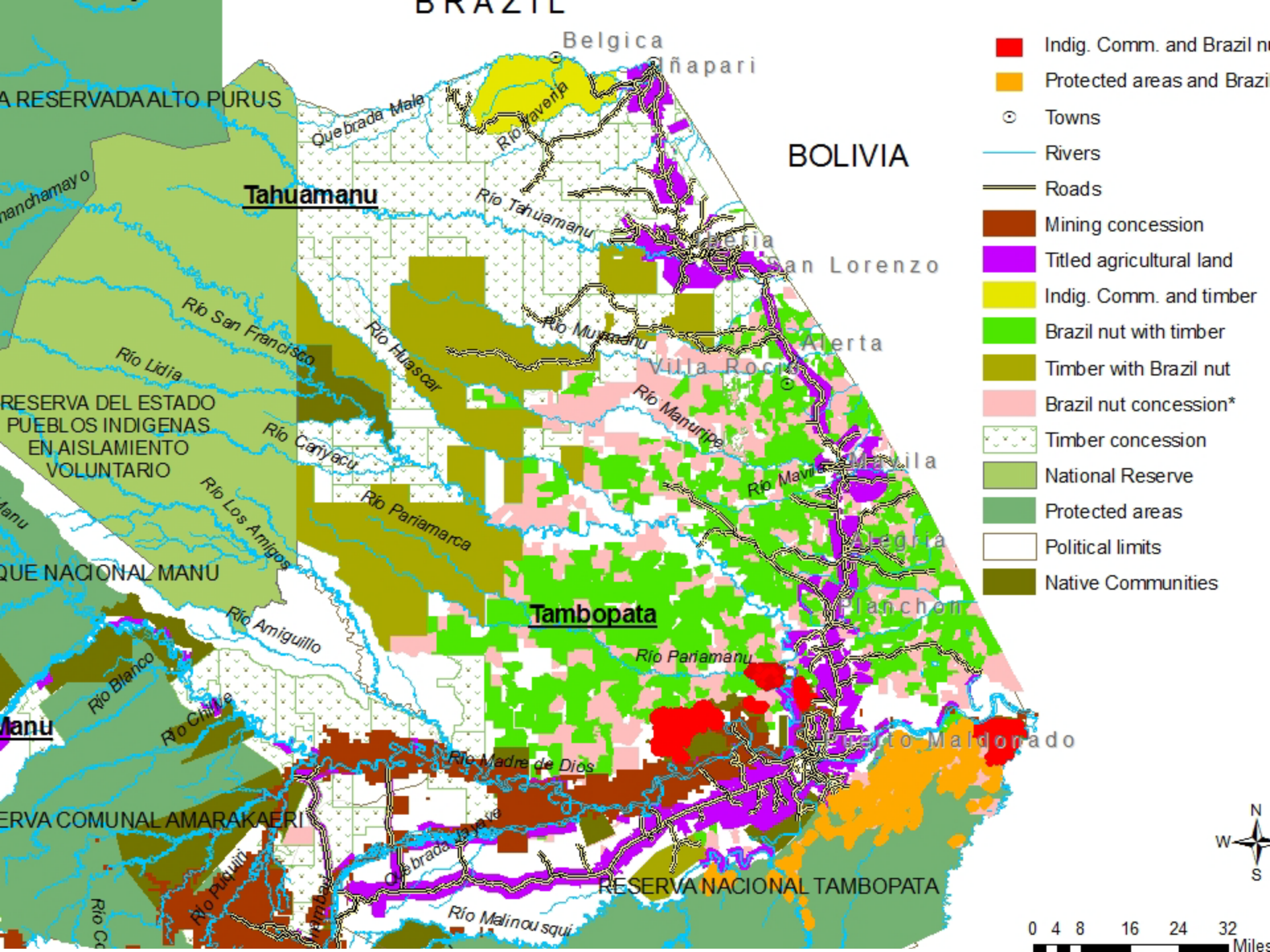
Gold Mining in Madre de Dios region of the Peruvian Amazon, cont.

- Widespread mercury pollution in air and waters throughout Madre de Dios, negatively affecting the entire food chain and people far beyond the mining sites.
 - ▣ Almost 80% of residents in Madre de Dios have high levels of mercury
 - ▣ Almost 60% of consumed fish species have mercury levels exceeding the safe limits
- Hunting is also widely associated with gold miners who search the forest for game meat, creating empty forests (defaunation) with impaired ecological function.
- Widespread tree mortality on the fringes of both small and large mines.

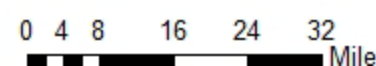




PA=Protected areas; AG = Agricultural lands; F=Forestry concession



- Indig. Comm. and Brazil nut
- Protected areas and Brazil nut
- ⊙ Towns
- Rivers
- Roads
- Mining concession
- Titled agricultural land
- Indig. Comm. and timber
- Brazil nut with timber
- Timber with Brazil nut
- Brazil nut concession*
- Timber concession
- National Reserve
- Protected areas
- Political limits
- Native Communities





WINNER
BEST AUGUST
CRITICAL MESSAGE
AWARD
International Wildlife
Film Festival
2013
MONTANA

OFFICIAL
SELECTION
Arizona Film Festival
2012
LOS ANGELES

OFFICIAL
SELECTION
Virginia Film Festival
2012
CHARLOTT.
EVILLE

HONORABLE
MENTION
COMPFEST
Community
Film Festival
2012
TORONTO

WINNER
BEST AUGUST
AWARD
Foreign International
Film Festival
2012
HONOLULU

OFFICIAL
SELECTION
International Film Festival
2013
WASHINGTON
D.C.

OFFICIAL
SELECTION
Miami International
Film Festival
2013
MIAMI

AMAZON GOLD

Directed and Produced by REUBEN AARONSON Produced by SARAH DUPONT JAMES CAVELLO
Executive Producers NICOLAS IBARGUEN Americas Business Council Foundation MARGARITE ALMEIDA Amazon Aid Foundation
Narrated by SISSY SPACEK HERBIE HANCOCK Cover Art ©2012 BRYAN EL CASTILLO
AMAZON GOLD ©2012 AMAZON AID FOUNDATION in association with AMERICAS BUSINESS COUNCIL FOUNDATION

<https://www.youtube.com/v/9YE5FbHWgn8>

What to do?

Grim prospects for sustainable miners in Peru

by Saul Elbein - [@saul_elbein](#) | September 21, 2015 5:30AM ET

□ [*Small-scale miners aggressively targeted in government crackdown on illegal gold mining*

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Topics: Peru, International, Environment



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mining

Panorama

Discussion

- What type of alternative development policies need to be issued and implemented in order to alleviate the controversies between conservation and development issues related to mining activities? Is it feasible?
- Do we understand the diverse drivers (social, economic and environmental) implicated in the complex scenario of mining extraction in Latin America?
- Can you think of crucial research priorities?

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World Gold Council 2012 World Gold Council (www.gold.org/)

Thank you! Andreabirgitchavez@gmail.com

NO MAS MERCURIO EN NUESTROS CUERPOS

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Aerial view of many small-scale artisanal gold-mining operations in the Madre de Dios region of the Peruvian Amazon. Source: [The Guardian](#).

The Situation

The uncontrolled spread of illegal mining has rapidly deforested wide swaths of lowland Amazonian rainforest in the department of Madre de Dios in southeastern Peru. The worldwide surge in gold prices – a 360% price increase in the last decade- following the financial crisis, draws new miners daily. Recent completion of the Interoceanic Highway has increased access to the area and today more than 30,000 miners are estimated to be operating without legal permits.

The Impacts

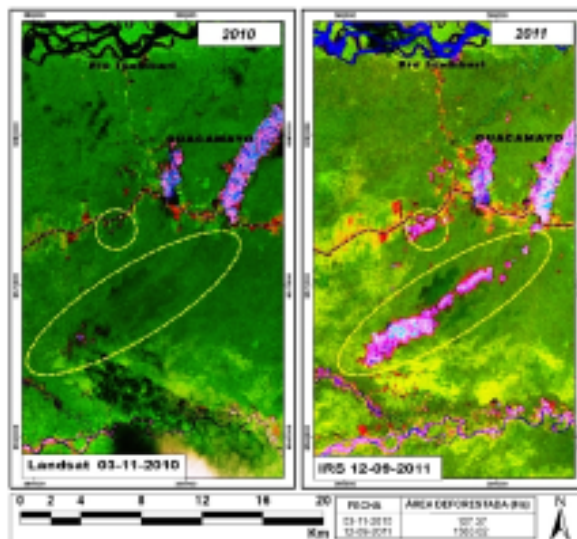
Destructive mining methods raze trees, devastate habitat, contaminate waterways used by communities and fauna alike, and endanger public health.

Worldwide, small-scale mining accounts for one-third of all mercury pollution; in Madre de Dios alone an estimated 30 to 40 tons of mercury are dumped into the environment annually. Mercury, a potent neurotoxin, is used to amalgamate gold particles and then burned off – generally without even rudimentary technology to protect workers' health or capture waste or fumes. Carnegie Institute for Science researcher Luis Fernandez, who received Amazon Conservation Association (ACA) support, recently conducted a major mercury study which found that:

- 9 of the 15 most consumed fish species for sale in markets have mercury levels exceeding the safe limit set by the US EPA; and,
- 78% of residents of the capital of Madre de Dios have dangerously high levels of mercury in their bodies, with women of childbearing age the most affected.



Destruction from gold mining creates pits polluted with mercury in the middle of once pristine forests in Madre de Dios, Peru; Aerial photo by Enrique Ortiz.



In 2010, Peru's former Minister of the Environment, Antonio Brack Egg, estimated that miners had already cut down over 370,000-acres of forest and this number only continues to climb. Deforestation even impacts areas which should benefit from heightened protection. ACA's satellite imagery analysis (left) shows its rapid advance in the buffer zone of Tambopata National Reserve.

Weak governance in Madre de Dios and strong political pressure has allowed mining to continue nearly unregulated, despite the illegality of the operations. Mining creates conflict over land use rights and land tenure and many communities and property owners have been illegally invaded by miners intent on accessing gold. Miners have resisted efforts at restoration and reforestation and establishment of rule of law.