A Perfect Storm in the Amazon Wilderness

Development & conservation in the context of the
Initiative for the Integration of the Regional Infrastructure of South America (IIRSA)

Timothy J. Killeen

Woodrow Wilson Centre for International Scholars
Wednesday, January 16, 2008, 1
2:00 PM – 5:30 PM

CONSERVATION INTERNATIONAL

Center for Applied Biodiversity Science
Centers for Biodiversity Conservation
Brazil, Andes & Guyana
Conservation International

The fate of the Amazon: three scenarios

Utilitarian

Utopian

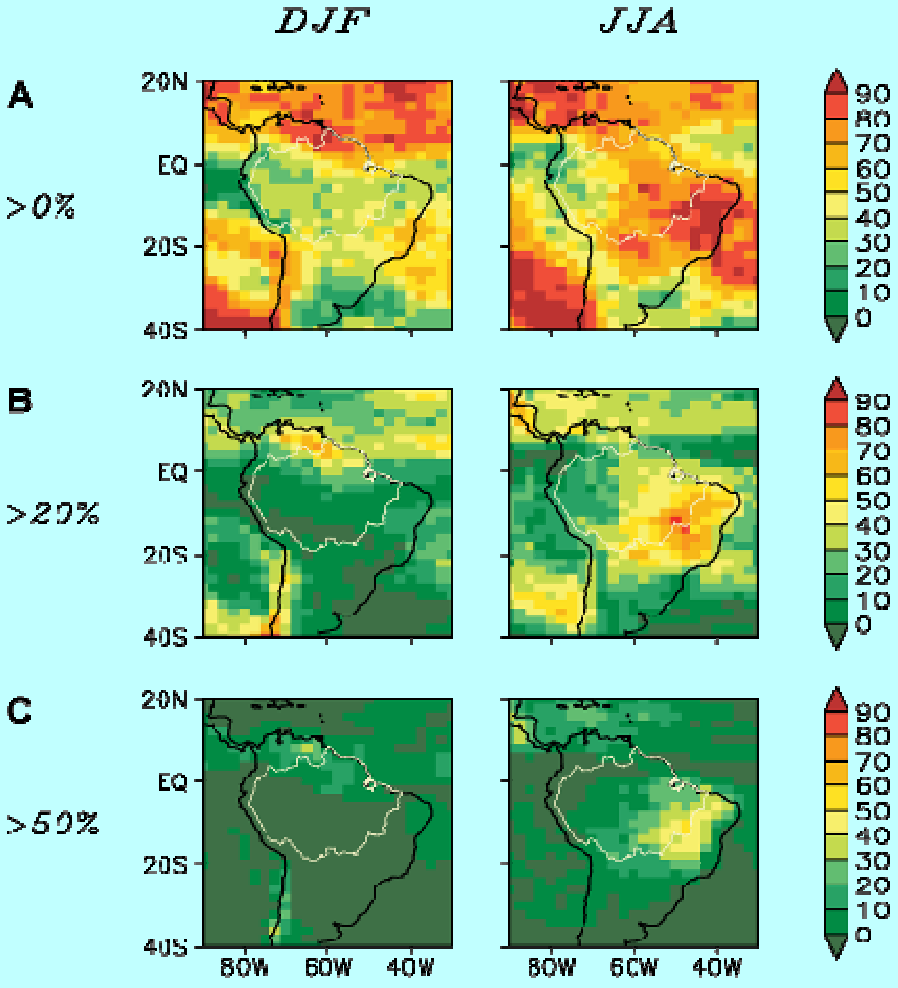
The fate of the Amazon: three scenarios

Utilita

Utopian

Reality Check

Regional Manifestations of Climate Change



Probability map of inctreasing drougfht based on 23 GCM

Mahli *et al.* Science, 2007 (in press)

Model Results (GCM & Regional)

- Trade Winds (E → W)
- Walker Circulation Systems (EW)
- Pacific & Atlantic SST
- Uncertainty

Historical Evidence (Future patterns)

- El Niño / ENSO droughts (wet season)
- 2005 record drought (dry season)
- Pleistocene (cool & dry)

Physiological Constraints

- Temperature (respiration)
- Water (photosynthesis)

Deforestation

- Local ↑ (h~ 35%)
- Regional (↓↓)

CO2 flux

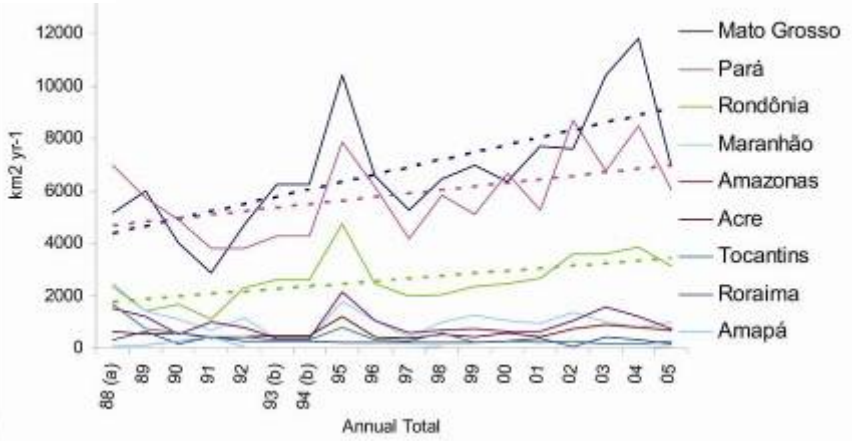
Net Sink (now)

Net Source (future)

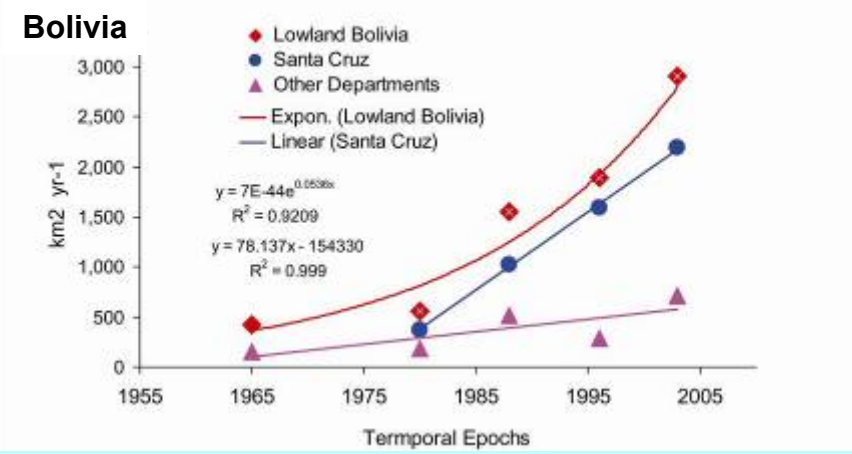
The Advance of the Agricultural Frontier

Historical Record

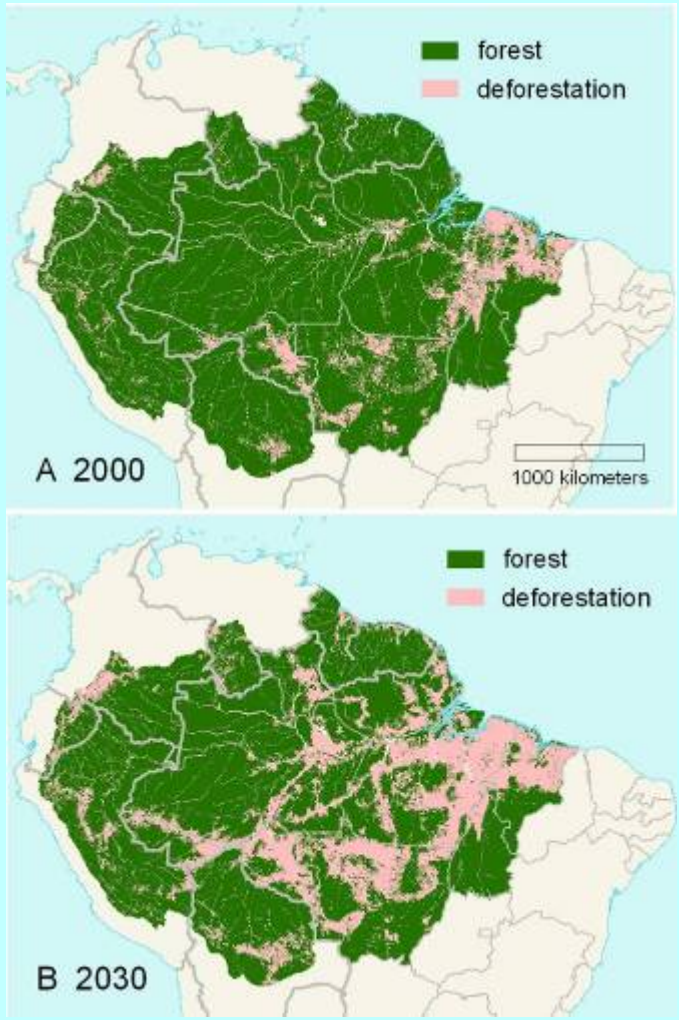
Brasil



Bolivia



Predictions for Future

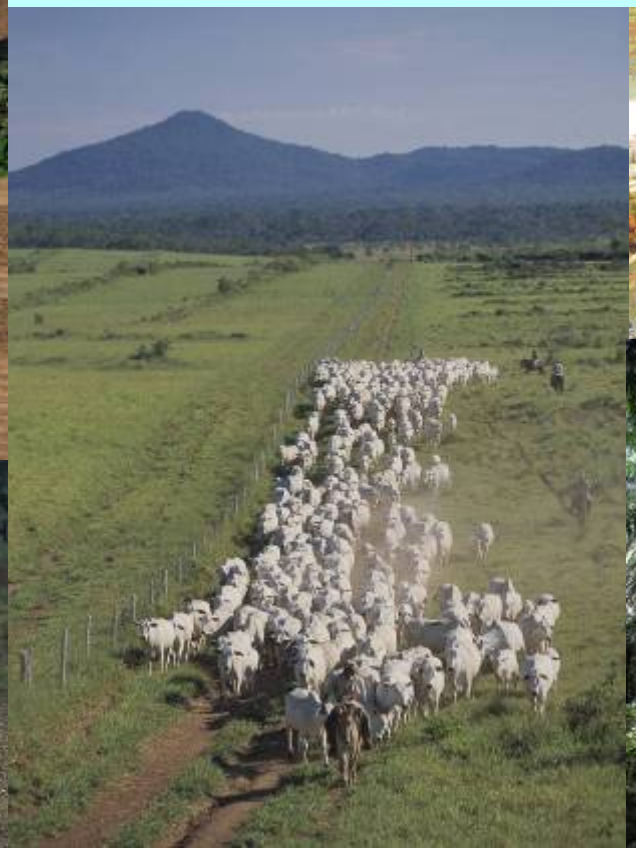


The Advance of the Agricultural Frontier

Agricultural Production Models

- Peasant Farmers – slash and burn / coca
- Cattle Ranches – cultivated grasses
- Agro Industry – row crops / soy, rice, maize
- Biofuels – oil palm, sugar cane, soy

Market forces: local, national, global
Technology y Sustainability



Forest Management

Extractive Reserves (RESEX)

- Brazil Nut & – what else?
- Slash & burn – on the increase

Timber Industry

- Reduced Impact Logging
- Sustainability
    - trees 100 – 300 años
    - harvest Cycle: 20 - 30 years---

Fact, fiction or only wishful thinking?

Wildfire

Causes

- Deforestation
- Logging
- Climate Change

Impacts

- Loss of timber (10-59%)
- Human health (smoke)
- Co2 emissions

Oil & Gas

Andean Piedmont
Urucú & Western Amazon
2nd Tier companies

High biodiversity = High potential
Peru vs. Ecuador
Compensation Funds

Geological Reality
Economic Reality
Political Reality

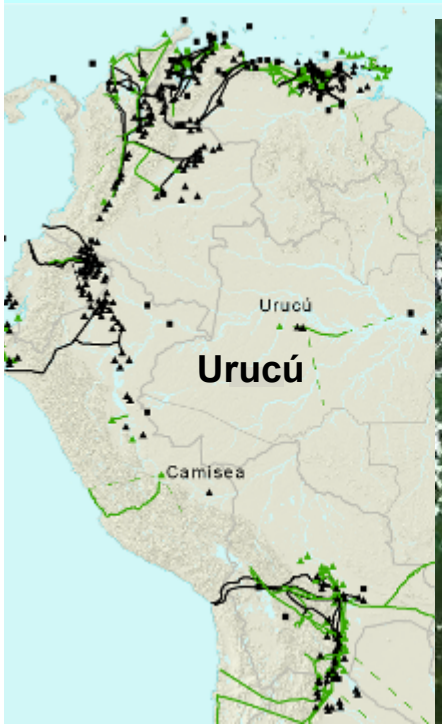
Secondary Impacts
Aquatic Systems
Deforestation

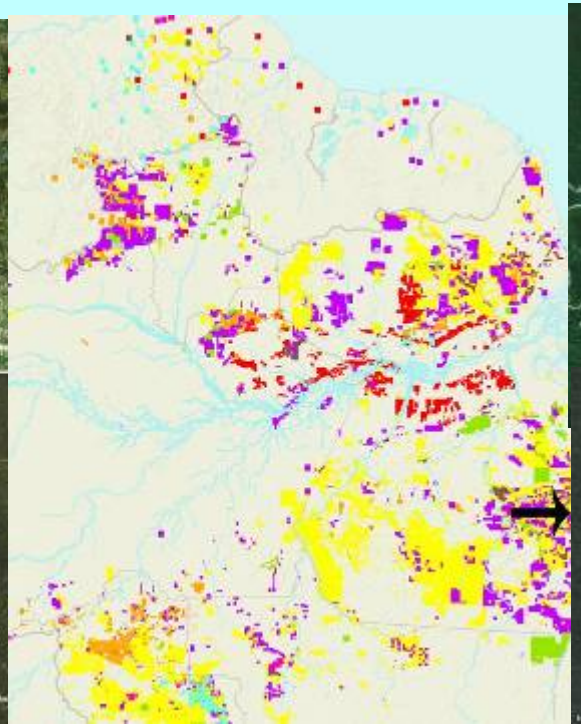
Mines

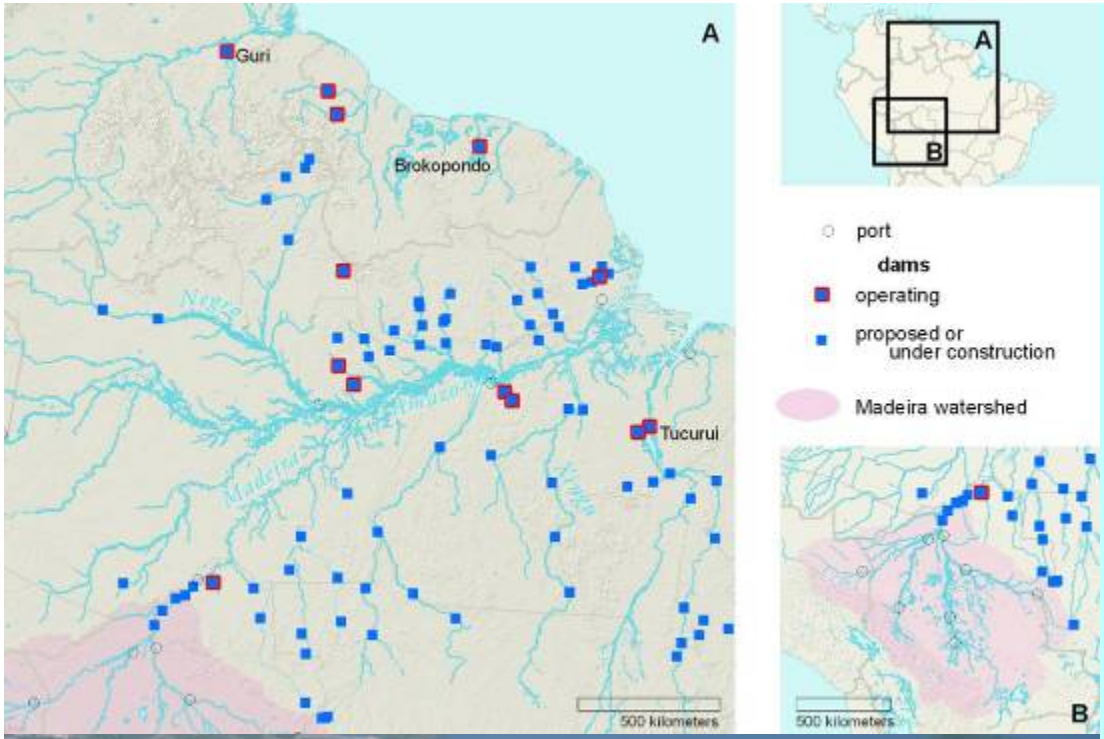
Industrial Minerals
Precious Metals & Diamonds

Multinational Corporations
Garimpeiros & Cooperatives

Metallurgical Industries
Transportation systems
Energy subsidies







Hydropower

- Job creation (short term)
- Metallurgical industry (subsidized)
- Mega projects - Downstream
  - Tucuri & Guri
  - Xingu & Madeira
- Mini projects - Upstream
  - Tocantins - Araguaia

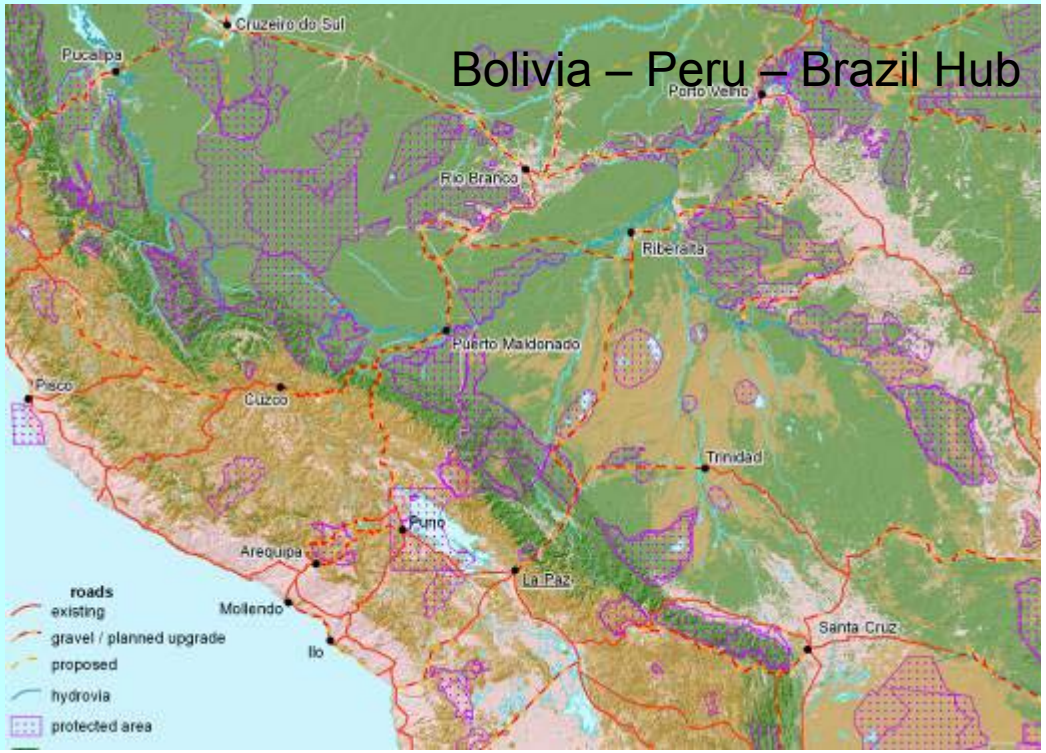
Hydrovías

- Bulk Transport system
  (soy, minerals, biofuels)
- Multimodal systems (river + rail)

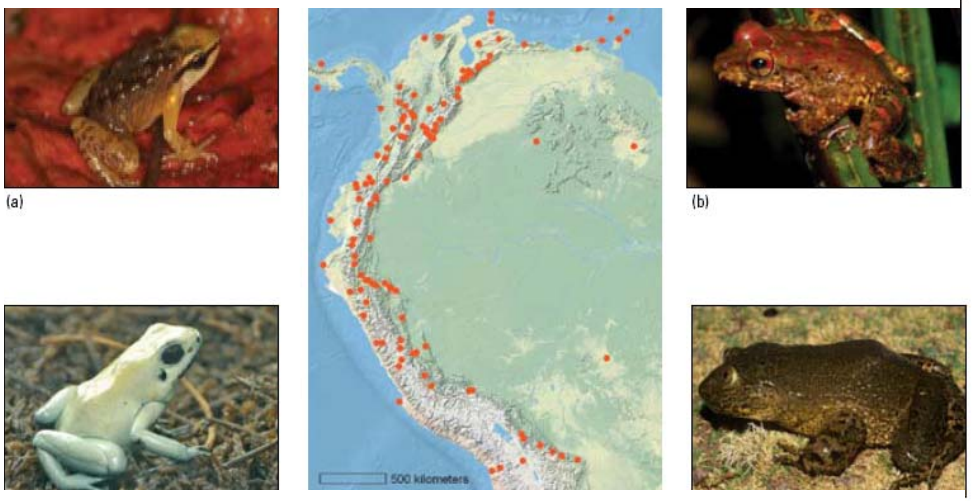
- Amazonas
- Tocantins - Araguaia
- Madeira – Mamoré
- Orinoco
- Paraguay – Paraná

How will IIRSA Impact the Amazon?

- Reduce Transportation Costs
- Create New Markets (Meat → Lima)
- Technological Transfer
  (Cattle Ranching / Biofuels)
- Expand production existing settlements
  (Acre, Roraima, Santa Cruz)
- Open new areas for colonization
  (Madre de Dios, Guiana)
- Expand Logging into Western Amazon



Tropical Andes Biodiversity Hotspot



Local Endemism (AZE)
Mountain topography
High biodiversity (alpha & beta)

Impacts

IIRSA
- Direct
- Immediate

Climate Change
- Altitudinal displacement
- Medium-term

Amazon High Biodiversity Wilderness Area

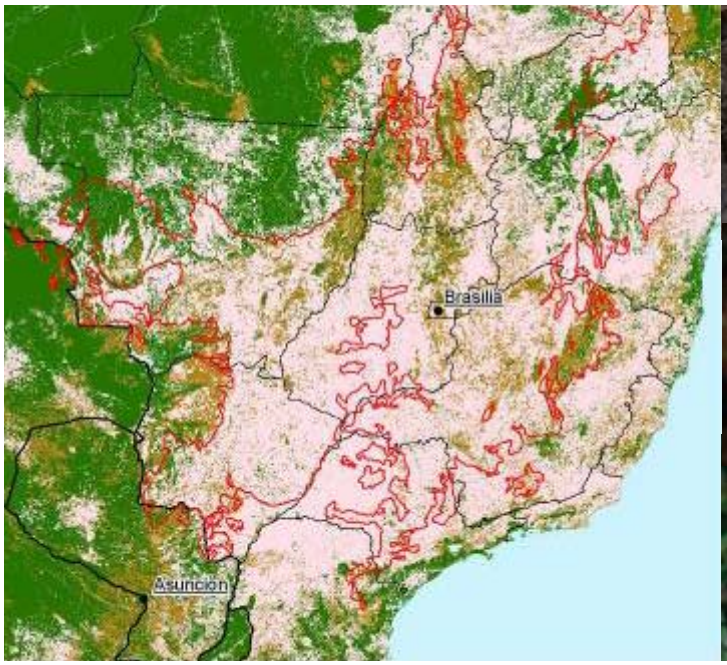
Regional Endemism
Rivers as Barriers
Large Biogeographic sub-regions

Impacts

IIRSA
- Indirect
- Deforestation

Climate Change
- Latitudinal displacement
- Mediam-term

Cerrado – Biodiversity Hotspot



- Local y regional endemism
- Landscape diversity (beta)
- Phylogenetic diversity (grasses)
- Only 30% of species inside a Protected Area

Impacts

Farming & Ranching
> 50% habitat conversion
~ 100% impacted
~ 30 years = 0%

Aquatic Systems

Species Richness & Endemism
Habitat diversity
Migratory fish

Impacts

Deforestation
Wetland conversion
Dams (fragmentation)
Contamination

Social Landscapes

Migratory Flows

- rural → rural
- rural → urban
- urban → urban

Land tenure

- Local elite
- Urban investors
- Indigenous lands

Social Displacement

- Education
- Access to credit & opportunities

Human health

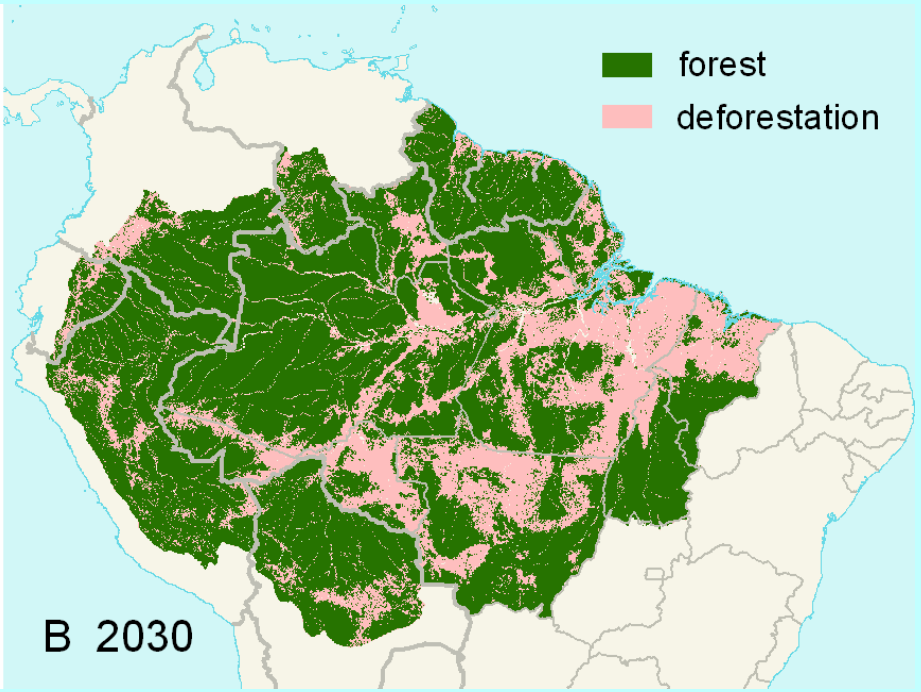
- Groups in voluntary isolation
- Emerging diseases
- Respiratory ailments (smoke)
- HIV / SIDA

How do we ensure that the benefits of IIRSA are equitably shared among the old, new and future residents of the Amazon

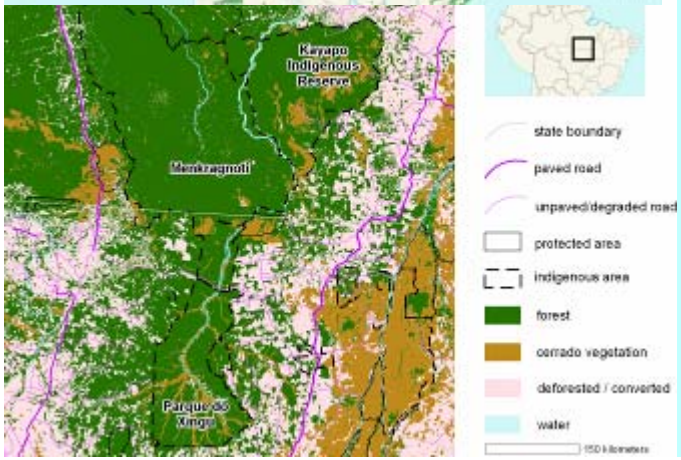
What to Do?

Reform IIRSA

Accept the inevitable



A visionary initiative should be visionary in all of its components



Improve Environmental and Social Evaluation and Mitigation

Improve the quality of SEAs
- Prior to project design
- Greater thematic and geographic scope
- Ensure democratic participation (MAP)

Environmental Action Plans
- Plano Sustenable (BR-163)
- Corredor Bioceánico (Santa Cruz)

What Works?
- Protected Areas
- Indigenous Reserves

What hasn't worked?
- Land-use planning
- Community – based development

What remains to be seen?
- Political decentralization
- Forest management

Valuating Ecosystem Services – Carbon Markets

How valuable is the carbon in the forest?

- Biomass (200 – 300 ton per hectare)
- Carbon ~ 50% of biomass = C
- C → CO_2 conversion factor = 450 T/HA
- Current Market value @ $2.5 → $15 ton
- $1000 - $7000 per hectare
- Amazon ~ 600 M hectares

TOTAL = $1 - 10 Trillion

Replacement cost of Annual Emissions?

Mean annual LUC (1990) 2.5 M hectares

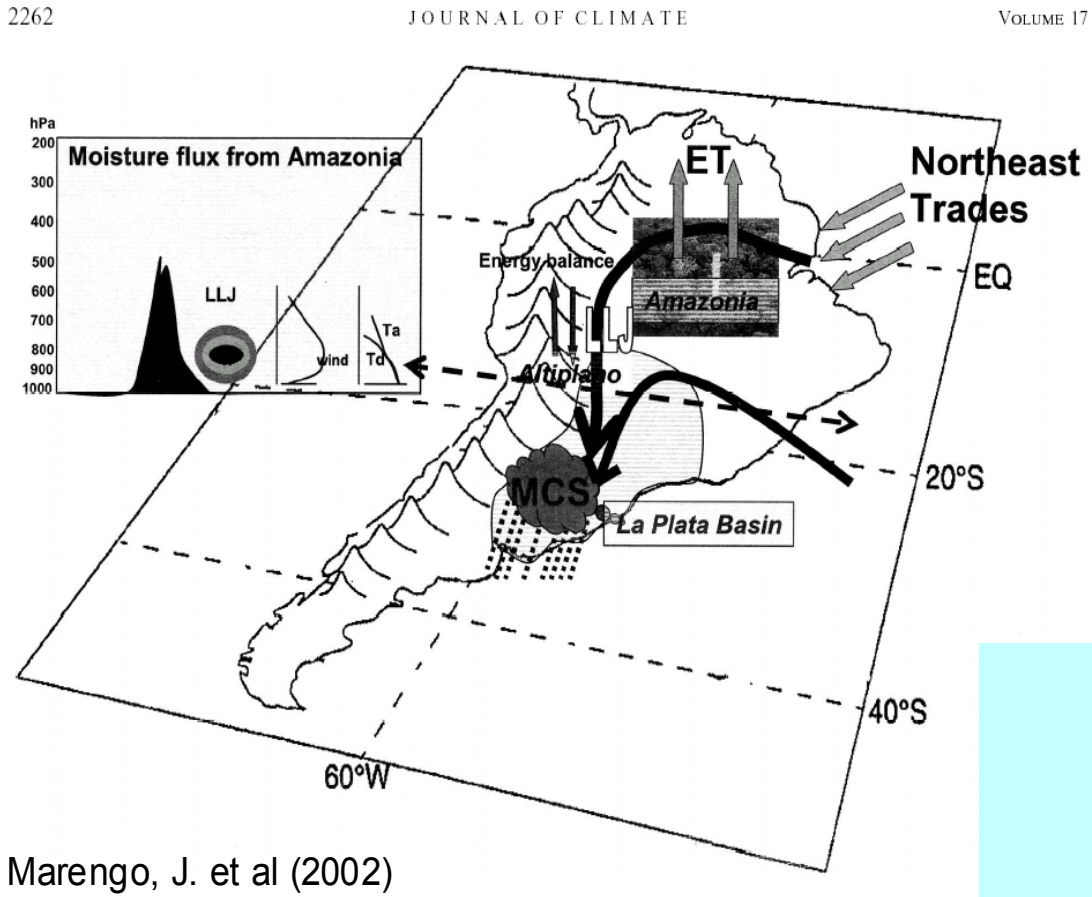
TOTAL = $6.5 Billion`

5% Phased Annual Reduction

First Year = $647 M

10th Year = $8.6 B

Valuating Ecosystem Services – Water / Weather



Marengo, J. et al (2002)

South American Low Level Jet (SALLJ)

Teleconection
- Amazon → Andes
- Amazon → Río Plata

Agricultural production
Hydroelectric generation
Rio de la Plata Basin
$ 100 B annually

Consider the impact 1 – 5% reduction in precipitation?

Avoiding the End of the Amazon

Recognize the Main Threats

Climate Change ↔ Deforestation

Stopping deforestation reduces the risks from climate change

- *Reduced emissions from CO2*
- *Maintain local, regional and global hydrological cycles*

Slowing global warming reduced the risk of forest degradation

- *Reduces forest fires*
- *Allow time for species to adapt*

Development initiatives (IIRSA) should be evaluated en the context of climate change, the emissions of greenhouse gases and the real cost of these impacts

CONSERVATION INTERNATIONAL

Avoiding the End of the Amazon

Monetize Ecosystem Services

- Reform CDM
- Implement REDD
- Transfer Payments for Precipitation Regulation

Ecosystem Services for Social Services

- Education & Health
- Avoid Entitlements

Quid Pro Quo

- Fair Trade & Agricultural Subsidies
- Link to other North – South Issues

Redefine Sustainability

- Promotes Forest Conservation

CONSERVATION INTERNATIONAL

Avoiding the End of the Amazon

Innovative Production Systems

- Transformational Economy (value-added)
- Fish farming (Brazil – Andes – China)
- Biofuels (REDD + Perennials + CDM)
- Manaus as Model

Use new revenues to subsidize production

- Avoid Rents (= welfare)
- Create Markets not Development Assistance
- Economic growth & job creation

Land Tenure

- Reward forest conservation
- Incentives (taxes & access to credit)
- Focus on the individual – as well as – community

Alternative Transport Systems

- People y Air — Cargo by Water

CONSERVATION INTERNATIONAL

Avoiding the End of the Amazon

Designing Conservation Landscapes

- Latitudinal corridors
- Altitudinal corridors
- Areas of climatic stability
- Exploit soil & topography for habitat stability

Resolve Conflict between Conservation & Development

- Highways & Protected Areas
- Mineral Exploitation (Compensation Funds)

Forest Management (long rotation harvest cycles)

River Basin Compromises

1st, 2nd, 3rd order rivers

Protected Areas - How much is enough?

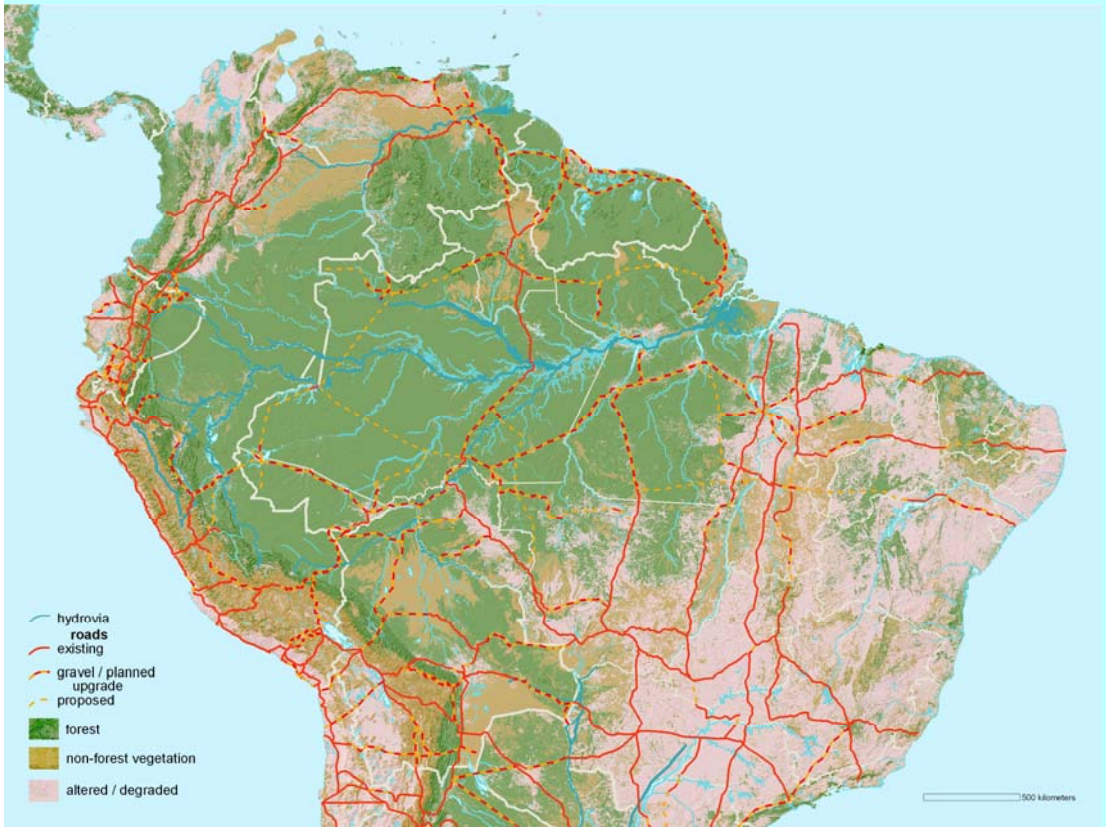
CONSERVATION INTERNATIONAL

A Perfect Storm in the Amazon Wilderness

Development & conservation in the context of the
Initiative for the Integration of the Regional Infrastructure of South America (IIRSA)

t.killeen@conservation.org

http://science.conservation.org/portal/server.pt



CONSERVATION INTERNATIONAL