Time for loss and damage agenda for risk reduction in the Amazon

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Patricia Pinho, PhD
INCLINE- University of São Paulo- Brazil
PNUD- Brazilian fourth communication to UNFCCC
IPCCAR6 Lead Author
Incidence of Fire

Land Use Change
Deforestation/Cattle ranching/Agricultural/Urbanization

Degradation and loss of Ecosystem, Habitats & Biodiversity
(Aquatic and Terrestrial)

Incidence of Fire

Degradation and Loss of Ecosystem Services
Provisioning, Regulation and Cultural

Systemic Risks to Socio-Ecological Security
Framing loss and damage in the Amazon Forest Degradation

Exemplify with a snapshot of a case study of Amazon forest fires in Acre & overall losses and damages on extreme events in recent years

• Multiple spheres of marginalization and exclusion, including in the Science & Policy Domain amply the environmental and climate hazards (Droughts, Fires, and Flooding).
  – Slow onset events (loss of forest, biodiversity, drought, temperature warming).

• What do we know and what we don’t know about material economic and (NELD) in the de meta-categories of Biodiversity, Ecosystem Services, Human Life, Meaningful Places, Communal Sites, Production Sites, Intrinsic Values, Identity and Agency?

• Problematic is how the Amazon is portrayed in climate change models, projections and and policy debate
  • I show the limitations of these views to inform policy that reduce negative impacts and risks to socioecological domain;
The diagram illustrates the relationship between the frequency and intensity of adverse impacts, categorized into different risk levels:

- **Intolerable risks**: High intensity and very frequent events.
- **Adaptation limit**: The boundary beyond which adaptation becomes impractical or impossible.
- **Tolerable risks**: Moderate to high intensity and rare events.
- **Acceptable risks**: Low intensity and very rare events.

This diagram is part of IPCC AR5 Ch 16.
The day the sky of Sao Paulo Megacity was dark by 3PM
The formation of “smoke corridor”

Forest fires in the Amazon blacken the sun in São Paulo
Brazil’s president, Jair Bolsonaro, blames environmentalists (The Economist, Aug 22nd 2019)

“O fim da Amazônia: A noite no meio do dia me pareceu um sinal óbvio demais para ser ignorado”
(Jornal Folha de São Paulo, August 19th of 2019)
What is going on right now in the Amazon?

The world watched perplexed the Amazon, the largest remaining track of tropical forest in the world burn!!
Governance Spur Fires in the Amazon

- Monitoring of Deforestation doesn’t appear in any instrument for Brazilian Environmental and Climate Change
- Climate Change agenda has been terminated.
- The MMA Merged to MAPA
- The Brazilian International Climate Change commitment of curbing emissions through deforestation control which is at the center of Brazilian Climate INDC for Paris Agreement.
- Ministry of the Environment – INACTION and violation of environmental and social constitution
  - Delay in Action to Control Fire
  - The No-Minister of Environment met with Miners organizations (illegal!!) as the IBAMA have burned their equipment’s that were inside an Indigenous Territory.

- The Amazonian state of Pará, farmers and ranchers in the region organized what they called “a day of fire” for Aug. 10, where they would set forests aflame to clear land for pasture and planting.
Cross-Scales Political and Economic threats

**Market-oriented dynamics:** Complex path of agricultural, cattle, mining commodities chains (actors, localities and Scales).
- Locally informality
- Violence
- Large International Companies
- Political Bargains and Favors of an Elite
- Influx of Migration

**Governance:** Critical role in framing the paths for economic development, socioenvironmental protection.
- FUNAI and INCRA under anti-indigenous groups.
- Land grabbing and use disputes (commodities)
- Large development projects and infrastructure (eg. Belo Monte, Jiraú, etc).
- Neglected rights of properties, health, security, and sewage.
- Highly migratory fluxes happening in Latin America and in Amazon basin, associated with political and climate induced crises, specially for indigenous people.
- Precarious urban living associated with migration fluxes.
Science at the center

Bolsonaro afirma que dados de desmatamento foram 'espancados' para atingir governo

Ministro Ricardo Salles, do Meio Ambiente, voltou a dizer que quer novo monitoramento

 Folha Informações: É falso que período de chuvas impediu desmatamento na
Focus on the future of the region, including cities, traditional and indigenous people; Bishops reinforced the high violence and environmental and Climate Change impacts and risks to indigenous people and local communities in the Basin.

“Life in the Amazon has never been so threatened as now”
(Jornal Folha de São Paulo – 17th October 2019)
There is a resurgence of cross-national collective expressions to the fate of the Amazon forest and indigenous people, in the context of an unprecedently climate crisis and sustainable future.

“The Year the World Caught Fire “which was published in December 1997.
Protagonist role of Indigenous People

Sting and Raoni during UN Rio 92 and Sept 2019 in SP
Number of hotspots per Biome/year (1998 – 2019)

Série histórica de focos por bioma e ano

2019 increase in 60% on the number of cumulative fire count in Brazil, Bolivia and Peru in comparison with the same period in 2018, and 12% increase in comparison with the same period in an extreme dry year in 2016 (Global Fire Emissions Database 2019)

in August of 2019, there were ~3,500 fires in 148 indigenous territories (Deter/INPE 2019; ISA 2019).

33% of forest fires was observed within indigenous territories and protected areas (Deter/INPE 2019; ISA 2019)

The incidence of fires increased by 36% in the 2015 drought and increased the carbon emissions associated to Amazon forest fires.

Implication to increasing Emissions from deforestation and burning- in exceptional dry years, such as 2005, 2007, 2010 and 2015, the contributions are beyond 50%, with an average (2003-2015) of 454 ± 496 Tg CO$_2$ year$^{-1}$ (Aragão et al. 2018).
Material Loss and Damage (Economic and health)

- 2005- Burning in Acre recorded 400,000 people affected and loss of 300,000 hectares of forest with direct costs of US $ 50 million (Brown et al. 2006).

- 2010- Total economic loss ~US $ 243.36 ± 85.05 million, 9.07 ± 2.46% of Acre’s gross domestic product (GDP) (Campanharo et al. 2019).

- Deforestation, urbanization, and incidence of fire episodes propagation and increased incidence of malaria (Hahn et al. 2014).

- Increase up to 27% in hospitalizations of children (under 5 years) due to respiratory diseases (Smith et al. 2015).
Amazonia Socioeconomic prospect For Risk Analysis Perspective

Over 30 million people live in the Region.

30% indigenous and or traditional ethnical groups.

Income –based poverty up to 42% of the (Pinho et al. 2014, Pinho, et al 2015)

80 % lives in urban centers with 60–90 % living under moderate to high degree of vulnerability (Mansur et al., 2016)

Threats to Indigenous People:
Suicides; premature death( in childhood); child malnutrition; death for lack of assistance; invasion of the territories by loggers, gold miners, land grabbers, ranchers, real estate speculators responsible for the devastation environmental goods; confinement in improper areas for life, without drinking water, sanitation and housing; murders; death threats; beatings; prejudice, racism and discrimination(CIMA Report, 2019).

Work on the social and health implications of climate change in the Amazon falls behind other research areas, limiting reliable information for analytical models and for Amazonian policy-makers and society at large (Brondizio et al 2016)
Climate Change impacts in the Amazon

With intersectionality of socio-spatial marginalization and remoteness, Amazonia is a ND global hotspot (Hotez, 2014).
### Examples of Non-economic loss and damage (NELD)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Nature of losses</th>
<th>Direct economic loss (USD$)</th>
<th>Nature of gains</th>
<th>Direct economic gain (USD$)</th>
<th>Social Costs (Qualitative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>Long-term effect of 1% - 20% decrease of crop yields on 2006-2015 Amazonian agricultural GDP</td>
<td>6.3 - 126 bi</td>
<td>&quot;Drier-climate&quot; cultivars replacing low yield crops</td>
<td>0</td>
<td><strong>Medium / high</strong>: food security of small-holder farmers to be affected</td>
</tr>
<tr>
<td>Fisheries</td>
<td>5% to 30% long-term reduction of fishing stocks and/or diversity, incl. reduction of productivity in aquaculture</td>
<td>0.4 - 2.5 bi</td>
<td>Short-term (3yrs) increase (5%-30%) of fishing yield</td>
<td>0.01 - 0.06 bi</td>
<td><strong>High</strong>: income and/or subsistence of large number of fishermen affected</td>
</tr>
<tr>
<td>Transport &amp; Livelihood</td>
<td>Long-term effect of 10% - 30% reduction of shipping activities in the Madeira waterway</td>
<td>0.6 - 1.7 bi</td>
<td>None</td>
<td>-</td>
<td><strong>High</strong>: no acces to goods, education, health for people outside big urban centers</td>
</tr>
<tr>
<td>Cities &amp; Migration</td>
<td>Migration of people in the Manaus polygon to Manaus and Boa Vista</td>
<td>?</td>
<td>None</td>
<td>-</td>
<td><strong>High</strong>: migrants occupying marginal spaces in major cities</td>
</tr>
<tr>
<td>Energy &amp; Infrastructure</td>
<td>10% - 50% long-term reduction of hydroelectric potential of plants in operation and planned</td>
<td>1.2 - 6 bi</td>
<td>Relaxation of standards for implementation of infrastructure such as roads, ports, railways affecting 1% - 20% of IIRSA projects</td>
<td>0.05 - 1.05 bi</td>
<td><strong>Low / Medium</strong>: loss of energy potential affects few amazonians; generation of jobs; impacts of new infrastructure for forest dwellers</td>
</tr>
<tr>
<td>Health</td>
<td>Treatment costs of higher incidence of malaria (5% - 10%) and respiratory diseases (20% - 50%)</td>
<td>0.06 - 0.17 bi</td>
<td>None</td>
<td>-</td>
<td><strong>High</strong>: diseases affecting people's ability to carry out their day-to-day activities</td>
</tr>
<tr>
<td>Ecosystem Services</td>
<td>10% - 50% loss of water quantity and quality; reduction of carbon stocks and carbon sink capacity; loss of biodiversity; others</td>
<td>45 - 226 bi</td>
<td>Production of highest rent crop on 10% - 50% of current forest area</td>
<td>12 - 59 bi</td>
<td><strong>Low / Medium</strong>: loss of ES affecting a limited amount of people; generation of jobs in agricultural sector</td>
</tr>
</tbody>
</table>

**TOTAL (no-ES)** 8.6 - 136 bi 0.06 - 1.1 bi  
**TOTAL (with ES)** 54 - 362 bi 12.6 - 60.1 bi

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Science of Climate Change: The Amazon dieback hypothesis

-> what does the climate change models (GCMs) says about the Amazon

- Global circulation models (and modellers)
- Land use change, its forest impact, and responses to it;
- Regional and Global CO2 balance and emissions debates;
- importance for overall global climate stability.

Where is humans and their institutions, economy, infrastructure, and livelihoods?

Climate Change is relatively new concept for the Amazonia population – albeit extreme recent droughts and floods demonstrate hardship on its population and economy.
Limitations on Earth System Models to Climate Policy Agreements and Decision-Making

- Current models used in climate research have a limited ability to represent the poor, vulnerability and risks;
- Need to Incorporate Social heterogeneity and different Policy mechanisms;
- Increased collaboration between modellers, economists, and other social scientists could aid this development.

A Hidden Social Domain in the Amazon (and in Brazil)

Hidden social domain in the Amazon

Source: Brondizio et al 2016

Pinho et al in review
Amazon First out of Five Reasons for Concern Climate Change

Five Reasons For Concern (RFCs) illustrate the impacts and risks of different levels of global warming for people, economies and ecosystems across sectors and regions.

Impacts and risks associated with the Reasons for Concern (RFCs)

Purple indicates very high risks of severe impacts/risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.

Red indicates severe and widespread impacts/risks.

Yellow indicates that impacts/risks are detectable and attributable to climate change with at least medium confidence.

White indicates that no impacts are detectable and attributable to climate change.

Confidence level for transition: L = Low, M = Medium, H = High and VH = Very high.

Source: IPCC Special Report on Global Warming of 1.5°C
What to expect in a future global warming for the Amazon and indigenous people

- Loss of Resilience of Forest Ecosystems to climate change.

- Indigenous land and other categories of protected areas represented in 2014 the equivalent of 58.5% of all the carbon stored in the Brazilian Amazon biome.

- Lowest deforestation rate (2.1%) and fires incidences, evidencing the effectiveness in safeguarding important ecosystems services and wellbeing (Nogueira et al. 2018).