Making Research Matter for Nature Protection

“The Amazon Third Way Initiative”

Ismael Nobre, PhD
Acknowledgments

This presentation is part of an ongoing research proposal, the ”The Amazon Third Way Initiative” led by Carlos A. Nobre and Juan Carlos Castilla-Rubio
Research...

How does it matter for Nature Protection?

A case about the hopes of Bioeconomy in the Amazon Biome
Calls for “an Amazon-specific Fourth Industrial Revolution innovation (4IR) “ecosystem” that is able to rapidly prototype and scale innovations that apply a combination of advanced digital, biological, and material technologies to the Amazon’s renewable natural resources, biomimetic assets, environmental services, and biodiverse molecules and materials”

The Amazon Third Way initiative

(Nobre et al., 2016)
The Amazon Third Way initiative can be seen as one of the needed disruptive social and technological transformations towards a sustainable development pathway.

An Amazon’s bio-industrial revolution.
Land Use in the Brazilian Amazon: the First Way and the Second Way
PROTECTED AREAS – BRAZILIAN AMAZON

1990

# Indigenous Lands: 54
Area: 11 million ha

# Protected Areas: 65
Area: 33 million ha
PROTECTED AREAS – BRAZILIAN AMAZON

2000

# Indigenous Lands – 212
Área – 69 million ha

# Protected Areas – 149
Área – 54 million ha
2005

# Indigenous Lands – 285
Area – 94 million ha

# Protected Areas – 238
Área – 84 million ha
PROTECTED AREAS – BRAZILIAN AMAZON

2008

# Indigenous Reserves – 330 Area - 102 million ha

# Protected Areas – 274 Area – 119 million ha
2013

# Indigenous Lands – 381
Area – 112 million ha

# Protected Areas – 311
Area – 125 million ha

PROTECTED AREAS – BRAZILIAN AMAZON
Future land use change in the Amazon will result in sustainability or fragmentation?
Annual deforestation rates in Brazilian Amazon

Deforested Area (%) in 2010

Scenarios of future deforestation to 2030

Observed

Deforestation rates

Year

Km²/year


Deforested Area (%): -0.1 ~ 0.1 0.1 ~ 0.2 0.2 ~ 0.3 0.3 ~ 0.4 0.4 ~ 0.5 0.5 ~ 0.6 0.6 ~ 0.7 0.7 ~ 0.8 0.8 ~ 0.9 0.9 ~ 1.1

Source: PRODES – INPE and Aguiar et al., 2013
A recent editorial of Science Advances by Thomas Lovejoy and Carlos Nobre warns that the Amazon may be close to a tipping point if deforestation exceeds 25% of the forest!
What is the potential of a biodiversity-driven bio-economy in the Amazon to produce viable value chains for food, nutraceuticals, cosmetics, fragrances, pharmaceuticals, industrial oils bio-industries?
A novel sustainable development paradigm based upon harnessing biological and biomimetic assets of Amazon biodiversity.
<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aniba rosaeodora</td>
<td>Pau-rosa</td>
<td>Fine Perfumery</td>
</tr>
<tr>
<td>Bertholetia excelsa</td>
<td>Castanha do Pará</td>
<td>Food; Cosmetics</td>
</tr>
<tr>
<td>Carapa guianensis</td>
<td>Andiroba</td>
<td>Medicinal; Cosmetics</td>
</tr>
<tr>
<td>Copaifera spp.</td>
<td>Óleo de Copaíba</td>
<td>Cosmetics; Perfumery; Medicinal</td>
</tr>
<tr>
<td>Cyperus sp.</td>
<td>Priprioca</td>
<td>Fine Perfumery; Medicinal</td>
</tr>
<tr>
<td>Dipteryx odorata</td>
<td>Cumaru</td>
<td>Cosmetics; Perfumery; Food</td>
</tr>
<tr>
<td>Euterpe oleracea</td>
<td>Açaí</td>
<td>Food; Medicinal; Cosmetics</td>
</tr>
<tr>
<td>Hevea brasiliensis</td>
<td>Seringueira</td>
<td>Technology of Materials; Biotechnology</td>
</tr>
<tr>
<td>Mauritia flexuosa</td>
<td>Burity</td>
<td>Cosmetics; Medicinal</td>
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<tr>
<td>Oenocarpus bacaba</td>
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Research for assessing **issues and opportunities for a “Third Way” based on non-timber products of biodiversity in the Brazilian Amazon**
Research for assessing issues and opportunities for a “Third Way” based on non-timber products of biodiversity in the Brazilian Amazon

Geographic distribution of 20 selected plant species with literature and modeling data

Rosewood (Aniba rosaeodora)

(Nobre et al., 2017, in preparation)
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<td>Protium spp.</td>
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Research for assessing issues and opportunities for a "Third Way" based on non-timber products of biodiversity in the Brazilian Amazon.

Field study of 5 selected plant species regarding their Value Chains.
Research for assessing issues and opportunities for a “Third Way” based on non-timber products of biodiversity in the Brazilian Amazon.

Field study of 5 selected plant species regarding their Value Chains.
Research for assessing issues and opportunities for a “Third Way” based on non-timber products of biodiversity in the Brazilian Amazon

Field study of 5 selected plant species regarding their Value Chains

Brazil nut (Bertholletia excelsa)

Places of Extractivism or Agroforestry System
Field study of 5 selected plant species regarding their Value Chains

Brazil nut (Bertholetia excelsa)

Places of Value Aggregation
Research for assessing issues and opportunities for a “Third Way” based on non-timber products of biodiversity in the Brazilian Amazon.

Field study of 5 selected plant species regarding their Value Chains.

Brazil nut (Bertholetia excelsa)

Production transportation pathways.
Research for assessing issues and opportunities for a “Third Way” based on non-timber products of biodiversity in the Brazilian Amazon

Field study of 5 selected plant species regarding their Value Chains

Brazil nut (Bertholletia excelsa)

Places of destination of processed products
Research for assessing issues and opportunities for a “Third Way” based on non-timber products of biodiversity in the Brazilian Amazon.

Field study of 5 selected plant species regarding their Value Chains.

Research and development laboratories in Brazil that deal with Bertholletia excelsa (Brazil nuts tree) indicating a knowledge network for that valued product.
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<th>Products</th>
<th>Location</th>
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<tbody>
<tr>
<td>1. <strong>MAI BRA</strong></td>
<td>Cosmetics, Perfume, Fragrance</td>
<td>Manufacture of finished products for the face, body, soap, beard, cosmeticians, body oils, makeup, perfume, hair and skin protection, and children. Their line of products includes the following ingredients: <strong>Aurora</strong>, <strong>Andiroba</strong>, <strong>Passion Fruit</strong>, <strong>Apricots</strong>, <strong>Cattleya</strong>, <strong>Babacu</strong> and <strong>Copaiba</strong>.</td>
<td>Goiania, São Paulo, Brazil</td>
</tr>
<tr>
<td>2. <strong>Sensillo</strong></td>
<td>Flavors, Nutrition, Skin &amp; Care</td>
<td>Manufacture of flavors, cosmetics, body oils, ingredients for food, cosmetics, toiletries, and a selection of essential oils for perfumery. Their products include the following ingredients: <strong>Aurora</strong>, <strong>Andiroba</strong>, <strong>Passion Fruit</strong>, and <strong>Copaiba</strong>.</td>
<td>Belo Horizonte, Brazil</td>
</tr>
<tr>
<td>3. <strong>PRIMA</strong></td>
<td>Cosmetics, Ingredients for Industry</td>
<td>Rainforest specialists, they use ingredients that are sourced from the Amazon rainforest and other tropical regions. They use ingredients such as <strong>Aurora</strong>, <strong>Andiroba</strong>, <strong>Passion Fruit</strong>, <strong>Babacu</strong>, and <strong>Copaiba</strong>.</td>
<td>São Paulo, Brazil</td>
</tr>
<tr>
<td>4. <strong>AMAZONIA</strong></td>
<td>Cosmetics, Pharmaceutical</td>
<td>Manufacturing of cosmetic products that are derived from the Amazon rainforest. They use ingredients such as <strong>Aurora</strong>, <strong>Andiroba</strong>, <strong>Passion Fruit</strong>, <strong>Babacu</strong>, and <strong>Copaiba</strong>.</td>
<td>Amambai, Pará, Brazil</td>
</tr>
<tr>
<td>5. <strong>Cosmeitiva</strong></td>
<td>Food</td>
<td>Products of the company are noted for their use of <strong>Babacu</strong>, <strong>Aurora</strong>, <strong>Passion Fruit</strong>, and <strong>Copaiba</strong>.</td>
<td>Belo Horizonte, Brazil</td>
</tr>
<tr>
<td>6. <strong>Cosmedica</strong></td>
<td>Food</td>
<td>Products include <strong>Natural Cocoa Butter</strong>, <strong>Black Pepper</strong>, and <strong>Vegetable Oils</strong> from the Amazon.</td>
<td>Goiânia, Dourados, Brazil</td>
</tr>
<tr>
<td>7. <strong>Econatura</strong></td>
<td>Food</td>
<td>Products include <strong>Babacu nuts</strong> and a number of derived products from the fruit.</td>
<td>Goiânia, Dourados, Brazil</td>
</tr>
<tr>
<td>8. <strong>Lumina Brasil</strong></td>
<td>Food</td>
<td>Products include <strong>Bertholletia excelsa</strong> and <strong>Cassia</strong> from the Amazon.</td>
<td>Jan Clementon, U.S.A.</td>
</tr>
<tr>
<td>9. <strong>Firmenich &amp; Co</strong></td>
<td>Perfumery, Flavors, Ingredients</td>
<td>Products include <strong>Copaiba</strong> and <strong>Guarana</strong>.</td>
<td>Goiânia, Dourados, Brazil</td>
</tr>
<tr>
<td>10. <strong>IFF</strong></td>
<td>Flavors, Fragrances</td>
<td>Products include <strong>Copaiba</strong> and <strong>Guarana</strong>.</td>
<td>Goiânia, Dourados, Brazil</td>
</tr>
<tr>
<td>11. <strong>Globel</strong></td>
<td>Flavors, Fragrances</td>
<td>Products include <strong>Copaiba</strong> and <strong>Guarana</strong>.</td>
<td>Goiânia, Dourados, Brazil</td>
</tr>
<tr>
<td>12. <strong>Pharmacéia NECA</strong></td>
<td>Food</td>
<td>Products include <strong>Copaiba</strong> and <strong>Guarana</strong>.</td>
<td>Porto Velho, Brazil</td>
</tr>
<tr>
<td>13. <strong>IGES Amazônia</strong></td>
<td>Food</td>
<td>Products include <strong>Purpurina</strong> (a natural dye from the Amazon).</td>
<td>Belo Horizonte, Brazil</td>
</tr>
</tbody>
</table>
## Bio-industries in the Amazon biodiversity supply chain

<table>
<thead>
<tr>
<th>Enterprise</th>
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</tr>
</thead>
<tbody>
<tr>
<td>14 Amazon Business Trading</td>
<td>Food, Cosmetics, Ingredients for industry</td>
<td>Averrhoa, Babassu, Cacau, Brazil nuts, Cassava, Manioc, Passion Fruit, Pequi</td>
<td>Manaus, Amazonas, Brazil</td>
</tr>
<tr>
<td>15 Cooperação para o Desenvolvimento Productivo Amazonense do Araxá (CDPAM)</td>
<td>Food</td>
<td>Peeled Brazil Nuts</td>
<td>Belo Horizonte, Minas Gerais, Brazil</td>
</tr>
<tr>
<td>16 Cooperação para o Desenvolvimento Productivo Amazonense do Araxá (CDPAM)</td>
<td>Food</td>
<td>Peeled Brazil Nuts</td>
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<td>21 Cooperação para o Desenvolvimento Productivo Amazonense do Araxá (CDPAM)</td>
<td>Food</td>
<td>Peeled Brazil Nuts</td>
<td>Belo Horizonte, Minas Gerais, Brazil</td>
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<td>22 Cooperação para o Desenvolvimento Productivo Amazonense do Araxá (CDPAM)</td>
<td>Food</td>
<td>Peeled Brazil Nuts</td>
<td>Belo Horizonte, Minas Gerais, Brazil</td>
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<td>23 Cooperação para o Desenvolvimento Productivo Amazonense do Araxá (CDPAM)</td>
<td>Food</td>
<td>Peeled Brazil Nuts</td>
<td>Belo Horizonte, Minas Gerais, Brazil</td>
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<td>24 Cooperação para o Desenvolvimento Productivo Amazonense do Araxá (CDPAM)</td>
<td>Food</td>
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<td>Food</td>
<td>Peeled Brazil Nuts</td>
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### FRUIT POWDERS
- **Acai** (Euterpe oleracea)
- **Acomá (Mollugo vulgaris)**
- **Cupuaçu (Theobroma grandiflorum)**
- **Jatobá** (Platymiscium falcatus)

### OILS
- **Acai** (Euterpe oleracea)
- **Andiroba** (Carapa guianensis)
- **Bacuri** (Bacuriobium arboreum)
- **Brazil Nuts** (Bertholletia excelsa)
- **Broto Branco** (Psidium macrantherum)
- **Buriti** (Mauritia flexuosa)
- **Copíha** (Copía americana)
- **Coxa** (Theobroma grandiflorum)
- **Guaraná** (Paullinia cupana)
- **Jatobá** (Platymiscium falcatus)
- **Maça-cerâmica** (Averrhoa carambola)
- **Mamão** (Mangifera indica)
- **Maracujá** (Passion Fruit)
- **Maracujá** (Passion Fruit)
- **Passarinho** (Psychotria emarginata)
- **Pé de Serra** (Psychotria emarginata)

### BY-PRODUCTS
- **Açaí** (Euterpe oleracea)
- **Babaçu** (Borbonia yerbamatea)
- **Bacuri** (Bacuriobium arboreum)
- **Coxa** (Theobroma grandiflorum)
- **Guaraná** (Paullinia cupana)
- **Jatobá** (Platymiscium falcatus)
- **Maracujá** (Passion Fruit)
- **Passarinho** (Psychotria emarginata)
The Human Dimension of Natural Resources

4700 Localities scattered over Brazilian Amazon territory

towns (orange), villages (pink), settlements (red), agrovilas (white) and Indian villages (green),

(IBGE 2017)
The Açaí Value Chain
SUSTAINABLE USE OF THE AÇAÍ PALM TREE (EUTERPE SP.)
ARE THERE WAYS TO UTILIZE AMAZON BIODIVERSITY SUSTAINABLY?

The Açaí Fruit Case

Direct Economic Value of Açaí over 250,000 tons/year over US$ 1.6 billion/year

Net Profitability from Açaí Production in the Amazon
Pará State: US$ 200 ha/year (unmanaged) to over US$ 2,000 ha/year (managed)

New uses: natural marker for plaque

Jardim and Anderson (1987)
Hiraoka (1994a, 1994b)
Brondizio, E. (2007)
Costa F (2017)
Multidisciplinary Research show ways to promote Nature Protection by harnessing Nature’s own bioeconomic potentials

What can be done to begin the change?

**Capacity Development**

Studies carried out by the Program to Protect the Rainforests of Brazil (PPG-7) show that lack of entrepreneurial skills was accounted as one of the main reasons impeding or slowing down the development of a non-timber bio-economy in the Amazon.
Capacity Development and the Amazon Creative Labs

The Amazon Third Way Initiative
Amazon Creative Labs*

- Developing capacities for biodiversity-driven, inclusive socioeconomic transformations in the Amazon

- Transportable field laboratories on tents or on floating platforms for innovative experimentation in smaller communities

- Providing a unique environment for problem-solving innovations based on a four-pronged approach: collaboration, knowledge sharing, experimentation and open spaces for citizens

*conceptual development phase
Focused on a number of products of Amazon biodiversity illustrative of an array of bio-economic and even bio-artistic applications, such as

- food,
- fungi
- resins / natural polymers
- nutraceuticals,
- cosmetics,
- fragrances,
- pharmaceuticals,
- industrial oils,
- art crafts,
- bio-art,
- biomimicry,
- etc.
The training activities can be directed to providing capacity for the local communities to gather more information on the natural resources available to them, including the use of high-end technologies

With the assistance of technology experts, on one hand, and entrepreneurship specialists, on the other hand, groups of participants from Amazonian villages, towns and cities would be invited to develop new applications and to prototype (at least digitally) such innovations.
The main target audience should be a blend of two kinds:

- Young undergraduate or just graduated students interested in innovation to create new, sustainable businesses in the Amazon;
- Forest people living in forest, riverine communities and agroforestry farmers already engaged on a biodiversity-based economy or willing to start activities in that realm.

For these communities, the exposure to 4IR technologies would allow innovative concepts to emerge which would make use of such technologies. The blend of these two communities would also give rise to new partnerships.
ACL - Amazon Creative Labs

Biodiversity Value Chains

Cupulate Edition

Amazon Sociobiodiversity

Mobile Hi-tech Training Lab

Nutraceutical Cupulate

Cupuacu Fruit

3D Food Printer for Cupulate Form & Content

Bacuri Fruit - C Vitamin super source

Cocoa-like Cupuacu Seeds
ACL - Amazon Creative Labs

Biodiversity Value Chains

Brazil Nut Edition

Humidity Tester
The Earth BioGenome Project

Target: Genome sequencing of about 1.5 million known species in 10 years.
ACL - Amazon Creative Labs

GENOMICS

Accessible DNA decoding

Portable Genome Sequencer

Benchtop Electron Microscope

Mobile Hi-tech Training Lab

Amazon Social biodiversity
KNOWLEDGE AS THE BASIS OF SUSTAINABILITY FOR THE AMAZON
WE NEED A NEW SUSTAINABLE DEVELOPMENT PARADIGM FOR THE TROPICAL FORESTS

Science and technology must offer solutions for the emergence of an innovative, knowledge-based standing forest-flowing rivers economy and local bioindustries.

Along with empowerment and quality, inclusive education for all the forest people.
“To add value to the heart of the forest”

Bertha Becker
Brazilian geographer
Thanks

nobreismael@gmail.com