Tinker Foundation Final Report, UC Berkeley
Chris Lesser, PhD Student, Geography

Since 1988, with the publication of annual data on deforestation in the Amazon, and especially since "real time" monitoring began in 2004, Brazil's forest service has been successful in affecting land cover change. My research considers how new representations of landscape, and especially satellite images, with a certain spatial and temporal resolution, coincided with economic and political transitions that dispossessed rural agriculturalists – the same people who came to build their homes in cities. These conjoined processes, which took place throughout the 20th century, have continued in the 21st century in Brazil, shaping both cities and forests. While aerial images have been important towards understanding areal land cover change, these images also occlude "sub-pixel" (and super-pixel) processes that structure forest communities and their trajectories of change. It is these processes and their inter-scalar affects that might tell us something about the specificity of diverse forest communities and their futures in the midst of climate change. I see building this understanding as an iterative process that transcends disciplinary boundaries.

My research aims to examine a central hypothesis of the theory of complex adaptive systems in ecology – the idea that ecosystems do not develop in a linear fashion, but rather have multiple possible developmental trajectories (Solé and Bascompte, 2006). Because these dynamic developmental pathways exceed the limits of models, complexity science has approached ecological research as an iterative exploration of tentative relationships with a high degree of uncertainty. An important insight arising from complex adaptive systems theory is that ecosystem management relies upon a perpetually incomplete archive of historical and ecological evidence (Dearing et al. 2015). Nonetheless, "management" must take place within these larger

and dynamic patterns (Levin et al. 2013; Messier et al. 2014). My inquiry into complex systems ecology departs from this perspective, with the caveat that there may be no such thing as management per se. In investigating ecologies modified by human beings my intent is to question the distinction between management and other socio-ecologies that shape trajectories of environmental change and affect human and non-human lives.

As part of my pre-dissertation research, I returned to Rio de Janeiro this July with support from the Center for Latin American Studies and the Tinker Foundation to continue archival work – searching for maps, government documents, and records of companies involved in 19th and 20th century land development – as well as field work at sites where biotic communities and soils can offer pictures of how specific ecosystems have developed and changed in time and space. I photographed collections materials (not yet digitized) at Brazil's National Archives and at the *Arquivo Público do Rio de Janeiro*, as well as at the library of the *Jardim Botânico do Rio de Janeiro* (JBRJ) and began fieldwork at the *Reserva Biológica Poço das Antas* in the municipality of Silva Jardim, RJ. At this protected research preserve, established in the 1960's on former agricultural lands, I met with park managers and local residents and spent a week surveying sites where samples of soils, inventories of plants, and tree cores might be made on future visits. Dendrochronology, soil samples, and the character of plant communities are important indicators of how the forests of *Poço das Antas* may be changing, especially when conjoined with documents and oral histories capable of capturing the social and political forces within these forests. The development of this ecosystem profoundly affects how we approach conservation and restoration throughout the Atlantic Forest, a biome that is home to the majority of Brazil's population, the source of water for its largest cities, and an important center of agricultural production.

BIBLIOGRAPHY

Biondi F. 1999. Comparing tree-ring chronologies and repeated timber inventories as forest monitoring tools. Ecological Applications 9: 216–227.

Bonduki, Nabil. Origens da habitação social no Brasil. São Paulo: Estação Liberdade, 2011.

Boscolo et al. 2015. "Ethnobotany as a tool for identification of geographical indications and collective marks at a community in hilly region of Rio de Janeiro State, Brazil." *Revista GEINTEC* v.5 n. 1

Brandes, AFN. 2011. Dendrocronologia e dendroecologia de árvores e lianas da família Leguminosae na Mata Atlântica. PhD Thesis, Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, Brazil.

Caldeira, Teresa. *Cidade de Muros*. São Paulo: EDUSP, 2000.

Chakrabarty, Dipesh. "The Climate of History." Critical Inquiry (35). The University of Chicago Press, 2008.

Chaloub, Sidney. *Cidade Febril*. São Paulo: Companhía das Letras, 1996.

Da Silva Lisboa, Baltazar. *Riqueza do Brasil em madeiras de carpintaria e construção.* Rio de Janeiro: Typografia Nacional, 1823.

Davis, Diana. *Resurrecting the Granary of Rome.* Athens: Ohio University Press, 2007.

Dean, Warren. *With Broadax and Firebrand: the destruction of the Brazilian Atlantic Coastal Forest*. Berkeley: University of California Press, 1995.

Dearing et al. "Social-Ecological systems in the Anthropocene: The need for integrating social and biophysical records at regional scales." *The Anthropocene Reviw*. 2015, vol. 2(3) 220-246.

De Carvalho Cabral, Diogo. *Na Presença da Floresta.* Rio de Janeiro: Garamond, 2014.

Dray, S, R Pélissier, P Couteron, M Fortin, P Legendre, R Bivand, F G Blanchet, et al. 2016. "Community Ecology in the Age of Multivariate Multiscale Spatial Analysis" Ecological Society of America (3).

Fearnside, Philip M., Adriano M R Figueiredo, and Sandra C M Bonjour. 2013. "Amazonian Forest Loss and the Long Reach of China's Influence." *Environment, Development and Sustainability* 15 (2): 325–38.

Gray, Emma F., Archibald, S, S Levin, S a Archibald, W a Hoffmann, W J Bond, N Hanan, J Ratnam, et al. 2011. "Global Resilience of Tropical Forest." *Science* 334 (October): 232–35.

Hecht, Susanna. *The Social Lives of Forests.* Chicago: University of Chicago Press, 2014.

Hoelle, Jeffrey. *Rainforest Cowboys, the rise of cattle ranching and cattle culture in western Amazonia.* Austin: University of Texas Press, 2015.

IBGE. 2013. "Censo Demografico 2010: Aglomerados Subnormais," 251.

Kässmayer, Karin. "Cidade, riscos e conflitos socioambientais urbanos: desafios à regulamentação jurídica na perspectiva da justiça socioambiental." (Doctoral Thesis, Unversisdade Federal do Paraná, 2009).

Kohn, Eduardo. *How Forests Think*. UC Press, 2013.

Kronka, F J N, M A Nalon, C K Matsukuma, M M Kanashiro, M S S Ywane, L M P R Lima, J R Guillaumon, et al. 2005. "Monitoramento Da Vegetação Natural E Do Reflorestamento No Estado de São Paulo." *Anais Do Simpósio Brasileiro de Sensoriamento Remoto, Goiânia, Brasil*, no. 1967: 1569–76.

Lavalle, Aida. *A Madeira na economia paranaense*. Curitiba: Grafipar, 1981.

Lima, Deborah, Angela Steward, and Bárbara Trautman Richers. 2012. "Trocas, Experimentações E Preferências: Um Estudo Sobre a Dinâmica Da Diversidade Da Mandioca No Médio Solimões, Amazonas." *Boletimdo Museu Paraense Emilio Goeldi: Ciencias Humanas.*

Machado C. 2015. "Plantas do nosso chão: levantamento etnobotânico de quintais na comunidade da Fazendinha, Niterói, RJ." Undergraduate Thesis. Universidade Federal Fluminense. Instituto de Biologia.

Marín-Spiotta, E., Rebecca Ostertag, and W.L. Silver. 2007. "Long-Term Patterns in Tropical Reforestation: Plant Community Composition and Aboveground Biomass Accumulation." *Ecological Applications : A Publication of the Ecological Society of America* 17 (3): 828–39.

Mathews, Andrew S. *Instituting Nature: authority, expertise and power in Mexican forests*. Cambridge: MIT Press, 2011.

Opalach, Bethany. 1997. "Political Space: The Architecture of Squatter Settlements in Sao Paulo, Brazil." *Tradional Dwellings and Settlements Review* 9 (1): 35–50.

Resende et. al. 2015. "Atlantic Forest Spontaneous Regeneration at Landscape Scale." Biodiversity Conservation, 24:2255–2272.

Santos, Milton. *A Urbanização Brazileira*. São Paulo: Hucitec, 1993.

Silver, W L, F N Scatena, A H Johnson, T G Siccama, and F Watt. 1996. "At What Temporal Scales Does Disturbance Affect Belowground Nutrient Pools?" *Biotropica* 28 (4, pt. A): 441–57.

Solé and Bascompte. *Self Organization in Complex Ecosystems.* Princeton, 2006.

Slater, Candace. *Entangled Edens, visions of the Amazon.* Berkeley: UC Press, 2002.