

Multi-‘steak’holder sustainability: reduced deforestation and the cattle agreement in Brazil

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Student handout: Lesson 1 - Introduction to the cattle agreement in Brazil

Introduction

‘How are the boots that we make connected to deforestation in Brazil?’ This was the question that Timberland CEO Jeff Schwartz asked himself when his inbox was flooded with emails from 65,000 Greenpeace supporters alleging that the manufacture of his boots were causing the destruction of the Brazilian Amazon rainforest. Only days later, Swartz and several others CEOs committed to support Greenpeace's efforts to control deforestation from cattle production in Brazil. Timberland CEO Jeff Swartz recalls the day his company was first dragged into the debate: <https://www.youtube.com/watch?v=wSizpj-7seg>.

This case illustrates emerging opportunities to reduce deforestation by changing how consumer products are made. Pressure from consumers and environmental groups can convince businesses to alter their sourcing policies. How does this sort of thing happen? What impacts do these changes have on consumers, businesses, farmers, and the environment? Why do environmental groups and businesses get involved? Should they? How do governments affect the outcome? What role is science playing?

Over the next seven lessons, we will explore these questions, using the case-study of the cattle agreement in Brazil as an example that can help us to better-understand many of these issues.

Learning objectives

- Understand common trade-offs between conservation and development objectives
- Evaluate the roles of private-sector, government, and civil society agencies in solving complex socio-environmental problems

Key messages & skills

By the end of the lesson, students should understand that:

- Commodity production in tropical forest and agricultural landscapes presents complex environmental, social, and economic challenges

Students should be able to:

- Synthesize information from a range of popular media, to understand the context and key concepts of a previously-unfamiliar case study

Background reading (*before class*)

The cattle agreement was signed in 2009, following a series of events that involved a variety of different actors (individuals and organizations) associated with the cattle supply chain, both in Brazil and further afield. Before the class, you should first read the references listed below, in order to understand: a) the actions and information that precipitated the cattle agreement (Greenpeace 2009a); b) the commitments made by signatories to the cattle agreement (Greenpeace 2009b), and c) the implications of those commitments for different actors (Barrionuevo 2009, Mongabay 2009, Schwartz 2010a). For those interested in more in-depth understanding, additionally read Schwartz (2010b).

Second, you should read O'Rourke (2014) and Walker et al. (2013), as an introduction to the concept of supply chain governance, in the context of the Brazilian cattle production industry.

Reading these references is essential for being able to effectively engage with this case-study

Task (*in class*)

In small groups, briefly discuss the following questions and note down your responses. Spend no more than five minutes on each question.

- a. What are the key environmental impacts of cattle production in Brazilian Amazonia?
- b. What were the roles of a) civil society, b) private sector, and c) government individuals and organizations in the events leading up to the signing of the cattle agreement?
- c. What are the key commitments made by signatories to the cattle agreement?

We will then discuss your responses as a class.

References

Barrionuevo A. (2009) Giants in cattle industry agree to help fight deforestation. New York Times. New York. Available at:

<http://www.nytimes.com/2009/10/07/world/americas/07deforest.html>.

Greenpeace. (2009a) Slaughtering the Amazon (summary). Greenpeace, Amsterdam. Available at: <http://www.greenpeace.org/international/Global/international/planet-2/report/2009/7/slaughtering-the-amazon.pdf>.

Greenpeace. (2009b) Minimum criteria for industrial scale cattle operations in the Brazilian Amazon biome. Available at:

<http://www.greenpeace.org/usa/Global/usa/report/2010/1/minimum-criteria-for-i.pdf>.

Mongabay. (2009) Brazilian beef giants agree to moratorium on Amazon deforestation.

Available at: http://news.mongabay.com/2009/1007-greenpeace_cattle.html.

Schwartz, J. (2010a) CEO of Timberland Credits Greenpeace. Available at:
<https://www.youtube.com/watch?v=wSizpj-7seg>

Suggested additional reading

Schwartz, J. (2010b) How I Did It: Timberland's CEO on Standing Up to 65,000 Angry Activists. Harvard Business Review. Available at: <http://hbr.org/2010/09/how-i-did-it-timberlands-ceo-on-standing-up-to-65000-angry-activists/ar/5>. *NB to access this article online, you will need to subscribe (for free) with Harvard Business Review.*

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Student handout: Lesson 2 - Supply chain governance

Summary

This lesson introduces the concepts and actors involved in the functioning and governance of agricultural commodity supply chains. We will apply general principles of supply chain governance to the particular case of the cattle sector in Brazil.

Learning objectives

- Evaluate the roles of private-sector, government, and civil society agencies in solving complex socio-environmental problems
- Find and synthesize knowledge and ideas, to better understand socio-environmental challenges

Key messages & skills

By the end of the class, students should understand that:

- Supply chains connect different actors across space and time
- Supply chain governance interventions can thus affect where and how commodity production occurs

Students should be able to:

- Synthesize information from a range of sources (e.g. academic journals; popular media)

Background reading (*before class*)

Before the class, you should read O’Rourke (2014) and Walker et al. (2013), as an introduction to the concept of supply chain governance, and to the context of the Brazilian cattle sector.

Task (*in class*)

Working in the same small groups as in lesson 1, sketch a commodity supply chain diagram for cattle products in Brazil. Use Fig. 1 in O’Rourke (2014) as a template, and draw from Walker et al. (2013) as a source of information on the cattle sector in Brazil. Synthesize the two, including different types of actor (e.g. producer, consumer) and their relationships to each other. Annotate the supply chain diagram with other elements of the socio-environmental system - this could include elements of the biophysical system (e.g. different land uses and biomes), information about different impacts (e.g. environmental, social), and an indication of the stage(s) in the

supply chain where the cattle agreement affects the supply chain (refer to Newton et al. 2013) .
Spend 20-30 minutes preparing your diagram, after which you will present it to the class.

References

O'Rourke D. (2014) The science of sustainable supply chains. *Science* 344, 1124-1127.

Walker N.F., Patel S.A., Kalif K.A. (2013) From Amazon pasture to the high street: deforestation and the Brazilian cattle product supply chain. *Tropical Conservation Science* 6, 446-467.

Suggested additional reading

Nepstad, D.C., Stickler, C.M., Almeida, O.T. (2006) Globalization of the Amazon soy and beef industries: opportunities for conservation. *Conservation Biology* 20, 1595-1603.

Newton et al. (2013) Enhancing the sustainability of commodity supply chains in tropical forest and agricultural landscapes. *Global Environmental Change* 23, 1761-1772.

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Student handout: Lesson 3 - Perspectives on tropical agriculture and forest tradeoffs

Introduction

The transformation of tropical forest landscapes for agriculture is a topic of high policy relevance and active scientific research. However, the framing of the problems created and the solutions suggested varies greatly across fields of study. This lesson introduces and contrasts three literatures examining deforestation—agricultural economics, political ecology, and environmental science. Each student is assigned one literature to read. During the class meeting, a ‘flipped classroom’ is employed, requiring students to read background material before coming to class, and using the classroom time to discuss and explore the case in greater depth.

Learning Objectives

- Understand different ways science frames deforestation
- Get better at reading scholarship from outside your comfort zone
- Learn to communicate (and critique) scientific arguments

Key messages & Skills

- Synthesize and succinctly present a literature on a complex environmental problem that was previously unfamiliar to you.
- Learn to engage your classmates representing other perspectives to better understand these perspectives, and why they differ with the perspective that you represent.

Background Reading and Preparations

You will be divided into three groups. Group (1) will read articles from Field 1, Political Ecology. Group (2) will read articles from Field 2, Environmental Science, and Group (3) will read articles from Field 3 on Development and Agriculture.

- Political ecology

-Hecht, S. (1985). Environment, development and politics: Capital accumulation and the livestock sector in Eastern Amazonia* 1. *World Development*, 13(6), 663-684.

-Walker, R., Browder, J., Arima, E., Simmons, C., Pereira, R., Caldas, M., et al. (2009). Ranching and the new global range: Amazonia in the 21st century. *Geoforum*, 40(5), 732-745.

- Environmental sciences/climate science

-Cederberg, C., Persson, U. M., Neovius, K., Molander, S., & Clift, R. (2011). Including Carbon Emissions from Deforestation in the Carbon Footprint of Brazilian Beef. *Environmental Science & Technology*, 45(5), 1773-1779.

-Oliveira, L. J., Costa, M. H., Soares-Filho, B. S., & Coe, M. T. (2013). Large-scale expansion of agriculture in Amazonia may be a no-win scenario. *Environmental Research Letters*, 8(2), 024021.

- Development and agriculture

-VanWey, L. K., Spera, S., de Sa, R., Mahr, D., & Mustard, J. F. (2013). Socioeconomic development and agricultural intensification in Mato Grosso. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 368(1619).

-Chaddad, F. R., & Jank, M. S. (2006). The Evolution of Agricultural Policies and Agribusiness Development in Brazil. *Choices: The magazine of food, farm and resource issues*, 21(2), 85-91.

As you complete your readings take notes on the following questions:

- 1) *What are the key drivers of land use change in the region?*
- 2) *Compared to business as usual what outcomes are desirable?*
- 3) *What are barriers/obstacles preventing improvement?*
- 4) *What opportunities are there for positive change?*

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Student handout: Lesson 4 - The governance of cattle production in Brazil

Introduction

In addition to the cattle agreement, many other governance interventions (including policies and incentive mechanisms) operate within the cattle sector, and within forest and agricultural landscapes more widely, in Brazil. The interaction of these interventions creates a complex governance landscape that forms the backdrop against which the cattle agreement has been implemented. In this lesson, we will learn more about the other interventions and how they may either complement or constrain the objectives of the cattle agreement.

Learning objectives

- Understand common trade-offs between conservation and development objectives
- Evaluate the roles of private-sector, government, and civil society agencies in solving complex socio-environmental problems
- Find and synthesize knowledge and ideas, to better understand socio-environmental challenges

Key messages & skills

By the end of the class, students should understand that:

- A diverse array of interrelated interventions is operating in the same sector (the cattle supply chain in Brazil) and the same landscape (forest, agricultural, and development policy operate in the same space and time).
- Different interventions variously support different environmental, social, and economic goals. Interactions between interventions therefore represent both trade-offs and synergies.

By the end of the class, students should be able to:

- Succinctly summarize and clearly present information to their peers.

Background reading and presentation preparation (*before class*)

To understand the wide diversity of governance interventions operating in this landscape, you should read one paper (Nepstad et al. 2014) and one media article (The Economist 2013) before class. This will give you a broad view of the broad ‘policy landscape’.

Next, you should work in pairs to learn in much more depth about ONE particular intervention from Table 1 below. For your designated intervention, you and your partner should conduct research to learn more about the intervention, and prepare a short (2-slide, 2-minute) PowerPoint presentation that summarizes: a) the principal objectives, activities, and actors associated with that intervention; b) one or more ways in which the intervention supports or constrains the cattle agreement. Aim to be clear and succinct. One or two references for each intervention are provided in Table 1: you can use these as starting points, but should also use the links in Nepstad et al. (2014) and search for additional literature (articles, reports, and websites) to deepen your knowledge of the intervention.

Task 1 (in class)

Each pairs of students will take turns to **present their 2-minute PowerPoint presentation**. During other students’ presentations, take notes to learn about other governance mechanisms, and think of salient questions to ask at the end of their presentation. Share your presentations digitally with your peers after the class. The aims of this exercise are 1) to quickly learn about the range of governance interventions operating in the same sector and in the same landscape, and how they interact; and 2) to practice presenting key information in a succinct and clear manner.

Task 2 (in class)

We have learned that there is a wide range of policies and incentive mechanisms operating within the cattle sector and associated forest and agricultural landscapes in Brazil. Clearly, the interaction of these different interventions is likely to have an impact on different sustainability outcomes. As a class, we will now think about and discuss:

- a. How do these policies and incentives interact?
- b. What are some of the challenges for achieving enhanced sustainability in forest and agricultural landscapes in Brazil?
- c. What changes in governance are needed to better-enforce the cattle agreement?

References

Nepstad, D., McGrath, D., Stickler, C., Alencar, A., Azevedo, A., Swette, B., et al. (2014). Slowing Amazon deforestation through public policy and interventions in beef and soy supply chains. *Science*, 344(6188), 1118-1123.

The Economist, 2013. Brazil's conversion: trees of knowledge. Available from: <http://www.economist.com/news/special-report/21585096-how-brazil-using-education-technology-and-politics-save-its-rainforest-trees>.

Suggested additional reading

Binswanger, H. (1991). Brazilian policies that encourage deforestation in the Amazon. *World Development*, 19(7), 821-829.

Lambin, E.F., Meyfroidt, P., Rueda, X., Blackman, A., Börner, J., Cerutti, P.O., Dietsch, T., Jungmann, L., Lamarque, P., Lister, J. (2014) Effectiveness and synergies of policy instruments for land use governance in tropical regions. *Global Environmental Change* 28, 129-140.

References from Table 1

CAR (2014) Cadastro Ambiental Rural, Available at: <http://www.car.gov.br/#/> (in Portuguese).

GTPS (2014) Grupo de Trabalho da Pecuária Sustentável. Available at: <http://www.pecuariasustentavel.org.br/en/>.

Hansen, M., Potapov, P., Moore, R., Hancher, M., Turubanova, S., Tyukavina, A., Thau, D., Stehman, S., Goetz, S., Loveland, T. (2013) High-resolution global maps of 21st-century forest cover change. *Science* 342, 850-853.

Hansen, M.C., Shimabukuro, Y.E., Potapov, P., Pittman, K. (2008) Comparing annual MODIS and PRODES forest cover change data for advancing monitoring of Brazilian forest cover. *Remote Sensing of Environment* 112, 3784-3793.

IPAM (2012) Brazil's "low-carbon agriculture" program: barriers to implementation. IPAM (Amazon Environmental Research Institute). Available at: http://www.gcftaskforce.org/documents/brazil's_low-carbon_agriculture_program.pdf.

Mongabay (2012) Brazil can eliminate deforestation by 2020, says governor of giant Amazon state, Available at: http://news.mongabay.com/2012/0405-swf_jatene_interview.html.

Newton, P., Alves-Pinto, H.N., Pinto, L.F.G. (2014) Certification, forest conservation, and cattle: theories and evidence of change in Brazil. *Conservation Letters* DOI: 10.1111/conl.12116

Soares Filho, B.S., Dietzsch, L., Moutinho, P., Falieri, A., Rodrigues, H., Pinto, E., Maretti, C.C., Suassuna, K., de Mattos Scaramuzza, C.A., de Araújo, F.V. (2008) Reduction of carbon emissions Brazil—the role of ARPA. *Policy Matters* 16, 180-189.

Soares-Filho, B., Rajão, R., Macedo, M., Carneiro, A., Costa, W., Coe, M., Rodrigues, H., Alencar, A. (2014) Cracking Brazil's Forest Code. *Science* 344, 363-364.

Tollefson, J. (2009) Paying to save the rainforests. *Nature* 460, 936-937.

Tollefson, J. (2012) Brazil set to cut forest protection. *Nature* 485, 19.

Tollefson, J., (2014) Prosecutor takes on beef industry to put brakes on deforestation in the Amazon, Available at: <http://insideclimatenews.org/covering-ground/20140611/prosecutor-takes-beef-industry-put-brakes-deforestation-amazon>.

Viana, C., Coudel, E., Barlow, J., Ferreira, J., Gardner, T., Parry, L. (2014) From red to green: achieving an environmental pact at the municipal level in Paragominas. Embrapa, Brazil.

Table 1. Cattle sector and Brazilian forest and agricultural landscape governance interventions

Intervention	Suggested references (intended as an entry point only)	Key points	Interactions with/relevance for the cattle agreement
Essential interventions (ensure that these interventions are assigned to one pair of students)			
Forest Code	Soares-Filho et al. 2014 Tollefson 2012	National environmental policy Legal Reserves and Permanent Protected Areas Recent revisions	Many farms are not compliant with the Forest Code. Does the cattle agreement prevent beef-producers buying from such farms?
Cadastro Ambiental Rural (CAR)	CAR 2014 Mongabay 2012	Ensures compliance with the Forest Code. A policy, but an incentive is that rural credit schemes can only be accessed by registered farms. Recent (2012-14) rapid growth in number of properties registered.	Enables identification of compliant farms.
Public prosecutor and Terms of Adjustment of Conduct	Tollefson 2014	Enforcement of policies	Catalyzes compliance. An important legal 'stick'.
DETER	Hansen et al.	High-resolution,	A key tool for monitoring,

	2008 Hansen et al. 2013	publicly-available (transparent), geo- referenced data	reporting, and verification of compliance.
Amazon Region Protected Areas (ARPA) program	Soares Filho et al. 2008	Strictly protected areas, multiple-use reserves, indigenous territories	Cattle ranching and deforestation not permitted in most protected areas.
Amazon Fund	Tollefson 2009	Mechanism for disseminating REDD+ funding	Funding other interventions occurring in the same time and place as the cattle agreement.
Optional interventions (pairs of students can choose to study none, some, or all of these)			
Low-Carbon Agriculture (ABC) program	IPAM 2012	Access to credit for farmers	Creates an incentive for environmental compliance (via the CAR).
Green Municipalities Program, Pará	Viana et al. 2014	>80% of properties per municipality must achieve the CAR	Creates an incentive for environmental compliance, on a jurisdictional-wide scale.
Brazilian Working Group on Sustainable Beef (GTPS) and Global Roundtable on Sustainable Beef (GRSB)	GTPS 2014	Multi-stakeholder group to collaborate on more sustainable cattle production	Could lead to more comprehensive sustainability (social and environmental; more than just zero deforestation).
Cattle certification	Newton et al. 2014	New; small-scale Third-party verification Expensive and/or difficult to achieve	A longer-term governance option (e.g. for when the cattle agreement expires). More comprehensive sustainability (social and environmental; more than zero deforestation).

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Student handout: Lesson 5 - Evaluating avoided deforestation

Summary

This lesson equips students to critically read a paper evaluating the efficacy of a deforestation policy. The lesson emphasizes a framework for reading scholarly works employing the scientific methods and encourages students to think about challenges and opportunities for evaluating the efficacy of environmental policies.

Learning Objectives

- Learn a system for readings papers using the scientific method
- Apply the system to an evaluation of the role of a Brazilian government deforestation policy in preventing deforestation
- Consider standards of evidence for evaluating policies.

Key messages & Skills

- Use of a framework for critically evaluating research employing the scientific method
- Evaluation of policies is crucial and complex

Background Reading and Preparations

Assunção, J., Gandour, C., & Rocha, R. (2013). DETERring Deforestation in the Brazilian Amazon: Environmental Monitoring and Law Enforcement. *Climate Policy Initiative Report*, PUC-Rio, May.

Optional Readings

<http://greedgreengrains.blogspot.com/2013/11/fixed-effects-infatuation.html>

<http://blogs.worldbank.org/impac evaluations/often-unspoken-assumptions-behind-difference-difference-estimator-practice>

Hargrave, J., & Kis-Katos, K. (2013). Economic causes of deforestation in the Brazilian Amazon: A panel data analysis for the 2000s. *Environmental and Resource Economics*, 54(4), 471-494.

Tasks

1. After Lesson 4, think about how you would evaluate the impacts of your chosen intervention

- what data would be needed?
- how would it be collected?
- what would be the control?

You will then summarize the thoughts on impact evaluation as part of an improved summary of the intervention. These updated summaries must be submitted to the instructor and shared with the group prior to Lesson 5.

2. Watch a brief video making the case for causal inference of development policies -

http://www.ted.com/talks/esther_duflo_social_experiments_to_fight_poverty?language=en.

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Student handout: Lesson 6 - Spatial analysis of agriculture and deforestation

Introduction

Spatial analysis tools are a vital component of emerging efforts to monitor and govern the influence of tropical agricultural supply chains on deforestation. This Lesson consists of a practicum that introduces students to the task of monitoring deforestation using Google Earth Engine. The practicum requires that students register for the Google Earth Engine Trusted Tester program. Please ask the students to start registration process at least two weeks before the lesson. Earth Engine is a website based spatial analysis platform. It can be used on any computer with an internet connection.

Learning Objectives

- Gain familiarity with Google Earth Engine, a powerful, free online platform for conducting spatial analysis
- Consider how spatial data and analysis might influence the ability to govern tropical agriculture and deforestation
- Think about the limits, the uncertainty, and the unintended consequences associated with spatial data and spatial analysis.

Key Messages & Skills

- Become a user of Google Earth Engine
- Have a grasp of how spatial analysis and data influence environmental governance

Background Reading and Preparations

All students should register for the Google Earth Engine Trusted Tester program prior to coming to class for the lesson. Go to <https://earthengine.google.org/#workspace> , login and make sure that you see the add data and add computation options on the left side of your screen. If not, send

an email containing your Google ID and explaining that you need access to the Trusted Tester program to - earthengine-beta@google.com

Tasks

Complete Google Earth Engine Tutorial, “Monitoring Deforestation in the Amazon.”

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Student handout: Lesson 7 - Synthesis: roundtable discussion

Summary

This final lesson in this case-study on the cattle agreement in Brazil provides an opportunity to bring together and synthesize much of the knowledge and many of the skills and themes that have been introduced in the previous six lessons. This lesson takes the form of a whole-class exercise. Individual students will become conversant in an issue from a unique perspective, and we will pool our collective knowledge in the classroom, in format of a roundtable discussion, in which everyone participates.

Learning objectives

- Understand common trade-offs between conservation and development objectives
- Evaluate the roles of private-sector, government, and civil society agencies in solving complex socio-environmental problems Understand different disciplinary and policy perspectives and priorities
- Apply concepts and methods from multiple disciplines to solve complex socio-environmental problems
- Create a persuasive argument that synthesizes literature and data to define and justify a position

Key messages & skills

By the end of the class, students should understand that:

- Multiple stakeholders in a complex socio-environmental system have divergent perspectives and objectives.
- Governance interventions may present trade-offs and synergies between different outcomes.

By the end of the class, students should be able to:

- Construct a cohesive argument from a perspective that may differ from their own.
- Respond appropriately when challenged by alternative perspectives.

Preparation (*before class*)

At the end of lesson six, each of you will be allocated to one of six different actor groups (see Table 1 below). Before class, you should read the literature pertinent to the perspective of your designated actor group, and meet with your fellow class members allocated to the same actor group to draft responses to a series of questions (see below) that will facilitate you in thinking about the cattle agreement from that actor's perspective.

Questions

1. What environmental, social, or economic outcomes are of highest priority to this actor? What are the costs and benefits for this actor of supporting the cattle agreement?
2. What data and/or analyses would enable this actor to make more informed decisions about how to act (with respect to support of the cattle agreement)?
3. Are there other mechanisms that would be a better way to achieve this actor's desired outcomes than the cattle agreement?

Task (*in class*)

The entire class will **participate in a roundtable discussion**. The discussion will be facilitated by the instructor, who will represent the Whole Foods Sustainability Director. The objective is to help the Whole Foods Sustainability Director to understand **whether Whole Foods should buy beef from JBS farms in Brazil**. The discussion format will be as follows. For each of the three questions above:

- a. A spokesperson from each group will give a 2 minute statement that outlines their actor's position.
- b. After each round of statements, there will be 5-8 mins for questions (posed by any member of any group to any member of another group), responses, and discussion.

After the discussion, there will be time to reflect on the issues raised, and on the case-study as a whole.

References

Nepstad, D. C., Boyd, W., Stickler, C. M., Bezerra, T., & Azevedo, A. A. (2013). Responding to climate change and the global land crisis: REDD+, market transformation and low-emissions rural development. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 368(1619), 20120167.

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Forbes. (2011) JBS: the story behind the world's biggest meat producer. Available at: <http://www.forbes.com/sites/kerenblankfeld/2011/04/21/jbs-the-story-behind-the-worlds-biggest-meat-producer/>.

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Smith, B.G. (2008) Developing sustainable food supply chains. *Philosophical Transactions of the Royal Society B: Biological Sciences* 363, 849-861.

Zhour, A. (2010) "Adverse forces" in the Brazilian Amazon: developmentalism versus environmentalism and indigenous rights. *The Journal of Environment & Development* 19, 252-273.

Table 1. Actor roles to be researched by students

Actor	References (suggested starting points)
Instructor role	
Whole Foods Sustainability Director	Schwartz 2010
Student roles	
Socio-environmental synthesis scientist	Nepstad 2013
JBS representative	Forbes 2011 Gruley & Kassai 2013
Brazilian Environment Minister	Zhouri 2010
Cattle rancher, Acre	Fearnside 2008 Hoelle 2012
Environmental Defence Fund	Deprez & Miller 2014 Smith 2008
Consumer	Butler & Laurance 2008