

Addressing deforestation and other land-based conflicts in the frontier forests of eastern Panama: The case of Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+)

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The Bayano Lake and surrounding forests in eastern Panama. (Photo credit: Javier Mateo-Vega)

1. Summary:

This case explores the complexities of tropical deforestation and considers the potential role of the proposed climate change mitigation mechanism, *Reducing Emissions from Deforestation and Forest Degradation in Developing Countries* (REDD+) in developing countries. Using the highly contested forest landscapes of eastern Panama as a stage, this case confronts students with the challenges of implementing ambitious, international, and often prescriptive natural resource policies at local levels. Eastern Panama, encompassing the Bayano and Darien regions, is home to vast and highly diverse forest ecosystems, and is considered one of the most important frontier forests in the Americas (dubbed by some the “Amazon of Central America”). It is also home to three indigenous groups (Kuna, Embera and Wounaan), populations of African descent (*Afro-Darinitas*) and migrant farmers (*colonos*), all with different histories, traditions and worldviews concerning forests and land management resulting in often violent territorial conflicts. A major social-ecological issue facing the region is deforestation, which is driving biodiversity loss and landscape change, threatening traditional

livelihoods and cultures and challenging the government to effectively respond. One relatively recent mechanism designed to stem climate change, but which can potentially also reverse tropical forest degradation in eastern Panama is REDD+. REDD+ is a technocratic and controversial global mechanism that requires intricate local-based technical, social, cultural, ethical, political, financial, and governance requirements to be met – a significant challenge in developing areas. In Panama, the government is leading the REDD+ efforts with support from the World Bank and United Nations. This case is built through the experience of a public hearing on the potential implementation of REDD+ in the upper Bayano Watershed, raising discussions about access to land, biodiversity conservation, poverty reduction, and social justice. Combining role-playing and problem-based learning, this case is designed to take place in a classroom setting, requiring preparatory readings, viewing videos, and group work. The case is divided in two sessions, each requiring approximately two hours of preparatory time for students and three hours for each session. It is primarily directed to graduate-level students taking courses in Forestry, Natural Resource Management, Geography, Political Ecology, International Development, Environmental Studies, Conservation Biology, Ecological Economics, Development and the Environment in Latin America. However, the case may be suitable for undergraduate students with adjustments as described in the Teaching Notes.

2. Background to the case study

This case study builds on more than a decade of participatory research with indigenous peoples and farmers in the Upper Bayano watershed in eastern Panama by the *Neotropical Ecology Lab* of McGill University and the Smithsonian Tropical Research Institute (STRI), led by Prof. Catherine Potvin. In the mid-2000s, studies focused geographically on Ipeti, an Embera indigenous community whose traditional authorities had expressed interest in carbon (C) sink projects (*i.e.* afforestation/ reforestation – AR) under the Clean Development Mechanism¹ (CDM) of the Kyoto Protocol². A study by Kirby and Potvin (2007) explored the potential for above and below-ground carbon storage in managed forests, agroforests and pastures, and the implications of land use on these stocks. Although protecting managed forests from conversion to pastures was clearly the best option for sequestering carbon, given the scope of the CDM, which did not consider “avoided deforestation” (*i.e.* precursor concept to REDD+), agroforests appeared to be the next best option. This study found that agroforests in Ipeti were comparable in C stocks to teak plantations, but provided additional livelihood benefits that plantations could not. A parallel study by Tschakert *et al.* (2007) explored the socio-economic potential for C-sink projects in Ipeti. Although improved management of fallows proved to have great C-sequestering capacity, heterogeneous assets and livelihood strategies among families in Ipeti suggested that only the better-endowed

¹ http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php

² http://unfccc.int/kyoto_protocol/items/2830.php

families would be able to participate in such schemes, thus further widening existing inequalities.

Alongside both of the aforementioned studies, Potvin *et al.* (2007) showed the value of using local knowledge of land cover and land use in establishing a baseline for CDM projects and estimating changes in C stocks over time. This study suggested that Ipeti would undergo a process of significant C stock impoverishment in the absence of C-sink projects. The question remained, however, if CDM-AR projects were truly a viable option for Ipeti and other rural communities throughout the tropics. This motivated a study by Coomes *et al.* (2008), which examined the opportunities, challenges and obstacles rural communities would face in adopting CDM-AR projects. The financial analyses suggested that under CDM conditions, AR projects would be prohibitive to low-income households such as those in Ipeti due to economic costs and risks, while “avoided deforestation” projects showed more promise in meeting multiple objectives such as carbon sequestration and storage, improving rural incomes, and generating additional ecosystem services. By then, “avoided deforestation” was morphing into what is now known as REDD+ (initially, RED, then REDD, and finally REDD+), and Potvin *et al.* (2008) examined the financial feasibility of this proposed climate change mitigation mechanism, using Panama as a case study. Their findings suggested that the two proposed funding strategies for REDD projects, carbon markets and designated funds, were unlikely to stimulate action, and that the costs of implementing REDD would double the conservation expenses of the country, in addition to incurring other opportunity, transaction and administration costs.

In 2008, Panama initiated activities to prepare for the REDD+ mechanism, a process known as ‘REDD readiness’, funded by the Forest Carbon Partnership Facility (FCPF) of the World Bank and the United Nations Programme on REDD (UN-REDD). The *Neotropical Ecology Lab* played an active role in providing training, along with local and international partners, for indigenous leaders and technicians, government officials and farmers on the technical, social, economic and governance dimensions of REDD+, with a strong focus on conflict resolution (Amado *et al.*, 2014). From this, the *Consultative Council on Conflict Resolution and REDD+* was created with participation of all sectors of society. This group led an unprecedented effort to outline a series of recommendations to address territorial disputes, one of the primary obstacles to REDD+ implementation in Panama, using the Upper Bayano watershed as an example³. These recommendations were brought forward to the Government of Panama. To significantly improve the access for indigenous peoples and rural communities to information about climate change and REDD+, Ventocilla and Potvin (2011) produced an educational, fully illustrated book (*i.e.* by renowned Panamanian indigenous artist, Ologwagdi) that has been distributed throughout Latin America. Representatives from all of Panama’s indigenous groups reviewed this book more than 15 times prior to publication.

³ <http://usmapanama.com/foroyobservatoriodesostenibilidad/files/ConsejoConsultivo.pdf>

Researchers, students and collaborators from McGill and STRI have continued to carry out research on, or related to, REDD+. For example, Pelletier *et al.* (2011) made important progress in elucidating the primary sources of uncertainty in quantifying emissions from deforestation (*e.g.* measures of carbon stocks in mature forests, and reliability and quality of land cover maps). They highlighted, among key challenges, the difficulties in assessing fallow land dynamics, which cover significant portions of the country. A series of recommendations for addressing these uncertainties were put forward. Peterson St-Laurent *et al.* (2012) engaged small-scale colonist farmers in eastern Panama to understand if and how they may be included in a national REDD+ strategy. They found that farmers are willing to consider protecting forests, but their participation would be contingent on adequate financial compensation, irrespective of whether it is under a REDD+ mechanism or not. Drawing from people-centered conservation and rural development projects, Holmes and Potvin (2014), produced a framework of best practices (BP) with indicators to improve the design, monitoring and evaluation of REDD+ projects, particularly in indigenous and rural communities. This study found that many BPs were either deficient or absent in community-level REDD+ projects in Latin America according to development practitioners and researchers. Sharma *et al.* (2015) advanced our understanding of the linked ecological and social interactions that influence land-use decisions that lead to the loss of forests, using the Embera community of Piriati as an example. This study elucidated the importance of considering cultural norms, gendered perspectives, and social organization, among other factors, in defining future land uses such as reforestation schemes.

More recently, Vergara-Asenjo *et al.* (2015) examined how participatory mapping with indigenous peoples in the Upper Bayano watershed can significantly improve land cover classification, which is necessary for monitoring changes in forest carbon stocks in the context of REDD+. This study found that maps produced with local knowledge were more accurate than those that relied only on remotely sensed data. Along the same lines, Mateo-Vega and Potvin (in preparation) designed and tested a participatory method for inventorying above-ground biomass in heterogeneous forest landscapes in eastern Panama. Both studies align with the UNFCCC's call for the full and effective participation of indigenous peoples in REDD+ (UNFCCC, 2011).

The *Neotropical Ecology Lab* is now engaged in an effort to facilitate a participatory, multi-cultural land-use planning effort for the Upper Bayano watershed, working with the Embera, Kuna and colonist farmers. This initiative is focused on identifying opportunities for forest conservation, sustainable agricultural production and addressing the long-standing social tensions surrounding land invasions and tenure. REDD+ may be a future land-use option for some of these groups. This case study was possible due to the long and rich body of work that has been carried out in this region.

3. What courses might this case be appropriate for?

This case study has been designed for use in a graduate-level Environmental Policy course, taught intensively over two 3-hour sessions. It would be suitable in a variety of courses within the following disciplines/topics: Forestry, Natural Resource Management, Geography, Political Ecology, International Development, Environmental Studies, Conservation Biology, Ecological Economics, Development and the Environment in Latin America.

4. What level is this case appropriate for?

This case study has been developed for graduate students. However, it could be adapted for upper-level undergraduate students, with more guidance and background information on the tools being applied for synthesizing and analyzing the case information [*i.e.* Stakeholder Analysis, Driver-Pressure-State-Impact-Response (DPSIR) Framework, Conceptual Mapping].

5. S-E Synthesis Learning Goals:

Successful application and understanding of this case study will achieve the following SE synthesis learning goals:

1. Understand the structure and behavior of complex socio-environmental systems.
 - Identify the environmental and social components of the system and their interactions.
 - Identify feedbacks and explain the dynamics of an S-E system.
 - Use tools and modeling approaches to understand dynamics of an S-E system.
2. Consider the importance of scale and context in addressing socio-environmental problems.
 - Understand that ecological and social processes often vary across differing contexts, including space, time, and conditions (*e.g.* economic or political).
 - Understand that ecological and social processes interact across different scales.
3. Co-develop conceptual models in inter- or trans-disciplinary teams.
 - Communicate across disciplinary boundaries.
 - Understand the value of different knowledge sources and ways of knowing.
4. Find, analyze, and synthesize existing data, ideas (*e.g.* frameworks or models), or methods.
 - Use visualization tools.
 - Integrate different types of data (interdisciplinary integration).

6. Learning objectives:

1. Students will develop a critical understanding of the complex interactions occurring between social, cultural, political, economic, ethical, ecological and

- technical components of coupled natural and human forest ecosystems in eastern Panama.
2. Students will learn to identify, analyze, synthesize and communicate different stakeholder perspectives on tropical forest and climate change policy issues using the case of REDD+ in Panama.
 3. Students will learn to conceptualize and analyze the complex social-environmental system underlying wicked problems such as tropical deforestation in order to better identify the challenges and opportunities for policy responses using the DPSIR framework.

7. Introduction:

This case study serves to highlight the complexity of social-ecological systems (SES) by exploring how different stakeholders, who share a common landscape, and value forests in fundamentally different ways, interpret their main forest-related issues and view the potential for the climate change mitigation mechanism, REDD+, to contribute to sustainable development. The case study is structured around Ostrom's (2009) framework for analyzing SES, but is focused on the stakeholders (*i.e.* resource users subsystem) and how they may exercise their agency to either accept or reject REDD+. Although based on an ongoing situation taking place in eastern Panama's Bayano region, the specific scenario setting is fictional. Reflecting the situation facing policy-makers "on the ground", there is no ideal resolution to the issues being raised in this case. Instead, this case aims to encourage students to grapple with the elements of conflict, complexity, change and uncertainty that are inherent to resource management decision making in any SES (Mitchell, 1997). No previous knowledge of REDD+, or indigenous peoples and farmers in Panama is required.

The course instructor will play the role of facilitator through both the role-playing and problem-based learning processes. Students will work in groups and space should be allocated for the groups to react to each other's position or observations. The facilitator's role will be to ask questions in order to stimulate collective reflection and co-learning around desired themes.

Background reading:

Forests and climate change

Forests play a fundamental role in the global carbon cycle, serving as both sinks and sources of carbon dioxide (CO₂) (Gibbs *et al.*, 2007), a greenhouse gas that is the primary cause of global climate change (IPCC, 2007). When forests are felled or degraded, carbon is released back to the atmosphere in the form of CO₂ if the vegetation is left to decompose or is burnt. Between 2000 and 2010, the global rate of deforestation decreased relative to the previous decade, but remained alarmingly high with 13 million hectares of forests loss every year (FAO, 2010). Deforestation and forest degradation

are believed to account for 6-20% of global anthropogenic CO₂ emissions (UNFCCC, 2009; van der Werf *et al.*, 2009; Baccini *et al.*, 2012; Houghton, 2012; Zarin, 2012).

Additional reading:

UNFCCC, 2009. Fact Sheet: The Need for Mitigation. United Nations.

https://unfccc.int/files/press/backgrounders/application/pdf/press_factsh_mitigation.pdf



Pristine forests and rivers with crystalline waters in the Bayano Region (Photo credit: Javier Mateo-Vega)

Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+)

In response to high deforestation rates, and the recognition that deforestation and forest degradation are one of the leading causes of human-induced climate change, proposals were put forward to include “compensated reductions” in deforestation (Santilli *et al.*, 2005) – *i.e.* “avoided deforestation” – as part of the United Nations Framework Convention on Climate Change’s (UNFCCC) Kyoto Protocol. It was suggested that avoiding deforestation was the most cost-effective and immediate mechanism available to fight climate change (Stern, 2007). The concept of avoided deforestation has now morphed into REDD+, which is a UNFCCC-sanctioned mechanism (Angelsen *et al.*, 2012; Pistorius, 2012). Through REDD+, developed countries may partially offset their CO₂ emissions by financing efforts in developing countries to reduce deforestation

and degradation, as well as enhance forest carbon stocks through forest conservation, sustainable forest management, and afforestation and reforestation (UNFCCC, 2011; Olander *et al.*, 2012). REDD+ has also been hailed as a mechanism to achieve a variety of co-benefits including biodiversity conservation, rural development, poverty alleviation, and improved forest governance, even though this has been subject of much debate (Potvin *et al.*, 2008; Chhatre *et al.*, 2012; Pokorny *et al.*, 2013; Potts *et al.*, 2013).



Deforestation in eastern Panama. (Photo credit: Javier Mateo-Vega)

Additional readings:

Angelsen, A., 2008. Moving ahead with REDD: Issues, options and implications. CIFOR, Bogor, Indonesia. http://www.cifor.org/publications/pdf_files/Books/BAngelsen1201.pdf

UNFCCC, 2011. Report of the Conference of the Parties on its sixteenth session, held in Cancun from 29 November to 10 December 2010. Addendum part two: action taken by the Conference of the Parties at its sixteenth session. FCCC/CP/2010/7/Add.1. United Nations Framework Convention on Climate Change. <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=2> (Read Section III C).

REDD+ furor and concerns

No other international mechanism that deals with forests or climate change has generated as much interest, debate and controversy as REDD+. It has spawned a deluge of research and publications in both academic and policy theatres, been the central theme of countless conferences, congresses, and meetings, drawn the mass attention of

media, become a primary theme in formal and informal educational platforms, and pitted multiple stakeholders in heated debates and discussions. This REDD+ “furor”, however, has been tempered over time by the realization that REDD+ is complex (Angelsen *et al.*, 2012). Challenges with the design, architecture and implementation of REDD+ have been increasingly well articulated, but uncertainties regarding whether and how the mechanism will be funded remain (Angelsen, 2008; Potvin, 2008; Phelps *et al.*, 2010; Visseren-Hamakers *et al.*, 2012).

In the social and ethical realm, concerns over the infringement of human rights of forest-dependent and dwelling people, including indigenous and rural populations, has been at the forefront of REDD+ discussions. Fears over land grabbing and invasions, land and forest (and carbon) tenure uncertainties (Stevens *et al.*, 2014), forced displacements, inequitable distribution of local benefits from REDD+ activities, impacts on traditional livelihoods, lack of participation in decision-making, and exclusion of indigenous and other minority world views have been a continued source of tension among REDD+ stakeholders (Griffiths, 2009; Sikor *et al.*, 2010; Hiraldo and Tanner, 2011; Lyster, 2011; Chhatre *et al.*, 2012). In addition, setting aside tracts of forest for REDD+ may generate downstream opportunity costs and economic impacts to local residents and governments such as foregone tax revenues, employment opportunities, commodity production, and infrastructure development, among others, that may not be adequately offset by REDD+ revenues (Butler *et al.*, 2009; Ghazoul *et al.*, 2010; Hein and van der Meer, 2012).

Broader national-level issues raise additional concerns. For example, the capacity of developing countries to enact and apply necessary changes in forest governance are a subject of debate, particularly in “fragile” or “failing” states that are fraught with corruption, civil unrest, widespread poverty, poor enforcement capacity, gross social discrimination, and economic inequalities (Hansen *et al.*, 2009; Peskett and Yanda, 2009; Unruh, 2011; Karsenty and Ongolo, 2012). Overall, the challenges for bringing REDD+ to fruition in the developing world are enormous, particularly as these countries are confronted with addressing equally or more pressing development needs, such as education, health, security, poverty and economic stability. However, despite these concerns and questionings, there appears to be enough institutional backing and impetus, including startup funding, behind REDD+ to believe that it will move forward.

Additional readings:

Peskett, L., Yanda, P., 2009. The REDD+ outlook: how different interests shape the future. ODI Background Notes. Overseas Development Institute, United Kingdom.
<http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/5531.pdf>

Stevens, C., Winterbottom, R., Springer, J., Reytar, K., 2014. Securing Rights, Combating Climate Change: How Strengthening Community Forest Rights Mitigates Climate Change. World Resources Institute. Washington, DC. <http://www.wri.org/sites/default/files/securingrights-full-report-english.pdf>

REDD+ in Panama

Panama was one of the first pilot countries to receive support for the creation of the enabling conditions for REDD+, a process known as REDD-Readiness, from the United National Collaborative Programme on REDD+ (UN-REDD) and the World Bank's Forest Carbon Partnership Facility (FCPF) in 2008. Progress was initially hampered by accusations from the National Coordinating Body of Indigenous Peoples of Panama (COONAPIP), an entity that represents Panama's seven indigenous groups, of inexistence of guarantees for the respect of their human rights and inadequate mechanisms to ensure their full and effective participation in the REDD+ process (Cuellar *et al.*, 2013; Feiring and Abbott, 2013; Tuckman, 2013). In February 2013, COONAPIP formally withdrew from the process, claiming violations to indigenous rights by UN-REDD and the Panamanian National Environmental Authority (now Ministry of Environment). By December 2013, COONAPIP and UN-REDD had made amends and agreed to continue collaboration. However, fractures within COONAPIP resulted in some indigenous groups manifesting an interest in REDD+, others rejecting it, and some failing to define a position on the mechanism.

Additional readings:

Tuckman, J., 2013. Panama's indigenous people see Redd over UN forest conservation scheme. The Guardian, United Kingdom. <http://www.theguardian.com/global-development/2013/may/24/panama-indigenous-people-un-forest-conservation>

Feiring, B., Abbott, E., 2013. Preliminary note on findings, conclusions and recommendations. . Independent team for the investigation and evaluation of the UN--REDD Panama Programme, Panama. **The "link "to report appears on the July 4, 2013 note.** http://www.un-redd.org/UNREDD_Launches_Panama_NP_Evaluation_EN/tabid/106063/Default.aspx#DraftReport

Video:

Panama's National Forest Inventory (introduction to REDD+ in Panama):
<https://www.youtube.com/watch?v=nskGQyInyM&index=1&list=UUz5rINjAhdCQbe0HVlfDA>

The eastern Panama social-ecological system

Eastern Panama hosts one of the last remaining stands of pristine, tropical forests in Mesoamerica (Figure 1). The "Darien Gap" has long held a mystical significance as a place of contrasts, representing both a division of continents, due to the break in the Pan-American Highway, and union of oceans, as one of the first places in the Americas that saw the crossing from the Atlantic to the Pacific, *i.e.* the "discovery" of the Pacific Ocean during the colonization period. The legacy of the "Darien Gap" extends to surrounding areas, and is increasingly threatened by competing interests under broadly defined processes of globalization and development (Suman, 2007). Widespread illegal deforestation and long-standing plans to complete the ~100km remaining of the Pan-American Highway have raised concerns over the future of this region's natural and cultural heritage (Miller, 2014; Arcia Jaramillo, 2015). These forests are part of a global biodiversity hotspot (Myers *et al.*, 2000) and much of this diversity remains unknown. In addition to "natural" diversity, it hosts a unique combination of social and cultural traits

that include three indigenous groups, afro-colonial groups known as Afro-Darienitas, and *mestizo* (i.e. persons of mixed European and Amerindian descent) farmer groups, known as *colonos* (i.e. Spanish for individuals colonizing the agricultural frontier), that have migrated from the western province of Panama in search of land for subsistence farming and cattle raising (Torres de Araúz, 1967; Heckadon-Moreno, 1984).

The disappearance of the “Darién Gap” would represent an unprecedented transformation of this social-ecological system with implications beyond local and national boundaries (Suman, 2007). Battles over forest resources constitute a key component of the struggle to ensure human rights. Mixed into this complex web of issues lies the inherent need to take into account the needs of the international community as agents or stewards of global diversity, national governments responsible for multiple actors and the wellbeing of an extremely biodiverse sovereign territory, and the multiple and often conflicting interests of local level stakeholders whose wellbeing and existence often depends directly on these resources. It is within this context that REDD+ is expected to operate.

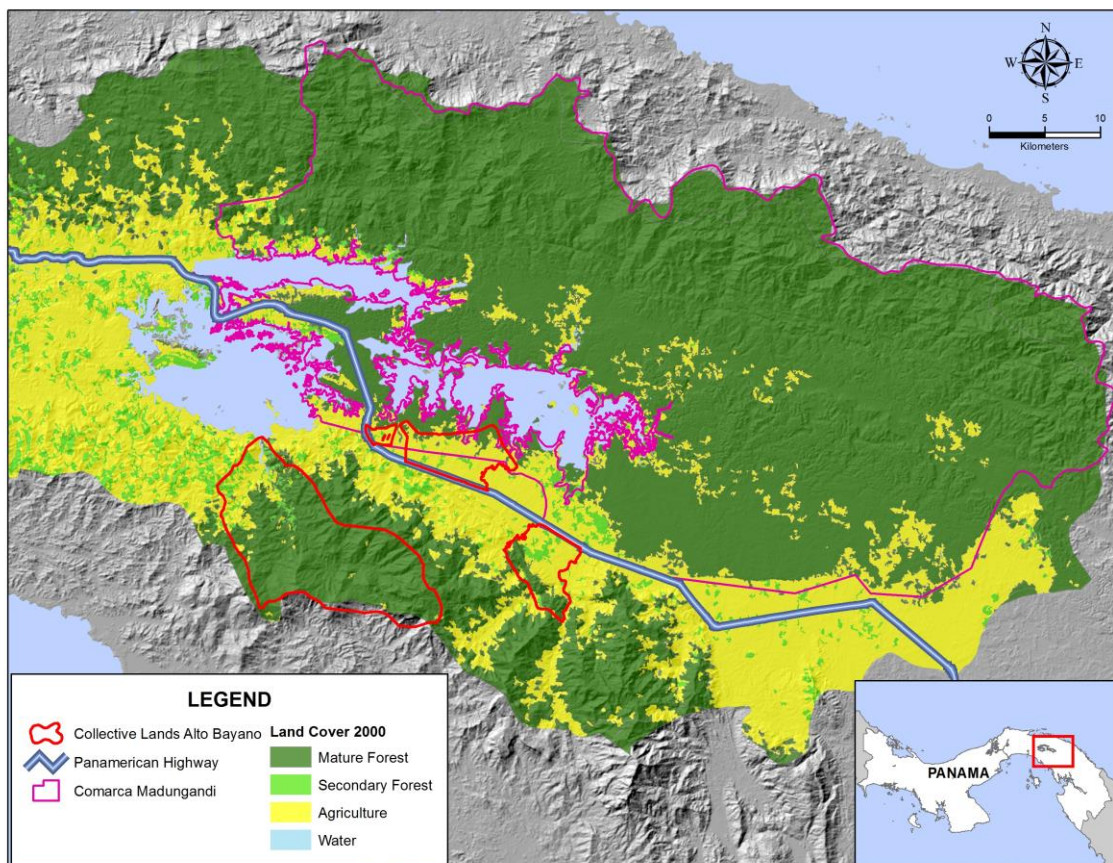


Figure 1: The Bayano region of eastern Panama

Additional readings:

- Wali, A., 1989a. In Eastern Panama, Land Is the Key to Survival. Cultural Survival Quarterly 13, 25-29. <http://www.culturalsurvival.org/ourpublications/csq/article/in-eastern-panama-land-is-key-survival>
- Suman, D., 2007. Globalization and the Pan-American Highway: Concerns for the Panama-Colombia Border Region of Darién-Chocó and its Peoples. University of Miami Inter-American Law Review 38, 539-614. <http://repository.law.miami.edu/cgi/viewcontent.cgi?article=1067&context=umialr>

The Bayano region of eastern Panama

The Bayano region (approximately 485,000 hectares, excluding the Bayano Lake) has been the stage of long-standing territorial conflicts primarily between and among indigenous peoples, *i.e.* Kuna and Emberas, *colonos*, and the government (Wali, 1989a). These conflicts, catalysed by the forced displacement of local populations by the Panamanian government in the wake of the construction of the Bayano Hydroelectric Complex in 1970, have yet to be fully resolved (Wali, 1989b; IACHR, 2013), despite a recent ruling by the Inter-American Court of Human Rights (IACHR, 2014). Differing interests and worldviews about land management, land invasions and conflicts, unclear and poor enforcement of land tenure, and the expansion of exotic tree reforestation/afforestation projects have all been catalysts of disputes among these groups, and the principal drivers of landscape-level changes in this region (Wali, 1993; Simmons, 1997; Sloan, 2008). Conflicts between Kunas and Emberas have deeper roots and, with few exceptions such as the case brought forward to the IACHR, they do not tend to collaborate.

Additional readings:

- Wali, A., 1989a. In Eastern Panama, Land Is the Key to Survival. Cultural Survival Quarterly 13, 25-29. <http://www.culturalsurvival.org/ourpublications/csq/article/in-eastern-panama-land-is-key-survival>

Stakeholders and REDD+ in Bayano

Emberas: The Emberas migrated to eastern Panama from Colombia starting in the 19th century. Their presence in the Bayano region, however, is reported until the 1940s in isolated home sites along the Bayano River and its tributaries (Torres de Araúz, 1967; Pastor Nuñez, 1998). Recognizing the value of collective action in dealing with the government and for commercializing agricultural products (*e.g.* plantains), as they had observed in the Kunas, the Emberas began to settle in small villages in the 1950s and 1960s. With the construction of the Bayano Hydroelectric Complex, they were re-settled in three territories, Ipeti, Piriati and Maje, but were not conferred formal land title. With the passing of law No. 72 of Dec. 23, 2008, which established a new legal figure that set the rules for adjudicating collective lands to indigenous and rural communities that fall outside of the Comarcas – *i.e.* legally declared indigenous territories – they politically organized themselves as the *Tierras Colectivas de Alto Bayano*. After almost 40 years of waiting, Piriati and Ipeti received their land titles in 2014 and 2015, respectively. Maje has not received its title and is the territory that has the highest percentage of

remaining forests, but is also the most threatened due to illegal logging and land invasions. Having legal land title is a REDD+ requirement, as it provides assurances to investors that forests are under the stewardship of those receiving payments. Land invasions in all three territories by *colonos*, as well as the use of lands for agriculture by the Emberas, have resulted in the loss of important tracts of forest (Sharma *et al.*, 2015). Guaranteeing the protection of forests under a REDD+ project is key given that the mechanism is results-based –*i.e.* payments are made against proof that forest carbon stocks have been protected. The Emberas have a strong connection to the forest, but due to deforestation are no longer able to benefit as much from traditional uses of the forest. The most evident manifestation of this has been the rapid and widespread shift from traditional Embera architecture to building methods employed by *colonos*. The traditional huts, built on stilts and with materials from the forest, have given way to ground-level cinder block homes with metal zinc roofs, because access to the forest is now too far away to source natural, yet heavy, construction materials. The Emberas in the Bayano region have experience with carbon sink projects, including a native tree species reforestation project in the community of Ipeti established in collaboration with the Smithsonian Tropical Research Institute to offset the institution’s carbon dioxide emissions. Despite this, they have not formally accepted to participate of the national REDD+ strategy that is being advanced by the government of Panama.



Traditional Emberá village in eastern Panama. (Photo credit: Javier Mateo-Vega)

Kunas: The Kunas from the Bayano region are remnant populations from a migration that occurred toward the San Blas region and islands on Panama's Caribbean coast in the 18th century from Darien (Torres de Araúz, 1967). They were later adjudicated legal title in 1996 of a large extension of the Upper Bayano Watershed (2,318.8km²). This was also the result of the forced displacement of their numerous communities during the construction of the Bayano Hydroelectric Complex and subsequent flooding of their ancestral lands. They created the *Comarca Kuna de Madungandi* with the administrative-political status of a municipality. The *Comarca* has 14 villages, which are informally divided in two regions, those located on the shores of the ~300km² artificial Lake Bayano, created when the Bayano River was dammed, and those that do not have direct access to the lake. The Kunas maintain the largest tracts of forest in the Bayano region, particularly in the regions north of Lake Bayano until the limits with the *Comarca Kuna Yala*, but some villages along the lake and the rivers have established forestry concessions with logging companies that have extracted timber from extensive areas.



Kuna village nestled in the forests of the Bayano region. (Photo credit: Javier Mateo-Vega)

The forests along the Pan-American Highway have been heavily logged since the 1960s and the villages in this region use these lands primarily for subsistence agriculture. The region near the highway has been subject to invasions by *colonos*. Agreements were reached with some groups of *colonos* so that they could remain on *Comarca* lands, but waves of migrants have continued to arrive, resulting in occasional violent

confrontations among both groups. Some invasions, both permanent and temporary, have also begun to occur in the more inaccessible lake-side region. Following suit of the *Comarca Kuna Yala*, the *Comarca Kuna de Madungandi* has, for now, opted to not participate of the REDD+ mechanism (Potvin and Mateo-Vega, 2013). Even a study that aimed to quantify the volume of the carbon stocks contained in the forests by researchers from the Neotropical Ecology Lab was halted half way through in 2013 and has not been reactivated. The leaders of the *Comarca*, however, have recently expressed a willingness to revisit the issue of REDD+ following meetings with representatives from the Government of Panama and UN-REDD.

Colonos: *Colonos* began to arrive in the Bayano region in the 1950s, with colonization steadily increasing with the construction of the hydroelectric dam and the Pan-American Highway over the following three decades (Wali, 1989b). These farmers, primarily of *mestizo* origin, migrated mostly from the central and western provinces of Panama in search of land, and implemented their traditional agricultural practices of subsistence farming, followed by pasture establishment for low-density cattle-ranching (Heckadon-Moreno, 1984). For the most part, they manage small farming units, which they clear on their own or with limited support, as they typically have limited resources to do so. Few will have land title, but many do obtain “possession rights”, which are legally recognized by the Government of Panama, but do not carry the same weight, particularly when trying to access bank credit (Peterson St-Laurent *et al.*, 2012).



Colonos live in dispersed houses throughout the Bayano region. (Photo credit: Javier Mateo-Vega)

As mentioned above, waves of *colonos* continue to arrive in the region, often invading indigenous lands. Unlike the Emberas and Kunas, they are not accustomed to working with each other and tend to lack organizational structures that can represent their interests collectively (Wali, 1993; Peterson St-Laurent *et al.*, 2012). Studies in the region of Bayano have explored the opportunities and challenges for implementing REDD+ with *colonos* (Peterson St-Laurent *et al.*, 2012; Peterson St-Laurent *et al.*, 2013), and found that if the mechanism is unable to reconcile farmers' cultural uses of lands, capture the full range of their aspirations, and avoid disparities in the sharing of benefits, it would likely not succeed. These studies, however, revealed that *colonos* do value forests and may participate in conserving these ecosystems under the right conditions.

Government: For this case study, government refers to the authorities of the Ministry of Environment who are leading the REDD-Readiness process in Panama, in close collaboration with UN-REDD. Representatives from both of these organizations shared a joint office until recently, with no practical distinction among staff in terms of institutional affiliation. As mentioned earlier, the relationship between the government and indigenous peoples on the subject of REDD+ has been rocky, marred by accusations of lack of guarantees for recognition of human rights and the inadequate inclusion of indigenous peoples in the REDD+ process (Cuellar *et al.*, 2013; Feiring and Abbott, 2013). Even after amends were made with COONAPIP, several indigenous groups have refused to take part in REDD+ and even severed their affiliation with COONAPIP due to their agreement to move forward.

The government's role, along with UN-REDD, has been to move the REDD+ process along in all of its dimensions (technical, social, political, financial, ethical and governance). Given that as of 2008, 54% of remaining mature forests in Panama are located in indigenous territories, both recognized and under claim (Vergara-Asenjo and Potvin, 2014), the government has a vested interest in guaranteeing the participation of these groups in REDD+. Their interactions with *colonos* and other farmer groups are unknown.

Others: This category has been added in order to provide opportunities for students to explore other entities that are often embedded in rural settings like Bayano, and that may have an interest, influence and/or be affected by the deployment of a mechanism like REDD+. Students can be encouraged to delve into the literature to further explore the role or position of these stakeholders. The following are examples of potential additional actors:

- Non-governmental organizations
- Church
- Forest industries
- Local entrepreneurs who sell equipment, tools, machinery for agriculture and forestry.

8. Classroom management:

This case has been designed to be taught intensively over two 180 minute sessions, but can be broken down as desired to suit different teaching schedules and needs. Students will need to complete the assigned pre-class readings and watch several videos, all of which require internet access and approximately two hours of dedicated time. They will also need to download the free software CmapTools to develop their concept maps (Session 2).

Teaching the Case

For this case study, students will be divided in groups that represent the Kunas, Emberas, *colonos* and government officials/multi-lateral agencies, and be asked to **develop and or represent a position on REDD+ while role-playing**. Other actors may also be considered (see “Others” section below for a list) in this case study, but these are not fully discussed and would require additional work by the instructor and students. In particular, they should be prepared to **present and defend why they believe REDD+ is or is not a valid land management strategy and potential source of income**. If divergent views are presented – which should be the case – they will be asked to develop recommendations on how to potentially reconcile these contrasting perspectives on REDD+, if possible. In other words, **what conditions would have to be met for REDD+ to be adopted in the Bayano region by the different groups and what actions would be required for these conditions to be met?** This latter question may be answered in a group setting, or each group may first discuss their ideas and then present them in a plenary session. For this, students will receive background information on each one of the groups. They will also be encouraged to conduct their own research about the cultural and social factors that may influence their position on REDD+:

Session 1 (180 minutes):

Prior to class, students will need to read the case introduction and background material and complete the following pre-class readings:

- Angelsen, A., 2008. Moving ahead with REDD: Issues, options and implications. CIFOR, Bogor, Indonesia. (**For students to peruse - e.g. Summary and Chapter 1**) http://www.cifor.org/publications/pdf_files/Books/BAngelsen1201.pdf
- Wali, A., 1989a. In Eastern Panama, Land Is the Key to Survival. Cultural Survival Quarterly 13, 25-29. <http://www.culturalsurvival.org/ourpublications/csg/article/in-eastern-panama-land-is-key-survival>
- Peterson St-Laurent, G., Gélinas, N., Potvin, C., 2013. Diversity of Perceptions on REDD+ Implementation at the Agriculture Frontier in Panama. International Journal of Forestry Research 2013. <http://www.hindawi.com/journals/ijfr/2013/657846/>
- <http://www.redd-monitor.org/redd-an-introduction/> (Anti-REDD+)

- WWF (2005). Cross-Cutting Tool: Stakeholder Analysis. *Available online:* http://www.panda.org/standards/1_4_stakeholder_analysis

They will also need to watch the following short videos available here:

- Panama's National Forest Inventory (introduction to REDD+ in Panama): <https://www.youtube.com/watch?v=nskGQgYInyM&index=1&list=UUz5rINjAhdCQbe0HVlelfDA>
- A series of short videos produced by youth that partook in documentary-film making workshops facilitated by the Neotropical Ecology Lab (McGill/Smithsonian) in collaboration with the NGO, Wapikoni. <http://www.wapikoni.ca/films/en?nation=8d9284f0-7234-4477-add5-939315f69c63&community=&genre=&language=&year=&sort=0>
 - *The house of our grandparents*: the Embera narrate the cultural changes they have experienced as a result of the loss of their forests.
 - *Our home*: a brief clip that touches on the challenges that the Embera have faced in securing their territorial rights.
 - *Akua Yala*: provides a glimpse into the lives of the Kuna after the construction of the Bayano Hydroelectric Complex and the impact it has had on their lives (no translated subtitle, but even the images offer a sense of place and culture).
 - *Discrimination*: highlights the social tensions, but also shared sentiments about discrimination, among the three main groups that inhabit the Bayano region.
 - *Deforestation*: showcases the issue of forest loss and the role that various actors play.
 - *Retratos del Bayano* (Portraits of Bayano): audiovisual presentation of the Embera and farmer (*colono*) cultures in the Bayano.
- <https://www.youtube.com/watch?v=D0WeGw3h2yU> (Pro REDD+ VIDEO)

When reviewing the case material, students should take notes on the various aspirations of different forest-related stakeholders in the Bayano region and their relative positions of influence/power and stake/interest in REDD+ projects, following the structure provided by WWF (2005).

In class:

1. Introduction (5 min.): The instructor should begin the class with a brief summary of the background readings/videos highlighting the broad characteristics of this case that make it relevant to the biodiversity conservation, natural resource management and climate change mitigation challenges being faced in different contexts internationally.

2. Breakout groups (55 min.): The class should then be divided into groups of three (depending on class size, two or four would also work) and assigned a stakeholder group (*i.e.* Kuna, Embera, Colono, Government, Other) whose perspective they will seek to represent. Drawing on their assigned readings, each group will prepare their stakeholder position on REDD+ policy in the Bayano region, detailing their key issues and concerns.

3. Public hearing (10 min. per group; 60 min. maximum depending on the number of groups): The instructor will then act as the Chair of a public hearing session being organized by an independent review panel established to advise the Panamanian government if and how best to proceed with REDD+ in the region. Each stakeholder group will be given just 10 minutes to formally present their position, aspirations, arguments and justifications in order to try and influence the policy process.

4. Debate (45 min.): There will then be a facilitated general discussion period to allow each stakeholder group to directly ask and respond to questions arising from other stakeholder perspectives with a view to clarifying areas of agreement and disagreement.

5. Debriefing (15 min.): The instructor will then facilitate a debriefing session on the main points arising and, in discussion with students, identify some of the key lessons for natural resource management and policy (15 minutes). These issues may include (1) the lack of trust among the various groups due to previous interactions, (2) asymmetries in power due to differences in access to knowledge, experience in advocacy, and stakes in participating in a mechanism such as REDD+, and (3) and challenges in implementing global initiatives at the local scale.

Session 2 (180 minutes):

Prior to class, students will need to have completed following pre-class readings and assignments:

- Lindsey, R. 2007. Tropical Deforestation. NASA
<http://earthobservatory.nasa.gov/Features/Deforestation/>
- Bradford, A. 2015. Deforestation: Facts, Causes & Effects. LiveScience.
<http://www.livescience.com/27692-deforestation.html>
- Explore the Panama Country Data on www.globalforestwatch.com focusing on forest cover changes that have taken place in the Bayano region over time.
- US EPA Tutorials on Systems Thinking using the DPSIR Framework (Modules 1 to 4): <http://archive.epa.gov/ged/tutorial/web/html/index.html>

In class:

1. Introduction (10 min.): The instructor should begin by setting the scene for tropical deforestation, identifying the wicked nature of the problem and the need for complex systems approaches to help with identifying the different components and interactions affecting outcomes so as to improve policy design and learning (responses). While there are different tools available, the Driver-Pressure-State-Impact-Response (DPSIR) framework has been widely used in government to facilitate more systems-based approaches to public policy thinking. The framework serves to show the causal links between human actions (drivers), the effects these generate (pressures), the resulting condition on the environment (state), the impacts of this condition (impacts) and the policy choices (responses) to address the problem.

2. DPSIR matrix (60 min.): The class should then be divided into breakout groups of five to develop a detailed DPSIR matrix on the different issues affecting tropical deforestation in Panama, drawing on their assigned readings, including the tutorial on the DPSIR framework, and any additional internet research they may wish to do. Within the 'Responses' category, REDD+ should be included as one possible option.

3. DPSIR concept map (80 min.): Each group will then work on translating their matrix into a conceptual map using the freely available software [CmapTools](#) (following the direction of the US EPA training modules). This will involve identifying the direction of relationships, potential feedbacks (positive and negative) and the implications for different policy responses (60 minutes). See module 4 in EPA readings for further guidance. An example of an [Integrated DPSIR CMap](#) may be downloaded to explain the framework to the students.

4. Class presentation (30 min.): Once completed, each group will present their conceptual map to the class for critical feedback and further discussion.

5. Debriefing (30 min.): The instructor will then facilitate a collective debriefing session on the main points arising from the discussion of the concept maps and consider the potential for REDD+ to achieve the desired impacts in Panama through a DPSIR lens. An example of a DPSIR on deforestation is available in the *Supplementary Materials* file.

Suggested Discussion Questions

Discussions questions that can be brought up during the in-class work or provided to students at the end of the case study:

Session 1:

1. What are some of the management tools/approaches that can be used to increase adoption of REDD+ in Panama?
2. Who is responsible for environmental degradation in areas slated for REDD+?
3. What are the broader political economic conditions that affect/influence decisions around the use of natural resources?
4. Who are the winners and losers in REDD+?
5. What are some ways in which local communities (indigenous, farmers, etc.) could resist or support REDD+ programs? Who would be their allies, locally, nationally, regionally, and internationally?

Session 2:

1. What opportunities and challenges face deforestation and climate change mitigation-related policy initiatives in Panama? How might community and policy responses be more effective?

2. To what extent might the Driver-Pressure-State-Impact-Response (DPSIR) framework facilitate more systems-based approaches to environmental research and policy thinking? Could it help with the implementation of REDD+?

9. Suggested modifications:

For an undergraduate version of the course, instead of having student groups generate the conceptual map using the DPSIR framework, the instructor could generate the conceptual map with input from all students, as part of an in-class exercise. Additionally, more time could be allotted to explaining the various approaches (*e.g.* stakeholder analysis, DPSIR framework) and where they have been used previously in order to tease out important issues for policy to consider.

Another suggested modification would include asking students to submit a critical essay on the role of REDD+ in the Bayano region of eastern Panama that requires them to do additional literature research beyond the material and references provided in this case study. Students could also be asked to critically examine the various possible “R: Responses” to tropical deforestation using the DPSIR framework and discuss the regulatory challenges associated with sustainable forest management in Panama.

10. Assessment

Students will be evaluated based on their degree of class participation and the quality of their contributions to the various tasks assigned in the sessions (see Grading Rubric, pg. 22). Neither the stakeholder position statement from Session 1, nor the DPSIR conceptual map from Session 2, have correct answers, as these represent a group thought process. However, in order to facilitate the development of the conceptual map we have attached an example for the instructor to use as a guide (*Supplementary Material* file).

Learning objectives (LO) will be assessed through the use of the following formative and summative assessments for each of the two proposed activities:

Session 1 (180 minutes):

Formative Assessments:

- Using literature and videos from the case, student groups will generate a “position statement” on REDD+ from the perspective of their assigned stakeholder group, to be delivered orally in class.

Summative Assessment:

Following the general discussion (public meeting) in which stakeholder positions are presented through role-play, and debriefing about key lessons in natural resource

management and policy, the instructor will evaluate student preparation for and participation in group question periods and discussions. (LO-1 and 2)

Session 2 (180 minutes):

Formative Assessments:

- During the in-class group work to produce the DPSIR framework, students will be given a notecard and asked to reflect, in 1 minute, on the usefulness of framework for: (a) synthesis of the problem; (b) operationalization of the case; or (c) explore their reactions to the complexity and challenges of development work. (LO-1 and 3) (This assessment is **OPTIONAL**. It allows students to express their feelings of frustration about the wicked and complex nature of coupled social-environmental problems).
- Following the group work and presentations on the DPSIR matrix, instructors will facilitate a 5-7 minute discussion around issues of: feedback, causality, scale, and the emergence of conflict as they relate to the various challenges associated with the implementation of forest and climate change mitigation-related policy in Panama.

Summative Assessment:

Final group discussion about difficulties of breaking down SES, linking components, and bringing in responses. Individual contributions to discussion will be graded. (LO-1, 2, and 3)

GRADING RUBRIC

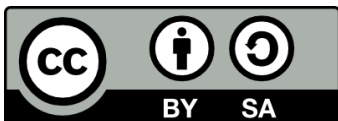
LEARNING OBJECTIVES			
1. Students will develop a critical understanding of the complex interactions occurring between social, cultural, political, economic, ethical, ecological and technical components of coupled natural and human forest ecosystems in eastern Panama.			
2. Students will learn to identify, analyze, synthesize and communicate different stakeholder perspectives on tropical forest policy issues using the case of REDD+ in Panama.			
3. Students will learn to conceptualize and analyze the complex social-environmental system underlying wicked problems such as tropical deforestation in order to better identify the challenges and opportunities for policy responses using the DPSIR framework.			
	LEVELS OF ACHIEVEMENT		
ASSESSMENT/CLASS ACTIVITIES	HIGH	MEDIUM	LOW
Stakeholder REDD+ “position statement” role-playing exercise, to be delivered orally and debated in class. (LO 2)			

Facilitated discussion session on the some of the key lessons for natural resource management and policy, in the context of a forest socio-ecological system. (LO 1 and 2)			
Group work to create and present on DPSIR matrix, with discussions on: feedback, causality, scale, and the emergence of conflict as they relate to the various challenges associated with the implementation of international natural resource policies. (LO 3)			
Final group discussion about difficulties of breaking down SES, linking components, and bringing in responses. Individual contributions to discussion will be graded. (LO 1, 2, and 3)			
<p>* HIGH: Student has clearly done the readings and understood the materials provided for the class. In addition to engagement with the literature, students contribute interesting and thoughtful insight to the benefit of the class</p> <p>* MEDIUM: Student understands the material and is engaged with the class, but contributions falls short of providing the useful, insightful, and critical questions about the topics covered, that would contribute to the broader SES learning goals outlined in the teaching notes.</p> <p>* LOW: Student is able to present information from readings, but without an opinion or analysis of the content.</p>			

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