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Renewable Energy and Human Rights Violations: Illustrative Cases from Indigenous Territories in Panama

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Local implementation of international climate policies is frequently obscure. The objective of our research is to unpack the "black box" of carbon offsetting as it is being conducted in Latin American indigenous territories. Our two case studies of renewable energy projects under construction in Naso and Ngöbe villages in western Panama show that carbon offsets in oppressive societies have the potential to cause social harm. Our cases illustrate processes of green authoritarianism, spatial control, and social restructuring. The private developers constructing the Chan 75 and Bonyic dams did not follow international standards for free, prior, and informed consent, and state agencies reinforced private rights with physical violence. As the hydro developers await decisions on their applications for verification under the Clean Development Mechanism (CDM), we recommend CDM procedural reforms to assure respect for human rights, including the special rights codified in the 2007 UN Declaration on the Rights of Indigenous Peoples. If not, project developers could use low-carbon objectives to justify social oppression. *Key Words: carbon offsets, hydroelectric dams, Indigenous peoples, Panama, renewable energy.*

国际气候政策在地方一级的实施经常是模糊不清的。我们的研究目标是要解开在拉丁美洲的固有领土所进行的碳补偿的"黑盒子"。我们对巴拿马西部的纳苏和恩哥贝农村正在建设的两个再生能源项目进行了个例分析，研究显示，社会压迫情况下的碳补偿有可能会造成社会危害。我们的案例展示了绿色独裁，空间控制和社会转型过程。建设 Chan 75 和 Bonyic 大坝的私人开发商为遵循国际标准而付出了代价，事先知情并且同意的国家机构用身体暴力来强化私有权利。随着水电开发商等待他们根据清洁发展机制（CDM）提交申请的核查决定，我们建议 CDM 进行程序改革以确保对人权的尊重，包括依据 2007 年联合国土著人民权利宣言中所定义的特殊权利。如果不这样，项目开发人员可以使用低碳目标作为社会压迫的理由。*关键词：碳补偿，水电坝，土著人民，巴拿马，可再生能源。*

La implementación local de políticas climáticas internacionales es frecuentemente oscura. El objetivo de nuestra investigación es destapar la "caja negra" de las compensaciones por carbono, como están siendo aplicadas en los territorios indígenas latinoamericanos. Nuestros dos estudios de caso sobre proyectos de energía renovable en contrucción en las aldeas Naso y Ngöbe, en el occidente de Panamá, indican que los bonos de carbono en sociedades opresivas potencialmente pueden causar daño social. Nuestros casos ilustran procesos de autoritarismo verde, control espacial y reestructuración social. Los empresarios que están construyendo las represas de Chan 75 y Bonyic no siguieron los estándares internacionales sobre consentimiento libre, anticipado y consciente, a la vez que entidades estatales reforzaban los derechos privados con violencia física. En tanto que los promotores del desarrollo hidroeléctrico esperan las decisiones sobre sus propuestas para verificación de acuerdo con el Mecanismo de Desarrollo Limpio (CDM), nosotros recomendamos reformas de procedimiento del CDM para apuntalar el respeto por los derechos humanos, incluyendo los derechos especiales codificados en la Declaración de las NU sobre Derechos de los Pueblos Indígenas. Si no se hace eso, quienes desarrollan este tipo de proyectos podrían usar objetivos orientados hacia la baja en emisiones de carbono para justificar opresión social. *Palabras clave: bonos de carbono, represas hidroeléctricas, pueblos indígenas, Panamá, energía renovable.*

Should low-carbon development fragment communities and disrupt Indigenous peoples' collective institutions and subsistence practices? Emerging from structural inequities and physical violence, the two hydro development projects we assess potentially extend Radcliffe's (2007) Latin American indigenous geographies of fear, racism, and unevenness to the clean energy sector.

The Clean Development Mechanism (CDM), an international framework to reduce greenhouse gas (GHG) emissions as industrial countries finance low-carbon projects in developing regions, has the potential to

significantly influence global processes. There were US$6.5 billion dollars of project-based CDM finance transferred in 2008 alone (Capoor and Ambrosi 2009). By January of 2011, 2,700 validated projects existed in seventy countries. In spite of a bifurcated mandate to promote sustainable development along with GHG emissions reductions, the focus of CDM regulatory tools on measuring carbon (e.g., monitoring methodologies, additionality assessment,[1] etc.) limits attention to socioeconomic factors (Capoor and Ambrosi 2009; Gilbertson and Reyes 2009; Lövbrand, Rindefjäll, and Nordqvist 2009).[2]

In this article we assess whether carbon offsets can cause social harm. In 2008, the Indigenous Environmental Network (IEN) and Society for Threatened Peoples (2008) identified GHG mitigation projects they believe violate indigenous rights in acts of carbon colonialism, including several Panamanian dam sites. IEN's claims, and documents from Cultural Survival (e.g., Lutz 2007), spurred our 2009 fieldwork to analyze two projects in Naso and Ngöbe villages.[3] In western Panama, renewable energy projects create intense pressure for governance and livelihood transitions (Cordero et al. 2006; Paiement 2007; Jordán 2008; Finley-Brook and Thomas 2010).

The central objective of our research is to unpack the "black box" of carbon offsetting (Lovell and Liverman 2010). National and subnational implementation of the policies emerging from international climate institutions is often opaque (Lövbrand, Rindefjäll, and Nordqvist 2009; Bulkeley and Newell 2010). Since 2008, we have completed fieldwork on eleven carbon projects in four countries, including Nicaraguan bagasse cogeneration, forest carbon and hydroelectric dams in Costa Rica and Panama, and Dominican wind development. Research methods include semistructured interviews with project developers, state officials, nongovernmental organizations (NGOs), and impacted populations. The nineteen interviews contributing to this article drew from each of these sectors. Our case study approach documents how decision-making power and processes influence cost–benefit distribution among stakeholders (e.g., host communities, investors, government agencies, offset purchasers, etc.).[4]

Naso and Ngöbe community members charged the Panamanian government with human rights violations due to dam construction in their territories. As we sought to contextualize their claims within broader clean development trends, we uncovered an avoidance of issues pertaining to indigenous land and cultural rights in CDM project documents throughout Latin America, even in those located in Mexican *ejidos* (communal lands). Academic research addressing injustice in Latin American offsets tends to focus on biofuel or forestry projects (e.g., Boyd 2009; McAfee and Shapiro 2010; Hazlewood forthcoming), creating a research gap. In popular media (e.g., Dyer 2009), concerns about renewable energy CDM projects in indigenous territories are addressed.

Although we caution against generalizing from our illustrative cases, we recognize similar patterns in other indigenous territories (see, e.g., Hale 2002, 2004; Radcliffe 2007; Baldwin 2009). During hydro development, private and state partners often attempt to extinguish indigenous land claims (Paiement 2007; Jordán 2008). With the rise of offset markets, we argue that project developers might use low-carbon objectives to justify their demands for local sociocultural change. We highlight "stick and carrot" approaches that use carbon credits as positive incentives while employing physical force to assure project implementation. As global environmental change influences expectations for energy projects (Zimmerer 2011), we identify a resurgence of historical prejudices that categorize subsistence practices as inefficient and indigenous customs as inferior. Before presenting the details of our two case studies, we seek to contextualize events in Panama, where state agencies and private firms selectively define sustainable development in renewable energy projects in ways that allow them to pursue neoliberal agendas while further marginalizing indigenous communities.

Expanding Interests and Inequities in Hydro Power

There is a historic pattern of unequal distribution of costs and benefits in large-scale energy projects. *Hydrologic colonialism* is a spatial process imposed by big dams: high costs (e.g., ecological degradation, resettlement, loss of resource access, etc.) are felt in source landscapes and benefits (e.g., electricity, profit, etc.) are exported (Bakker 1999; Bonta 2004; Desbiens 2004; Sneddon and Fox 2008). State agencies have long justified large-scale energy projects as essential for national economic development, in spite of obvious spatial and social inequities.

We suggest that some large-scale CDMs might extend these inequities. Fair distribution and social consensus might be sidelined in CDM decision making because a major goal is to save money: Industrialized nations finance mitigation in developing countries because it is less expensive than cutting domestic

emissions (Bumpus and Liverman 2008; Gilbertson and Reyes 2009; Bulkeley and Newell 2010). For host governments, renewable energy CDM projects are an opportunity to capture foreign investment for the expansion of infrastructure (Lokey 2009; Schreuder 2009), a pressing concern in countries like Panama with rapid growth in electrical demand.

Approximately 60 percent of CDM projects create renewable energy and the largest CDM sector in terms of total number of projects is the hydro sector.[5] As of January 2011, there were 800 CDM-verified hydro projects globally and 750 in the pipeline.[6] Our cases involve foreign-financed, large-scale (>15 megawatts) dams. Multinational firms sponsor a significant share of large hydro CDM projects (Haya 2007).

The hydro industry suggests large dams can be socially responsible as well as ecologically friendly (International Hydropower Association 2007). The project developers in our case studies are Colombia's state utility company (*Empresas Públicas de Medellín*, or EPM) and a Panamanian subsidiary of U.S.-based AES Corp.[7] Both firms claim to be industry leaders in corporate social responsibility (AES-Changuinola 2008; EPM 2009). Our case studies suggest these firms recast negative social consequences as economic development in ways that are both superficial and harrowingly profound.

Private–State Energy Sector Partnerships

Neoliberal economic reforms, such as privatization and deregulation, generally expand or reinforce the power of multinational firms, and this is certainly evident in the energy sector (Ahmed 2010). The Central American Electrical Interconnection System (SIEPAC), an integrated regional grid under construction across 2,000 kilometers, required extensive foreign private investment. Energy projects linked to SIEPAC, including the two Panamanian case studies, fit within broader private–state economic development strategies to exploit rural peripheries to fuel industrial and urban areas.

Involvement of the private sector in Latin American energy development signifies an important political-economic shift with broad implications for industry, trade, tax collection, and much more (Lokey 2009; Schreuder 2009). Impacts from neoliberal reforms are varied and remain tied to other international and domestic policies (Mansfield 2004; Radcliffe 2007). For example, the CDM transfers extensive authority to the private sector because it is a project-based framework often relying on implementation by firms, although the vast rule-based structure of the CDM maintains an instrumental role for governmental and quasi-governmental agencies (Giddens 2009; Bulkeley and Newell 2010). State agencies continue to influence the type, pace, and form of resource commodification tied to specific CDM projects (Lokey 2009; Schreuder 2009).

Processes in Panama reflect the hollowing out of the state as responsibility for watershed management, public education, and energy infrastructure shifts to the private sector. At the same time, authoritarianism seeps out of complex rearticulations of governance and regulation (*sensu* Swyngedouw 2000). The state and private sector join forces to constrict local resource access and disempower Indigenous peoples, in spite of Panama's recognition of semiautonomous indigenous territories (*comarcas*) over the past century.[8] Across national and institutional landscapes, support for racial and class-based privilege rooted in colonial and imperial histories remains clear (Swyngedouw 2000; Hale 2002, 2004; Radcliffe 2007; Jordán 2008).

When Latin American Indigenous peoples oppose development projects, they might become targets of state violence (Radcliffe 2007; Jordán 2008). Yet Hale (2002, 2004) identified concurrent politics of recognition where states legally codify ethnic rights in ways that seem progressive but might still be manipulated to limit access to land and resources. Tying race relations to the valorization of GHGs, Baldwin (2009) suggested that carbon markets can lead to the entrenchment of racial hierarchies and limit Indigenous peoples' economic and political options. In western Panama, the selective transfer of benefits (e.g., land payments, jobs, gifts, carbon credits, etc.) to local individuals willing to allow hydro development creates community division such that the organization of alternatives or unified opposition becomes unviable (Jordán 2008).

Although neither project we assess had been verified by the CDM at the time of writing, project developers had submitted proposals and, more important, justified the dams using global climate change arguments (e.g., AES-Changuinola 2008; Rodriguez 2010).[9] Bonyic developers suggested in their CDM application that a main motivation for the project was to share carbon market benefits with Naso communities (Rodriguez 2010).

Hydro Development in Bocas del Toro, Panama

After determining strong hydro potential in Bocas del Toro Province in the 1970s, Panama set aside Palo Seco Forest Reserve (Figure 1) in the 1980s to protect

the watershed for energy production, but state attempts to build dams in the region were unsuccessful (Paiement 2007; Barber 2008; Jordán 2008). Following privatization of Panama's Institute of Hydrologic Resources and Electrification (IRHE) in 1998, there was vast investment leading to more than seventy new hydro concessions (Cordero et al. 2006). Eighty percent of Panama's two dozen proposed and verified CDM projects involve dams.

The Panamanian state plans to redefine Bocas del Toro Province. Paiement (2007, 126) described a vision a governmental official shared with him: "in the next ten years the rivers and forests of Bocas del Toro will be transformed by a series of dams, artificial lakes, access roads, and transmission lines."[10] In this context, state efforts to assure implementation of the first hydro projects in the province, described next, garner additional importance.

Green Authoritarianism in Naso-Tjërdi

> I didn't know that the development I was promised had people in uniforms militarizing our communities . . . every day more than ten or twelve police enter our community. . . . They are taking care of the machines. That is what they do. (Naso leader, conversation, 7 June 2009)

This Naso leader's allegation, supported by other interviews and media coverage, was that Panamanian officials protect dam construction equipment from sabotage in the face of local resistance. We label this process of state oppression to defend renewable energy sources and market-valorized ecological processes *green authoritarianism* (see Peluso 1992; Neumann 1998).

As an example of green authoritarianism, Bonyic dam obstructed progress toward legal recognition of the Naso homeland (*Naso-Tjërdi*; Paiement 2007; Jordán 2008; World Bank Inspection Panel 2009). The Naso were in the final stages of negotiating their comarca when the Colombian state utility company EPM (and two partner firms with minor holdings) purchased the dam concession (Paiement 2007; Jordán 2008).[11] Naso leaders believe demarcation of Naso-Tjërdi was stalled to assure dam construction, particularly after Naso began to vocalize opposition to the energy project (Anonymous, conversation, 7 June 2009).

The Naso are proud to have one of the few remaining monarchies in the Americas, but disagreement over the Bonyic dam split their kingdom (Paiement 2007). King Tito Santana signed a weak agreement in 2003 with the firm Hydroecológica Teribe (HET), of which EPM is the majority owner (Paiement 2007). Later, HET promised to transfer 25 percent of the project's carbon credits to the local community (Rodriguez 2010). Santana's cooperation with HET, however, led many Naso to accuse him of being corrupt, although he maintained support from a group of followers (Paiement 2007; Jordán 2008). The majority of Naso elected a new king, but the Panamanian state and private investors continue to recognize Tito Santana. Naso institutions were sufficiently disrupted that in 2004 the Inter-American Development Bank cancelled loans promised to HET for dam construction (Paiement 2004; Rodriguez 2010).

In June 2009, after HET decided to finance the dam with internal funding, the National Environmental Authority (ANAM) granted a 1,246-hectare hydro concession (Rodriguez 2010). Construction began in spite of Naso protests (Finley-Brook and Thomas 2010). In June 2010, Naso, seeking to halt Bonyic construction, filed a petition with the Inter-American Commission on Human Rights (IACHR). A series of IACHR petitions expose a pattern of Panamanian state oppression of Indigenous peoples (see Mayhew, Jordán, and Rolnick 2009; Finley-Brook and Thomas 2010).

In June 2010, the Bonyic project applied for CDM verification. According to the application, at the time of negotiation with HET, the Naso were "in the midst of a prolonged leadership crisis, caused by historical and political factors, as well as by family feuds and personal interests" (Rodriguez 2010, 16). This version of history removes blame from HET and the Panamanian state, although Paiement (2007) provides a detailed firsthand account of their involvement in Naso internal conflicts.

We have argued elsewhere that CDM application processes do not provide adequate, accessible opportunities for impacted communities to document concerns (Finley-Brook and Thomas 2010). In addition to a one-month public commenting period on the Internet,[12] developers are required to comply with national standards, as Bonyic did.[13] Describing the consultation process, the Bonyic CDM application vaguely mentions "a public discussion with local stakeholders" in 2005, and greater attention is drawn to "highly positive" comments generated in Panama City at a clean production symposium (Rodriguez 2010, 49). Although it is likely CDM verifiers will request additional details,[14] this example suggests applicants might attempt to omit essential information. In the next case study, the CDM application notes "ample support" from local populations (TÜV-SÜD 2008, 35), but when the UN Special Rapporteur on the situation of human rights and fundamental freedoms of Indigenous peoples visited the

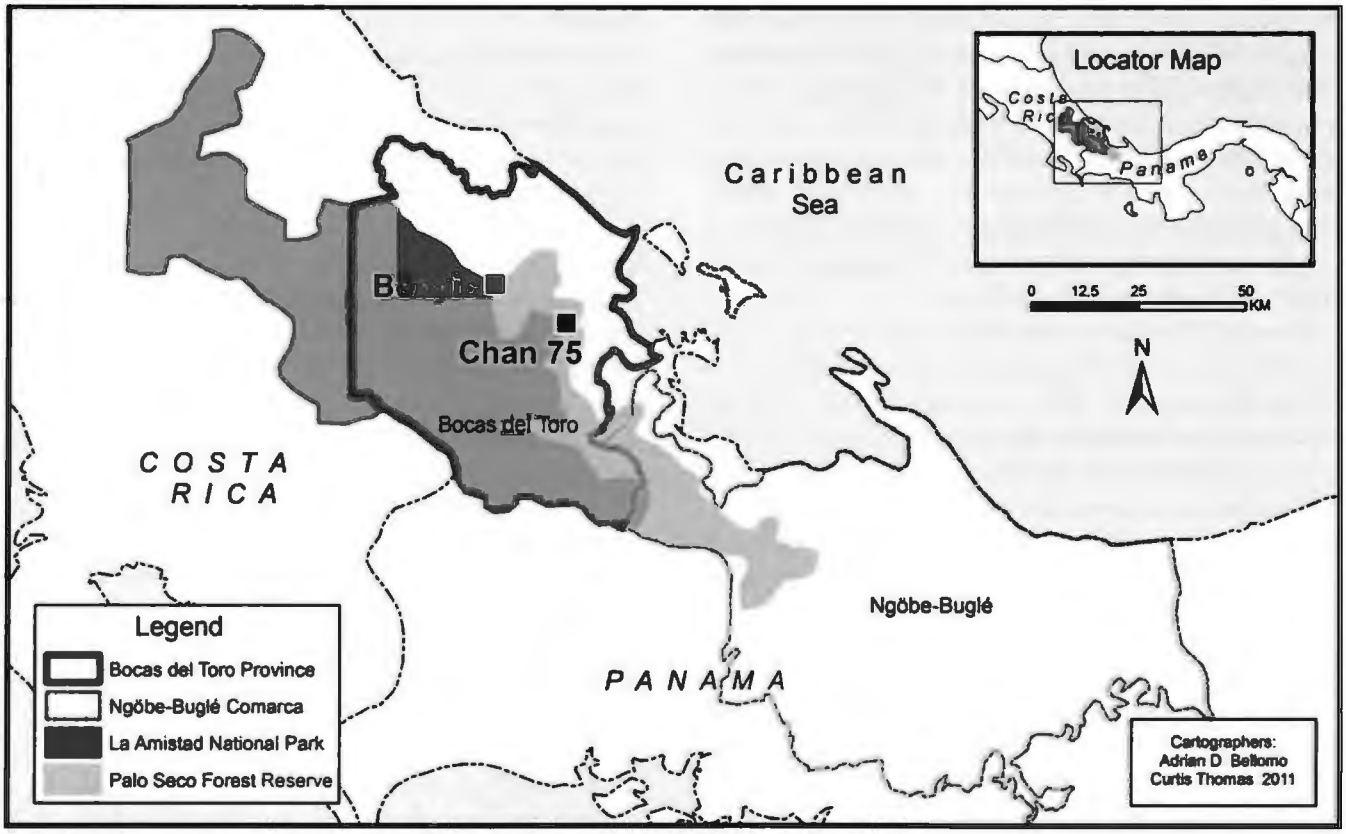

Figure 1. Bocas del Toro Province with dam locations.

project area, he found "significant discontent" (Anaya 2009, 10, authors' translation). Both statements are selectively true, as the dam created a social rift.

Spatial Control and Social Restructuring in Chan 75[15]

In 2007, Ngöbe villagers blocked Chan 75 dam construction for two weeks until national police beat and arrested protesters, including women and children (Barber 2008; Cultural Survival 2008; Jordán 2008). Since this protest, national police receiving salaries from AES-Changuinola screen movement to and from the zone. According to the UN Special Rapporteur on the rights of Indigenous peoples, the contractual relationship between state security forces and AES-Changuinola is concerning due to evidence of unequal power and pressure tactics (Anaya 2009).

Four Ngöbe villages (Changuinola Arriba, Charco de la Pava, Nance de Risco, and Valle del Rey) are being resettled without free, prior, and informed consent (Anaya 2009). AES-Changuinola notes compliance with World Bank standards for involuntary resettlement.[16] Based on the 2007 UN Declaration on the Rights of Indigenous Peoples, however, an international norm Panama supported, involuntary resettlement is prohibited in indigenous territories.

In 2007, Panama's National Assembly Resolution Number 1228 decreed that the four Ngöbe villages in the proposed flood zone would be permitted to stay within the Palo Seco Forest Reserve if they relocate to allow dam construction (Jordán 2008). Modern Ngöbe settlements in this area predate the reserve's creation (Anaya 2009), but inhabitants were not allowed to register their lands prior to the dam concession (Jordán 2008; Mayhew, Jordán, and Rolnick 2009). The World Bank loaned funds in 2001 to Panama's National Land Administration Program to title Ngöbe-Buglé Comarca (Figure 1) annex areas (World Bank Inspection Panel 2009), including Ngöbe and Naso villages in this study. A decade later these villages remain without land titles.

AES-Changuinola's 2007 contract with the state environmental agency ANAM privatized responsibility for 6,215 hectares of the Palo Seco Forest Reserve (Jordán 2008). Because watershed protection is necessary for hydroelectric production, the firm will restrict the clearing of agricultural fields: "[Resettled populations] are being trained on farming techniques and

Figure 2. Chan 75 dam in relation to a Ngöbe village (upper right). *Source:* Photo by Mary Finley-Brook.

efficient production. Moreover, they are receiving training on the sustainable environmental management the communities must adhere to" (AES-Changuinola 2008, 47).

Company employees designed new forms of subsistence for local populations as tree farmers and as artisans producing crafts for tourists expected to visit the artificial reservoir. Paternalistic social programs followed state violence to quell local opposition to the dam (Barber 2008; Cultural Survival 2008; Jordán 2008; Anaya 2009; Finley-Brook and Thomas 2010). Spatial control (i.e., fences, travel restrictions, loss of river transportation) and pressure tactics (i.e., unwarranted house-to-house searches, death threats, destruction of crops and property) promoted isolation, fear, and desperation (IACHR 2009a). Dynamite blasts were loud enough to force school closures in the nearby village of Charco de la Pava (Figure 2).

Chan 75 creates fundamental change in surrounding villages and positive social development could be possible. For example, AES-Changuinola (2008) has established education and health care programs. Although the firm suggests that these efforts are evidence of corporate social responsibility, the investments were integral to a broader partnership with state agencies and paved the way for AES-Changuinola to receive the hydro concession. Furthermore, AES-Changuinola's social programs, as well as the firm's commitment to share 20 percent of earnings from carbon offsets with the state environmental agency (Finley-Brook and Thomas 2010), allows the government of Panama to avoid paying for basic programs and services generally defined as state responsibilities. Social assistance can also be used to counteract allegations of harm caused by dam development or to mask other injustices.

AES-Changuinola's (2008) plans to improve Ngöbe living conditions create significant cultural change, such as splitting multigenerational households into nuclear families. Traditional houses were categorized as instituting "confinement" due to "inadequate use of construction materials" (AES-Changuinola 2008, 43). New cement structures are "dignified," in contrast to customary wood and palm structures that left inhabitants "exposed to rain and diseases" (AES-Changuinola 2008, 50).

AES-Changuinola representatives negotiated relocation accords and compensation for land use by household, creating upheaval within families because individuals signed resettlement agreements in representation of other family members even when they lacked this legal right (Lutz 2007; Jordán 2008). Discrete negotiations with each household unit were inappropriate because land is communally owned (Barber 2008; Jordán 2008). The firm's disbursement of gifts and money during negotiations also contributed to social tension (Jordán 2008).[17]

In 2009, the IACHR advised the Panamanian state to halt dam construction and consult with the Ngöbe in good faith. Negotiations occurred while construction advanced. Decisive meetings were held in Panama City, meaning select village representatives negotiated without community support and other villagers were

unable to monitor events (Mayhew, Jordán, and Rolnick 2009). Displeased Ngöbe suggest state officials made sure that dam opponents were not allowed "at the table" (IACHR 2009a, audio recording, authors' translation). The accord signed between village and state representatives stated that both parties agreed to work together to assure timely dam completion.

The IACHR brought the Panamanian state to the Inter-American Human Rights Court (CIDH) in May 2010. The court decided to disregard the IACHR's recommendation to halt dam construction because judges were not convinced the matter was "extremely serious" or "urgent" (CIDH 2010, 9–12, authors' translation). Panamanian officials testified that by mid-2010 only a handful of families had not signed relocation agreements with AES-Changuinola (CIDH 2010). Judges highlighted acceptance of money and land settlements on the part of various members of the indigenous communities, while noting the existence of unclear dates for alleged death threats and pressure tactics.

The Chan 75 application has been in the CDM pipeline since 2008. The verdict remains unclear at the time of writing. The consultation process leading to the application was poor. ANAM's public meetings in reference to the dam in 2005 were held in a town located six hours away from the four communities to be resettled (Anaya 2009). A letter from members of the Charco de la Pava village opposing the project was sent to ANAM in 2007 during the prevalidation public consultation period for AES-Changuinola's concession, but state officials approved the concession nonetheless (Anaya 2009). Chan 75's CDM application made no mention of the land tenure conflict or social opposition (TÜV-SÜD 2008). No comments were received during the thirty-day online CDM public commenting period.

Neocolonial Carbon Projects and Indigenous Communities

Green authoritarianism and carbon colonialism are evident in the construction of both the Chan 75 and Bonyic dams. In these case studies, state agencies and private firms worked in partnership to dominate and oppress local populations. With support from the state, developers used physical force to assert claims to exploit or protect natural resources with market value. Working in partnership, state actors and private firms have obligated Naso and Ngöbe villages to experience what Radcliffe (2007) defined as Latin American Indigenous peoples' geographies of fear and inequitable development.

Our research suggests GHG reduction projects in indigenous territories can adversely affect local self-governance, land tenure, resource access, and subsistence practices (see also Lohmann 2006; Baldwin 2009; Lövbrand, Rindefjäll, and Nordqvist 2009; Mate and Ghosh 2009; Hazlewood forthcoming). The protection of cultural rights is lacking in CDM requirements and Indigenous peoples have insufficient influence over carbon offset decisions (see also Finley-Brook and Thomas 2010). For example, there are no CDM guidelines to protect cultural heritage. We are aware of two Panamanian projects in the CDM pipeline that destroyed or displaced ancient ancestral sites including cemeteries.

Hydro development and carbon markets involve spatial imbalance in terms of the distribution of costs and benefits. Although Latin American CDM projects are often linked to high-stake energy markets, the United Nations Framework Convention on Climate Change oversight processes focused on GHG emissions currently lack safeguards against exclusionary and harmful practices. Findings from our two cases suggest that the CDM might contribute to hydrologic neocolonialism in some instances; however, constraints to local participation are not limited to dam projects. Regardless of CDM project type, greater attention appears necessary to defend local populations from authoritarian spatial control linked to the imposition of externally defined institutional arrangements and neoliberal ecological practices.

We expect that solving social justice issues in international carbon offset and renewable energy projects will be complex. For example, stipulations such as prohibiting CDM projects in untitled indigenous territories could create perverse incentives for the privatization of communal property if broader sociopolitical injustices are not addressed first. Although the UN Declaration on the Rights of Indigenous Peoples provides important guidelines, its impact might remain limited if even the Inter-American Human Rights Court averts the Declaration's fundamental call for free, prior, and informed consent, as apparently occurred in the case of Chan 75. For low-carbon development to be considered truly "clean," it is necessary to eliminate pervasive social inequalities and oppression in addition to reducing GHG emissions.

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Notes

1. Additionality suggests that a project would not have occurred without CDM finance. See Schneider (2009) for problems associated with assuring additionality.
2. Emissions markets separate GHGs from other elements in the development equation, such as ecosystem integrity and community resilience. Carbon calculations remain imperfect (e.g., exaggerated baselines, indirect emissions, externalities, exceptions for transportation, etc.; Lohmann 2006; Haya 2007; Gilbertson and Reyes 2009).
3. We also assessed older dams in Chiriquí and Panamá Provinces (see Finley-Brook and Thomas 2010).
4. Although we record material flows, we recognize limitations to this approach because value cannot be placed on key components such as cultural change.
5. Updates can be found at http://cdmpipeline.org/cdm-projects-type.htm (last accessed 7 April 2011).
6. A guide to the CDM project cycle can be found at http://www.undp.org/energy/docs/cdmchapter2.pdf (last accessed 7 April 2011).
7. Founded in 1981 as Applied Energy Systems, the name was changed to AES Corporation and later shortened.
8. See Paiement (2007) and Jordán (2008) for details about comarca recognition.
9. Both firms have implemented carbon offsets in other locations, including indigenous territories (Lokey 2009; Wittman and Caron 2009; Finley-Brook and Thomas 2010).
10. In this article we focus on the role of national-level state actors. Lutz (2007), Paiement (2007), Jordán (2008), and Mayhew, Jordán, and Rolnick (2009) documented how the actions of provincial officials generally coincide with central government efforts.
11. The Naso and Ngöbe in Bocas del Toro refused entry into the Ngöbe-Buglé Comarca (Figure 1) when it was formed in 1997 due to concerns over representation (Paiement 2007; Jordán 2008).
12. Fewer than 10 percent of verified Central American CDMs (2005–2008) received online comments (Finley-Brook and Thomas 2010).
13. See Paiement (2007) for details.
14. A CDM applicant is responsible for contracting a UN-designated operational entity (DOE) to carry out verification. The contractual basis of this relationship might create situations where DOEs are biased toward approval because rejecting projects could harm their ability to obtain future contracts.
15. This dam is sometimes referred to as Changuinola 1 or Chan 1.
16. A 2009 AES-Changuinola slideshow is available from the authors.
17. Details of financial settlements have not been publicly disclosed. Resettlement contracts transferring land holdings were signed with one person in each family, even though in some instances other family members were opposed to relocation (Jordán 2008). Firm representatives pressured illiterate individuals to "sign" (by thumbprint) resettlement agreements (Lutz 2007; Jordán 2008).

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