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Green Cooperation: Environmental Governance and Development Aid on the Belt and Road

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Abstract

The Belt and Road Initiative (BRI)—China's multi-trillion-dollar infrastructure program across 145 countries and counting—is provoking concern among observers that China is exporting its polluting model of development. Yet, China's leaders frame the BRI as a pathway for "green development," pointing to China's ambitious climate targets and leadership in green industries like renewable energy. To date, efforts to "green" the BRI have focused on mitigating impacts of large-scale infrastructure—but a "soft" approach to greening is emerging. In this essay, we trace the rapid rise of what we call *green development cooperation*: environmentally-focused activities that forge people-to-people connections with host countries. Activities include training, dialogues, research, and development projects, some of which build on existing initiatives, and some which are entirely new. Our systematic review of these engagements finds that cooperation emphasizes technocratic approaches to environment and development problems that are based on China's own experience. Cooperation thus offers a means to position China as an alternative environmental leader—a kind of green soft power—while also facilitating transfer of Chinese green technology and expertise to the Global South. At the same time, the green BRI is a fluid and malleable concept, shaped by diverse Chinese and host country actors who seek to advance their own objectives through cooperation. This carries the risk of ineffective or "greenwashed" cooperation interventions, but also creates opportunities for new forms of engagement and dimensions of coalition-building, and an important opening for improving the environmental performance of the BRI.

Implications and Key Takeaways

- At the broadest level, the green BRI discourse should be understood as just that—a *discourse*. This means that it can be used as a tool for greenwashing, but also offers a powerful platform for engagement with a diverse range of Chinese actors, many of whom are working hard to improve environmental outcomes on the BRI. Calling out cases of greenwashing is far easier than building new engagements. Attention and resources should thus target this latter more difficult but ultimately more transformative task.

- U.S. engagement should focus on identifying shared perspectives and common goals for greening the BRI, both with Chinese and BRI host country actors. China wants to be seen as a global leader in sustainable development, which provides an opportunity to work with Chinese counterparts in environmental issues of shared concern.

- Policymakers and concerned observers should build on collaborations currently in place. Many of the activities identified in this paper received some input from non-Chinese specialists hailing from multilateral institutions and NGOs. These partnerships should be encouraged and strengthened.

- At the same time, the United States should recognize that Chinese actors are mainly promoting the green BRI to their own government, not the international community. Measuring the BRI against international environmental standards is worthwhile, but leverage for change will only come through convincing Chinese decision-makers—a task that can be advanced by U.S. engagement in green cooperation.

- Moreover, the United States should view China's coalition building in the Global South as a new area of collaboration, not a contest. USAID should provide resources to equip BRI host country actors and institutions with tools to navigate China's policy and business context—and leverage these partnerships for real environment and development gains.

1. Introduction

Since it was first announced in 2013, China's Belt and Road Initiative (BRI) has attracted criticism for its environmental impacts.[1] Observers point out that China's large-scale infrastructure projects—such as roads, bridges, ports, and dams—can significantly alter ecosystems and reduce biodiversity.[2] Critics also highlight China's role in driving increased carbon emissions in BRI countries, most notably by financing and constructing fossil fuel extraction and generation infrastructure.[3] Measures to mitigate these environmental impacts, on the other hand, have been deemed insufficient. Chinese BRI projects have tended to defer to weak host country standards in assessing and regulating environmental harm, and consultation with local communities and stakeholders has been generally absent.[4] But this reticence to engage in environmental governance, we find, is changing.

China's leaders are heavily promoting the BRI as "green." This framing is more than just a pledge to minimize environmental impacts; rather, in the words of Xi Jinping, it promises to foster "a way of life that is green, low-carbon, circular and sustainable."[5] The green BRI entered official Chinese discourse in the late 2010s—embodied in dual guidelines issued by China's central government[6]—and is now a prominent feature in official speeches, communiques, and media coverage. China's leaders highlight their national dominance in renewable energy and high-speed rail as evidence of their ability to deliver on green claims along the BRI, and the country is taking an increasingly active, leadership role in global environmental governance initiatives more broadly. Outside observers, meanwhile, see both potential for greening BRI infrastructure and risks that rhetoric will not translate into meaningful change in investment decisions and construction practices.[7]

This green discourse is part of larger efforts in China to foster positive perceptions of the BRI, in part by framing it as more than just an infrastructure initiative. Xi made this point explicitly at the Third BRI Symposium in November 2021, categorizing BRI activities as "the infrastructure "hard connectivity" as an important direction, the rules and standards "soft connectivity" as an important support, with the construction of the people of the countries "heart connectivity" as an important foundation."[8] Indeed, Beijing has sought to advance these latter goals of soft power and person-to-person connections for decades, beginning with agricultural training programs in

Africa in the 1960s, and expanding to encompass trainings across sectors, policy dialogues, joint research and scholarships for study in China, and specific projects focused on rural development and poverty alleviation.[9] In the last five years, moreover, many such initiatives have been refashioned as green, incorporating the rhetoric of the green BRI. These "soft" activities exist alongside, but still apart from, "hard" infrastructure projects, offering a focused channel for advancing a vision of the BRI that is both win-win and sustainable.

In this policy paper, we offer the first systematic review of these environmentally-focused activities on the BRI, what we term "green development cooperation" (or *green cooperation* for short). Chinese leaders refer to a wide range of transnational engagements as development cooperation, and while most of these activities have begun to refer to environmental concerns, we see an emergence of trainings, dialogues, research, and development projects as the main ways China engages in explicitly green cooperation. Our analysis reveals that, since the late 2010s, the green BRI has become a core organizing principle of China's development cooperation. Green cooperation activities have increased substantially as a result. Many of these activities are delivered through existing cooperation mechanisms, such as decades-old agricultural technology demonstration centers in Africa; others are entirely new. The organizations and actors who design and implement cooperation are likewise diverse, and include foreign cooperation departments of Chinese central and provincial government ministries, state-owned and private enterprises, think tanks and research centers, and non-governmental organizations (NGOs). Cooperation initiatives target Global South countries facing environmental risks, and emphasize technological solutions drawn from China's own experience. As such, cooperation often aligns and overlaps with technology transfer and "hard" infrastructure projects, as we explore elsewhere.[10]

From a broader perspective, we find that green cooperation has become a primary venue through which China projects influence over global environmental governance—a kind of green soft power. It does so by promoting a China- and BRI-centric narrative of green development and "ecological civilization" that emphasizes technocratic and growth-oriented approaches, offering a potential alternative to the Western-led development model. At the same time, the green BRI is a fluid and malleable concept, shaped by Chinese and host country actors who seek to advance their own political, economic,

and environmental objectives. This carries the risk of ineffective or "greenwashed" cooperation interventions, but also creates opportunities for collaboration and engagement. Indeed, the rapid growth of green cooperation shows that China is serious about environmental issues. Working with rather than against this cooperation should thus be a top U.S. priority.

2. Greening the Belt and Road

Green cooperation on the Belt and Road—like the BRI itself—is rooted in China's own domestic socioeconomic and environmental context. China faces numerous well-publicized environmental challenges, which over time have prompted ever-stronger responses from China's leadership, as evidenced by the strengthening of environmental policies, targets, and government bureaucracy.[11] Underpinning these important shifts is the discourse of "ecological civilization," which was introduced into Communist Party ideology in 2007, adopted by Xi Jinping as a major framework in 2013, and elevated to a prominent position in the constitution in 2018.[12]

Ecological civilization pervades Chinese rhetoric of the green BRI. In its 2017 "Guidance on Promoting Green Belt and Road," the Communist Party Central Committee and State Council foreground the goal to "mainstream ecological civilization in the 'Belt and Road Initiative,'" while the Ministry of Environmental Protection's (MEP) "Belt and Road Ecological and Environmental Cooperation Plan" specifically states that "to 2025, we will integrate the concepts of ecological civilization and green development into the Belt and Road Initiative."[13] Indeed, the government is promoting the concept of ecological civilization heavily in multilateral contexts, including most recently its selection as the theme of the China-hosted 2021 COP15 Biodiversity Summit.[14] Chinese scholars tend to view the mainstreaming of ecological civilization positively, seeing it as a means for China to influence international environmental governance by drawing on national wisdom and experience.[15] Non-Chinese researchers and think tanks, meanwhile, show some concern that China aims to supplant existing global environmental norms and values with those drawn from ecological civilization, and to channel these through the BRI.[16]

The technocratic emphasis of efforts to green the BRI is similarly rooted in China's own experience and its domestic efforts towards sustainable develop-

ment. Hansen et al. argue that ecological civilization constitutes a Chinese state-initiated "socio-technical imaginary," meaning that it reveals "how technological values and visions of the future are interwoven with political, social, and cultural ones."[17] This imaginary portrays a continuity between China's ecological tradition and its green future, positioning technological innovation and improvement in the people's environmental consciousness as a pathway to green development. As such, this imaginary lays an epistemological foundation for "state-led technocratic processes of socio-environmental engineering,"[18] ranging from consolidation and intensification of agriculture, to construction of new hydropower and water management infrastructure, to classifying areas of the country based on monitoring of ecological health and risk. There exists a parallel emphasis on the BRI on celebrating China's technical achievements as an example (or model) for other developing countries, and therefore on interventions that transfer Chinese technocratic expertise to environmental and development problems.

Yet, while China is "talking the talk" through green BRI discourse, scholars find that it is not "walking the walk" through its investments on the Belt and Road. Jessica Liao, a 2020-21 Wilson Fellow, argues that the green BRI agenda represents the rise of China's "green mercantilism," defined as "using state capital to build a BRI-centric coalition around the issue of sustainable development in the Global South."[19] This green mercantilism seeks to woo developing countries through environmental discourse—with particular emphasis on China's expertise and technology—but it chiefly serves to advance economic and political objectives over environmental benefits. As a result, Chinese investments on the BRI are mostly comprised of "brown" infrastructure projects, including several hundred coal-fired power plants, with only limited engagement in green projects like solar and wind energy.[20] China's hydropower projects on the BRI, meanwhile, have been controversially promoted by Chinese actors as "green," despite their well-documented social and environmental impacts. Some observers thus conclude that the green BRI discourse is largely being ignored or simply "greenwashed" in favor of infrastructural and technological interventions that benefit the Chinese state and host country elites.[21] Beijing's recent pledge to end state-sponsored finance for overseas coal power projects[22] offers cause for optimism—as do new Chinese solar and wind projects in Africa[23]—but there remains a disconnect between green BRI promises and actions on the ground.

Focusing only on this disconnect, however, risks overlooking the broader implication of the green BRI: that China is centering environmental protection in how it engages as a global development partner. This engagement increasingly occurs through people-to-people cooperation activities—trainings, dialogues, research, and development projects—that are related to, but exist separately from, high-level policy discourse or infrastructure investments. This cooperation aims to strengthen China's environmental leadership and soft power, but it does so in ways that are shaped by the specific actors involved. Indeed, drawing on the literature on Chinese development aid, we can understand green cooperation as spaces of encounter, where norms and values are both advanced and co-constructed by Chinese and host country actors.[24] Understanding how this cooperation occurs can shed important light on how the green BRI is being defined in particular contexts, and how it is shaping development pathways.

3. Methods

The analysis that follows provides an assessment of the breadth of China's green cooperation through the review of related activities, then provides two in-depth case studies. Defining the types of projects that fell into our conceptualization of green cooperation in itself was an iterative process. We began by conducting a review of literature on China's green BRI in both English and Mandarin language search terms. Using this literature review as the basis for designing search terms and targeting our search for public secondary materials, we conducted a systematic review of green cooperation activities.

Information was compiled from publicly available secondary sources in Mandarin and English language. Sources include searches of the websites of foreign engagement branches of multiple Chinese state Ministries (e.g. the State Forestry Administration, the Ministry of Agriculture, the Ministry of Ecology and Environment), popular media, and reports published by related policy and academic institutions on the topics of environment and the BRI (e.g. the China Council for International Cooperation on Environment and Development, the China Academy of Belt and Road Initiative, BRI International Green Development Coalition). Projects that mentioned environmental engagements but, to the extent we could discern, did not demonstrate a substantive focus

on the environment in their related activities were excluded. Because the BRI builds upon a longer history of Chinese actors 'Going Out' (investing overseas), we include projects established before the BRI's establishment in 2013, as well as more recent projects for which implementation agreements (e.g., Memoranda of Understanding) have been established but activities on the ground are at a mixture of stages from still in planning (including those delayed by the Covid-19 pandemic) to well underway.

Finally, two case studies based on former field work conducted by the authors are presented. Previous field work on each case has been updated based on secondary sources collected through desk studies and a limited number of remotely conducted interviews.

4. Green Cooperation

Green cooperation activities are clearly on the rise. They are part of an overarching trend in which *all* types of overseas interventions by Chinese actors are referred to in connection with the Chinese state's vision of a green Belt and Road. This trend intersects with China's increasing investment in "soft" connectivity by facilitating people-to-people interactions and collaborations between Chinese actors and the rest of the world. Our review revealed four primary types of green cooperation activities initiated by Chinese actors with explicitly stated (though often broadly defined and interpreted) environmental objectives: trainings, dialogues, research, and development projects. These interventions involve encounters between Chinese actors and public and private sector decision-makers from BRI countries which go beyond the expanding sphere of formal environmental policymaking and "hard" infrastructure projects or other physical investments.

The majority of green cooperation activities captured in our review occur in three sectors: water (including hydropower), agriculture, and forestry (often connected with conservation efforts). This concentration makes sense considering that China has invested considerable resources in developing these sectors domestically and has historically focused its development aid contributions to developing countries in the same sectors. Agricultural technology demonstration centers, for example, have featured heavily in Chinese foreign aid to Africa[25] and simultaneously provide agricultural extension services,

commercial opportunities (connecting Chinese agribusinesses with farmers), and connections between Chinese and African agricultural sector state officials.[26] China's water management sector also has a long history of training developing country technicians and state representatives,[27] again unsurprising considering China's status as one of the top hydropower and irrigation technology developers in the world. Forest sector activities range from advising afforestation and anti-wildlife trafficking efforts to developing sustainable investment tools for Chinese firms like the "Guide on Sustainable Management and Utilization of Overseas Forests by Chinese Enterprises" issued by China's State Forest Administration in collaboration with WWF, The Nature Conservancy, Forest Trends, and IUCN.[28] Activities in other sectors such as urban greening, pollution and waste management, and energy initiatives are likely to increase in the future, with many currently in the planning phase.

We distinguished between four types of green cooperation activities, though there are significant overlaps between types and the actors who deliver them. The most common by far are trainings hosted by a range of Chinese state and private sector actors, many of whom have hosted annual or otherwise regular training events on certain topics for years. Institutions like chambers of commerce, business associations, think tanks, and research centers are also increasingly organizing training in their own sectors. They are especially dominant in the water sector where training accompanies sector events like trade shows, and in agriculture where China's network of agricultural training and research centers in developing countries provides a precedent for such activities. Training tends to involve the transfer of technology, standards and practices, and lessons learned from China to actors in Belt and Road countries, thus positioning China as a disseminator of technologies it has developed domestically. For example, the Ministry of Commerce and the State Forestry Administration of China held a 'Belt and Road National Nature Reserve Management and Protection Seminar' in 2021 during which participants were regaled with stories of "Chinese wisdom and Chinese solutions to the management of nature reserves and biodiversity conservation."[29] Some trainings are one-time events, such as this seminar, while other trainings constitute recurring events, such as hydropower workshops held annually at the International Center on Small Hydropower Center in Hangzhou, China.

We also document a rise in green research initiatives, dialogues and other multinational collaborations on environmental topics, and on-the-ground development projects. Sharing data between Chinese and other countries' research institutions or engaging in collaborative research, particularly to facilitate joint monitoring and assessment of shared ecosystems, is increasingly common. A number of institutions, networks, and diplomatic fora have been established that aim to facilitate dialogue and other forms of engagement between actors in China with certain regions on a range of topics including the environment (e.g., the Lancang-Mekong Environmental Cooperation Center [LMEC], discussed below) or on common specified environmental goals (e.g., the China-Africa Forest Governance Platform launched in 2013). We include in this category a particularly fast growing set of engagements between Chinese (often state and sectoral institution) actors and foreign entities (often international NGOs or their counterparts in BRI countries) establishing voluntary environmental standards. Finally, a limited but growing number of on-the-ground development projects are noted, some of which pilot the application of Chinese environmental interventions elsewhere,[30] others which seek to offset the environmental impacts of Chinese investment activities (e.g., the Mombasa-Nairobi Railway Wildlife Corridor[31]). These types of activities overlap with each other: institutions that facilitate dialogues may organize training series, these trainings may be used to launch research collaborations, and so on. Table 1 provides examples of each type.

TABLE I: Examples of the four types of green development cooperation activities

Training	Research
International Training Course on Water Conservancy and Hydropower Construction & Management (annual) *Hangzhou, China* Jointly delivered by the International Center for Small Hydropower and the Hangzhou Regional Center for Small Hydropower, which sit under auspices of UN agencies and Chinese government ministries.	**Sino-Kazakhstan Modern Agricultural Innovation Park (2016)** *Almaty, Kazakhstan* Established jointly by state-owned Yangling Modern Agriculture Demonstration Park Development and Construction Co. Ltd. (which also manages its sister park, the Shaanxi Yangling Agricultural High-tech Industrial Demonstration Zone), and Integrachia- Turgen, an agricultural company in Kazakhstan.
Capacity Building on Ecological Remote Sensing in Lancang-Mekong Countries (2018) *Hubei, China* Sponsored by the Green Lancang-Mekong Initiative, part of the Lancang-Mekong Cooperation Center.	**Egypt-China Agricultural Green Development Joint Laboratory (2021)** *Cairo, Egypt* Signed between the Egypt National Remote Sensing Space Science and the Chinese Academy of Agricultural Sciences.
Belt and Road National Nature Reserve Management and Protection Seminar (2021) *Online* Sponsored by the Ministry of Commerce and the State Forestry and Grassland Administration School of Management (China), training over 200 students from 16 BRI countries.	**China-Thailand Joint Laboratory for Climate and Marine Ecosystem (2013)** *Phuket, Thailand* Established jointly by the State Oceanic Administration (China) and the Ministry of Natural Resources and Environment (Thailand).

Dialogues	Projects
Lancang-Mekong Roundtable Dialogue on Regional and Global Environmental Governance: Action on Climate Change and Sustainable Infrastructure (2021) *Beijing, China and Online* Guided by Ministry of Ecology and Environment (China), supported by Lancang-Mekong Cooperation Secretariat, co-hosted by Foreign Environmental Cooperation Center, Lancang-Mekong Environmental Cooperation Center, and Department of Ecology and Environment of Yunnan Province (China). **Roundtable Forum on Sustainable Development and Capacity Building of Reservoir Dams and Hydropower (2019)** *Kunming, China* Organized by the Chinese Society of Dam Engineering and Chinese National Committee on Large Dams. **China-Africa Forest Governance Platform (2013)** *Cameroon, DR Congo, Mozambique, Uganda, China* Joint effort between IIED (UK government), Centre for Environment and Development (Cameroon), Reseaux Ressources Naturelles (DRC), Terra Firma (Mozambique), Advocates Coalition for Development and Environment (Uganda), the Chinese Academy of Forestry, Global Environmental Institute (Chinese NGO), and WWF (international NGO).	**Vientiane Saysettha Development Zone (2021)** *Vientiane, Laos* MOU signed by the Heads of the Ministry of Natural Resources and Environment (Laos) and the Ministry of Ecology and Environment (China), to be managed by the Lao-China Joint Venture Investment Co., Ltd. between the Yunnan Construction and Investment Holding Group and the Vientiane Municipal Government. **Mombasa-Nairobi Standard Gauge Railway Wildlife Corridor (2017)** *Kenya* China Road and Bridge Corporation, the development contractor for the Mombasa-Nairobi Railway. **"Forest-wise" Parks (Sustainable Forest Product Processing Parks) (2019)** *Nankang & Zhenjiang China, Mozambique* Memorandum of Understanding signed between China-Africa Forest Governance Project, Chinese Academy of Forestry, IIED, and Ministry of Land, Agriculture, Environment, and Rural Development of the Mozambique government.

The Lancang-Mekong Environmental Cooperation Center offers an example of how these activities are often organized and can overlap. LMEC was established by Chinese Premier Li Keqiang at the first Lancang-Mekong Cooperation Leaders' Meeting in 2016, and was formally integrated into the overall Lancang-Mekong Cooperation Framework in 2018. In its own words, the Center "aims to disseminate China's theory of environmental governance, boost the capacity of environmental governance of each country and achieve regional sustainable development through the promotion of environmental cooperation among Lancang-Mekong countries."[32] It does this primarily through what it calls the "Green Lancang-Mekong Initiative," an umbrella for all four types of cooperation activities including "policy dialogue, capacity building, mainstreaming environmental policy, joint research and the demonstration of environmental projects, etc."[33] Recent topics include water quality, ecological remote sensing, industrial gas emission standards, and waste management, with strong emphasis on technological solutions. All of these activities—and LMEC itself—operate under the auspices of China's Ministry of Ecology and Environment, but also have stated partnerships with UN agencies, international NGOs, and Chinese business associations and large SOEs.

Indeed, there is a vast array of Chinese actors engaged in green cooperation. China's environmental turn on both domestic and international fronts—through the emphasis on ecological civilization domestically and on greening the BRI—has compelled all Chinese actors to at least engage with a baseline level of environmental concerns while creating a much greater space for actors to push for environmental improvements. The Chinese state is involved across all types of green cooperation, a reality which parallels non-environmental activities in the same sectors. Standard setting activities disproportionately involve Chinese private sector actors from individual corporations (both private and state-owned) to sector business associations and research institutions. NGOs (Chinese, international, and BRI host country domestic) are also active across types and sectors but hold far more leadership roles in implementing activities in the areas of conservation and forestry. These actors are increasingly collaborating, with ties between civil society and the private sector, and between Chinese and multilateral organizations, becoming increasingly common.

Several preliminary observations emerged through the compilation and review of these green cooperation activities. Many featured activities serve as

channels for the transfer of Chinese experiences and technology alike to other countries. Such activities are referred to by Chinese proponents as South-South cooperation, and while assessing their reception as such in Belt and Road countries is beyond the scope of this report, we take the rise of green cooperation to indicate that China's environmental turn is linked to its commitment to serving as a development partner and a model for developing countries to follow. Chinese technology transfer activities occur primarily in areas where Chinese companies excel, such as the production of high-productivity seeds, irrigation management systems, and hydropower production, among others. But they also occur in these sectors because Chinese companies invest heavily in them, have experienced the costs of environmental risks, and are learning firsthand the value of preventing or mitigating them.

We take the diversity of actors engaged in green cooperation as indicative that concern for the environment has become a dominant discourse in Chinese development thinking. On one hand, much like the broader concept of sustainable development, the mainstreaming of the green BRI means that many actors will promote environmental rhetoric without actually committing to behavioral or structural change. It is simply normatively necessary for them to acknowledge the green BRI in order to continue operating. On the other hand, green cooperation offers a new space for environmental action on the BRI. New coalitions are forming, not just between natural allies, but also between actors who might generally be hostile to one another, such as Chinese firms and international NGOs. Finally, most activities documented are extremely new. This too means considerable promise for future change, but also the need for more careful, in-depth assessment of their implications. We make a first step towards such an assessment of China's green cooperation through two case studies that follow.

5. Case Study: Guidelines for Chinese Overseas Rubber Plantations

In the 2010s, the expansion of monoculture rubber plantations across the Mekong Region drove mass clear-cutting of some of the world's most biodiverse, carbon-rich forests. From 2005 to 2015, over 2 million ha of rubber

plantations were established across the region,[34] 70 percent of which replaced forest land.[35] By the mid-2010s, intense public pressure to curb the commodity's environmental impacts was building. China dominates the global rubber supply chain as the top consumer of natural rubber (41 percent of global output)[36] and a primary site of production for a range of rubber products. Domestic rubber production is concentrated in Yunnan and Hainan provinces and has long been protected as a sector of strategic importance to the country. In the 2000s, Chinese rubber companies began to expand into the Mekong Region and beyond, both establishing large-scale rubber plantations and extending processing and purchasing networks to encourage rubber uptake by local farmers. China has therefore both directly and indirectly driven the unsustainable expansion of rubber production across Southeast Asia and has come under considerable scrutiny for its role.

In 2014, China's Chamber of Commerce for Metals, Minerals and Chemicals—an industry group affiliated with the Ministry of Commerce that includes a number of downstream manufacturers of rubber-based products—entered into partnership with the UK's Department for International Development (DFID) and a handful of international NGOs. CCCMC was approached by DFID funders to spearhead the project after its leadership on a similar set of guidelines for China's overseas mining investments. The group produced a set of voluntary guidelines for companies investing in rubber production abroad titled, "The Guidance for Sustainable Natural Rubber" (hereafter The SNR Guidelines). These SNR Guidelines were developed through a series of stakeholder consultation events, studies of comparable documents beyond the rubber sector, and field visits to countries where Chinese investment is active. They were published in English and Mandarin and outline six operating principles for both environmental and social responsibility and suggestions for their implementation by companies.

The project, while prompted by DFID, was motivated as well by a growing realization among Chinese policymakers and private sector leaders that rubber investments carried serious risks when implemented without regard for environmental and social concerns. Both Chinese and Vietnamese companies had come into conflict with local land users[37] and been featured in negative media and development organization reporting,[38] and Chinese rubber companies struggled far more than expected to obtain land for rubber expansion

in Laos and Myanmar.[39] Not only did these conflicts and negative coverage create obstacles for individual companies operating, but they contradicted the promotion of Chinese rubber investments as a form of development cooperation—a crop that would both raise the livelihoods of poor farmers in the Mekong Region, contribute to host country economies, and improve China's access to a sustainable supply to the strategic material.

The SNR Guidelines represent an important early foray by Chinese actors into the area of sustainable standards setting. As such, their impact can be measured in very different ways. On one hand, the SNR Guidelines have been taken up by activist organizations in Laos, Myanmar, Cambodia, and Vietnam and in some cases adopted to local contexts and translated into local languages. These organizations draw on the fact that the SNR Guidelines come from Chinese actors to boost their legitimacy in engaging Chinese companies. That said, company engagement activities both by CCCMC and by activist organizations in host countries are still in the early stages. Field interviews in 2018 and 2019—well after the guidelines were officially launched—suggested that almost no Chinese rubber company employees were aware of them, and pilot programs launched in 2019 were slowed by the Covid pandemic.

On the other hand, the SNR Guidelines demonstrate important engagement across actors often assumed by outsiders to be at odds or not in dialogue in China. The fact that the project brought together CCCMC, an organization that bridges private sector and state interests in rubber, into collaboration with both foreign development organizations (DFID) and international NGOs like Global Witness which have been vocally critical of Chinese capital goes against dominant narratives of Chinese actors' willingness to engage with foreign civil society. CCCMC continues to engage with foreign NGOs today, and to host fora in which Chinese state, private sector, and non-Chinese state, private sector, and civil society actors come together to discuss rubber's environmental impacts.

6. Case study: Training in Small Hydropower and Green Development

Hydropower is one of the most prominent types of infrastructure projects on the BRI. According to the American Enterprise Institute (AEI) Global

China Investment Tracker, Chinese financiers invested approx. U.S.$18 billion in completed BRI hydropower dams from 2014-19, while Chinese firms were involved in engineering, procurement, and construction (EPC) contracts for approx. U.S.$40 billion worth of projects. As with many large-scale BRI projects, finance is dominated by state development and commercial banks, and construction by the many state-owned hydropower firms that Webber and Han refer to as China's "water machine."[40] Nearly all overseas projects are large-scale and dam-type installations that impound reservoirs and transmit electricity through regional or national grids. These projects have a significant environmental footprint both in the local area and downstream, and many require resettling affected communities. These impacts have prompted strong opposition to Chinese hydropower projects at the local, national, and global levels, despite their continued popularity with many BRI host country governments.

China's hydropower industry portrays hydropower as a green and low-carbon technology that is essential to decarbonization. China, like many (but not all) countries, classifies hydropower as a renewable energy, and substantial new domestic installations are calculated as part of China's Nationally Determined Contributions (NDCs) in the Paris Agreement. Chinese negotiators also pushed for hydropower projects to be eligible for carbon offset finance as part of the Kyoto Protocol Clean Development Mechanism (CDM).[41] Indeed, domestic hydropower projects in China were by far the chief recipients of CDM finance across all countries and sectors,[42] contributing to a hydropower boom in China that is set to continue. Critics thus tend to see China's (and the broader global hydropower industry's) promotion of green hydropower as an attempt at "greenwashing" and facilitating continued domestic and international expansion.[43]

Yet, this view elides a much longer and more expansive history of "green" hydropower in China, and the specific experiences, technologies, and standards that are promoted internationally. Indeed, the genesis of China's "greening" of hydropower lies in the overlooked small hydropower (SHP) industry, a classification that in China refers to projects <50 megawatts (MW). Since the 1950s, China's central government has promoted (and at times, subsidized) SHP projects in rural areas as a method of rural electrification, which provided millions of Chinese villagers with their first electricity connection.[44]

Beginning in the early 2000s, the government also began upholding SHP as a driver of "green development," because it was believed to replace peasant firewood with electricity, thereby preventing deforestation and soil erosion.[45] To encourage SHP development, the government set aside ¥127 billion for SHP station and transmission line construction, and cut household electricity tariffs in half in some of the poorest areas of the country.[46] These policies, along with energy sector reforms, precipitated a boom in SHP construction, with installed capacity tripling from 2002-15. Most of these new stations are privately-developed and operated, in contrast with SOE-dominated large hydropower dams.[47]

It is in this context that Chinese state ministries are sponsoring and delivering "green" SHP training and technology transfer programs for BRI countries. This training, too, has a long history. In 1981, China's Ministry of Water Resources established the National Research Institute for Rural Electrification, which gained co-sponsorship from the United Nations Development Program (UNDP) and began referring to itself in English as the Hangzhou Regional Center for Small Hydropower (HRC). In 1994, the Ministry of Science and Technology and the United Nations Industrial Development Organization (UNIDO) created another institution, the International Center for Small Hydropower (ICSHP), which has a more international focus but significant cross-pollination with HRC staff and activities. Together, these two organizations offer a number of weeks-long training courses for international participants each year, while also acting as a center for SHP expertise and a central node of a global network of SHP experts, manufacturers, and EPC contractors.[48] By their own account, since their inception, HRC and ICSHP have hosted 160 training courses for participants from 112 countries, focused on hydropower technologies, construction, policies, and standards.[49] Both organizations also offer their own for-profit consulting and EPC services for small- and medium-sized projects in China and overseas, and also facilitate finance for overseas projects from Chinese banks.

While HRC and ICSHP programs have long praised the role of SHP in rural electrification, they are increasingly promoting its environmental benefits, too—particularly since the green BRI gained prominence in the late 2010s. Like green cooperation as a whole, SHP training draws heavily on the rhetoric of ecological civilization—as evidenced by titles of recent

symposia and training courses—and emphasizes Chinese experience and technology as a means to combat environmental risk. These themes are integrated into course materials and site visits. For example, a typical training workshop begins with several days of presentations on China's SHP experience, stressing in particular how SHP has prevented deforestation in ecologically sensitive regions of China. Participants then listen to lectures on hydropower technologies (such as turbines, electrical equipment, and dam types) and take field trips to SHP "demonstration sites" where they can tour Chinese facilities and ask technical questions about equipment manufacturing and plant operation. Throughout, trainers repeatedly stress the quality and reliability of Chinese SHP technology and its critical role in China's own green development.

Still, while promoting SHP as "green," training staff also point to the potential ecological impacts of small hydropower, highlighting domestic examples from parts of China where SHP did not develop in an "orderly" manner. This recognition helps to diffuse potential criticism, but also to highlight China's new domestic evaluation standards for green SHP, which include guidance on site selection, environmental impact analysis, and construction and operation. China's domestic SHP plants can apply for green certification under these official standards, either in the process of building a new plant, or through renovation of existing plants. These standards are widely viewed by Chinese SHP experts as bringing the domestic SHP industry in line with international norms, with the hope that they will increase the global competitiveness of Chinese SHP on the BRI.

Thus far, these green standards—and green SHP training programs more broadly—have had little influence over China's hydropower projects on the Belt and Road. Chinese SHP firms are encouraged to adopt new standards for domestic projects, but have no incentive to do so for overseas projects—meaning that most BRI plants simply abide by (often lax) host country regulations. Perhaps more importantly, the vast majority of Chinese-financed and/or constructed SHP plants on the BRI are medium-sized, grid-connected, and usually unsubsidized, such that they privilege power generation over rural electrification and forest protection. Indeed, Chinese SHP experts admit that the green, pro-poor SHP promoted in training programs is difficult to implement in other countries without strong host government support and

subsidies. Rather, water-rich BRI countries tend to prefer large hydropower projects backed by Chinese policy banks and built by SOEs, to which green SHP standards and technologies do not apply.

At the same time, China's cooperation in green SHP has brought together domestic and foreign actors from government, industry, and civil society who might not otherwise collaborate. Organizations like HRC and ICSHP provide a forum for this collaboration by working under the auspices of both the United Nations and the Chinese government. Training programs and joint development of standards, while still limited to SHP, reveal how such longstanding development activities are being reframed and reworked as green.

6. Conclusion

The BRI has an enormous environmental footprint, and China's attempts to green this footprint are both necessary and welcome. This paper highlights that such efforts are very much underway, pointing to a rapid increase in the last five years in Chinese-led trainings, dialogues, research, and development projects focused on the green BRI. These myriad activities—which we term green cooperation—build upon longstanding development cooperation between China and other countries, particularly in the realms of water, agriculture, and conservation. Such cooperation is now placing the environment at the forefront, drawing on China's domestic efforts (and in some cases, global leadership) in strengthening environmental protection. Indeed, just as the environment has become a central tenet of domestic policy making and development planning in China, greening the BRI and green cooperation are becoming mainstream.

An analysis of this cooperation itself reveals a strong focus on technological solutions to environmental problems, drawn from China's own historical and contemporary experience. This perspective is grounded in the concept of "ecological civilization," which China's leaders promote internationally as a rallying principle for win-win and sustainable development. For the many Chinese actors and institutions involved in cooperation—including government ministries, state and private firms, think tanks, and NGOs—there is thus a clear connection between China's own domestic environmental transformation and its push to green the BRI. Our case studies of rubber and hydropower

show that this push at times is superficial and opportunistic, but the broader momentum of change is genuine and holds massive opportunity.

Concerned governments and institutions, then, should identify and focus on shared goals and perspectives for a green BRI, engaging with rather than working against China's green cooperation. Analysis of cooperation in this paper and of our rubber and hydropower case studies shows that collaboration for a green BRI is possible, even if its current implementation is limited. Simply labeling China's green cooperation as an attempt at "greenwashing" will only deepen mistrust; it is far better to engage in and seek to strengthen this cooperation. Indeed, the joint climate pledges from China and the U.S. at COP26 illustrate the possibility for collaboration on norms and standards—an outcome we hope to see replicated on the BRI.

The views expressed are the author's alone, and do not represent the views of the U.S. Government or the Wilson Center.

Notes

1 Elena F. Tracy et al., "China's New Eurasian Ambitions: The Environmental Risks of the Silk Road Economic Belt," *Eurasian Geography and Economics* 58:1 (January 2017), 56–88; Fernando Ascensão et al., "Environmental Challenges for the Belt and Road Initiative," *Nature Sustainability* 1:5 (May 2018), 206–9; Hoong Chen Teo et al., "Environmental Impacts of Infrastructure Development under the Belt and Road Initiative," *Environments* 6:6 (June 2019), 72.

2 Li Shuen Ng et al., "The Scale of Biodiversity Impacts of the Belt and Road Initiative in Southeast Asia," *Biological Conservation* 248 (August 1, 2020), 108691; Xuan Liu et al., "Risks of Biological Invasion on the Belt and Road," *Current Biology* 29:3 (February 2019), 499-505.\\uc0\\u8221{} {\\i{}Biological Conservation} 248 (August 1, 2020

3 Peng Ren, Chang Liu, and Liwen Zhang, "China's Involvement in Coal-Fired Power Projects along the Belt and Road," Global Environmental Institute, May 2017. Accessed on March 14, 2022. http://www.geichina.org/_upload/ file/report/China percent27s_Involvement_in_Coal-fired_Power_Projects_OBOR_EN.pdf; Ning Zhang et al., "Carbon Footprint of China's Belt and Road," *Science* 357: 6356 (September 2017), 1107.

4 Scott Morris, "The Kunming-Vientiane Railway: The Economic, Procurement, Labor, and Safeguards Dimensions of a Chinese Belt and Road Project," CGD Policy Paper 142, Center for Global Development, May 17, 2019. Accessed on March 14, 2022. https://www.cgdev.org/publication/kunming-vientiane-railway-economic-procurement-labor-and-safeguards-

dimensions-chinese; Xiheng Jiang, "Green Belt and Road Initiative Environmental and Social Standards: Will Chinese Companies Conform?" *IDS Bulletin* 50:4 (December 2019); FOE, "Investing in a Green Belt and Road? Assessing the Implementation of China's Green Credit Guidelines Abroad," Friends of the Earth (FOE), December 2017. Accessed on March 14, 2022. https://foe.org/resources/green-belt-china-green-guidelines/

5 Liqiang Hou, "Nation Will Promote Green Belt and Road," *China Daily*, November 3, 2018. Accessed on March 14, 2022. http://www.chinadaily.com.cn/a/201811/03/WS5bdcee26a310eff30328651b.html

6 MEP, "Belt and Road Ecological and Environmental Cooperation Plan," China Ministry of Environmental Protection (MEP), May 28, 2017. Accessed on March 14, 2022. https://english.mee.gov.cn/Resources/Policies/ policies/ Frameworkp1/201706/t20170628_416869.shtml; China State Council, "Guidance on Promoting Green Belt and Road," May 8, 2017. Accessed on March 14, 2022. https://eng.yidaiyilu.gov.cn/zchj/qwfb/12479.htm

7 Jonathan Elkind, "Toward a Real Green Belt and Road," Columbia University Center on Global Energy Policy, April 2019. Accessed on March 14, 2022. https://www.energypolicy.columbia.edu/research/commentary/toward-real-green-belt-and-road; Tsinghua, "Decarbonizing the Belt and Road: A Green Finance Roadmap," Center for Finance and Development, Tsinghua University, September 2, 2019. Accessed on March 14, 2022. https://www.climateworks.org/wp-content/uploads/2019/09/Decarbonizing-the-Belt-and-Road_report_final_lo-res.pdf; WRI, "Moving the Green Belt and Road Initiative: From Words to Actions," World Resources Institute (WRI), November 8, 2018. Accessed on March 4, 2022. https://www.wri.org/research/moving-green-belt-and-road-initiative-words-actions; WWF, "Greening the Belt and Road Initiative: WWF's Recommendations for the Finance Sector," World Wildlife Fund (WWF), January 1, 2018. Accessed on March 14, 2022. https://www.sustainablefinance.hsbc.com/mobilising-finance/greening-the-belt-and-road-initiative

8 Xinhua, "习近平出席第三次‘一带一路’建设座谈会并发表重要讲话 (Xi Jinping Attended the Third 'Belt and Road' Construction Symposium and Delivered an Important Speech)," *Xinhua*, November 19, 2021. Accessed on March 14, 2022. http://www.gov.cn/xinwen/2021-11/19/content_5652067.htm.

9 Kenneth King, *China's Aid and Soft Power in Africa: The Case of Education and Training* (Rochester, NY: James Currey, 2013); James Reilly, "A Norm-Taker or Norm-Maker? Chinese Aid in Southeast Asia," *Journal of Contemporary China* 21:73 (January 2012), 71–91; Deborah Bräutigam, *The Dragon's Gift: The Real Story of China in Africa* (Oxford: Oxford University Press, 2009); Maria Repnikova, *Chinese Soft Power* (Cambridge, UK: Cambridge University Press, 2022).

10 Tyler Harlan and Juliet Lu, "The Cooperation-Infrastructure Nexus: Translating the 'China Model' into Southeast Asia," Working paper, 2022.

11 Yifei Li and Judith Shapiro, *China Goes Green: Coercive Environmentalism for a Troubled Planet* (Cambridge: Polity Press, 2020).

12 Mette Halskov Hansen, Hongtao Li, and Rune Svarverud, "Ecological Civilization: Interpreting the Chinese Past, Projecting the Global Future," *Global Environmental Change* 53 (November 2018), 195.

13 China State Council, "Guidance on Promoting Green Belt and Road," 1; MEP, "Belt and

Road Ecological and Environmental Cooperation Plan," 5.

14 Juliet Lu and Tyler Harlan, "COP15 in Kunming: A New Role for China in Global Conservation?" *Wilson Center Asia Dispatches*, October 19, 2021. Accessed on March 14, 2022. https://www.wilsoncenter.org/blog-post/cop15-kunming-new-role-china-global-conservation

15 Xiaofeng Liu and Mia M. Bennett, "The Geopolitics of Knowledge Communities: Situating Chinese and Foreign Studies of the Green Belt and Road Initiative," *Geoforum* 128 (January 2022), 176.

16 Liu and Bennett, 176.

17 Hansen, Li, and Svarverud, "Ecological Civilization," 196.

18 Jesse Rodenbiker, "Urban Ecological Enclosures: Conservation Planning, Peri-Urban Displacement, and Local State Formations in China," *International Journal of Urban and Regional Research* 44:4 (June 2020), 1931.

19 Jessica Liao, "China's Green Mercantilism and Environmental Governance: A New Belt and Road to the Global South?" in *Essays on the Rise of China and its Implications,* ed. Abraham M. Denmark and Lucas Myers, Woodrow Wilson International Center for Scholars, April 2021), 242. Accessed on March 14, 2022. https://www.wilsoncenter.org/publication/2020-21-wilson-china-fellowship-essays-rise-china-and-its-implications

20 Jessica C. Liao, "Talking Green, Building Brown: China-ASEAN Environmental and Energy Cooperation in the BRI Era," *Asian Perspective* 46:1 (Winter 2022): 21–47; Tyler Harlan, "Green Development or Greenwashing? A Political Ecology Perspective on China's Green Belt and Road," *Eurasian Geography and Economics* 62:2 (March 2021), 202–26.

21 Maddy White, "China's Belt and Road Initiative: Green Leadership or Greenwashing?" *Global Trade Review*, October 14, 2020. Accessed on March 14, 2022. https://www.gtreview.com/news/sustainability/chinas-belt-and-road-initiative-green-leadership-or-greenwashing/; Jane Nakano, "Greening or Greenwashing the Belt and Road Initiative?" Center for Strategic and International Studies (CSIS), May 1, 2019. Accessed on March 14, 2022. https://www.csis.org/analysis/greening-or-greenwashing-belt-and-road-initiative; Harlan, "Green Development or Greenwashing?"

22 Quirin Schiermeier, "China's Pledge on Overseas Coal — by the Numbers," *Nature* 598:7879 (September 2021), 20–21.

23 Bo Kong and Kevin Gallagher, "Chinese Development Finance for Solar and Wind Power Abroad," Working Paper 009, Global China Initiative (GCI), Global Development Policy Center, Boston University, January 2020). Accessed on March 14, 2022. https://www.bu.edu/gdp/files/2020/02/WP9-Kong-Bo-inc_abstract.pdf; Frangton Chiyemura, Wei Shen, and Yushi Chen, "Scaling China's Green Energy Investment in Sub-Saharan Africa: Challenges and Prospects," Institute of Development Studies, The African Climate Foundation, and The Open University, November 2021). Accessed on March 14, 2022. https://africanclimatefoundation.org/wp-content/uploads/2021/11/800539-ACF-NRDC-Report.pdf

24 Xiuli Xu et al., "Science, Technology, and the Politics of Knowledge: The Case of China's Agricultural Technology Demonstration Centers in Africa," *World Development* 81 (May 2016), 82–91; Tyler Harlan, "A Green Development Model: Transnational Model-Making in China's Small Hydropower Training Programmes," *Area Development and Policy* 2:3 (June 2017), 251–71.

25 Xu et al., "Science, Technology, and the Politics of Knowledge: The Case of China's Agricultural Technology Demonstration Centers in Africa."

26 Henry Tugendhat and Dawit Alemu, "Chinese Agricultural Training Courses for African Officials: Between Power and Partnerships," *World Development* 81 (May 2016), 71–81.

27 Harlan, "A Green Development Model: Transnational Model-Making in China's Small Hydropower Training Programmes"; Michael Webber and Xiao Han, "Corporations, Governments, and Socioenvironmental Policy in China: China's Water Machine as Assemblage," *Annals of the American Association of Geographers* 107:6 (November 2017), 1444–60.

28 SFA and MOFCOM, "A Guide on Sustainable Overseas Forest Management and Utilization by Chinese Enterprises," China State Forestry Administration (SFA) and Ministry of Commerce (MOFCOM), August 24, 2009. Accessed on March 14, 2022. https://www.iucn.org/content/a-guide-sustainable-overseas-forest-management-and-utilization-chinese-enterprises

29 Yi Sui, "一带一路" 国家自然保护区管理与保护研修班顺利开班 ('Belt and Road' National Nature Reserve Management and Protection Seminar Successfully Launched)," China State Forestry and Grasslands Administration and National Parks Management Bureau, September 22, 2021). Accessed on March 14, 2022. http://www.forestry.gov.cn/stafa/563/20210922/170243695211476.html

30 United Nations, "High-Level Meeting on Juncao Technology," General Assembly of the United Nations, April 18, 2019. Accessed on March 14, 2022. https://www.un.org/pga/73/2019/04/18/high-level-meeting-on-juncao-technology/

31 Xinhua, "Chinese Infrastructure Projects Built on Solid Environmental Foundations," *China Daily*, October 28, 2021. Accessed on March 14, 2022. https://global.chinadaily.com.cn/a/202110/28/WS6179ee11a310cdd39bc71be2.html.

32 LMEC, "Lancang-Mekong Environmental Cooperation Center (LMEC)," 2022. Accessed on March 14, 2022. http://en.lmec.org.cn/.

33 LMEC.

34 Eleanor Warren-Thomas, Paul M. Dolman, and David P. Edwards, "Increasing Demand for Natural Rubber Necessitates a Robust Sustainability Initiative to Mitigate Impacts on Tropical Biodiversity," *Conservation Letters* 8: (March 2015), 230–41.\\uc0\\u8221{} {\\i{} Conservation Letters} 8, no. 4 (2015

35 Kaspar Hurni and Jefferson Fox, "The Expansion of Tree-Based Boom Crops in Mainland Southeast Asia: 2001 to 2014," *Journal of Land Use Science* 13:1–2 (March 2018), 198–219.

36 Research and Markets, "Global and China Natural Rubber Industry Report 2019-2025," Research and Markets, 2019. Accessed on March 14, 2022. https://www.researchandmarkets.com/reports/4770751/global-and-china-natural-rubber-industry-report?utm_source=GNOM&utm_medium=PressRelease&utm_code=7893kx&utm_campaign=1248494+-+Global+and+China+Natural+Rubber+Industry+Report percent2c+2019-2025&utm_exec=chdo54prd.

37 Inclusive Development International, "Cambodia: Defending Indigenous Rights and Resources against HAGL Land Grab," Inclusive Development International, 2021. Accessed on March 14, 2022. https://www.inclusivedevelopment.net/cases/cambodia-hoang-anh-gia-lai-rubber-plantations/; Karen E. McAllister, "Rubber, Rights and Resistance: The Evolution of Local Struggles against a Chinese Rubber Concession in Northern Laos," in *Global*

Land Grabbing and Political Reactions 'From Below,' ed. Mark Edelman et al. (New York: Routledge, 2019), 351–72.

38 Global Witness, "Rubber Barons: How Vietnamese Companies and International Financiers Are Driving the Land Grabbing Crisis in Cambodia and Laos," Global Witness, May 2013). Accessed on March 14, 2022. https://www.globalwitness.org/en/campaigns/land-deals/rubberbarons/.

39 Juliet Lu and Oliver Schönweger, "Great Expectations: Chinese Investment in Laos and the Myth of Empty Land," *Territory, Politics, Governance* 7: 1 (January 2019), 61–78.

40 Webber and Han, "Corporations, Governments, and Socioenvironmental Policy in China: China's Water Machine as Assemblage."

41 John A. Sautter, "The Clean Development Mechanism in China: Assessing the Tension between Development and Curbing Anthropogenic Climate Change," *Virginia Environmental Law Journal* 27:1 (2009), 91–118.

42 UNEP and DTU, "UNEP DTU Clean Development Mechanism / Joint Implementation Pipeline Analysis and Database," United Nations Environment Program (UNEP) and Danish Technical University (DTU), 2022. Accessed on March 14, 2022. http://www.cdmpipeline.org/

43 Jessica Corbett, "Hundreds of Groups Reject Greenwashing of Destructive Hydropower Industry at COP26," *Common Dreams*, November 9, 2021. Accessed on March 14, 2022. https://www.commondreams.org/news/ 2021/11/09/hundreds-groups-reject-greenwashing-destructive-hydropower-industry-cop26

44 HRC, *Rural Hydropower and Electrification in China*, 2nd ed., Hangzhou Regional Center for Small Hydropower (Hangzhou, China: China Water Press, 2009); Wuyuan Peng and Jiahua Pan, "Rural Electrification in China: History and Institution," *China & World Economy* 14:1 (February 2006), 71–84.

45 Tyler Harlan, "Rural Utility to Low-Carbon Industry: Small Hydropower and the Industrialization of Renewable Energy in China," *Geoforum* 95 (October 2018), 59–69.

46 Charlotte Hicks, "Small Hydropower in China: A New Record in World Hydropower Development," *Refocus* 5:6 (November-December 2004), 36–40.

47 Harlan, "A Green Development Model: Transnational Model-Making in China's Small Hydropower Training Programmes."

48 Harlan, 259.

49 ICSHP, "International Center on Small Hydropower," 2022. Accessed on March 14, 2022. http://www.icshp.org/inshp/default.asp; HRC, "Hangzhou Regional Center for Small Hydropower," 2022. Accessed on March 14, 2022. http://www.hrcshp.org/en/about/hrc.html.