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**E**nergy infrastructure is critical to the future of any rapidly emerging economy. Unprecedented rates of growth in the global south have quickly raised the stakes for finding plentiful, low-cost energy technology options to keep pace with development needs. This demand has been a significant factor but is not the only one driving a global resurgence in the deployment of large energy infrastructure, and in particular, the hydroelectric dam. Nevertheless, the increasing number of dam projects deployed in developing countries over the last two decades that perform poorly regarding their economy, the environment, human rights, inequality and wealth distribution, as well as public support, all illustrate a seeming disconnect between planners, stakeholders, and our technological energy solutions of choice.

The literature generally focuses on a techno-managerial assessment of large-scale energy projects, highlighting issues of technical and economic performance, environmental risk, and the impacts of social displacement. Beyond economic and technocratic analyses of impact and mitigation, we argue that truly comprehensive energy project assessment should consider the contemporary and historical global contexts within which such developments are embedded. That is, we

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# Mundane Is the New Radical

*The Resurgence of Energy Megaprojects and Implications for the Global South*



Katse Dam in Lesotho, Africa.

argue for examining the processes that give rise to energy projects, alongside consequences thereof. Such an assessment shows that balancing the need for large energy infrastructure with local and contextualized solutions is a major challenge that, more than technological

dynamics, may be a challenge of cultural dynamics. We posit that addressing such seemingly mundane issues is the radical solution needed for sustainable infrastructure development, by exploring global drivers of the dam resurgence and discussing implications for policy.

## Global Drivers of the Large-Scale Energy Infrastructure Resurgence

### *The Great Economic “Convergence”*

The economic separation of early industrializers from the rest of the world during the Industrial Revolution, often termed “the great divergence,” has characterized our global political and economic hegemony for the past two centuries (1)–(3). But now, a historic change is taking place. A “great convergence” is underway as less developed countries quickly adopt the technology, competence, and policies that formerly propelled the developed world (4)–(6). United Nation’s Human Development data shows that for the first time in over 150 years the combined output of today’s most populous emerging markets — China, India, and Brazil — is equal to the combined GDP of all the major industrial powers of the north — Canada, France, Germany, Italy, the United Kingdom, and the United States — representing a major rebalancing of global economic power.

In fact, it is projected that China, India and Brazil alone will make up over 40% of global GDP by 2050 (7, p. 13), and the “convergence” is far beyond these three (8). Countries such as Mexico, Bangladesh, Tanzania, and Yemen and at least forty others have registered significant growth this decade and other breakout nations such as Afghanistan and Pakistan had some of the fastest growth rates in the world over the past ten years. On average, non-oil, non-small developing countries have seen GDP per capita increasing at a rate of 3% per year since the 1990s. Today, the South produces about half of world economic output, up from a third in 1990 (7, p. 13). While there have been periods of rapid growth for individual countries in the past, seldom in the last

50 years have we seen episodes where so many poor countries have simultaneously done well as in the decade preceding the recent Global Financial Crisis (9).

The evidence is clear, says the UN Human Development Report 2013, that “the rise of the South is unprecedented in its speed and scale. Never in history have the living conditions and prospects of so many people changed so dramatically and so fast. This change represents a global rebalancing far greater than that experienced during the Industrial Revolution. The Industrial Revolution was a story of perhaps 100 million people, but this is a story about billions of people” (7, p. 11).

This change in economic dynamics over the past decade is due in part to the differing experiences of Northern and Southern countries during and after the Global Financial Crisis of the 21st century. In the past, Northern countries served as the major importers of goods from Southern countries, such that as Northern economies grew or receded and as demand increased or decreased it would have a trickle-down effect on the export economy of less developed countries. The 21st century recession that resulted has largely upended this relationship.

It is argued that in developed countries the crisis stemmed from, in part, a constriction of credit flow, which followed the burst of the housing and oil price bubbles caused by excessively low interest rate policies from financial institutions (10). Initially emerging economies “dodged the housing crisis that froze credit markets in the United States and Europe and that threw the rich world into the worst downturn since the 1930s. They never had to bail out their banks or endure the high unemployment and stagnant growth that historically follow financial crises” (11). While the reduced

spending and reduced demand from markets in advanced countries did eventually have impact on less developed countries, they were able to keep growing in the aftermath of the crisis, albeit more slowly, unlike most advanced economies which registered negative growth for many years after the crisis.

Economic growth alone does not automatically translate into human development progress. But Southern countries are not just tapping into global trade, they are also improving health, communication, and education services, which continue to support the growth experienced since the 2000s. This contrasts with contemporary policies adopted by many Northern countries which include austerity measures and cutting of social programs post-economic crisis. Experts say that it is this combination of policies, population growth and global economics that has allowed the middle class in the South to expand so rapidly (7). In fact the UN projects that by 2030 more than 80% of the world’s middle class will reside in developing countries and account for 70% of total consumption expenditure globally (7, p. 14).

### *Global South’s Growing Middle and Energy Demand*

With this unprecedented improvement in aggregate human development scores, we are now seeing an increasing demand for basic services across the globe. Improved water and sanitation access along with reliable energy services have become major Millennium and now Sustainable Development Goals (SDGs). The U.S. Energy Information Administration (EIA) projects that due to population growth, non-Organization for Economic Cooperation and Development (OECD) economies will account for more than half of the world’s total increase in

energy consumption until 2040, at which point they will account for two thirds of world total (12, p. 1). In contrast, more mature energy-consuming and slower growing OECD countries will see total energy use increase only 18% by 2040.

This is compounded by the fact that energy consumption “per person” is also predicted to rise as developing countries grow not only bigger (more populous) but richer, as mentioned in the previous section. As middle-income groups in these countries grow larger, demands for improved standards of living, such as for better housing and sanitation, increase. As demands for housing, appliances, and transportation increase, energy capacity must also increase to produce food, infrastructure, goods, and services for both domestic and foreign markets, leading to higher per capita energy consumption. Whereas energy use per capita will remain flat in OECD countries over the next 30 years, EIA forecasts more than half the increase in global energy consumption will come from non-OECD countries across Asia, the Middle East, Africa, and Latin America in the same time period, even accounting for efficiency gains (12, p. 8).

We are seeing an increased focus on the need for electricity services in places where it has not been as major a human development focus before. Infrastructure has moved from being a “simple precondition for production and consumption to being at the very core of these activities” (13, p. 2). This energy “pivot” to the South has given rise to a surge in large-scale energy infrastructure projects to facilitate industrial productivity and consumption (14).

### ***Emerging Role of the Global South in Climate Change Mitigation***

At the same time that energy demand grows sharply in the global south,

there is also currently an increased global awareness of climate change and an international commitment to reducing emissions to limit temperature to under a 2 °C increase over pre-industrial levels. This was recently affirmed as the Paris Agreement was ratified by over 140 countries (15). In the past, world leaders have argued that rich, industrialized countries created the global warming problem with their industrial emissions and should bear the larger brunt of emissions reduction — this has been a well-known sticking point in past climate negotiations (16), (17).

But climate experts and now even officials from developing nations are saying “there is no way that global warming can be kept below the international 2 °C goal without dramatic limits in future emissions from the developing nations (because) under a Business As Usual (BAU) scenario, most emission growth will come from the anticipated increase in fossil fuel use by developing nations” (18). Experts find that approximately two-thirds of avoided emissions will have to come from the developing world to meet the collective goal, which means that new targets such as the “High Ambition Coalition” target of 1.5 °C, which while making very sound climate sense, poses particular challenges for developing nations (18).

Given the threat of global warming and the yet essential nature of electricity to development, low-emission energy solutions that supply massive amounts of power are in high demand (19). This brings us to the hydro-electric power dam, our large energy infrastructure technology of focus.

### ***Southern Investors and New Finance for Development Projects***

Historically speaking, dams and hydroelectric infrastructure have

always been on the international and national development agenda for modernization. Such projects were generally financed by international development cooperation agencies and multilateral development banks (MDBs). But the World Bank eventually came under strong fire for its lack of attention to the negative impacts of many of these projects, particularly regarding population displacement. The late 1990s were “characterized by escalating debates over large dams” (20) and fierce discussions over a number of high profile cases such as India’s controversial Sardar Sarovar Dam.

Furthermore, cost overruns are typical and well-documented in hydropower finance. A recent Oxford study analyzed a sample of large dams built between 1934 and 2007 and found that three of every four dams suffer from cost overruns, one of every two dams had costs that exceeded benefits, and that the actual cost of dams is on average double their estimated costs (21).

Mounting international pressure arose against dams during this period. The World Bank was eventually forced to pull out of the Sardar Sarovar project after an independent review in 1993 (22). The participation of MDBs in large-scale dam projects quickly subsided. At the World Bank alone investments in hydropower declined by 90% between 1992 and 2002 (23). Consequently, there was a noted lull in international mega-dam funding during the 1990s.

Yet at the same time other events were brewing. In the aftermath of the 1997 Asian Financial Crisis, several Southern countries began developing new monetary arrangements for lending. Added to the South’s growing financial reserves coming out of the 2009 Global Financial Crisis, this has transformed global financial architecture, such that the South

has now become a major source of foreign direct investment (FDI). Most important is that this Southern investment is directed back to the South (23).

The World Bank, the International Finance Corporation (IFC), and the World Trade Organization (WTO) all acknowledge the dramatic uptake of South-South FDI. In fact it is projected that South-South trade will soon overtake trade between developed nations (24). The combined value of FDI outflows from Brazil, Russia, India, China and South Africa (the “BRICS” countries) alone skyrocketed from U.S.\$7 billion in 2000 to U.S.\$126 billion in 2012, with nearly 58% being received by other developing countries. So though still a relatively small volume of total direct investment outflow, South-South FDI is growing at an annual rate of 21% (23).

Developing Asia is the largest recipient of FDI inflow, and accounted for nearly 30% of global FDI in 2013. China has strengthened its position as “one of the leading sources of FDI, and its outflows are expected to surpass inflows within two years.” Flows to African countries have also increased significantly. Between 1992 and 2011, China’s trade with Sub-Saharan Africa alone rose from U.S.\$1 billion to more than U.S.\$140 billion (7), (25). Africa’s FDI inflow increase is sustained in part by growing intra-African flow, from growing consumer markets. The share of investment projects originating from within Africa increased to 18% in 2013 from 10% in 2008 (26, p. 19). This intra-regional investment front is led by Transnational Corporations (TNCs) from South Africa, Kenya, and Nigeria.

The rapid growth of Chinese outward FDI by both state-owned and private Chinese corporations was also catalyzed by deregulation. The Chinese government has been

actively encouraging firms to invest overseas through its “Going Out” policy since 2000 (27). Then in 2009 the Law Concerning the Control of Outward FDI by the Chinese Ministry of Commerce came into force, transferring authority to approve investment plans to local governments and greatly simplifying application criteria and process. In one year Chinese outward to inward FDI ratio jumped 10 percentage points and from 49% in 2009 to 55.8% in 2010 (28, p. 148). As a result, “China significantly expanded its resources and energy availability base, in addition to gaining a foothold in the global manufacturing sector” (28, p. 147). Many southern national and multilateral development banks, such as the Asian Infrastructure Development Bank (AIDB) also expanded global development financial flows, with banks able to craft their own lending policies as outward FDI became increasingly deregulated.

Thus national development banks and private investors from emerging economies such as China, Brazil, Thailand, and India have picked up the slack in international investment where MDBs like the World Bank left off (23), (29)–(31).

### ***A Critical Culmination: The Large Dam Resurgence***

All these conditions combined provide the ingredients for a great resurgence. Increasing energy demand in the global south is being partly driven by changes in the global economy and together with increasing focus on climate change mitigation commitments from the South act as a driver for low-emission technologies that deliver massive amounts of power — ostensibly in the form of projects such as the mega-dam. New investment opportunities for such projects have emerged from the south, filling the

gap left by a northern MDBs financing downturn.

And indeed this is the boom we are seeing — globally, between 2005 and 2011, newly installed hydropower capacity outpaced new generation capacity from all other renewables combined, driven mostly by hydropower development in Asia, led by China, where — as discussed earlier — energy security has become a significant concern for sustaining its economic development (32), (33). Already home to more than half the world’s dams, China has built 850 more since 2000, scores of these since 2005. India has added 296 dams since 2000 and together countries like Brazil and Peru in the Amazonian basin have built or are planning over 400 new dams (34). Indeed, new and resumed construction of mega-dams is underway across the global south, from Latin America to Asia and Africa.

Beyond its own borders, China is also funding or building more than 350 dams around the world (27). Emerging as “contender to the power of western donors” (29), China is participating in at least \$9.3 billion of hydropower projects across the African continent (35). Companies like Sinohydro Corporation and Dongfang Electric Corporation financed by Chinese banks are investors behind the \$2.2 billion Gibe III in Ethiopia (Africa’s tallest dam), Egypt’s \$705 million Kajbar Dam, and Ghana’s \$729 million Bui Dam on the Black Volta River. In recent years, Chinese investors have been particularly active in neighboring countries along transboundary rivers such as the Mekong (27). In Southeast Asia, the Three Gorges was completed in 2006, the Lao Nam Theun was completed in 2010, while over 40 GW of hydropower is now planned in the Mekong Basin and in East Malaysian Borneo a series of twelve mega-dams are under development. China

is involved in building over 125 dams in Southeast Asia, representing 45% of all Chinese overseas dams (36). “According to the Lao government’s own figures, by the end of 2016 Chinese companies had signed up for US\$6.7 billion worth of construction projects in the country” — some 30% of the total earmarked for Laos’ Mekong basin, making Laos the third-largest market for China in the Association of Southeast Asian Nations (ASEAN) bloc (37).

The Intergovernmental Panel on Climate Change (IPCC) predicts that hydropower generation will double in China between 2008 and 2035, and triple in India and Africa over the same period (38). At least 3700 major dams, each with a capacity of more than 1 MW, are either planned or under construction, primarily in countries with emerging economies. Experts find that “following a period of such relative stagnation during the past 20 years, the current boom in hydropower dam construction is truly unprecedented in both scale and extent (39, p. 162).”

### ***Compounding Effects of the Contemporary Dam Resurgence***

Seeing the mega-dam resurgence through this lens of major contemporary global dynamics has critical implications for understanding the impacts of the development trend itself. For instance, researchers across various fields are noticing that not only has the pace of hydropower growth been unprecedented, but the physical and cultural geography of where hydropower development is now happening is also unprecedented. And this geographic factor is causing major compounding effects on the impacts of our energy technology solutions.

First, the collective nature of these shifts has meant that much of this new energy infrastructure is being built in tropical and subtropi-

cal zones, where the global south’s emerging economy demand is growing. These zones are also home to many of our most critically important tropical forests, important for their global carbon stores, important as sensitive, concentrated zones of ecological diversity, and critically important for their cultural significance as some of the last remaining areas of indigenous livelihood in the world (40). Given the nature of where the dam resurgence is happening, there are enormous human, environmental, and cultural costs both locally and globally.

New evidence finds that the resurgence of the large-scale infrastructure projects through new land acquisitions in tropical and subtropical zones is directly and simultaneously inducing a resurgence of population displacement and dispossession (19, p. 1). This is at a time when these very indigenous communities are more vulnerable than they have ever been to the implications of displacement due to rampant environmental degradation, climate change itself, and urban migration. In fact some studies suggest that besides energy security or regional cooperation one of the primary motivations for Chinese investment in dams in Southeast Asia outside of its borders is “to spare China’s own rivers and avoid resettlement” since domestically the over-damming of Chinese rivers has already displaced over 23 million people and significantly affected water availability (36, p. 313).

This displacement is exacerbated by the fact that tropical rivers are critical to global food security. In tropical rivers of Africa, Asia, and South America, rainfall drives a periodic flood pulse fueling fish production and delivering nutrition to more than 150 million people worldwide (41). The Mekong River Basin alone hosts one of the largest inland fish-

eries in the world, and the over 370 individual dam projects proposed for the basin will likely modulate this flood pulse, thereby threatening food security for already marginalized communities. The main tool for environmental governance and licensing in countries like Laos is local environmental impact assessment, which in most cases does not provide adequate technical information for, and thus has had minimal influence on, policy decisions.

China itself has been heavily criticized for lax environmental and social impact assessment standards at home. For instance, over 300 000 deaths have been reported due to dam failure in China, and it is believed that the devastating 2008 Sichuan earthquake was triggered by the province’s Zipingpu dam (42). Since 1949, 23 million Chinese citizens had been relocated for dam construction, and 6.5 million of those since 2000. Meanwhile, the Three Gate Gorges dam was decommissioned four short years after being built due to siltation (43), like many others, and data shows that dams in China underperform regard electricity output, due to increasing drought and water scarcity. Brazil is also heavily criticized for weak licensing regulation for large dams, and a poor impact assessment process, that was further simplified and weakened in 2012 (44). Hydroelectric power is particularly damaging in the Amazon as larger reservoirs are needed to compensate for lowland topography. For this reason many Amazonian dams suffer from chronic siltation, which reduces electricity production, drastically affecting river ecology. Furthermore, seasonal flow Amazonian rivers means that many dams perform at only partial capacity. This lack of transnational basin-wide assessment often leads to disjointed project development with exacerbated impacts (45).

Second, hydropower's reputation as a low carbon energy solution has come under major scientific scrutiny in recent years. According to the latest science, reservoirs in different natural belts are responsible for different levels of emissions. In many rocky regions low on vegetation and population, such as in Iceland and other northern mountainous regions, the production of electricity from hydropower with temperate reservoirs is a net gain in terms of mitigating emissions from electricity production. In Asia, Africa and South America however reservoirs inundate tropical vegetation that decays, releasing masses of methane and soil carbon that can represent a net loss for mitigation.

While estimating emissions from hydroelectric generation is still an evolving field, there is broad consensus among the scientific community that methane production is a major concern for tropical freshwater reservoirs (46)–(50). Major emission pathways for fresh water storage reservoirs include diffusion of dissolved gases at the air-water surface, methane emission from organic matter decomposition, and downstream dam emissions from degassing at turbine and spillway discharge points (47), (50). Research now shows that among other variables, the geographic location of reservoirs has a significant impact on the organic matter storage, water temperature, and subsequent emissions through these mechanisms (50). For instance, Fearnside highlights the example of the Curua-Una Dam in Brazil, where massive emissions from turbines and spillways mean annual green-house gas (GHG) emissions 3.6 times higher than would be emitted by the equivalent amount of diesel generated electricity, and these emissions levels are more than a decade after the dam's reservoir was inundated (51). Fearnside and Pueyo conclude that "emis-

sions from tropical hydropower in particular are often vastly underestimated and can exceed those of fossil fuel for decades (52, p. 384)."

Third, a major impact of the increasingly available deregulated private finance has led to a proliferation of projects that are largely managed outside the realm of international conditionality or regulatory oversight. In 2013 the World Bank reversed its two-decade old decision to turn its back on large hydropower investment, citing its improved impact assessment guidelines. The World Commission on Dams (WCD) was established in 1998 by the World Bank and the World Conservation Union (IUCN) as an independent, multi-stakeholder body to review the effectiveness of large dams and to develop internationally acceptable criteria and guidelines for their planning and operation (53).

After WCD's establishment, the World Bank went from a low of just a few million dollars investment in dams in 1999 to about \$1.8 billion in 2014. However this still amounts to less than 2% of hydropower project investment today, given all of the other development finance avenues now filling the gap. Instead of acting as a primary investor, the World Bank has stated that it now "typically acts as a 'convener,' bringing other financiers to the table (54)." Research finds that this switch to private financing for projects with such massive externalities "derisks" megaprojects for the private sector. "Very often this means privatizing profits and outsourcing risks to the public (38)."

South-South investment trends noted above bode well for regional integration and set the stage for other forms of South-South cooperation, such as technical assistance and capacity development. However, the requisite institutional reform to regulate such development projects

has lagged. Much southern development financing is not currently tied to human-rights progress, environmental impact standards, or democratic and participatory civil society stakeholder engagement. Nationally backed development banks such as the Brazilian Development Bank, China Development Bank, and the Development Bank of Southern Africa, or the Asian International Development Bank, the very banks now sopping up the hydropower investment gap we discussed earlier, "have abysmal records in terms of transparency and in terms of social and environmental safeguards (38)," and can be looked to for "alternative sources of finance that are perceived to be faster, come with fewer conditions and are more flexible" (29). In many cases the companies conducting feasibility studies are also the same serving as financiers, builders, and regulators of projects, which "results in a blurring of lines between these role(s)" and raises issues of transparency (36, p. 322), (33).

International guidelines have always been far from perfect, as the World Bank case study showed, but the reduced financial involvement of international institutions allows project developers to ignore international concerns, with major implication since political attention often comes to communities most greatly affected by environmental risks only when larger national or international geopolitical forces come into play.

## Defining Problems and Solutions

We argue that articulation of this confluence of global dynamics and their subsequent compounding effect on impacts helps to explain the fuller story of our large energy infrastructure resurgence, as well as our current dilemma. Local and global tensions are growing between civil communities and policy makers

as decisions affecting resources, ecology, inhabitants, and industry are quickly being made with little public consultation or open analysis of alternatives, socio-ecological impacts, or land-use tradeoffs. Yet as shown, these are the communities most heavily affected by dam-related forest loss, displacement, and food insecurity.

Indeed, the activism space around hydro-development has become increasingly violent, with many high-profile murders and kidnappings being reported in the past ten years. Ironically, it seems in seeking to provide energy, climate, and social security, those are the very same securities jeopardized and in many cases eroded through such infrastructure projects (55)–(58). Literature on the political economy of energy transitions suggests that rather than safeguarding marginalized communities from depravation, large-scale energy projects often serve to exacerbate existing social tensions and conflict, intensifying various manifestations of insecurity (55).

Furthermore, large-scale hydropower is often proposed as a tool for energy security, stimulating local economic development, or power export revenue through a low-emission renewable energy technology (44). However recent research finds that national plans for greater energy security often overestimate the need for infrastructure and investment (59). Rather, exploration of numerous contemporary dam conflicts, such as the Yacyreta Dam on the Parana River, along the border of Argentina and Paraguay, the Belo Monte dam of Brazil, the Tawang dams of Arunachal Pradesh, India, and the Mekong Dams of Laos show that the use of this win-win low-carbon development “narrative” can in fact disguise perverse incentives of state elites for construction, and perpetuate the imbalance of power

dynamics among local and global actors (29), (30), (60). The modern-day hydro-resource conflict can be framed as a reiteration of resource conflicts past and ongoing, proving waterscapes to be a new frontier in the local resource commodification and territorialization conflict (61).

Power dynamics and political economy play a key role in determining the winners and losers among different energy pathways, and in whose favor the trade-off between competing policy objectives weighs. In a state-led, investor-driven, donor-shaped policy context where state elites and international actors exercise imbalanced agency relative to constituents, the interests of the poor and the interests of the environment can be marginalized (62). For this reason many civil society representatives and people from affected communities argue that the issue of land rights and access to rights must now more than ever be a core part of development planning, rather than sitting on the periphery. As such, the literature calls for increased focus on cultural politics — the institutions and relations of power among state and non-state actors that govern energy regimes and the outcomes they produce (63)–(65).

Returning to our initial discussion of the global resurgence of the large dam, if we see the trend toward large dams as part of this complex sphere, the issue of energy supply quickly becomes embedded in more imminent issues of rights and inclusion, necessitating critical reflection on our global, discursive definitions of “problems” and “solutions.” Not addressing these key issues can lead to inaccurate, non-strategic policy-making and possibly lead to the assumption of false dichotomies between policy goals such as emissions reduction and poverty reduction (66). High-modernist initiatives that orient themselves around prob-

lem solving without precedent of consensus on the very definition of the “problem” being solved run the risk of undermining their own objectives by predetermining the ways in which the “problem” can be conceptualized, discussed, and assessed. In ostensibly solving problems of energy demand and climate change, the hydropower resurgence may perpetuate even larger problems both at the local landscape and for global commons (62), (67).

### **In a World where Novel is Normal, Mundane is the New Radical**

We contribute to the growing body of literature on sustainable energy transitions by placing the mega-energy infrastructure resurgence in the context of the confluence of global dynamics that have led to its development. From this perspective, we posit that truly sustainable energy futures will require more radical attention to the global dynamics and cultural politics that account for the power-play among actors, and more radical attention to our definitions of problems and their solutions, as opposed to a focus on technological innovations and financing them.

Critical issues such as power symmetry, land rights, representation, and participation have persisted for centuries, but rarely factor into energy planning policy in concrete central ways. The work ahead is thus to create formalized spaces for inclusion of a diversity of actors in the planning process, and for the exercise of rights to participate in that process. We suggest three ways in which local and international energy planning processes can be revised.

As Escobar’s framework of cultural politics suggests, (65) first is the need to limit cultural dominance in the state’s key institutions, especially those that create and implement development policy and local

institutions that control access to rights. Addressing cultural dominance could encompass extensive legal reformation; the establishment of anti-corruption legislation that limits political interference and promotes merit-based employment and business contracting; and legislation that institutes regulatory bodies for investors and local industries that are independent, transparent, and accountable to the courts.

Second is a need to create spaces for, and to support diverse visions of, rights and what the exercise of rights means (65). Even within one river basin, ideas of resource, subsistence, autonomy, identity, economy, and development can differ widely. Acknowledging and empowering non-dominant bio-cultural experiences of nature is a move towards peace with justice. Importantly, enclosure through restructuring resource use can have the same impact as enclosure through physical fencing (68). So, seemingly inclusive solutions to environmental conflict that involve community management of forests, payment for ecological services, algorithmic river flow control, or other such initiatives should be approached thoughtfully and through truly participatory decision-making processes.

Third, while inclusivity is critical, the legitimate community of people who have rights to participate cannot be a foregone assumption in negotiation processes (63). Creation of such a community will involve conscientious attention to the diverse and more nuanced expressions of agency (political, ecological, and cultural) that are important in identification of stakeholders for public participation and involvement. An organized civil society that acknowledges its own diversity will further support a broader representation in decision-making processes.

In their popular paper on the virtues of mundane science, Kam-

men and Dove themselves state that “the major obstacles to developing sound environmental practices are not principally technological, though expanding our research efforts in that area is critically important. Instead, the primary stumbling block is the lack of integrative approaches to complex systems and problems (69, p. 12).” Especially as large-scale energy infrastructure and technology is projected to dominate energy planning policy in emerging economies, we argue that there is no time to ignore the pressing and yet often overlooked issues of problem definition, inclusivity, and power dynamics. Addressing these seemingly mundane, yet fundamental, challenges may be the radical solution our global society needs.

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