

# Mitigating social-ecological risks from the surge in China's overseas investment: an Indonesian profile

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## Abstract

Rapid development has become a global priority as countries strive to meet the UN Sustainable Development Goals by 2030. Sustainable development is crucial for increasing human well-being in emerging economies while avoiding perverse outcomes on livelihoods, biodiversity, and ecosystem services. China's Belt and Road Initiative (BRI) promises to help countries reach their national goals for economic growth, trade, and development, but there remain widespread concerns over how this boom in Chinese foreign direct investment (FDI) will impact social-ecological systems. Here, we discuss the risks implicit in BRI-related FDI projects to ecosystems and local communities, and how these risks can be mitigated or exacerbated by national governance of BRI projects and national development policies. We frame our discussion around Indonesia, where convoluted governance of some of the largest Chinese FDI projects may reduce accountability, and a recent job creation law brings risks of rapid unsustainable development practices across this biodiversity hotspot.

**Keywords** Belt and Road Initiative · Development finance · Development policy · Land use change · Omnibus Law · Sustainable development

## 1 Introduction

This next decade will be a critical period for global sustainable development. As nations strive to reduce poverty, increase human health and well-being, and enhance their competitiveness in the global market, they are simultaneously confronted by ongoing crises surrounding sovereign debt, biodiversity loss, and climate change [1]. Moreover, issues surrounding the equitable and inclusive nature of development will need to be addressed across the three main components of sustainable development: the economy, the environment, and society [2]. These concerns over multi-dimensional sustainability have heightened over the last decade, which has witnessed a surge in overseas development finance from various creditors to help propel economic prosperity in low- and middle-income countries. Bilateral finance has now begun to outpace multilateral finance, upending the twentieth century pattern of project development and accountability. These trends are unsurprising in and of themselves, as theoretical and empirical economic literature suggests that as per-capita income grows, national preferences change and investment may replace aid, which in turn may become less effective [3–6]. Notably, one actor has emerged as the single largest bilateral creditor of overseas development finance

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in the last decade [7] while simultaneously rising to become one of the top sources of foreign direct investment, thus falling under the greatest contemporary scrutiny from all sides: China.

Since its massive economic and policy reform in the 1980s, China's economy has grown exponentially. Today, the country is considered a global economic powerhouse, which has remarkably advanced its scientific and technological foundations to compete with some of the wealthiest countries around the world. With this rapid economic growth, China has been able to substantially bolster its portfolio of overseas lending. During the last global business cycle, from 2008 to 2019, two government-sponsored 'policy banks'—the China Development Bank (CDB) and the Export–Import Bank of China (CHEXIM)—have provided US\$461 billion in overseas development finance to 88 low- and middle-income countries [8], with 10 countries constituting 60% of all finance commitments: Venezuela (\$58.2 billion), Pakistan, Russia, Angola, Brazil, Ecuador, Argentina, Iran, Indonesia, and Turkmenistan (\$14.2 billion). During these same years, Chinese outbound foreign direct investment (FDI) has been similarly concentrated. Just 10 host countries comprise the majority of investments: India, Vietnam, the United States, Indonesia, Nicaragua, Mexico, Malaysia, Russia, Egypt, and Brazil [9]. Notably, Indonesia is one of just two countries that are major hosts for both types of Chinese flows.

In light of China's economic power and the emergence of ambitious foreign policy to expand their global influence, President Xi Jinping of the People's Republic of China announced the Silk Road Economic Belt and the 21st Century Maritime Silk Road (shortened to the 'Belt and Road Initiative' or 'BRI') in 2013 as a means "to strengthen trust, friendship and cooperation, and promote common development and prosperity so as to bring benefits to our people" through practical and mutually beneficial cooperation [10]. The initiative sets five priorities: policy coordination, facilities connectivity, unimpeded trade, financial integration, and people-to-people bonds. Officially launched in 2015, China has since signed agreements with 140 countries under the BRI scheme as of January 2021 [11]. The BRI has the potential to bring tremendous improvements in market access and living standards around the world. A World Bank study [12] estimates the boost to amount to 2.9% of global GDP, mostly concentrated among developing countries. Indonesia, in particular, is expected to benefit: it is one of just four countries (together with Malaysia, Pakistan, and Russia) that are collectively expected to attract half of all BRI investment [12]. These benefits have already begun to materialize. As Dreher et al. [13] show, Chinese financing is strongly associated with host country economic growth, even more so than World Bank financing.

While the BRI may be a necessary catalyst for helping countries achieve national development goals and enhancing human well-being around the world, mounting concerns over potential perverse outcomes for nature and society have enveloped the multi-billion-dollar initiative—as well as China's role in global development more broadly—in controversy across sectors, disciplines, and stakeholders. These concerns range from the lack of biodiversity safeguards present in lenders' financing practices [14], to the prolific investment in coal- and other fossil fuel-based power generation [15], and the lack of protection, inclusion, and recognition of local Indigenous communities impacted by the BRI [16]. Across Africa, the rise of these Chinese development projects has received considerable backlash from civil society, with an increasing number of public protests over (e.g.) wages, working conditions, and impacts on nature-based tourism and livelihoods in areas where Chinese-financed projects are more abundant [17].

Unlike most multilateral development banks (MDBs), China's policy banks follow a "country systems" approach to environmental management of development finance projects: in most cases, they defer to borrowing nations' standards and practices. Given the scale of international financing by these two Chinese banks, this approach can present a significant challenge for host country governments, many of which have never before managed such a broad portfolio of projects with sole oversight responsibilities. Moreover, Humphrey and Michaelowa [18] indicates that host country financing ministries may seek out Chinese financing in order to avoid the "hassle factor" of waiting for MDB safeguard systems to be completed for large or complex projects. Where this phenomenon occurs, host countries are effectively designing national infrastructure pipelines in which the projects that pose the greatest oversight challenges have the least external support for environmental management.

A parallel trend further exacerbates this lack of institutional support. When host country governments are solely responsible for project oversight, their own standards become significant determinants of the speed of inbound investment, and so they may face more pressure to relax those environmental standards to facilitate as much foreign investment as possible. This phenomenon has been well documented in commodity-producing countries in South America, for example, especially during times of cooling commodity prices and slowing investment [19, 20]. Where governments capitulate to this pressure, they risk not only environmental harm but also the economic benefits they may have expected from the new investment: incomplete or failed projects, diminished local livelihoods from damaged ecosystems and diminished ecosystem services, and reputational damage that can hamper the potential for future investment growth [21]. For these reasons, it is of particular importance to monitor the environmental

management frameworks of commodity-producing countries that host significant Chinese development finance and investment projects, such as Indonesia.

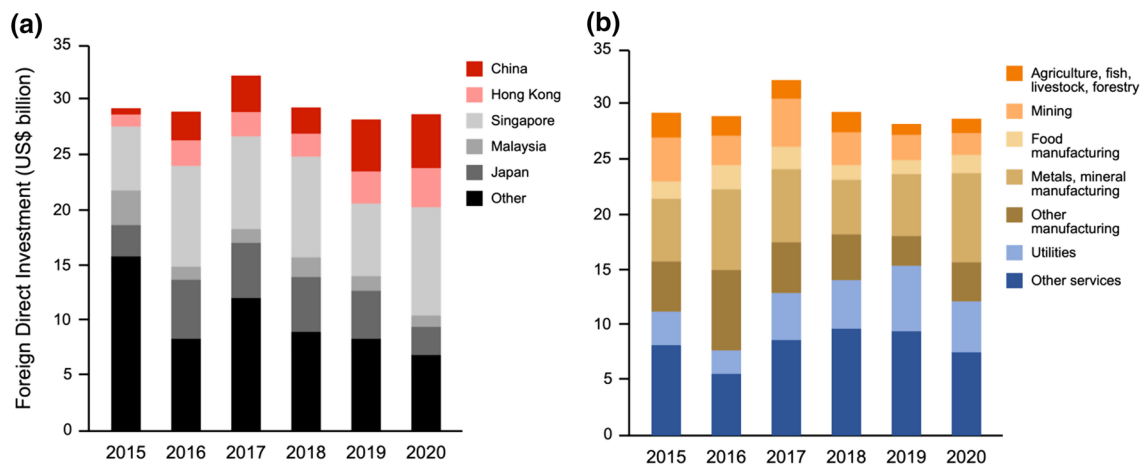
Here, we highlight how national-level policies and governance of BRI-related investments can heighten the potential social and ecological risks of these projects and ultimately jeopardize sustainable development, using Indonesia as a topical case study with international parallels. We begin with an overview of Indonesia-China relations and the development of a shared vision of economic prosperity and cooperation leading to their BRI partnership. We then discuss the potential economic benefits brought by Chinese financing and investment in Indonesia, as well as the inherent social and ecological risks. Using 14 existing FDI projects under the BRI scheme, we illustrate the manifestation of these risks by examining the extent to which land use/land cover change, pollution, and other stressors threaten biodiversity, local communities, and other aspects of the economy. We then discuss how these risks may be amplified through inefficient governance of BRI projects and national policies designed to reduce impediments to such development projects, using Indonesia's new Omnibus Law as an exemplar policy reflective of emerging trends in BRI countries around the world. We conclude with recommendations for new research and policy agendas to improve the monitoring, evaluation, and mitigation of social and ecological risks from the BRI.

## 2 Increasing relations with China promise substantial economic benefits

Indonesia-China relations have existed for centuries, but cooperation between the two countries has intensified over the last decade through the emergence of a shared vision for economic prosperity. This began in 2011, when former President Susilo Bambang Yudhoyono invited China to assist Indonesia in building economic corridors throughout Indonesia by investing in the mining, infrastructure, industrial, and agricultural sectors [22]. During President Xi Jinping's visit to Indonesia, both countries agreed to build a comprehensive strategic partnership to share prosperity and security [23]. In 2014, a new phase of this cooperation began when President Joko Widodo (Jokowi) introduced a National Ocean Policy through the concept of *Poros Maritim Dunia* (Global Maritime Fulcrum, or GMF) with its five pillars to reinvigorate the maritime culture in Indonesia, as well as the notion of Indonesian seas as a maritime geopolitical and economic power [24]. One of the pillars is the development of maritime infrastructure and connectivity by building and improving logistical shipping networks, deep seaports, the shipbuilding industry, and marine tourism. Given the shared vision between the GMF and the 21st Century Maritime Silk Road, Indonesia and China agreed to develop a Maritime Partnership to strengthen cooperation and align policies and strategies in developing and investing in a more prolific maritime economy [25].

For the last decade, Indonesia-China relations have intensified, particularly through trade, finance, and investment. Since 2016, China has been an important trading partner with Indonesia for both exports and imports [26], and China's two policy banks have financed US\$14.5 billion worth of development projects in Indonesia's power and transportation sectors since 2008 [8]. FDI from China has also increased substantially between 2015 and 2020, with the total investment reaching more than US\$17 billion [27]. Annually, these investments rose from an insignificant percentage in 2015 to the second largest in 2020, including both mainland China and Hong Kong [28] (Fig. 1a). The investments are mostly in three sectors: metal industry (42%), transportation, warehousing, and telecommunication (20%), and electricity, gas, and water (19%) (Fig. 1b). The investments are concentrated in three provinces: Central Sulawesi, West Java, and Banten. The investment in Central Sulawesi is mainly in nickel mining and processing for the growing battery industry for electric cars, which is also among the first investments under the BRI.

With a lack of infrastructure impeding Indonesia's global economic competitiveness, this new wave of BRI funding is expected to significantly contribute to Indonesia's national development goals. A study by the World Bank [12] lists Indonesia among the largest recipients of BRI investments globally, in which about US\$50 billion is expected to be brought into the country. Other studies estimate that the BRI will bring benefits to Indonesia's GDP from greater infrastructure development, reduced tariffs, and reduced trade barriers [29], as well as from increased exports worth between 0.95% and 2.86% of GDP [30]. BRI investments are also appearing to deliver benefits to local economies. For example, in the Morowali district of Central Sulawesi, where the first investment in a BRI project is located (the Indonesia Morowali Industrial Park, an integrated nickel industry), the gross regional domestic product (GRDP) soared from Rp 1.3 trillion in 2007 to Rp 17.2 trillion in 2019 (in constant prices of 2000 and 2010, respectively), and the Human Development Index of the district increased from 65.25 to 72.02 during 2010–2019 [31].



**Fig. 1** **a** Annual trends in the top five countries contributing to foreign direct investment (FDI) in Indonesia since 2015. **b** Annual trends in total FDI in Indonesia across sectors since 2015. Data from BKPM [28]

### 3 Lingering risks to social and ecological systems

The majority of BRI projects consist of infrastructure development, resource extraction and processing, and power generation. For example, Indonesia has received US\$9.3 billion in finance from the China Development Bank (CDB) and Export–Import Bank of China (CHEXIM) for coal-fired power plants since 2000 [32, 33], with Chinese investment (including CDB/CHEXIM finance and FDI) accounting for over 14,000 megawatts (MW) of power in Indonesian coal-fired power plants since 2008 [34]. Furthermore, Chinese construction firms and power companies have been granted as many as 36 engineering, procurement, and construction contracts of coal-fired power plant projects [35]. While these activities may generate substantial economic benefits, they also have the potential for adverse social and ecological impacts, which may imperil those same economic gains.

A recent study by Yang et al. [36] found that 40% of Indonesian development projects financed by Chinese policy banks in the last decade (including 24 power plants, 4 roads, the Jakarta–Bandung railway, and the East Nusa Tenggara dams) present significant risks to biodiversity and/or Indigenous communities. On average, these projects overlap with 32 threatened species ranges, with some projects, like the Bengkulu and Teluk Sirih power plants, overlapping with the ranges of 50 or more threatened species. Further, 30% of the projects are located within areas potentially qualifying as ‘critical habitat’ by the International Finance Corporation, with the Balikpapan–Samarinda road development increasing fragmentation of the protected Bukit Soeharto Grand Forest Park in East Kalimantan. Several projects also occur within historic boundaries of Indigenous peoples’ lands, including four power plants and the Manado–Bitung toll road, placing additional risks to traditional livelihoods and the integrity of these communities’ lands.

Chinese FDI may also pose similar risks to vulnerable social–ecological systems, but such risks have yet to be investigated. To highlight these potential risks, we consider 14 clusters of Chinese FDI projects related to the BRI across Indonesia and provide an initial outlook of potential social and ecological risks, including projects in Sumatra (2 clusters), Java (2 clusters), Bali (1 cluster), Borneo (4 clusters), Sulawesi (2 clusters), East Nusa Tenggara (1 cluster), Maluku/the Mollucas (1 cluster), and Papua (1 cluster) (Fig. 2a). We focus on these clusters given the ecological and national importance of the projects and the presence of Indigenous peoples in the areas, while maximizing the geographical representation and diversity of business cores.

#### 3.1 Land use/land cover change

We calculated the extent of land clearing for each project within the 14 clusters by analyzing the Normalized Difference Vegetation Index (NDVI) with a harmonic time series dataset of Landsat series (1972–2020) and Sentinel-2 (2016–2021) [37]. Land clearing for infrastructure development occurs in all 14 clusters, as well as in open pit mines for coal, bauxite, nickel and limestone mining. Starting as early as 2009, the Indonesia Morowali Industrial Park has

led to large and ongoing land clearing over time (Fig. 2b), mostly for the construction of its industrial complex and operation of open pit mines (Fig. 2c). The SDIC Cement Project in West Paupa has cleared a more modest amount of land, yet 180 ha of Maruni protected forest has been cleared since May 2016 (Fig. 2c). Meanwhile, several clusters, such as the Batang Toru, East Nusa Tenggara Dams, Kayan River Cascade Hydropower, and Likupang Economic Zone, have not shown substantial land use change or land clearing. While these projects may indeed have a smaller clearing footprint, this may also be indicative of early stages of project development. In addition to the direct ecological risks from habitat loss and fragmentation, vegetation clearance and the stripping of topsoil increases carbon emissions and pollution risks.

### 3.2 Pollution and carbon emissions

The surge in coal-fired power plants associated with the BRI presents several environmental and health challenges. These plants contribute to carbon emissions and emit pollutants, such as sulfur dioxide, nitrogen oxide, and particulate matter, which can create smog, haze, and acid rain, affecting respiratory health [38]. They also produce hot water effluents (thermal pollution) created from high pressure steam to rotate turbines, which adversely affects aquatic ecosystems [39]. The ecological and social footprints of coal consumption surrounding coal mines is a particular concern in Sumatra and Kalimantan (Indonesian Borneo). For instance, PT Kaltim Prima Coal (KPC) in East Kalimantan, the second largest production site in Indonesia, has been responsible for contaminating the river used by downstream villagers with untreated wastewater discharge, increased flooding, severe dust and noise pollution from blasting, and forced displacement of local people from ancestral homelands, reducing the land available to them for traditional cultivation and hunting practices [40, 41]. Hydropower projects also present inundation risks, particularly the Kayan River Cascade Hydropower Project in North Kalimantan, which consists of five dams.

These pollutants can also have deleterious effects on migratory species. In Paiton (East Java), for instance, the release of toxic and thermal stressors [42] from the Paiton power plant—the largest coal-fired steam power plant complex in Southeast Asia—has the potential to directly impact the endangered whale shark (*Rhincodon typus*), which has been spotted in the plant's water canal several times [43]. Based on temporal observations of satellite-derived sea surface temperature [44], the coastal seas surrounding the power plant have increased 0.58°C over the past 30 years (Fig. 2d). These stressors will most likely influence the abundance of plankton and smaller animals on which whale sharks feed, leading to more indirect impacts that manifest through the food chain. The potential impacts of these pollutants on the food chain become even more consequential for Indonesia and beyond given the importance of this migratory route for other plankton and/or nekton feeders, like the blue whale (*Balaenoptera musculus*), humpback whale (*Megaptera novaeangliae*), and short-finned pilot whale (*Globicephala macrorhynchus*) which have also been known to pass through the Madura strait.

### 3.3 Threatened species

Using range maps from the IUCN Red List of Threatened Species [45], we identified at least 42 threatened species in 14 localities across Indonesia (8 critically endangered, 13 endangered, and 21 vulnerable species). Extractive industries and infrastructure development threaten species' persistence across the country, including some island endemic species that only occur in one location. Disturbance can dramatically reduce species' foraging time, energetics, and even breeding opportunities. The conservation of both habitat specialists and disturbance-prone species should therefore be taken into account, as disturbances will naturally exert differential impacts on different threatened species.

Concentrations of threatened species are significant for each of Indonesia's BRI localities. For instance, along the Balikpapan-Samarinda road, at least three endangered species are at risk: Bornean gibbon (*Hylobates muelleri*), Bornean peacock pheasant (*Polyplectron schleiermacheri*), and Southeast Asian box turtle (*Cuora amboinensis*). In another example, the construction of the Batang Toru hydropower plant may threaten at least five critically endangered species: Tapanuli orangutan (*Pongo tapanuliensis*), Sumatran tiger (*Panthera tigris sumatrae*), pangolin (*Manis sp.*, trenggiling), helmeted hornbill (*Rhinoplax vigil*, rangkong gading), and pitcher plant (*Nepenthes sumatrana*, kantong semar). However, no biodiversity assessments have been made across these development sites to date, which introduces further ambiguity to the potential negative ecological impacts within and between projects.



### 3.4 Socioeconomic risks

The geographic and economic scale of these BRI projects present several social risks in both the core areas of the project clusters as well as the sourcing areas of supporting materials, such as the mining sites for coal and minerals that feed the smelters. For instance, bauxite mines used to feed the alumina grade smelters owned by PT Well Harvest Winning Alumina Refinery and PT Borneo Alumindo Prima in the Ketapang district (West Kalimantan) are on the lands of the Indigenous Dayak peoples. With their open pit mining method, bauxite extraction could significantly jeopardize existing practices related to swidden agriculture, agroforestry, and customary forests, yielding adverse impacts on the livelihoods, health, and identities of these communities.

Another key risk to social systems is the potential for corruptive behavior in the implementation of the BRI in Indonesia, since permitting in business establishment has historically been susceptible to corruption. The Corruption Eradication Commission (*Komisi Pemberantasan Korupsi* or KPK) has indicted a number of district heads (*bupati*) related to the issuance of concession licenses, including a former bupati of the nickel-rich Konawe Utara (Southeast Sulawesi)—a neighboring district of the Morowali district [46]. This risk deserves serious attention, as a recent study has shown that BRI investments in many other countries have been suspected to involve corrupt practices in securing projects [47]. Other studies have also flagged several economic risks that may be relevant to Indonesia. For example, Damuri et al. [48] identified several potential problems pertaining to Indonesian BRI projects, such as the prolific use of Chinese workers in project construction, the creditworthiness of Chinese companies, flawed trade balance, and the lack of involvement of small and medium enterprises in BRI projects.

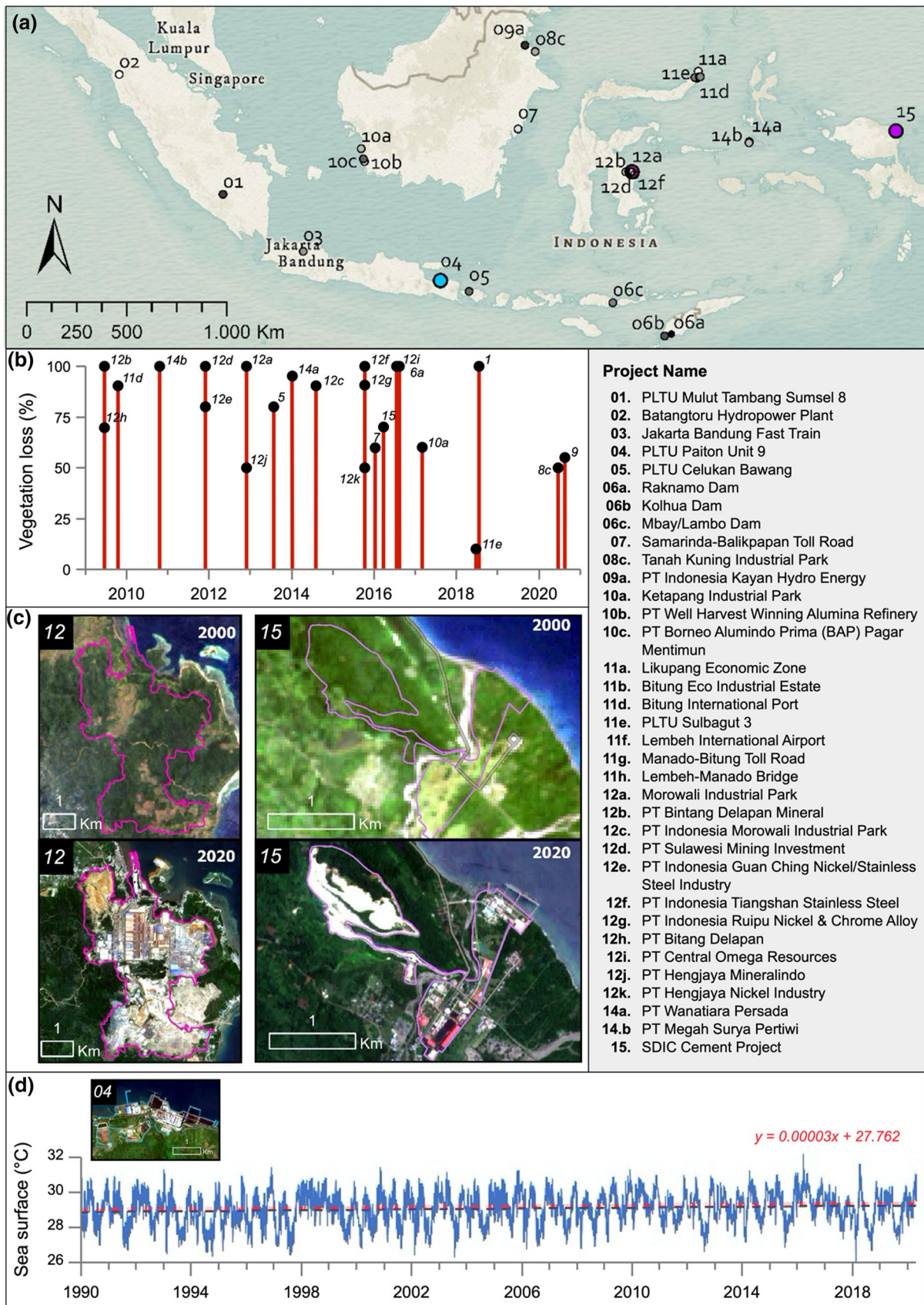
## 4 Rising concerns over robust and accountable governance of BRI projects

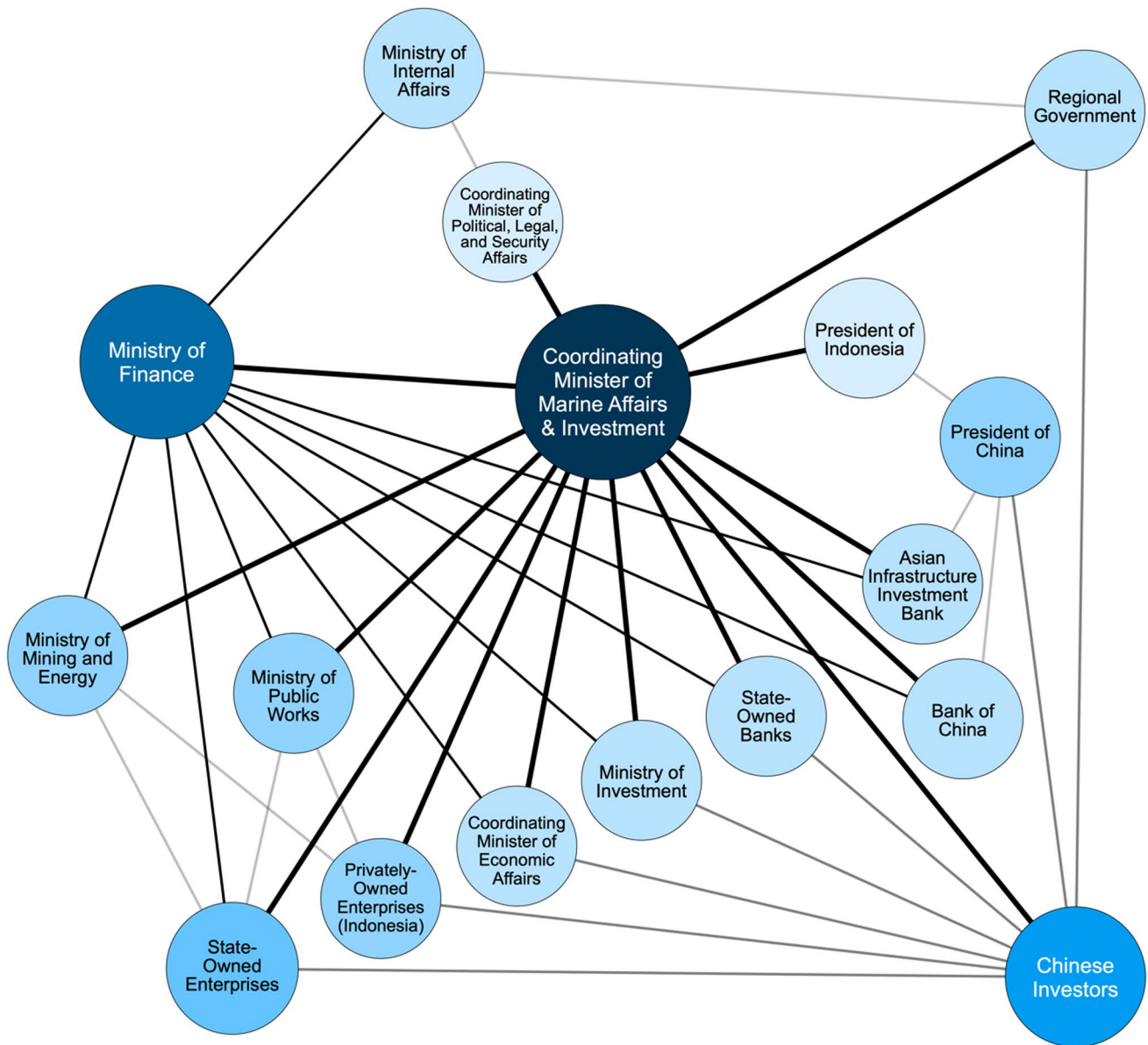
As one of the countries facing the “middle income trap” [49], it is clear that Indonesia does need leverage to push the country forward to improve its GDP and economic growth [50], which the BRI scheme is expected to contribute to. This investment opportunity should be managed in a way that aligns with Indonesia’s own development strategy. In this regard, many BRI projects have been adopted into national development plans. In their effort to accelerate infrastructure development, President Jokowi’s administration has listed 28 BRI projects as part of various national strategic projects, initially stipulated in Presidential Regulation No. 3 (2016) and later in the 2020–2024 Mid-term National Development Plan. Such a policy raises the critical issue of how to ensure robust and accountable governance of development—a principle that appears to be lacking in the governance of Indonesian BRI projects.

As Chinese investments grow rapidly in Indonesia, there are some interesting developments in the Indonesia-China trade relationship. With the implementation of BRI projects, there has been a shift from a state-led Government-to-Government (G2G) scheme [51] to a Business-to-Business (B2B) scheme [52, 53]. Although such an arrangement reduces the burden on government, the monitoring of the B2B scheme is more difficult, especially if the companies involved are not listed. Additionally, the prevailing investment offers also come with prepackaged conditions that favor Chinese interests: the operating business partners, financing banks, and construction companies must be from China, or at least associated with the Chinese government [54].

Despite Indonesian policy designed to promote the B2B scheme in BRI projects, the partnership with Chinese companies may burden state budgets in two major ways. First, any construction failure by the Chinese companies, for example, will jeopardize their Indonesian counterparts into an investment loss, which may require the Indonesian government to default on the debts due to unyielding investments, ultimately leading to a potential debt trap [55, 56]. Second, many Chinese FDIs are listed as national strategic projects, which justifies state funding to the Indonesian partners (either state-owned or privately-owned enterprises) as a government investment or loan [57]. However, the state funding often comes from the lending from Chinese financial institutions to the Indonesian government using the G2G scheme rather than the B2B scheme, resulting in complicated financial flows (Fig. 3).

**Fig. 2** **a** Locations of Chinese foreign direct investment (FDI) projects across Indonesia related to the Belt and Road Initiative (BRI) of high social and ecological significance (colored points are featured in **c**, **d**). **b** Extent of land clearing over time for BRI projects. **c** Satellite imagery of land clearing for the construction of multiple projects between 2000 and 2020. **d** Increasing trends in sea surface temperature surrounding the Electric Steam Power Plant (PLTU) Paiton project. Note: *Perseroan Terbatas* (PT) is the Indonesian abbreviation of limited liability company.





**Fig. 3** Complexity in the financial flows of Chinese investment in Indonesian Belt and Road Initiative (BRI) projects between diverse actors increases the burden on state budgets and risks inefficiencies in project management and governance

Additionally, coordination within the national government may not be effective in managing the implementation of BRI projects. President Jokowi assigns the Coordinating Ministry for Maritime and Investment Affairs (CMMIA) to handle BRI projects under the rubric of GMF-BRI joint cooperation, yet many of these projects are designated as national strategic projects that fall under the coordination of the Coordinating Ministry for Economic Affairs (CMEA) through the Committee for Acceleration of Priority Infrastructure Delivery, of which CMMIA is the Vice Chair. In another level, most of the BRI projects are within remote areas of many districts who report to the Ministry of Home Affairs, coordinated by the Coordinating Ministry for Political, Legal, and Security Affairs. The overlapping authority among coordinating ministries weakens the controls and increases the risks for fraudulent misconduct in the entire governance process [58].



## 5 New economic policies may further jeopardize sustainable development

Despite an improved performance in its ranking from 114 in 2015 to 73 in 2020 among 190 economies, Indonesia has been among the lowest ranking in 'ease of doing business' in Southeast Asia [59]. The Jokowi administration believes that a long, convoluted permitting process (which is often nontransparent) created by overlapping laws and regulations has largely contributed to this situation. Additionally, the country's unemployment rate is high, and the micro and small enterprises that have been absorbing the majority of Indonesia's workforce do not have proper protection and support. In the inauguration speech for his second term of office, President Jokowi announced five priorities of his administration, including massive policy reform and bureaucratic simplification [60]. He asked the lawmakers to discuss two omnibus laws (job creation and empowerment of micro, small, and medium enterprises), in which existing laws are amended to achieve an orchestrated policy breakthrough by eliminating the existing regulatory barriers and having massive bureaucratic reform. Immediately, the administration began drafting a bill for this massive policy reform to be submitted to Parliament.

After nine months of intense debate amidst strong rejection from civil society, on 5 October 2020 the lawmakers at the House of Representatives agreed to pass the Omnibus Law, officially known as Job Creation Law (No. 11 of 2020). This new law amended more than 1200 articles stipulated in 78 sectoral laws, including environment, forestry, fisheries, investment, land affairs, and spatial planning. The Jokowi administration immediately issued a set of operational regulations in early March 2021, which consist of 45 government regulations and four presidential regulations. As stated in its consideration, the Omnibus Law has three main themes: (1) facility, protection, and strengthening of cooperatives and micro, small, and medium enterprises (MSMEs); (2) improvement of the investment system (and ease of doing business); and (3) acceleration of national strategic projects (and state investment). These themes, as well as the issue of land appropriation, are covered significantly in the articles of the law [61], indicative of a newfound attention to the streamlining of business permitting processes and land appropriation (including spatial planning matters).

For the development of MSMEs, the Omnibus Law provides favorable measures for social forestry and lands managed by Indigenous communities, even if the legal recognition of the latter is still based on pre-existing policies. The law also provides strong measures on human-induced fires for land clearing, including the imposition of corporate liability. Yet the law presents considerable concerns in other aspects vital to mitigating and managing risks from development. For example, the law adopts a more centralized system for business permitting (including environmental management permitting), thus revoking the authority of regional government in this matter. The withdrawal of license permitting further erodes the authorities of provincial, district, and city governments in natural resource management, which was already limited in the previous regional development law. This new policy may be aimed to reduce rampant corruption risk, as the anti-corruption body indicates [62], but such a centralized permitting system will potentially face infrastructure and geographical challenges, as MSMEs may face difficulties in accessing the system due to the uneven quality of communication infrastructure in more than 500 districts/cities throughout Indonesia. Additionally, the Omnibus Law introduces risk-based permitting, replacing a colonial law on hinderance (*Hinderordonnantie*), and it provides several privileges to the national strategic projects and special economic zones in terms of land appropriation, financing, and impact management.

In terms of environmental issues, there are several policy drawbacks in the Omnibus Law, as it reverses some of the progressive environmental measures of the previous Environmental Protection and Management Law (No. 32 of 2009) [61, 63]. First, environmental protection is less favorable than investment security. Second, the centralization and simplification of environmental management permitting has reduced the participation of affected communities and concerned groups in the approval process of environmental impact assessments. Third, land conflicts may rise due to favorable policies on land appropriation for commercial establishment. Overall, the Omnibus Law provides more stringent measures for some issues but is more lenient in others (especially environmental issues) and has the potential of maintaining rent-seeking behavior, which has been prevailing in business activities in Indonesia for decades.

## 6 Setting a research and policy agenda

Despite growing concerns over the social and ecological risks posed by the BRI, research to date has been limited on how these risks manifest into direct and indirect impacts on social-ecological systems. There is an urgent need to investigate these impacts from past and ongoing BRI projects, which can be used to predict future impacts from projects that have yet to be committed. While previous attempts at estimating these risks largely suffered from a lack of high-precision spatial data on the locations of these projects [16], new spatial data is available that tracks more than 600 of China's overseas development finance projects since 2008 [8], which increases the opportunity for conducting more robust impact analyses. While these data have been useful for comparing global risks to biodiversity and Indigenous lands between China and the World Bank's development finance portfolios [36], more localized investigations are required to understand how Chinese development finance and FDI linked to the BRI affect the features, processes, and communities composing complex social-ecological systems around the world.

Our initial outlook on the risks from these 14 clusters of Chinese FDI projects in Indonesia illustrates a greater need to explore the multi-dimensional impacts of BRI projects across Indonesia's diverse landscape and investments. Within Indonesia, as well as the rest of the BRI countries, there must be a concerted research effort to illuminate the realized consequences of development on biodiversity, local and Indigenous communities, and regional economies through the quantification of land use/land cover change, air and water pollution, carbon emissions, and other stressors, which can be used to weigh potential costs with purported benefits. Only by providing a robust and scientific evidence base can we expect significant strides to be made in truly sustainable and socially responsible development in the next decade.

Yet the question remains: how do we ensure that the Indonesian regulatory framework is up to the significant challenge of preventing social, ecological, and economic damages from the BRI? Certainly, Chinese investments can be a useful means for Indonesia to improve its infrastructure and add value to its natural resources—two priorities of the Jokowi administration. With its vast deposit of nickel, for example, Indonesia can be a key player in lithium-ion battery production—a type of efficient battery used in the rapidly growing electric car industry—and the GMF-BRI cooperation scheme will help Indonesia achieve these industry visions. However, there are several concerns that need to be considered in China-Indonesia relations.

China is currently the world's largest official bilateral creditor, with US\$1.5 trillion in the form of direct loans and trade credits to more than 150 countries. However, about 50% of loans are unreported, which can lead to hidden debts and hidden risks [64]. Careful steps need to be taken when accessing Chinese financing to avoid potential debt traps, especially when domestic political and economic rivalries prevail [65]. To reduce this risk, the GMF-BRI cooperation should be fully aligned to the classic B2B scheme. The Indonesian government, represented by the Coordinating Ministry for Maritime and Investment Affairs, can still support BRI projects through some degree of mediation and bureaucracy assistance. However, Indonesia should not place itself at risk by financing these investments through some over-expansive loan commitment.

Environmental concerns over Chinese FDIs, and BRI projects in particular, are mounting, especially for infrastructure development projects and investments in primary industries in remote areas [66–69]. Although the Chinese government has “provisions on social and environmental protection,” they have been described as “minimal and basic” [70]. Environmental organizations in Indonesia have raised their concerns over the environmental impacts of BRI projects, and research suggests public dissent may heighten as the number of projects increase over time [17]. Globally, there is a stronger trend toward stringent environmental and social safeguards within the financial industry and certain resource extraction industries. Multilateral financial institutions, such as the World Bank and Asian Development Bank, have been implementing environmental and social safeguard standards for nearly 30 years, yet similar safeguards have not been a staple of BRI financing [14]. Market-driven initiatives, such as the Roundtable on Sustainable Palm Oil (RSPO) and the International Council on Mining and Metals (ICMM), have also been gaining legitimacy and could be a valuable tool for mitigating risks from certain BRI projects. Additionally, state financial institutions in Indonesia, primarily *Otoritas Jasa Keuangan* (Financial Services Authority), have promoted green financing of lending schemes for Indonesia's financial services industry, which may be another viable option.

In response to these environmental and social concerns, some financial institutions participating in the BRI have launched new initiatives to keep up with the latest standards, such as the Green Investment Principle (GIP) for the Belt and Road Initiative, as well as the Belt and Road Initiative Green Coalition launched by the Chinese Ministry of Ecology and Environment to “promote international consensus, understanding, cooperation and concerted actions

to realize green development on the Belt and Road, to integrate sustainable development into the BRI through joint efforts and to facilitate BRI participating countries to realize SDGs related to environment and development” [71]. These initiatives should also be adopted within BRI projects in Indonesia. Individual companies under the BRI scheme, in particular, should adopt such principles and practices of the highest standards internally, which can provide a positive image of the companies and may affect the prices of their products when certification schemes exist. For example, PT Well Harvest Winning Alumina Refinery, an alumina smelter company in Ketapang, should adopt ICMM's Mining Principles given Glencore PLC, a substantial shareholder (through a subsidiary) of PT Cita Mineral Investindo Tbk and thus a partner of the smelter company, is a current member of the ICMM.

## 7 Conclusion

If adequately managed, the BRI and its accompanying investments may bring an unparalleled boost to economic growth and human well-being across the developing world. But as significant as these potential benefits are, so too are the potential risks from the same investments, if managed poorly. Environmental damage from slipshod infrastructure and investment can devastate ecosystems, as well as the communities and economies that depend on them. We identified several risks to biodiversity and local communities from vegetation loss, pollution, and other stressors associated with 14 BRI-affiliated FDI projects in Indonesia. However, this is just a glimpse into the potential social-ecological impacts for all BRI investments across the country, as threats to species and their interspecific interactions can magnify risks of ecosystem degradation and even potential collapse. China's “country systems” approach to project management means that much of the potential benefit and risk rests on the shoulders of national institutions, the standards they set, and their capacity for implementing those standards. In this perspective, we have highlighted how these risks may be exacerbated by the inefficient governance of BRI projects in Indonesia, where complex financial flows of a mixed G2G and B2B scheme and overlapping authority among coordinating ministries ultimately weakens government control, monitoring, and accountability of development projects. Furthermore, the introduction of a new Omnibus Law could reduce the due diligence necessary to prevent perverse outcomes from development activities on people and nature, emphasizing the critical role of domestic economic and environmental policies in delivering a ‘green’ BRI. While the present perspective focuses on one country where these risks and benefits come together in particularly strong ways, this example holds policy lessons for countries in all BRI regions. Now more than ever, BRI countries have the ability—and thus, the responsibility—to determine their own outcomes by ensuring that their national standards and practices are adequate for the task.

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**Declarations**

**Competing interests** The authors declare no conflicts of interest or competing interests.

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