



Universiteit Leiden
The Netherlands

Ecological Sustainability and the Chinese Belt and Road Project:

An assessment of Strong Sustainability within the
Standard Gauge Railway projects in Sub-Saharan Africa

Anoek Zijderveld

Student number: 1824406

a.zijdereld@umail.leidenuniv.nl

Master Thesis International Relations

Specialization Global Political Economy

June 3rd 2020

Thesis Supervisor: Dr S. Shibata

Second Reader: Dr E. Amann

Word Count: 14.432

Word Count Excluding Bibliography: 12.488

Abstract

The concept of Sustainable Development is increasingly used in development policies. Still, it remains questionable whether sustainable development is feasible in reality. Since a few years, China aims to be leading in sustainable development. Their Belt and Road Initiative (BRI) could secure that leading role at a global scale. Nonetheless, many scholars argue that this project is far from sustainable. Others refute this criticism and state that the BRI has the most potential for sustainable development. This thesis aims to investigate this debate by answering the following question: *To what extent is ecologically sustainable development implemented within the Chinese BRI Railroad projects in Sub-Saharan African Countries?* A qualitative data analysis (small-N) will answer this question. The conditions of sustainable development will be compared to practice by studying three railroad projects. This thesis will view sustainable development through an ecological lens with a focus on Strong Sustainability. This thesis analyses how the projects relate to the criteria of Strong Sustainability: protecting and promoting biodiversity, sustainable water management and carbon emission reductions. The results show that the SGR projects do attribute to the Sustainable Development Goals. Still, they could have done more to make the project genuinely sustainable; a lot of environmental concerns remain unaddressed within the projects. Therefore, these projects cannot be labelled as ecologically sustainable under the criteria of Strong Sustainability.

Content

Abstract	1
Introduction.....	3
Literature review	6
Neoliberal Theorists.....	6
Moderate Theorists	7
Green Theorists	9
Research Design	13
Theory.....	13
Sustainable Development and Strong Sustainability	13
Method	15
Cases	16
Data collection	16
Potential problems.....	16
Kenya	18
Biodiversity	19
Nairobi National Park.....	19
Tsavo National Park	20
Water Management	23
Carbon Emissions.....	24
Nigeria	26
Biodiversity	26
Water Management	27
Carbon Emissions.....	28
Djibouti	30
Biodiversity	30
Water management.....	31
Carbon Emissions.....	32
Conclusion	35
Bibliography.....	38

Introduction

Is it possible for a country to promote sustainable development when the country itself is one of the world's largest polluters? Is it possible for a country to promote sustainable development when it is hungry for more carbon-based resources? Whether this is possible or not, China aims to become leading in sustainable development. Sustainable development is becoming more prominent in everyday life, but also within academic literature. Political debates are involved as well. This aspect is seen through international efforts, for example, through the Belt and Road Initiative (BRI). Within this initiative, China aims to work together with their destination countries to conform to the 2030 Agenda for Sustainable development. Critics claim that this initiative will not improve sustainability. Instead, they argue that the projects will harm the planet (Ascensão et al., 2018, p. 2). Henceforth, there is much controversy around sustainability and China's role within it.

The debate about the BRI relates to the broad Global Political Economy debate about the compatibility of economic growth and environmental sustainability. Some environmental economists like Beacon question whether economic growth could be combined with protecting the environment in the long run. He argues that the earth can only be genuinely protected when consumption decreases, which would lead to economic decline (Beacon, 1996). Alternatively, more neoliberal scholars like Rauf et al. argue that economic growth and ecological sustainability could go hand in hand. This school of thought argues that innovation is the source of economic growth, while they can also solve environmental problems (Rauf et al., 2018). This debate remains unsolved so far. Nevertheless, the debate can be applied to various contexts.

Within this thesis, the debate about economic growth and sustainability will be applied to the Chinese efforts in the BRI project in Sub-Saharan Africa. Infrastructure is one of the central pillars of this project. Improved infrastructure would increase trade which is beneficial for China. China also used the BRI infrastructure to secure resources. Railroads are mostly used to improve infrastructure. However, infrastructure is generally very polluting (Renwick, Gu & Gong, 2018, p. 4). This thesis aims to find out whether this is different within these projects and whether sustainability is valued significantly within these projects. The analysis will take place after 2013, which indicates the start of the BRI project. The central research question for this thesis is:

'To what extent is ecologically sustainable development implemented within the Chinese BRI Railroad projects in Sub-Saharan African Countries?'

China makes many claims about the ecological sustainability of the BRI project and how the BRI will generate green growth (Goh & Cadell, 2019). This thesis will analyse whether these claims about sustainability lead to more green practices, or that it is a case of greenwashing. Greenwashing refers to the selective presentation of information which makes organisations and practices look greener than they are (Bowen & Aragon-Correa, 2014, p. 107). It can indeed be the case that China uses sustainability for public relation purposes, to promote its image and to wary of environmentalist concerns about the BRI. The academic relevance here lies with the fact that there is no consensus reached about the compatibility of economic growth and sustainability. More specifically, there is still much debate about the sustainability of the BRI project. Besides, Chinese efforts in Africa have not been addressed sufficiently addressed from an environmental perspective. Therefore, there is sufficient academic relevance to pursue this topic.

This topic also has societal relevance. Climate change is becoming one of the most significant threats to society. Rising sea levels, desertification and other consequences of climate form an increasing threat to human life. Policies that create sustainable practices are crucial for combatting this threat. China and its BRI project are 'too big to fail' when it comes to sustainability. This means that the success of China is vital for global success in this area. The country currently emits the most greenhouse gasses in the world, which means that China is an essential factor in deciding the future of the world (Xue, Weng& Yu, 2018, p. 155). Another societal aspect of this research is that the BRI destination countries often severely need economic development. Many BRI countries, especially those in Sub-Saharan Africa, are economically underdeveloped. At the same time, these countries remain incredibly vulnerable to climate change. If sustainable development is possible, it would arguably be most needed within countries in this region.

China-Africa relations within the context of the BRI are quite broadly researched, for example, in Were (2018), who examined whether the BRI loans to African nations are a debt trap. Likewise, the BRI and its sustainability have been researched extensively, for example, in Pandey and Subedi (2020). However, there is a lack of cooperation between these two fields. BRI sustainability research focusses on the sustainability of the BRI in within China and

Central-Asia the BRI in general. Sustainability of the BRI in Africa is hardly discussed; authors like Anslem (2017) and Guthega and Bing (2019) are exceptions. Still, they discuss the topic on a national level. There is a lack of research that analyses multiple African countries. Both research fields thereby understudy ecological sustainability in this geographical area. This thesis aims to combine these two research field to solve the gap within the existing knowledge on the sustainability of the BRI in Africa.

This thesis will be structured as followed: First, the previous literature will be discussed. It will analyse various perspectives on the combinability of economic growth and environmental sustainability. After that, the theories of Sustainable Development and Strong Sustainability will be discussed, followed by the methodology. This thesis will be a small-n case study, where three BRI railroad projects will be accessed on ecological criteria. There will be three analytical chapters; each will cover one of the cases. The selected cases are Kenya, Djibouti and Nigeria. Finally, it will discuss the results and this thesis concludes with the notion that the BRI has created some improvements in sustainability. However, the Chinese companies did not take enough active measures to promote sustainability to be labelled as sustainable under the criteria of Strong Sustainability.

Literature review

Neoliberal Theorists

Economic Growth and Environmentalism as Mutually reinforcing

Some authors, such as Rauf et al. state that economic growth and sustainability are not mutually exclusive. They argue that growth and sustainability go hand in hand. The first stream of arguments within this group uses the Ecological Kuznets Curve. This theory claims that pollution will go up in the early stages of development, in the second stage it reaches a peak (Galeotti, Lanza & Pauli, 2006) (Yandle, Vijayaraghavan & Bhattarai, 2002). After that peak, there will be more investment in green technologies and the economy will increasingly become a service economy with less manufacturing and more low carbon service industries. This shift will cause decreased pollution lowers the curve again. This logic additionally would apply to different types of pollution such as water, waste and air pollution (Rauf et al., 2018 p. 3-4 & 17).

Critics of the Environmental Kuznets Curve question whether the pollution really decreases. They argue that pollution could is often shifted instead of decreased. When countries become more economically developed, they usually start importing goods from lower-wage countries, while they outsource part of their production process. The importation and outsourcing also include pollution heavy goods, such as clothing and metal goods. When these industries are outsourced to a developing country, the pollution in the exporting country decreases. However, global pollution is not reduced, the pollution is just outsourced to a developing country. The consumption of the developed country still requires the same amount of emissions. The emission level could even rise due to transportation and increased consumption. Additionally, outsourcing makes it harder for developing countries to lower their national emission level. Besides, it would be impossible to shift pollution endlessly. When the most impoverished countries would develop, they would eventually not be able to shift their pollution to another place (Greig, Hulme & Turner, 2007, pp. 193-195).

Another neoliberal stream places much emphasis on innovation to enable sustainable growth. Yi and Xiao propose this argument and focus more on technology that reduces pollution. They see this as the most viable solution for sustainability. The only other ways of reducing carbon emissions are through reducing population growth and through reducing economic growth, according to these authors. However, this is politically unattainable in

most countries (Yi & Xiao, 2018, p. 27). Technology and science are enablers of sustainable development, and they are also prominent in the BRI project (Tracy et al., 2017, p. 59). The Chinese government sees a significant role for technology and believes in Green Growth and Sustainable Development, according to Ascensão et al. (2018, p. 3).

The third neoliberal argument is the marketisation and efficiency argument. Zhan et al. state that ecological concerns will open new business opportunities; this creates more competitive businesses and countries. They state that lean and green practices are more efficient and decrease costs. This process would both increase the company's profit while it would also make significant contributions to a more sustainable economy (Zhan et al., 2018, p. 2 & 20). Green technology is thus highly profitable, according to this perspective. Profits will create incentives to develop green technology. Sustainability and economic growth are both incentivised by market incentives.

In sum, the neoliberal school of thought believes that sustainability can foster economic growth. They see this as a win-win scenario; they argue that it is possible to create an economy with economic growth without harming the earth. The Environmental Kuznets curve, sustainable development and the new markets arguments all require efficiency gains and technological advancement. This logic is based on the belief that humans can create advancements and that entrepreneurs are efficient in using the market.

Moderate Theorists

Neutral Relation between Economic Growth and Sustainability

Opposed to neoliberal scholars, moderate theorists use various arguments that state that economic growth and sustainability have a neutral relationship. The first stream of the arguments within the moderate group is about political decisions. Jia, Goslin and Witzel argue that there is no causal relationship between economic growth and ecological sustainability. They see this connection as undecided; they argue that China plays a crucial role in the supply chain and thereby an influential role in the overall global economy. In this vision, China can decide to make the supply chain more ecologically responsible from the start of the chain, or they can decide that they will not make the production process ecologically sustainable. Either way, China is a determining force for environmental protection (Jia, Gosling, Witzel, 2017, p. 3). Whether the environment will be protected is decided by the willingness to take risks on green technology, even if they could lead to

decreased economic growth. Moderates critique the neoliberal assumption that China is willing to share these technologies or that countries can discover these technologies themselves. However, there is no guarantee that this would happen.

The second argument here is about the double-edged sword of technology. Jackson states that technology has both negative and positive feedback loops. Within negative feedback loops, the technology that harms the environment is rewarded with commercial profit. This process will further encourage agents to develop these harmful technologies. Positive feedback loops, on the other hand, encourage sustainable technology (Jackson, 2017, p. 16). Guoyou et al. further argue that China is interrelated with a wide range of countries, the potential for spill-over effects of green innovation in other countries is quite extensive. However, there could also be pollution spill-over (Guoyou et al., 2013, p. 9). Sustainable technology is, therefore, not an inherent effect of international interaction.

Scholars that argue that technology is ambiguous also critique the assumption that there will be innovation and the assumption that this innovation will be green. Innovation can be hard to direct and to predict. Commercial viability, political will and luck play quite a significant role here. Jackson acknowledges that it is uncertain whether we will have green growth soon (Jackson, 2017, p. 18). The type of infrastructure also influences the chances of the spread of sustainable technology to destination countries. Thus, more traditional and carbon-based infrastructure projects are unlikely to lead to green growth (Zhou et al., 2018, pp. 2-3). Railroad construction could be beneficial here since this is less polluting compared to other modes of transport. Still, it remains uncertain whether the BRI railroads will lead to green growth.

Thirdly, there is an argument about non-carbon-based growth which means that the growth based on material resources can shrink, but that growth from carbon-neutral activities can rise (Jackson, 2017, p. 143). Non-carbon based growth stresses the moderates claim about the lack of causality and correlation between economic growth and sustainability. Carbon neutral growth would be harder to achieve in the BRI context because the BRI is based on the expansion of trade and material infrastructure. Also, the BRI project is often coined as a project that aims to extract material resources from the destination countries. However, in the long term, train travel could be seen as low carbon.

Moderate scholars emphasise the uncertainty about future innovation. It is therefore risky to push measures to reduce carbon emissions to the future (Lorek & Spangenberg, 2014, p. 4). It depends on the premises that there will be innovation and that this innovation will tackle the specific problems of unsustainability. It also assumes that this technology would work in different contexts, at different locations and at different times. How technology works is also highly depends on the type of technology. Some technologies worsen pollution, while other innovations can decrease pollution (Bhattarai & Hamming, 2001, pp. 996, 1001 & 1004).

Moderate scholars do not see a direct relationship between economic growth and sustainability. They argue that political will, commercial viability and luck also play a significant role. There is additionally much uncertainty about the role of innovation and how it will lead to economic growth and more sustainability. This logic differs from the neoliberal perspective since there is a reduced belief in the human capacity to solve every potential problem and there is also less trust in technology. Sustainability, therefore, should get more political guidance according to this view, but moderate theorists do not eliminate the possibility of innovation and market-led sustainability either.

Green Theorists

The Incompatibleness of Growth and Sustainability

The last group within the literature argues that economic growth conflicts with achieving ecological sustainability. Beacon is an important author within this group. He states that the promise of endless economic growth is false; the earth cannot sustain that in the long run. Nonetheless, the current economy is still based on the idea of limitless economic growth, as capitalism is based on an expansionary narrative (Antonio, 2013, p. 20). Additionally, sustainable development is an oxymoron here. To be truly sustainable, ecological arguments should override economic ones, according to Green Theorist (Beacon, 1996, pp. 3-7).

Economies should aim to reach a static point, where they do not experience growth. Many classic economists, such as John Stuart Mill, believed that this state was the end goal of economic development (O'Connor, 1997, p. 2). Countries in the North need to embrace a static existence as soon as possible, but the Global South would also need to adopt a static state in the near future. It is important to note that Beacon meant that the physical output should become constant or even shrink. GDP growth could still be possible due to higher

prices or non-material products. Still, this growth is unlikely to lead to sustained GDP-growth. Innovation would also be possible here, but that should be done with the available resources (Beacon, 1996, pp. 31-32). Beacons argument is quite old but remains relevant within the discussion about economic growth and sustainability. Some criticism on this perspective is that when Western countries reach a static existence, they would still pollute too much and it would thus not lead to sustainability. Economic shrinkage might be necessary in these cases, since continuing with the current practices is unlikely to be sustainable. Still, economic growth remains a crucial determinant of CO2 emissions (Saud, Chen & Haseeb, 2019, p. 2254).

The BRI project is unlikely to a static or shrinked production process. China is still very much dependent on material resources within its production process and many of these materials are imported. The BRI project did not make a lot of effort for sustainability before 2015, which caused much criticism by environmentalists and other nations. Therefore the strategy was somewhat altered with the launch of the Green BRI. Xi Jinping stressed the importance of sustainability within the BRI in a speech in 2015. Here he launched the term Green BRI, which would indicate more effort towards sustainability within the BRI. Still, Tracy et al. (2017) see this as a possible case of greenwashing. Green theorists also claims that the Green BRI elements are not specific enough with their sustainability goals (Zhou et al., 2018, pp. 5-7).

Additionally, the BRI is still very much focussed on transport and industrial parks for the facilitation of importation and increased trade. This indicates an increased volume of traded goods which means growth in manufacturing (Tracy et al., 2017, pp. 67-74). Therefore, the BRI is not likely to lead China or the destination countries into a no-growth economy. According to Beacons argument, this would not be sustainable. Saud, Chen and Haseeb argue further that more investment in infrastructure would increase energy consumption within the countries, which would lead to higher CO2 emissions (Saud, Chen & Haseeb, 2019, pp. 2253-2255).

The substantial investment in the energy industries is likely to lead to lower emissions. Additionally, there is a vast distance between China and the destination countries, the transportation between the countries will emit a significant amount of carbon. The trade volume of all BRI-destination countries grew. At the same time, 54% of the BRI projects are

located in pollution-intensive industries. The air pollution in these countries also increased significantly after the BRI investments in most of the countries (Tian et al., 2019, pp. 1-4). In sum, Green theorist claim that an increase in material production leads to economic growth, the material production is now too high and therefore, it is unsustainable. The BRI is thus unlikely to lead towards more sustainability, according to Green Theorists. In short, they argue that economic growth and sustainability are not mutually reinforcing, as neoliberals argue. They also refute the claim of moderates that there is no causal relationship between economic growth and sustainability. Instead, they argue that economic growth will hinder sustainability.

The various streams above make clear that there is no consensus on the consequences of economic growth on the environment. Neoliberal scholars claim that growth and sustainability are mutually reinforcing. They have a vast trust in the human ability to create the appropriate innovation and considerable trust in the market to make these innovations profitable. Moderate scholars argue that economic growth and sustainability do not have a direct relation. According to them, it is more like a matter of both political decisions and chance. However, they do not exclude the possibility of having sustainable economic growth. Finally, green theorist claim that economic growth predominantly hinders sustainability. The infinite expansionary logic is unsustainable. It is based on annually growing production.

Secondly, the discussion between the various streams indicate that it is unclear if the BRI project is sustainable and whether it will be a force for sustainable development. The different theories disagree on this notion. Neoliberals are more optimistic and argue that it would lead to more technological advancement and the sharing of information between countries. These shared innovations would lead to more sustainability. Moderate scholars are more hesitant compared to neoliberals. They argue that the BRI could lead to more sustainability if there is a strong political commitment from China. Moreover, this does not guarantee sustainability; it also depends on luck and the right market conditions. Green theorists are the most critical on the BRI. They are worried it would lead to more CO₂ emissions due to the expansion of infrastructure and the thereby facilitated expansion of trade.

This lack of consensus translates to a gap within the literature on the relation between economic growth and sustainability. It also indicates a gap in the sustainability of the BRI in Sub-Saharan Africa. This thesis aims to contribute to the existing literature by investigating these gaps with an underused angle for the analysis of China-Africa relations, an environmental one. It aims to find out whether it is possible to combine sustainability and development within the context of the BRI in three Sub-Saharan African countries. Sustainable Development theory and specifically Strong Sustainability will be suited to fill this gap. Strong Sustainability is a concept derived from Green Theory. This thesis will build on Green Theory. At the same time, this thesis aims to remain critical towards the theory and offer a fair examination of the cases. The section below will further discuss the cases, the concept of Sustainable Development alongside with the methodology.

Research Design

This chapter will discuss the used theory of sustainable development, followed by a discussion about the methodology. The method that will be employed in this research is small-n qualitative data analysis. The cases, Kenya, Djibouti and Nigeria, will be briefly introduced and followed by a section about data collection and finally a section about the potential problems and limitations of this study.

Theory

Sustainable Development and Strong Sustainability

Sustainable development will be used in this thesis to fill the gap within the literature. This theory investigates the link between economic development and sustainability. It, therefore, studies whether the two can be combined within the BRI project. Sustainable development is seen as meeting present needs, while the needs of future generations are not compromised. Sustainable development allows economic advancement for the poor now, while the ecological impacts are also taken into consideration (Lorek & Spangenberg, 2014, pp. 1-2).

This concept is useful for answering the research question since it aims to access to which extent sustainability is implemented. Sustainable development aims to combine economic development and a sustainable shift in the economy. This corresponds with China's aims for the BRI. China aims to increase trade and economic growth, but it also claims to be sustainable. This thesis aims to access whether the BRI in Sub-Saharan Africa is sustainable. The literature has not done this so far since many theories disagree on whether it is possible to have sustainability and growth. Sustainable development puts sustainable criteria for economic growth. If economic growth and sustainability could be combined, it would be through sustainable development. Besides, as discussed before, Sub-Saharan Africa severely needs sustainable development, both to protect itself against climate change and to adhere to their populations' economic needs.

Different organisations and researchers have different definitions and criteria for sustainable development; some are narrower, while others are more open-ended. Some of these criteria present a rather minimal form of sustainability that might not be enough to truly protect the

environment (Spangenberg, Omann & Hinterberg, 2002, p. 430). The term sustainability is vague; this is sometimes seen as beneficial because the vagueness enables depoliticisation. The vagueness makes it easier to form an agreement since the concept is less controversial. For some authors and state leaders, sustainability also refers to social sustainability aspects such as poverty alleviation. The term got more prominent through the UN Sustainable Development Goals (SDG) (Xue, Weng & Yu, 2018, pp. 150-151). How the theories relate to the concept depends on the definition that is used. Definitions that focus more on economic development are more aligned with neoliberalism, while definitions that focus on both align more with moderate theorists. The versions that are primarily focussed on ecological sustainability are more in line with green theorists.

Strong Sustainability is one of the more strict varieties of sustainable development, this thesis will use this concept to investigate the research question. These strict criteria make the concept better equipped to deter greenwashing. The theory looks at more practical sides instead of just rhetoric and it is more focussed on ecological sustainability. Sustainable development, on the other hand, also looks at financial sustainability and social development. Within ecological sustainability, strong sustainability focusses on multiple areas. This makes it harder for businesses to be labelled as sustainable if they only made an effort for ecological practices in one category or one area of their business. Another benefit of this concept's definition of sustainability is more definite. It also has more precise criteria which make this concept more suited for practical assessments (Pelenc & Ballet, 2015, pp. 37-40).

Strong Sustainability focusses on two main aspects. The first is known as the carrying capacity, which is the supply and demand of the ecosystem; the ecological footprint matters here. The second aspect is resilience, which is divided between biodiversity and variability (Pearce, Hamilton & Atkinson, 1996, pp. 86-88). These transfer to the three different criteria on which the projects will be assessed in this thesis: the protection of clean water and sanitation (SDG 6), the reduction of carbon emissions (SDG 13.2) and the protection of biodiversity and the ecosystem (SDG 15) (United Nations Sustainable Development Goals, 2018). This theory allows this thesis to focus on these practical criteria.

Method

The method will be primarily qualitative. This thesis will perform a small-n analysis by accessing three cases. Small-n research is beneficial here since there are only a limited amount of cases that meet the criteria of the research question. At the same time, small-n research allows for more in-depth investigation of these cases. More in-depth investigation is beneficial since it could better explain contradictions and greenwashing could be detected more successfully. Small-n studies also allow for more analysis and consideration of environmental factors within each case. Although the cases are relatively similar, each case can have different environmental factors that would alter the result. For example, the case countries can have different climates or political factors that could influence the result. Within an in-depth investigation, there is more room for consideration of those factors. This leads to a more accurate depiction of reality. Therefore, this approach is useful for answering the research question. Additionally, the limited cases allow more in-depth analysis and consideration for context. In result, this method combines a case-focused approach with a variable oriented approach (Rihoux, 2006, pp. 680-681).

Because these cases are relatively similar, there can be some level of generalisation. The selected cases are roughly similar since they are all SGR railroad projects in Sub-Saharan Africa performed by the CCCC or one of their subsidiaries. They are also primarily financed by the African governments with loans from the Chinese Ex-Im Bank. This similarity should result in more robust conclusions about the research question. Additionally, the number of factors that are analysed is limited to environmental ones. The limited scope increases the feasibility of the study (Collier, 1993, p. 106).

The employed method is qualitative data analysis. Government reports, public documents and newspaper articles are the central data sources and this thesis aims to uncover the underlying themes of sustainability within these reports. This method is useful here because it allows for a broad selection of sources and the analysis of a wide variety of documents. Qualitative data analysis also can develop grounded theory about the researched topic, meaning that the outcomes of research can be transformed into a theory (Bryman, 2012, pp. 559 & 570). Therefore this method is well suited to answer the research question; different types of data can be analysed to conclude the sustainability of the BRI projects in Sub-Saharan Africa.

Cases

The cases are selected on a few conditions. One condition for the projects is that their primary source of loans needs to stem from the Chinese government or a Chinese state-owned bank. China will be seen as the exporter here; the companies that construct the project are mainly state-owned (Xue, Weng & Yu, 2018, p. 153). The three cases that are selected are Kenya, Djibouti and Nigeria. All these countries have Standard Gauge Railway projects, which will be the focus of this thesis which has two significant advantages.

First, the projects are relatively comparable, problems and outcomes within these projects are therefore likely to be comparable too. This similarity makes the findings of this thesis more generable and robust. Secondly, these projects are high profile, and widely covered by the media. Compared to other projects, there is a significant amount of information and policy documents on these projects. The selected countries are spread throughout Sub-Saharan Africa and all meet different interests for China. Kenya is mainly attractive for transportation purposes, while Nigeria is more attractive for its oil (Ibrahim & Solomon, 2018, p. 67). Djibouti is an essential country since China has a military base within the country (Kodzi, 2018, p. 57). These different interests are not necessarily related to the SGR. However, they could make the result more generalisable since one specific interest (like oil) does not skew the results.

Data collection

Desk research will be the primary mode of data collection. The primary sources that will be analysed would be government reports from both the Chinese government and the BRI destination countries. For information about the specific case country, this thesis will use the UN and the World Bank reports. In order to triangulate this thesis will use civil society reports. Triangulation would make the analysis more robust and the results more trustworthy. Another source here can be a global non-governmental organisation (NGO's). However, local organisations will be preferred. Thirdly, academic journals and other secondary sources will be used, mainly for determining criteria, but also to provide more information about the context of the cases.

Potential problems

This thesis knows some limitations. With a small-n study, there is always some selections problems. However, the amount of cases that meet the criteria mentioned above is also

limited. Choosing three different countries with different characteristics should minimise selection problems. There are also the problems of intentions and Green Washing; specific measures might be presented as more green than they are. Greenwashing is the selective publication of positive information, while negative environmental information is not disclosed (Bowen & Aragon-Correa, 2014, p. 107). Triangulating data with Civil Society Organisations and other independent reports can limit this problem. Another potential problem is that the projects are not sustainable now but will be in the future. Railroads could be a more sustainable alternative compared to other modes of transport, but the construction of the tracks might be polluting. Therefore, this thesis aims to focus on both the constructional stage and the operational stage. Because there is only a limited amount of information about the long term effects of the operational stage, this thesis restricts itself to the information that is currently available. The scope of this thesis is, therefore, limited.

Kenya

This chapter will discuss the SGR project in Kenya, but first, it will introduce the project in this subsection. Kenya is an integral part of the Belt and Road Project, mainly for transportation purposes. The port town Mombasa is seen as the gateway for trade with (Central) Africa (Kodzi, 2018, p. 157). The Standard Gauge Railway project is, therefore, a crucial part of the project in Kenya. The railway runs from Mombasa to Naivasha and will be constructed in different phases. The construction of the first phase, from Mombasa to Nairobi has been completed and the track is operational. The second phase is divided into three subphases. Phase 2A runs from Nairobi National Park to Naivasha Narok, phase 2B continues from there to Kisumu. Phase 2C covers the distance from Kisumu to Malaba (Ambani, 2017, p. 2).

The China Road and Bridge Corporation (CRBC), a subsidiary of China Communications Construction Company (CCCC), is contracted for the project. The Chinese government is the majority shareholder of the CCCC. The Chinese Export-Import Bank, A Chinese state-owned bank, funds 85% of the US\$3.804 billion project. This loan is given to the Kenyan government, which also finances the remaining 15% of the costs (Wissenbach & Wang, 2017, p. 5). The project is controversial in Kenya. During its construction, the local community issued multiple complaints about land compensation and the environmental impact. There were also various protests against the import of materials and workers from China because this would limit the advantages for the local economy in Kenya. The costs of the project have additionally come under scrutiny. Commentators claim it will lead to unsustainable debt for the Kenyan Government, while others take issue with the fact that the restoration of the colonial train track would have been cheaper (Wissenbach & Wang, 2017, p. 4).

Kenya's ecosystem is very vulnerable to climate change. Various areas are arid, and desertification could occur, as a result of increased pressure (Li et al., 2015 p. 7268). The next section will discuss various sustainability criteria. First, this chapter will discuss the protection and promotion of biodiversity, followed by an accession of water management. Finally, this chapter will discuss the carbon emissions associated with the projects.

Biodiversity

Nature conservation and the protection and promotion of biodiversity are essential aspects of sustainable development. Concerns about nature conservation related to the SGR are mainly centred around national parks and the protection of wildlife. The SGR route is planned through two national Parks in Kenya: The Nairobi National Park and the Tsavo National Park. This plan was highly contested and protested by different environmental movements. There are concerns about decreases in animal population and even the disappearance of individual species. Additionally, there are concerns about the disturbance of the broader ecosystem.

Nairobi National Park

The SGR crosses Nairobi National Park during its second stage, from Nairobi to Naivasha. Nairobi National park lies close to the capital city and is home to a range of endangered species. The construction of the SGR would cause a significant amount of noise that would disturb the animals. This plan caused protest from nature conservation groups which led to a temporary stop of the construction in the park and it ultimately led to some changes.

Although various organisations such as the UN proposed alternative routes, the government and the CCCC ultimately decided to keep the route that crosses Nairobi National Park. Ombuor argues that the fact that the government already owns the park plays a crucial fact here. It meant that the government did not have to compensate for any landowners. This makes this route significantly cheaper, but it also has considerable negative effects on wildlife conservation, which will be discussed below. Still, there are some compromises to the plan. There was more attention for bridges, that facilitate wildlife crossing and there were some speed limits and limitations on the noise levels put in place. These regulations are not that substantial, they do not limit the project significantly and it can be questioned whether it helps with improving wildlife conservation (Ombuor, 2018). The government and the CCCC thereby acknowledge that there are some environmental concerns. However, economic considerations seem to trump ecological ones. This indicates a lack of willingness to support the biodiversity, an essential element behind Strong Sustainability.

This is demonstrated by various researchers and organisations like the UN. They argue that the construction of the railroad can still cause problems for the biodiversity within the park. The UN argues that the construction of infrastructure causes vibrations, in the ground, this

can disturb the animals and it can deter them from the area. The park is a carbon sink and has various vulnerable ecosystems within it such as wetlands and savannahs. These ecosystems rely on many factors; any agitation can lead to severe land degradation. Besides, railroads can cause weed evasions, which can be harmful to local flora since they would dominate over indigenous plants. The large number of workers and vehicles that enter the park daily is an additional factor of disturbance. Along with that, there is the danger that animals will have difficulty crossing the railroads. There will be multiple corridors, but these are not beneficial for animal learning (Mwanza & Chumo, 2019, pp. 2-8). Again, biodiversity within this project is not sufficiently protected under the criteria of Strong Sustainability.

Ambani argues that the chances that animals will use the corridors to a significant extent will remain low. The railway, therefore, leads to a substantial decrease in habitat. The natural habitat of the animals in the park will be decreased by 0,75% due to new infrastructure (Ambani, 2017, p. 38). Ambani additionally argues that the noise pollution during the construction of the tracks and the operational stage of the train will disturb many animals as well. The noise levels during construction are vast and the noises can be heard in an extensive area. Animal behaviour will be disturbed, and this can have long term consequences for nature preservation (Ambani, 2017, p. 39).

In conclusion, the construction of the SGR faces much criticism from a nature conservation standpoint within the Nairobi National Park. The main concerns are decreases in biodiversity caused by vibrations, noise pollution, weed invasion and habitat loss due to segregation of the area by the railroad. All these factors can cause severe challenges to nature conservation within Kenya. This large number of factors means that it will be hard for the project to live up to the sustainable development goal of nature conservation. It compromises the future biodiversity and thus does not protect it, it, therefore, does not qualify for the label of Strong Sustainability.

Tsavo National Park

The SGR also crosses Tsavo National park which differentiates itself from Nairobi National Park in two main ways. First, the park is more isolated from the human population, Nairobi national park lies close to the city and therefore already has more human interference in the park before the SGR. Secondly, Tsavo National Park has elephants; there are specific issues

that will affect elephants more due to their specific modes of communication and migration. The main concerns about the SGR here are about noise pollution and its effects on the elephants. The noise pollution can lead to disturbances in intra- and inter-species communication. The noise pollution has severe effects on elephants and thereby, biodiversity within the park (Ochungo & Odira, 2019, pp. 2-3).

Save the Elephants, an NGO working for the preservation of elephants within the park expects that the SGR will cause problems in the operational stage as well. Elephants communicate in an exceptionally low frequency and are acutely impacted by construction noises. Disturbances in communication can lead to more exposure to danger and more stress which leads to multiple behaviour disturbances, such as reduced chances of mating. Additionally, the habitat fragmentation reduces the biodiversity of the two areas between 13% to 75%, dependent on whether or not animals use the corridors. Besides, the fragmentation decreases the nutrient cycles. Species have reduced space to find diverse nutritional sources which decreases their nutrition cycles, because of stress and disturbances of communication (Ochungo & Odira, 2019, pp. 3-5). This shows that animals struggle with the SGR and that their survival. Biodiversity is, thus, threatened during the operational stage as well.

The Kenyan government and the CRBC took some action to prevent loss of animal life. To enable wildlife migration, there will be six wildlife crossings under the railway in the park; these will be 70 meters wide and 6 meters high. Elephants were generally quick in learning how to use these crossroads. However, the SGR trains led to the death of 20 elephants within just one operational year. This is a vast increase in elephant mortality compared to previous years (Ochungo & Odira, 2019, pp. 7-8). Besides, not all animals could cross easily. Many had problems with the exposed pipeline and walked over the railway instead of finding the designated areas. It takes time for animals to learn new behavioural patterns. Therefore it will take some years before wildlife has adapted to the new railway construction (Okita-Ouma et al., 2016, pp. 109-110). So even though action was taken, this was not sufficient to protect biodiversity. This project, therefore, does not adhere to the demands of Strong Sustainability.

When animals do not use the crossings, their habitat decreases, and the habitat of the total population will be further fragmented. Not all animals would likely use the crossings.

Therefore the habitat of many animals would be decreased. Habitat fragmentation reduces the biodiversity of the two areas between 13% to 75%, dependent on whether or not animals use the corridors. Habitat fragmentation also leads to a decrease in the nutrient cycles of animals. Animals have decreased access to diverse nutrition and would have fewer opportunities to migrate to different areas with different nutritional sources (Ochungo & Odira, 2019, pp. 4-5). Habitat reduction is a severe threat to biodiversity and thereby violates the criteria of Strong Sustainability.

Several elephants were collared with a GPS device to test these assumptions and to measure their movements. They show that elephants heavily use both sides of the tracks; connectivity is therefore important for their habitat. To prevent elephant crossings on dangerous spots, there needs to be an elephant proof electrified fence along the railway. The first fence that was not electrified so that elephants could trump them. According to the NGO *Save the Elephants*, accidents with elephants were inevitable. A newly built fence in 2016 was electrified, additionally speed bumps and speed limits in were established spaces where there is a lot of wildlife activity. (Okita-Ouma et al, 2016b, p. 3-4, 13 & 28). These measures signal some goodwill on the protection of wildlife. Still, this came relatively late and are rather easy and cheap ways to protect biodiversity. These measures do not protect animals sufficiently.

This is seen in the many animal deaths that were recorded due to the highways around the railroad in 2017. SGR construction workers were the primary users of these highways at this time. These deaths have a significant impact on the ecosystem (Okita-Ouma et al., 2017, pp. 110-111). The railroad significantly reduces the animals' freedom of movement since some animals use the animal crossings, but not all. Therefore some animal groups and species face significant loss of habitat which complicates their search for water. Since elephants sometimes dig up water, their behaviour impacts other animals as well (Koskei et al., 2018, p. 33). The railroad this influences the animals and biodiversity despite the measures.

All elements considered, the SGR project in Kenya does not attain to the needs of nature conservation within the Sustainable Development Goals Framework. There have been some elements that are favourable for animal protection, but the SGR still runs through two wildlife parks. This shows that the effort for nature preservation in the SGR is severely

limited. Strong Sustainability has strict criteria. Biodiversity is not protected not promoted enough for Strong Sustainability.

Water Management

Water supplies in Kenya are very climate-sensitive; the majority of the economy is centred around activities that are dependent on water. For instance, 80% of the population is dependent on agriculture. Drinking water and water for agricultural purposes is scarce in various rural areas and some urban districts. Thus, the state of water supplies in Kenya are already somewhat problematic. Still, Kenya is not very arid compared with other African nations (Ministry of Environment and Natural Resources Kenya, 2016, p. ii).

Nevertheless, infrastructure development, in general, can lead to more problems with water supplies. Physical infrastructure decreases the surface on which water can be absorbed. It can cause land degradation, which complicates water management. Road drainages can lead to soil erosion through runoff. In effect, the soil will retain less water which makes it less fertile and more prone to droughts. Additionally, construction can cause water pollution; this would decrease the quality of the water. Drinking water and agriculture water could become toxic (Ministry of Environment and Natural Resources Kenya, 2016, pp. 25-26). Drilling also impacts the natural hydraulic functions in nature areas. Natural water streams can be disrupted, which can lead to ecological imbalances (Ambani, 2017, p. 4). Still not enough research has been done on this specific SGR project in specific. Most of the sources mentioned above discuss potential problems based on research about infrastructure development and construction in general.

The Chinese Road and Bridge Cooperation did find a natural water source during construction. This water stream can be used for human consumption and irrigation purposes, which would be beneficial for local communities (Ngotho, 2018). This project is called the Kimuka Community Water Aid Project. Interestingly, the Chinese government and their state-owned media are almost the only ones that cover this project (China.org, 2018 September 15; Xinhuanet, 2018, September 13). Only one Kenyan online newspaper mentions it and the parliamentary representative of the Kajiado West Constituency mentions it on his Facebook page (Githaiga, 2018 September 16; Sunkuyia, 2018, September 14). The lack of domestic and local coverage of the project can indicate that the project is not that highly valued by the local communities. The information was openly available to the

public, so it was not a matter of undisclosed information. It can be easily found on English versions of Chinese government websites. It is therefore questionable whether this project has as much benefit as the Chinese government claims it has. This might be an attempt at greenwashing since China highlights only the beneficial parts of water management.

There are also concerns about the use of concrete and cement. These materials are among the most used materials in the projects. Concrete can be very polluting for the environment and specifically for the groundwater. Groundwater pollution could potentially be felt in a vast area. Some share of the cement is imported from China, but a local company called Bamburi Cement produces the majority. The CCCC and Bamburi Cement, claim that they do take the pollution in regard and that they try to minimise the impact. They claim it is sustainable. However, the long-term effect is yet unknown (LafageHolcim, 2019). There have been clashes over water use in some areas. There have been protests against Chinese SGR workers as well. According to a local civil society organisation, the Chinese workers did not sustainably manage the water. It would lead to pollution and shortages for the local population (Mwabege, 2016 March 29). This conflict indicates that the SGR project does have negative consequences on the local level. However, this conflict seems to be a rare case.

There are mixed signs to the question of whether China complies with water sustainability. Water is not the most significant issue from the ecological backlash against the SGR but is a crucial factor to consider. Infrastructure projects do need materials that require water. The SGR project here does not seem to require a disproportionate amount of water. The beneficial water management factors such as the community project are not widely covered as are the protest against the water usage by the CCCC. Water sustainability is not a substantial problem within the BRI in Kenya. Still, not enough active measures were taken for Strong Sustainability.

Carbon Emissions

The carbon emissions of the entire railroad sector did sharply increase due to the construction of the SGR. The increase is primarily attributed to the transport production of materials that were used for construction. Nevertheless, the overall plan for the SGR is to reduce carbon emissions in the long term. The plan here is to shift the freight and their carbon emissions from the road to rail. There are plans to make the SGR run on electricity instead of carbon-based energy which will also decrease the carbon output and leaves

possibilities open for renewable energy sources for the trains. This electrification would mean that the operational stage of the SGR would lead to decreased greenhouse gasses (Ministry of Transport Kenya, 2019, pp. 14-16). Besides, Kenya Electrical Transmission Company (Ketraco) signed a deal with China Electric Power Equipment and Technology Company (Ketraco, 2018). This electrification will be beneficial for reducing carbon emissions from transport. Githaiga and Bing argue that the electrification will likely reduce carbon emissions in the long term. However, the projects construction phase is still very polluting. This is also due to the construction of the connecting highways and buildings near the railway (Githaiga & Bing, 2019, 224-225).

While greenhouse gas emissions are alleviated during the construction phase, the SGR would ultimately decrease the carbon emissions from transport. However, more research needs to be done on how much freight shifts to railroads in practice. The SGR will likely lead to increased trade which means that more goods need to be transported. This increase reduces the beneficial effects of the road to rail shift. Since railroads are a more sustainable mode of transport, this project can be seen as promoting sustainable development, especially since it will be electrified. The source of energy for the trains are not from renewable energy, so there is still a significant amount of room for improvement on these criteria. The carrying capacity from Strong Sustainability is improved, but the energy is not renewable, which limits the improvements.

In sum, the SGR in Kenya poses mixed signals when it comes to sustainability. It performs poorly on promoting biodiversity. In Kenya, the railroad is a threat to preservation since it crosses two national parks. There are not too many problems with water management and carbon reductions. However, the CCCC and the Chinese government do not take many active measures to promote sustainable practices within those two criteria. The extent to which the BRI projects promote strong sustainable development is thus limited.

Nigeria

This chapter will discuss the ecological consequences of the Belt and Road Initiative projects in Nigeria. It will access this on the three ecological criteria of Strong Sustainability. First, it will discuss the relationship between Nigeria and China, and the SGR project will be introduced. Next, it will discuss the consequences of biodiversity, followed by water management and the consequences to the carbon emissions within the country. There are not too many sources that cover consequences to water management and biodiversity. Therefore, the primary debate will be focussed on carbon emissions within this chapter.

The CCECC will again facilitate the construction of the railroad. This company has finished multiple infrastructure projects in Nigeria in the past. It will construct two SGR projects, an upgrade of the railway between Lagos and Kano and a new route from Abuja to Kaduna. This section will focus on the constructional stage of the project. The Exim Bank of China entirely finances the project with a loan to the Nigerian government (Chen, 2018, pp. 1-2). The costs of the project are US\$5,3 billion. The Lagos-Kano Railway is 2700 kilometres long and connects the port city Lagos to the city Kano, which is near the border of Niger. The Abuja-Kanuda railroad is 920 kilometres long (Alhaji, 2019).

China is mainly interested in Nigeria for its oil reserves. Initially, China offered to build the railroad in exchange for oil, instead of cash. However, Nigeria preferred cash, but according to some critics, the country could have benefitted from preferential loans if they had chosen the oil (Kafilah et al, 2017, pp. 1222-1224). Nigeria faces a lot of environmental problems related to its oil industry such as oil spillage, but also gas flaring and other sources of air pollution. There are also problems with land degradation, water pollution and decreased biodiversity within the country (Anslem, 2017, p. 775). Therefore, action to achieve sustainability is needed. The Chinese government claims that the SGR would be a way for Nigeria to achieve green growth faster (Xinhua, 2017).

Biodiversity

Nigeria is relatively rich in biodiversity, specifically within the wetlands. The railroad will cover coastal areas that are quite sensitive to soil erosion and increased rail transport can cause damage to riverbanks. This balanced ecosystem will be disrupted by the construction of the railroad and its operational phase, which will be harmful to biodiversity. Additionally, railroad construction leads to deforestation and land drainage. This also harms the areas

such as the wetlands. This changed habitat makes it harder for many animals and plants to live here. There is also much noise associated with the SGR railroad construction and operation in Nigeria. This noise can disturb animals, but it is unclear whether this will decrease biodiversity (Adeniran & Yusuf, 2016, pp. 99-103).

In sum, there are some problems associated with railway construction regarding biodiversity. However, the extent to which the SGR forms a threat to biodiversity remains uncertain, mainly due to a lack of sources. At the same, these factors seem to remain potentials as there is hardly any information about actual threats to biodiversity as a direct consequence of the project. Still, the project also lacks active measures to protect biodiversity. These factors additionally remain unaddressed by Chinese corporations. There is no information available on how these potential problems are addressed and what the CCCC does to protect biodiversity. It remains unknown whether they take action to prevent deforestation and land drainage and whether they take action to limit noise pollution. There is no definite proof that China harms biodiversity in Nigeria, nor is there proof that China protects and promotes biodiversity along the railroad track. Therefore, there is also no evidence that the SGR would lead to improved biodiversity; the lack of pro-active action makes it harder for this project to fall under Strong Sustainability.

Water Management

Adeniran and Yusuf state that all transportation activities, including railroad impact hydrological functions such as water retention. Trains and their tracks alter how the water fluctuates underground as a result of their weight. These authors additionally state that particulates can discard from the vehicles, which can contaminate rivers. The trains are likely to carry oil in Nigeria and it will drive past the wetlands near the Niger Delta. Therefore, the chances of pollution seem quite high (Adeniran & Yusuf, 2016, pp. 100-103). Still, their paper lacks proof that this has been the case within this specific project. Water management, therefore, does not seem to be a problematic factor. On the other hand, there are no reports of active measures the CCECC takes to prevent water pollution within this project. The BRI does not seem to damage ecological sustainability in water management in Nigeria, but it also does not promote the concept sufficiently for the criteria of Strong Sustainability.

Carbon Emissions

The transport system is currently highly inefficient and mostly neglected. The Nigerian population does not use trains widely. Therefore, there is much potential for improvements and reductions in carbon emissions. More railways thus can reduce carbon emissions (Abioye, Shubber & Koeningsberger, 2016, pp. 103 & 112). According to Alqali, the railroads are excellent examples of how infrastructure projects can be sustainable, as the projects are done in accordance with the Sustainable Development Goals. However, he mainly cites social Sustainable Development Goals. Still, he also argues that carbon emissions could decrease as a result of the SGR (Alqali, 2018). This signals that the SGR could contribute to more sustainability on the criteria of reduced carbon emissions in Nigeria. However, this contribution could be overstated when looked at the ecological criteria of Strong Sustainability.

The SGR is situated around the Niger Delta Region where the carbon emissions are exceptionally high, reductions in air pollution are highly needed here. There is also an infrastructure gap in this region. Rail construction would be the preferred alternative since the construction of railways emits less carbon compared to road construction (Fagbeja et al., 2017, p. 7790). Railroads are also more sustainable compared to highways because railroads need fewer maintenance. Also, the upgrading of an existing railway is significantly more sustainable compared to building a new one. Currently, only a small portion of the population uses trains (Babatunde, 2019, 110-111). The upgrade of the old narrow-gauge railway to a standard gauge railway will double the load a train can carry (BBC, 2017). This upgrade will facilitate a more significant shift from road to rail for cargo which is beneficial for sustainable development since it decreases carbon emissions.

Still, the railroad will also facilitate the movement of oil since China is mainly interested in building the railway for that reason (Richter, Wang & Adeola, pp. 8-9). The oil industry signals unsustainability, further developing this industry will lead to more pollution. The goal of the project is not sustainable, but the project itself could be sustainable. Still, this limits the believability of China when it comes to their sustainable intentions. The Nigerian government claims it has intentions to electrify the railroad but has not done so yet (Rail Business, 2018). This lack of action means that there is a lot of potential missed when it

comes to reducing carbon emissions. An electrified railway would make the project more sustainable, and it would also distance the project further from the oil industry.

In the area of carbon reductions, there seems to be contradicting ideas about this project and whether it is beneficial or harmful for carbon emissions reduction. Some harm in this project might be hard to avoid. Construction projects often emit a large number of almost unavoidable carbon emissions, but in the long term, they could lead to decreased pollution rates. Likewise, the SGR would be a low carbon alternative and seems to be beneficial for the reduction of emissions. On the other hand, the railroad is not electrified, which means that the full potential of the railroad is not reaped. The ecological footprint is not sufficiently reduced for the criteria of Strong Sustainability.

To conclude the chapter about Nigeria, the SGR projects in Nigeria do not seem particularly harmful towards ecologically sustainable development. Still, more information is needed to make a more definite conclusion about the effect of the SGR on biodiversity and water safety. In these areas, there were many concerns about potential threats, but little research is done to confirm or deny these threats. Meanwhile, the CCEC and the Nigerian government could have done more to make this project sustainable. Thus, the project is not sustainable enough to for the criteria of Strong Sustainability. This theory demands more action to improve and protect sustainability.

Djibouti

This chapter will discuss the ecological sustainability of the Standard Gauge Railway between Djibouti and Ethiopia, it will focus on Djibouti. The first part will introduce the China- Djibouti relationship and the project specifics. A section about the consequences of the SGR railroad to biodiversity will follow, next the consequences for water conservation will be discussed. Finally, this section about Djibouti will discuss the consequences of carbon pollution. There is not too much information about biodiversity preservation and water management, the issue of carbon emissions is more debated here. The expected carbon reductions as a result of the SGR might not be as high as the initial research expected it to be.

Climate change profoundly impacts Djibouti. It is one of the warmest and driest places on earth, which leads to a lot of water scarcity. The country needs to import most of its goods and therefore, it needs economic resources. Djibouti uses its strategic location to get investments to attain these resources (Schulman, 2019, p. 64). The country lies close to the Yemen and Somalia, where many conflicts take place. Along with other military powers, China has a military basis in Djibouti. Additionally, Djibouti has a strategic location for transportation since it connects various regions. For these reasons, Djibouti is a crucial state within the BRI for China's connectivity and security (Hussein, 2018, p. 940; Kodzi, 2018, p. 57).

The SGR railway runs from the port of Doraleh in Djibouti to Addis-Ababa in landlocked Ethiopia and it would replace the colonial railway. Only 93 kilometres of the 759 kilometres from the railway runs through Djibouti (Vhumbunu, 2016, p. 285). The CCECC constructs the project and the costs are US\$3,5 million. The China Export-Import Bank finances 70% with a loan to the two countries and the Ethiopian government finances the remaining 30%. A separate contract negotiated the electrification of the railroad. Initially, the Djiboutian government would pay for this project, but it was unable to do so. Eventually, the CRCC paid the costs and got a part of the Djiboutian stake of the train operating company in return (Styan, 2020, pp. 195-196).

Biodiversity

The region where the SGR runs in Djibouti has a semi-desert climate and is not rich in biodiversity. Occasionally, there have been reports of collisions with animals. It is estimated that the SGR trains killed at least 50 animals in 2018. Still, these are mostly farming animals

(camels) which does threaten the biodiversity significantly (The Economist, 2018). Pollution is a more significant threat to biodiversity here. The transportation sector pollutes a lot of oil and chemicals due to truck accidents on the busy roads to Ethiopia. Shifting freight from road to rail could reduce the number of accidents and therefore the amounts of hazardous spills, this would be beneficial for the on-land biodiversity.

Meanwhile, maritime diversity could suffer from the SGR. Since the SGR has a vital function within the Chinese global transport chain, the traffic to and from Djibouti will likely increase. Heightened maritime transport can endanger the breeding habitat for whale sharks. More maritime traffic will disturb the animals and more traffic is associated with more chemical and oil spills and an increase in solid waste in the ocean. This pollution is dangerous for sea life, but also coastal birds (Failler, Karani & Seide, 2015, pp. 14 & 19). However, this is an indirect consequence. Biodiversity is not significantly threatened as a direct result of the SGR construction and operation of the SGR in Djibouti. However, the CCECC did not undertake active measures to protect biodiversity. This means that the SGR project does not threaten sustainable development here, but it also does not contribute to the improvement of sustainable development in biodiversity in Djibouti. This means that the protection of biodiversity is insufficient, according to Strong Sustainability.

Water management

Djibouti suffers a lot from water scarcity and droughts. At the same time, there is an increase in truck accidents. These accidents could lead to spills of oil and hazardous chemicals, which causes water pollution (Failler, Karani & Seide, 2016, pp. 4 & 17). Similar to improving the biodiversity, a shift from road to rail can help to reduce these spills and it would improve water management. The CCEC additionally takes active measures to prevent water pollution due to the construction of the railroad. They dug nineteen wells along the line (it is unclear how many of them are situated in Djibouti). The CREC tests water within these wells. They can assess whether the project has much impact on the water quality, both surface water and of groundwater.

Besides, there is an assigned engineer who is responsible for the water waste and the treatment and potential recycling of it (Zeleeke, 2017, p. 82). Another way in which the SGR could boost water management is through improving the relations between Ethiopia and Djibouti. The Chinese Export-Import Bank also established an additional project for a water

pipeline from Ethiopia to Djibouti. This project was more straightforward to realise due to the SGR project, but still should be seen as a separate project (African Review of Business and Technology, 2017).

Overall, the water management of the SGR project is not problematic for sustainable development. There are active measures to prevent water pollution. On the other hand, there are not any projects that improve the water recycling of Djibouti. It seems like the situation here is somewhat undecided, there are no controversial cases of unsustainable water management, but there is also a lack of actively improving it. The efforts China makes and the benefits of rail transport are not harmful, but it can be questionable if the measures are enough for Strong Sustainability.

Carbon Emissions

Carbon emissions reduction is the most contested of the three criteria in Djibouti. According to the Djiboutian government documents the SGR railway as part of their plan to reduce carbon emissions. They also cite that the railway would boost the green economy within Djibouti which would give them more resources to battle the consequences and causes of climate change (Republic of Djibouti, 2015, pp. 5 & 8). However, it is unclear whether the project will reap all these benefits. Transportation is the backbone of the Djiboutian economy according to its government, transport services attributed to over 70% of the annual GDP in 2012. However, in that year, transportation also contributed to 31,7% of the country's CO₂ emissions (Ministère de l'Habitat, de l'Urbanisme, de l'Aménagement du Territoire et de l'Environnement, 2012, pp. 89 & 99).

Transportation is so substantial in Djibouti because the country is responsible for 90% of Ethiopia's trade. Ethiopia is a nation of 109,2 million inhabitants. This transport requires over 1500 trucks daily that move cargo from Addis Ababa to Djibouti and back. An electrified railroad emits fewer carbon emissions compared to older railroads and other modes of transport as discussed below (Woldegebriel, 2013). This means that the SGR railroad here can contribute to sustainable development since the emissions for transportation can be reduced here.

The SGR would shorten the transportation time from over three days to just 10 hours. Therefore, it is expected that the SGR will contribute to a significant reduction in the amount

of road transport. In result, carbon emissions would decrease as well (Oirere, 2018). Another possible way in which the Djibouti-Ethiopia railway can reduce air pollution is through challenging aviation transport between the countries. The new railway significantly reduces the travelling time compared to the old railway. Green claims that many passengers who now travel by plane would prefer the railroad since the flights make frequent stops according to the current schedule (Green, 2018). Thirdly, the SGR could benefit carbon emission production through decreased purchases and usage of cars. The Islamic Development Bank expects that the SGR will prevent the importation of a total of 10.000 of old cars. This decrease in purchases would especially be beneficial since older cars produce more pollution than newer cars. Preventing their emissions would be desirable (Islamic Development Bank. 2018, p. 52).

On the other hand, the expected benefits described above might be too optimistic and slightly misleading. One of the purposes of the SGR is facilitating more trade and the transportation that comes with that. China, Djibouti, and Ethiopia all share this goal and therefore were willing to commit to this project. The increased transportation makes it unclear whether the effect of the SGR will lead to a significant reduction of the carbon emissions caused by transportation (Failler, Karani & Seide, 2016, p. 4). Many of the authors discuss the benefits base their argument on older traffic data. However, these benefits might not be as substantial when the total amount of traffic increases as well. The amount of maritime traffic has already augmented in 2015.

Additionally, the UN estimates that the freight of the line is comparable to 200 trucks. Still, they expect that the railway will lead to lower carbon emission, improved air quality and that it is a step towards the green economy in Djibouti (United Nations Climate Partnership for the Global South, 2017, p. 53). When only 200 of the 1500 trucks replaced, most of the transportation would still take place on the road. More trade will also lead to more cargo and thereby more trucks, the total amount of daily trucks is therefore likely to raise. This increase in traffic diminishes the significance of the SGR in reducing carbon emissions even more. The number of passengers that change to rail transport also remains lower than expected, this means that the environmental benefits in this regard have not to be obtained (Manek, 2019). The reductions in carbon emissions the SGR would facilitate are present but do not seem highly significant next to the higher volume of the total transportation. This

makes its contribution to sustainability questionable. This project is, therefore, unlikely to be labelled as Strong Sustainability.

To conclude the Djiboutian chapter, within the pillars of biodiversity and water management, there were no reports of significant violations of ecological standards. However, this thesis argues that the CCCC has not done enough for this project to be labelled as ecological sustainable under Strong Sustainability. They took some measures to prevent damage to the environment, but they did not take enough active measures to protect biodiversity and water safety and to reduce carbon emissions. It does not improve the carrying capacity of the earth, nor does it increase the ecological footprint.

Conclusion

This thesis argues that the Standard Gauge Railway project of the Chinese Belt and Road Project does not contribute significantly to sustainable development under the criteria of strong sustainability. Within this thesis, I aimed to answer the following question:

‘To what extent is ecologically sustainable development implemented within the Chinese BRI Railroad projects in Sub-Saharan African Countries?’. To answer this question, this thesis analysed SGR railroad projects in Kenya, Nigeria, and Djibouti on three ecological sustainable development pillars, namely biodiversity, water management and carbon emission reduction. This thesis contributes to the existing literature by addressing the gap between literature on the sustainability of the BRI in Sub-Saharan Africa. It employed an underused angle, namely the China-Africa relation through an environmental perspective. It aimed to contribute to the existing literature of Green Theory by using the concept of Strong Sustainability to analyse whether the BRI attributes to sustainable development in the selected case countries.

The results show that most environmental problems were found within Kenya since the railroad crosses two wildlife parks. The railroad threatens biodiversity, which incited many protests from various organisations in this country. There were no significant violations of sustainable development in the categories of carbon reduction and water management. Still, sustainable development is not promoted, especially under the criteria of Strong Sustainability. In Nigeria, the carbon emission reduction is not as high since the railroad is not electrified here. Additionally, the CCCC did not take any active measures to protect biodiversity and water. There were also no measures taken to protect biodiversity and clean water. This lack of action not only indicates that China does not promote sustainable development, but it also means that the BRI works against sustainability in some instances. The potential threats to biodiversity and water safety remained unaddressed by the CCCC. On the other hand, there were no reported incidents of threats to biodiversity and water pollution. Djibouti has more protections for water management. There also seem to be no significant violations of biodiversity and carbon emissions. Still, the expected carbon emission reduction might be not as high since the railroad will also incite more trade and thereby more transport.

Overall, train transport is one of the lowest carbon modes of transportation and shifts from road to rail are beneficial for sustainable development. At the same time, there are less proactive measures on biodiversity and water management within the BRI project in Sub-Saharan Africa. This means that China greenwashed the project to some extent, the BRI is not as clean and green as claimed. Additionally, BRI will very likely lead to increased trade; this will result in more transportation that could outweigh the carbon reduction benefits. In sum, the carrying capacity and the resilience of these areas are not supported and protected enough to attain to the demands of Strong Sustainability. China does not disregard sustainable development entirely, but it does not promote it enough to be seen as green according to the concept of Strong Sustainability. In conclusion, the BRI in Africa is not as green as China claims.

This thesis contributed to the existing literature by providing more information on the sustainability of China-Africa relations in the context of the BRI. It refuted the claim that the BRI is a significant force in favour of sustainability by using Green theory and the concept of Strong Sustainability. It thereby refuted the neoliberal expectation that the BRI would lead to more sustainability. It also critiqued the binary view that the BRI is either completely sustainable or not. In many cases, the results show that the project did not take active measures to improve on sustainability, but the project also was not particularly harmful towards nature in every case. The stricter Strong Sustainability was useful allows focussing on practical criteria for sustainability that show violations. A disadvantage is that it would be almost impossible for large projects such as the BRI to adhere to the demands of Strong Sustainability. Some projects would have to inflict some damage in one area to lead to sustainability in the long term. It also is complicated to promote sustainability in every subcategory. It would require companies to establish many side projects. Strong Sustainability is thus useful for establishing criteria that measure sustainability, but these measures might be too strict.

The argument is somewhat inconclusive since it cannot be argued that China completely goes against all measures of Strong Sustainability. Besides, some subcategories would need more research to tell if the BRI is harmful in this area. Therefore, there more field research is required to form a more definite conclusion. Future research could also investigate whether large scale projects are inherently disadvantaged by Strong Sustainability. As mentioned

above, large scale projects that aim for long term sustainability might be negatively affected during their constructional phase when they are assessed on the criteria of Strong Sustainability.

Bibliography

Adeniran, A. O. & Yusuf, T. B. (2016). Transportation and National Development: Emphasis to Nigeria. *Transportation*, 7(9), 93-104.

African Review of Business and Technology. (2017). Ethiopia-Djibouti Water Project to be inaugurated soon. <http://www.africanreview.com/manufacturing/water-a-environment/ethiopia-djibouti-water-project-to-be-inaugurated-soon>

Alqali, A. (2018). INDEPTH: How Nigeria's Abuja-Kaduna railway is impacting lives of commuters, communities at both end of the rail corridor. <https://www.africannewspage.net/2018/08/how-abuja-kaduna-railway-is-impacting-the-lives-of-commuters-and-communities-at-both-ends-of-the-rail-corridor-in-nigeria/>

Alhaji. (2019). Nigeria Launches construction of the \$US 5,3B Ibadan-Kano Railway. *Construction Review Online*. <https://constructionreviewonline.com/2019/12/nigeria-launches-construction-of-the-us5-3b-ibadan-kano-railway/>

Ambani, M. M. (2017). *GIS Assessment of environmental footprints of the standard gauge railway (SGR) on Nairobi National Park, Kenya* [Published Master Dissertation]. University of Nairobi.

Anslem, A. J. (2017). China's Efforts in Sustainable Development: A Test Case for Nigeria's Environmental Sustainability Goals. *Modern Economy*, 8(5), 770-790.

Antonio, R. J. (2013). Plundering the commons: The growth imperative in neoliberal times. *The Sociological Review*, 61, 18-42.

Ascensão, F. et al. (2018). Environmental challenges for the Belt and Road Initiative. *Nature Sustainability*, 1(5), 206, 1-4.

Babatunde, A. (2019). Efficiency of Railway Transport as a Sustainable Mode of Transport in Nigeria: A Study of Rail Mass Transit in Lagos and its Environs. *Electronic Research Journal of Social Sciences and Humanities*, 1(1), 102-126.

BBC. (2017). Getting Nigeria's Railway back on track with China's help. *BBC News Online*. <https://www.bbc.com/news/world-africa-42172955>

Bhattarai, M. & Hammig, M. (2001). Institutions and the environmental Kuznets curve for deforestation: a cross country analysis for Latin America, Africa and Asia. *World development*, 29(6), 995-1010.

Bowen, F., & Aragon-Correa, J. A. (2014). Greenwashing in corporate environmentalism research and practice: The importance of what we say and do. *Organization & Environment* 27(2), 107-112

Bryman, A. (2012) Social Research Method (Fourth Edition). *Oxford University Press*.

Chen, Y. (2018). China's Role in Nigerian Railway Development and Implications for Security and Development. *special report, United States Institute of Peace*, 2.

China.org. (2018, September 15). China-sponsored project to ease water shortage in Kenyan county. [://www.china.org.cn/world/2018-09/15/content_63453910.htm](http://www.china.org.cn/world/2018-09/15/content_63453910.htm)

Collier, D. (1993). The comparative method. In A. W. Finifter (Ed), *Political Science: The State of Discipline*. Washington DC: American Political Science Association.

Economist. (2018 February 10). Camel Trains are holding up Ethiopia's new railway line. *The Economist*. <https://www.economist.com/middle-east-and-africa/2018/02/10/camel-trains-are-holding-up-ethiopias-new-railway-line>

Fagbeja, M. A. et al. (2017). Challenges and opportunities in the design and construction of a GIS-based emission inventory infrastructure for the Niger Delta region of Nigeria. *Environmental Science and Pollution Research*, 24(8), 7788-7808.

Feiller, P., Karani, P. & Seide, W. (2016). Assessment of the Environmental Pollution and its impact on Economic Cooperation and Integration Initiatives of the IGAD Region; National Environment Pollution Report- Ethiopia. *Suez Consortium*. 1-38

Galeotti, M., Lanza, A., & Pauli, F. (2006). Reassessing the environmental Kuznets curve for CO2 emissions: A robustness exercise. *Ecological economics*, 57(1), 152-163.

Githaiga, P. (2018, September 16). Accidental water-well to quench thirst in Kijadio. *Standard Media Digital*. <https://www.standardmedia.co.ke/article/2001295803/accidental-water-well-turns-into-village-gem> at 22-03-2020

Goh, B. & Cadel, C. (2019 April 25). China's Xi says Belt and Road must be green, sustainable. *Reuters*. <https://www.reuters.com/article/us-china-silkroad/chinas-xi-says-belt-and-road-must-be-green-sustainable-idUSKCN1S104I>.

Green, J. (2018 March 26). Ethiopia-Djibouti railway poses threat to Ethiopian airlines. *The Exchange*. <https://theexchange.africa/investing/africas-development/ethiopia-djibouti-railway-ethiopian-airlines/>

Greig, A. Hulme, D. & Turner, M. (2007). *Challenging Global Inequality: Development Theory and Practice in the 21st century*. London (UK): Palgrave Macmillan London UK.

Guoyou, Q., Saixing, Z., Chiming, T., Haitao, Y., & Hailiang, Z. (2013). Stakeholders' influences on corporate green innovation strategy: a case study of manufacturing firms in China. *Corporate Social Responsibility and Environmental Management*, 20(1), 1-14.

Guthega, N. M., & Bing, W. (2019). Belt and Road Initiative in Africa: The Impact of Standard Gauge Railway in Kenya. *China Report*, 55(3), 219-240.

Hultman, N., Sierra, K., & Shapiro, A. (2012). Innovation and Technology for Green Growth. *Old Problems, New Solutions*, 31, 31-63.

Hussein, Y. (2018). China's Infrastructure Investments in Djibouti, Djibouti: Mutual gains or just an expansion of China Power? *International Journal of Social Science and Humanities Research*, 6(4), 940-947.

Ibrahim, S. G., & Solomon, C. I. (2018). The Emergence and Development of Sino-Nigeria Economic Relations: An Analysis. *SOCIALSCI JOURNAL*, 1(1), 62-70.

Islamic Development Bank (2018). *Low-Carbon Transport for Development Trends and Recommendations for Islamic Development Bank Member Countries*. https://slocat.net/wp-content/uploads/2020/02/SLOCAT-ISDB_2018_low-carbon-transport-for-development.pdf

Jia, F., Gosling, J., & Witzel, M. (2017). *Sustainable Champions: How International Companies are Changing the Face of Business in China*. Routledge.

Kafilah, G., Rasiah, R., Kwek, K. T., Muhammad, M., & Yusuf, A. (2017). China's Aid and Oil for Infrastructure in Nigeria: Resource Driven or Development

Motive?. *Contemporary Chinese Political Economy and Strategic Relations: An International Journal*, 3(3), 1197-1235.

Ketraco (2018 February 5) Ketraco to Electrify SGR in 28 months.
https://www.ketraco.co.ke/news/2017/Ketraco_to_Electrify_SGR.html

Kodzi, E. (2018). Live and Let Live: Africa's Response Options to China's BRI. In Zhang, W., Alon, I. & Lattemann, C. (Eds.), *China's Belt and Road Initiative: Changing the Rules of Globalisation*. Palgrave Macmillan. 155-178

Koskei M. et al. (2018). The effect of the new standard gauge railway (SGR) on elephant movements in the Tsavo Ecosystem Kenya. *Save The Elephants and Kenya Wildlife Service*. 1-42.

LafargeHolcim (2019 April 17). SGR Project in the Spotlight: Sustainability.
<https://www.lafargeholcim.com/sgr-kenya-spotlight-sustainability>

Lorek, S., & Spangenberg, J. H. (2014). Sustainable consumption within a sustainable economy—beyond green growth and green economies. *Journal of cleaner production*, 63, 33-44.

Manek, N. (2019 April 4). Djibouti Needed Help, China Had Money and Now the US and France are Worried. *Bloomberg*. <https://www.bloomberg.com/news/features/2019-04-06/djibouti-needed-help-china-had-money-and-now-the-u-s-and-france-are-worried>

Ministry of Environment and Resources Kenya. (2016). *Kenya Strategic Investment Framework for Sustainable land management 2017-2027*.
<http://www.environment.go.ke/wp-content/uploads/2018/08/KSIF-Kenya-Strategic-Investment-Framework-on-SLM-2017-2027.pdf>

Müller, J. M., & Voigt, K. I. (2018). Sustainable industrial value creation in SMEs: A comparison between industry 4.0 and made in China 2025. *International Journal of Precision Engineering and Manufacturing-Green Technology*, 5(5), 659-670.

Mwabegbe, F. (2016 March 29). Locals deny Chinese firm water use for SGR construction. *Daily Nation Kenya*. <https://www.nation.co.ke/counties/Standard-Gauge-Railway/-/1107872/3138022/-/129ktxwz/-/index.html>

Mwanza, S. & Chumo, C. (2019). Standard Gauge Railway (SGR) through Nairobi National Park: Will the Iconic Park Survive. *UN Environment*, 1-8.

Ngotho, S. (2018 September 18). Kajiado taps spring water from SGR tunnel. *Business Daily Africa*. <https://www.businessdailyafrica.com/news/counties/Kajiado-taps-spring--water-from-SGR-tunnel/4003142-4758872-y06cua/index.html>

Ochungo, E. A. & Odira, W. (2019, September 21). The Inaudible voice from wildlife habitat: the case of interaction between wildlife, ecosystem and infrastructure development in Kenya [Conference Paper] *International Conference on Ecology and Transportation, Hyatt Regency Hotel, California USA*.
https://www.researchgate.net/profile/Ochungo_Ochungo/publication/336057568_The_inaudible_voice_from_wildlife_habitat_the_case_of_interaction_between_wildlife_ecosystem_and_infrastructure_development_in_Kenya/links/5d8c63c492851c33e93c6d4e/The-inaudible-voice-from-wildlife-habitat-the-case-of-interaction-between-wildlife-ecosystem-and-infrastructure-development-in-Kenya.pdf

O'Connor, M. (1997). John Stuart Mill's utilitarianism and the social ethics of sustainable development. *Journal of the History of Economic Thought*, 4(3), 478-506.

Oirere, S. (2018 February 26). Feature: Modern Railways and the route to boosted growth in Eastern Africa. *Supply Chain Digital*.
<https://www.supplychaindigital.com/distribution/feature-modern-railways-and-route-boosted-growth-eastern-africa>

Okita-Ouma, B. et al. (2016a). Preliminary indications of the effect of infrastructure development on ecosystem connectivity in Tsavo National Parks, Kenya. *Pachyderm*, 57, 109-111.

Okita-Ouma, B. et al. (2016b). Movements of satellite-linked collared elephant and other wildlife in relation to the Standard Gauge Railway (SGR) and highways in Tsavo Ecosystem, Kenya. *Save The Elephants and Kenya Wildlife Service*, 1-34.

Okita-Ouma B., et al. (2017). Preliminary indications of the effect of infrastructure development on ecosystem connectivity in Tsavo National Parks, Kenya. *Save The Elephants*. 109-111.

Ombuor, R. (2018, March 1). The environmentalist in Kenya Protest China Backed Railway Construction. *Voa News*.

Parke, P. (2016). Dirtied by success? Nigeria is home to city with the worst PM10 levels. *CNN*. <<https://edition.cnn.com/2016/05/31/africa/nigeria-cities-pollution/index.html>>

Pearce, D., Hamilton, K., & Atkinson, G. (1996). Measuring sustainable development: progress on indicators. *Environment and Development Economics*, 1(1), 85-101.

Pelenc, J., & Ballet, J. (2015). Strong sustainability, critical natural capital and the capability approach. *Ecological Economics*, 112, 36-44.

Rail Business (2018). Nigeria: Lagos-Ibandan Rail can run on Electric. <https://railbus.com.ng/index.php/firms/nigeria-lagos-ibadan-rail-can-run-on-electric/>

Rainey, D. L. (2010). *Sustainable business development: inventing the future through strategy, innovation, and leadership*. Cambridge University Press.

Rauf, A. et al. (2018). Energy and ecological sustainability: Challenges and panoramas in belt and road initiative countries. *Sustainability*, 10(8), 2743.

Republic of Djibouti (2015) *Intended Nationally Determined Contribution of the Republic of Djibouti*. https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Djibouti%20First/INDC-Djibouti_ENG.pdf

Richter, U., Wang, M. & Adeola, O. Sustainability of Chinese Railway Projects in Africa: A Study in Progress. <https://africa-china.yale.edu/sites/default/files/files/Sustainability%20of%20Chinese%20Railway%20Projects%20in%20Africa%20-%20A%20Study%20in%20Progress%20-%20amended.pdf>

Rihoux, B. (2006). Qualitative comparative analysis (QCA) and related systematic comparative methods: Recent advances and remaining challenges for social science research. *International Sociology*, 21(5), 679-706.

Sachs, J. D. (2012). From millennium development goals to sustainable development goals. *The Lancet*, 379(9832), 2206-2211.

Saud, S., Chen, S., & Haseeb, A. (2019). Impact of financial development and economic growth on environmental quality: an empirical analysis from Belt and Road Initiative (BRI) countries. *Environmental Science and Pollution Research*, 26(3), 2253-2269.

Schulman, S. (2019). Climate Change Challenges and Djibouti: A Photo essay. *The RUSI Journal*, 164(1), 62-75.

Spangenberg, J. H., Omann, I., & Hinterberger, F. (2002). Sustainable growth criteria: Minimum benchmarks and scenarios for employment and the environment. *Ecological Economics*, 42(3), 429-443.

Styan, D. (2020). China's maritime silk road and small states: lessons from the case of Djibouti. *Journal of Contemporary China*, 29(122), 191-206.

Sukuyia, G. (2018, September 13) Kimuka Community Water Aid Project Kijiado West Constituency [Facebook]. <https://www.facebook.com/honsunkuyia/posts/kimuka-community-water-aid-project-kajiado-west-constituency-the-sgrphase2a-cont/482056635608387/>

Tian, X., Hu, Y., Yin, H., Geng, Y., & Bleischwitz, R. (2019). Trade impacts of China's Belt and Road Initiative: From resource and environmental perspectives. *Resources, Conservation and Recycling*, (150)104430, 1-8.

Tracy, E. F., Shvarts, E., Simonov, E., & Babenko, M. (2017). China's new Eurasian ambitions: the environmental risks of the Silk Road Economic Belt. *Eurasian Geography and Economics*, 58(1), 56-88.

United Nations (2011). *Working towards a Balanced and Inclusive Green Economy: A United Nations System-wide perspective*. Geneva: United Nations Environmental Management Group, 1-204.

United Nations Climate Partnership for the Global South (2017) *Catalysing the Implementation of Nationally Determined Contributions in the Context of the 2030 Agenda through South-South Cooperation*. United Nations Sustainable Development. <https://www.un.org/sustainabledevelopment/wp-content/uploads/2017/05/Download-Report.pdf>

United Nations Sustainable Development Goals (2018). *Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development*. 1-21.

https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework%20after%202020%20review_Eng.pdf

Vhumbunu, C. H. (2016). Enabling African regional infrastructure renaissance through the China-Africa partnership: A trans-continental appraisal. *International Journal of China Studies*, 7(3), 271-300.

Were, A. (2018). Debt trap? Chinese loans and Africa's development options. *South African Institute of International Affairs*, 66, 1-16.

Wissenbach, U., & Wang, Y. (2017). African politics meets Chinese engineers: The Chinese-built Standard Gauge Railway Project in Kenya and East Africa. *China-Africa Research Alternative*, 13 [Working Paper], 1-33.

Woldegebriel, E. G. Ethiopia hopes to reap benefits from eco-friendly rail project. *Thomas Reuters Foundation Review*. <https://news.trust.org/item/20130423142157-cofa6/>

Xinhua (2017 July 1). Chinese-built railway fast tracks Africa's green growth. www.xinhuanet.com/english/2017-06/01/c_136331499.htm

Xinhuanet (2018 September 13). Chinese SGR contractor launches water project in Kenyan county. http://www.xinhuanet.com/english/2018-09/13/c_137465933.htm

Xue, L., Weng, L., & Yu, H. (2018). Addressing policy challenges in implementing Sustainable Development Goals through an adaptive governance approach: A view from transitional China. *Sustainable Development*, 26(2), 150-158.

Yandle, B., Vijayaraghavan, M., & Bhattarai, M. (2002). The environmental Kuznets curve. *A Primer, PERC Research Study*, 02-01.

Yi, S., & Xiao-li, A. (2018). Application of threshold regression analysis to study the impact of regional technological innovation level on sustainable development. *Renewable and Sustainable Energy Reviews*, 89, 27-32.

Zelege, A. (2017). *Compare and Adapt Project Organization Structure and Key Project Management Practices for Construction of Railway Track, Bridge and Tunnel (A Case Study on Awash – Weldia and Addis Ababa – Djibouti Railway Project)*. [Published Master thesis]. Addis Ababa University. Addis Ababa, Ethiopia.

Zhan, Y., Tan, K. H., Ji, G., Chung, L., & Chiu, A. S. (2018). Green and lean sustainable development path in China: Guanxi, practices and performance. *Resources, Conservation and Recycling*, 128, 240-249.

Zhou, L., Gilbert, S., Wang, Y., Cabré, M. M., & Gallagher, K. P. (2018). Moving the green belt and road initiative: from words to actions. *World Resources Institute and BU Global Development Policy Centre*, <http://www.bu.edu/gdp/files/2018/11/GDP-and-WRI-BRI-MovingtheGreenbelt.pdf>