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ScienceDirect

Advances in Climate Change Research 7 (2016) 253–263

www.keaipublishing.com/en/journals/accr/

Review

Moving past the rhetoric: Policy considerations that can make Sino-African relations to improve Africa's climate change resilience and the attainment of the sustainable development goals

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Received 13 April 2016; revised 20 September 2016; accepted 28 November 2016
Available online 11 December 2016

Abstract

Climate change is a threat to the attainment of the Sustainable Development Goals (SDGs) in sub-Saharan Africa as its impacts can lead to increased incidences of poverty and inequality which can subsequently lead to a 12% decline in the Human Development Index (HDI) for sub-Saharan Africa. Emerging countries such as China have the potential to support Africa to achieve the SDGs by pioneering South–South Climate Finance (SSCF) modalities. In order to increase knowledge on climate informed development and the role of China in global climate governance, the paper examined various research articles, case studies, policy briefs and project reports. Sino-African aid, investments and trade were noted as essential in mitigating Africa's climate change vulnerabilities which induce poverty traps and inequality. Some African countries were noted to have a comparative advantage in environmental standards over China but lacked the initiative to use this comparative advantage to enhance the Forum on China–Africa Cooperation (FOCAC) and assist China to have a sustainable growth trajectory. The paper concludes that SSCF modalities can enhance climate risk management in Africa if they focus on improving financial inclusion and improving climate finance flows towards climate change adaptation activities in Africa. Additionally, to increase the effectiveness and impact of Chinese climate finance support to Africa, African policymakers should not allow political and market forces to decide how climate related support from China should be allocated as decisions based on political and market forces could potentially promote an inequitable distribution of funds and ignore the most vulnerable countries and regions.

Keywords: Climate risk management; Financial inclusion; Food security; Forum on China–Africa Cooperation (FOCAC); Microfinance; Youth unemployment

1. Introduction

The attainment of the Sustainable Development Goals (SDGs) and achieving sustainable economic growth faces a variety of challenges in sub-Saharan Africa (SSA). Sustainable Development Goal 8 (i.e. promote sustained, inclusive and sustainable economic growth) (UN, 2015) suggests that developing countries and more particularly Least Developed Countries (LDCs) should sustain per capita economic growth to at-least 7% Gross Domestic Product (GDP) annually. Globally there are 48 LDCs of which 34 are in Africa. Six of the thirteen countries with the highest compounded annual growth rate (CAGR) from 2014 through 2017 are in Africa (i.e. Rwanda, Tanzania, Mozambique, Cote d'Ivoire, Democratic Republic of the Congo and Ethiopia) (Holodny, 2015), but economic growth in SSA has averaged roughly 5% per year over the past decade (Pigato and Tang, 2015). Looking ahead, some projections show that SSA is facing a challenging

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Peer review under responsibility of National Climate Center (China Meteorological Administration).

Production and Hosting by Elsevier on behalf of KeAi

http://dx.doi.org/10.1016/j.accre.2016.11.002

outlook as economic growth slowed down to 3.7% in 2015 but might pick up to 4.4% in 2016 and 4.8% in 2017 as a consequence of a changing global economic environment and delays in implementing structural reforms to alleviate the domestic impediments to growth (WB, 2015). Arguably, weaker growth complicates the task of accelerating poverty reduction (WB, 2015) and SSA is already falling below the suggested growth rate for sustainable economic development. To add to this quagmire, Africa is one of the regions that has the most vulnerability to current climate variability and future climate change (WB, 2013), hence is arguably the region whose economic growth may be adversely impacted the most by climate change. Climate change is therefore a major threat and impediment to the eradication of poverty and achievement of the SDGs in Africa.

Remittances, the export of commodities, Foreign Direct Investment (FDI) and Official Development Assistance (ODA)/aid are regarded as sources of Africa's economic growth (Marwan et al., 2013). With the advent of climate change and its impacts on economic growth and livelihoods, there is now a necessity to develop policies and strategies that can ensure that the funds from remittances, exports, FDI and aid are channelled to the appropriate sectors and activities to ensure sustainable economic growth; and climate change mitigation, adaptation, research and development, and capacity building are achieved. In recent times, emerging economies (Brazil, China, Russia, India, etc.) have provided significant amounts of aid and investments to countries in SSA. For example, investment commitments in Africa by these emerging financiers jumped from less than US$1 billion per year before 2004 to US$8 billion in 2006, and by 2012 this had exceeded US$20 billion (Ubi, 2014). China has also emerged as Africa's largest trading partner as between 2003 and 2011, FDI from China to Africa increased thirty-fold, from US$491 million to US$14.7 billion (Ubi, 2014) and as of end-2013, China had more Outward Direct Investment (ODI) in Africa (US$26 billion) than in the U.S. (US$22 billion) (Chen et al., 2015).

China has also arguably contributed to the economic growth of Africa through its interventions in the education sector. Initial human capital (measured by education) is a stronger predictor of economic growth than initial per capita GDP, FDI and ODI because countries with higher educational attainment can better benefit from technological advances (Klapper et al., 2016). China has supported Africa's education sector by among others providing i) Confucius Institutes, which are providing language and culture-related training in host countries; ii) long term scholarships and short-term training for Africans in China; iii) school construction programs; iv) stand-alone education projects; and v) Agricultural Technology Demonstration Centres (ATDC) (Xu et al., 2016; Nordtveit, 2011; Niu, 2013). During the period 2008–2015, it has been estimated that China has helped improve Africa's education sector by building over 146 rural schools, providing over 4000 fellowships to African students, providing over 23,500 scholarship to African students, building over 23 Confucius Institutes or classrooms, building over 20 African universities (or vocational colleges), facilitating the training of 1500 school headmasters and teachers, facilitating the training of 30,000 African professionals in various sectors, and providing US$8 million to support education development programs in Africa through a Funds-in-Trust Agreement with UNESCO (FOCAC, 2016b). While it is hard to quantify the direct impact that these education sector based interventions have had on Africa's development and initial human capital, what is plausible is that these interventions have indirectly contributed to the creation of jobs and improvements in human and institutional capacity in many sectors.

Climate finance which is critical for facilitating climate change mitigation, adaptation, research and development, capacity building, and technology transfer initiatives, is regarded as a highly contentious issues in multilateral climate change negotiations (Mbeva et al., 2015; Ha and Hale, 2016). This follows that a combination of uncertainty around climate impacts, the uncertainty of the impact of emerging technologies, the uncertainty of the impact of current climate change policies, media coverage on climate change issues, the impact of media coverage on extreme weather events, political events, global political and economic performance, and in-country priorities influence the development of climate change policies and commitment of donors and policymakers to global funds for climate finance (Ratter et al., 2012; Hu and Monroy, 2012; Rong, 2010).

Due to the aforementioned factors, climate finance instruments and mechanisms, and funds are presently far below the levels that are necessary in order to create low-carbon, resilient economies (Ha and Hale, 2016). Furthermore, this situation can be considered to be direr in Africa, where climate finance levels are far from satisfactory in terms of the size, source and distribution (Yu, 2014). It has always been generally accepted that developed countries can enhance climate change mitigation and adaptation at global and national levels by providing a sustainable flow of funding to the developing world to facilitate change, enhance cooperation amongst states and support the development of new low-carbon technologies (WEF, 2015). However, contemporary commentators like Ha and Hale (2016) and Yu (2014) are of the opinion that emerging economies such as China have the potential to become major contributors of climate finance to other developing countries through South–South Climate Finance (SSCF) modalities. According to Ha and Hale (2016) SSCF takes four major forms: i) developing countries' contributions to established multilateral funds; ii) bilateral initiatives; iii) new Southern-led international organisations like the BRICS bank and the Asian Infrastructure Investment Bank; and iv) private sector investments. It is therefore conceivable that if the concept of SSCF is embraced and developed, it can greatly benefit Africa by improving its climate finance sources and resilience to climate change.

Various scholars have looked at how climate change and various African development issues could promote or impede the achievement of the SDGs. For example, Cobbinah et al. (2015) assessed the implications of rapid urbanisation on the sustainable development of Africa. They discovered that urbanisation has multifaceted causes, such as natural population

growth, increasing insecurity and conflict, and pull (e.g. uneven spatial development of urban and rural areas, perceived economic opportunities in cities) and push (e.g. unprofitable agriculture, drought, limited livelihood options in rural areas) factors. He also discovered that there is very limited meaningful guidance available to African governments, planning institutions, and policymakers regarding how best to address these concerns. İyigün (2015) looked at the role of entrepreneurship in facilitating sustainable development and discovered that the sustainability market is in its development phase in industrialised nations and still quasi-non-existent in developing countries hence this market of "sustainopreneurship" presents not only uncertainties but also opportunities to those who can recognise them. Doyle and Stiglitz (2014) looked at eliminating extreme inequality as a SDG and concluded that economic forces, politics and policies shape the extent and nature of inequality across countries, but sustainable development cannot be achieved while ignoring extreme disparities. However, limited research has been undertaken on the policies that need to be put in place in order to enable China help address Africa's challenges in reducing poverty and managing climate change induced risks that can derail the achievement of the SDGs. This paper is therefore an attempt to address this knowledge gap. Crucially important, addressing this knowledge gap is imperative since some research has indicated that rapid and inclusive development can prevent most of the impacts of climate change on poverty, but only if new investments and developments are "climate informed", that is, designed to perform well under changing climate conditions so that they do not create new vulnerabilities to climate impacts (Hallegatte et al., 2016). An increase in literature and knowledge about climate informed development could therefore be imperative as a failure to implement climate informed development could lead to climate change forcing more than 100 million people into extreme poverty by 2030 (Hallegatte et al., 2016), thereby putting the global ambitions as expressed in the SDGs in disarray.

In order to fill the aforementioned knowledge gaps, this study analysed various research articles, case studies, policy briefs and project reports. The paper is structured as follows: Section 2 reviews the implications of climate change impacts on societies in Africa and what strategies can be implemented to ensure that climate change induced poverty traps are minimised. Section 3 analyses Sino-African strategic collaboration and practical cooperation as presented in the Forum on China–Africa Cooperation Johannesburg Action Plan (2016–2018). Section 4 focuses on current climate finance mobilisation challenges and how there should be additional deliberate policies put in place to encourage the private sector in Sino-African climate change programs to focus on climate change adaptation rather than mitigation. Section 5 discusses the importance of enhancing financial inclusion to reduce climate change vulnerability and how Sino-African partnerships should focus on promoting financial inclusion in order for Sino-African cooperation to have a greater impact in facilitating the SDGs. The paper ends with a conclusion in section 6. The concluding remarks highlight that Sino-African cooperation have an important role in promoting peace and averting social unrest in SSA, but may be enhanced if some African countries take the initiative to support China in developing effective environmental standards.

2. Climate change vulnerabilities and poverty traps in Africa

Climate variability and change is anticipated to disrupt rainfall patterns and agricultural yields in SSA. Subsequently, this may impede and/or reverse the gains that have been made in the region's fight against poverty. Additionally, these climatic changes will increase in frequency and magnitude hence potentially putting many communities, especially those that depend on rain-fed agriculture to be more susceptible to poverty, ill health and malnutrition (FAO, 2015; Hallegatte et al., 2016). It is therefore not surprising that meeting the first SDG, to eradicate extreme poverty by 2030, is aspirational and feasible only under very optimistic of scenarios, more particularly for Africa, which is forecasted to continue to have the highest rate and depth of poverty of all regions of the world beyond 2030 (WB, 2015).

One of the problems that exacerbates the exposure and vulnerability of communities to natural disasters is that most rural populations in Africa experience marginalisation and lack of access to social services, information and technologies which makes their adaptation to climate change challenging (UNDP, 2015). Furthermore, the reliance on providing relief after disasters strike rather than fostering adaptation increases the vulnerability of communities as it perpetuate disease, political unrest and economic stress (WEF, 2015). The increased frequency and magnitude of adverse climate events is particularly detrimental to the development aspirations and livelihoods of Africa since recovery from shocks is often slow and much more slower for the poor than for the non-poor. For example, after the 1984–1985 famine in Ethiopia, rural households took ten years, on average, to rebuild livestock holdings to the levels existing before the famine, and households affected by drought in Ethiopia and the United Republic of Tanzania had lower incomes than unaffected households even ten years later (FAO, 2015; Hallegatte et al., 2016). Climate shocks do not only adversely affect poor people but also affect non-poor people that are vulnerable to shocks, hence arguably many communities in Africa live in uncertainty and are at a constant threat of falling into poverty, as they could be just one natural disaster away from losing everything they have in the absence of effective adaptation mechanisms or social protection measures (Hallegatte et al., 2016).

Another adverse phenomenon on development and poverty that may be attributed to climate change is that climate change impacts may magnify poverty traps (at the household, regional, or country level) and thus reduce people's flow out of poverty. For example, increased natural risks may impair capital accumulation through more asset losses (e.g. due to floods), but also through reduced incentives to invest (in children's education, nutrition and health) due to higher uncertainty and risk (Hallegatte et al., 2014). In the advent of

failed harvests and other negative income shocks, rural households are noted to reduce food consumption, sell off productive assets, and pull children out of school. These coping strategies unfortunately mire households in poverty traps since they degrade households' capabilities, and thus ability to escape poverty (Lawlor et al., 2015). Addressing climate change and poverty simultaneously therefore requires strategies that are aimed at ensuring that poor and non-poor households have sufficient food, income and resources to enable them to quickly accumulate assets after losses/shocks and not lose all their assets during environmental shocks.

Regardless of the vulnerability of Africa's agriculture sector to the impacts of climate change, the agriculture sector presents itself as one of the sectors that has the best potential to facilitate sustainable development in Africa. For example, some global development reports indicate that in Africa, a 10% increase in crop yields translates to approximately a 7% reduction in poverty and GDP growth generated by agriculture has been shown to be eleven times more effective in reducing poverty than GDP growth in other sectors (SDSN, 2013; Munang and Mgendi, 2016). Consequently, investment in agriculture remains the single most effective way to provide opportunities to generate income and improve nutrition, especially for women and the youth in rural areas (FAO, 2015).

One of the strategies that has the potential to reduce the vulnerability of the agriculture sector to climatic shocks whilst providing environmental co-benefits and improving productivity is the application of Ecosystem Based Adaptation approaches (EBA) in agriculture (Vignola et al., 2015). EBA in agricultural systems refers to the implementation of agricultural management practices that use or take advantage of biodiversity, ecosystem services or ecological processes (either at the plot, farm or landscape level) to help increase the ability of crops or livestock to adapt to climate variability (e.g. the use of mulching or local species as cover crops to help conserve soil structure) (Vignola et al., 2015). Some estimates have pointed out that embracing EBA for on-farm production can enhance yields by up to 128%, create as many as 17 million jobs in Africa, lower climate induced crop failure risks and enhance farmer incomes at lower environmental and financial cost (Munang and Mgendi, 2016). Additionally, only 4% of the cropland in SSA is irrigated, and approximately 40 million hm^2 of its land are suitable for irrigation, but only 7.3 million hm^2 are actually irrigated. Consequently, some commentators (Munang and Mgendi, 2016; Yihdego et al., 2015) consider that promoting decentralised irrigation—small individual irrigation systems designed to serve a single or community farm—rather than large, centralised irrigation schemes can insulate Africa's agriculture sector against weather-related shocks since decentralised irrigation schemes can be tailored to the needs and conditions of specific communities, and could have fewer adverse environmental and social impacts than large, centralised irrigation schemes. A combination of improving the implementation of EBA and decentralised irrigation could therefore play a significant role in minimising the detrimental effects of climate change on agriculture. It can therefore be argued that policymakers in both Africa and China should focus on directing Chinese aid, development programs and investments into designing appropriate policies, incentives and implementation frameworks that can enable various stakeholders (especially the private sector) to facilitate and engage into EBA and decentralised irrigation in Africa (e.g. mapping out water sources and local hydrology, developing appropriate irrigation technology, establishing and maintaining extension programs for smallholder farmers, improving access to credit for farmers, etc.).

In addition to the aforementioned, what is arguably of crucial importance when implementing EBA and other strategies aimed at reducing the vulnerability of agricultural systems to climate change is to ensure that climate change maladaptations do not occur. Eriksen et al. (2011) stressed that there is potential for maladaptation and unsustainable adaptation strategies and measures to be implemented because strategies or policies that make sense from one perspective, or for one group, may at the same time reduce the livelihood viability or resource access of other groups. In the case of African agricultural systems and societies, it is therefore important to ensure that adaptation and resilience strategies incorporate measures to improve access to resources for women and have measures to control greenhouse gas emissions from the agriculture sector. Agriculture is responsible for 14% of global greenhouse gas emissions and by 2030, emissions of methane and ammonia from the livestock sector in developing countries could be 60% higher than at present (Wong, 2016). Therefore, while increasing agricultural productivity may be important to avert food insecurity and improve livelihoods, accompanying measures such reducing methane from paddy fields and ruminants (i.e. through better farm management and by reducing animal numbers in degraded grasslands) may promote sustainable agriculture (Huang and Wang, 2014). On the other hand, due to sociocultural factors, women in many rural African societies are noted to be more vulnerable to the impacts of climate change than men. In comparison to men, women are noted to have less access to common property resources, control less land, have insecure land tenures and control land that is often of poorer quality (Perez et al., 2015). Furthermore, agriculture based climate finance modalities have also been criticised for reinforcing existing vulnerability patterns of women and even reducing their adaptive capacity (Wong, 2016; Nagoda, 2015). Arguably, such deeply rooted structural inequalities call for adaptation and resilience strategies in Africa to also prioritise the integration of robust gender monitoring and evaluation that focuses on eliminating the constraints and insecurity women face (Wong, 2016; Nagoda, 2015).

3. The Forum on China–Africa Cooperation Johannesburg Action Plan (2016–2018)

Arguably, the main policy which establishes the strategic collaboration and mechanisms of practical cooperation between China and Africa (i.e. Sino-African cooperation) is the Forum on China–Africa Cooperation (FOCAC). The

first FOCAC was in 2000 and the successive FOCAC summits are undertaken every three years. In December 2015, Chinese and African policymakers met in Johannesburg for a FOCAC summit that culminated in the launch the Forum on China–Africa Cooperation Johannesburg Action Plan (2016–2018) which among other things announced that China would provide US$60 billion of assistance to Africa in the form of grants, loans, export credits, development funds, and scholarships and training for Africans (FOCAC, 2016a; Onishi, 2015).

According to the Forum on China–Africa Cooperation Johannesburg Action Plan (2016–2018), Sino-African cooperation will focus on i) political cooperation; ii) economic cooperation (i.e. agriculture and food security, industry partnering and industrial capacity cooperation, infrastructure development, energy and natural resources, tourism, investment and economic cooperation, trade, and finance); iii) social development cooperation (i.e. medical care and public health, education and human resources development, science and technology cooperation and knowledge sharing, and environmental protection and tackling climate change); iv) cultural cooperation and people-to-people exchanges; and v) security cooperation. It can therefore be seen that within the framework there are plans to enhance agriculture and food security by strengthening cooperation in the fields of agricultural policy consultation, planning and design; facilitating joint research on breeding and the production of seeds as well as plant protection, specifically focussing on increasing outputs of grain, cotton and other key crops in African countries (FOCAC, 2016a). Within this framework, there will also be support for the implementation of the Comprehensive African Agriculture Development Program (CAADP) whereby China will assist Africa to build agriculture technology demonstration centres, send professionals for technical cooperation, and train agricultural technicians (FOCAC, 2016a). Arguably, the agriculture and food security programs have therefore got the potential to assist some if not most African countries to reduce their vulnerability to the impacts of climate change providing that the past mistakes and failures of previous Sino-African cooperation are addressed.

China has been providing aid to Africa for over 50 years (Lin and Wang, 2014) and past experiences on the collaboration between China and Africa have shown that at implementation stage, the impacts to which Sino-African projects have is limited. For example, China has launched over ten agricultural demonstration centres in Africa to expand Research & Development on African crops, irrigation, agricultural engineering, or other potential drivers of agricultural reform (as suggested by China's own experience). To date, however, these centres often operate in a vacuum, poorly connected to the recipient countries' national programs and with limited outreach to local farmers and slim chances of scaling up nationally (Davis and Woetzel, 2010). These observations therefore mean that even with China pledging to provide funds and assistance to Africa, Africa could still be vulnerable to the impacts of climate change due to institutional and structural weaknesses in African countries which make the integration of Chinese support into African programs problematic and problems with the service delivery by African governments which render public institutions to be ineffective in reaching all sectors of the society.

Davis and Woetzel (2010) further assert that a contributing factor to the limited impact to which Chinese aid has had in improving development in Africa can be attributed to the fact that the Chinese approach to aid and investment presupposes that an effective public sector in the recipient country exists, which is not always the case, and many African countries lack robust strategic-development plans and therefore can't benefit fully from investments by China and others. As it stands, some African countries have problems in improving their climate risks because of institutional constraints such as the underperformance of government departments and agencies (Wood et al., 2015). Additionally, a lack of climate policies in many African countries means that there are inadequacies in the effective coordination, institutional harmonisation, and implementation of climate change initiatives as climate change issues are fragmented in sectoral policies, and the policy statements in most of the sectoral policies are very general hence do not provide for specific strategies or measures on climate change management (CEPA, 2012).

Notwithstanding the aforementioned issues, many countries in Africa are considered to be in the right direction to address current and future effects of climate change (e.g. member states of the East African Community (EAC), the Common Market for Eastern and Southern Africa (COMESA) and the Southern African Development Community (SADC) have committed to develop and implement regional and national laws, regulations and strategies; and adaptation and mitigation interventions to address climate change issues) (Viljoen, 2013). However, regardless of these commitments, various practical challenges such as a lack of technical, institutional and financial capacity; bureaucratic delays in adopting and implementing policies and strategies; and a lack of awareness of the implications of climate change for future economic growth and development mean that the commitments and regulatory frameworks in the regions and countries are not guaranteed to improve climate change risk management in the continent (Viljoen, 2013). In other words, African policymakers have drawn up commendable plans to enhance climate change mitigation and adaptation but have not put in place the necessary measures to address the factors and challenges that can hinder the implementation of their climate change strategies and regulatory frameworks. It might therefore be prudent to work on improving knowledge and awareness on climate change issues not only to policymakers but also to the masses and civil society so that the impacts of climate change on poverty and development can easily be discernible so that there should be an urgency in developing and implementing climate change policies and regulatory frameworks.

Another aspect that limits African countries from implementing effective development strategies and increasing the impact of Sino-African cooperation is that most African countries do not take responsibility for their development agendas but instead leave them in the hands of others (Davis and Woetzel, 2010). Consequently, many African countries have problems in developing comprehensive development

strategies for agriculture and other areas. As a case point Davis and Woetzel (2010) pointed out that China has sent agricultural experts to Africa since the 1950s, yet China's current agricultural-extension efforts in Africa are small (with fewer than 1000 experts on the continent), uncoordinated, and unsystematic. Several Chinese agricultural experts believe that these programs have had a negligible impact, hence such programs could prove valuable, and more effective if planned and executed with a better understanding of specific African conditions and local issues (Davis and Woetzel, 2010). It can be argued that another way of improving the effectiveness of these programs is for Sino-African relationships to aim at changing the mind-sets of African policymakers and communities about their levels of (income) poverty and human resources so that they become more pro-active in understanding their development context and developing their unique development approaches.

China was a low-income country when it started providing development cooperation to African countries in the 1960s (Lin and Wang, 2014) and was arguably poorer than most countries in Africa at that time but it still had the will and mind-set to support other developing countries. Lin and Wang (2014) further say that when China was starting its economic transition in 1979, it was a poor agrarian economy, with 81% of its population living in rural areas. Its per capita income was US$154 in 1978, less than one-third of the average in SSA countries. However, its per capita income reached US$6100 in 2012, more than four times the average in SSA countries (Lin and Wang, 2014). The Chinese people therefore did not consider their low per capita income as a hindrance to helping other countries that were arguably richer than them. The Forum on China–Africa Cooperation Johannesburg Action Plan (2016–2018) (FOCAC, 2016a) is fraught with statements like “the Chinese side will introduce …”, “China will advance cooperation …”, “The Chinese side will offer African countries …”, “The Chinese side will continue to send …”; and statements like “The African side highly appreciates that the Chinese government …”, “The African side welcomes the announcement by the Chinese side …”, “The African side pledges to cooperate with the Chinese side in …”, and “The African side highly appreciates China's …”. The Forum on China–Africa Cooperation Johannesburg Action Plan (2016–2018) therefore has limited instances where African governments make an effort to provide financial assistance or technical support to China. China's philosophy towards investment, aid and development assistance towards its partners (not beneficiaries) follows the principles of equality and mutual respect, reciprocity, and mutual benefit (Lin and Wang, 2014; Davies et al., 2014; Mol, 2011) hence within the FOCAC there are opportunities for African countries to also take the lead in assisting China, which is also a developing country, to improve capacities in areas that the country lags in. African policymakers are therefore neither taking the initiative nor utilising their (limited) financial resources, human resources and technical expertise in various areas to support China in its development aspirations. For example, whilst China can provide tacit knowledge and opportunities to facilitate Africa's economic transformation and industrialisation, China itself is struggling with challenges of implementing its own labour and environmental standards (Lin and Wang, 2014; Davies et al., 2014; Mol, 2011). Since some African countries have commendable environmental standards (that are better than the environmental standards of China), it can be argued that such countries can in fact assist Chinese policymakers in developing and implementing world class environmental standards and regimes that have been developed using experiences and knowledge from developing countries. For example, the Environmental Performance Index 2016 ranks China at 109 whilst Tunisia ranks 53, Mauritius ranks 77 (Mauritius ranked 6 on the Environmental Performance Index 2010), Namibia ranks 78, Botswana ranks 79 and South Africa ranks 81 (YCELP, 2016). It can therefore be argued that African policymakers are not industrious in that they do not prioritise mainstreaming challenges that hinder climate change management in their development planning and do not utilise the comparative advantage in environmental performance that some African countries have over China in order to enhance the FOCAC and also assist China to have a sustainable growth trajectory.

4. Private sector engagement in climate change Sino-African cooperation

Some current discourses on the implementation of the SDGs and the UNFCCC Paris Climate Agreement are on how to sustainably finance these two frameworks as Africa alone requires about US$100 billion a year in investments in order to cope with its projected climate change impacts (Hallegatte et al., 2016). On the other hand, some policymakers have estimated that public and private stakeholders have to jointly mobilise US$100 billion per year by 2020 to support climate change mitigation and adaptation activities in all developing countries in different regions (Glemarec, 2012). However, there is no clear view on how developed countries can efficiently and effectively mobilise further climate finance to meet the needs of developing countries and mobilise US$100 billion per year by 2020 (Kato et al., 2014).

A particular challenge for Africa is not only that the continent has insufficient domestic financial resources to facilitate effective reductions in its climate risks, but globally, the private sector is more inclined to support climate change mitigation initiatives rather than adaptation initiatives. Africa has limited emissions reduction potential as it only produces about 3.3% of the global greenhouse gas emissions (Khan et al., 2014), hence arguably requires more funding for adaptation particularly since there is need to improve the resilience of the agricultural sector which is the biggest employment sector in Africa, employing about 65% of the continent's labour force, and contributes to about 32% of the continent's GDP (Mbeva et al., 2015). However, even though climate financing for mitigation and adaptation should be addressed with the same priority, some findings show that the implementation of climate finance modalities are highly construed towards mitigation efforts, whereby 91% of climate

finance flows are for mitigation efforts, 7% for adaptation efforts, and 2% for activities with both mitigation and adaptation objectives (Buchner et al., 2014). This suggests that the current decision makers and actors involved in international climate finance have perpetuated a low prioritisation of adaptation in international climate finance (Abadie et al., 2013). Additionally, Amatayakul and Berndes (2012) and Timilsina et al. (2010) further assert that carbon credits provide an incentive for various stakeholders especially the private sector to implement climate change mitigation projects, hence the absence of adaptation finance credits deters the private sector from engaging in climate change adaptation (Abadie et al., 2013). Arguably, with the Global North led North–South Climate Financing modalities that are in place, it will be difficult to balance mitigation and adaptation finance mobilised by developed countries, at-least in the short-term as the majority of public and private climate finance to date has focused on mitigation and thus, scaling up and replication of existing climate interventions in developing countries, which have successfully mobilised private climate finance would be likely to result in a continued focus on mitigation interventions (Kato et al., 2014). Finding the correct business models and climate finance frameworks to incentivise the private sector to be engaged in adaptation efforts is therefore an area that stakeholders from the Global North and Global South have many challenges in, but yet it also presents the best area in which SSCF modalities can be pioneers in.

The Forum on China–Africa Cooperation Johannesburg Action Plan (2016–2018) will provide CN¥20 billion (US$3 billion) for setting up the China South–South Cooperation Fund to support other developing countries to combat climate change and enhance their capacity to access Green Climate Fund funds (FOCAC, 2016a). However the Action Plan is silent on how the private sector will be engaged in implementing projects under this program and how the money will be disbursed amongst the various African countries. Some commentators have argued that Chinese investments, aid and development assistance to Africa is mostly confined to resource-rich African countries such as Angola, Nigeria, South Africa, the Democratic Republic of Congo, Sudan, and Zambia (Davies et al., 2014). A challenge for Chinese interventions in Africa is therefore in balancing out aid and investments—proportionally or equitably—amongst the different resource rich and resource poor African countries. A contributing factor to this challenge is that despite the existence of the FOCAC at strategic level, at implementation level China has in practice no singular well-defined, coherent and widely supported strategy for Africa, nor for individual African countries (Mol, 2011). Consequently, there are therefore various contradictions, failures and lack of coordination among different Chinese state and private actors which sometimes lead to some competition among Chinese (state-owned) enterprises, the private sector and Chinese provinces actors in Africa (e.g. vicious bid undercutting, downward operating standards, and denigration of other companies at policy making bodies are regular practices) (Mol, 2011).

Arguably, without an additional framework detailing how the Chinese private sector can be engaged in Africa's climate management activities, there is a potential threat that Chinese support can actually perpetuate inequality in Africa since activities and funding could be focused in Africa's resource rich countries thereby making the poor countries more vulnerable to the impacts of climate change. This could be attributed to the fact that the amount of aid and development assistance provided to a beneficiary country is contingent upon the extent to which its beneficiaries are able to facilitate the donor's political, security, and trade interests (Halimanjaya, 2015; Kragelund, 2015); and climate change activities and investments by private entities in developing countries tend to follow countries and sectors where there is potential to maximise on profits and not necessarily social benefits (Urpelainen, 2012). Consequently, the African countries that already have high emissions reduction potential, political and macroeconomic stability, sound regulatory frameworks (and efficient supporting institutions enforcing the relevant laws and regulations), and good physical and social infrastructure are bound to be more favourable and attractive to Chinese climate change related cooperation (Chirambo, 2014; Winkelman and Moore, 2011; Burian et al., 2011).

After years of a period of relative peace during the first decade of the 21st century, the number of violent events in Africa has been rising again and one-third of the poor in Africa are noted to be in fragile and conflict-affected countries that continue to lag in poverty reduction (WB, 2015). Arguably fragile and conflict-affected countries are characterised by weak political and macroeconomic stability, hence one-third of the poor in Africa are extremely vulnerable to climate change and poverty since their countries' might not be favourable towards Chinese climate change investments and development programs. With the aforementioned factors in mind, arguably, there is an onus on African policymakers not to allow political and market forces to decide how climate related support from the Forum on China–Africa Cooperation Johannesburg Action Plan (2016–2018) should be utilised, but the policymakers should actually work in unison and decide on which countries should receive what sort of climate related support from the Action Plan in order to promote an equitable distribution of funds and target the most vulnerable countries and regions. This is particularly important since increased vulnerability to natural disasters and climate change in certain countries and regions is a precursor to migrations and civil conflict in both the affected areas and receiving areas (Bryan et al., 2013; Ghimire et al., 2015; Dumenu and Obeng, 2016). It is therefore not surprising that climate change is sometimes increasingly viewed as a global security threat and many officials and analysts have warned that it will destabilise weak or fragile countries. This follows assertions that with the predicted increases in the frequency and intensity of extreme weather events as a result of climate change, it can be expected that there will be more incidences of mass migration events in the future which will then also lead to increases in the risk of civil conflict in receiving areas as a result of mass influxes of displaced people, combined with poor

socioeconomic characteristics and weak institutions in receiving areas (Ghimire et al., 2015).

5. Discussion

Poverty reduction (i.e. the reduction of income poverty and also multidimensional poverty covering education, public health, drinking water, and sanitation facilities) and sustainable development are inseparable; and poverty reduction is the premise for sustainable development (Liu et al., 2015). Some estimates point out that climate change induced extreme events will impact access to water and threaten food security and livelihoods thereby by 2050, climate change and environmental degradation will likely lead to an 8% decline in the Global Human Development Index (HDI), with a 12% decline in South Asia and SSA (UNDP, 2011). As it stands, between now and 2030, climate policies and stringent global emissions reductions can do little to alter the amount of global warming that will take place and as such a plausible option therefore, is to reduce vulnerability and poverty through targeted adaptation investments and improved socioeconomic conditions (higher incomes, and lower poverty and inequality) (Hallegatte et al., 2016; Biesbroek et al., 2010).

Some research has pointed out that development aid-style climate funding, in the form of international loans or grants, is not the only, and probably not even the most effective way of closing climate financing gaps as public and private climate finance mobilisation, delivery, and utilisation varies between countries and is constrained by different factors (Fankhauser et al., 2015). Consequently, other measures (such as technical assistance) or vehicles (such as national development banks) could be more effective than international climate aid in addressing the climate finance deficits that are in Africa (Fankhauser et al., 2015). Similarly, Yu (2014) considered that African countries need to work on establishing appropriate legal and institutional frameworks that would attract private (international and local) finance into climate change activities, and improving the absorptive capacity of African countries to effectively deploy climate funds. These observations reinforce the notion of Ubi (2014) that the support that China provides to Africa in terms of trade, investments, aid, etc. can only be maximised if African governments develop good policies, adequate institutional frameworks and regulations when strategising for development and engaging with China. A strategy focussing on simultaneously reducing poverty and climate change vulnerability could therefore be a plausible priority policy development area for Sino-African relations.

A common theme that has been shown in this paper is that the financial sector in SSA is important to enable people and the private sector to have access to credit, insurance and savings that can enable them to improve resilience to climate change, escape poverty and support entrepreneurship. It can therefore be argued that there is a need for successive Sino-African strategic collaborations and mechanisms of practical cooperation to focus on improving the rates of financial inclusion in Africa as that can eliminate some of the barriers to sustainable inclusive growth in SSA. This follows that whilst the Forum on China–Africa Cooperation Johannesburg Action Plan (2016–2018) incorporates a program to encourage and support Chinese and African financial institutions (e.g. the Chinese side will offer African countries US$35 billion of loans of concessional nature on more favourable terms and export credit line, and the Chinese side will encourage Chinese financial institutions to provide financing and insurance support for China–Africa cooperation in energy, mining, agriculture, etc.), the Action Plan does not explicitly state that it will improve financial inclusion in Africa.

Inclusive growth is not possible in the absence of greater financial inclusion since financial inclusion encompasses enhanced access to savings, credit and risk mitigation products, and a well-functioning financial infrastructure that allows individuals and companies to engage more actively in the economy (Triki and Faye, 2013). In SSA an average of only 24% of the population has an account with a formal financial institution (in contrast to 55% of adults in East Asia, 35% in Eastern Europe, 39% in Latin America, and 33% in South Asia), subsequently leading to reduced female empowerment and productive investment in the region (Aga and Peria, 2014). Some commentators have pointed out that greater access of firms and households to various banking services, as well as increasing women users of these services, lead to higher economic growth (Sahay et al., 2015). Additionally, whilst FDI plays an important role in contributing to economic growth by facilitating technology transfers, the introduction of new processes to the domestic market and access to markets, such positive effects are only fully realised if the host economy has a sufficiently developed local financial market (Alfaro et al., 2004; Agbloyora et al., 2013). Since, Africa has low levels of financial inclusion it can be argued that the benefits that can be derived from finance and funding through climate finance mechanisms, FDI and trade are not being adequately utilised in many countries and are not reaching the most vulnerable communities.

Table 1 suggests that Sino-African investments have mostly been focused on extractive industries and infrastructure. Arguably, there is a need for African governments to seek for greater investments and technical assistance in the financial sector (e.g. in governance and regulation of financial services, digital financial services, etc.) so as to increase the continent's rates of financial inclusion which could then eventually improve the region's climate change adaptive capacity and resilience.

Table 1
Chinese investments in Africa by sector.

Sector	In percentage	Sector	In percentage
Oil and natural gas	19.0	Airports	2.0
Rail and road	18.6	Aid	1.8
Hydroelectric dams	9.2	Port construction	1.6
Iron ore	7.4	Gold	0.7
Copper	6.9	Water	0.5
Civil construction	5.9	Other mining	10.0
Manufacturing	3.7	Other	11.0
Uranium	2.3		

Source: Ubi (2014).

Reducing inequality is of paramount importance in relation to the achievements of the SDGs as a combination of socio-economic inequalities and large youth unemployment rates potentially make countries more susceptible to political instability and national insecurity (Azeng and Yogo, 2013). Ten million young Africans enter Africa's workforce annually since Africa is the fastest growing continent in the world, and more than half of the global population growth between now and 2050 is expected to occur in Africa (AGRA, 2015). The Forum on China–Africa Cooperation Johannesburg Action Plan (2016–2018) does not explicitly make provisions to tackle youth unemployment but only provides pledges to provide study and training opportunities to the youth. An area for further research could therefore be to determine how youth unemployment can be reduced in Africa by creating employment and entrepreneurship opportunities in climate risk mitigation programs and activities. This follows suggestions by Ajufo (2013) that youth unemployment in Africa is partly a consequence of a mismatch between the skills of the youth and labour market demands, market failures and externalities.

6. Conclusions

The SDGs, as a global ambition can only be achieved if climate informed development is promoted. In SSA, climate change is threatening the regions agricultural productivity, infrastructure and livelihoods hence will not only exacerbate poverty, but can also instigate conflicts and inequality. African policymakers are therefore tasked with the challenge of ensuring that the threats as presented by climate change can be overturned to become opportunities. It is within this context that Sino-African relations present themselves as a viable means to which Africa's climate change vulnerabilities can be minimised through a better targeting of climate finance, aid, investments and trade between China and Africa.

The paper explored how South–South Climate Finance (SSCF) modalities and particularly Sino-African relations could improve SSA's climate risk management capacity and capabilities by improving the mobilisation of funds and financing, and disbursement of aid and investments for climate change activities.

The paper analysed various climate change policy issues in Africa and discovered that:

(1) Climate variability and change is anticipated to disrupt rainfall patterns and agricultural yields in SSA, thereby increasing climate change vulnerabilities and poverty traps in SSA. Climate change can therefore impede progress towards achieving the SDGs in Africa. Consequently, it was suggested that Sino-African aid, development programs and investments focussing on enhancing the implementation of EBA and decentralised irrigation could be strategies that could improve the resilience of Africa's agricultural systems and livelihoods to climate change impacts.
(2) Through the Forum on China–Africa Cooperation Johannesburg Action Plan (2016–2018), China is anticipated to provide US$60 billion of assistance to Africa. However, bureaucratic delays in adopting and implementing climate change policies and strategies in many African countries, and a lack of awareness of the implications of climate change for future economic growth and development could impede the effectiveness of climate change related assistance from China to Africa. Redressing this situation could potentially be possible by developing the will and industriousness of African communities and stakeholders so as to change their mind sets and start utilising their comparative advantage in areas such as environmental standards to support the aspirations of China and other African countries that have poor environmental standards.
(3) Africa requires significant financial and technical support in order to facilitate effective climate change adaptation. However, climate change mitigation activities receive more financial and technical support than adaptation initiatives, and it can be anticipated that more funding will continue to be provided to climate change mitigation activities in the future as the private sector will focus on scaling up and replicating existing climate change initiatives and business models in developing countries. Sino-African climate change policies and strategies may therefore focus on developing additional frameworks and business models detailing how the Chinese private sector can be engaged in Africa's climate management activities. This can enable Chinese led SSCF modalities to be pioneers in financing climate change adaptation initiatives, and in providing aid and investments equitably amongst the different resource rich and resource poor African countries regardless of existing political and market forces.
(4) Financial sector support from China to Africa through the Forum on China–Africa Cooperation Johannesburg Action Plan (2016–2018) is inadequate to enhance inclusive growth and enhance climate change resilience in SSA. This follows that the Action Plan has limited emphasis on financial inclusion, an aspect that can enable the provision of credit, insurance, savings and other social safety nets to Africa's vulnerable households and communities. Consequently, it may be prudent that for the forthcoming FOCAC, Chinese and African policymakers should prioritise funds and investments towards financial inclusion as this would not only provide a better environment for accessing and deploying climate finance, but can also improve the utilisation of FDI and trade in Africa.

Through this paper, it is apparent that China has more investments in Africa than in America, China is Africa's largest trading partner, and possibly with a better realignment and implementation of Sino-African policies and the FOCACs towards improved climate risk management (in the key areas highlighted in this paper), China could well become Africa's greatest asset and partner in reducing inequalities and conflict in SSA.

Acknowledgments

The author acknowledges the support of Prof. Dr. Eike Albrecht and fellow colleagues at the Department of Civil and Public Law with references to Law of Europe and the Environment, Brandenburg University of Technology Cottbus-Senftenberg.

References

Abadie, L.M., Galarraga, I., Rübbelke, D., 2013. An analysis of the causes of the mitigation bias in international climate finance. Mitig. Adapt Strateg. Glob. Change 18, 943−955.

Aga, G.A., Peria, M.S.M., 2014. International Remittances and Financial Inclusion in Sub-Saharan Africa. Policy Research Working Paper 6991. World Bank Group (Development Research Group), Washington, DC.

Agbloyora, E.K., Abora, J., Adjasib, C.K.D., et al., 2013. Exploring the causality links between financial markets and foreign direct investment in Africa. Res. Int. Bus. Finance 28, 118−134.

AGRA (Alliance for a Green Revolution in Africa), 2015. Africa Agriculture Status Report: Youth in Agriculture in Sub-Saharan Africa, Issue No. 3. Nairobi, Kenya.

Ajufo, B.I., 2013. Challenges of youth unemployment in Nigeria: effective career guidance as a panacea. Afr. Res. Rev. 7 (1), 307−321.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., et al., 2004. FDI and economic growth: the role of local financial markets. J. Int. Econ. 64 (1), 89−112.

Amatayakul, W., Berndes, 2012. Determining factor for the development of CDM biomass power projects. Energy Sustain. Dev. 16, 197−203.

Azeng, T.F., Yogo, T.U., 2013. Youth Unemployment and Political Instability in Selected Developing Countries. Working Paper Series No. 171. African Development Bank, Tunis.

Biesbroek, G.R., Swart, R.J., Carter, T.R., et al., 2010. Europe adapts to climate change: comparing national adaptation strategies. Glob. Environ. Change 20, 440−450.

Bryan, E., Ringler, C., Okoba, B., et al., 2013. Adapting agriculture to climate change in Kenya: household strategies and determinants. J. Environ. Manag. 114, 26−35.

Buchner, B., Stadelmann, M., Wilkinson, J., et al., 2014. The Global Landscape of Climate Finance 2014. Climate Policy Initiative.

Burian, M., Aren, C., Sterk, W., et al., 2011. Integrating Africa's Least Developed Countries into the Global Carbon Market: Analyzing CDM Implementation Barriers. Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

CEPA (Centre for Environmental Policy and Advocacy), 2012. Draft Position Paper: Towards Development of Climate Change Policy in Malawi. Centre for Environmental Policy and Advocacy, Malawi. http://www.cepa.org.mw/documents/ECRP_documents/CEPA_Draft_Position_Paper_Climate_Change_Policy.pdf.

Chen, W., Dollar, D., Tang, H., 2015. Why is China Investing in Africa? Evidence from the Firm Level. The Brookings Institution, Washington, DC.

Chirambo, D., 2014. The climate finance and energy investment dilemma in Africa: lacking Amidst plenty. J. Dev. Soc. 30 (4), 415−440.

Cobbinah, P.B., Erdiaw-Kwasie, M.O., Amoateng, P., 2015. Africa's urbanisation: implications for sustainable development. Cities 47, 62−72.

Davies, M., Draper, P., Edinger, H., 2014. Changing China, changing Africa: future contours of an emerging relationship. Asian Econ. Policy Rev. 9, 180−197.

Davis, S., Woetzel, J., 2010. Making the Most of Chinese Aid to Africa. Retrieved May 11, 2016. http://www.mckinsey.com/industries/public-sector/our-insights/making-the-most-of-chinese-aid-to-africa.

Doyle, M.W., Stiglitz, J.E., 2014. Eliminating extreme inequality: a sustainable development goal, 2015−2030. Ethics Int. Aff. 28 (1), 5−13.

Dumenu, W.K., Obeng, E.A., 2016. Climate change and rural communities in Ghana: social vulnerability, impacts, adaptations and policy implications. Environ. Sci. Policy 55, 208−217.

Eriksen, S., Aldunce, P., Bahinipati, C.S., et al., 2011. When not every response to climate change is a good one: identifying principles for sustainable adaptation. Clim. Dev. 3 (1), 7−20.

Fankhauser, S., Sahni, A., Savvas, A., Ward, J., 2015. Where are the gaps in climate finance? Clim. Dev. http://dx.doi.org/10.1080/17565529.2015.1064811.

FAO (The Food and Agriculture Organization of the United Nations), 2015. The State of Food and Agriculture Social Protection and Agriculture: Breaking the Cycle of Rural Poverty. FAO, Rome.

FOCAC (The Forum on China−Africa Co-operation), 2016a. The Forum on China−Africa Cooperation Johannesburg Action Plan (2016−2018). Ministry of Foreign Affairs, The People's Republic of China. http://www.focac.org/eng/ltda/dwjbzjjhys_1/t1327961.htm.

FOCAC (The Forum on China−Africa Co-operation Action Plans), 2016b. The Forum on China−Africa Cooperation. Compilation by the Author of the Education Related Commitments from China to Africa from the First Ministerial Conference to the Fifth Ministerial Conference. Ministry of Foreign Affairs, The People's Republic of China. http://www.focac.org/eng/ltda/dwjbzjjhys/t954620.htm.

Ghimire, R., Ferreira, S., Dorfman, J.H., 2015. Flood-induced displacement and civil conflict. World Dev. 66, 614−628.

Glemarec, Y., 2012. Financing off-grid sustainable energy access for the poor. Energy Policy 47, 87−93.

Ha, S., Hale, T., 2016. Climate finance in and between developing countries: an emerging opportunity to build on. Glob. Policy 7 (1), 102−108.

Halimanjaya, A., 2015. Climate mitigation finance across developing countries: what are the major determinants? Clim. Policy 15 (2), 223−252.

Hallegatte, S., Bangalore, M., Bonzanigo, L., et al., 2014. Climate Change and Poverty: An Analytical Framework. Policy Research Working Paper 7126. World Bank Group, Washington, DC.

Hallegatte, S., Bangalore, M., Bonzanigo, L., et al., 2016. Shock Waves: Managing the Impacts of Climate Change on Poverty. Climate Change and Development Series. World Bank, Washington, DC.

Holodny, E., 2015. The 13 fastest-growing economies in the world. In Business Insider UK. http://uk.businessinsider.com/world-bank-fast-growing-global-economies-2015-6.

Hu, Y., Monroy, C.R., 2012. Chinese energy and climate policies after Durban: save the Kyoto Protocol. Renew. Sustain. Energy Rev. 16, 3243−3250.

Huang, J., Wang, Y., 2014. Financing sustainable agriculture under climate change. J. Integr. Agric. 13 (4), 698−712.

İyigün, N.Ö., 2015. What could Entrepreneurship do for sustainable development? A corporate social responsibility-based approach. Procedia − Soc. Behav. Sci. 195, 1226−1231.

Kato, T., Ellis, J., Pauw, P., et al., 2014. Scaling Up and Replicating Effective Climate Finance Interventions. Climate Change Expert Group Paper 2014(1). OECD, Paris.

Khan, M.A., Khan, M.Z., Zaman, K., et al., 2014. Global estimates of energy consumption and greenhouse gas emissions. Renew. Sustain. Energy Rev. 29, 336−344.

Klapper, L., El-Zoghbi, M., Hess, J., 2016. Achieving the Sustainable Development Goals: The Role of Financial Inclusion. The Consultative Group to Assist the Poor (CGAP), Washington, DC.

Kragelund, P., 2015. Towards convergence and cooperation in the global development finance regime: closing Africa's policy space? Camb. Rev. Int. Aff. 28 (2), 246−262.

Lawlor, K., Handa, S., Seidenfeld, D., 2015. Cash Transfers and Climate-resilient Development: Evidence from Zambia's Child Grant Programme. Innocenti Working Paper No. 2015-03. UNICEF Office of Research, Florence.

Lin, J.Y., Wang, Y., 2014. China−Africa Co-operation in Structural Transformation: Ideas, Opportunities, and Finances. WIDER Working Paper, No. 2014/046.

Liu, Q.Q., Yu, M., Wang, X.L., 2015. Poverty reduction within the framework of SDGs and Post-2015 Development Agenda. Adv. Clim. Change Res. 6 (1), 67−73.

Marwan, N.F., Kadir, N.A.A., Hussin, A., et al., 2013. Export, aid, remittance and growth: evidence from Sudan. Procedia Econ. Finance 7, 3−10.

Mbeva, K., Ochieng, C., Atela, J., et al., 2015. Intended Nationally Determined Contributions as a Means to Strengthening Africa's Engagement in International Climate Negotiations. Climate Resilient Economies Working Paper no. 001/2015. African Centre for Technology Studies (ACTS). ACTS Press, Nairobi.

Mol, A.P.J., 2011. China's ascent and Africa's environment. Glob. Environ. Change 21, 785−794.

Munang, R., Mgendi, R., 2016. The implications of Paris agreement for Africa: seizing the moment. Africa Adaptation Network Newsletter 14. www.aaknet.org.

Nagoda, S., 2015. New discourses but same old development approaches? Climate change adaptation policies, chronic food insecurity and development interventions in northwestern Nepal. Glob. Environ. Change 35, 570−579.

Niu, C., 2013. China's educational cooperation with Africa: toward new strategic partnerships. Asian Educ. Dev. Stud. 3 (1), 31−45.

Nordtveit, B.H., 2011. An emerging donor in education and development: a case study of China in Cameroon. Int. J. Educ. Dev. 31, 99−108.

Onishi, N., 2015. China pledges $60 billion to aid Africa's development. In New York Times. http://www.nytimes.com/2015/12/05/world/africa/china-pledges-60-billion-to-aid-africas-development.html?_r=1.

Perez, C., Jones, E.M., Kristjanson, P., et al., 2015. How resilient are farming households and communities to a changing climate in Africa? A gender-based perspective. Glob. Environ. Change 34, 95−107.

Pigato, M., Tang, W., 2015. China and Africa: Expanding Economic Ties in an Evolving Global Context. Presentation Paper at the Investing in Africa Forum, Addis Ababa.

Ratter, B.M.W., Philipp, K.H.I., von Storch, H., 2012. Between hype and decline: recent trends in public perception of climate change. Environ. Sci. Policy 18, 3−8.

Rong, F., 2010. Understanding developing country stances on post-2012 climate change negotiations: comparative analysis of Brazil, China, India, Mexico, and South Africa. Energy Policy 38, 4582−4591.

Sahay, R., Čihák, M., N'Diaye, P., et al., 2015. Financial Inclusion: Can It Meet Multiple Macroeconomic Goals? IMF Staff Development Note (SDN) 15/17.

SDSN (The Sustainable Development Solutions Network), 2013. Solutions for Sustainable Agriculture and Food Systems. Technical Report for the Post-2015 Development Agenda. SDSN, New York.

Timilsina, G.R., de Gouvello, C., Thioye, M., et al., 2010. Clean development mechanism Potential and challenges in sub-Saharan Africa. Mitig. Adapt Strateg. Glob. Change 15, 93−111.

Triki, T., Faye, I., 2013. Financial Inclusion in Africa. African Development Bank.

Ubi, E.N., 2014. Foreign aid and development in Sino-African relations. J. Dev. Soc. 30 (3), 243−272.

UN (United Nations), 2015. Transforming Our World: the 2030 Agenda for Sustainable Development. UN, New York.

UNDP (United Nations Development Programme), 2011. Human Development Report 2011 − Sustainability and Equity: a Better Future for All. UNDP, New York.

UNDP (United Nations Development Programme), 2015. Empowering the Poor in a Changing Climate: Experiences from UNDP Supported Initiatives on Adaptation. UNDP, Bangkok.

Urpelainen, J., 2012. Strategic problems in North−South climate finance: creating joint gains for donors and recipients. Environ. Sci. Policy 21, 14−23.

Vignola, R., Harvey, C.A., Bautista-Solisa, P., et al., 2015. Ecosystem-based adaptation for smallholder farmers: definitions, opportunities and constraints. Agric. Ecosyst. Environ. 211, 126−132.

Viljoen, W., 2013. Addressing climate change issue in eastern and southern Africa: EAC, COMESA, SADC and the TFTA. In: Cape to Cairo: Exploring the Tripartite FTA Agenda. Trade Law Centre and the Swedish Embassy, Nairobi, pp. 1−35.

WB (World Bank), 2013. Turn Up the Heat: Climate Extremes, Regional Impacts, and the Case for Resilience. World Bank, Washington, DC.

WB (World Bank), 2015. Africa's Pulse, Oct 2015, vol. 12. Washington, DC.

WEF (World Economic Forum), 2015. Outlook on the Global Agenda 2015. WEF, Geneva.

Winkelman, A.G., Moore, M.R., 2011. Explaining the differential distribution of clean development mechanism projects across host countries. Energy Policy 39, 1132−1143.

Wong, S., 2016. Can climate finance contribute to gender equity in developing countries? J. Int. Dev. 28, 428−444.

Wood, B.T., Sallu, S.M., Paavola, J., 2015. Can CDM finance energy access in least developed countries? Evidence from Tanzania. Clim. Policy. http://dx.doi.org/10.1080/14693062.2015.1027166.

Xu, X., Li, X., Qi, G., et al., 2016. Science, technology, and the politics of knowledge: the case of China's agricultural technology demonstration Centers in Africa. World Dev. 81, 82−91.

YCELP (Yale Centre for Environmental Law & Policy), 2016. The 2016 environmental performance index. http://epi.yale.edu/country-rankings.

Yihdego, A.G., Gebru, A.A., Gelaye, M.T., 2015. The impact of small-scale irrigation on income of rural farm households: evidence from Ahferom Woreda in Tigray, Ethiopia. Int. J. Bus. Econ. Res. 4 (4), 217−228.

Yu, Y., 2014. Climate finance, Africa and China's role. Afr. East-Asian Aff. 1, 36−57.