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THE CHINA MONITOR

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ENVIRONMENTAL SUSTAINABILITY AND CO-OPERATION BETWEEN AFRICA AND CHINA

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Editor's introduction

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The concept of *sustainability* is gaining importance, not least in discussions about the succession to the Millennium Development Goals that have a timeline until 2015. While sustainability is a widely accepted leitmotif, the practical reconciliation of environmental protection and conservation with economic and social development remains a challenge for developing and developed countries alike.

"Sustainability" implies the inclusion of a long-term perspective; additionally, it requires attention from various angles. Environmental protection can be regarded as a value in itself. Sustainability, in this understanding, is a survival imperative and a somewhat religiously justified moral obligation of humankind to "protect creation", including aspects of cultural resources. Secondly, a market rationale also gives good reasons for environmental protection and the aim towards sustainability. Negatively speaking, pollution inflicts costs and has negative impacts on economic growth, as has been calculated for China, for instance (as illustrated by Burgess and Esterhuyse in their Forum contribution in this issue). Additional to the economic costs, political costs are inflicted, as the lack of protection against pollution can be undermining state legitimacy. This cost-related rationale, in fact, also provides for reasons to engage in conservation efforts, as a healthy and di-

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verse environment provides a wealth of yet unknown treasures (for medicinal or agricultural or other uses) that needs to be preserved for future challenges. Thirdly, policies for environmental protection can work as incentives for innovation and new technology, guiding economic activities towards a greater good, but also stimulating competition of ideas for the best solutions. Some of these changes in thinking about environmental protection are taking place within China.

The debate on the environmental dimension in relations between Africa and China has several dimensions. First, there is a domestic Chinese angle to the discussion: what level of importance is attributed to environmental protection? How much is concern for the environment part of other policy decisions and go beyond "mere" conservation efforts? Environmental concerns might or might not have an impact on economic policies, including energy policy. And it certainly also has potential implications for the foreign relations of a country that is an investor abroad; how much does this feature in China's external relations with African states? Secondly, the African setting needs to be looked at with regards to domestic legislation, but also with regard to law enforcement; the latter more often than not, is the weak point, while legislation might be up to international standards. Thirdly, the international dimension of global norms and their "localisation" is important for discussions. How are norms accepted? Are they developed any further to fit the local context without being compromised? This special edition of *African East-Asian Affairs* aims to shed a light on some aspects of the debate, exploring the international dimension, local policy considerations in China, and the socialisation of norms and reconciliation of tensions between somewhat conflicting norms.

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Environmental awareness requires a longer-term vision – and is under enormous pressure when fast-increasing populations demand quick improvements to their living situations. However, environmental thinking is not for affluent societies only; those affected most by environmental degradation are usually poorer populations. Changes in climate with local effects, which is also a consequence of global

greenhouse gas emission, make adaptations to ways of life necessary. Climate change often exacerbates existing problems on the ground. Besides factors such as climate change due to greenhouse gas emission, demographic pressure is one driver for environmental degradation. Population growth means that more food needs to be produced from scarcer resources such as land and water. If scarce resources additionally become unusable because of pollution, the long-term perspectives for societies deteriorate. The challenge is thus to find quick-fix solutions to immediate problems that do not have an irreversible negative impact on future generations. This is, indeed, one definition of sustainability.

We can expect the emphasis and political dimensions in the internal discussion on environmental effects in developing countries to be different from industrialised societies for various reasons. First, the sense of urgency in economic growth is much more pronounced, job and wealth creation are an immediate need for large parts of the population (as illustrated in the research by Sternäng and Lundholm, 2011). Similarly, the need for secure energy supply is crucial for emerging economies with their developing industries. These aspects are often used as the guiding principle for governments' actions. Quite a substantial part of the debate on Chinese engagement in Africa and elsewhere regard the need to ensure the supply of commodities and energy as a major driver. Not least so, the discussion often includes references to historical milestones such as 1993, when China became a net oil importer, and 2007, which marks the year in which China became a net coal importer. Besides and beyond car traffic, the dependence on coal for energy production has large effects on environmental pollution in cities. Pollution levels present some pressure on the Chinese government to address health problems and compromised quality of life in Chinese cities (Burgess, 2012a; Li Wanxin et al, 2012). Chinese experiences with its unsustainable economic model could also give some clues on the effects of ignorance or denial towards mounting environmental challenges – and about changing perceptions. Nowadays, policies in China take environmental concerns into account more often than at earlier stages of development, including turning more attention towards the implementation level and cre-

ating incentives for provinces and municipalities to address environmental concerns (Esterhuyse, 2012a). The environmental awareness in China is mostly researched amongst students, showing an increasing awareness – with optimism waning. Expectations for the immediate future are dimmed and the hope that life will only get better is no longer there with regard to the environment (Wong, 2003).

While environmental challenges often have very profound local impacts, causes for environmental degradation *and* their effects are often beyond the local. Environmental protection and the reaction to environmental change are areas for international co-operation. China-Africa relations are to be included in this consideration. There are several dimensions to this: first, China's regulation for activities abroad, in other words, Chinese uni-lateral concerns. Secondly, bi-lateral relations also have an explicit environmental co-operation angle. And thirdly, multilateral engagement includes interactions in organisations with an environmental mandate.

At the uni-lateral level, environmental issues are also increasing in relevance in China's international relations, not least in its stance on climate change (see, for instance, Wei Liang, 2010), but also in debates about standards applied in co-operation. Besides the new opportunities for African countries and societies, much like any other outside assistance and co-operation, the Chinese contribution to development comes with challenges that need to be managed and mitigated. The challenges evolving from the engagement of Chinese actors, however, will be specific to the Chinese setting and have a lot to do with the development paths chosen in the "Middle Kingdom". China EXIM Bank, for instance, has introduced environmental standards in its lending practice. The environmental policy of EXIM Bank was already established in 2004 and it is publically available; it can thus also be used as a tool in advocacy by NGOs. Since 2007, environmental impact assessments are necessary in lending for Chinese infrastructure projects. Additionally, corporate social responsibility gets increasing attention from larger Chinese companies (Bosshard, 2008; Compagnon and Alejandro, 2013). The key challenge is thus not the lack of policy, but a lack of implementation or differences in interpre-

tation of what constitutes harmful behaviour and what does not. The onus to address environmental hazards is clearly predominantly on the African side; yet, China has responsibilities, being the more powerful element in the discussion (cf. Grimm, 2011).

With regards to the bi-lateral relations between African states and China, the environment also features in policies. Already in 2000, during the first FOCAC meeting in Beijing, environmental co-operation featured in the agreed action plan. Environmental co-operation between China and Africa's states was agreed upon in areas including pollution control, biodiversity conservation, protection of forests, fisheries and wildlife management. This general statement of intent, however, was not "operationalised" and not linked to specific targets. In all co-operation areas, problems have surfaced, be it in pollution control in the mining industry, the poaching of abalone and illegal fishing operations off the African coast, debates on rhino poaching and the role of Chinese criminal groups in it, or the accusation of illegal logging in African rainforests (cf. The CCS Weekly Briefing, various issues, also: Burgess, 2012b). Illegal activities by individuals do not devalue the overall partnership; doing so would indicate the use of different standards, as we do see weapon sales or oil exploitation or non-sustainable fishing by Europeans and North Americans. The value of a relationship, however, is in the way of handling those activities that are not covered by it. Nationally and internationally accepted standards need to be effectively policed and implemented. Specific international actions and multilaterally agreed targets help in formulating and focussing policies, not unlike the idea behind the Millennium Development Goals.

Undoubtedly, there is scope for mutual learning, including learning from negative examples in China (experiences that Chinese would probably also flag as things to learn *not* to replicate). There are, however, also examples from African countries that can provide inspiration for the Chinese side. African policy-makers can learn from China – and Chinese policy-makers can learn from experiences in African countries in terms of environmental protection, making the slogan of mutual learning and mutual benefit a real option in this topic area. Knowledge needs to be

broadened, if lessons are to be learned from another society's development trajectory.

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Thus far, development is fundamentally understood as being about human control over the environment. The very concept of development is that humankind is shaping the environment, making people less subject to natural hazard. In this rationale, it is logical that in many societies, a "natural state" is perceived as the situation to be overcome. Non-industrialised, agrarian societies base their livelihood on a life dependent on natural cycles and thus sensitive to environmental factors (which are sought be somewhat managed, nevertheless). Contrary to this, early industrialisation seems to come with a "can do" attitude that rather sees environmental issues as yet another managerial challenge, thus posing problems with policies and perceptions (Hong Jiang, 2010). This was the case in industrialising Europe in the late nineteenth century (Birnie *et al*, 2009: 589), and seems to also be a pattern in today's emerging economies. In the post-industrial societies, environmental concerns are revived again and are linked to evolving value systems and matters of quality of life – and yet, these concerns in a post-industrial society are often concerned with a "repair" of the already lost natural riches. In some instances, however, the environmental pressure precedes any industrialisation efforts and thus comes more to the fore in policies.

Desertification and specific pressure on increasingly scarcer water resources in the African Sahel – and in some parts of North-eastern and Southern China (Esterhuyse 2012b) – are more immediate and are effects of changing climatic conditions. The contribution of Alioune Thiam in this edition of *African East-Asian Affairs* explores the challenges in combating desertification and looks into possible avenues for co-operation between China and African states. The contribution somewhat indirectly also addresses China's international responsibilities with at least two elements. First, China is considered a partner, given that it is a technologically more advanced partner than other developing countries. And secondly,

the international commitments, not least through the Forum on China-Africa Co-operation, are promises to deliver on. The article by Alioune Thiam on combatting desertification does not simply demand more finance and includes support for international mechanisms and for technological transfers.

The need for finance is an important aspect in international negotiations on combatting human contributions to climate change mitigation, and, increasingly importantly, supporting the adaptation to changes of the climate. Increased efforts in mitigation as well as adaptation to a changing climate are needed, as just recently illustrated by the IPCC (Intergovernmental Panel on Climate Change) report discussed in March 2014. This also requires international finance for the poorest countries. Finance for climate change is an issue where China, too, faces increasing demands from third countries that are affected by climate change. A more detailed exploration of the international climate finance is provided by the contribution by Ye Yu. She is exploring the different financial channels and their shortcomings and looks at China's role in the international finance for climate change, both in bi-lateral and multi-lateral settings. Her conclusion is that "as a big emerging economy, China has to think and behave more globally earlier than others", which relates to responsibilities that are attributed to Beijing, whether Chinese officials agree with all the underlying assumptions or not. Globalisation is a factor to consider for both small and large developing countries, just as it is for developed nations.

Thirdly, Susan Keitumetse's contribution adds the dimension of community engagement to the need for conservation efforts. With the overall concern often focussing on economic growth and the control and exploitation of natural wealth, concerns of smaller and immediately affected groups, at least initially, might be regarded as less pressing. This is a challenge to any political system, whether it is authoritarian top-down or follows a basic democratic rationale; the challenge is particularly stark in the latter system if democracy is (wrongly) simply understood as majority rule, without respect for individual human rights or guarantees for minority groups and their specific beliefs or way of life. In the broader 'rush' towards

higher income for the general population, these minority groups can even be accused of holding society as a whole hostage with what will be attacked as "backward thinking" and preventing the majority to reap immediate gains from changes. As development changes are expected to be quick, the inclusion of communities thus arguably requires a particularly effort in developing countries.

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Sustainability – in the sense of respecting environmental limits to human activities – will have to be increasingly included in the co-operation between China and Africa. The interest in sustainability is driven by the Chinese government's own interests of managing the reputation of Chinese actors in African states, which is linked to their contribution to the well-being of the population and the respect for local legislation. There are, however, also motives stemming from domestic political interests in China (for example addressing grievances of the population) and economic drivers for innovation. With this diversity of factors, more importance can be expected to be attributed to the topic.

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Challenges in combating desertification in sub-Saharan Africa, which role for China?

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Abstract

Sub-Saharan African (SSA) countries are witnessing both man-made disasters, such as corruption, civil wars, fratricide conflict; and natural disasters, such as water scarcity, drought and desertification. These phenomena have led to land degradation and affected the economic and living conditions of the population. In response to these last challenges, several international conventions and domestic laws have been enacted to prevent and tackle their threatening effects. Among these attempts, is the United Nations Convention on Combating Desertification (UNCCD). This convention requires international co-operation in which China and Africa are both engaged.

Based on the above premise, the purpose of this article is to evaluate the main challenges in combatting desertification in SSA and to assess the role that China is playing with Africa to overcome the relevant challenges. Some questions will be addressed hereto: how does the UNCCD accommodate the needs of SSA countries and what are the remaining challenges? How do SSA countries comply and respond to the requirement of the convention and what are the unresolved issues? Finally, how are China and Africa co-operating or may better co-operate to tackle the nexus challenges on desertification?

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Introduction

Land, Air and Water (LAW), are among the most needed resources as they are the basis for survival. Their degradation threatens the economy and the living conditions of human beings. Arable land is under threat today. Two thirds of the land in Africa is classified as deserts or dry land. These are concentrated in the Sahelian region, the horn of Africa and the Kalahari in the south (ECA, 2007). Serious drought and desertification, particularly in these regions are one of the main problems that should not be left behind when dealing with environmental issues. Unfortunately, it seems to be neglected as a global challenge (Fuchs, 2005).

By analysing the causes of desertification particularly in Africa, one may notice direct and indirect factors combined to the socio-economic realities. Among the typical direct causes of desertification in the region are poor agricultural practices, such as continuous cultivation without adding any supplements; overgrazing; poor land management practices; and lack of soil and water conservation infrastructures. Another serious cause of desertification is the necessity to meet energy needs and expand agricultural land. More than 15 million hectares of tropical forests are depleted or burned every year in order to provide for small-scale agriculture or cattle ranching; or for using as fuel wood for heating and cooking (ECA, 2007). The issue can therefore be addressed in several angles, namely geographical, sociological, economical and legal.

On a legal point of view, as law has a moving target, it involves Land, Air and Water and implies enforceable binding rules and principles to protect these main components of the environment**.** Environmental Law is a collection of legal rules concerning the use, protection, management or restoration of the environment in all its forms: terrestrial, aquatic and marine**.** International Environmental Law indeed is a set of international rules and principles required for the protection of space, the biosphere, and global ecosystem. The definitions take into account the functional aspect of Environmental Law which is the cornerstone of this analysis.

The phenomenon of desertification is defined by the UNCCD (194 countries are members of the Convention) as land degradation in arid, semi-arid and dry sub-

humid areas resulting from various factors, including climatic variations and human activities. In 1977, the United Nations (UN) adopted a plan of action to address the issue but despite the effort, the problem of desertification remains unsettled. The question of how to tackle desertification remains a major concern with many challenges. This issue called for a conference organised by the UN held at Rio de Janeiro in 1992. The conference resulted in the adoption of Agenda 21, the Rio Declaration on Environment and Development, the Statement of Forest Principles, the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Convention on Biological Diversity (CBD).

The conference succeeded in establishing the concept of sustainable development as a combination of economic growth, environmental protection and social improvement. The UNCCD was adopted following a direct recommendation of the Rio Conference's Agenda 21, and the resolution 47/188 of the UN's General Assembly. According to Article 2 of the UNCCD, the objective is:

"to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international co-operation and partnership arrangements, in the framework of an integrated approach which is consistent with the Agenda 21, with a view of contributing to the achievement of sustainable development in affected areas".

Several countries have areas where desertification is occurring. The level of impact depends on the specific natural, socio-economic and political features of the area. The hardest hit is SSA, where poverty is more extensive, the level of awareness regarding potential catastrophe is low, and means for adapting and tackling the phenomenon are very weak (Winslow et. al. 2004). According to experts, SSA will lose two-thirds of its arable lands by the year 2025 (Youba, 2006:13). The UNCCD has been adopted to address the issue.

This paper will cast light on how the Convention on Combating Desertification accommodates the needs of SSA countries and what the remaining challenges are. The second part will address how the SSA countries responded to the requirement

of the Convention focusing on the efforts at the sub-regional and regional economic and legal orders and the outstanding limits. The third part will show how China and Africa are co-operating to tackle desertification as it is requested by the UNCCD and beyond how the Forum for China-Africa Cooperation (FOCAC) is addressing or could better address the issue.

The International Legal Framework in Combating Desertification and the needs of sub-Saharan African countries

According to the United Nations Environment Program (UNEP), desertification, land degradation and drought affect over one and a half billion people in more than 110 countries. This is a third of the world population, 90 per cent of whom are in low-income areas. The pathways out of poverty often depend on the resources that are lost: land, water and forests (UNEP, 2011). In Africa more than 73 per cent of the dry lands used for agriculture are already degrading. The UNCCD is seen as a new response to this age-old problem and the centrepiece in the international community's efforts to combat desertification and mitigate impacts of drought and ensure sustainable development. This convention is the sole legally-binding international agreement linking environment and development to sustainable land management. In the on-going ten-year strategy of the UNCCD (2008-2018) adopted in 2007, parties to the Convention further specified the aim to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability (Fuchs, 2005:292).

As the dynamics of land, climate and biodiversity are intimately connected, the UNCCD and the other two Rio Conventions, namely the CBD and the UNFCCC are also intrinsically inter-connected (Horstmann, 2006). These are among the international responses that derive from the 1992 Rio Global Earth summit. Each instrument represents a way of contributing to the sustainable development goals of Agenda 21. The three conventions are operating in the same eco-systems and addressing interdependent issues. The UNCCD helped to launch public awareness in Africa that has been put into practice by National Action Plans (NAP). It invites

countries to create conditions for greening the envi-ronment, in accordance with the means within their borders, by strengthening existing legislation on the subject or by es-tablishing new laws, policies and programmes (Article 4 of the UNCCD). The convention places special emphasis on the concept of participation, which also applies to the NAP development process, promoting bottom-up approaches and seeking to involve social groups that are usually excluded from the political decision-making process. It high-lights the fact that it is the local population who depends on the natural resources that are affected by desertification processes; they should be well-informed about the most suit-able practices to combat the challenge. This lack of co-ordination leads to a conflict of interest between the primary concern of the population and the mandate of the government. In a way this lack of co-ordination is unlikely to attract international assistance.

Lastly, in the convention, the NAPs are conceived as continuous processes to promote dialogue and search for effective solutions. The actors must therefore engage in a continuous participatory process to review and update NAPs in the ambit of changing socio-economic and environmental circumstances. The convention however remains silent on the specific contents and forms of these legislations.

In sum, the convention has taken in theory important measures to accommodate the need of African countries. However, overcoming correctly the challenge of desertification depends largely on international pragmatic measures and on local conditions. Besides its physical consequences on ecosystems there is a wide range of socio-economic threats including poverty, food insecurity, water shortage, health problems and conflicts that can be associated with truly combating the phenomenon. People leaving in rural areas are not aware of the measures provided by the convention. Therefore, the issue of public awareness particularly in rural areas must be addressed further. As such, more sensitisation campaigns are needed to raise public consciousness.

With regards to the implementation strategies some key words should be noted at the light of Article 2. These are "effective action at all levels" supported by "international co-operation and partnership arrangements" aimed at contributing to

the "achievement of sustainable development". Even though these features are in theory reflected in some African policies to combat desertification, outstanding issues linger in the implementation of such commands.

Sub-Saharan African countries responses in combating desertification

SSA countries adopted plans of action as requested by the convention, at national, sub-regional and regional levels. Nevertheless, the threat of the desert is still rising. These plans being only political assessments, it is commendable to find appropriate measures to join theory to concrete practice. The merits of these plans of action will be assessed and the remaining challenges will be emphasised further. Few examples will be pointed out in comparison to China where it is appropriate.

Actions taken at national level

African countries are at different stages of developing and implementing their NAPs as requested by the convention. In April 2007, NAPs had been developed and adopted by 42 African countries. The majority of the remaining countries had launched NAP processes (ECA, 2007:7). The NAPs are the overall strategies for specific land and drought-related plans and programmes. They also serve as important tools in guiding the implementation of the convention and monitor efforts in combating desertification and poverty. Efforts are being made at all levels but still the challenge is over rising due to some internal and external reasons. Based on the UN's published data on action taken at national level to combat desertification, a good number of projects have been reported in different regions since 1997. According to the report, the United Nation Economic and Social Council recorded in 2007, countries that have succeeded in mainstreaming NAPs and other Sustainable Land Management (SLM) include Burundi, Kenya, Burkina Faso and Uganda (ECA, 2007).

In Senegal, since October 2008 a national programme of combating desertification had been launched by the ministry of environment and the protection of the nature. The main legal instruments established by the Government are twofold: legal instruments relating to land tenure and sectorial laws. For the last, there is the Envi-

ronmental Code provided by law 2001-01 of 15 January 2001, which gives principles and instruments for environmental protection and on the other hand supports the management of the urban environment. The actions against desertification are mainly conducted in five areas: Agriculture, Livestock, Forestry, Hydraulics, and Training Education.

Mauritania had its plan of action since July 2002 where the core principles are to define an appropriate framework for consultation to local population, NGO's, community-based organisations and local communities to improve their management of natural resources (PAN/LCD, 2002). This approach has among its guiding principles: the implementation of plan in a permanent participation, improving the lives of people by linking the management of natural resources and the fight against poverty.

In Niger the NAP has been effective since November 2000; the reason being that Niger has an arsenal of legal pro-activities to combat desertification (CNEDD, 2000). To build warrants of an effective implementation of the plan of action Niger is be following the device of the decentralisation [*Programme d'action national de lutte contre la désertification et de gestion de ressources naturelles* (pan-lcd/grn), cit. p 52]. Indeed, actual distribution of powers assigned to the municipalities includes urban and rural planning and the protection of the environment (Saunders, nd:25).

Many efforts towards combating desertification could be recorded in SSA countries but despite these efforts there are common weaknesses that deserve more attention. In some African countries, like many other countries, the law in paper is promising but there is always a huge gap with the "law" in practice, and its implementation. Another problem witnessed in SSA countries is as a very weak technology with very little command of data on their own natural resources. Environmental data is often collected, analysed and processed through projects that are limited in time and space without any follow up. Unlike in China, there are very few African countries that have genuine national programmes for monitoring resources and the degradation phenomena that affect them (Youba, 2012:14). To this extent,

their land planning and development choices are seriously limited. Through national budgets, countries of the region are making provisions to fund directly or indirectly projects and activities to address drought impacts and tackle desertification. However, funding is channelled mainly through sectorial budgets particularly in the agriculture, environment and management of natural resources. Generally, these sectors receive low funding and the end use is not controlled. This lack of control encourages corruption or simply a misuse of public funds. As a result, there persists funding gaps for addressing the identified sustainable land management priorities. Due to these shortcomings, there should be a more pragmatic international response and device for control. Some actions are being taken at regional level to strengthen NAPs.

Actions taken at regional and sub-regional level

The New Partnership for Africa's Development (NEPAD) contains the environment initiative, which includes combating desertification as an integral and priority programme area. Action plans under this initiative are designed for the sub-regions in collaboration with African sub-regional organisations such as Permanent Inter-State Committee for Drought Control in the Sahel (*Comité Inter-Etat pour la Lutte contre la Sécheresse au Sahel* – CILSS). In the same direction, as reported by the Economic Commission for Africa (ECA), Sub-regional Action Programmes (SRAP) and the Regional Action Programme (RAP) on drought and desertification have been undertaken to complement the NAPs particularly with respect to trans-boundary resources such as lakes, rivers and forests; and crosscutting issues including information collection and dissemination, capacity building and technology transfer. Three SRAPs have been developed and implemented under the auspices of sub-regional institutions, namely the Economic Community of West-African States (ECOWAS) the Southern African Development Community (SADC), and the Inter-governmental Authority on Development (IGAD).

The treaty establishing the ECOWAS dedicates a chapter on environmental cooperation and natural resources. In light of its Article 29, member states shall undertake to protect, preserve and enhance the natural environment of the region and

co-operate in the event of natural disasters. To this end, they shall adopt policies, strategies and programmes at national and regional levels and establish appropriate institutions to protect, preserve and enhance the environment, control erosion, deforestation, desertification, locusts and other pests. In the aim of combating desertification and drought, the ECOWAS environmental policy aims, *inter alia,* at promoting appropriate partnerships for improving sub-regional co-operation on multilateral agreements on the environment, supporting the functioning of a regional technical consultation to monitor and boost the implementation of the Conventions.

The community aims also at promoting sustainable management of resources for the improvement of an environment-friendly life, to improve sustainable management of natural resources, ensure smooth implementation of joint programmes that address the causes and symptoms of land degradation particularly: good management of woodlands and off-forest trees in the sub-region through large scale reforestation programmes and integrated local programmes for rural development (ECOWAS Commission, 2008).

In the SADC sub-region, priority was given to programmes designed to fight drought and food security as a result of frequent droughts with devastating impacts on agriculture and food security. The region is investing heavily in irrigation. Furthermore, a number of sub-action plans have been undertaken to combat desertification. Among this plan is the *Kalahari-Namib Action Plan* that is aimed at achieving sustainable exploitation of natural resources, to stop human-induced land degradation and desertification and improve welfare of the population (Costantinos, 2003).

In the IGAD sub-region desertification control has been one of the bases at the creation of the organisation. Since its inception this issue remained a central objective of the Authority. The IGAD member states are Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan, and Uganda. The Article 13 (g) and (h) of the IGAD identifies desertification as important attempt for the Authority. To this aim, a New Environment and Natural Resources Strategy has been developed and endorsed by

the Ministers of Environment and Natural resources of the sub-region (Costantinos, 2003).

There are other initiatives aimed at mobilising and channelling funding programmes to combat desertification. In June 2007, the Global Environmental Facilities approved US$ 150 million funding for the Strategic Investment Programme for Sustainable Land Management for sub-Saharan Africa (ECA, 2007:36). The programme aimed to restore soil fertility, help boost food security, increase farm incomes, maintain ecosystem services, and engage local communities in better managing their lands. The beneficiary countries are Benin, Botswana, Burkina Faso, Burundi, Comoros, Central African Republic, Democratic Republic of Congo, Eritrea, Ethiopia, Gambia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Swaziland, Tanzania, Uganda, and Zambia (ECA, 2007:37). In another hand with the support from Norway, the UNEP provided support to Mozambique, Libya, Ethiopia, Ghana and Cameroon to develop their national action plans for the environmental initiative on a pilot basis. These pilot programmes are also being operationalised through innovative arrangements initiated under the UNCCD.

The c*hef de files* (a new arrangement initiated by the UNCCD) are development partners that have accepted to act as representatives of the African governments in support of UNCCD implementation. The so called *chef de files* provide leadership within the aid community to enhance support for NAP for a specific country (ECA, 2007:41). Canada was rendering this support to Ghana. Today with its withdrawal from the UNCCD, this gap should be considered further. Norway giving supports to Ethiopia; Italy to Niger; the Netherlands to Burkina Faso and Senegal; France to Chad and Cape Verde; and Germany to Morocco and Tunisia (ECA, 2007:41). Numerous co-operation efforts should be acknowledged, namely with the European Union (EU) and with America. For instance in 2011, African Union project on the Great green wall, was supported by the EU and Food and Agriculture Organization, aiming to address desertification, land degradation and drought in the Sahara and Sahel (Europafrica, 2011). Even though these efforts should not be underestimated, it should be seen behind the rhetoric how effective this funding

helps to tackle the imminent needs on combating desertification.

Remaining challenges

There are internal and external challenges that involve socio-economic dimension to which it can be added the failure of regional organisations to take effective actions.

As for the internal reasons, one can mention the poor co-ordination and collaboration among actors. In that sense, despite the call of the UNCCD to run an effective bottom up approach, rural habitants are being involved in the process only when it comes to work the land or plant trees. Insufficient political will affects the local population. There are also a lack of in-depth understanding and appreciation of drought and desertification issues, especially their links with poverty (Arba Diallo, 2005:158). Poor people are in a need to over exploit land resources in order to survive and the resulting impoverishment of land decrease the potential for subsistence and income creation. To this extent, poverty is both the cause and the consequence of desertification. (Arba Diallo, 2005:158). There is a weak institutional capacity including poor set-ups, lack of legislative support and inadequate human resources. The understanding and appreciation of drought and desertification issues due to inadequate information on drought, desertification and dry lands are also further challenges. The difficulties encountered in accessing and sharing information continues to obstruct environmental activities and progress. The political instability and conflicts faced by some countries in the region breeds conditions such as displacement and concentration of populations followed by destruction of natural resources. This stimulates land degradation and hampers implementation of programmes to reduce poverty and address drought and desertification.

As for the external or independent reasons it can be mentioned that the technology option that empowers communities remains largely inaccessible and unaffordable, particularly to a majority of rural populations and the urban poor. There is also a weak natural resources management policy that justifies the anarchic share of natural resources. Regarding these remaining challenges, it is of interest to see how China and Africa are jointly tackling the issue or what China is doing to assist

Africa in combatting desertification.

Chinese Strategic Assistance in combating desertification in sub-Saharan Africa

The UNCCD calls for international co-operation and partnership arrangement to hand-in-hand tackle the challenging issue of desertification. On this basis, China is lending support in addition to its role on forming strategic partnership with Africa.

As the French proverb states, charity begins at home (*Charité bien ordonnée commence par soi-même*), China is continuously making efforts on the domestic battle against desertification in its most affected areas (Tao, 2001). It has for instance established a committee for the implementation of the convention with its secretariat housed in National Greening Committee (State Forestry Administration). The government has also created the Desertification Monitoring Centre in order to collect macro dynamic information and data in real time (Ci & Yang, nd). This institutional framework is lacking in African countries. Furthermore, the Chinese government has made outstanding achievements over the past several years by means of planting trees, with the *Maowusu* project, A biomass thermoelectric project's in combating desertification in China's Maowusu desert, as one of the successful cases. The project made great efforts in dealing with global climate change, bearing social responsibility and developing green economy, its experiences are worth learning (Wei, 2012). The Chinese government has also tried with the green wall, a 4480 kilometres long belt along the edge of the *Gobi* desert which annually comes four kilometres closer to Beijing (Stenkjaer, 2010). This experience of establishing green walls is being experimented in Africa where it has been announced to build a "Great Green Wall" (*grande muraille verte)*. This belt of trees intends to go through 11 countries across the Sahara through Senegal, Mauritania, Mali, Burkina Faso, Nigeria, Chad, Niger, Sudan, Ethiopia, Eritrea and Djibouti. The African green wall will be 7,000 kilometres long and 15 km wide and is designed to stop spreading the Sahara to the south. The Senegalese government launched the first steps to implement this plan since 2008 starting from Louga, (northern Senegal) (Kané, 2011). It is interesting to follow up the practical evolu-

tion of the green wall to better evaluate its progress. Progress and reporting currently vary from one country to another (Youth Green Team, 2013). The project is already showing some success: a World Food Program (WFP) report from Senegal details how villages in Widou Thiengoli (Region of Louga- Senegal) are now harvesting fresh fruits and vegetables from the dry desert sands, a by-product of the Wall initiative. The process is still in its infancy and will take several years to complete. It requires strong perpetrated political will. What's more, planting trees alone will not stop the Sahara's spread; it should be followed up by an obligation of result from for all concerned countries.

Back to the efforts from China as outlined earlier, the government is making efforts to promote the obligation as requested by the Article 2 and 12 of the Convention. Some events are worth to remember since they are the blueprint of these efforts. In August 1996, Beijing hosted the first Asia-Africa forum on Combating Desertification and mitigating the effects of the Drought. This conference adopted the Beijing framework for Asian- African Cooperation on Combating Desertification. As provided in the objective of the forum, the co-operation should involve capacity building, transfer of technology, know-how, research and development, new attitudes, approaches and understanding. In that direction, China can seriously speed up the transfer of expertise and technology to African countries and boost co -operation in the fight against desertification. This attempt could be strengthened under the framework of the China-Africa Cooperation Forum (Dan, 2011). Among the guiding principles of this conference, it has been outlined that co-operation between Asia and Africa has to be broad and mutually beneficial to be sustainable. Asia should benefit from the co-operation as Africa does. Given the different stages of technological development that countries in the two regions have reached, interests could be diverse. Furthermore, it should not be a donor and recipient relationship. The co-operation between Asia and Africa is claimed to be pursued based on equality and mutual respect guided by the desire to learn from each other. It should also promote a two-way flow of experience. A framework for action has been drawn in that direction. To combat desertification and drought issues, it is required to run activities and actions in the following priority areas:

- Poverty eradication through, *inter-alia*, local area development programmes, including capacity building, promotion of alternative livelihood, and socio-economic development;
- Combating land degradation through, *inter-alia*, soil conservation, water resources management, forest management, afforestation and reforestation activities;
- Knowledge-base, information and monitoring systems through, *inter-alia*, research and development, information processing, and early warning systems

Within the framework of the FOCAC, it should be mentioned that -n November 2006, the Beijing Summit and the Third Ministerial Conference of FOCAC were again held in Beijing and gathered 48 African countries and China. The two sides have decided to promote dialogue and exchanges in environmental protection and co-operation in human resources development. China committed itself to increase year after year the number of environmental protection administrators and experts from Africa to receive training in China (Cheng, 2007). In this last field positive actions are being taken. "China will continue to help African countries combat desertification" according to the Gansu Desert Control Research Institute (GDCRI). The GDCRI is based in northwest China in Gansu Province. This institution trains among others technicians from developing countries in desert-control methods (Cheng, 2007). It organises two training sessions in June and August on how to set up windbreaks and choosing plants for desert control (Cheng, 2007). Still under the framework of the China-Africa Cooperation Forum to Combat Desertification, a Seminar of 21 days training course was held in Beijing on 17 June 2011. This was sponsored by the Ministry of Commerce and the State Forestry Administration Office to Combat Desertification and the International Centre for *Bamboo* and *Rattan* Network. Seventeen domestic academics from related fields, experts, government officials and business leaders from African countries, gathered for that training to combat desertification. In this dynamic and in the frame of sharing technologies and knowledge the Chinese Government and the United Na-

tions International Strategy for Disaster Reduction Secretariat (UNISDR) another conference was organised on 24-27 September 2011 still in Beijing. Participants shared knowledge, scientific approaches and practical methods in drought monitoring, early warning and management of agricultural drought in four areas: national policy and existing mechanisms for drought management and risk reduction; national and regional early warning systems; and good practices in reducing the socio-economic impact of drought.

Outstanding issues

The aforementioned efforts should highly be acknowledged but it should not be mere theory followed by little actions. It should indeed be recognised that there is ambitious political joint efforts, but the implementation step is still lagging behind. The resolution of conferences, the earned experience during training should mainly be implemented in Africa for the enactment of plans and programmes that may support Africans to solve their problems. In this attempt the African side would have a great duty to make a sustained follow-up plan in the implementation of programmes.

Due to the gravity of the desertification and the wide field of land being affected, important funds are necessary to sustain the efforts on combating this threatening phenomenon. It is doubtful that China will play a direct role on this point. Indeed, the fund that the country is able to invest for its own problem on desertification is said limited and scattered (Tao, 2001:103). In China alone the direct annual loss associated with desertification reaches US$ 42 billion (Tal & Cohen, 2007:164). In 2006, for instance, it has been identified by the China National Committee for the Implementation of the UNCCD the domestic weakness and challenges that China is encountering to combat desertification. These include, but certainly not limited to, the "fragile ecological condition, poor stability of man-made plant community, poverty in the affected areas, existence of natural and social factors resulting in desertification and the climatic variation that induced droughts". It is true that the challenges ahead are still huge and the task still arduous (UNCCD, 2013:73). Therefore, more serious and adequate international responses are need-

ed. The existing financial management of the UNCCD for instance should be revised for more support to countries experiencing drought and desertification. As recommended in an audit of the financial management of the UNCCD, the secretariat should create a documented fund raising strategy to mitigate the risk of not having financial resources to implement the substantive activities and ensure adequate representation of developing countries in activities of the conference of parties (UNCCD, 2009; UNCCD 2013). Yet most SSA countries are too poor to invest in major projects that may help to combat desertification but exceptional efforts from the African governments themselves and a common political will be helpful. These governments should consider the challenge as being among the top priority and make efforts themselves to solve the issue.

With regard to China-Africa ties, it is deplorable that the transfer of technology from China to Africa is still low. Regarding this matter there is no institutional basis that sustains this co-operation as suggested by the Article 2 of the UNCCD. Beyond training session organized in the ambit of the FOCAC, there is neither scientific basis for decision-making in the fight against desertification nor concrete and sustainable action on the ground. It should be worth noting that both parties identified practical problems and proposed technical solutions that should be implemented within a short time frame.

Conclusion and recommendations

Living in harmony with the land is like living in harmony with a friend. To build this environment-friendly policy, related programmes should be truly and efficiently executed. Any indecision is to banish. It is also worth to bear in mind that nothing less than a transformation of attitudes and behaviour toward the nature would bring the necessary changes. It is remarkable that 18 years after the UNCCD has been adopted, poverty and land degradation continue to expand in significant areas and a large number of people are being more and more affected throughout the world. The main goal is to achieve "zero net land degradation". Despite the on-going efforts, policy-makers and scientists generally agree that land degradation problem needs to be addressed and tackled urgently. In theory, the

UNCCD offer the best response thereof, but in practice, the issue remains questionable as shows the evolution of the threat, the failure of regional organisations and the limited attention given by the countries that are not directly affected. Today it is fair to say that the convention has yet to unfold its potential. As it is the case with any environmental challenge, it is far easier to pass legislations than implementing them. In the poorest nations where destitution is a rule rather than an exception, it will take considerable assistance to bring people to a point where regulation is a realistic alternative (Tal & Cohen, 2007:216). It should be highly considered that SSA countries depend on agriculture, livestock, and natural resources to cover their basic needs. This dependence is unlikely to change in the near future.

The involvement of local populations, mainly farmers, should be encouraged. These people should see an advantage in planting trees and making money out of it. A full implementation of the UNCCD is a primary necessity to secure water and food for the poorest and most vulnerable people. It requires a complete and true international co-operation with serious commitment among nations. The international development assistance should be strengthened at all levels and in diverse forms.

As regard the recommendation for partnership arrangement stated in the UNCCD, could the China-Africa cooperation be seen as a suitable strategy? There can be a mixed response to this issue. Africa should look at China not for coming to solve the problem but for enacting new joint projects in the environmental protection, anti-desertification and sea water desalination. Local and scientific communities offer fundamentally different and yet complementary perspectives that can provide policy-makers with more holistic reliable and pragmatic guidance. China understood this aspect and established a committee for the implementation of the convention creating the Desertification Monitoring Centre in order to collect macro dynamic information and data in real time. This experience should be performed in Africa for more information and public awareness. Also a follow up mechanism should be maintained to assess the progress of national, sub-regional and regional programmes, to evaluate their usefulness and remaining challenges. As for the

Great Green wall of Africa, it is advisable to enact this policy in each country's plan of action. China may also bring its expertise as it already succeeds on the establishment of its green wall with the *Maowusu* project. The mistakes and pitfalls encountered thereof should be among lessons to learn and be avoided in the African attempt of building great green wall.

A sustainable environmental protection requires basic financial support. If desertification is seen as a global challenge, then the international financial institutions should be truly involved. For sustainability, any funding for the implementation of programmes should be followed by an obligation of result. In areas where enforcement mechanisms are weak, the best compliance strategies may not be horizontal but vertical strategies of interaction, interpretation and internationalisation for a realistic "up-down, down-up" approach as suggested in the UNCCD.

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Climate Finance, Africa and China's Role

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Abstract

Financing is one of the most key issues for global climate co-operation. Climate finance as an increasing part of development issues is particularly relevant to Africa as the least developed continent which is most vulnerable to the impact of global climate change. Africa needs sufficient financing to secure a low carbon and sustainable development path as well as adapting to potential damages of climate change. The reality is far from satisfactory, however, in the size, source and distribution of climate finance for Africa. China has become the second largest economy as well as the largest energy consumer and greenhouse gas emitter in the world. It is now a systematically important country in almost every aspect including in tackling climate change, in which Africa has great interest. However, China does not seem ready to lead the world in climate finance except leading by example. It is not willing to give up its position on the principle of common but differentiated responsibilities. It is increasing financial, institutional and intellectual contributions to multi-lateral institutions for climate action, but insists on South-South co-operation as complementary to traditional North-South co-operation (Ministry of Foreign Affairs, 2013).

The more flexible bi-lateral channel is expected to continue to be the main platform that China can contribute to Africa's climate finance through public assis-

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tance as well as trade and investment. China is the largest trade partner of Africa and one of the largest sources of foreign direct investment (FDI) for Africa. The China-Africa relationship has been evolving from a traditional political friendship to a modern style of comprehensive and strategic partnership. With its own domestic economic transformation, China can help promote more sustainable development in Africa.

Introduction

Theoretically speaking, climate finance includes all resources, public and private, provided for mitigation and adaption to climate change in both developed and developing countries. Politically, however, the focus is on the climate finance flowing from the "North" to the "South". This is a reflection of the principle of common but differentiated responsibilities (CBDR), the cornerstone of United Nations Framework Convention on Climate Change (UNFCCC). It is an issue of both efficiency and equity. For efficiency, climate finance flows from north to south can make mitigation occur at places that cost the least. But equity is a more important issue. Developing countries contribute little to but suffer much from historical emissions of others. Climate finance is widely advocated as "entitlement" instead of "aid" (WRI, 2010:21). Major issues concerned could be sketched from the demand and supply sides respectively.

This article is divided into three parts. Part one describes the general theories of climate finance as a context. Part two focuses on the main challenges Africa faces on this issue from the perspectives of demand, supply and Africa's own capacities. Finally, part three explores different approaches that China can contribute to the solution and analyses relevant problems.

Climate Finance in General

Enormous need of climate finance

The demand for climate finance in developing countries is enormous, though esti-

mates differ greatly from US$ 265 billion to US$ 565 billion for mitigation and US$ 30 billion to US$ 100 billion dollars for adaptation per year under a two degree Celsius scenario (World Bank, 2010:257). With regard to the current size of annual climate finance, there is no clear and recognised data. According to the estimate of Organisation for Economic Co-operation and Development (OECD), the total amount of North-South climate finance stands at US$ 70 billion to US$ 120 billion per year during for the period 2009 to 2010, including private investment, (Table 1.2) while the total official development assistance (ODA) by OECD Development Assistance Committee (DAC) at its peak in 2011 stands at less than US$ 150 billion. In the Copenhagen Accord in 2009, developed countries made collective pledges to provide "new and additional" US$ 30 billion of fast start finance for 2010 to 2012 and US$ 100 billion annually by 2020. A new mechanism, Green Climate Fund (GCF), was proposed in Cancun in 2010 and accepted in Durban in 2011 to mobilise a certain share of the above pledges. The major purpose is to mobilise more diversified resources.

Supply side: a sketch of climate finance architecture

The overall landscape of climate finance that developing countries receive is very complicated (Atteridge, Siebert, Klein, Butler & Tella, 2009:4). Public and private sources are channelled through many different and overlapping agencies and systems. From the top-down perspective, they can be simplified as a competitive parallel structure: UNFCCC climate system and the traditional development system, including multi-lateral and bi-lateral. (Table 1.1) According to the UNFCCC, developed countries are obliged to provide "new and additional (N&A)" financial resources for developing countries to meet the costs of preventing and adapting to climate change. The baseline for judging N&A is the traditional ODA, which reflects the dissatisfaction of developing countries on traditional ODA system and their intention to separate climate finance from traditional development finance. The separation efforts largely succeeded in institutions. The financial mechanisms under the UNFCCC, from Global Environment Facility (GEF) to the Adaptation Fund and the recently established GCF, initiated a lot of reforms and innovations

Table 1.1 Climate finance and ODA

Donor-driven ⟶ Recipient-driven

vertical horizontal	Bi-lateral ODA	Multi-lateral ODA	Financial mechanisms under UNFCCC	National funds
ODA in general	Total bi-lateral climate change-related aid by OECD-DAC members reached US$ 21.2 billion per year in 2010 to 2011, representing 16 per cent of total official development assistance (OECD DAC Statistics, updated November 2013)			
Climate funds (mitigation and adaptation)	Fast Start Finance (Japan) International Climate Initiative (Germany) International Climate Fund(UK)	Global Climate Change Alliance (EU)	Global Environment Facility Green Climate Fund	Indonesia Climate Change Trust Fund Bangladesh Climate Change Resilience Fund
Mitigation funds	International Climate and Forest Initiative (Norway) International Forest Carbon Initiative (Australia)	Climate Investment Fund (World Bank, including Clean Technology Fund and Strategic Climate Fund) UN-REDD Program（UNDP） Global Energy Efficiency and Renewable Energy Fund（EU）		Amazon Fund
Adaptation funds		Pilot Program for Climate Resilience (World Bank) Global Fund	Least Developed Countries Fund Special Climate Change Fund Adaptation Fund Strategic Priority on Adaptation	

Source: edited on materials from http://www.climatefundsupdate.org/listing and others. There are overlaps among different sources

in governance structure to give more representation and voice to developing countries (Horstmann & Abeysinghe, 2011; Ballesteros, Nakhooda, Werksman & Hurlburt, 2010:12). It is fair to say that they are pioneers of the whole global economic governance reforms.

It is however technically very difficult, if not impossible, to completely separate climate finance from ODA in sources. Especially where adaptation is a continuum of activities, from those directly responding to the impacts of climate change, such as building a sea wall, to those addressing the underlying drivers of vulnerability, such as education and health, the latter of which is the core of traditional development finance (Persson *et al*, 2009:15-16). UNFCCC actually takes a pragmatic approach and does not exclude other channels, including bi-lateral and multi-lateral development agencies, for developed countries to deliver climate finance ["The developed country parties may also provide financial resources related to the implementation of the Convention through bi-lateral, regional and other multi-lateral channels" (UNFCCC, Article 11.5].

Many developed countries prefer to channel their climate finance through multi-lateral and bi-lateral development agencies as they can keep more controls on the usage of resources. Despite the intensive reforms under the UNFCCC financial mechanisms, more climate finance resources are actually channelled through bi-lateral and multi-lateral development systems. A notable example is that the Climate Investment Fund (CIF) initiated by the G8 Hokkaido Summit in 2008 administered by the World Bank has pledged more than US$ 6 billion, which is larger than the total size of all UNFCCC financial mechanisms. The author believes that with the competition and interaction of the development system and the climate system, the evolving definition of climate finance under the UNFCCC framework is going to seek more integration with, rather than separation from, the development system. The underlining economic situation and the decline of total ODA will bring even more pressure for the two systems to join.

Despite the fact that public climate finance is high on the agenda, private sector investment and carbon marketing from the bottom up is by far the major source of

climate finance (Table 1.2). Some of them are directly leveraged by public policies and resources, such as Clean Development Mechanism (CDM) carbon offset markets, while others are more or less venture capital. Similarly it is very difficult to differentiate between the two, but it is certain that the private sector is increasingly important for climate finance. As a seasoned practitioner from the World Bank said, "a critical goal of the design of any climate finance architecture will be to ensure that scarce public funds are used to leverage and mobilise private finance" (De Nevers, 2011:3).

Table 1.2. Estimates of North-South Climate Finance Flows

Type	Amount
Public Bi-lateral	US$ 15-23 billion
Public Multi-lateral	US$ 14-17 billion
Export Credit	US$ 0.7 billion
Climate Funds	US$ 1-3 billion
CDM Primary Transaction	US$ 2.2-2.3 billion
Private Philanthropy	US$ 0.4 billion
Private Investment	US$ 37-72 billion
Total Amount	US$ 70-120 billion

Source: OECD, Financing Climate Change Action, 5 April 2012

Private and innovative financing is very hotly discussed but very controversial under the current global climate negotiation as a way to narrow the gaps of climate financing needs. While the developed countries are seeking to "privatise" the problem, developing countries including Africa advocate that the annual climate finance of US$ 100 billion committed by developed countries should be from purely public source. Equity is the basic consideration. They strongly argue that developed countries should not evade their responsibilities by privatising prob-

lems. This is not a real issue, however, as private and innovative resources still depend on the leverage of public policies or resources, in which developed countries must play a leading role. Considering the current world economic situation and the efficiency, it is more problematic how private investment could be encouraged rather than whether they are needed. In fact, private sources will not only fill the gap of needs but also increase stability of climate finance.

The other concern is more reasonable: bias of private resources. Private investment is mostly feasible for mitigation activities, while adaptation depends heavily on ODA and grants. This will harm the interests of the most vulnerable countries and populations, including Africa. There must be co-ordinated measures, such as setting quotas, to make sure the adaptation needs of the most vulnerable are satisfied.

Climate Finance Challenges for Africa

Africa's demand for climate finance

Climate change augmented and complicated the challenges for African sustainable development. Africa accounts for 14 per cent of the world population, but contributes only less than four per cent of global greenhouse gas emissions, the least of all regions. However, Africa is most vulnerable to climate change because of poverty (instead of geographic conditions). It is predicted that by 2080 land with severe climate or soil constraints in sub-Saharan Africa (SSA) will increase by 26 million to 61 million hectares, which is nine to 20 percent of the region's arable land (World Bank, 2010:146). Therefore, serious finance is needed for Africa to adapt to climate change and adapt to a low-carbon development path. Again, estimates vary in different sources; one study, as an example, shows that for the period between present and 2030, Africa requires between US$ 510 billion and US$ 675 billion for low-carbon development (UNECA, 2011:32).

International supply for Africa

Due to the lack of comprehensive data, it is not clear how much Africa has received from the northern countries for responding to climate change. But there are

increasing efforts on tracking climate finance and Africa is the natural focus. Several general trends can be identified.

Firstly, the total supply is far from enough for Africa. According to the Climate Funds Update, which monitors close to 30 dedicated multi-lateral and bi-lateral climate funds, a total of US$ 1.73 billion has been approved for 381 projects and programs throughout the region of sub-Saharan Africa, of which US$ 586 million has been disbursed between 2003 and 2013. (Nakhooda *et al*, 2013). These statistics are incomplete, but this does not affect the fact that the current supply is only negligible compared to the demand. The same source shows 15 multi-lateral funds are active in the region. The UNFCCC funds are the major sources for SSA, while the World Bank and African Development Bank also play important roles. Individually, the World Bank's Clean Technology Fund (CTF) is the largest single source that has approved a total of US$ 401 million for five projects. Bi-laterally Germany, the United Kingdom and Norway are among the most active players.

Secondly, the two-level inequality in allocation of resources globally and within Africa has attracted more attention. As Confucius famously said, inequality rather than want is the cause of trouble. At the global level, Africa is generally thought to be marginalised as the climate finance mechanisms have shown a strong bias toward mitigation. It is estimated that the ratio for the amount of financial resources used in mitigation versus adaptation in developing countries is about ten to one (Parker *et al,* 2009:24). Mitigation finance favours big projects in industrial and energy fields in those emerging economies while Africa does not have advantages on them. Africa, SSA especially, is still an under-developed low-carbon society and therefore does not have many mitigation projects. Hydro power is the largest source of electricity generation across SSA. The experience of CDM under the Kyoto Protocol of the UNFCCC has been widely quoted as the example of how Africa has been discriminated against. Africa occupies only about two per cent of CDM projects officially registered (World Bank, 2010:40). The issue of allocative inequality within Africa is also widely noted. So far the Egyptian fertiliser factory, Abu Qir, located on the north coast of Egypt generates more carbon offset credits than the rest of the continent combined, while South Africa has the largest number

of registered projects (19). The rest of SSA hosts just 31 projects, amounting to 0.9 per cent of the total projects globally and just 0.005 per cent of credits issued to date (ISS, 2011). Take CTF administered by the World Bank as another example; South Africa received nearly half of the total US$ 924 million, while the rest went to Morocco and Egypt (Brown *et al,* 2010:10).

This two-level inequality for Africa is not expected to change much in the near future. Some initiatives are thought to be in great favour of Africa's land use sector, for example, to expand CDM to cover carbon storage in the soil integration. However, there is critical view that this will only benefit agribusiness instead of small farmers. What's more, other initiatives will definitely further harm the interest of SSA countries in the carbon offset market, such as the plan to include Carbon Capture and Storage (CCS) in the CDM. It is predicted that by 2020 Africa would get less than four per cent of CDM credits, though Nigeria could replace Egypt to be the largest beneficiary (ISS, 2011).

But not all are negative news. Adaptation has been gaining attention since late 1990s. Between 2004 and 2011, US$ 328 million has been approved for 75 adaptation projects in Africa, while US$ 132 billion has been disbursed to date, which represents about 30 per cent of finance disbursed for adaptation globally through dedicated climate financing instruments (Nakhooda *et al*, 2011). Some special funds favour Africa, such as the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF) under GEF.

There is still concern on the adaptation finance side in Africa. Owing to the obscure line between climate and traditional development finance, in the context of tightening budget limits and the huge finance gap between demand and supply, changing priorities of contributors in favour of climate resilience could benefit the water-related sectors and regions like the Middle-East, Asia and Latin America, but on the other hand reduce the proportion of development assistance resources sub-Saharan Africa countries will receive in health, education and so on (Brown, *et. al*. 2010). Fortunately, we hope to see improvement on this aspect as DAC is discussing "mainstreaming" climate considerations into all development activities

(Bird, 2013).

Lack of absorptive capacity of Africa

Many studies point to the lack of absorptive capacity within Africa as one factor, being as important as the shortages of international institutions, leading to Africa's disadvantage. As a recent study by the United Nations argues:

"While there are governance constraints at the global level, African countries need to work [...] towards stimulating effective domestic demand for climate adaptation and mitigation funds and improving the absorptive capacity of African countries to effectively deploy climate funds. African countries should also put in place appropriate legal and institutional frameworks that would attract private (international and local) finance into climate change activities" (Bird, 2013:10).

During 1980 to 2009, US$ 1.22 trillion to US$ 1.35 trillion illegally flowed out of Africa and 70 per cent of this total was from SSA (African Development Bank and Global Financial Integrity, 2013). This huge amount of money could have been used for Africa's own development much more effectively. As mentioned above, the UNFCCC is pioneering governance reform in climate finance mechanisms. One of the most significant achievements is the "Direct Access" to the Adaptation Fund and the new Green Climate Fund (Horstmann, *et al*, 2011; Ballesteros, *et al*, 2012:12). Africa is one of the active advocates and drivers of the reform, which shows the increasing influence of Africa in global climate and economic systems. There is reasonable concern that lack of institutional capacity domestically could be an obstacle for this new mechanism to be implemented.

The increasing fragmentation and complexity of international development and climate finance architecture is another factor that challenges the institutional capacity of African countries. On average, each recipient country needs to deal with 30 donor agencies, each with its own procedures (Adugna *et al*, 2009). In the first decade of the 21 century, the environment has become another area, following the health sector, where vertical funds proliferate, reflecting the rising concern on climate change (Castro *et al*, 2011). There are now several dozens of climate funds

already. This poses significant challenges for African countries to manage these different channels. It is difficult to get change the incentive for countries to set up new funds. Strengthening country-level co-ordination is what African countries need to consider, but this is a very profound issue. Institutional capacity and governance is actually only a small part of the whole story. Imporving the investment environment and stimulating the demands is the more structural and difficult part.

China's Role

Bi-lateral development co-operation frameworks is and will remain major channels for China-Africa climate co-operation, nonetheless, external pressure and internal drive will lead China to embrace multilateralism more strongly, including multi-lateral development banks and the UNFCCC. What China can provide for Africa in climate finance is far beyond capital and include more equitable and fair governance structures and knowledge sharing.

Bi-lateral development framework

Assessment of the size of China's aid has been controversial due to the lack of common definition and methodologies. Western scholars' estimate that China's annual aid budget ranges between US$ 1.5 billion and US$ 25 billion, with the upper estimate ranking second only to US (Walz & Ramachandran, 2011). In fact however, much of this "aid" belongs to investments implemented by state-owned entities instead of "aid" as defined by OECD. According to China's official data, China's total aid to developing countries by the end of 2009 amounted to RMB Yuan 256 billion (US$ 41 billion), RMB Yuan 170 billion (US$ 27 billion) of which was provided in the last ten years (US$ 2.7 billion) (State Council Information Office of the PRC, 2011).

It is not very clear how much of China's aid went to Africa. Bloomberg reported that China was to surpass the World Bank as the "top lender" to Africa by 3 November 2006. Chinese official data indicates nearly half of China's aid went to Africa in 2009 (State Council Information Office of the PRC, 2011). The China-Africa Development Fund ("CAD Fund") under China Development Bank, the

only Chinese fund specializing in investment in Africa launched on 26 June 2007, had delivered US$ 1 billion by 2011 and is starting to deliver its 2nd term pledge of US$ two billion, which all-together is expected to leverage more than US$ 8 billion investment of Chinese enterprises in Africa and increase nearly US$ 2 billion of local exports (China Development Bank, 2011:56).

It is even less clear how much exactly China has financed climate friendly activities in Africa. Compared to traditional donors, China is only a late-comer in providing special climate finance for Africa, but China's aid to Africa did cover renewable energy for a long period. In the 1980s, China transferred its biogas and small hydropower technology to many developing countries, including many African countries, through UN or bi-laterally means. China also provided training to many African countries in development and use of renewables such as bio-gas, solar power, small hydropower stations, as well as forestry management, and desertification treatment and prevention. In the future, China-Africa co-operation on renewable energy is expected to expand from bio-gas, small hydropower stations to solar and wind power.

Coping with climate change has been clearly declared as a new concern in China's foreign aid and Africa was the first targeted region (State Council Information Office of the PRC, 2011). Prime Minister Wen Jiabao declared 8 new measures to promote China-Africa co-operation at the 4th China-Africa Forum in Egypt on November 8, 2009, the first of which was to establish China-Africa Partnership in Coping with Climate Change, through which China pledged to establish 100 clean energy projects for Africa before 2012, though no accurate amount was given. This is set to leverage more Chinese investment into clean and renewable energy development in Africa, which would mean a shift away from the traditional focus on mining oil and gas. China also committed to invest US$ 100 million in developing solar energy projects for 40 African countries, for example, installing solar panels on the roofs of schools and hospitals (Energy and Environment能源与环境, 2012). This is expected to be mutually beneficial: improving Africa's energy sustainability and diversifying Chinese exports of solar panels.

China-Africa Climate Partnership is still at its earliest stage and a lot could be done in the future. It should continue to support mitigation activities like renewable and clean energy, since it is the competitive advantage of China. Clean coal co-operation should be given more attention considering the important role coal will continue to play in both China and Africa. On the other hand, China-Africa Climate Partnership could consider expanding co-operation to more comprehensive adaptation activities in the least developed areas. Furthermore, more co-ordination with other sources of climate or development funds at the country level is also one issue that needs to be considered.

Multi-lateral frameworks: Development banks and UNFCCC

China should embrace more multilateralism in dealing with Africa for sustainable development as multilateralism usually represents more transparency, norms and legitimacy that are critical to calm down western criticism about China's presence in Africa. Both multi-lateral development banks and the UNFCCC belong to multilateralism, but they differ from each other in values, institutions and policies as analysed in session one. However, the role that China can play in increasing Africa's interests in these two platforms is similar. There are at least two important dimensions: sources and governance.

Firstly, China could increase the supply of the global public resource pool, but it will take some time before systematic issues are solved. Changing capacity of China in the world development system not only raises the level of the global public resource pool but also reduces the demand for competition Africa faces. In the World Bank, China is upgrading itself from a pure recipient to a new contributor to the International Development Association (IDA). China committed to donate US$ 300 million in cash in the recently finished 17th replenishment of IDA, doubling from the last round. The total amount of this replenishment has been announced to be US$ 52 billion, while the detailed composition of donors is to be published in April 2014 because of the needs of internal approval. This will be an important way that China contributes to Africa's climate change action through multi-lateral channels. There are two reasons: firstly, IDA is going to focus on

Africa as many low-income countries in Asia and Latin America upgrade into middle-income countries (Bosco, 2012). Secondly, donors are calling for IDA to increase attention on climate change in its future activities so as to promote more sustainable development (World Bank, 2013). "This IDA replenishment will see an increased focus on the most challenging frontier areas, greater private sector mobilization, and stronger, more targeted investments in climate change and gender equality, as key to shaping the future. A strong commitment to more equitable growth underpins these efforts" (World Bank, 2013).

In the emerging GCF system under the UNFCCC, though as a developing country, China clearly declared giving up claims on it at Copenhagen in 2009. Actually there is high expectation that China should contribute resources to it. However, China is willing but very hesitant to donate to GCF, as it is concerned that this will be understood as giving up its position as a developing country. For China, maintaining the principle of CBDR is the top priority in global climate negotiations. Therefore, a clearer and "just" definition of CBDR will be necessary to persuade China to play a more constructive role in GCF. In addition, China could urge the developed countries to divide their collective pledge at Copenhagen, that is, an annual US$ 100 billion of climate finance by 2020, integrate them into the future measure, report and verification (MRV) system. If this can be done, it would mean the legalisation of climate aid obligations and a breakthrough compared to the traditional development system based on declaratory documents only without legal forces, for example, the Millennium Development Goal (MDG) pledges.

Secondly but not least, China could help protect African interests by enhancing the diversity of the governance structures in the development and climate finance institutions. In the global economic system, China still belongs to the disadvantaged side and is seeking improvement, if not "revolution", of it these institutions. However, global power shift is indeed unfolding from the bottom market level to the governance level. The governance issue has two dimensions: formal and informal power structure. Actually, under the background that almost all major international economic organizations are seeing a power shift from advanced to emerging and developing countries in formal organizational structures, development and climate

finance mechanisms are pioneers in this trend. GEF realised parity of voting rights between developed and developing countries 20 years ago while more recently GCF was again declared a victory of developing countries. The concept of "new world order" is reviving. Similarly Africa is gaining more representation and guarantee in various global economic, development and climate governance structures like the IMF, World Bank, GCF and G20.

However, there is an informal dimension of the source of power based on capital contributions under the control of domestic authorities. The most prominent cases are IDA and GEF, in which the United States Congress effectively imposed conditions on the operation of the funds through its approving power in the replenishment process and invalidated the formal governance structure. This has been widely criticised and must be solved in the future. Diversity is the solution and can be done by firstly looking at the public resource side. Emerging economies like China could provide new official sources for GCF in the long run, reduce the dominance of the largest shareholders and increase the predictability of the funds. China could also promote independence of the funds from domestic authorities.

For its own interest as a developing country, China has real incentives to safeguard the interests of African countries when participating in global economic and climate governance. In GCF, a lot could be done for Africa by China. The first step is still to urge the MRV for the collective pledge of developed countries on climate finance. The second step is to relieve the negative effects of private involvement, which is to say China could support setting quotas for African countries, especially the least developed ones, for adaptation activities in the allocation and use of funds. Thirdly, China could bring different thoughts on how the money should be used. China, India, Brazil and other developing country members played a high-profile role in helping South Africa win the approval of the World Bank Executive Board for the Eskom program, but this is very controversial and involves how to balance climate and development, short and long term interests.

BRICS is becoming a new forum for China-South Africa co-operation and energy is now a new focus. The proposed BRICS Development Bank is targeted at the

South-South co-operation beyond BRICS and is worth more exploration (BRICS, 2012).

Trade and investment

In the last couple of years, China has played a very important role in promoting private investment in climate funding. This is a very positive development since private investment rather than ODA is the most important assets for Africa. Actually it is fair to argue that China has a more important role to play further here rather than providing official climate aid. Through its firm determination and strong policy measures to promote energy transformation, China is leading the global renewable energy investments. This has spill over effects and indirectly encourages similar investment in Africa. According to BNEF, with nearly US$ 50 billion invested in 2010, China was by far the largest source of, and destination for, clean energy investment globally. Very notably Africa has become the new highlight in renewable energy investment. It registered a five-fold increase to US$ 3.6 billion, the fastest of all developing regions, in renewable energy investment in 2010 (UNEP and Bloomberg New Energy Finance, 2011:13). The total size however, was still small compared to other regions. Investment is also concentrated in a limited number of countries such as Egypt and Kenya (UNEP and Bloomberg New Energy Finance, 2011:22).

China and Africa can also further their co-operation in pushing their domestic energy policy reforms. China plans to establish a national cap-and-trade system for greenhouse gases by the end of 12th Five Year Plan period (2011-15). It is not excluded that the system could develop well and accepts offsets from Africa in ten years or so, similar to what Europe's Emission Trading System has done.

However, it is not time to say that this investment will be a sustainable one. There is serious concern as to whether this momentum can be sustained in China, Africa and the world. The boom of shale gas and other unconventional oil and gas exploration in America could reverse this trend in global renewable energy investment trends and increase difficulties of mobilising resources for climate. The unexpected success of shale gas development in the United States of America has been

encouraging major energy consumers in Europe and Asia to explore their own opportunities. IEA says natural gas will increase its share of the global energy mix at an annual rate of 2.4 per cent between 2012 and 2018, which is slower than previously projected but still a sign of a "Golden Age" (IEA, 2013). This could reduce CO_2 emissions by promoting substitution of gas for coal in electricity generation but, on the other hand, would also slow down the process of introducing renewable energy.

Future trends

Previous sessions indicate that China is not a major and active player in providing climate finance for other developing countries both globally and in Africa. However, this situation is gradually changing. Two major factors are working together in favour of an increasing role of China in this area.

First and foremost is the dynamics of global climate negotiations. The current global climate architecture, UNFCCC and its Kyoto Protocol, is primarily a set of rules based on the principle of CBDR between developed and developing countries, in which the former is obliged to provide financial support for the later. China and Africa belong to the same group of developing countries. Therefore, China is not morally or legally obliged to provide climate finance for Africa and other developing countries. However, this single dichotomy is thought to not be applicable any longer as developing countries are being divided into different echelons. Those so-called emerging powers represented by BRICS are thought to have larger capacities than other developing and poorer countries. The more fundamental and structural change is that the emerging powers are also emerging emission powers and could replace the so-called developed countries to be the major sources of greenhouse emissions in future. To some extent, their emissions rise even faster than their contribution to global GDP. The post-2012 climate system should be based on both the level of emissions and capacities. After a hard bargaining process, the CBDR principle, if not (fortunately) disappearing, is set to be redefined as against the interests of emerging powers. Considering its total size, China will be the first candidate to change from the "Right" side to the "Obligation" side,

though it is still a relatively poor country in terms of per capita GDP compared to many other developing countries (poorer than South Africa and 2nd poorest in BRICS).

Second is the evolution of China's development and foreign policy. If the first point stresses the external pressure China faces, this point looks at its internal incentives in a broader sense in the development and foreign policy that work in favour of Africa. As mentioned above, climate finance is fundamentally a development issue though it seeks to break away from ODA system. China's changing role in providing climate finance for Africa must be understood in the evolution of China's development policy and the overall framework of development co-operation between China and the African continent. Ideologically and historically, China is not willing to be seen as an "emerging donor", as it used to be colonised by western countries. Politically, China considers the global development system as an unfair and inequitable one. Economically, China realises the development challenges it still faces domestically and prefers to define its relationship with Africa as mutually beneficial economic integration and South-South co-operation instead of providing aid.

However, as a big emerging economy, China has to think and behave more globally, earlier than others, before it becomes a fully-fledged developed state. Facing the increasingly fierce strategic competition from traditional powers as well as other emerging economies, China has real incentives to do more for the interests of Africa. The underlining fundamental rule is that a multi-polar world is better for Africa. Chinese development policy could become more like a traditional donor, such as providing more grants instead of loans. On the other hand, global governance systems are being reformed to be more representative, such as in the G20 and the World Bank, which also gives more incentives for China to engage more with the global system. China should also seek more prevention and protection through engaging in more multilateralism in its foreign policy, which is in the interest of Africa and the global system.

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Cultural heritage resources as environmental sustainability enablers within the Sino-Africa environmental partnership: the case of Botswana

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Abstract

Opportunities for China-Africa environmental collaboration have always existed but the gap lies in establishing forms of partnerships that cover a wide spectrum of stakeholders and resources. This paper discusses opportunities that aim at value-add in environmental sustainability initiatives through the use of cultural and heritage resources within the China-Botswana partnership. Both Botswana and China have different strengths that are complementary when it comes to environmental conservation. China has a diversified pool of cultural and heritage resources, as well as a traceable cultural philosophy but lacks rigorous conservation strategies including those aimed at grassroots levels. Botswana's strength on the other hand lies in rigorous internationally accredited natural resources conservation policies which nonetheless lack conscious incorporation of cultural resources. The China-Botswana partnerships therefore provide an opportunity to explore cultural heritage resources as key components of environmental conservation and local economic development.

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Introduction

China-Africa relations are gradually gaining ground, with various sectors in both countries searching for avenues of collaboration. Environmental conservation is one area where the Sino-Africa relations feature promptly with several opportunities yet to be discovered, explored, and initiated. This paper discusses opportunities that allow for value-add within environmental sustainability initiative. Almost three decades since the formulation of sustainable development principles (WCED 1987), co-operation on environmental conservation by various state parties is still largely centred on environmental sustainability as a consequence of managing only those resources that are considered of "natural" value at the passive mention of cultural and heritage resources. This point of departure compromises environmental sustainability efforts as they remain devoid of cultural and heritage resources which would enrich existing and popular indicators coined for natural resources conservation. Cultural values are ubiquitous in inhabited geographic spaces of the world.

For both Africa and China, while focusing on a generic natural environment was acceptable two decades ago as a point of departure, the failure to co-opt other conservation indicators such as those emanating from cultural and heritage resources existent in the historic environment has left a loophole, particularly where involvement of people other than government officials and international experts are concerned. This omission continues to make environmental conservation efforts vulnerable at rural, remote, and most pristine areas of the world where grassroots communities are the main custodians at the disposal of the natural environment and hence readily available to monitor the situation. The rural levels of Botswana and China contain cultural and heritage resources in abundance therefore it is here where grassroots communities- who are time-immemorial custodians of the resources- can be motivated to translate their understanding and regard for cultural and heritage resources into conservation strategies for the overall environment. To achieve this mandate, the following processes are necessary:

- Identify procedures and processes through which cultural and heritage aspects of the environment can be recognised, acknowledged, and fully incorporated within sustainability initiatives.
- Identify and implement consumption and production indicators of cultural and heritage resources that will supplement those of natural resources.
- Use cultural heritage indicators to nurture sustainable communities – those that are in touch with their environment emotionally, psychologically and economically.
- Facilitate opportunities such as the Sino-Africa collaboration in a way that they become learning platforms for achieving sustainability initiatives.

Communities that are educated on comparative advantage provided by heritage resources within their respective geographical location, and the possible economic gains that follow as a result of conservation of relics, monuments, sites, and landscapes are likely to value the heritage first for the worth of their individual/communal identity (*heritage for heritage's sake*) nurturing a network of individual/communal and country identities together in a way that strengthens the relationship between the urban-rural, centre-periphery.

In order to safeguard cultural resources through community participation, governments often enforce return of discovered material objects to the central government, at times with an offer for a reward as is the norm in China. This approach can in certain instances influence local communities to become indifferent to conservation of cultural heritage as it does not allow the individual/community to connect emotionally and psychologically with the resources. A community-based cultural heritage model provide a potential to find/identify and celebrate cultural material at the level where it has to first bring value as a matter of precedence before that same value is catapulted to the regional and national levels.

Establishing opportunities

The passive mention of cultural heritage resources in sustainable development initiatives has with time only served to compromise the process of achieving sustainable use of both natural and cultural resources because in rural areas of developing countries, cultural factors emanating from heritage resources are key in devising coherent local land use planning (places of historical value, sacred spaces and so forth); influencing people's attitudes to the environment; and recently, in redefining rural economic systems (for example the boom in heritage tourism). Rural areas of countries such as Botswana and China therefore provide an untapped potential to juxtapose cultural heritage resources with wilderness and wildlife resources' to enhance sustainable utilisation of rural environments. Communities resident around wilderness and wildlife landscapes are custodians of these resources who are also endowed with knowledge and skills relating to both tangible and intangible cultural heritage resources (cf. UNESCO 1972; 2003) that when recognised and tapped can influence the attitudes of these communities and behaviour towards the environment. Rural communities therefore provide readily available personnel to be inducted on "modern management" methods.

In most developing countries, a more prevalent focus on cultural heritage and sustainable development link has been placed on urban spaces or cities (or rather, rural landscapes that have with time been urbanised), while in developing countries and emerging economies such as Botswana and China cultural heritage resources are mostly found in rural areas where an untapped opportunity to engage grassroots communities is readily available, and where opportunities for education on natural resource conservation remain open. A much needed geographical diversification of economic engagement is provided by a focus on cultural heritage whose most authentic components are located in rural areas. For a Sino-Africa partnership in environmental sustainability, it is pertinent to first of all recognise that there is a growing interest in community indigenous tourism using cultural heritage resources and as such, a re-assessment of conservation philosophies involving the addition of new conservation indicators specific to cultural and heritage resources.

In particular, China has the strength in terms of cultural and heritage products as well the Chinese philosophical heritage embedded within a history that runs from ancient period (371–233 BC) - mythological time of culture heroes known as the sage kings; the medieval period (179BC-798 AD); modern period (1017-1777 and the contemporary period (1858-1968) with the Communism years (1949-) and the Republic. In terms of conservation, China's philosophical heritage can guide the refining of conservation strategies. For instance, Chairman Mao's philosophical principle on continuation of culture is to look at the Marxist –Leninists' approach dividing between the quintessence and dregs of heritage whereby the quintessence "is that part of the heritage that is democratic, scientific, and for the masses.", and the dregs is defined as "what is anti-democratic, anti-scientific, and anti-people or aristocratic" (Chan 1963:781).

Botswana on the other hand, as evidenced by its environmental policies outlined in Table 03 below, is devoid of any traceable philosophical direction relating to cultural heritage management although it has cultural activities that can be interpreted as traditional management of cultural heritage, particularly that of an intangible nature. The country largely depends on international conventions to "manage" both its natural and cultural heritage and as such has national conservation policies that are highly favourable to the environment. Experiences of the two countries can be merged to inform new approaches to cultural resource management.

In addition, initiatives that exist in already popular conservation models such as the eco-tourism model (cf. Drum and Moore, 2002) can provide guidance, although it is similarly important to caution that ecotourism principles need to be modified as they are not tailor-made to be compatible with cultural heritage resources conservation (cf. Keitumetse 2009).

Adding new products requires new approaches. A cultural heritage specific community-based a conservation model named community-based cultural heritage resources management model (COBACHREM) has been outlined in earlier publications as a point of departure (Keitumetse 2013). The need for this model is compounded by the fact that modern managers of heritage sites (both national and in-

ternational) are involved in a growing trend where natural resource conservation approaches are automatically "adapted" into cultural and heritage resources, a process that ends up with cultural and heritage resources not adding value to conservation of natural resources. It is necessary to *adopt* some ideals from natural resources conservation models but *not adapt* these into management of cultural and heritage resources within the Sino-African partnerships.

International legislation on environmental conservation: Botswana and China

At an international policy level, mainstreaming cultural and heritage resources into sustainable development ideals will inform the Rio+20 debates, in particular agenda 21 chapter 26 of the sustainable development framework beyond a narrow definition of "communities" to a much broader and holistic definition that encompasses all people that have a relationship with their environment.

In identifying indicators that are specific to cultural and heritage resources it is necessary to not compare apples with oranges. It is equally important that the anticipated Sino-Africa environmental partnership identify a common point of departure to ease implementation at the national level. Already existing international conventions on environment and cultural heritage ratified (Table 01), ratified by both countries provide a point of departure in this regard. A majority of the states/ countries sign international conventions after a thorough legal assessment on how compatible these are with the specific country's internal laws and national systems. Viewed in this manner, international conventions constitute common concepts that harmonise various countries' approach to resource conservation, thus providing a template for collaboration that is compatible for both regions. The purpose of international conventions such as those in T*able 01* below is well captured by Gruber (2007: 263) when discussing the world heritage and its associated benefits in asserting that "The duty of State Parties to protect their heritage properties does not completely depend on inclusion in the World Heritage List, but comes from the duty to identify a nation's heritage", because countries are charged with developing implementation strategies that resonate with their national levels, hence models such as COBACHREM are significant in this regard.

National legislation on environmental conservation: China and Botswana

In addition to international legislation, both China and Botswana have national policies covering natural and cultural resource conservation. A selection of key laws governing conservation of resources within the two countries is outlined in this section.

Table 01: Select international conventions guiding both natural and cultural resources conservation in Botswana and China

International conventions on resources conservation/preservation	Country's # sites on World Heritage List	
	CN	BW
1972 UNESCO Convention for the Protection of the world's cultural and natural heritage	***43***	***01***
2003 UNESCO convention for the safeguarding of Intangible Cultural Heritage	***36***	***00***
1971 Convention on Wetlands (Ramsar, Iran), hence Ramsar Convention,	***41*** sites (3, 709, 853 hectares)	***01*** site (5, 537, 400 hectares

China

Literature on China's environmental issues illustrates that the majority of public outcry against environmental degradation derives from the public's "sense of injustice over the sacrifice of environmental and human health in the name of economic developmen" (Moore and Warren 206: 03), illustrating a reactive, rather than a proactive response to environmental concerns. In addition, the statement also points to an unbalanced placement of value on economics, at the expense of conservation, a common characteristic also in Botswana, though the scale of destruction varies due to

volume and significance in each country. However, with 41 sites on the world heritage list (UNESCO 1972); 36 sites on the Intangible Heritage list (UNESCO 2003); and 43 sites on the Ramsar convention list (Ramsar 1971), it is fair to expect China to lead initiatives on sustainable management of cultural and heritage resources conservation.

The law on protection of cultural relics (2002) in China is premised on the concept that inherited historical and cultural legacy can enable the Chinese government to build "a socialist society with cultural, ideological and material progress" (Chapter I, article. 01). Implementation strategies that could translate such a mission to practical resources management tools are more likely than not, to require grassroots community involvement because it is at grassroots level where the Chinese society's cultural assets are located. However, like most national policies and legal instruments, the law focuses primarily on punitive measures towards destructions rather than on identifying and outlining participatory approaches towards cultural conservation (example, ref chapter. V, art. 50-59). The same can be said of Botswana. At a country level, the National Bureau of Statistics of China 2011 report states that:

"*At the end of 2010, there were 2, 515 art-performing groups, 2, 141 museums, ...3, 258 culture centres*" (National Bureau of Statistics of China 2008: online).

However, issues of looting, illicit trading and illegal excavations are reported to be rampant in China, at most times perpetuated by communities that are local to the areas where cultural heritage resources are located. A case in point is that outlined by Gruber (2008: 294-295) in 1998 in Qixing Town in Xiangxiang city where a receding flood exposed "possibly the largest kiln site ever discovered in China" which was later looted by communities in the area.

Nonetheless China continues to encourage local communities' to participate in conservation of resources through measures such as education on the laws protecting the cultural relics; returning discovered relics to the state with a possible reward system to those that turn the items back. Adding more grassroots initiatives

such as those contained within a community-based cultural heritage resources management (COBACHREM) framework may curb destruction as communities become less indifferent to cultural material which they themselves can use in their geographical locations both as symbols of identity and as economic assets.

Botswana

As already stated and outlined, Botswana's conservation policies are mainly biased towards natural resources and this poses a risk as these strategies are current-

Table 02:China's existing legal frameworks for natural and cultural resources conservation under State Environmental Protection Administration (SEPA) and State Administration for Cultural Heritage (SACH)

Legal Instrument	Yr.	Community Participation Enablers	Forms of community participation Translation ©Moore and Warren (2006)
1) Environmental Impact Assessment Law [EIA Law]	2003	2006 Provisional Measures for Public Participation in Environmental Impact Assessment [EIA Implementing Law]	- Surveys (*diaocha*) - Solicitation and collection of expert opinion (*zhengquyijian*)
2) Administrative License Law [ALL]	2004	2004 Environmental Protection Administrative Licensing Hearings Provisional Measures [*ALL Implementing Measures*]	- Public hearings (*gongzhongtingzhongnui*) - Intergovernmental coordination meetings (*xietiaohui*) - Advance briefings (*chuifenghui*)
3) Law of the People's Republic of China on Protection of cultural Relics (Order of the President No. 76)	2002	- Chapter I, Article 01 and 02 (cultural material and society) - Chapter. V (on cultural relics in People's collection)	- Inheritance of historical and cultural legacy - "…material objects reflecting the social system, social production or the life of various nationalities in different historical periods.

Table 03: Botswana's key existing legal frameworks for natural and cultural resources conservation under the Ministry of Environment, Wildlife and Tourism (MEWT)

	Legal instrument	Yr.	Existing Community participation enablers
1	Botswana Ecotourism Best Practices Manual	2009	Identified ecotourism guidelines and criteria that later contributed to the development of Botswana Eco-certification programme. Funded by the Commonwealth Secretariat.
2	Community Based Natural Resources Management Policy (CBNRM)	2007	Guides community conservation of natural resources in tourism and regulates the use of natural resources in protected areas
3*	Environmental Impact Assessment Act	2005	Guides the conduct of environmental impact assessments that evaluate the effects of planned developmental activities on the environment and determine mitigation measures where necessary
4	Botswana National Ecotourism Strategy	2002	Ensures adherence to ecotourism principles by outlining guiding principles for environmental management The instrument guides the headline content of the Botswana Eco-certification programme, 2009/10.
5*	Monument and Relics Act (re-enactment of the 1970 version)	2001	For protection of heritage environments and resources. Provides for archaeological impact assessment (AIA) as part of EIA
6	National Parks and Game Reserve Regulations	2000	Regulates processes and procedures of activities taking place in protected areas through management plans, building & infrastructure specifications, waste management specifications, and so forth
7	Waste Management Act	1998	Describes activities necessary to ensure environmentally compliant waste disposal regulated by local authorities.
8	Tourism Regulations	1996	Provides processes, procedures, and instruments, for setting up tourism business establishments, and carrying out tourism activities in environmentally sensitive areas.
9	Wildlife Conservation and National Parks Act (*under review*)	1992	Provides for conservation of both wilderness spaces and wildlife species in the country. Provides quotas and permits for use of natural resources, etc.
10	Tourism Policy (*under review*)	1990	Guides tourism strategy for the country – e.g. high value, low volume strategy
11	Herbage Preservation Act	1977	Control and regulation of veldt fires for rangeland management purposes

ly being adapted into cultural and heritage resources during implementation, without assessing compatibility with cultural and heritage resources.

Discussion: collaboration opportunities on cultural heritage resources conservation within the Sino-Africa partnership

Although Botswana and China have not had significant direct collaboration within environmental sectors, there have been some encounters that provide opportunities to learn from one another and benchmark on possible future collaboration. In 2010, the two countries' select natural legislation outlined in tables 02 and 03 above had an opportunity to be compared and discussed at international level within the tourism industry. Botswana and China competed for the World Travel and Tourism (WTTC) Destination Stewardship Award that was won by the former.

The two sites, Huangshan Mountains in China and Okavango Ramsar site in Botswana are presented in brief here to indicate possible areas of collaboration for the two countries. The WTTC website outlines the following about the destination stewardship award:

"*This award goes to a destination - country, region, state, or town - which comprises a network of tourism enterprises and organisations which show dedication to and success in maintaining a programme of sustainable tourism management at the destination level, incorporating social, cultural, environmental and economic benefits as well as multi-stakeholder engagement… Finalists in this category must demonstrate sustainable tourism planning and policies that enhance the natural, historic and cultural assets unique to a destination*" (http://www.wttc.org/tourismfortomorrow/awards/award-categories/destination-stewardship-award/) as outlined in table 04 below.

It would appear from earlier sections of this article that unlike Botswana, China has a lot to offer in terms of cultural heritage landscapes of international value as well as endowed with cultural philosophy spanning years, while Botswana appears to have conservation policies and on-ground strategies that spans a wide network of stakeholders varying from government officials through to community and

business investors in natural resources conservation. The WTTC competition platform provides a starting point for future collaboration between the two countries.

The development of the link between sustainable development and the field of cultural heritage is facilitated from the disciplinary sub-fields that include public archaeology; historical archaeology, intangible heritage, museums, among others.

The main question is: how can the link between environmental sustainability and

Table 04: conservation characteristics of the two competing sites

SITE	Yr. of nomination	WTTC performance indicators for the Destination Stewardship Award © http://www.wttc.org/	Community components of the two sites
Huangshan mountains (yellow mountains)	1990	✓ maximum positive benefits and minimum negative impacts to the environment, ✓ tangible support for the protection of the destination's natural and cultural heritage, ✓ promotion of sense of place and authenticity, ✓ direct economic and social benefits to the host community, ✓ and educating visitors on the sustainable tourism efforts of the destination. ✓ These goals and accomplishments are also communicated widely with media and other stakeholders, in order to promote best practice in the Travel & Tourism industry	- Present: Inclusion of a number of Tibetan villages in the buffer zone. -Tang dynasty (Ad 747): Named Huangshan (Yellow) mountain - Yuan dynasty (1271-1368): temples constructed - Ming dynasty (1606): Fahai Meditation Temple and Wonshu Temple built
Okavango Delta Ramsar Site (ODRS)	1996		-15th Century and earlier: San communities inhabited the landscape -16th Century onwards: Bantu-speaking communities inhabited the landscape. - 18th century to the present: Various ethnic groups and businesses depend on the river system for economic, social, cultural and spiritual substance. Direct interaction with the landscape.

cultural resources be operationalised at community level? Developing conservation models that explore opportunities, and guide use of cultural and heritage at local community level may be the key. A working model coined Community Based Cultural Heritage Resources Management (COBACHREM) aims to build a practical framework that starts by first identifying production and consumption indicators specific only to cultural and heritage resources at a community level on one end, and the at national level on the other extreme to account for variations in cultural affiliation and use.

For instance, China may choose to focus on the pre-war period, post Cultural Revolution period, while Botswana may look at colonial, post-colonial or post-independence, as timeframes of interest. However, at community levels, the heritage in question will determine a point of departure for implementation.

The COBACHREM model is an outcome of experiences accumulated over a decade by the author. The research and experiences were accumulated from continuing work in Botswana's two regions of Okavango Delta in the North and Kgalagadi in the South. Other experiences emanate from consultancy works for institutions such as UNESCO which has cultural heritage data for most countries of the world including China and Botswana.

In addition to new perspective to sustainable development approaches, the relevance of this work lies in its potential to offer comparisons on the application of sustainable development using natural resources versus the application of sustainable development using cultural resources, thus providing opportunities to enhance conservation of the environment as a whole. Having China and Botswana as partners brings experiences that complement one another and offer opportunities to compare and share experiences across countries and continents.

Conclusion

Opportunities for China-Africa environmental collaboration have always existed but the gap lies in establishing forms of partnerships as well as diversifying them from manufacturing to other resources conservation for development in a way that

engages and motivates rural communities to translate their cultural heritage resources to environmental conservation as a whole. This article explored new forms of collaboration involving cultural and heritage resources.

While international organisations provide a general guiding platform for conservation of both natural and cultural resources, individual countries have the responsibility to formulate conservation programs that are specific to their countries' cultural contexts and that are sustainable.

Bi-lateral co-operation between China and Botswana in cultural heritage conservation has the potential to open up avenues through which the two countries' conservation efforts could be improved to benefit the psycho-social and economic well-being of their populations. Although the two countries have different strengths that complement each other, China and Botswana seem to be facing the same challenge of finding a way to incorporate resource conservation at grassroots level. As earlier stated, China has a diversified pool of cultural and heritage resources but lacks organised grassroots conservation strategies. Botswana's strength on the other hand is in natural resource conservation policies which nonetheless lack focused cultural resources conservation approaches in the country's many well reserved national parks. Sino-Africa co-operation could harness the comparative advantage of the two countries and explore opportunities for conservation of cultural and heritage resources and extrapolate those to local economic development.

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Forum: Engaging the environment in the relationship between China and Africa

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The changing world of limits

The path to development follows long held ideas on how to stimulate growth – variations in government control of the economy, variations in tax law, variations on which academic pursuits will stimulate most economic growth. As such there are many examples in history of different ways in which regions or states combined economics and politics to achieve economic growth. It is only in roughly the last 25 years however that the environment more strongly entered into the calculation of growth.

Growing scientific consciousness and understanding of global climate change has significantly increased in the last two decades. The world view of a planet with infinite resources and coping capacity has successfully been challenged. What is by now clearly understood is that the earth's resources and carrying capacity is

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finite and human activities have been and are affecting the global climate systems, especially through the emissions of greenhouse gasses (GHGs) that lead to atmospheric warming. Atmospheric GHG levels at present are at their highest concentration in 800,000 years (Flannery, Hueston & Beale, 2013). Additionally, demographic pressure and pollution reduces habitats for species, resulting in a loss of biodiversity of unprecedented proportions. Policy makers have to engage with this "new" finite world by accepting the limits it places on development. Due to this realisation of "limits", the idea of sustainable development has grown in importance. This growth has to occur in such a way as to preserve the state of the environment for future generations, not only for health or aesthetic reasons but for continued and future development. The importance of sustainable development has also come to the fore in the global discussion on the Millennium Development Goals (MDGs) with some countries propagating the idea of new Sustainable Development Goals for the post-2015 era.

This forum contribution discusses the importance of innovation and conservation as methods of adaption and mitigation in the reaction to climate change. The paper, as such, looks at the field of "environmental research" within political science and asks about the place for environmental research within the China-Africa discussion. In this pursuit we can find trends of interest beyond the halls of politics and policy, moving from the direct impacts to the nuanced and indirect.

China – Africa and the environment

Environmental research often seems to be seen as the younger sibling of mainstream research, with topics that focus on the political and economic dimensions as the older more established siblings. When one approaches China-Africa analysis from an economic or political basis, the importance of this analysis seems evident. Trade relations, resource allocation and labour practices (predominantly economics) interweave with the discussion on trade agreements, global positioning and maintaining coherent internal and foreign policy goals (politics). It is also true that "issues of the environment" are often easily slotted into older areas or as part of the domain of existing global governing. However looking at "the environment"

as only a subtext in the bigger picture of changing global power patterns or as the result of development leaves many gaps and combines too many subtexts to remain fully coherent.

The idea of "the environment" brings to the fore the impression of green activism, anti-pollution drives and recycling. Whilst all of these are important, they are individually too narrow to comprehend the scope that environmental research entails. Considering the environmental aspect means being aware of the history of the global change in the environment (including climate, resources, perceptions, energy) and looking at the various smaller parts that combine to form the relatively new understanding of our world of limits. In some ways, when we say we work in "environmental research" we say that we work as researchers on the *world of limits* – looking at new ways to reduce barriers to growth. Often this has much more to do with enabling continued growth and expansion than limiting it: both progress and sustainability are central.

China's economic growth began to increase exactly at a time that global environmental pressures entered the mainstream public consciousness at the beginning of the 1990s. This fact however seemed to have little impact on China's mode of development as China's economic growth still caused severe environmental damage in China. Many of China's large cities such as Beijing and Shanghai suffer from extreme air pollution with PPM air ratings hundreds of times above levels that are considered safe by the World Health Organisation (PPM, parts per million, refers to the number of tiny pollutants in the air in a given volume and indicates harmful pollution levels). Due to increased costs (health costs for one), the lack of energy efficiency (leading to higher production costs and thus loss of competitiveness) and public pressure amongst others, China's central government has in recent years begun to give more attention to sustainable development and economic greening in China itself (Esterhuyse, 2012). Some effects include: damaging acid rain which affects 1.5 million km^2 of China's land surface (Jiang, Sun & Liu, 2010); outdoor air pollution that causes over 1.2 million premature deaths a year; and life expectancy in Northern China which has been reduced by as much as five and a half years due to pollution (World Bank, 2007). According to the World

Bank "the health costs of air and water pollution in China amount to about 4.3 per cent of its gross domestic product (GDP). By adding the non-health impacts of pollution, which are estimated to be about 1.5 per cent of GDP, the total cost of air and water pollution in China is about 5.8 percent of GDP" (World Bank, 2007). With China's economy growing at around 7 per cent per year that "leaves" very little real growth. These costs have also partially led to China's attempts to reposition itself as a higher value added export orientated economy compared to the current status of a low value added export economy. As part of this process it is expected that China will begin to shift its dirtier factories and industries to other developing areas including to African countries.

In China's global self-depiction it tries to presents as a responsible power. As such the government condemns pollution at home and has pushed for (non-binding) environmental protective criteria for Chinese companies investing abroad. If China wants to play a greater role internationally it cannot shy away from the debate on climate and sustainable development at global meetings such at Rio+20 and other climate negotiations. Globally China is chastised for being the world's largest emitter of greenhouse gasses, however in this it defends itself by siding with the developing world claiming that it is in fact the industrialised nations such as the OECD that caused climate change and that, as a developing country, it cannot be overly laboured with environmental restrictions on its growth. In this argument China and Africa have found solidarity, calling on the "industrialised West" to bear the larger costs for combatting climate change. The world of limits means that countries cannot continue to pollute the world without consequence. North America and Europe developed at extreme environmental costs. Developing countries today cannot develop in the same way, because the earth is already unable to absorb the current human impact. Change will have to happen in the developed and developing parts of the world.

In climate change we talk about the need to react to the global climate changes, with reactions divided into the areas of adaption or mitigation. Adaption is changing the way we do things to be able to cope in a changed world and mitigation is the attempts to limit the scope of change by limiting the drivers of climate change.

Adaption and mitigation as ideas however need substance if they are to materialise. Our argument looks at two possibilities of such substance: conservation and innovation.

In a world of limited resources, we need conservation and innovation – there is a need for new ways of doing things. Conservation, by protecting natural areas and by educating the public and youth on nature, is sustaining the limited natural resources the planet has. Innovation for its part evolves new ways of doing things by providing new, cleaner technologies, and it also changes how we think about development. The following two sections discuss the world of limits within the areas of biodiversity (conservation) and renewable energy (innovation).

Conservation: a focus on biodiversity

Biodiversity is the variability of life in all its forms (Birnie, Boyle & Redgewell, 2009), and conserving biodiversity is essential to sustaining the "living networks and systems that provides health, wealth, food, fuel and the vital services life depend on" (Rands, Adams, Bennun & Butchart, 2010:1298). Globally biodiversity is threatened due to a variety of factors: habitat loss, invasive alien species, overharvesting, pollution, climate change as well as urban and rural development, industry, mining and agriculture. The increasing rate of the depletion and extinction of the world's biodiversity has become an important issue for many involved in the conservation of the world's natural environment – with no country able to achieve the Convention for Biodiversity's (CBD) targets and commitments to slow down the process (UNEP, 2010). This issue has also become important in the topic of China-Africa environmental research as there are a number of areas within the biodiversity conservation topic that has had major impacts in the China-Africa relationship, however, this includes both opportunities and challenges. Some of the challenges include the global increase in illegal wildlife trade for products such as ivory and rhino horn; as well as the increases in the depletion of natural resources such as water and forests for timber products. Opportunities can be found in the need for protected areas, spaces where a variety of species, fauna and flora or wildlife can live in their natural state without disturbance or external threat. This is

an area in conservation where mutual lessons may be learned among the African countries and China.

China, known as one of the "17 mega-diverse" countries in the world, is home to a large percentage of the world's biodiversity (Williams et al. 2001 quoted in Jordan, 2010). Due to rapid economic growth and development, industrialisation as well as a high population growth in recent decades, much of the country's biodiversity has been harmed or threatened (McBeath and McBeath, 2006). Consequently, in China, where conservation areas have only been developed in recent years, the pressure on natural resources and natural habitats of flora and fauna has taken on a significant scale. Similar to China, many African countries has some of the richest biodiversity in the world, also threatened by both natural causes and anthropogenic factors. For this reason, protected areas such as nature reserves, botanical gardens, scenic landscapes, historical areas and national parks have increasingly been established. Although Africa is sparsely populated, one can learn from the experiences of African countries in conservation. For example, in South Africa, one of the most popular tourist destinations and high biodiversity spots is the Table Mountain National Park (TMNP) that is situated within a metropolitan city in the Western Cape. This national park is situated in and around an expanding city, with much of the park bordering urban areas; however, the park has had considerable conservation success because of the regulation and management of the park (Burgess, 2012b). Co-operation between China and African counties in conservation should include protected areas such as national parks and nature reserves as there are many mutual lessons to be learnt regarding the similar threats to biodiversity being faced in the two regions. Protected areas need to be maintained as a network rather than on their own in order to sustain biodiversity thus, many African countries can be used for lessons in biodiversity conservation, including across frontiers.

An important issue area for China-Africa environmental research has been the case of illegal wildlife trade, especially rhino poaching. In South Africa, a record of more than a thousand rhinos were poached in 2013, an increase of more than 50 per cent since 2012 (Hellwig-Bötte, 2014). Some rhino species are moving to-

wards the verge of extinction in some African and Asian regions. There are five rhino species in the world and all five species have been on the endangered and threatened species list of the International Union for Conservation of Nature (IUCN) for many years. Rhino horn have been found to be poached mainly for the Asian markets, particularly Vietnam, China and Thailand, where horn is traded illegally and said to be used in traditional medicine or as a hangover cure (Burgess, 2012a). With increasing wealth in East Asia, rhino horn demand is increasing; Rhino horns can fetch up to US$ 110,000 per kilogram (Ibid, 2012). The rapid economic development experienced by China in recent years has further created new challenges and opportunities for the conservation and sustainable use of wild animals and plants with indirect effects on Africa. From a traditional Chinese perspective, as in many other countries, wild animals are a resource to be exploited, not something to be protected for their intrinsic value. However, as more people are able to afford traditional medicine, mounting pressure on conservation simultaneously leads to greater environmental awareness. The rhino poaching issue could be viewed as a problem not only for African countries and China but also for the global community as this crime cuts across many countries and borders. Rhino poaching has become crucial as a result of the growing need for environmental protection and conservation internationally. Thus, at a recently-held international conference on illegal wildlife trade by the UK government, global leaders agreed to a high level political commitment to take urgent action to tackle illegal wildlife trade (BBC, 2014). Illegal wildlife trade has become a serious criminal industry, with products worth millions of dollars. Combatting this trade is clearly an area for co-operation between African and Asian countries.

Innovation: renewable energy driving a new development path

China's original motivation for promoting green technologies was not part of a discovery of green values or the result of energy needs, but rather as a reaction to the needs of its changing economy. Partially as a result of China's attempt to reposition its economy higher up the value chain, China has invested heavily in the creation of a renewable energy industry. Renewable energy makes economic sense since it uses high end technology, requires skilled labour and gives potential con-

trol over a technology that will probably be the most important energy source in the future. China's aggressive government support of the industry (wind, solar, hydro) has catapulted Chinese RE industries to positions of world leaders in development, manufacturing and sales. As European markets cool due to restrictions imposed by the European Union after fears of Chinese dumping, other markets such as the developing markets of Africa have increased in importance. At the same time many African countries are experiencing severe energy shortages that have limiting effects on their economies. Even some of Africa's largest economies such as Nigeria and South Africa experience power shortages; Eskom, South Africa's state power utility, is applying load-shedding (planned power outages) to limit industrial electricity usage in South Africa for example. The fact that China is a world leader in renewable energy and that many African countries are experiencing energy shortages do provide lucrative areas of possible co-operation between China and (depending on local situations) different African countries.

Renewable energy, as mentioned has vast economic potential for the future. In terms of investment it is expected that a total of 75 per cent of world energy generation in 2050 will be renewable. This means that there is a large market that will need servicing and being at the forefront of RE development will be economically lucrative (Liu & Goldstein, 2013). China has taken the lead in global RE investment. In 2012, out of US$ 269 billion global RE investment, China accounted for US$ 65.1 billion (PEW, 2013. & Flannery, Hueston & Beale, 2013). RE exports allow China to produce higher end products compared to its current main low value added exports. China follows a distinct export lead growth policy and has had much success with its "go-out" policy. By 2005, exports accounted for 36 per cent of China's GDP, this is up from 9 per cent in 1980. RE both allows for economic growth and for nationally sourced energy (Liu & Goldstein, 2013).

The economic importance of RE in China's does not mean that it is not, in addition, important for its energy value. The demand for energy in China continues to increase. China already produced the energy equivalent of 620 million tonnes of coal equivalent in 1978, a figure that rose to 2370 million tonnes of standard coal equivalent by 2007. Largely due to the increase in energy production China saw a

rise in GHG emissions, with emissions for its energy sector increasing from 2.24 billion tonnes of CO_2 in 1990 to 5.65 billion tonnes of CO_2 per year in 2006, 20.2 per cent of the global total. Even in terms of per capita this is a large increase, rising from half the world per capita to equal to the average global per capita (Jiang, Sun & Liu, 2010). Thus although RE was primarily driven by economic interests, its energy value does count in its favour. It must also be understood that greening of an economy is most likely not an act driven by national feelings of environmental consciousness. Increasing the percentage of renewable energy in a country's energy mix can potential reduce the cost of energy, which increases the economic competitiveness of an economy due to higher energy efficiency. Greening therefore does not only sound good, but it also makes economic sense.

In terms of RE in Africa, the continent in general is positioned exceptionally well to benefit from RE. The need for energy in Africa is very large, with the continent in total producing a mere 600 TWh/year at present. In comparison, Africa has around 6000 TWh/year wind power potential and up to 170,000 TWh/year in solar energy potential (IRENA, 2011). Most of Africa's energy production is still reliant on fossil fuels, with coal and natural gas as well as oil accounting for more than 80 per cent of the energy production (EIA, 2014). This exposes African countries to international fluctuations in fossil fuel prices. In addition it is difficult to expand traditional energy infrastructure networks since the costs involved are increased by Africa's terrain. Although 60 per cent of Africans still live in rural areas, these areas often still have relatively low population density, making it less cost effective to expand the power grid to rural areas with increased costs and low returns. Renewable energy in contrast can be installed without grid connection and sources such as solar can provide near instant benefits after installation. China is not Africa's only "hope" for renewable energy growth and Africa is not China's last hope of having a sustainable RE sector. However, there is a case to be made for China-Africa co-operation and it does not have to be a case of "either or". Africa can engage with other international actors and states other than China, yet there is clear potential for China-Africa renewable energy co-operation through the combination of indirect but complimentary China-Africa self-interest (IRENA,

2011; EIA, 2014).

Conclusion

Growing scientific consciousness and understanding of global climate change has significantly increased in the last two decades. The world view of a planet with infinite resources and limitless coping capacity is gone. Human activities have been and are affecting the global ecological systems substantially, especially through the emissions of greenhouse gasses that lead to atmospheric warming and the destruction of biodiversity. The field of environmental research engages with this "new" finite world by accepting the limits it places on development.

Focussing on the environment allows research to understand situations from a different perspective, aiming at creating a holistic understanding of a problem with its own political and economic dimensions. In environmental research, politics (international relations or domestic), as well as economics, receive consideration – as part of the larger picture of sustainability within the *world of limits*. If economics looks at markets and politics looks at (human) institutions and power structures, environmental research looks at the "environmental economy" of the world *economics* and *politics* inhabit. Similar to politics and economics, environmental research adds perspective that allows us to understand what seems to be an increasingly complex world (even if this added complexity is only the result of increased reflection). Economically, the current ways of development are becoming environmentally too expensive, and politically, climate change is substantially adding to future uncertainty and conflict. In preparation for a future that limits the effects and scale of climate change, adaption and mitigation processes are key. Environmental research, conservation, innovation and sustainable development are areas that also contain interesting indirect effects of the China-Africa relationship, beyond the intended which is planned for and mapped out by governments. In a globalised world, conservation and innovation need to be issues for research and need to be fed into international processes, including the interaction between China and Africa.

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