REDD-plus and China's contribution

To cite this article: Li Shuyong *et al* 2014 *IOP Conf. Ser.: Earth Environ. Sci.* **17** 012021

View the article online for updates and enhancements.

REDD-plus and China's contribution

LI Shuyong[1,2], HUANG Mei[1], and LI Shenggong[1]

[1] Key Laboratory of Ecosystem Network Observation and Modelling, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of sciences, Beijing, China

[2] Puyang Meteorological Administration, Puyang, China

Email: lishuyongcn@126.com

Abstract. The United Nations' program Reducing Emissions from Deforestation and forest Degradation (REDD) seeks to reduce emissions resulting from deforestation and forest degradation in developing countries. The program's overarching goal is to curb rising CO_2 levels and combat global climate change, and it focuses in particular on nations in or near the tropics that possess abundant rainforest resources. REDD-plus upgrades the program to include additional emphases on the roles of conservation, sustainable management of forests, and enhancement of forest carbon stocks. China has one of the world's richest forest resources and, through its afforestation and reforestation efforts, also possesses the world's largest reserve of planted forests. Currently, most of China's forests are young and/or mid-aged, and, as a result, China is positioned to make significant contributions to REDD-plus through sustainable forest management that enhanced forest carbon stocks. Though REDD-plus does not represent a comprehensive solution to global climate change, it can help stabilize rising temperatures and buy time for researchers to devise solutions that target the greenhouse effect.

1. Introduction

Climate change, characterized chiefly by rising temperatures, remains the globe's most pressing environmental crisis, and it poses threats to natural ecosystems and human society and ultimately may cause widespread devastation. Rising atmospheric levels of the most abundant greenhouse gas, CO_2, are the primary cause of global warming. Forests currently provide for social and economic needs for wood products, fiber, energy, and other ecosystem services such as tourism, biodiversity, and water conservation. In the future, forests could also play a significant role in the global carbon cycle through photosynthetic CO_2 uptake, CO_2 storage in vegetation and the soil, and respiratory CO_2 emission [1]. As the need to address climate change grows in importance, forests represent one of the key foci of current global climate-change research.

Through their growth, forest ecosystems can act as a carbon sink by removing the accumulated CO_2 from the atmosphere. By contrast, cutting and burning forests, both of which release large quantities of CO_2 into the atmosphere, serve as a carbon source. With the growing demand for wood products and increasing clearing of woodlands for farm use or development, vast of forests continue to disappear—this is especially the case with rain forests and natural forests—and the result is the release of massive amounts of CO_2, into the atmosphere.

Reliance on forests as carbon sinks represents an effective, convenient, and economical way to conquer the greenhouse effect and address climate warming [1-3]. Nevertheless, more and more forests are being destroyed for local development. Estimates suggest that deforestation and forest degradation account for almost 20 percent of total greenhouse gas emissions and exceed emissions from the entire transportation sector [4]. Deforestation for local development and forest conservation for carbon sequestration represent conflicting goals. The Clean Development Mechanism (CDM), as developed by the Kyoto Protocol, and the United Nations' (UN) Reducing Emissions from Deforestation and forest Degradation (REDD) program seek to address the tension created by these conflicting goals [5].

REDD seeks to reduce emissions resulting from deforestation and forest degradation in developing countries, and it focuses in particular on nations in or near the tropics that possess abundant rainforest resources. REDD was launched in 2008 and structured based on the convening role and technical expertise of the Food and Agriculture Organization (FAO) of the UN's Development Programme (UNDP) and the UN Environment Programme (UNEP). REDD's mission is to raise funds to assist developing countries in reducing carbon emissions from deforestation and forest degradation [6].

2. The origin and development of REDD

The Kyoto Protocol was created in 1997, at the Third Conference of the Parties (COP3) of the UN's Framework Convention on Climate Change (UNFCCC). The protocol's chief mission is to address global climate change, and while the protocol asserts that sustainable forest management, forestation, and afforestation can help sequester CO_2 and mitigate climate change, it stops short of recommending specific policies. The policies were omitted mainly because of the complexity of measuring and monitoring CO_2 emissions across diverse forest ecosystems and in response to land-use changes. In 2005, the Coalition for Rainforest Nations was formed to address these policy omissions. Participant nations included Papua New Guinea, Costa Rica, and other nations endowed with significant rainforest resources. These and other nations responded by suggesting that they should be compensated for their actions to conserve forests.

Also in 2005, at the 11th Conference of the Parties (COP11), the Coalition for Rainforest Nations initiated a request to consider "reducing emissions from deforestation" in developing countries. The matter was referred to the Subsidiary Body for Scientific and Technical Advice. This proposal received universal support and led to formation of the Reducing Emissions from Deforestation (RED) program.

At the 2007 Bali UNFCCC meeting (COP13), participants reached an agreement on "the urgent need to take further meaningful action to reduce emissions from deforestation and forest degradation." With addition of an emphasis on forest degradation as well as deforestation, RED became REDD. The deadline for reaching an agreement on the specifics of the short- and medium-term implementation of REDD was set for the 15th Conference of the Parties (COP-15), which was held in Copenhagen in December 2009 [7].

REDD encourages developing countries to reduce deforestation and to receive appropriate compensation for their efforts. Without compensation, these nations would have little financial incentive to halt the rapid pace of deforestation. Much like rewarding a person for giving up harmful habits, compensation for efforts to stop deforestation will encourage compliance among nations that, in the past, may have profiting, if only in the short term, by converting forests to farmland. It is unfair for the countries which have not destroyed forests in the past, even have being hammer at forests conservation.

In addition to its emphasis on reducing emissions from deforestation and forest degradation, REDD mission was expanded to encourage conservation, sustainable forest management, and enhancement of the forests' carbon stocks. With this upgrade, REDD became REDD-plus or REDD+. In this article, the use of the abbreviation REDD will refer to the full scope of REDD-plus.

3. The who, where, and how that define participation in REDD

Governments, nongovernment organizations (NGOs), the private sector, or any combination of these entities can participate in REDD programs. To date, many NGOs, development agencies, research institutes, and international organizations offer help and support to the developing countries that engage in REDD activities. The World Bank's Forest Carbon Partnership Facility (FCPF), the UN-REDD Programme, and Norway's International Climate and Forest Initiative (ICI) are examples of such supportive efforts.

The primary actors in the REDD program, however, are the populations whose livelihoods derive from forests, and REDD cannot succeed without their engagement. Funding remains a key factor in the implementation of the REDD program, and the Norwegian government has funded implementation of REDD programs in several developing countries. Currently, REDD programs are being implementation in Indonesia, Tanzania, Cameroon, Guyana, and Brazil, and a number of corporative and financial lobbies have pushed for, and helped fund REDD's implementation. According to REDD's rules and guidelines, the program can be implemented only in developing countries with forest assets and cannot be used to offset emissions from developed countries [8,9].

In 2009, the Meridian Report proposed a three-phased approach for the implementation of REDD. The three phases are the readiness phase, the frameworks phase, and the implementation phase [10]. This phased approach allows countries to prepare for REDD implementation through capacity building and development of funding portfolios. This approach also gives full consideration to the diverse circumstances among REDD's participating countries and makes it possible for REDD to use fund-based as well as market-based financial resources.

The readiness phase focuses mainly on capacity building and stakeholder engagement as parts of an essential learning process. In the first phase, a country implementing a REDD program creates a national strategy that identifies and addresses the drivers of deforestation that are specific to that country. During the second phase, the participating nation establishes policy frameworks for the implementation of REDD and links these policy measures to the appropriate sectors (e.g., agriculture, industry, energy, development, etc.). In the third phase, REDD activities are fully implemented, and payments to the participant nation are based on performance. Linking REDD to compliance markets at this stage depends on whether or not the UNFCCC process can reach a legally-binding post-2012 climate agreement with binding emissions reductions for Annex 1 countries [11].

Table 1. Some of developing countries implementing REDD and their supports

REDD Implement Country	Area (km^2)	Supporting parties		
		National REDD Plan	FCPF	UN-REDD
Brazil	8,514,877	-	-	-
Cameroon	475,440	-	√	-
Vietnam	331,210	-	√	√
Guyana	214,970	√	√	√
Sri Lanka	65,610	-	-	√
Ecuador	283,561	√	-	√
Mexico	1,972,550	√	√	√
Lao PDR	236,800	-	√	-
Dominican Republic	48442	-	-	-
Peru	1,285,216	-	√	√
Ghana	238,540	-	√	-
Kenya	582,646	-	√	-
Indonesia	1,904,569	√	√	√
Malaysia	329,847	-	-	√
Nepal	147,181	-	√	√
Cambodia	181,035	-	√	√
Tanzania	945,203	-	√	√
Papua New Guinea	462,840	-	√	√

Up to now, most developing countries are engaged in the readiness phase (phase 1) of the REDD process, and many pilot projects are being implemented across the tropical region. Most countries are supported in these readiness activities through multilateral and bilateral funding, while individual pilot projects are sometimes linked to the voluntary carbon market. Table 1 provides details on some of the developing countries that currently engage in implementing REDD [12].

As Table 1 shows, projects and programs supported by National REDD Plan account for only a quarter of total REDD programs. It suggests that the countries currently implementing REDD programs should enhance their own supporting funds to develop well REDD programs.

4. Possible existing problems

REDD is a useful and effective way to curb rising CO_2 concentrations in the atmosphere and, thus, to weaken the greenhouse effect and mitigate and control global warming. REDD projects have been active for several years, but several issues remain in terms of the process by which REDD is implemented.

First, REDD's performance must be measured and verified in terms of the practical effect on reducing CO_2 emissions or in terms of the conservation, sustainable management, and enhancement of forest carbon stocks. This is known as the monitoring, reporting, and verification (MRV) process. To measure the target emission reductions we hope to achieve, we must first establish a reference level and select a reasonable and responsible approach. Unfortunately, to date, we have not established a uniform carbon-measuring system [11].

Second, some essential terms, including leakage, permanence, additionality, and reference levels, have provided a conceptual framework for clarifying some of the methodological challenges of quantifying and verifying the reductions of forest-related emissions. But yet to be resolved is whether such reference levels should take into account projected rates of future deforestation or historic rates of deforestation [13].

Third, some people are concerned that REDD will give rise to corruption, as other projects have, because it involves massive levels of funding. This corruption could compromise the interests and welfare of indigenous peoples and other forest-dependent communities. Meanwhile, others are concerned that REDD will create a carbon market glutted with credits and trigger the collapse of carbon prices. Such an outcome could adversely affect other projects that seek to mitigate climate change, including those that support renewable energy development and carbon-substitution projects.

5. China's forests' contribution to REDD

According to the data produced by China's Seventh Forest Resources Inventory, China's forests comprise 1.95×10^8 hectares. Forests cover 20.6 percent of China's landmass, raking the nation fourth in the world in terms of forest resources. China has achievements considerable gains in increasing its forest coverage, enhancing forest stocks, and improving the quality of its forest land. This has resulted in a significant increase in carbon sequestration and storage, as well expanded wood production and enhanced ecosystem services. China has achieved these gains through years of afforestation and reforestation projects, as well as the conservation efforts implemented as part of six key forestry projects: the Three Norths Shelter Forest System Project, the Grain for Green Project, the Natural Forest Conservation Program, the Wildlife Protection and Nature Reserve Development Program, the Beijing Neighboring Area Sand-control Project, and the Fast-growing and High-yield Plantation Construction Program [14].

Though China has rich and vast forest resources, two-thirds of China's forests are young or mid-aged. This reality, combined with the absence of effective forest-management and silvicultural practices, contributes to poor-quality forest stands marked by low productivity. As a result, the carbon density of China's forests is much lower that that in advanced countries and even falls below the world average [15].

However, in the context of extensive worldwide deforestation that results from the harvest of wood products or clearing of forests to create farmland, China has achieved notable success through its

large-scale afforestation and reforestation projects. To date, however, China has yet to benefit from the REDD program. Nevertheless, China remains committed to contribute to REDD goals by developing its forests and amplifying its forests' carbon stocks. It is worth mentioning that China has become an observer country of REDD program [16].

6. Conclusions

REDD provides a useful means for expanding forest ecosystems to absorb atmospheric CO_2 and, thus, can contribute to controlling rising CO_2 levels and help mitigate global warming. As Table 1 shows, all of REDD's current programs have been implemented in countries in or near the tropics. To date, China has not directly benefitted from any REDD programs, perhaps because China is situated far from the equator or because China is a large CO_2 emitter. Meanwhile, countries located in the tropics possess more-advantageous climatic conditions. Indeed, nowhere in the world are the conditions better for growing trees than in the tropics, where year-round warmth and moisture encourage rapid growth. But as things stand, many of the countries currently implementing REDD programs face constraints to increasing forest areas. Among them are those that result from these countries' confined territorial landmass, relative to China's. In the regard, China has the advantage of a vast territory and significant amounts of land suitable for forests. Indeed, China's land area almost equals the sum of all the countries, except for Brazil, that are currently implementing REDD programs.

China will play corresponding role in REDD program. After all, China possesses the world's fourth largest forest reserves, while its planted forest area ranks number one in the world. We believe that China's massive forest reserves will certainly contribute to REDD's mission. Moreover, China perseveres in planting more and more trees, and, as a result, its forest area continues to increase. In the future, China can make even more significant contributions to REDD through sustainable forest management to enhance forest carbon stocks.

REDD may not represent the definitive solution to the trend toward a warming climate; indeed, it is but one approach to controlling rising CO_2 levels. However, widespread adoption of REDD's principles and projects, together with global efforts aimed at afforestation and reforestation, may well buy us time to devise more effective tools, techniques, and technologies to mitigate the devastating future effects of global climate change.

Acknowledgements

References

[1] Dixon, R. K., J. K. Winjum, *et al* 1993 *Global Environ. Change* **3** 159-173
[2] Fang, J. Y., A. P. Chen, *et al* 2001 *Science* **292** 2320-2322
[3] IPCC 2007a *Climate Change 2007: Mitigation* (New York: Cambridge University Press) pp 9-14
[4] IPCC 2007b *Climate Change 2007: Synthesis Report* (New York: Cambridge University Press) pp 36-37
[5] Angelsen, A. 2010 *J. For. Econ.* **16** 253-256
[6] Laurance, W. F. 2008 *Bioscience* **58** 677-677
[7] UNFCCC 2007 *Report of the Conf. of the Parties on Its Thirteenth Session, Bali 3rd–15th December 2007* (Bali, indonesia) pp 1-60
[8] Cerbu, G. A. C. G. A., B. M. Swallow, *et al* 2011 *Environ. Sci. Policy* **14** 168-180
[9] IUCN 2013 REDD-plus explained Seeing: *http://www.thereddesk.org/countries*
[10] Meridian Institute, 2009. Reducing emissions from deforestation and forest degradation: an options assessment report Seeing: *http://www.redd-oar.org*
[11] Fry, B. F. B. 2011 Environ. Sci. Policy **14** 181-187
[12] REDD desk 2013 A database of REDD activities on the ground Seeing: *http://www.theredddesk.org/countries*

[13] Magnani, F., R. C. Dewar, *et al* 2009 *Tellus Ser. B-Chem. Phys. Meteorol.* **61** 385-393

[14] Ke, S. F., J. E. Wagner, *et al*. 2010 *Int. For. Rev.* **12** 247-255

[15] Zhang, S. G., W. F. Xiao, *et al*. 2002 *Plant Biosyst.* **136** 159-165

[16] Yang, X. H., Z. Q. Jia, *et al*. 2010 *Nature* **466** 315-315