bioresources.com

Classification, Production, and Carbon Stock of Harvested Wood Products in China from 1961 to 2012

Hongqiang Yang,[a,b,c] Xufang Zhang,[b,c] and Yinxing Hong [a,*]

China boasts a large production, import, and export volume of harvested wood products (HWP). The production, trade volume, and carbon stock of HWP can be used as valuable reference data for the economic growth and the participation of China in climatic negotiation. This research counts the production of major Chinese HWP between 1961 and 2012 according to the HWP classification standards of the Food and Agricultural Organization. The total forestry production value of China reached RMB 3,950 billion in 2012. The total forestry production value and the HWP production of China have been rising steadily. By applying the carbon accounting model of HWP under the stock change approach, this research estimates and analyzes the carbon stock of Chinese HWP from 1961 to 2012. The development of Chinese HWP inventories within this period can be roughly divided into three phases, which show a general uptrend. In 2012, the total carbon stock of Chinese HWP reached 888.01 million tons, whereas the annual increment of Chinese HWP reached 50.78 million tons. Therefore, HWP significantly contributes to the positive growth of Chinese carbon stock.

*Contact information: a: Center for the Yangtze River Delta's Socioeconomic Development, Nanjing University, No. 22, Hankou Road, Nanjing, Jiangsu, 210093, China; b: College of Economics and Management, Nanjing Forestry University, No. 159, Longpan Road, Nanjing, Jiangsu, 210037, China; c: Research Center for Economics and Trade in Forest Products of the State Forestry Administration, No. 159, Longpan Road, Nanjing, Jiangsu, 210037, China; *Corresponding author: yhqnfu@aliyun.com*

INTRODUCTION

The GDP of China has been growing continuously at a high level after the reform and opening up policies in 1978. This steady growth has rapidly increased the harvested wood products (HWP) supply and demand in the country along with the ever-increasing demands of the Chinese population. China has become one of the most important countries in terms of the production, consumption, and import/export trade of timber products and HWP (Jiang 2006). Along with the rapid development of the Chinese economy, HWP has become one of the major commodities that China imports in large quantities. China not only imports a large quantity of primary HWP, such as logs, sawn wood, and paper pulp, but also exports a large quantity of finished HWP, such as furniture and flooring. By ranking first worldwide in terms of the import volume of logs, China has gradually established itself as a large importing country of HWP. China also ranks first worldwide in terms of the export volume of furniture and rosin and ranks second worldwide in terms of the export volume of HWP (Sun and Zhang 2005; Shen *et al*. 2013). In 2013, the total HWP import/export volume of China reached USD 126 billion, which represented a 6% growth. During this period, the import volume of logs accumulatively reached 45,159 km^3 (19.18% growth), and the import volume of sawn

wood reached 23,939.7 km^3 (16.42% growth) (Zhou 2013). The production of Chinese timber products and wood-based panels in 1961 only reached 11,361 kT and 1,309,500 m^3, respectively; these values increased to 396,020 kT and 425,476 km^3 in 2012. Based on China Forestry Statistical Yearbook, the total production value of Chinese forestry increased from RMB 158 million in 1995 to RMB 3,950 billion in 2012. This growth represented a 24-fold increase. These figures show that Chinese forestry has made an outstanding contribution to the economies of China and of the world.
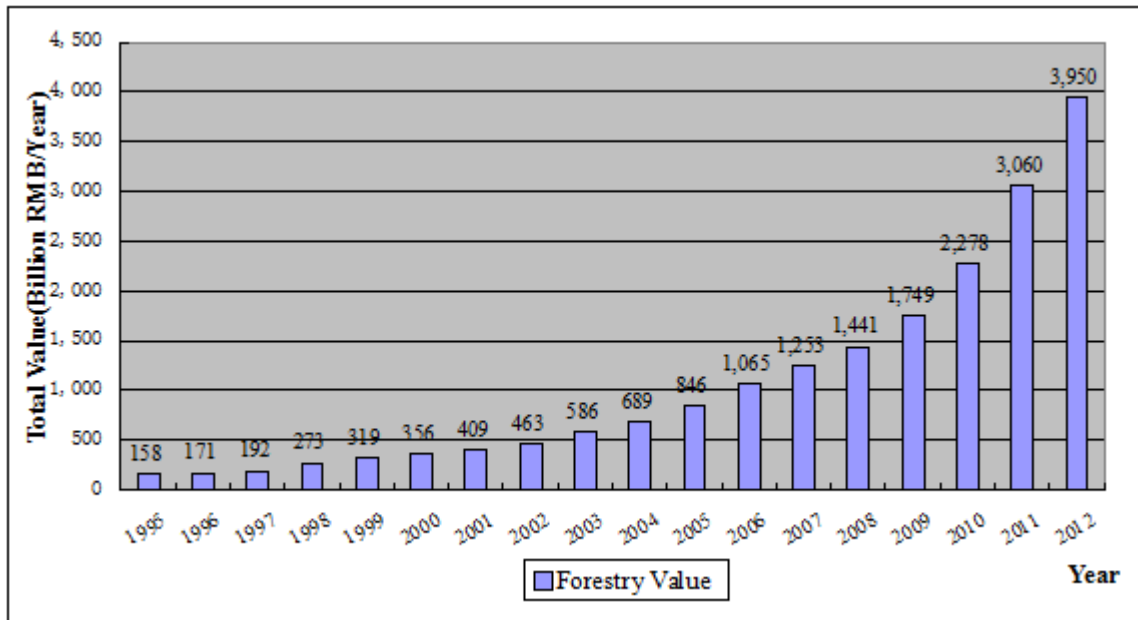

Fig. 1. The total value of the Chinese forestry industry from 1995 to 2012.

The seventh national counting of forest resources shows that China has 195.45 million hectares of forest area and a 20.36% forest coverage. China ranks first worldwide in terms of artificial forest area. However, China has only 0.145 hectares of forest area per capita, which is below 1/4 of the world's average. Therefore, China must reasonably and effectively utilize its forest resources (SFA 2010). Data from the International Energy Agency (IEA) shows that the carbon dioxide emissions in the world increased by 1.4% in 2012, reaching a record figure of 31.6 billion tons (IEA 2013). Along with the rapid economic development of various countries, the increasing greenhouse gas emissions have turned global warming into an international crisis and challenge. This problem is addressed through two channels, namely, active emission reduction and carbon sequestration, or the increase of carbon stock. International communities have agreed on the contribution and the huge potential of HWP to mitigate the emission of greenhouse gases, and the estimation of the carbon stock of HWP has become an important topic in the discussion on climatic changes. In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted at the United Nations Conference on Environment and Development (UNCED). During its fourth session of UNCED in 1996, the appraisal and estimation of carbon stock in HWP was first considered an important issue (UNFCCC 1997), thus affirming the carbon storage function of HWP. The carbon sequestration ability of HWP can mitigate global warming to a certain extent (Hashimoto *et al*. 2002; Chen *et al*. 2010; Nunery and Keeton 2010).

The carbon stock of China must not be ignored because of its large production and trade volume of HWP.

Classification

The UNFCCC defines HWP as wood materials and products that are harvested from forests and can serve as an energy source and be used to manufacture furniture, plywood, woodwork, paper, paperboard, and other products (UNFCCC 2003). This definition pertains to HWP in a broad sense, which includes non-wood fiber products of bamboos and rattans. In a narrow sense, HWP refers to wood fiber products (emphasizing the concept of "wood"), including industrial roundwood, wood fuel (including charcoal), sawn wood, other industrial roundwood products, wood-based panels, paper pulp, paper, paperboards, and recovered paper (Zhang and Yang 2013) .

The classification and the carbon storage function of HWP must be ascertained to calculate its carbon stock accurately. Different countries and regions adopt different classification methods of HWP. The HWP classification method of the Food and Agriculture Organization (FAO) is universally applied in international communities. This method classifies HWP into 10 categories, with each category having different sub-categories. Fig. 2 shows the FAO classification system of forestry products.
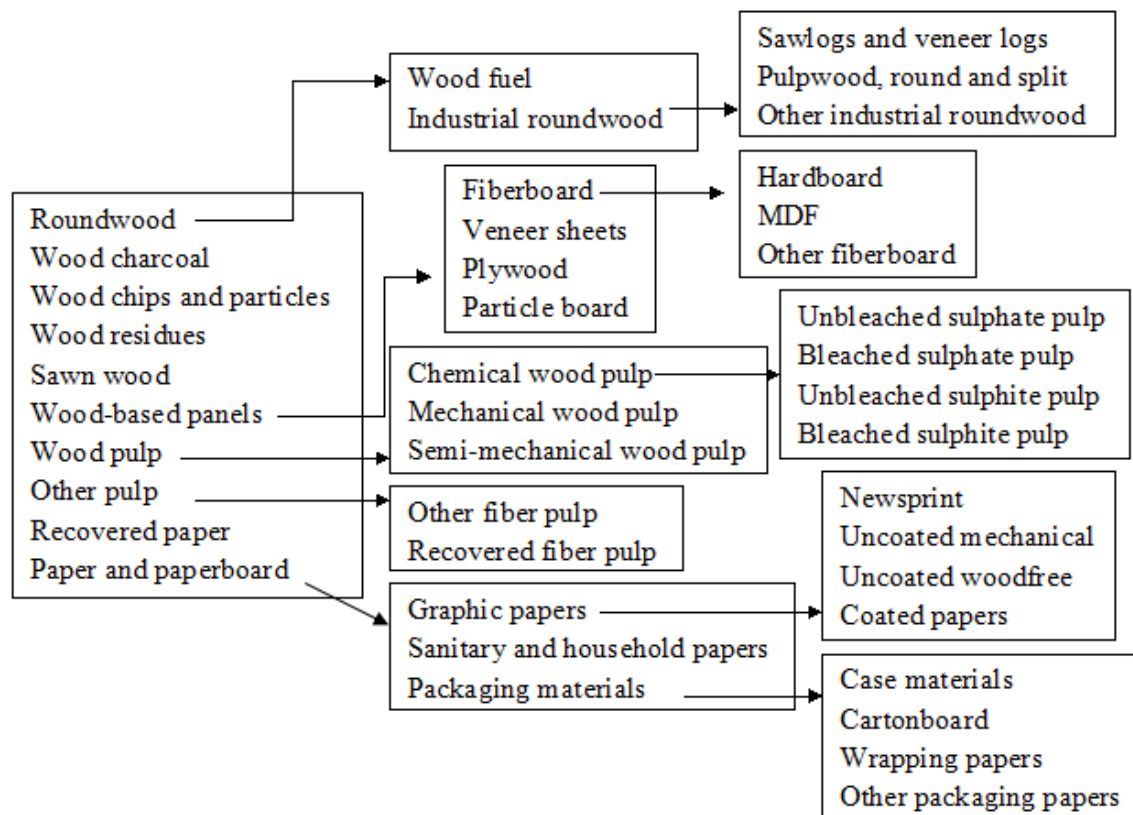

Fig. 2. FAO classification system of forestry products

The FAO classifies HWP into 10 categories, namely, roundwood, wood charcoal, wood chips and particles, wood residues, sawn wood, wood-based panels, wood pulp, other pulp, recovered paper, and paper and paperboard. In terms of content, the FAO creates an all-encompassing classification method that involves all HWP types and is applicable in all countries/regions worldwide. In terms of time, the FAO considers all

stages in their classification method—from the felling of timber to the production of finished timber products, including timbers in their original state (*e.g.*, roundwood and wood fuel), processed and manufactured products (*e.g.*, sawn wood, wood-based panels, and paper pulp), as well as finished products (*e.g.*, paper products). In terms of form, the classification method of the FAO includes the hardwood form (*e.g.*, sawn wood, wood-based panels, and other industrial roundwood), the liquid form (*e.g.*, wood pulp and other pulps), to-be-gas form (*e.g.*, wood charcoal, wood chips and particles, and wood residues), and paper form (*e.g.*, paper and paperboard). Countries have different forestry development conditions and use different types of classification methods for HWP. Therefore, an international uniform classification method must be used to calculate the carbon stock of HWP accurately.

Production

Aside from having a large production of timber products, China also consumes a huge amount of timber. The large demand for timber in China has been attributed to the natural endowment of forest resources and the rapid development of the social economy in the country (Yang and Nie 2012). China also has experienced a rapid development of forestry. The Communist Party of China (CPC) Central Committee and the State Council of China focus on the forestry of the country. In June 2003, these two bodies promulgated Resolutions on Accelerating Forestry Development (SFA 2008). "The construction of ecological civilization" was included in the government work report for the first time during the 17th CPC Congress in October 2007. Along with the promulgation and implementation of these resolutions, Chinese forestry has been pushed toward unprecedented heights and has become the target of several missions. Table 1 shows the production values of main HWP products in China from 1961 to 2012 as determined based on statistical data from the FAO.

Table 1. Production of Main HWP from 1961 to 2012

Years	Sawn Wood ($10^3 \, m^3$)	Wood-based Panels ($10^3 \, m^3$)	Other Industrial Roundwood ($10^3 \, m^3$)	Paper and Paperboard (10^3 tons)
1961–1964	44,900	1,310	54,918	11,361
1965–1968	52,127	2,559	62,110	11,643
1969–1972	60,169	4,495	68,885	12,180
1973–1976	67,366	5,508	80,733	16,383
1977–1980	79,496	8,117	99,726	23,236
1981–1984	95,878	10,122	120,899	32,407
1985–1988	108,027	12,654	144,790	53,889
1989–1992	90,043	14,843	148,824	72,625
1993–1996	104,325	38,606	156,498	107,134
1997–2000	63,361	59,070	154,542	132,315
2001–2004	43,597	131,985	141,940	180,083
2005–2008	99,640	273,560	144,240	291,449
2009–2012	169,944	425,476	153,840	396,020

Note: Data are from the China Forestry Statistical Yearbook.
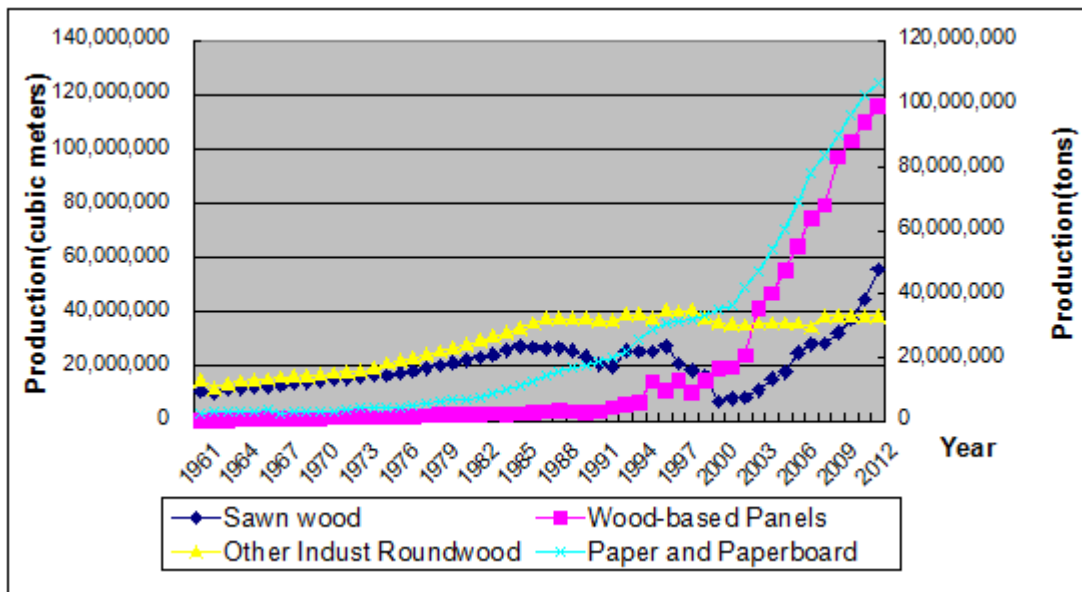
Fig. 3. Production of solid wood as well as paper and paperboard in China from 1961 to 2012

Figure 3 demonstrates the general uptrend of the HWP production of China from 1961 to 2012. China produced 2.53 million tons of paper and paperboard in 1961. This value increased to 106.30 million tons in 2012 with an increase of a factor of 41. Moreover, China produced 0.25 million m^3 of wood-based panels in 1961. This value increased to 115.65 million m^3 in 2012 with an increase of a factor of 460.5. However, the production of various types of HWP in different periods shows distinct trends of change. The following major periods are identified:

1. The production of Chinese HWP experienced a slow, fluctuating growth during the first period (1961 to 1999). The production of sawn wood and wood-based panels also fluctuated before and after the Asian financial crisis in 1997.

2. The production of Chinese HWP rapidly increased during the second period (2000 to 2012). After joining the World Trade Organization (WTO) in 2001, China's market became much more open and its trade was liberalized, the forestry economy of China has been booming steadily (Fig. 1) and has overcome various challenges.

METHODOLOGY

Methods

China has a large production of forestry products. HWP significantly contributes to the Chinese economy and increases the carbon stock of Chinese HWP inventories. In 1997, the Intergovernmental Panel on Climate Change (IPCC) established "Guidelines for the Methodologies of Estimation for National Greenhouse Gas Inventories," which introduced the default IPCC approach (IPCC 1996). In May 1998, a seminar on the metering methodology for the carbon stock of HWP was held in Dakar, the capital of Senegal. Three additional approaches were introduced during the seminar, namely, the stock change approach, the production approach, and the atmospheric flow approach, all of which could be used in place of the default IPCC approach (Brown *et al.* 1998). The 2006 IPCC Guidelines for the Methodologies of Estimation for National Greenhouse Gas

Inventories suggests that the four abovementioned approaches should be used to calculate the carbon stock of HWP.

Based on the theory that "the carbon is discharged into the air once and for all," the default IPCC approach uses forest ecology as its measuring system. The default approach is also the easiest among the four IPCC measuring approaches. Based on the systematic carbon stock change of a country, the production approach includes the net change of carbon stock in the forest-growing country where HWP originates. Under this approach, the producing country must track the carbon stock change of HWP. This approach is applicable to major HWP-producing countries. Under the atmospheric flow approach, the import of HWP cannot increase the carbon stock of the importing country. However, the carbon emission that arises from the oxidative decomposition of HWP products must be included in the carbon stock of the importing country. Therefore, the atmospheric flow approach is applicable to the net exporting countries where HWP originates. The stock change approach considers carbon flow within the scope of the national system. Under this approach, HWP exports are equivalent to the carbon emissions of the exporting country, whereas HWP imports can increase the HWP carbon stock of the importing country. Therefore, the stock change approach is applicable to the net importing countries where HWP originates. China has more HWP imports than exports (Fig. 4), and this information confirms the suitability of the stock change approach for calculating the carbon stock of Chinese HWP (Ruan *et al*. 2006; Bai *et al*. 2009; Ji *et al*. 2011). Solid wood products (*i.e.*, sawn wood, wood-based panels, and other industrial roundwood) as well as paper and paperboard are the only HWP that can stock carbon (Bai *et al*. 2006; Skog 2008; Lun *et al*. 2012; Zhang and Yang 2013; Bai *et al*. 2011). Given that solid HWP products and paper products are capable of carbon sequestration, this research calculates the carbon stock of Chinese HWP by applying the stock change approach based on statistics from the FAOSTAT Forestry Database.
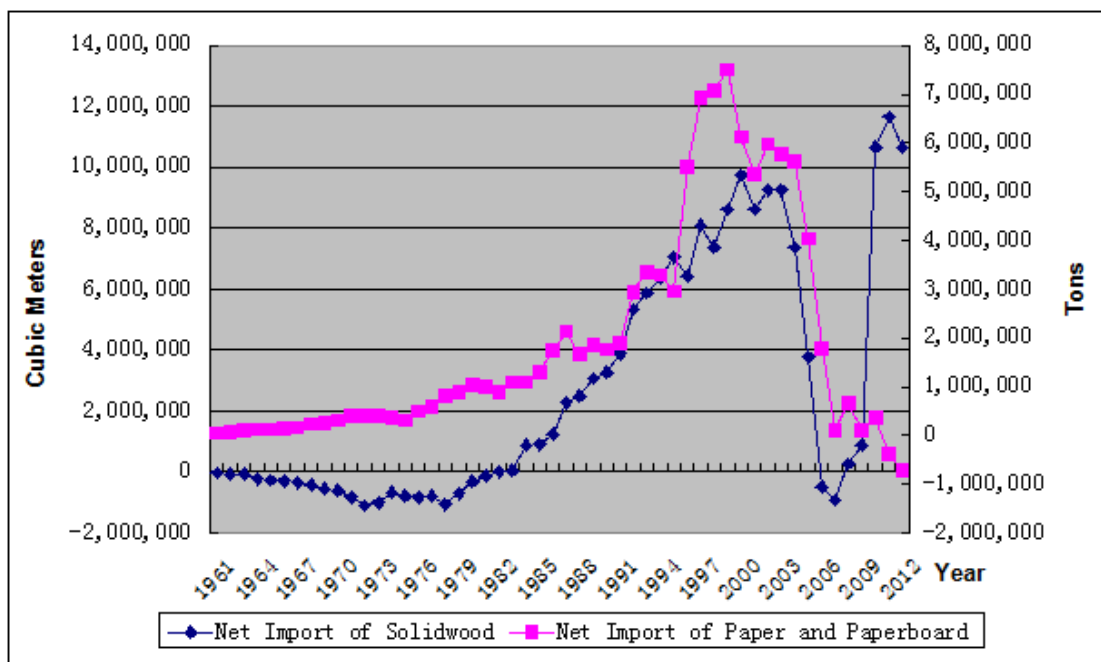

Fig. 4. Net Chinese imports of solid wood as well as paper and paperboard from 1961 to 2012

The accounting models for determining the carbon stock of HWP using the stock change approach are expressed as follows:

$$\Delta C(i) = C(i+1) - C(i) \tag{1}$$

$$C(i+1) = e^{-k} \bullet C(i) + \left\lceil \frac{(1-e^{-k})}{k} \right\rceil \bullet \textit{Inflow}(i) \tag{2}$$

$$\textit{Inflow}(i) = P + P_{IM} - P_{EX} \tag{3}$$

$$V_t = V_{1961} \bullet e^{[U \bullet (t-1961)]} \tag{4}$$

$$K = \frac{\ln(2)}{HL} \tag{5}$$

$$P = V \bullet F \tag{6}$$

$$F = D \bullet R \tag{7}$$

In formulas (1) to (7), i is the time; $\Delta C(i)$ is the change of HWP carbon stock in year i; $C(i)$ is the carbon stock in year i; $C(1900) = 0$; K is the first-order decay of every year; $\textit{Inflow}(i)$ is the volume of carbon that flows into the HWP carbon stock in year i; P, P_{IM}, and P_{EX} are the carbon stock corresponding with the production, import, and export of HWP, respectively; Vt is the production and import/export volume; U is the rate of change of industrial roundwood consumption of the reporting country ($U = 0.0217$); t is the time; HL is the half-life period; F is the carbon conversion factor; D is the basic density; and R is the carbon fraction. The half-lives of hardwood and paper products are 30 and 2 years, respectively, and their carbon factors are 0.45 and 0.295 tons, respectively (IPCC 2006; Yang *et al.* 2013). In future work it is recommended that attention be paid to determining updated values for these default coefficients suggested in the cited sources.

The accounting results of HWP are subject to many factors, such as the accounting approach selection, HWP basic density, carbon fraction, carbon conversion factor, FAO variable, rate of change in the industrial roundwood consumption of the reporting country, and half-life period. Despite the effects of these factors on the accounting results, this research does not focus on them (Zhang and Yang 2014) because they have been discussed in our previous research. The accounting of the carbon stock of HWP constitutes only one of the four parts of this research, and the accounting data are only used to explain the annual HWP production and selling of China to a certain extent. Given that the carbon stock of Chinese HWP also contributes to the mitigation of global warming, this article refers to the viewpoints of earlier researchers when selecting data for the accounting of HWP carbon stock and attempt to ensure the accuracy of the present data. The authors will conduct an in-depth research into the measurement of the half-life period in the near future.

Carbon Stock

Data on the production, import, and export of Chinese HWP from 1961 to 2012 were quoted from the FAO database. The production, import, and export of Chinese HWP in 1960 were inversely derived using the 1961 numerical value of HWP from the FAO database as well as formula (4). After including the relevant data into the formula for the carbon stock of HWP, values of $C(i)$ and $\Delta C(i)$ were obtained, which denoted the total carbon stock of Chinese HWP from 1961 to 2012 and the annual carbon stock of HWP, respectively. "Annual Stock" refers to the carbon stock of HWP that is added every year (*i.e.*, the annual change in the carbon stock of HWP) and "Total Carbon Stock" refers to the cumulative value of the carbon stock of HWP (*i.e.*, the sum of the newly added HWP carbon stock of this year and the cumulative HWP carbon stock of last year). The total carbon stock and the annual carbon stock over time, as stated in the FAOSTAT Forestry Database, are shown in Fig. 5.
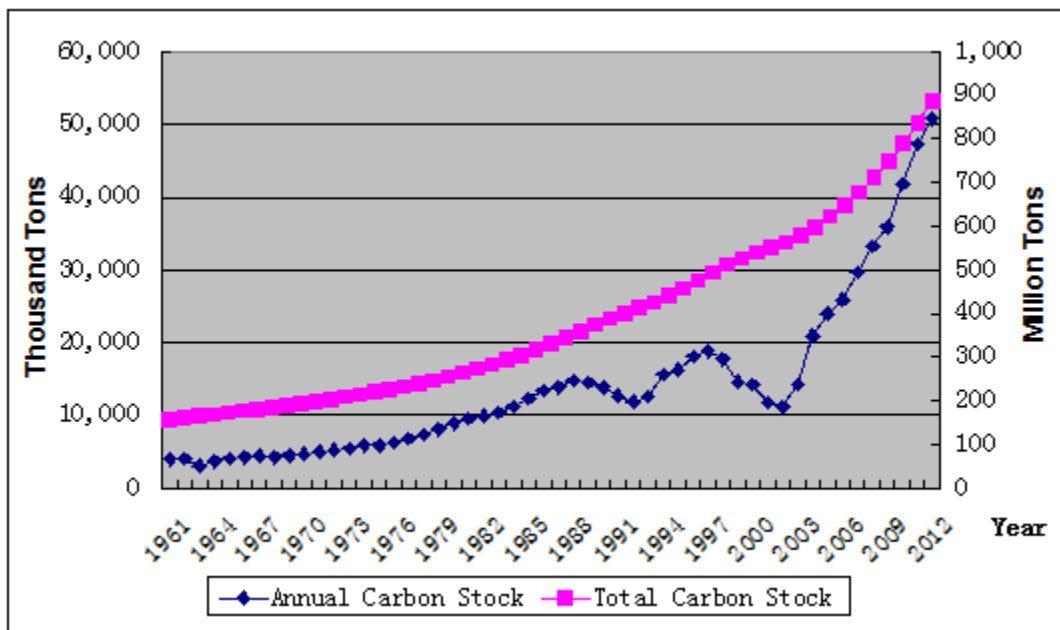

Fig. 5. Annual carbon stock and total carbon stock in China from 1961 to 2012

As shown in Fig. 5, China's total carbon stock of HWP has continuously increased from 1961 to 2012. The carbon stock of Chinese HWP reached 162.41 million tons in 1961 and 888.01 million tons in 2012. Such increase reflects the contribution of China to the carbon stock of HWP. As shown in the above overview of the HWP accounting approaches, under the stock change approach, an increase in HWP production and import as well as a decrease in HWP export will increase the carbon stock of the HWP inventories of a country. Therefore, the numerical value of the carbon stock of Chinese HWP reflects the comprehensive effect of its production and trade. The yearly development of the carbon stock of Chinese HWP from 1961 to 2012 can be roughly divided into three periods:

1. The carbon stock of Chinese HWP grew steadily from 1961 to 1997. This period coincides with the period of slow economic development, backward economy, underdeveloped industries, and sole reliance on forestry for the production of timber products for national construction that immediately took place after the founding of

the PRC. China entered a new period of reform and opening up after the 3ʳᵈ Plenary Session of the 11ᵗʰ Central Committee of the CPC. After the adoption of "Resolutions on Several Issues of Developing Forestry by Protecting Forests" and "Resolutions on Launching the National Campaign of Voluntary Tree Planting" in 1981, the concepts of "tree planting" and "afforesting our motherland" were rooted in the minds of people. The Forestry Action Plan of the Chinese 21ˢᵗ Century Agenda was promulgated in 1994 in response to the call for "the sustainable development of the world forestry." The measures for this Action Plan were introduced in 1995. The sustainable development of Chinese forestry was analyzed comprehensively and systematically, concrete targets and action projects were proposed, and a blueprint for the development of Chinese forestry in the 21ˢᵗ century was created. This period also marked the first time for China to introduce the concept of "adapting to climatic changes," which significantly helped slow down the global climatic changes. To summarize, Chinese forestry developed steadily, the production and trade of Chinese HWP grew slowly, and the annual Chinese carbon stock of HWP increased steadily during this period.

2. The carbon stock of Chinese HWP declined between 1998 and 2002. The export volume of Chinese HWP increased during this period. The Asian financial crisis in 1997 exerted a certain influence on the Asian economy. After the financial crisis, China implemented a "tax reimbursement for export" policy for all HWP products and encouraged the export of HWP. The export volume of HWP products, such as sawn wood, also increased during this period. Figure 3 shows the increase in the export volume of Chinese HWP after 1997. In 1999, China also implemented "the protection project of natural forests" and "the program of converting cultivated land into forests," which decreased the supply of domestic timber recourses (Yang and Nie 2012) and the production of Chinese HWP products. Therefore, the carbon stock of Chinese HWP decreased during this period.

3. The carbon stock of Chinese HWP products rapidly increased after 2003. In the 21ˢᵗ century, forestry gained a very important position in the sustainable development of the Chinese national economy, which rapidly developed Chinese forestry. After implementing several policies, such as "lowering down the import duty of HWP products" and "reducing the import control of HWP products" in 1999, the import of HWP products began to increase annually, and the import duty of logs decreased to zero (Sun and Zhang 2005). After joining the WTO in 2001, the Chinese government reduced the customs duty of 249 types of forestry products, which subsequently increased the import volume of Chinese HWP products. After 2001, the production of Chinese HWP products increased at a rapid speed, subsequently increasing the carbon stock of Chinese HWP products during this period.

CONCLUSIONS

1. China is a large country that is known for its production and trade of HWP. As indicated in the 12th Five-Year Plan of the Forestry Development of the State Forestry Administration of China, the special role of forestry in responding to climatic changes and increasing carbon sequestration capacity under the theme of "developing modern agriculture, building ecological civilization, and promoting

scientific development" should be emphasized. According to the FAO, the production of HWP in China has increased annually and has thus contributed to the economy of the country and to the carbon stock of Chinese HWP. The carbon-stocking function of HWP decreases CO_2 emissions, thereby allowing China to deal with climate change.

2. This study focused on the forestry industry of China, the FAO classification of HWP, and the HWP production of China from 1961 to 2012. The study also evaluated the carbon stock of HWP in China from 1961 to 2012 using the stock change approach. Chinese carbon stock generally increased from 1961 to 2012, which could be divided into three periods. In 2012, the carbon stock of HWP in China reached 888.01 million tons, which considerably increased the carbon stock in China.

3. This study introduced a new mechanism for addressing climate change by adding carbon stock via HWP. Countries all over the world must work together to reduce carbon dioxide emissions. China is a major producer, consumer, exporter, and importer of HWP and thus produces large amounts of CO_2 emissions. The carbon stock function of HWP can give China several advantages in future global climate change negotiations.

ACKNOWLEDGMENTS

REFERENCES CITED

Bai, Y. F., Jiang, C. Q., and Lu, D. (2006). "Review on approaches for estimating the carbon stock in harvested wood products," *World Forestry Research* 19(5), 15-20 (in Chinese).
Bai, Y. F., Jiang, C. Q., and Zhang, S. G. (2009). "Carbon stock and potential of emission production of harvest wood products in China," *Acta Ecologica Sinica* 29(1), 399-405 (in Chinese).
Bai, Y. F., Jiang, C. Q., and Zhang, S. G. (2011). "Definitions and carbon stocks accounting approaches of harvested wood products in climate change negotiation," *Scientia Silver Sinicae* 47(1), 158-164 (in Chinese).
Brown, S., Lim, B., and Schlamadinger, B. (1998). "Evaluating approaches for estimating net emissions of carbon dioxide from forest harvesting and wood products," *IPCC/OECD/IEA . Programme on National Greenhouse Gas Inventories. Meeting Report* (http://www.ipccnggip.iges.or.jp/public/mtdocs/dakar.pdf).
Chen, J. X., Colombo, S. J., Ter-Mikaelian, M. T., and Heath, L. S. (2010). "Carbon budget of Ontario's managed forests and harvested wood products, 2001-2100," *Forest Ecology and Management* 259(8), 1385-1398.
Hashimoto, S., Nose, M., Obara, T., and Moriguchi, Y. (2002). "Wood products: Potential carbon sequestration and impact on net carbon emissions of industrialized countries," *Environmental Science & Policy* 5(2), 183-193.

Intergovernmental Panel on Climate Change (IPCC) (1996). *Report of the Twelfth Session of the Intergovernmental Panel on Climate Change* (http://www.ipcc.ch/meeting_documentation/meeting_documentation_ipcc_Sessions_and_ipcc_wgs_Sessions.htm).

Intergovernmental Panel on Climate Change (IPCC) (2006). "Harvested wood products," *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, 12.6-12.18.

Ji, C. Y., Yang, H. Q., Nie, Y., and Hong, Y. X. (2013). "Carbon sequestration and carbon flow in harvested wood products for China," *International Forestry Review* 15(2), 160-168.

Jiang, Z. H. (2006). "Current status and future perspective of forest products development in China," *China Wood Industry* 20(2), 1-4 (in Chinese).

Lun, F., Li, W. H., Wang, Z., Bai, Y. Y., and Yang, Y. G. (2012). "Spatio-temporal changing analysis on carbon storage of harvested wood products in China," *Acta Ecologica Sinica* 32(9), 2918-2928 (in Chinese).

Nunery, J. S., and Keeton, W. S. (2010). "Forest carbon storage in the northeastern United States: Net effects of harvesting frequency, post-harvest retention, and wood products," *Forest Ecology and Management* 259(8), 1363-1375.

Shen, W. X., Li, F., and Liu, L. M. (2013). "Coupling degree of international woody forest products trade and forest ecology safety," *World Forestry Research* 26(1), 69-73 (in Chinese).

Skog, K. E. (2008). "Sequestration of carbon in harvested wood products for the United States," *Forest Products Journal* 58(6), 56-72.

State Forestry Administration (SFA) (2010). *The Seventh National Forest Resources Statistics of China* (http://www.forestry.gov.cn/main/65/content-326341.html).

Sun, B., and Zhang, Y. L. (2005). "Analysis of present situation and research of countermeasure on Chinese forest products in international trade," *Hubei Forestry Science and Technology* 132, 45-48 (in Chinese).

State Forestry Administration (SFA) (2008). *National Bureau of Statistics on the Issuance of Forestry and Related Industries Classification Piloted* (http://www.gov.cn/zwgk/2008-02/21/content_896037.htm).

The International Energy Agency (IEA) (2013). "The global carbon emission has been up to a new height in 2012," (http://www.antpedia.com/news/67/n-317867.html).

United Nations Framework Convention on Climate Change (UNFCCC) (1997). "Report of the subsidiary body for scientific and technological advice on the work of its fourth session," (http://unfccc.int/resource/docs/1996/sbsta /20.pdf).

United Nations Framework Convention on Climate Change (UNFCCC) (2003). "Estimation, reporting and accounting of harvested wood products," *Technical paper. FCCC/TP/2003/7*(http://unfccc.int/resource/docs/tp/tp0307.pdf).

Yang, H. Q., Ji, C. Y., Yang, H., Nie, Y., and Hong, Y. X. (2013). "Global climate change and China's contribution to carbon reduction: Based on carbon storage accounting of Chinese harvested wood products," *Journal of Natural Resources* 28(12), 2023-2033.

Yang, H. Q., and Nie, Y. (2012). *The Safety of China's Wood Resources*, People's Publishing House (in Chinese).

Zhang, X. F., and Yang, H. Q. (2013). "The cycle of carbon flows in harvest wood products and methods of carbon reduction of the United States," *Forestry Economics* 12, 22-27 (in Chinese).

Zhang, X. F., and Yang, H. Q. (2014). "Accounting methods and influences of carbon stock in harvested wood products in the context of climate changes," *Journal of Anhui Agricultural Sciences* 7, 2014-2021 (in Chinese).

Zhou, G. W. (2013). "China: Increasing Imports of Logs and Timber," *International Wood Industry* 8, 15 (in Chinese).