

*Full Length Research Paper*

# Benefits of carbon markets to small and medium enterprises (SMEs) in harvested wood products: A case study from Saharanpur, Uttra Pradesh, India

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Harvested wooden handicrafts products have the ability to lock carbon for long time and mitigate climate change. These products are currently eligible for availing benefits from voluntary carbon markets. The market size and opportunities for carbon credits are likely to increase substantially for these products during the post-2012 UNFCCC period. This paper analyses the limitations and opportunities for the wooden handicrafts units in Saharanpur in India in an emerging carbon market scenario. The results of this case study show that these small and medium scale enterprises (SME) can benefit from the carbon markets with the help of an integrated project to address energy efficiency, innovative technologies that reduce waste, improving the quality of supply and sourcing wood from sustainably managed and certified forests and trees outside the forests. It is estimated that the potential benefits from the carbon markets for harvested wood products in Saharanpur is about \$ 5.34 million annually. India's recent national action plan on climate change provides the policy back up to initiate this and minimise the carbon footprint of the country.

**Key words:** Harvested wood products, carbon markets, handicrafts.

## INTRODUCTION

Forests and trees outside the forests store more than one trillion tonnes of carbon, double the amount of carbon found in the atmosphere (FAO (2007), FAO NewsRoom, How Forest Trap One Million Tonnes of Carbon. <http://www.fao.org/newsroom/EN/focus/2006/1000247/index.html>). Deforestation and other land uses changes are responsible for one fifth of green house gas (GHG) emissions globally. Presently, the annual rate of deforestation globally is about 13 million ha due to several factors including large scale conversion to establish agriculture, plantations such as oil palm and soy, illegal logging and mining (FAO, 2007). The loss of high conservation value forests is a threat to the biodiversity and provisioning of ecosystem services. It is recognized that avoided deforestation is a cost effective method to reduce GHG emissions when compared to other options and there is no need for developing new

technologies to achieve this (Stern, 2006).

However, there is a need to take action now since the extent of GHG benefits from reduced deforestation will be less as we delay the process (IPCC, 2006; Noble and Scholes, 2001; Motel et al., 2008; Gordon and Bonan, 2008; WWF, 2008). The afforestation and reforestation (A&R) activities also help in mitigating climate change issues by sequestering carbon (Gorte et al., 2008). An emerging area of interest is on the contribution of harvested wood products (HWP) in locking carbon and thereby availing benefits from the emerging carbon markets (Dias et al., 2007; Green et al., 2006; Garcia et al., 2006; European Commission, 2003; Winjum et al., 1988; Buchanan and Levine, 1999; Brown et al., 1998; Perez-Gracia et al., 2005).

The harvested wood from forests and other areas are carbon reservoirs as long as they remain in the form of a product or solid waste. These include all wood and bark removed for products including fuel and it does not include wood left out at harvest site (IPCC, 2006). Harvested wood products are currently eligible for benefits from voluntary carbon markets (The United

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Nations Framework Convention on Climate Change, 1998.). The harvested wood in housing, construction or furniture can store carbon for more than 100 years (Haripriya Gundimeda, 2001). The market size and opportunities for carbon credits are likely to increase substantially for these products in a post-2012 UNFCCC framework (Gorte and Ramseur, 2001). The present paper analyses the opportunities and limitations of the wooden handicraft industries comprising mainly small and medium scale enterprises (SME) in Saharanpur District in State of Uttar Pradesh, India to tap the emerging carbon markets under the Clean Development Mechanism.

### The policy context

The United Nations Framework Convention on Climate Change (UNFCCC) is the primary international agreement to mitigate climate change by reducing Green house gas (GHG) emissions ((The United Nations Framework Convention on Climate Change, 1998.). The Kyoto Protocol provides for the accounting of direct human-induced land use change and forestry activities like ARD (afforestation/reforestation/deforestation) under its article 3.3 and for the accounting of additional activities under article 3.4. Wood products could be accounted for under article 3.4. The decision to include forest sinks was taken in COP7 at Marrakesh (2001) and this opens the way for possible inclusion of wood products (The Marrakesh Accords and the Marrakesh Declaration, 2001. [http://unfccc.int/cop7/documents/accords\\_draft.pdf](http://unfccc.int/cop7/documents/accords_draft.pdf)) as of 2013 – 2017 (Second Commitment Period of Kyoto Protocol) while presently parties can account for carbon removal by LULUCF activities (that is, ARD) during the first commitment period (2008 - 2012) itself.

Harvested wood products has been in the agenda of the UNFCCC since 2001 and this in turn has deliberated policy discussions at various levels, including the conceptual and methodological aspects of eligibility (UNCCC, 2004). At the Subsidiary Body for Scientific and Technological Advice Meeting number 26 (SBSTA 26), it was decided to discuss reporting of HWP in the context of its consideration of the 2006 IPCC Guidelines (IPCC (2006): Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html>) (SBSTA30). The Ad Hoc working group on Kyoto Protocol (AWG-KP) (UNFCCC/AWG (2008): Round table on the means to reach emission reduction targets. FCCC/KP/AWG/2008/CRP.1. Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol. 5<sup>th</sup> session. Bangkok, 31 March to 4 April 2008, and Bonn, 2-12 June 2008), in its meeting at Bali in 2007 has considered the possible changes to the rules and modalities for the treatment of LULUCF for the second commitment period of the Kyoto Protocol, including

accounting for HWP. New methodologies for reporting HWP are available in the IPCC 2006 Inventory Guidelines.

India's National Action Plan on Climate Change (2008) stated that climate change may alter the distribution and quality of India's natural resources and adversely affect the livelihood of its people. The policy objective is to establish an effective, cooperative and equitable global approach based on the principle of common but differentiated responsibilities and relative capabilities, enshrined in the UNFCCC. The plan has eight National Missions representing multi-pronged, long term and integrated strategies for achieving the key goals (Government of India, 2008a). Of these, the National Mission for a Green India focuses on enhancing ecosystem services including carbon sinks. This is expected to complement the national target of achieving 33% forest and tree cover as per the National Forest Policy, 2008 (MoEF, 1988). Presently, the forest and tree cover in India is about 23 percent as per the State of Forest Report-2005 (FSI, 2008). The forest cover estimates in India during the last decade show a net addition in forests, largely due to the increase in open forests. The Government of India has earmarked an initial corpus of Rs.60,000 million for the Green India programme through the Compensatory Afforestation Management and Planning Authority (CAMPA) (The Ministry of Environment and Forests, Government of India introduced "Compensatory Afforestation Fund bill-2008" towards compensatory afforestation, additional compensatory afforestation and penal compensatory afforestation and net present value (NPV). <http://pib.nic.in/release/release.asp?relid=44094>). India's position on Bali Action Plan outlines a possible approach towards provision of positive incentives for four categories of actions, viz., reduced deforestation, conservation, sustainable management of forest and increase in forest cover (Government of India, 2008b). However, harvested wood products have not been discussed as a potential opportunity yet in UNFCCC for complications related to the accounting methodology involved.

The principal aim of India's National Forest Policy 1988 is "to ensure environmental stability and maintenance of ecological balance, including atmospheric equilibrium which are vital for sustenance of all life forms, human, animal and plants. The derivation of direct economic benefits must be subordinated to this principal aim". This was a major shift from earlier forest policies of 1894 and 1952. The present policy advocate the participatory forest management, promotion of non timber forest products, support agro-forestry and farm forestry practices in the country. In order to meet the growing demand for wood and wood products, the policy recommends the liberalization of wood imports. However, the SMEs in Saharanpur find it difficult to import wood since it is not cost effective. Besides, the imported wood cannot be a substitute for indigenous hard wood species in many

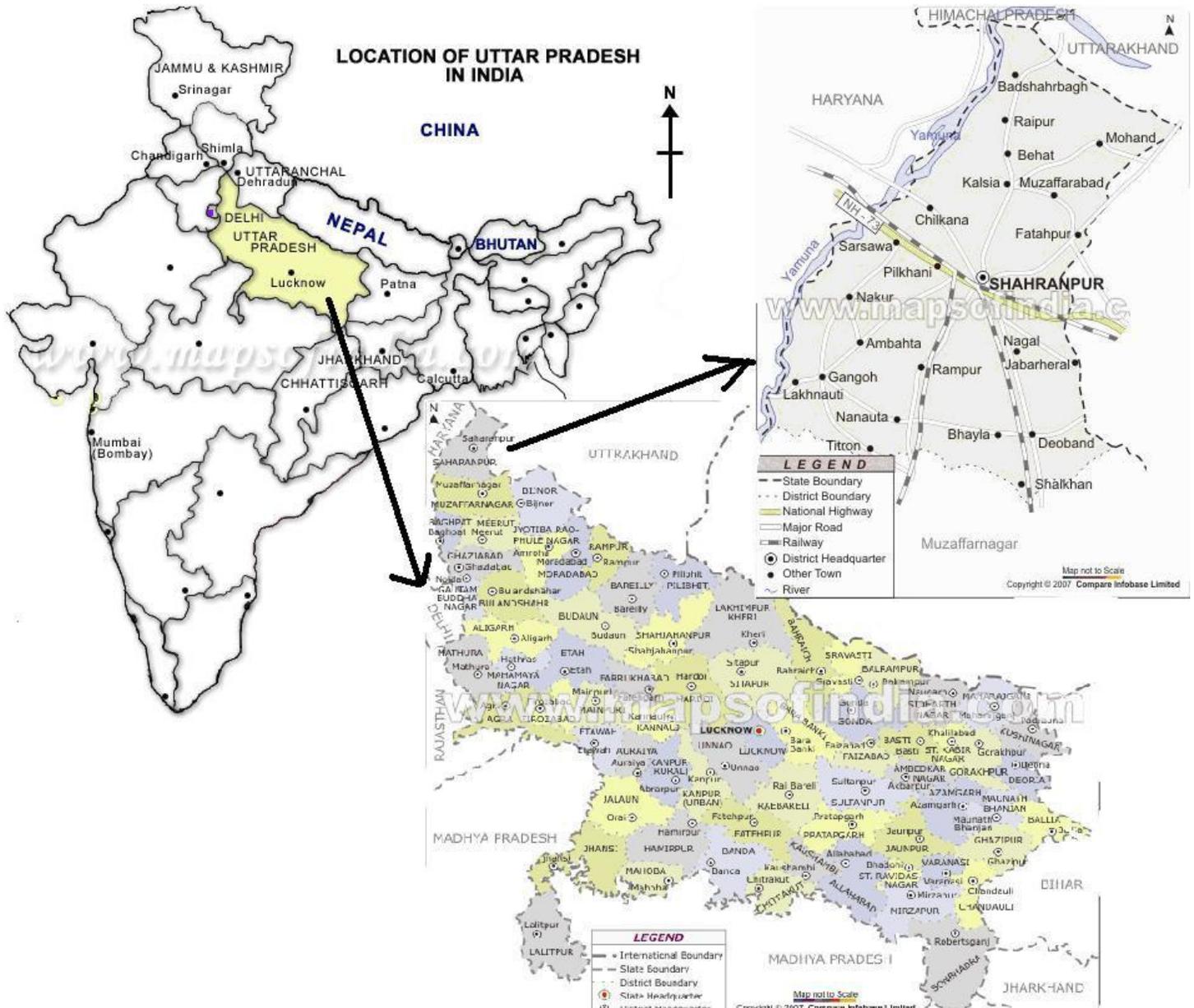


Figure 1. Location map of Saharanpur, Uttar Pradesh, India. Bhattacharyya Sarkar.

Source: Maps of India, www.mapsofindia.com; reorganized by Anindita

situations. As a result, SMEs largely depend on agro-forestry/farm forestry to source raw material (MoEF, 1988). The office of the development commissioner (handicrafts), ministry of textiles is responsible for the development of wooden handicrafts and addressing market access issues. The ministry has introduced plans to promote forest certification in order to meet the export demand according to the discussion in national forest certification committee meetings. The approach paper to 11<sup>th</sup> five year plan emphasizes the need for promoting SMEs in order to achieve the desired development goals and thereby addressing the unemployment and livelihood issues.

## MATERIALS AND METHODS

### Study area

Saharanpur, an important industrial city and municipality lies in the state of Uttar Pradesh in northern India (29°58 N 77°33 E / 29.97, 77.55) shown in Figure 1. Saharanpur is internationally famous for its wood carving work cottage industry. A variety of other agro-based industrial enterprises such as textile, sugar, paper and cigarette factories are also located in the city. According to Government of India, the district Saharanpur is one of the minority concentrated district in India (Planning Commission, 2005).

The population of Saharanpur District is 2.9 million which is growing at the rate of 2.59% annually. The district has an average literacy level of 64%, higher than the national average of 59.5%:

**Table 1.** The demographic and socio economic aspects of Saharanpur district.

Demographic and socio-economic variables	Value
Population	2.9 million
Annual population growth rate	2.59%
Sex ratio (No. of females per 1000 males)	865
Literacy rate	61.22
Female literacy	50
Gender participation in workforce	3%
Average daily number of workers employed in wood based SMEs	12,496
Number of registered SMEs	156
Number of unregistered SMEs	3,500

Source: Planning commission (2005).

male literacy is 67% and female literacy is 60% indicated in Table 1. About 14% of the population is below 6 years of age (Census, 2001).

Saharanpur is a flourishing business city: an important regional centre of wholesale and retail trade, particularly in grain, timber and textiles. The description of Saharanpur's economy is incomplete without mentioning the contribution of wooden handicrafts industry, which is the basis of livelihood for half of the population and source of recognition globally. Beautiful art and utilitarian woodwork objects are displayed and sold in the sprawling market from near the Ambala Road up to Chilkana Road. The timber market traditionally receives supplies from the extensive northern forest regions (Uttarkhand, Himachal Pradesh and Uttar Pradesh) to support the local wood carving cottage industry and other demands.

There are approximately 3500 unregistered SMEs, which function on their domestic premises on contract basis. Most of the production units are concentrated in Saharanpur in localities like Kamela colony, Sabari-ka-bag, Khattakhedi, Khajur-tala, Pilkhan-tala, Mehandisarai, Ale-ki-chungi, Sarai-Mardan-Ali, Sarai Shahji and Purani Mandi area. They use traditional hand tools. These unregistered SMEs form the backbone of the massive woodcraft industry of Saharanpur and produce nearly 80% of the products that are sold in the market. The value of exports of wooden handicrafts from Uttar Pradesh has increased from Rs2793 million in 1997 – 1998 to Rs.10389 million in 2007 - 2008 (Government of Uttar Pradesh, 2008). The Uttar Pradesh State Development Report 2005 provides the results of a detailed SWOT analysis of handicrafts of SMEs of Saharanpur which is summarised in Table 2.

## Methodology

The study was carried out through a participatory approach and literature review. Field visits were carried out in October and November 2008 to collect primary data on wood consumption, energy use and to understand the process of converting harvested round wood to handicraft products through several stages. The

extent of solid waste generated and its pattern of reuse was also documented from the sites. The participant observations, interviews and scientific experiments like dry weight estimation were conducted to generate the required primary data.

The SME wooden handicrafts units were selected randomly from the Saharanpur directory for industries. Thereafter, a select sample of units were identified on the basis of:

- Industries having requisite local capacity and manpower.
- Formal registration with Small Scale Industries (SSI) and Saharanpur Wood and Handicraft Association
- Willingness of local SMEs and others to participate in the survey.

A survey was conducted in December 2008 to analyze the opportunities and constraints of the industry in relation to the emerging carbon markets. Required data was collected from 47 SME units registered under the Export Promotion Council of Handicrafts (EPCH), Government of India.

The methodology to calculate carbon content in HWP and subsequent estimation of CO<sub>2</sub>e was followed by applying the CUFR carbon calculator method (The US Forest Service Center for Urban Forest research, July 2008). This method has been widely acknowledged and involves the following steps:

The steps described here can be given as a box item.

**Step 1:** Use equations for Diameter, Breath and Height (dbh) and height (or equations for dbh only if necessary) to calculate volume of wood.  $V = 0.002245 \times (\text{dbh})^{2.118} \times (\text{h})^{-0.447} = V \text{ in m}^3$

**Step 2:** Convert from volume to Fresh Weight (FW) biomass by multiplying V to the species-specific density factor. (FW = V × species specific density factor)

**Step 3:** The above equations given here only calculate volume (and hence biomass) for the aboveground portion of the tree. Add the biomass stored belowground by multiplying the FW biomass by 1.28, that is, FW (Kg) = FW × 1.28.

**Step 4:** Convert FW biomass into Dry Weight (DW) biomass by multiplying by the constant 0.56 for hardwoods and 0.48 for conifers (Nowak, 1994). For example: DW (Kg) = FW × 0.56.

**Step 5:** Convert DW biomass into kilograms of carbon (C) by multiplying by the constant 0.50. C = DW × 0.5 kg.

**Step 6:** Convert stored carbon into stored carbon dioxide (CO<sub>2</sub>) by multiplying by the constant 3.67 as follows: CO<sub>2</sub> = C \* 3.67 kg.

**Step 7:** Stored carbon dioxide is to be reported in metric tons. Therefore, results calculated in kilograms must be multiplied by 0.001 to convert to metric tons.

## Carbon markets for HWP

Carbon markets in 2007 was valued at \$ 67 billion globally of which \$ 50 billion was traded through the European Union Emission Trading Scheme (EU-ETS) a major market for greenhouse gas (GHG) emission allowances (EU- ETS was launched on January1, 2005). The continued growth of the Chicago Climate Exchange (CCX) resulted from increased interest and activity as market players responded to state level, regional and federal developments in climate policy in the United States is shown in Table 3.

The New South Wales Green House Gas Abatement Scheme (NSW GGAS) market saw a sharp increase in volumes traded and thereafter New Zealand launched its own ETS, covering all GHG and progressively including all sectors, starting with forestry in 2008 (Capoor and Ambrosi, 2008). India's first carbon exchange was established in Mumbai in collaboration with CCX and as part of Mumbai Multi commodity exchange. In 2007, the voluntary markets to reduce emissions doubled in volume terms (42 MtCO<sub>2</sub>e) and tripled in value terms (US\$265 million) from the previous year. The harvested wood product industry has a strong case to make use of these emerging market opportunities based on our study.

**Table 2.** Summary of a detailed SWOT analysis of handicrafts of SMEs of Saharanpur.

<b>Strengths</b>	<b>Weakness</b>
1. Rich tradition of excellence in art and craft 2. Development of supply chain with skill specialization 3. Component level manufacturing , providing it the efficiency and skill requirement 4. Achievable and acceptable social standards 5. Labour law conforming to ILO convention 6. High employment potential 7. Highly export driven for foreign exchange accrual.	1. Unorganized marketing and inadequate market information 2. Inadequate support mechanism for product development 3. Power interruptions and inadequate infrastructure facilities 4. Inadequacy of raw material at appropriate price and no legal mechanism for procurement 5. Lack of mechanism for dispersal of innovative technology for enhancement in production and finishing 6. Lack of investment for fulfilling of international standards 7. A general poor image of the country as supplier of quality goods with consistency.
<b>Opportunities</b>	<b>Threats</b>
1. A large trained skilled manpower base 2. Existing international collaborations 3. Existing social interventions and structure 4 Traditional knowledge base 5. Growing demand in export market quality products 6. Reduction in demand for mass produced products in Europe and USA 7. Growing environmental concern 8. Growing sophistication and buying power of Indian consumers	1. Competitors gaining market share on strength of volume price 2. Competitors edging out Indian exporters on strength of quality 3. Growing environmental concerns in the country affecting supply of raw material 4. Lack of coordination between institutions affecting production and exports 5. Increased competition among indigenous suppliers leading to price wars , high transport cost. 6. Excessive reliance on state incentives and prospects.

Source: Planning Commission (2005)

**Table 3.** Major carbon markets and potential for HWP.

<b>S/No.</b>	<b>Existing market mechanisms</b>	<b>Status of harvested wood</b>
1	EU –ETS	Harvested wood under consideration for the post Kyoto
2	Chicago Climate Exchange (CCX)	period Carbon in LLWP is already credited
3	New South Wales exchange/ Australian Climate Exchange	Carbon in HWP will be considered for future transaction with respect to
4	UKETS	VCS Parallel to EU ETS- Not Identified yet
5	Multi Commodity Exchange- Mumbai, India (MCX)	Affiliated to CCX for carbon trade. Trade in Harvested wood products /LLWP can be explored.

### Long lived wood products in CCX

Harvested wood products under EU ETS are also known as long lived wood products (LLWP) under the Chicago Climate Exchange. While exploring carbon credits for HWP is still a nascent development under the UNFCCC, the same has already become operational in the CCX mechanism. A protocol and conceptual framework has been already developed for reporting and accounting carbon sequestered in LLWP (Figure 2).

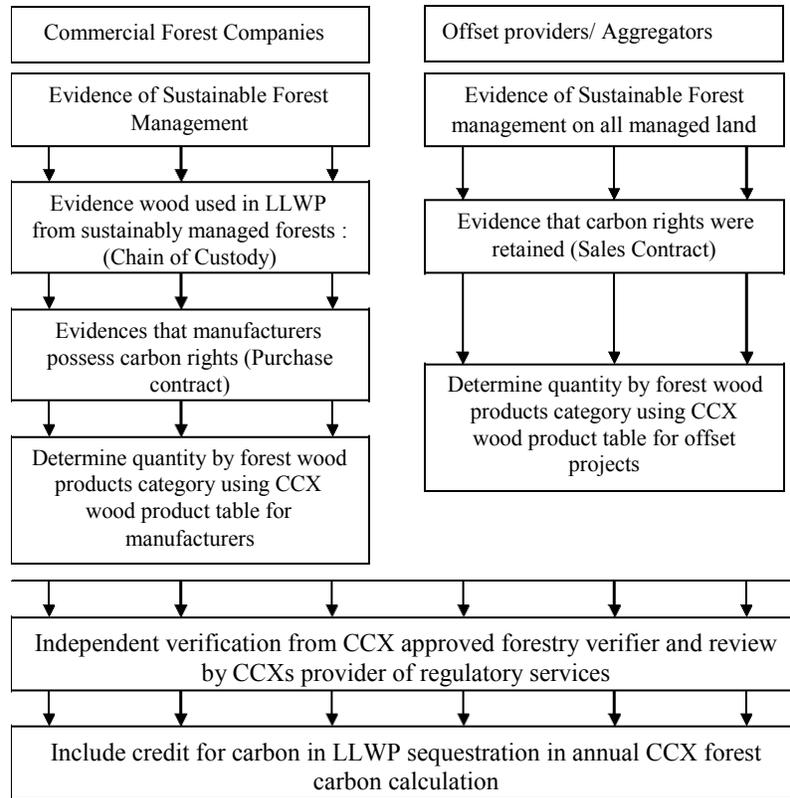
## RESULTS AND DISCUSSION

### The production process of wooden handicrafts

The harvested wood undergoes a lengthy wear and tear

process before becoming an art piece or product. The SMEs mostly procure raw wood or harvested round wood from the local auction centre (Mandi) at Saharanpur. It is estimated that each SMEs procure about an average quantity of 10,000 kg of round wood in a week. Once this is procured, they send this to a local saw mill for converting to wood planks of required size or get it done within the unit area. This is required to get a texture and thickness ready for carving. This results in loss of 10% of wood as waste. Out of this (that is, about 10 quintals of biomass waste) 7% is used by the plywood industry and 3% by the brick kilns for burning the bricks.

This follows with the seasoning and chemical treatment as per the requirement. The seasoning is carried out for 10 to 15 days in seasoning plants where it is treated to save pest



**Figure 2.** Conceptual Framework for crediting carbon sequestered in LLWP, Source: CCX Rule Book (2003), Section 7.2.3, CCX protocol for crediting carbon in long lived wood products.

10 to 15 days in seasoning plants where it is treated to save pest and termite attacks. There are two seasoning plants available in the Saharnapur area for this purpose. Thereafter, these wood planks have to pass through planing and band saw machines. This results in loss of an additional 7% of remaining wood as waste. Some of this waste is used by brick kilns, plywood industry and are also used to heat boilers, in seasoning plants and in household as fuel for cooking (Figure 3) . The next steps involve movement of the treated wood through planing and gauge machine resulting in the loss of another 7% of wood as waste in the form of dust. This dust is collected and mostly used by the workers as fuel wood in their houses. The fine carving is done in Jigsaw machine and through hand planner. This results in wood loss of 3 and 1% respectively. Chiseling or Chillai with different types of sharp-edged cutting tools is done after carving. Sometimes, according to requirement, trelliswork or jali-katai has to be done. Lathe work or kharad is required for making certain kinds of woodenwares like bowls, plates, vases, rings and all types of objects- round, spherical and cylindrical. The final look of a product is given through sanding, staining and coloring of the product. Thus, finally the total amount of wooden biomass left out in the wooden handicrafts is about 74.28 per cent of the total biomass harvested. Most of these handicrafts products

are exported. The major export markets of these wooden handicraft products are in North America, Europe and Australia. Waste generated in the above chart can also be mentioned in discussion for additional credits under CDM.

### Estimation of carbon in harvested wooden handicraft products

The average consumption of wood (any broad leaf species) per SME unit in Saharanpur in a week has been estimated as 10,000 kg approximately. These SME units may be a cluster or many small single room units or a single big factory with its own production centre. The carbon content was calculated as per the CUFR Tree Carbon Calculator method (DRAFT Annex C , Urban Forest Project Reporting Protocol, The US Forest Service Center for Urban Forest Research, July,2008, [www.arb.ca.gov/cc/protocols/urbanforest/pubs/2008\\_07\\_07\\_annex\\_c\\_biomass.pdf](http://www.arb.ca.gov/cc/protocols/urbanforest/pubs/2008_07_07_annex_c_biomass.pdf) -) (Table 4).

The potential benefits of harvested wood from carbon markets has been estimated based on the total CO<sub>2</sub>e that can be traded and the prevailing value of this in the voluntary market (Chicago Climate Exchange). It is estimated that the annual benefits from carbon markets

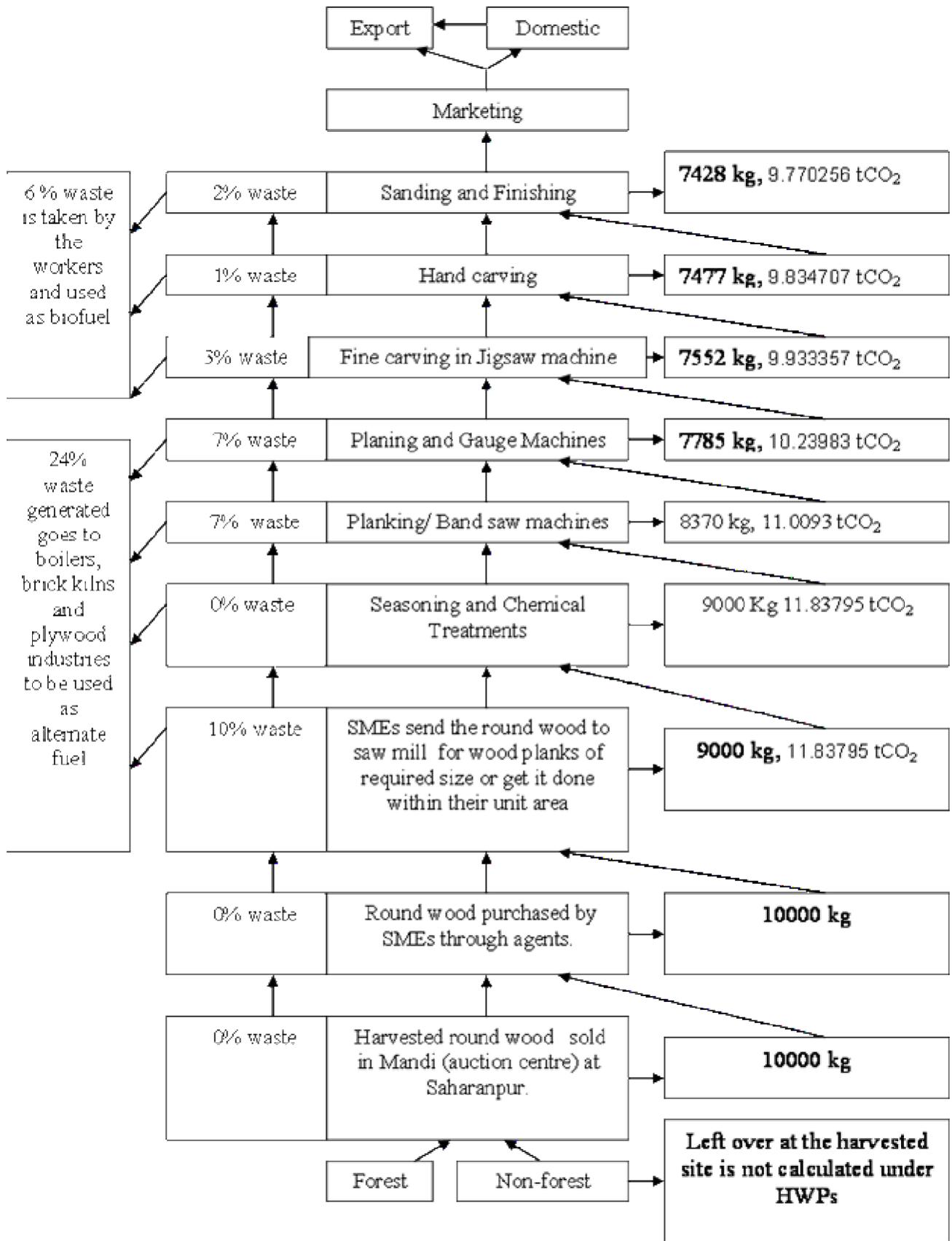


Figure 3. Production process of SME wooden handicraft products.

**Table 4.** Estimation of CO<sub>2</sub>e in harvested wood products in different stages of production process in one SME unit in a week.

Stages of production process	Input wood mass (kg)	Output wood mass (kg)	Wastage (%)	Total fresh weight (TFW) (kg)	Total DW (kg)	Total carbon content (TC) (kg)	CO <sub>2</sub> e (Metric tonnes)
I. Saw mill	10000	9000	10	11520	6451.2	3225.6	11.83795
II. Planking/ Band saw machines	9000	8370	7	10713.6	5999.616	2999.808	11.0093
III. Planing and Gauge Machines	8370	7785	7	9964.8	5580.288	2790.144	10.23983
III. Fine carving in Jigsaw machine	7785	7552	3	9666.56	5413.274	2706.637	9.933357
IV. Hand Carving	7552	7477	1	9570.56	5359.514	2679.757	9.834707
V. Sanding and Finishing	7477	7428	2	9507.84	5324.39	2662.195	9.770256
<b>Total</b>			30				

**Table 5.** Estimation of carbon content from harvested wood products and SMEs in Saharanpur

S/No	Details	Calculations	Value
1	CO <sub>2</sub> e for one unit for one week		9.770256
2	Co <sub>2</sub> e for one unit for one year	9.770256* 52 weeks	508.053312
3	Co <sub>2</sub> e for 3500 units	508.05*3500	1.78 × 10 <sup>6</sup>
4	Value of 1 ton of CO <sub>2</sub> e	(as per the CCX prevailing rates for HWP)	\$3
5	Value of CO <sub>2</sub> e for one unit for one year	508.053312*\$3	\$1,525
6	Registered SME wooden handicrafts units in Saharanpur		156
7	Total value of CO <sub>2</sub> e for 156 units	\$237,768.95	\$0.24 million
8	Value of CO <sub>2</sub> e for 3500 unregistered units	\$1525*3500	\$ 5.34 million
9	Total value of CO <sub>2</sub> e for both registered and unregistered units in Saharanpur	\$0.24 + \$5.34 (million)	\$5.58 million.

for one SME wooden handicraft unit is about \$1,525 and the same for all units together will be about \$5.28 million or Rs. 258.72 million ( Table 5)

It was noticed that the best option to avail these benefits was to initiate the process through an association of SME wooden handicrafts or a agency, including those set up by the government rather than individual SMEs themselves. There are several such agencies currently in operation in the area. There is a need to develop an integrated project in the area to address energy efficiency, innovative technologies that reduce waste, improving the quality of supply and sourcing wood from sustainably managed and certified forests and trees outside the forests.

#### Potential CDM benefits

The Clean Development Mechanism (CDM) projects

secured 91% of the carbon market globally in 2007 in value terms in the category of project based transactions. The primary transactions of CDM in 2007 were valued at \$7.4 billion. Most of the demand came from the private sector with India being one of the major beneficiaries.

In terms of energy use by the SMEs in Saharanpur electricity generation provided by the State Electricity Board was not sufficient to meet the demand for the wooden handicraft units. Therefore, these units met their energy requirements through diesel based generators set up in every individual units. The expenditure for electricity on annual basis has been estimated in Figure 4 at about Rs 52, 606 per SME Unit where as the amount spent for fuel for running the diesel generators to meet energy needs was Rs176, 289, 00 which is very high including the electricity cost. The results indicate that there is high potential for CDM benefits from carbon markets if these units switch the source of energy consumption from diesel to non conventional energy sources. These CDM

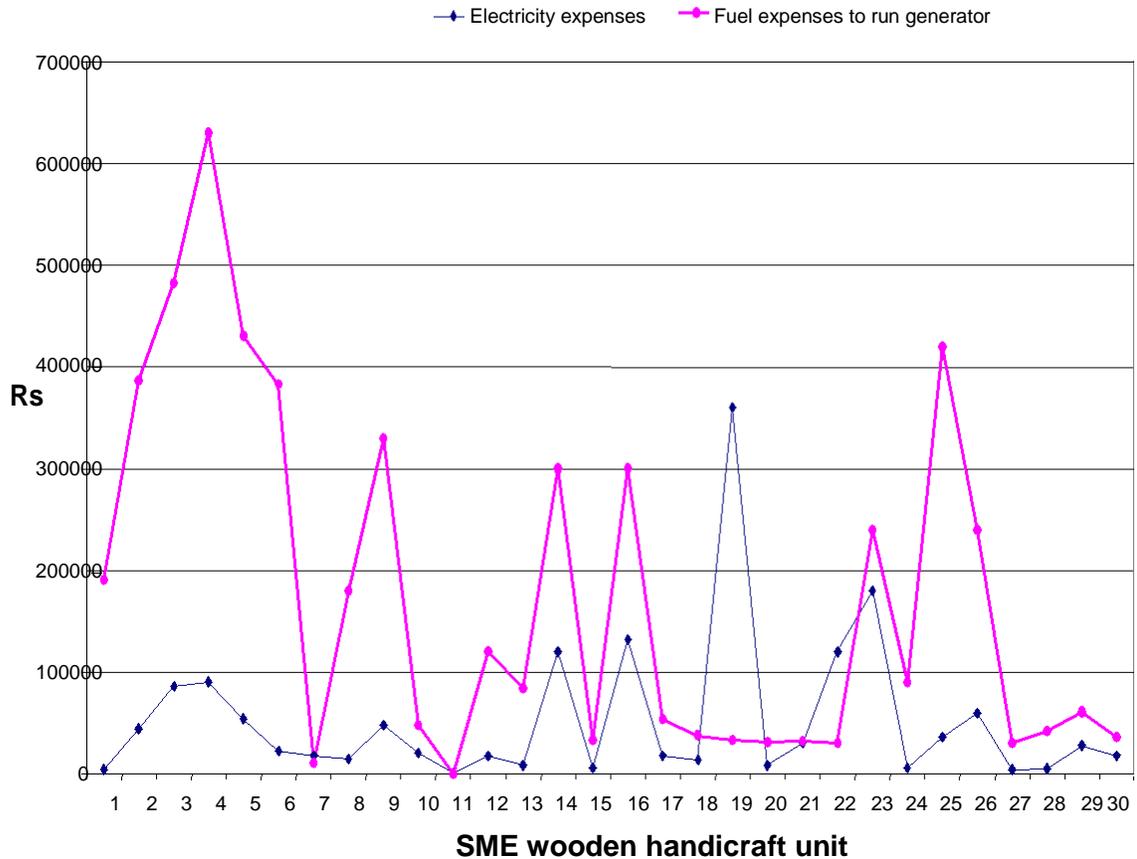


Figure 4. Expenses for electricity and fuel consumption in the SME units of Saharanpur.

benefits are not estimated in this paper but are additional to the potential benefits from carbon markets for harvested wood products.

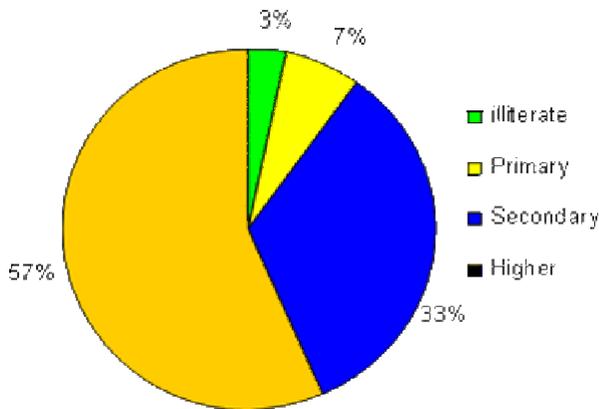
### Forest certification

Forest certification has become one of the prerequisites to avail the benefits of carbon markets for harvested wood products. Forest certification is the process of inspecting particular forests or woodland for verification by an independent evaluator according to an agreed set of standards from environmental, social and economic perspectives. Forest certification involves two set of certification processes, forest management unit certification (FMU) and chain of custody (CoC). While FMU certifies the forests, the CoC is the process of tracking the products harvested from the certified forests to the point of sale

In India, forest certification process is still at a nascent stage. Presently, the country has one forest management unit certification (FMU) and a few Chain of Custody certifications by the Forest Stewardship Council (FSC). In 2008, the Ministry of Environment and Forests, Government of India constituted a committee on forest certification with a view to establish a national forest

certification system. The wooden handicrafts units in Saharanpur currently source wood from the areas which are not presently certified. The situation is likely to change in the coming years as more areas are brought under the certification process. The survey (47/ 156 Registered SME Units) shows that the SMEs are willing to source wood from known sources and to obtain forest certification. The willingness for certification was closely correlated with the level of awareness and education of the SME entrepreneurs (Figure 5)

Traditionally, the Saharanpur wooden handicraft units source harvested wood largely from the forests and adjacent areas in the States of Uttarakhand, Uttar Pradesh, Bihar, Himachal Pradesh and the North Eastern States. The changes in forest policies and introduction of other conservation measures in the country have influenced the sourcing of wood and the growth of wood based industries in general. The timber from natural forest areas has been banned and the supply from government forest plantations and production forests have become insufficient. This has resulted in sourcing wood largely from privately owned areas, including farm forestry/ agro forestry areas in the region. These SMEs are presently not using imported wood due to cost procurement of imported wood becomes cheaper and there is an increase in demand for wood from certified



**Figure 5.** Willingness to forest certification among SMEs and level of education.

forests. Export of wooden handicrafts have recently shown a decreasing trend due to the recent global financial crisis. Among other factors, demand for forest certification is significant (EPCH, 2009) {(In the wooden handicrafts sector the export have decreased from US \$ 24.42 Million in 2008- 2009 to US \$ 18.47 Million in 2009 which shows a decrease of 24.37 %. In the year 2008-2009 (EPCH Export Review Report, 2009 April).}

## Conclusion

The potential of availing carbon benefits from harvested wood products is mainly from the voluntary market. The study shows that the annual economic benefit of harvested wood products from SME wooden handicraft units in Saharanpur is about \$5.28 million. Additionally there can be CDM benefits from the waste generated from HWP processes. There are several constraints considerations but the situation is likely to change as availing these benefits, including the development of a forest certification framework in the country since the certification is a pre requisite. There is a need to develop an integrated project in the area to fulfill the requirements of carbon markets with the active support and cooperation from these SMEs. These projects can be initiated by the district administration and cooperative societies in collaboration with NGOs. The above initiatives will improve the quality of products provided there is basic support and enabling mechanisms. Adequate policy support is also required to promote wood based products in the global carbon market.

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