Sustainable Cities and Society 22 (2016) 104–115

Contents lists available at ScienceDirect

Sustainable Cities and Society

journal homepage: www.elsevier.com/locate/scs

Role of different stakeholders in trading of reusable/recyclable urban solid waste materials: A case study

Surindra Suthar*, Poonam Rayal, Chetan P.S. Ahada

School of Environment & Natural Resources, Doon University, Dehradun 248001, India

ARTICLE INFO

Article history:
Received 23 May 2015
Received in revised form 7 January 2016
Accepted 24 January 2016
Available online 26 January 2016

Keywords:
Resource conservation
Material recovery
Informal sector
Rag pickers
Household waste
Waste recycling

ABSTRACT

This study aimed to investigate the role of different actors/stakeholders in informal waste recycling/trading system in the Dehradun city, India. An extensive survey on waste recycling/trading system was conducted through a defined methodology and framework of material flow was prepared. Results suggested three operation levels of collection/segregation of recyclable waste articles: (i) household, commercial points and shops, (ii) community waste dumping points and, (iii) municipal waste dump site of the city. The major stakeholders in waste trading system of the city identified as: households, itinerant buyers (*Pheriwala*), waste pickers, middleman (small dealers), large dealers, and remanufacturing industries. A variety of direct value waste articles (e.g., old news papers and books/magazines, wooden furniture, cardboard/cartons, plastic scrap/polythene bags, iron and non-ferrous metal scrap, glass scrap, rubber, electrical/electronic articles) are being traded in this waste trading network and estimated quality of this material is about 362.4 t per month. The end users in this network are poor house-dwellers and remanufacturing industries. Results suggest that remanufacturing industries are the main buyer of these direct-value materials (paper, iron, rubber, non-ferrous metals, empty liquor/wine bottles etc.). The sharing of benefit/margins by different stockholders in this waste trading system depends upon a variety of political, social and economic factors. The study revealed that informal waste recycling is not only a waste reduction practices but also creates opportunities for urban poors as livelihood earning. Informal waste cycling thus can be promoted as sustainable approach to design a community based solid waste management program for developing cities in low and middle income countries.

1. Introduction

The solid waste collection and its safe disposal is one of the major issues in fast-growing urban centers in the world. According to a report of International Solid waste Association (ISWA), today the total amount of municipal solid waste (MSW) generated annually worldwide is more than 1.6–2.0 billion tons (ISWA, 2012). The increase in human population and gross national income (GNI)/capita growth in developing countries are the major drivers in increasing quantity of MSW from urban centers. To tackle this mammoth problem there is need to introduce sustainable approaches in existing conventional MSW management systems in majority of cities of developing nations. However, the waste management is now becoming resource conservation practice (ISWA, 2012). The R-3 (reduce, reuse and recycle) approach is being promoted globally as an integral part of sustainable solid waste management model in modern waste handling practices because of its dual benefits—conserving precious natural resources and minimizing the burden of MSW reaching at waste dumpsites (Sudhir, Muraleedharan, & Srinivasan, 1996; Seik, 1997; Kaseva & Mbuligwe, 2000). Environmental protection agency of US (US EPA) has recognized the recycling as the "most environmentally sound" strategy for dealing with MSW following only the preventive strategy of source reduction and reuse (U.S. EPA, 2004). There is growing concerns over economic and environmental impacts of recycling practices in the formal MSW management system in developing countries. The waste recycling is desirable from environmental (Kaseva & Gupta, 1996), economic (Van Beukering & Curlee, 1998) and social (Misra & Pandey, 2005; Ferrara, 2008) points of view. Furthermore, empirical studies have shown that the solid waste recycling/reuse reduces the environmental damage and is an import-substituting economic activity which also saves energy, conserves resources and saves waste collection and

* Corresponding author. Tel.: +91 135 2255103.
E-mail addresses: sutharіitd@gmail.com, sutharss_soilbiology@yahoo.co.in (S. Suthar).

http://dx.doi.org/10.1016/j.scs.2016.01.013
2210-6707/

disposal costs (Kaseva & Gupta, 1996). In developing countries the waste recycling/reuse systems is in practice since centuries, as an integral part of the consumer society (van Eerd, 1997; Scheinberg, 2001; Kaseva, Mbuligwe, & Kassenga, 2002; Hicks, Dietmar, & Eugster, 2005; Wilson, Velis, & Cheeseman, 2006). Few earlier studies have reported the socio-economic aspects of community-level solid waste recycling/reuse practices in developing counties like, Tanzania (Kaseva & Gupta, 1996; Kaseva & Mbuligwe, 2000; Kaseva et al., 2002;); Nigeria (Ezeah, Fazakerley, & Roberts, 2013; Ezeah & Roberts, 2014), Pakistan (Anjum & Deshazo, 1996); India (Sudhir et al., 1996; Patra, Anwar, & Chaud, 2000; Haque, Mujtaba, & Bell, 2000); Singapore (Seik, 1997) and Taiwan (Lee, Chang, & Tsai, 1998). In all these studies, the solid waste recycling has been advocated as environmentally sound, economically feasible and socially acceptable practices for achieving the goal of sustainable urban habitat development. Ezeah et al. (2013) have also pointed out that Informal Sector Recycling (ISR) activity can bring other benefits such as, economic growth, litter control and resources conservation. Few studies in Asia and adjoin part have revealed the significant role of informal waste recycling sector in regional environmental, social and economic development. Asim, Batool, and Chaudhary (2012) investigated on rag pickers and their role in the recycling of waste in Southern Lahore. According to their reported information rag pickers recovers recyclable material about 525 t per month, which generate an income of US$ 30,875 per month. This practice also supports a huge part of local community in terms of livelihood. A recent case study from Bangladesh (*Rajshahi* city) has suggested the utility of recyclable direct value materials (iron, glass, plastic, papers etc.) in industrial remanufacturing as secondary raw materials (Bari, Hassan, & Haque, 2012a). This study suggests that waste extraction/recycling is a wide network of buyers and sellers which creates vast business opportunities for low-income people in the city. Recycling of precious materials like metals extends the efficient use of resources and reduces pressure on environment. According to Raghupathy and Chaturvedi (2013) in developing economies the waste recycling had been an integral part of industrial activity and has become a major concern due to the handling of potentially hazardous waste materials without following the occupational health and safety norms.

The studies have revealed that solid waste also creates opportunities for the urban poor communities in terms of employment and livelihood earning. According to Wilson et al. (2006) many thousands of people in developing country cities depend on recycling materials from MSW for their livelihoods and from a macroeconomic perspective, the informal waste recycling can bring significant economic benefits to developing countries. It is estimated that Informal Sector Recyclers (ISR) are around 20 million worldwide, almost 50% of the labour force involved in waste management (ISWA, 2012). However, in the majority of urban habitats, the solid waste recycling practices takes place at the generation, collection, illegal dumping sites and at the final disposal points (Kaseva & Mbuligwe, 2000). The trading of reusable/recyclable solid waste items is not a relatively new approach in waste management system in India but, very limited information is available in the published literature on this sector. However, a study published by Agarwal, Singhmar, Kulshrestha, and Mittal (2005) had suggested that the informal sector, comprising waste recyclists and a hierarchy of recyclable dealers, plays an important role in the management of solid waste in the Indian capital city of Delhi. The associated activity transports nearly 17% of the waste to the recycling units (RU). The role of informal waste recycling and trading system in urban settlements need to be quantified in order to enlist the contribution of this sector in the areas of employment generation, livelihood earning and resource recycling. The informal sector activities contribute to global recycling rates and create opportunities of employment in marginalized populations in urban centers. As per recent report of ISWA (2012) the recycling is one of the most important sectors in terms of employment creation and currently employs 12 million people in just three countries—Brazil, China and the United States.

The aim of this study was to analyze the overall picture of recyclable/reusable wastes trading system in the Dehradun city, India. The study aims to explore the issues of waste trading system in the city like: quality and quantity of wastes received at different points of waste trading chain in the city, the major stakeholders in this system, economical aspect of waste junk market of the city, material flow in waste trading network system etc. To achieve the goals, a systematic approach was designed to collect the primary information/data sets pertaining to this waste recycling network in the city. Since, waste screening and trading is an important part of the marginalized populations in the city but comprehensive study on the working mechanism of this system is not well taken by previous researchers for urban centers in Indian. This study can be taken as example to draw an illusion of waste recycling/trading mechanism in any small city/urban habitat of India.

2. Materials and methods

2.1. Study site: Geography, demography and MSW management in the city

Dehradun (Fig. 1), capital of Uttarakhand state is located at the foothills of Shivalik hill ranges in India. Being the capital of the State, the Dehradun is the center of power, trade and commercial activity. The city has an area of 67 Sq. km and surrounded by river Song on the east, river Tons on the west, the Himalayan ranges on the north and Sal forests in the south. The city is governed by Municipal Corporation which comes under Dehradun Metropolitan Region. As per Census of India (2001) the population of Dehradun is 578,420. The area receives an average annual rainfall of 2073.3 mm mostly during June to September. The average ambient temperature during summer and winter is 23.4 °C and 5.2 °C, respectively.

The population of Dehradun had increased significantly during last decade and issues related with population increments, e.g. solid waste disposal/management, safe water supply, sanitation, urban settlements are now more complex in the city. In 1981 and 1991 decades, the decadal change in population of Dehradun was 21.33% and 21.85% respectively. In the decade 1991–2001, Dehradun achieved the decadal population growth rate of 39.73%, which was considerably high than the national average of 21.53% (Census of India, 2001). It is assumed that the population of Dehradun will grow at the rate of 4% per annum for 5 years following 2009, 3.5% from 2010 to 2014, and 3.0% from 2015 to 2019 (UDD, 2007).

The municipal territory of the city is sub-divided into 45 different wards or sub-zones. The city garbage, i.e. municipal solid waste (MSW) production in the city is around 200 t/day. MSW collections, transportation, storage, recycling and disposal handled by the local private venture Doon Valley Waste Management (DVWM) in collaboration with Dehradun Nagar Nigam. For MSW collection a total of 105 CP (Compactor Pressure), 61 DP (Dumper Pressure) and 4 DP on loader are established in different blocks of the Dehradun municipality as community waste collection facility. For transportation of waste from block to block and from inter-colony community waste disposal points the waste collection and transportation following equipments has been deployed in the city: 42 tipper, 250 rishkas, 3 mini-truck loaders, 6 DP loaders, 4 compacters, 1 tractor loaders and 1 tractor DP (personal communication with DVWM).