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Mary Downs  
*COLEF, Chula Vista, California*

Martin Medina

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## A Brief History of Scavenging

MARY DOWNS

MARTIN MEDINA

### *Introduction*

The recovery of materials from waste to be reused or recycled has been carried out for millennia, and probably throughout the whole of human history. Wastes result from the production and consumption processes by which society satisfies its needs. Wood, ceramics, metals, glass, paper, textiles and food wastes represent some of the most commonly discarded materials. When these materials are no longer needed, they are discarded and become part of the waste stream. Yet such materials may be useful and are considered a resource by others. Scavengers, those individuals who informally recover items from waste for the purpose of reuse or recycling, play an important role in transforming objects of discard into objects of value. In this role, scavengers are mediators in the relationship between societies and their environment.

In contemporary societies, scavenging activities reduce the amount of wastes that need to be collected, transported and disposed of, and extend the life of dumps and landfills. Reuse and recycling also render environmental benefits: they reduce water and energy use and lower pollution of solid, liquid and gaseous byproducts, compared with the manufacture of products from virgin resources. Thus, scavenging reduces society's exploitation of natural resources, a necessary step towards minimizing the impact of human society on the environment, and towards a sustainable development.<sup>1</sup>

Despite the clear environmental benefits of scavenging, it is an activity that has received little attention from scholars. While the impact of scavenging may once have been limited to the immediate physical and cultural environment of villages or towns, it today constitutes an activity that has significant implications for the economy and environment, particularly in devel-

oping countries. Scavenging remains a poorly understood social and historical phenomenon. Scavengers have been portrayed as poor and marginal. Yet in both agrarian and industrialized societies, past and present, there is clear evidence that they are not always poor, and that they play an important role in supplying raw materials for agriculture, petty commodity production and industry.

In the interests of providing a history of scavenging over the long term, this article looks at some patterns and developments of scavenging. Our concern here is with the materials that have been recovered by scavengers, as well as on the economic and environmental aspects of this occupation, although it is also clear that social and religious attitudes toward wastes vary significantly across time and space. A clear relationship emerges between the development of technologies and the reuse / recycling of materials: materials begin to be reused or recycled soon after their development. Metals, paper, and glass, for instance, started being reused and recycled almost immediately following their refining and invention by humans. Lastly, this article examines in particular the effect that chronic poverty, war and economic crises have had on scavenging activities throughout human history.

Scavenging and recycling activities are hardly new or recent. They have existed for millennia. Yet throughout, it is clear that scavenging represents an adaptive response to scarcity.<sup>2</sup>

### *Scavenging in Prehistory*

Some of the earliest instances of coping with scarcity occur in hunting-gathering societies, where seasonal variations in the availability of plants, and risks associated with hunting, may have been compensated by scavenging. In Africa, for instance, it is clear that early hominids scavenged in order to complement their diet, especially during the dry season, when plant foods were most scarce. Risks associated with hunting may have been avoided by the scavenging of animal meat killed by predators, or dead from natural causes. Blumenschine and Cavallo, indeed, argue that scavenging may have been more important to human

survival and evolution than previously thought. Among contemporary societies in sub-Saharan Africa, human scavenging of meat from dead animals has been observed. Chimpanzees and baboons have also been observed scavenging the kills of cheetahs and leopards. Blumenschine and Cavallo, in fact, hypothesize that two million years ago scavenging may have been more common than hunting. They have found some evidence of early hominids' use of stone tools to extract bone marrow from carcasses of dead animals. Thus, scavenging might have played an important role in the survival of the human species.<sup>3</sup>

### *Scavenging in Antiquity*

When humans lived a nomadic existence, waste disposal was not a major concern, since wastes were usually dumped around people's foraging areas. The wastes generated by hunter and gatherer groups were mostly organic in nature, such as bones, feathers, shells, the inedible portion of fruits and vegetables, as well as ash from fires, and old stone items. With the advent of permanent settlements in the Neolithic, waste disposal started to become an issue. It became apparent that some wastes could be reused or recycled since reuse or recycling involve less effort and time than obtaining virgin resources. Archaeological evidence suggests that metal scrap and metallic objects no longer useful may have been melted and recycled as early as 3000 B.C., the beginning of metallurgy. Pieces of broken pottery were also reused or recycled soon after pottery was invented. Plunderers along the Mediterranean coast are said to have dismantled the giant statue of the Colossus of Rhodes - felled 800 years earlier by an earthquake - and sold the bronze to weapons makers for melting.

Ancient civilizations displayed different attitudes toward solid waste and towards the people who routinely came in contact with those wastes. In most cases, garbage presented considerable problems for ancient cities. For some, however, living amid refuse seemed not to be a serious consideration; for others it was simply a nuisance, while still others made every effort to

maintain clean surroundings and to dispose of wastes in a way they considered proper. The inhabitants of ancient Troy, around the year 1200 B.C., simply left their wastes on the floor of their homes or threw them into the streets. Urban settlements in the Near East now appear as "tells": sites inhabited from the Neolithic through the Bronze Age that consist of superimposed habitation levels. In various African cultures similar habits prevailed and, as a result, street levels rose and new homes had to be built on higher ground. This practice forms the basis of archaeological stratigraphy. The Minoan civilization -which flourished in Crete from about the year 2500 to 1500 B.C. - collected its wastes and disposed of them in holes, covering the refuse with earth at alternating layers. The Minoans, thus, developed the basic idea of what later would become known as sanitary landfills. And in ancient Egypt, the later occupants of Amarna -the city founded by Akhenaton in 1400 B.C. and later abandoned- excavated houses searching for things the original occupants had left behind.<sup>5</sup>

The main centers of the classical cultures in the Mediterranean--Athens and Rome--encountered major problems in the disposal of wastes generated by their inhabitants. Athens, with a population of 315,000 at its height around 500 B.C., created the first 'municipal dump' known in the Western world and city sewers provided fertilizer for nearby agricultural fields. The Council of Athens enacted an ordinance requiring scavengers to dispose of the wastes they collected at least one mile from the city walls. Some scavengers were also engaged in the collection of mixed wastes, and not only in the recovery of reusable and recyclable materials, as the previous ordinance refers to scavengers primarily as refuse collectors. Athens also enacted the first known edict against throwing refuse into the streets.<sup>6</sup>

Ancient Rome, due to its large size -about one million inhabitants in the reign of Augustus (31 B.C.-A.D.19) - generated a large amount of wastes and undertook several measures to deal with them. Street cleaning is mentioned in many Roman laws, and in inscriptions in the eastern Mediterranean at cities such as Pergamum. Julius Caesar, for instance, required citizens to sweep

clean the street in front of their homes. Much of the waste Rome generated was flushed out through sewers -particularly through the Cloaca Maxima, Rome's main sewer, installed ca. 500 B.C. - and then into the sea. The Tiber was the repository for all sorts of wastes, including dead animals, corpses that had been denied burial and stale grain. Several emperors dredged the river in order to remove the accumulated refuse. Augustus widened the bed of the river, cleaned it up and appointed supervisors of the riverbed and banks of the Tiber (*curatores alvei et riparum Tiberis*). Trajan (ca. A.D. 100) incorporated the sewers into the jurisdictions of the attendants and Aurelian (ca. A.D. 400) later followed Augustus' example.<sup>7</sup>

Contact with wastes in ancient Rome was considered shameful. Slaves collected and disposed of the waste produced by wealthy Romans. Trajan had convicts clean up the sewers of Rome. Cesspool cleaning was regarded as particularly demeaning, and the individuals who carried that out had one of the lowest status jobs in Roman society. Sanitation in Rome was deficient and posed risks to human health and the environment. Rats were abundant since they had plentiful sources of food and they could move and breed easily in the sewers. As a result of inadequate sanitation and waste disposal, periodic epidemics affected Rome and other Mediterranean cities.<sup>8</sup>

Despite the deficient sanitation and waste management, the Romans did engage in the reuse and recycling of various materials: in 1992, Italian archaeologists discovered a sunken ship in the Adriatic Sea containing parts and pieces of Roman bronze statues. The age of the bronze cargo ranged from the fourth century B.C. to the third century A.D. and is believed to be the first tangible proof of commerce in the recycling of ancient bronzes. Such bronzes were probably going to be melted and recycled into new products. Pliny the Elder mentioned in his writings the reuse of scrap copper and the manufacture of bronze mirrors in Brindisi in the first century A.D.<sup>9</sup>

Additional reuse and recycling activities in Rome included the following. Peddlers were common in Rome, selling, among

other things, used clothes. Older stone buildings were often dismantled and the stones reused to construct new buildings. The reuse of older monuments was undertaken not only for practical purposes, but also had an aesthetic element to it. Possibly the best known example is the Arch of Constantine, in Rome, in which the fragments of earlier monuments of Trajan and Marcus Aurelius appeared. Independent scavengers collected solid wastes and excrement, which they sold to farmers as fertilizer. In the city, the "manure merchants" collected human excrement from the trenches that served as sewers and sold it to farmers. Urine was collected and used in the dyeing of fabrics and by fullers to cleanse clothing. Emperor Vespasian (A.D. 69-79) had urinals installed in public places and imposed a "urine tax" on their operators, who reportedly made a good business by selling the collected urine. Fullers placed jars outside their establishments for people to urinate in them, obtaining the urine for free. Fullers also collected the soft fluff produced by their combing of clothing, which was used to stuff cushions and pillows. While the Romans made great use of stone, bronze and wooden tablets to announce notable events, they also used reusable tablets on which wax could be erased or corrected, a practice that had a more benign effect on the environment.<sup>10</sup>

In China, records of the second century B.C. indicate the existence of a "sanitary police" force which was in charge of removing human and animal carcasses and of a "traffic police" that supervised, among other things, street sweeping in the major cities. Researchers have found in China samples of paper made from linen rags dating to 65-66 B.C., probably collected by scavengers. For centuries, Chinese farmers have collected human excrement or 'night soil' from roadside public latrines and used it as fertilizer in their fields. Farmers also acquired excrement from scavengers who collected it in urban areas. Excrement was so valued by Chinese farmers that they referred to the containers used to store it as 'honey pots.'<sup>11</sup>

Religion played an important role in the development of sanitary practices in the ancient world. One of the most remarkable



examples concerns the Jewish laws of cleanliness. Around the year 1600 B.C., a code attributed to Moses included sanitary laws that required every Jew to remove their own waste and bury it far from their homes. These laws have been preserved and expanded over the centuries. In India, the harijans -formerly untouchables- have historically been responsible for collecting the wastes generated by all castes. Islam also considers the handling of wastes an impure activity. Consequently, non-Muslims performed -and still do- that task in Islamic countries. Shinto religion influenced the Japanese concept of cleanliness and their avoidance of things dirty. As a result, Japanese outcasts were in charge of removing corpses and dead animals from the streets, and performed tasks considered dirty by the general population.<sup>12</sup>

In the New World, the Maya engaged in the reuse of various items, such as broken pottery, ground stones and stones taken from old buildings as fill in temples or other buildings. They saved resources by using used or broken, rather than new items - jewelry, pottery and tools- in burials. The Maya also substituted less valuable, imitation for original art. Many of these reuse and recycling activities are apparent after the year 1200 in the Late Postclassic Period, and were perhaps an adaptation to economic decline. Other cultures reused and recycled pottery as well. Reuse of pottery was carried out by putting together pieces of broken objects and holding them with metal. Several cultures recycled pottery as well, collecting broken pieces of pottery, grounding and using them as temper in the manufacture of new pottery.<sup>13</sup>

Aztec scavengers were popularly known as *pepenilia*. The Aztecs engaged in intensive recycling: in their capital Tenochtitlan – present-day Mexico City – scavengers collected human excrement from the public latrines and used it as fertilizer, as well as in the tanning of hides. The excrement was so valued by farmers that it was bought and sold in Tlatelolco, the city's largest market. Each household had containers to store urine, which the Aztecs used as mordant in the dyeing of fabrics. Organic waste, in addition to being used as fertilizer, was fed to



fatten the edible dog as *izcuintli*. The Aztecs had a high sense of order and cleanliness. Under Moctezuma II's rule, littering and the dumping of garbage was banned and penalized, and there were officials in charge of street sweeping. The Aztecs emphasized the productive use of their wastes and they also enacted harsh laws to protect the environment: the Chichimec Code prescribed the death penalty for cutting down a living tree.<sup>14</sup>

*Scavenging in the Middle Ages, Renaissance and Early Modern Periods*

In Medieval Europe, skimmers, glove makers and curriers often located their operations downstream from dyers in order to take advantage of the alum flushed in the river. Human excrement provided fertilizer for backyard gardens and much of the household garbage was fed to pigs. Artisans collected urine and dog excrement for industrial purposes and used them to make saltpeter. In the fourteenth century, scrap dealers in Florence enrolled in the same guild as copper engravers.<sup>15</sup>

In Samarkand, Baghdad, Cairo and Damascus paper was made from rags in the ninth century. Rag collectors salvaged hemp ropes, fishing nets, footwear soles and robes to be sold to papermakers. Records show that during the twelfth and thirteenth centuries Bedouins and Arabs looted Egyptian graves in order to recover burial clothes, to be reused or sold for recycling to papermakers. Papermaking from rags was introduced to Europe - via Spain - by the Arabs in the tenth century and it extended throughout Europe and North Africa between the eleventh and thirteenth centuries. During that period, rag collectors in Spain were known as *pannorum collectores* or as *pannicolorum collectores* (collectors of rags and 'little rags', respectively). And post-consumer rags used in papermaking were called *resuris veterum pannorum* ('shaved old rags') in the twelfth century.<sup>16</sup>

For much of the period between the thirteenth and eighteenth centuries a chronic scarcity of rags existed in Spain and most of Europe. Demand for paper kept increasing while the supply of rags did not, because clothes were used as long as possible and

discarded infrequently. Further, most clothes during this period were made of wool, a material not suitable for making paper. Rag collectors kept recovering post-consumer rags during this period, and they were known in Spain as *traperos*. The recovery of post-consumer rags for papermaking during the seventeenth and eighteenth centuries was of such economic importance that it commanded royal attention. For instance, in Spain Felipe IV issued a decree in 1641 banning the export of rags collected in Murcia and Castilla and ordered that they be sold exclusively to an individual named Juan Otonel. Also in Spain, another royal edict exempted Catalanian rag collectors, middlemen and papermakers from any taxes on the collection and transport of rags and paper. The shortage of rags was so acute in 1778, that Felipe II authorized the *Reglamento de Libre Comercio de Indias* (free trade law between the Spanish Crown and its territories in the Americas), which exempted the rags collected in the Spanish colonies in the Americas from the payment of taxes. Thus, this law attempted to encourage Mexican rag collectors -also known as *traperos*- to collect more rags, which would be shipped to Spain, transformed into paper, part of which would be sent back to New Spain.<sup>17</sup>

Poverty afflicted a large percentage of the European population for several centuries. In eighteenth-century France, for instance, about half of the population was permanently destitute. Also about half of the population in Sweden in 1815 were either landless peasants or beggars. Having low incomes with little to spend on clothing, garments were valuable. Hospital regulations in Perugia in 1582, for example, provided that the clothes of the deceased should be given to their lawful inheritors. As a result of widespread poverty, people discarded old clothing infrequently and in small quantities. It has been estimated that French scavengers in 1760 collected at the most 2 kilograms of white linen a day. White linen constituted the most suitable raw material to make paper.<sup>18</sup>

Conditions in New Spain (colonial Mexico) were no different from Europe regarding poverty and scarcity of rags. Anecdotal evidence shows that in the late seventeenth and early

eighteenth centuries scavengers recovered rags from Mexico City's waste. Mexican *traperos* sold the linen, cotton, hemp and other types of rags either to middlemen or directly to the paper mills. By the end of the eighteenth century the supply of paper in New Spain was so insufficient that prices doubled. The high prices paid for paper encouraged the plundering of offices and archives. In this way, documents and books -in some cases more than one hundred years old- were stolen and mutilated. Vendors bought the stolen paper, and used it to wrap merchandise, as well as to make fireworks. As a result of the scarcity and high paper prices, official documents were reduced in size, and government employees were urged to shorten the size of the letters in their handwriting and to write on the margins of existing documents.<sup>19</sup>

Thus, despite a strong demand for rags -both from domestic and Iberian paper mills- and despite a large number of poor people probably willing to scavenge, an active export market did not develop in colonial Mexico. No records exist of exports of rags from New Spain to Spain in spite of the royal efforts to stimulate them. The reason seems to have been the inelastic supply of rags: the Mexican population was so poor that, regardless of the high prices, scavengers probably could not get significant amounts of rags because people discarded old clothing infrequently and in small quantities.<sup>20</sup>

While the quantity available and the demand varied greatly across time and space, it is clear that scavengers played a crucial role in papermaking by supplying rags to the paper mills for nearly 1,000 years in the Middle East and throughout the Medieval, Renaissance and Early Modern periods in Europe and in the Americas.

The scavenging of marble and stones from older buildings was common in Medieval Rome. The Coliseum and other structures built during the Roman period served as quarries in late Antiquity and into the Middle Ages. Reuse and recycling of materials was also commonly practiced in Japan. During the Middle Ages (1185-1600) as well as during the Tokugawa Period (1600-1867), farmers used agricultural waste, such as straw and

hulls, as filler for constructing walls and as cushioning for straw mats to lay on the floor (*tatami*) and for pillows. When the use of cotton became widespread, virtually all used clothing was reused as diapers, rags and other household items. By the mid-Tokugawa period an abundance of second-hand clothing shops existed in Edo (present-day Tokyo), and a market for old clothing was held in the Tomizawa area every morning at dawn. Old clothing reached such high prices in the 1720s that people began stealing clothes in order to sell them at the markets. Japanese farmers used human excrement extensively. The steep price of excrement forced many poor farmers to steal it to fertilize their fields. In Osaka, landlords had property rights over excrement, while urine belonged to the tenants. The strong demand for excrement and the high prices caused disputes among groups of excrement/urine collectors over collection rights in certain areas, as well as between collectors and farmers' associations. Outcasts performed the collection of excrement and urine, since the Japanese considered contact with these materials undesirable and dirty.<sup>21</sup>

The Japanese traditions of movable furniture and sitting on the floor -predominant in all socioeconomic classes- saved resources compared with the lavish homes and lifestyles of Western upper classes. During the Tokugawa period -due to their self-imposed isolation and lack of imports, as well as the densely populated territory- the Japanese developed a resource-efficient culture, in which a simple lifestyle was the norm. Factors such as a limited resource base, pragmatism and religious influence -Zen Buddhism- shaped the Japanese resource-conserving traditions during this period.<sup>22</sup>

In the U.S., in the years after the Civil War, the country experienced rapid urban growth and scavengers picked over kitchen waste, dead cats and dogs, and all kinds of materials to make a living. In pre-industrial America, before municipal waste collection existed, scavengers collected and disposed of the wastes generated in many towns and villages.<sup>23</sup>

Even though most reuse and recycling activities were carried out by scavengers --in most cases migrant, poor and uneducated

--several noted individuals have been associated with these activities. In Medieval England, Geoffrey Chaucer served as Clerk of the Works at Westminster Palace in the late fourteenth century. One of his duties consisted in the collection and inventory of scrap metal, and in his *Tales of Canterbury* he described the scavenging of materials from waste at his time. Queen Mary of England was interested in salvage drives and reportedly did not hesitate to stop her car to retrieve bits of scrap along the road. Paul Revere, the New England patriot, was a foundry pioneer and scrap buyer. He recycled old metal scrap in his Canton, Massachusetts farm. Benjamin Franklin supported scavenging activities and bought rags and discarded paper from scavengers to obtain paper to publish the *Pennsylvania Gazette*. Abraham Lincoln's father was a part-time peddler. When he decided to move to Indiana, he acquired a trunk full of objects to peddle along the way, at that time a common practice when travelers wished to offset the cost of a trip. Giovanni Toclonia, founder of the Italian family of merchants of that name, was a scavenger himself ('rag and bone man'). Maxim Gorky, the Russian writer, gathered waste materials when he was a boy. And Wendell Wilkie, the presidential candidate, swept and collected scrap in a factory in his hometown of Elwood, Indiana.<sup>24</sup>

### *Scavenging in the Nineteenth Century*

Scavenging flourished during the nineteenth century. Urbanization and industrialization played major roles in the development of scavenging and recycling activities. While in 1800 no more than 2.5 percent of the world's population lived in cities, by 1900 the urban population had risen to about 10 percent. Factories in the cities attracted the rural poor, particularly from areas where overpopulation, lack of land and work were major problems. The migration process was first apparent in Britain, which in 1851 constituted the most urbanized country in the world, with 40 percent of its population living in cities.<sup>25</sup>

Starting in the fourteenth century, the word "scavenger" referred to the collectors of tolls or duties on merchandise sold by

non-resident merchants in London and other English towns. But during the nineteenth century, scavenging acquired the meaning of cleaning out, street sweeping, cleansing rivers and refuse collection. Scavengers received licenses from cities to act as refuse collectors and to recover waste materials. In Edinburgh, one of the filthiest cities in Europe in the nineteenth century, residents threw their garbage into the streets at night, hoping that the scavengers would pick it up in the morning. Other British cities had similar practices. Individuals who recovered materials from waste were also known as 'rag and bone men,' 'totters,' and 'rag pickers.'<sup>26</sup>

An intensive recycling system also existed in the rest of Europe and in the U.S. during the nineteenth century: the so-called 'peddlers' (U.S.), *chiffonniers* (France), and *lumpensammler* (Germany) and their scavenging activities have been reported. The Paris *chiffonniers*, for instance, rose in 1831 against the police because new regulations prevented them from recovering items from the waste dumped on the streets.<sup>27</sup>

In the U.S., recycling was particularly extensive in New England, where individuals exchanged tin ware for rags, rubber and metal scrap. During the nineteenth century, peddling flourished. Peddlers, first equipped with backpacks and then with horse wagons, collected rags, bones, scrap metal and other waste materials from city alleys and municipal dumps. Peddlers also bartered a wide array of merchandise, such as pots, pans, washbasins, trays, beeswax, eyeglasses, calico, medicines, and so forth, in exchange for rags, bones, and scrap metal. Scrap metal was melted and recycled into new products, while bones were used to make glue, and rags to make paper.<sup>28</sup>

Enterprising Jewish immigrants from Eastern Europe, as well as Italian immigrants founded the scrap recycling industry in America. Some of them started collecting scrap in sacks or horse carts, prospered and eventually became dealers and owners of steel minimills. There were a number of depots specialized in equipping those immigrants as peddlers along the Northeast, with the larger ones based in Brooklyn. In order to facilitate the entry

of recent migrants into peddling, as late as the 1930s, collectors could hire horses and wagons for \$1 a day, plus 50¢ per day for feed. For a peddler having a horse wagon had obvious advantages, such as the ability to travel longer distances, to collect and transport more materials and as a consequence, to earn a higher income.<sup>29</sup>

Statistics compiled at the end of the nineteenth century demonstrate that scavengers performed the bulk of refuse collection in many U.S. cities. In Boston in 1890, for example, scavenging teams collected approximately 350,000 loads of household wastes, ashes, and street sweepings. In Chicago, 225 scavenger teams collected about 2,000 cubic yards of refuse daily during the same year. And, at the turn of the century in Manhattan, scavengers collected an average of 612 tons of wastes daily. Also in New York City, scavengers removed 15,000 dead horses -then widely used for transportation- from city streets in 1880. Until 1878, New York City paid the so-called 'scow trimmers' for their recycling services, and allowed them to keep what they recovered. These individuals rummaged through mixed wastes on the dumping scows -barges used to transport the wastes from the city to the disposal sites- searching for reusable and recyclable items. Scow trimmers used the salvaged items for their own consumption or for sale. From 1878 to 1882 the city eliminated the payments but allowed the scavengers to salvage any items from the waste. And starting in 1882, the city charged a flat fee to scow trimmers for the privilege of scavenging the city's refuse. Most of the scow trimmers were Italian immigrants organized by local *padrones*.<sup>30</sup>

At the turn of the century, collectors in the Midwest and the Southeast recovered mostly horseshoes, wagon wheels, and metal scrap from agricultural implements. In the Southwest, individuals gathered bison, cattle and horse bones accumulated on the prairies of Kansas, Oklahoma and Texas, which they sold to glue-making companies. Scavengers could also obtain scrap rubber in large quantities from discarded boots, shoes, rubber rollers from old washing machines and other products. A method com-



monly used at the turn of the century was called "reduction" by which dead animals and organic wastes were cooked to produce grease -used in the manufacture of perfume, lubricants, glycerin, candles and soap- as well as a residue that served as fertilizer.<sup>31</sup>

### *Contemporary Scavenging*

The trade in bones, bottles and fur diminished gradually during the twentieth century as industrialization took over: the manufacture of paper from wood pulp replaced the need for rags and more metal became available from domestic and foreign sources. Until the 1950s, scavengers collected various types of materials for reuse or recycling from American dumps, when, for sanitary considerations, as well as potential liability suits from scavengers, dump scavenging was banned. Street scavenging, on the other hand, continues to exist in America. The poor and the homeless recover materials from waste for reuse or recycling. No reliable data exist on the number of individuals engaged in scavenging, but it has been found to be a common activity among the homeless and the poor. Scavengers recover food to eat from restaurant wastes, from dumpsters at grocery stores, discarded clothes for reuse, recyclables for sale, and whatever items can be sold, such as books and repairable appliances.<sup>32</sup>

Today, aluminum cans constitute the most common material recovered by scavengers in the U.S. and other industrialized countries. Over the last few years, the price of aluminum and paper has been so attractive, that scavengers steal these materials from source-separated recycling bins:

- Los Angeles lost an estimated 4,000 tons of newsprint a month to 'paper poachers' at a cost of \$2 million in lost revenues in 1995. The city plans to instruct participants in its recycling program to separate at the source mixed grades of paper from the newsprint, to make scavenging more difficult

- Paper thieves cost New York City around \$4.5 million in 1995 by beating city crews on recycling days. Sanitation police officers started arresting and fining paper poachers in January 1995. Scavengers also recover cans, bottles, magazines, clothes

and anything else that can be restored, resold or recycled

- According to reports, organized scavengers working in teams to steal cans and bottles from recycling bins are common in Southern California. As a result of persistent scavenging, 220 cities and 33 counties in California have recycling programs with anti-scavenging provisions

- Theft of recyclables from recycling bins has been observed in cities across the country, including Chicago, Detroit, Houston, St. Louis, Washington, DC, Boston and San Francisco.<sup>33</sup>

Recycling programs in the U.S. and other industrialized countries have been created in order to deal with increasing amounts of solid waste, declining landfill capacity, public opposition to the siting of landfills and incinerators, and a favorable view of recycling. But setting up a recycling program requires investments that must be recouped from the sale of recyclables. Therefore, scavenging reduces the revenues needed by the recycling programs, and many municipalities have undertaken efforts to eliminate scavenging.<sup>34</sup>

In developing countries, on the other hand, scavenging plays an important role in supplying raw materials to industry, and represents a common survival strategy for the poor. Since Third World cities usually lack recycling programs, the bulk of recycling activities are carried out informally by scavengers. It has been estimated that in Africa, Asia and Latin America, up to 2% of the urban population make a living by recovering materials from waste. This translates into a figure of up to 30 million people in the developing world who are scavengers today.<sup>35</sup>

Scavengers in developing countries usually specialize in one or a few categories of materials. Sometimes the right to scavenge in certain neighborhoods is actually bought and sold. In some cases, such as in several Mexican, Colombian and Ecuadorian cities, municipal collection crews bid to their supervisors for being assigned to collecting wastes in upper-income areas, where recyclables are more plentiful. And in Mexico City, Bogota and Manila, city collection crews often include a 'volunteer' whose sole responsibility is the recovery of recyclables inside the refuse

collection vehicles; the revenue obtained from the sale of the salvaged items is then distributed among the crew and the volunteer.<sup>36</sup>

Despite the stereotypical view of scavengers as marginal individuals living on the edges of mainstream economy and society, scavengers often form stable communities and constitute an important component in the recycling of wastes in developing countries. The estimated number of scavengers operating in Bogota, Colombia is 10,000 individuals, 12,000 in Cairo, 13,000 in Mexico City and 20,000 in Calcutta. Despite the lack of data at the national level, various studies have highlighted the economic importance of scavenging activities. In Bangkok, Jakarta, Kanpur, Karachi and Manila, scavenging saves each city at least U.S. \$23 million/year in lower imports of raw materials, and reduced need for collection, transport and disposal equipment, personnel and facilities. Indonesian scavengers reduce by one-third the amount of garbage that needs to be collected, transported and disposed of. In the city of Nuevo Laredo, Mexico, the economic impact of scavenging activities has been estimated at nearly half a million dollars per month. In 1985, plastics manufacturers in Cairo saved 50% in raw materials costs by recycling plastics gathered by scavengers instead of buying virgin materials.<sup>37</sup>

Scavenging activities are sometimes highly organized with bosses, specialization and division of labor, as is the case in Mexico City, Calcutta and Cairo. And in some cities, such as Manila and Caracas, scavenging resembles an industrial activity with three shifts of scavengers who recover materials 24 hours a day. Scavenging takes place in a wide variety of settings: source separation at homes and small businesses, collection crews sort materials inside collection vehicles, at communal storage sites, dumpsters, illegal dumps, littered on the streets, and at municipal open dumps, composting plants and landfills. Many studies report that scavenging populations are largely composed of poor, migrant individuals from rural areas, though in certain areas - such as in Beijing, Cairo and Nuevo Laredo, Mexico- they derive an income of over three times the prevalent minimum wage.<sup>38</sup>

### *Scavenging and War*

The scarcity of resources brought about by war stimulates the recovery of materials for recycling. In the Classical world, after battles, the victors and nearby residents recovered clothing, weapons and other items of value from the deceased. In *Les Misérables*, Victor Hugo described the recovery of reusable and recyclable items from the dead in combat, after the battle of Waterloo was over. During the American Revolution, the women of the colonies brought to the town square their spare lead, pewter, iron kettles and pots in order to be melted to make weapons. During the U.S. Civil War, drives in the South produced water pipes, sash weights, bells and other metal items to be recycled and made into weapons. During World War II, the Germans seized church and other bells inside the country and in the occupied territories to recover the metal.<sup>39</sup>

In the U.S., salvage drives during World War II and the Korean War produced 9 million and 2.5 million tons of scrap, respectively. War also generates large amounts of metal that can be available to scavengers: still today, Vietnamese peasants dig in agricultural fields and the jungle, searching for metal scrap left from the Vietnam War; and in the aftermath of the Persian Gulf War, Iraqi individuals recovered metal scrap from armament and metal scrap left over from the war to obtain extra cash.<sup>40</sup>

Siege situations in particular -and the scarcity they bring about in the besieged population- encourage scavenging. During the siege of Sarajevo by the Bosnian Serbs, some of its inhabitants survived by scavenging for food in waste bins, dumpsters and dumps. Sarajevans also collected all kinds of wooden items to be used as firewood. And during the siege of Grozny by the Russians in their efforts to defeat the Chechen independence movement, scavenging emerged as a survival strategy.<sup>41</sup>

### *Scavenging and Economic Crises*

But not only war encourages recycling and scavenging. Economic crises bring about similar results. For example, during the Great Depression many unemployed individuals in the U.S.

earned cash by collecting metal and other types of scrap. Following the Mexican peso devaluation of December 1994 and the ensuing economic crisis, scavenging increased dramatically in Mexico, particularly in the wholesale produce markets, where poor individuals salvaged discarded fruits and vegetables. Also as a result of the peso devaluation and unemployment, bands of thieves stole shipments of metal scrap destined for the city of Monterrey for \$1.5 million in 1995. Natural disasters may cause severe economic crises and encourage scavenging: in the aftermath of the "Dust Bowl" of the 1930s, thousands migrated from Tennessee and Alabama to Florida. Individuals along U.S. Highway 31 gathered the old cars that had broken down during this migration in order to recover the metal for recycling.<sup>42</sup>

Embargoes may also trigger economic crises and scavenging: the United Nations-sanctioned embargo against Haiti in 1994 to restore President-elect Jean-Bertrand Aristide to power increased scavenging in the Haitian capital, Port-au-Prince. And during the economic blockade against Belgrade, individuals began scavenging at the local dump for food to eat and materials to sell. Due to the restrictions on movement of Palestinians from Gaza to Israel in 1994, many residents resorted to scavenging in order to recover reusable and recyclable items. Anecdotal evidence suggests that following the collapse of the Soviet Union, scavenging increased in the former Soviet republics and Eastern European countries as a result of the economic crisis and unemployment. In Israel, in 1993, unemployed Jewish immigrants from the former Soviet Union became scavengers in order to survive.<sup>43</sup>

### *Conclusions*

Humans have engaged in scavenging activities throughout history, and these may have played an important role in the survival of early hominids. Cultures show varying attitudes towards the wastes they generate, as well as towards the individuals who handle those wastes. More often than not, scavengers have been associated with dirt and regarded as the lowest stratum in the social hierarchy. Poor, immigrant and uneducated individuals

usually constitute the majority of scavenging populations, which reinforces and perpetuates social perceptions of scavengers.

Begun merely as a coping mechanism in conditions of scarcity and in order to survive, scavenging became an important source of raw materials for agriculture, artisans and, with increasing industrialization, for industry. Despite the popular perception of scavengers as marginal, they played a crucial role in supplying rags for papermaking for nearly 1,000 years, and they are still very important for the paper industry in developing countries today. Urbanization and industrialization -- in the nineteenth century in Europe and in the U.S., and still an ongoing process in developing countries -- encouraged migration from the rural areas to the cities and increased demand for inexpensive raw materials. By choice, or forced by their inability to secure employment, some migrants become scavengers. Even though scavenging renders environmental benefits to society -- such as energy savings, lower consumption of water, reduction in water and in pollution in manufacturing compared to the use of virgin materials -- the motivation for scavengers is fundamentally economic. In economic terms, the environmental benefits of scavenging are merely positive externalities of this activity. If the price paid for a particular material is high enough, scavengers will recover it, and, in some cases, will even resort to stealing it.

Scavenging represents an adaptive response to scarcity caused by chronic poverty, war and economic crises. Since these causal factors are not likely to disappear in the foreseeable future, scavenging is likely to exist in industrialized and developing countries alike.

COLEF, ChulaVista, California

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