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Community-based Solid Waste Management: The Case of Sai Son Commune, Quoc Oai District, Hanoi

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Abstract

Waste is an unavoidable by-product of human activities. Hanoi, like many cities of developing countries, is undergoing a tremendous increase in the amount of solid waste due to economic development, urbanization and improved living standards. Its government faces great difficulties in addressing waste issues because of limited sound managerial instruments and financial means. A proposed solution is to mobilize community participation in managing solid waste. Community-based solid waste management is a process that involves all community members in active management and responsibility for planning, operating and controlling elements in the waste system. It is expected to be an effective management model that creates benefits for the local community and authorities. This article analyzes one typical model of community-based solid waste management in Hanoi, the case study of Sai Son commune, Quoc Oai district. After examining the structure of the model, several findings are explored in terms of environmental, social, financial and management perspectives. Based on these analyses, some recommendations are proposed toward a sustainable model of community-based solid waste management.

Keywords: community-based solid waste management, community, municipal solid waste, urbanization

บทคัดย่อ

ขยะเป็นผลพลอยได้ที่หลีกเลี่ยงไม่ได้ของกิจกรรมของมนุษย์ เช่นเดียวกับเมืองอีกมากมาย ในประเทศกำลังพัฒนา กรุงฮานอยกำลังมีขยะมูลฝอยเพิ่มขึ้นอย่างมหาศาลอันเป็นผล

มาจากการพัฒนาเศรษฐกิจ การขยายตัวของเมือง และมาตรฐานการครองชีพที่สูงขึ้นของประชาชน ภาครัฐประสบความยากลำบากอย่างมากในการแก้ปัญหาขยะ เนื่องจากมีเครื่องมือในการจัดการปัญหาและงบประมาณที่จำกัด ทางแก้ที่สำคัญประการหนึ่งคือการระดมการมีส่วนร่วมของชุมชนในการจัดการขยะมูลฝอย การจัดการขยะโดยมีชุมชนเป็นฐานใช้กระบวนการระดมสมาชิกของชุมชนเข้ามามีส่วนร่วมในการจัดการ การวางแผน การดำเนินงาน และการควบคุมองค์ประกอบต่างๆ ในระบบขยะ โดยคาดหวังว่าแนวทางดังกล่าวจะเป็นต้นแบบการจัดการขยะที่มีประสิทธิภาพที่จะก่อประโยชน์แก่ทั้งชุมชนและทางการ บทความนี้ได้ศึกษาวิเคราะห์ต้นแบบของการจัดการขยะโดยมีชุมชนเป็นฐานแห่งหนึ่งในกรุงฮานอย ได้แก่ กรณีชุมชน Sai Son ในเขต Quoc Oai บทความได้นำเสนอโครงสร้างการบริหารจัดการขยะและจากนั้นได้วิเคราะห์ถึงประเด็นด้านสิ่งแวดล้อม สังคม การเงิน และการจัดการ รวมทั้งได้ให้ข้อเสนอแนะต่อการจัดการขยะที่มีชุมชนเป็นฐานอย่างยั่งยืน

คำสำคัญ: การจัดการขยะโดยชุมชนเป็นฐาน ชุมชน ขยะมูลฝอยในเขตเทศบาล การกลายเป็นเมือง

Introduction

Solid waste management (SWM) is one of the critical environmental challenges of rapid urban development facing developing countries. Solid waste (SW) resulting from human domestic, social and industrial activities is increasing in quantity and variety as a result of growing populations, rising standards of living and development of technology. Consequently, adequate SWM is urgently required. In the cities of developing countries, SWM is the major responsibility of local governments. However, these governments face great difficulties in addressing this problem due to the lack of sound managerial instruments and financial means. As a result, public systems of waste management are able to collect only between 30 and 50 percent of SW, and most cities often dispose of SW in ways detrimental to the environment, such as open burning, burying or dumping in rivers (Hoornweg, Thomas and Otten, 2000).

Since Vietnam implemented its renovation (Doi Moi) policy in the late 1980s, its capital, Hanoi, has witnessed rapid economic development and urbanization. Ho Chi Minh City and Hanoi have the highest rate of urbanization. It is estimated that this rate was 30-32 percent in 2012 and is expected to be 55-65 percent by 2030. In the period 2008 - 2012, the average economic growth rates in Hanoi reached 10.2 percent, more than 1.5 times as much as the national rate (GSO, 2013). As is the case in many other cities in developing countries, rapid urbanization, increasing immigration from rural areas, industrialization and economic growth have put great pressure on the environment in Hanoi.

In the last decade, environmental problems have become worse in Hanoi because the urban environmental sanitation infrastructure is inadequate to provide the basic necessary services, specifically SW services (VEPA, 2004). Currently, SW is managed by the Hanoi Urban Environment Company (URENCO), a public unit belonging to the Hanoi People's Committee (the city government). In 2012, the daily amount of domestic SW generated in Hanoi was about 6,200 tones per day (URENCO, 2013). However, because of limited human and financial resources, only 70 percent of this waste was collected and disposed of in landfills by URENCO. The remaining waste in the urban center and in suburban areas has usually been thrown into ponds, rivers, sewers and public lands, leading to environmental pollution which can inevitably lead to negative health effects.

In October 2000, the Hanoi People's Committee issued Decision No 5466/QD-UB to initiate a policy of socialization of waste collection and transportation in Hanoi. According to this decision, the private sector and communities are encouraged to participate in SW collection and transportation. This decision aims to enhance the community's responsibility and awareness, increase grassroots participation and lighten the burden on the state budget. It has led to the establishment of pilot management models – a model of community-based solid management (CBSWM).

Around the world, community-based management is a bottom-up approach that has been evolving for more than 30 years in response to

the failure of more centralized approaches. It is recognized that local management may be more effective than a top-down approach (Christie and White, 1997). This approach is defined as a process which involves local individuals and groups in active management to address their own environmental concerns. Local communities have a central role in defining development priorities, choosing and adapting operational structures, and implementing management practices. The final goal of this process is to create benefits for members of the community. However, community-based management does not imply that communities have to be responsible for every stage of management. They may be involved in one, some or all of the managerial, operational and financial aspects of this process. The degree of community participation varies, ranging from information-sharing plans to discussions that allow community members to suggest ideas; or from various kinds of participation, such as cost sharing, or full transfer of responsibility and authority to local control.

This study examines the operation of CBSWM in Sai Son commune as a typical model in Hanoi. The model is analyzed in terms of environmental, financial, social and managerial perspectives. Based on this analysis, some recommendations are proposed toward a sustainable model of community-based solid waste management.

Research methods

This research leading to this article used the qualitative and exploratory approach. Exploratory work was conducted through serial field observations, in-depth interviews, household surveys and personal communication.

Field observation entailed informal observation of waste management as well as 'participant-as-observer' activities. This method was used to understand detailed environmental problems associated with SW, such as water pollution, garbage dumps and external landfills. In-depth interviews were conducted to obtain information and knowledge from selected persons. The main resource

persons in this research are members of local government, community-based organizations, waste-collection groups and households, who know well the history and situation of Sai Son commune. Vital information was obtained from the research field through face-to-face communication.

Two main sources of information and data were utilized in this study. Secondary data was obtained from existing data compiled by individuals, agencies, and government and non-governmental organizations. A large amount of related literature was reviewed in order to clearly understand the research topic. Attention was drawn to the key issues of the CBSWM concept, stakeholders, structure organizations and design principles. Available literature on the SWM in the context of Hanoi and Vietnam was also examined.

Primary data was collected from the field. To meet the research objectives, it was necessary to identify case studies of CBSWM in Hanoi. Initially, by using *A survey, assessment and summary on environmental service models in rural and urban areas: proposing mechanisms and policies for replication*, done by the Vietnam Ministry of Natural Resources and Environment, the authors defined models of CBSWM in Hanoi. The model in Sai Son that had some degree of self-organization in that SWM was chosen to be the case study. Subsequently in July 2012, the research group conducted the survey as described below.

- Household surveys: 120 households were randomly chosen for interviews to obtain the following information: (1) general information about households, (2) household perception of the importance of SWM and the potential impact of waste on their environment and public health, (3) households' assessment of the quality of SW services and their satisfaction in terms of time, frequency and fee collection.

- In-depth interviews were conducted with four groups, namely: (1) local government officials, (2) members of the community-based organizations, (3) workers/laborers gathering solid waste (service providers) and (4) some households (service beneficiaries).

Study area profile

Sai Son commune, belonging to Quoc Oai district, formerly HaTay province, is a suburban commune located in the southwest of Hanoi. Its natural land covers more than 10 square kilometers. The commune consists of six hamlets: Sai Khe, Da Phuc, Nam Trai, Thuy Khe, Phuc Duc and Khanh Tan.

Over past years, Sai Son has advanced considerably in economic achievements, especially after it was merged with Hanoi in August, 2008. On average, the economic growth rate in the period 2006-2010 was about 10.6 percent/year; annually its income per capita is VND 11,450,000.

The population of Sai Son is 18,718, divided into 4,200 households. Population growth rate remains at 1.3 percent/year, which is high as compared with rate of 1.0 percent/year in Hanoi (Sai Son People's Committee, 2011).

Agriculture is the key industry of Sai Son commune. Nevertheless, in recent years, Sai Son has been in the process of rural industrialization and modernization, causing numerous changes in the appearance of electricity, roads, school and medical stations. Consequently, there has been a considerable increase in the number of migrants (Nguyen Thi Thu, 2012).

Economic growth and urbanization are considered the main driving forces behind negative changes in the local environment. Air pollution from industrial zones, transportation vehicles and an increase in solid waste are environmental problems which are currently of concern to the residents (Nguyen Thi Thu, 2012).

History of the CBSWM model

Prior to 1995, there was no system of waste collection, transportation or other activity related to SWM in Sai Son. Most households burned, buried or threw their waste into the streets, surrounding fields or anywhere they could. The local environment was quite polluted with

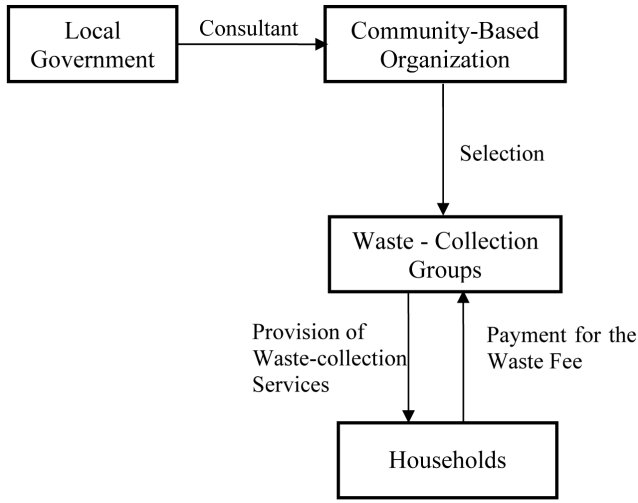
plastic bags in the community's ponds and throughout the streets. At that time, local people were not aware of environmental protection. Most did not think that waste had any negative effect on the environment, their health and life. Moreover, the local government did not acknowledge that there was a waste problem (Nguyen Thi Thu, 2012).

The year 2005 was a turning point in the SWM system of Sai Son. A high economic growth rate and population boom lead to an increase in waste generation. Because of the central government's environmental protection policy, the local residents' perception of the negative environmental and health impacts of poor SW services increased significantly. Together with the urbanization process, common ponds no longer existed in the locality. In this context, there was a pilot model of CBSWM which was self-established, self-financed and self-managed by community. Three hamlets in Sai Son were selected to be experimental places for applying this model. In the model, one or two residents were appointed with the responsibility for waste collection and disposal in regulated areas. Households had to pay to receive this service. In only six months the implementation of the CBSWM model in Sai Son commune yielded considerable positive effects, such as raising society's awareness of environmental sanitation, creating more jobs for its residents and eliminating rubbish dumps. Following this success, this model has been continuously applied in other hamlets since 2007.

Structure of the CMSWM model

The CBSWM model in Sai Son is a typical model for cooperation between the local government and the community in managing SW. Figure 1 points out the stakeholders and mechanism of model's operation.

Figure 1: Structure of community-based solid waste management in Sai Son



(Source: The figure was developed by the authors based on information from field study)

(1) Community-based organization (CBO): This is an organization which is elected by the community. However, in-depth discussion indicates that members of the CBO are introduced by and consult with the local government. In Sai Son, the CBO includes 12 members, of whom six are heads of hamlets, and the rest are heads of the hamlet's Woman's Union. Generally, this organization has three responsibilities for the community's SWM. The first and most important is to choose a suitable collector of SW in the community. The CBO is a representative of the community who proposes the requirements of SW service. The requirements include SW collection time, frequency, route and service fee. If the provider does not give sufficient SW service, the CBO can be replaced by another supplier. Second, the CBO makes a decision on waste collection fees. It is not an easy task because the fee is a sensitive issue. A high fee can be protested by households; and a low fee might not provide enough economic incentive for providers. In Sai Son, the CBO discusses this issue with the local government first to ensure that the fee is not over the maximum level which is set up by the central

government and appropriate for local residents' income. After that, they obtain households' opinions on the fee level at a community meeting and make a final decision. Third, the CBO has the responsibility of creating a forum in which service users can express their ideas and complaints about the quality of service in the community. Based on these opinions, the CBO forwards this information to providers and discusses it with them to improve SW services.

Six women in CBO are responsible for encouraging community participation in the collection system, conveying ideas about waste separation and discussing issues related to the local environment with residents. Women are responsible for assisting scheduling as well as ensuring that the community hall is in order before meetings. These women are elected annually by a 51 percent vote by members of the local Women's Union

(2) Households: include all households using SW service in Sai Son. Residential households are mainly interested in receiving effective and dependable waste collection service at a reasonably low price. They have the right to complain about the quality of waste collection services to the CBO if they are not satisfied and the responsibility to pay about VND 3,000/capita/month for waste collection service.

(3) Providers of SW service: Providers of SW service mainly supply a garbage-collection service. Collectors are responsible for gathering waste from households participating in the system, and then the garbage collected is discard in some ponds. The number of garbage collectors is based on the amount of daily rubbish, the area of each hamlet and the individual capacity for collecting, transporting and treating rubbish per day so as to achieve the greatest efficiency. In each group of collectors, there is a group leader appointed by the hamlet. In Sai Son, the suppliers are also responsible for collecting a fee from the households. The waste collection fee is not the primary source of income for collectors; it is a supplemental form of income. In both instances, the collectors are economically quite marginalized relative to other residents. Waste collection fees add 1,100,000 VND (equivalent $50 USD) per month to their livelihoods.

(4) Local government: In Sai Son, the local government plays a minor role in the CBSWM model. It does not have enough technical or financial assistance for the community or for waste collectors. In this model, the local government has consulted and introduced some members of CBO who are voted by the community. Moreover, it has the role of encouraging households as well as the whole community to participate and obey all CBO decisions related to SWM. Finally, the local government plays an intermediate role in reconciling disputes among stakeholders.

Discussion of community-based solid waste management in Sai Son commune

Based on information collected from fieldwork and the survey of 120 households in Sai Son, results of CBSWM models in Sai Son have been examined and analyzed in terms of some perspectives in order to define strengths and weaknesses of this model.

Strengths of the CBSWM model

Environmental perspectives:

- ***High rate of collected waste***: The socio-economic report in Sai Son indicates that that the environment is cleaner since CBSWM was applied here. It is shown that the SW collection rate increased gradually, reaching 78 percent. This rate is fairly high as compared to that of urban areas (71 percent), big cities (76 percent), small cities (70 percent), rural areas (20 percent) and the whole nation (65 percent) (MONRE, 2011b). High rates of collected waste have made significantly positive changes in the environment and community health. Results from in-depth interviews with local government and households in the locality show that uncollected waste, which mainly remains along the sides of rivers and ponds in the ward, has decreased considerably, leading to a reduction of waste, air and land pollution as well as the creation of good scenery in the community.

- ***Increase in recycled waste rate***: solid waste reuse/recycling brings about double benefits in term of economic and environmental perspectives. Regarding economic aspects, reuse/recycling creates an additional income for households and saves a considerable social cost for waste collection, transportation and treatment. As for the environmental aspect, reuse/recycling has contributed to resource recovery and reduction of the negative effects of landfills. The socio-economic report in Sai Son implies that the recycling rate is 28.3 percent, much higher than the average recycle rate of 18 percent in Hanoi. In Sai Son commune, nearly 30 percent of households participate in reuse and recycle activities. According to the in-depth interviews, some households said that they can earn from VND 50,000 to VND 100,000 per month from reuse/recycle activities. While the incremental income is not so high, it creates an incentive for households to implement reuse and recycle activities.

The first advantage of this model is the high rate of SW collection and recycling, which are meaningful indicators of this issue. It also reflects the capacity of the Sai Son model for providing MSW service, which had not been provided sufficiently by the public sector (URENCO).

Social perspectives:

- Job creation for local residents: The model in Sai Son has created a considerable number of jobs for local residents. Among 21 garbage collectors, 18 local laborers are employed. Workers are contracted as temporary workers by the chairman or leader of CBO. It is expected that generation of jobs will be higher in the near future when requirements of waste collection/transportation/reuse increase.
- Income of waste collectors: The salary of operators of waste collection services is often low, because waste collectors derive their income from waste collection fees and from the sale of recyclables. Neither yields much revenue in low-income neighborhoods. Fee collection is not high, because households in low-income neighborhoods are not able to pay high fees. The waste that remains to be collected is

often worthless due to its high organic content (Anschutz, 1996). Another reason for the low salary of operators of waste collection services is the size of coverage areas, which is often too small to earn an adequate income.

In Sai Son, the average income of collectors is about 1,100,000VND/person/ month (equivalent to 50 USD). In addition, employees can earn some extra money by selling the recycled materials, ranging from 500,000 to 700,000 VND/month. Their total income accounted for 70 percent of the per capita income in the locality. In the interviews, some employees shared that although their income is not high, it is quite stable. This is an advantage compared with that of other laborers.

- **High willingness to participate in source separation and recycling:** Sai Son has just finished a one-year project of source separation which is funded by the Vietnam Women's Union. Two of the six hamlets of the commune were selected to be experimental places for project. About 100 women were trained to implement source separation at their houses. Results from the project show that about 90 percent of women are willing to participate in waste separation. The in-depth-interviews also indicate that they are willing to implement separation because of positive changes from this activity, such as a decrease in waste disposal, higher income from selling recycled material and savings from not having to buy compost. However, it is estimated that about 10 percent of the women do not carry out this activity because it consumes much time and does not produce any benefits.

Weaknesses of the CBSWM model

Economic perspectives:

- ***Cost recovery problem***s: Cost recovery problems refer to a lack of funds to cover capital and recurrent costs of SW activities. Lack of funds can be caused by inadequate collection fees and rates (Anschutz, 1996:64).

The solid collection fee rate in Hanoi is regulated by the government. The current waste collection fee was imposed in Decision 111/2007/QD-UBND, dated 22 October 2007 on the level of waste collection fees in Hanoi. According to this decision, collection fees are freely set by local authorities but are not higher than VND 3,000/capita/month. In Sai Son, VND 2,500/capita/month is the rate applied to all households in the commune. On average, each collector can get about VND 1,000,000/month. Because they do not invest to buy equipment and transportation vehicles (this expenditure is financed by commune's fund), this rate may be acceptable to sustain collection services. According to opinions of waste collectors, the VND 2,500 fee, which was set four years ago, is too low and is not suitable for current conditions of high inflation. The collection fee should be changed year by year in order to match increasing prices in the economy. Actually, cost recovery in Sai Son is about 81.1 percent, which means that the revenue from waste collection is not enough to offset its cost. This problem can have a negative impact on the service providers' incentive, resulting in a decrease in the quality of SW services. Clearly, economic unsustainability is a big disadvantage of this model.

- ***Inadequate fee collection:*** Fee collection for SW services appears to be influenced by willingness to pay, the means of payment, the availability of sanctions and the persons collecting the fees. Results from in-depth interviews with waste collectors and households noted that the majority of household (80 percent) pay the fee, but about 20 percent of households cheat or even to refuse to pay this fee. Some households lie about the number of people living in the households to reduce the amount of the fee. Moreover, 15 percent of households think that they do not generate any waste because they sell recycled material; they make compost from organic waste and burn the rest of the waste. This means that no waste is generated, so they will not pay for waste collection or they will pay less than other households. Some households said that waste collection is a task which has been taken by the central government and so they do not take the responsibility of paying this fee.

The way of making the payment is another reason for losses of collection fees. In Sai Son, waste collectors collect this fee every three months. Previously, heads of hamlets were responsible for this task. The total fee collected by hamlets is much higher than the amount received by the waste collectors. The reason may be that households cannot cheat because the heads of hamlets know clearly the number of family members.

Inadequate fee collection can have negative consequences on the motivation of garbage collectors and thus on the reliability of the service, if they depend directly on these fees for their income. Low reliability of service can lead to low willingness on the part of the households to pay. It thus may become a vicious circle. This is considered the second limitation of this model

- ***Low ability to pay:*** Low-income communities are often assumed to have low ability to pay for services. Not all service levels are affordable and high fees cannot be charged (Anschutz, 1996). Currently, the total collection fee is about VND 30,000 per year, accounting for only 0.25 percent of average annual income per capita in Sai Son. The result of the household survey shows that about 25 percent of households agree to increase the fee to VND 4,000/ capita/month.

Managerial perspectives:

- ***Accountability and legality to the community***: Accountability to the community depends on the management structure, the way of supervision and the links with the community (Anschutz, 1996). In Sai Son, the accountability of the SWM model is not clearly defined. There is no contract which lists all rights and responsibilities of CBO, garbage collectors and households. CBO and waste collectors only discuss the time, frequency and route to gather the waste. There is a community meeting every three months between CBO and households, in which the CBO informs the households and obtains their opinions about collection fees and services. The households' responsibilities to participate in and pay collection fees are not prescribed. Consequently,

15 percent of the households surveyed said that they do not have the responsibility to take part in and pay for SW collection services.

- ***Monitoring mechanisms*** are not part of this model. No one is responsible for overseeing the day-to-day collection activities of the waste collectors. It is not confirmed whether collectors complete their tasks along the prearranged routes and within the predetermined time. Consequently, the quality of garbage collection service is not controlled or ensured.

Monitoring other people's behavior with regard to their disposal of waste is not common in Sai Son. When a neighbour, waste collector or member of the organization witnesses another resident disposing of their waste in a public space, they do not report the neighbour themselves, but in some cases, they might discuss this problem with a member of the organization. This problem normally occurs due to village culture in Vietnamese rural areas. Most residents in commune are relatives or have a close relationship, and consequently, they hesitate to reveal the unregulated actions of their neighbours. This is a cultural factor affecting the monitoring mechanism of the CBSWM system in Sai Son as well as in other rural communes.

Recommendations

Based on the discussion of the CBSWM model in Sai Son, the following recommendations are proposed.

Solutions of legislation/institution/policy framework

The government should enact specific legislation on socialization of environmental services, including specific community roles. The government issued Decree No. 69/2008, which encourages socialization in some fields such as education, environment and medicine. However, it is necessary to promulgate a special decree on environmental socialization which regulates all the environmental service providers, such as cooperatives, groups and teams. Such a decree should also delineate and coordinate the responsibilities of government departments, local authorities and organizations providing services to the community.

This is essential in the context of many documents overlapping in community-based environment management.

The government should continue to enact laws to create legitimacy for the operation of waste management, particularly general and community-based waste management. The laws should define financial and technical supporting mechanisms for newly-established communities. In addition, the government should also implement fully "the beneficiary pays principle," which means that the fees will be calculated according to the volume of waste discharged instead of a uniform flat fee for everyone.

Solutions of finance

The analysis found that one weakness of CBSWM is that it is not sustainable financially. The bottom line is that the cost and benefit flows are not balanced in the model. Therefore, the following solutions are offered.

Mechanisms of financial support by the central government/ local government for CBSWM should be created. Financial support should be made at an early stage when designing newly established models, especially in communities in rural areas with low incomes. The amount of funding should be limited by the cost of investment and will be repeated after a period of use (3-5 years).

The fees collected should be implemented in a flexible way depending on the different socio-economic conditions of the communities. Collection fees should also be made to facilitate the direction of management, and also to strengthen the autonomy of the service providers in setting fees. This means that the city government should establish a minimum fee of charge, with additional specific charges based on the consensus between providers and users of waste services.

Raising awareness

Raising awareness of community needs and the solution is particularly important to achieve success for the model CBSWM. The community's lack of awareness about potential impacts on the environment and human health and their responsibility to pay the sanitation fee has caused significant difficulties when operating the

model. Raising awareness can be done through the communication program, advocacy and campaigning through the media, organized environmental programs or the establishment of environmental clubs. Raising awareness is not a temporary solution; it needs to be recognized, and evaluation and design implementation should continue on a large scale and long term. In order to bring about significant changes in awareness, the action plan should have continuing and regular impacts on all age groups in society from children to the elderly.

Conclusions

Hanoi is undergoing rapid urbanization, which while helping to develop the economy, creates more environmental pressure on the city. The domestic waste of each household continues to increase together with population growth in the city, causing the rapid increase in the total amount waste needing to be treated. The constraints in terms of financial and managerial perspectives make it difficult for CBSWM in Sai Son. These are challenges for policy makers and implementers.

Solid waste management has become an issue of concern today. The solution is the responsibility not of only government or managers, but of everyone. Therefore, CBSWM is a good way to mobilize all members of society to participate in environmental management in order to find a way toward a sustainable future. In the suburbs of many cities of Vietnam, it is better to establish the CBSWM model for three reasons: (1) the government cannot provide sufficient financial and human resource assistance to these areas; (2) the community in this area can create initiatives and manage SW services; (3) the suburban area in Vietnam is like a small village which is a suitable scale for applying CBSWM. Although there are some problems of implementation, positive changes, such as an increase in the rate of waste collection, state burden relaxing, and increasing awareness are necessary for an optimal approach of CBSWM in many cities.

References

Anschutz, J. (1996). **Community-based solid waste management and water supply projects: problems and solutions compared: A survey of the literature**. UWEP Working Document.

Christie, P. and White, A.T. (1997). Trends in Development of Coastal Area Management in Tropical Countries: From Central to Community Orientation. **Coastal Management, 25**, 155-181.

Hanoi People's Committee. (2000). ***Quyet dinh 5466/ QD-UB ve 'Thi diem thuc hien xa hoi hoa thu gom va van chuyen rac thai sinh hoat o Ha Noi*. (**In Vietnamese) [Decision 5466/QD-UB on 'Pilot Implementation of Socialization of Waste collection and transportation in Hanoi]. Hanoi: Hanoi People's Committee.

Hoornweg, D., Thomas, L., and Otten, L. (2000). **Composting and its applicability in developing countries.** Urban and Local Government Working Paper Series No. 7. Washington, DC: World Bank.

Ministry of Natural Resources and Environment (MONRE). (2011a). ***Dieu tra, danh gia, tong ket cac mo hinh dich vu Moi truong o Do thi, nong thon: de xuat co che, chinh sach nhan rong*** (In Vietnamese) [A survey, assessment and summary on environmental service models in rural and urban areas: proposing mechanisms and policies for replication]. Hanoi: MONRE.

Ministry Of Natural Resources and Environment (MONRE). (2011b). ***Bao cao Hien trang Moi truong Viet Nam.*** (In Vietnamese) [Vietnam Environmental Status Report]. Hanoi: MONRE.

Nguyen Thi Thu. (2012, July 12). Interview. Head of Woman Union in Sai Son commune.

Sai Son People's Committee. (2011). ***Bao cao kinh te - xa hoi o Sai Son.*** (In Vietnamese) [Socio-economic report in Sai Son]. Hanoi: Sai Son People's Committee.

The Hanoi Urban Environment Company (URENCO). (2013). **Yearly report on solid waste management in Hanoi.** Hanoi: Hanoi State Urban Environment One Member Limited Company.

Vietnam Environment Protection Agency (VEPA). (2004). **Bao cao Hien trang Moi truong Chat thai ran.** (In Vietnamese) [Vietnam state of environment]. Hanoi: VEPA.

Vietnam General Statistics Office (GSO). (2013). **Statistical year book of Vietnam.** Hanoi**:** Statistical Publishing House.