

Full Length Research Paper

Recycling of wastes as a strategy for environmental conservation in the Lake Victoria Basin: The case of women groups in Kisumu, Kenya

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This paper examines the roles, opportunities and challenges that women groups in Kisumu City face as they recycle polythene papers and water hyacinth plant materials to make various saleable products such as bags, mats and baskets. The study objectives were: To analyze the roles of women groups in environmental conservation; To examine the opportunities that the women groups had in the recycling of polythene papers and water hyacinth plants; To examine the challenges faced by the women groups in their recycling efforts; To analyze the policy implications of the recycling effort of the women groups involved in environmental conservation. The study utilized the following methodologies, structured interviews, participant observations, Key informants, focus group discussions. Thirty-five women groups were analyzed. The findings indicate that recycling of polythene papers and water hyacinth plants contribute to environmental conservation, as well presenting opportunities for the creation of wealth among women in the groups.

Key words: Environmental conservation, recycling, women groups, roles, opportunities.

INTRODUCTION

This paper is based on a study conducted in Kisumu municipality during 2006 to assess the roles and opportunities that women groups involved in environmental oriented activities have in that region. As a commercial hub and administrative centre for Nyanza province, Kisumu is growing fast. It is surrounded by rich agricultural areas, which supports a wide range of crops that serve as raw materials for its agro-based industries, such as sugar-cane, rice, cotton, among others (Rok, 1984/1988).

The city is served by a transportation network of roads, railway, ship and air transport. It also has major educational institutions such as Maseno University, the Great Lakes University, as well as major hospitals such as New Nyanza hospital, Agha Khan Hospital among many others. Historically the city began its long journey to its current status when the railway line built by the British settlers reached the shores of Lake Victoria in 1901, which was known as port Florence. Since then the port has continued to stimulate major economic activities

in the city. The influence of the commercial activities undertaken in this city are felt far and wide in all of Kenya's neighbouring countries of Uganda, Tanzania, Rwanda and Burundi which are partners of the East African Community.

Solid wastes may be defined as residual of non liquid nature. As observed by Nyang'echi (1992) solid wastes represent potential sources of environmental pollution and disease. Recycling is one among different strategies employed in the management of solid wastes (UNHCS, 1989).

Background Information

In its study on waste management in Nairobi for example, the Intermediate Technology Development Group (ITDG), Action estimates that the current generation rate of plastics is almost 1 million tonnes per annum in Nairobi alone. Plastics constitute (all sizes) approximately 20% of the urban waste generated in Nairobi everyday. An estimated 4,000 tonnes of the low-density plastic bags called "flimsies" are produced each month in Kenya for shopping and packaging purposes. It is these thin plastic

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bags that are most prone to in ardent littering. The level of recycling and reuse of post consumption flimsies is very low, with only four firms in the country involved in the activity. There is an evident need for comprehensive interventions focused on management of the flimsy polythene (ELCI, 2005).

Waste generated by human activities can be controlled by source reduction, reuse, and recycling. Although many people already recycle products at home, waste reduction opportunities exist anywhere we have waste. Recycling is one way to reduce waste; reusing products is another. Products that can be reused and recycled are countless, and include everything from paper to clothing to worn-out electronics. Materials with a high potential for recycling are: Waste paper like newspapers, magazines, card-board, books, letters and other Metals, for example scrap metal, aluminum (beverage) cans, iron, and copper. Textile cut-offs which can be used for the production of door mats, cushions, mattresses, home made cups and duster coats, among others. Plastic such as broken buckets, containers can be re-melted and formed into new products Most waste reduction efforts save money, energy, and natural resources. It is important to teach children and young adults how solid waste affects their lives and their environment.

Environmental conservation in Kenya

Environmental conservation can be defined as the rational use of the environment to provide the highest sustainable quality of living for humanity (ELCI, 2005). Environmental conservation is synonymous with environmental management. Environmental management refers to the protection, conservation and sustainable use of the various elements or components of the environment. Good environmental management involves activities that enhance the environment and create conditions that are favourable to both people and other living organisms. Waste recycling and re-use is one such activity.

Sustainable use of resources is when we extract resources carefully and take only what we need to meet our social and economic needs, while taking into consideration our needs for today and also those of future generation. In Kenya environmental management is mainly vested on the Ministry of Environment and Natural Resources (MENR). The National Environment Management Authority (under MENR) is the institution with the legal authority to exercise general supervision and co-ordination over all matters relating to the environment, and is the principal instrument of the Government charged with the implementation of all policies relating to the environment.

Besides NEMA, activities in other line Ministries such as Forest and Wildlife, Water and irrigation, Agriculture, among others also contribute towards environmental conservation. Environmental conservation initiatives are also spelt out in various government policy documents

such as Development Plans, sessional papers, sector based legislations, among others. One such legislation is the Environmental Management and Coordination Act, 1999 commonly referred to as EMCA.

The environmental management and coordination act (EMCA), 1999

The Environmental Management and Co-ordination Act No. 8 of 1999 is an Act of Parliament that provides for the establishment of an appropriate legal and institutional framework for the management of the environment. As earlier provided, prior to its enactment in 1999, there was no framework environmental legislation. Kenya's approach to environmental legislation and administration was highly sectoral, legislation with environmental management components being formulated largely in line with natural resource sectors as aforementioned. The EMCA came into force on 14th January 2000 (ELCI, 2005; UNEP/ACTS, 2001). The Act aims at providing an appropriate legal and institutional framework for the management of the environment and sustainable use of natural resources.

EMCA was developed as a framework law, and this is due to the fact that the Act is thus far, the only single piece of legislation that contains to date the most comprehensive system of environmental management in Kenya. The Act provides for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya and for matters connected therewith and incidental hereto. The Act is based on the recognition that improved legal and administrative co-ordination of the diverse sectoral initiatives is necessary in order to improve national capacity for the management of the environment, and accepts the fundamental principle that the environment constitutes the foundation of our national, economic, social, cultural and spiritual advancement. Section 3 of the Act enunciates the General Principles that will guide the implementation of the Act. Every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. It is worth noting that the entitlement to a clean and healthy environment carries a correlative duty. Hence, there is not only the entitlement to a clean and healthy environment, but also the duty to ensure that the environment is not degraded in order to facilitate one's own as well as other persons' enjoyment of the environment.

The Act established a number of institutions for the management of the environment in Kenya. At the apex is the parent Ministry (Ministry of Environment and Natural Resources). Below this is the National Environment Council established under Section 4 of the Act as the body responsible for policy formulation and directions for purposed of the Act, as well as the setting of national goals and objectives and the determination of policies and priorities for the protection of the environment. The

Council is chaired by the Minister responsible for environmental matters and its composition is drawn from all public, private and non-governmental sectors of the country as is provided for within Section 4. It is important to note that the EMCA did not override or replace other laws. The EMCA is applied alongside other existing laws. The National Environment Management Authority (NEMA) established by the Act is the main body that coordinates environmental management activities. NEMA works in collaboration with the existing government agencies and departments.

EMCA and protection and conservation of the environment

Part V of EMCA provides legal tools for sustainable management of the environment. It covers the protection and management of wetlands, hilly and mountainous areas, forest, environmentally significant areas, the ozone layer and the coastal zone. It further provides for the conservation of energy and biological diversity, access to genetic resources and environmental incentives.

This Part of EMCA delegates onto the Director General various responsibilities to ensure protection and sustainable management of the environment. In addition, the part also gives the Minister in charge of environmental affairs the mandate to give orders.

Conceptual Framework

This study was guided by the following conceptual framework, environmental conservation which essentially consists of conservation of natural resources, protection of natural resources as well as management of the natural resources. The capacity of the women groups includes various components such as financial, technological, educational, organizational, mobilization and institutional capacity.

MATERIALS AND METHODS

Study design and sampling procedure

This study was cross-sectional and descriptive, and it aimed at collecting data of a social and cultural nature to provide a context for understanding the capacity, roles and opportunities that women groups have in environmental conservation. Women groups may be categorized in terms of local cultural preference. This study focused on those women groups that had a bearing on environmental conservation activities. The paper examines only one aspect of conservation that the women groups in Kisumu are involved in namely recycling of polythene papers and water hyacinth plants into useable products.

The scope of this paper, therefore focus on recycling of polythene papers, sisal, papyrus, water hyacinth plant materials and old fishing nets. The study purposely interviewed women group members, women group leaders, using a structured questionnaire, two focus group discussion sessions were also conducted among

the two selected women groups for purposes of this paper.

Study site

As already stated, Kisumu City is located on the shores of Lake Victoria in Winam Gulf. It is a major commercial hub in the great Lakes region. Among the major industries are those of refined sugar, frozen fish, textiles and processed sisal. It is situated between 34 degrees 25' E and 35 degrees 25' East longitude (Rok, 1984/1988)

It has a rich agricultural surrounding which provides agricultural raw materials to its agro-based industries. Crops such as sugar cane, rice, groundnuts, cotton, tobacco, coffee, tea and pyrethrum are grown in its surroundings.

Methods of data collection

The methods used in this study were key informants, participant observation, interview schedules, and focus group discussions. Key interviews were combined with participant observation methods to yield the data for this paper. The key informants were people with particular specialized knowledge on women group such as government officials from relevant Ministries such Culture, Gender and Sports, Non –Governmental Organizations with a particular focus on environment and other Community Based Organizations (CBOs)..

Pelto and Pelto (1970) observe that the interview method works best when combined with the participant observation method to collect data. Other scholars who have used this method include Keya et al. (1989) and Peil (1982) among others. The main advantage of using a structured questionnaire is that it enabled us to stick to our objectives without deviations which are bound to happen when conducting interviews. The questionnaire had both close –ended and open –ended questions.

Participant observation enabled us to counter check the validity of the information gathered. Haviland (1974) observes that participant observation is one of the chief ethnographic methods, and it involves going to live among the people where the study is being conducted. In this study the researchers lived among the people for a continuous period of one month to observe their environmental conservation activities and create rapport with the respondents.

Focus group discussions was another method that we used in this study, the method involved gathering people of similar interests and discussing with them in detail on the objectives of our study. In this study the focus groups comprised 8-10 members moderated by key researchers. The focus group comprised of the most active members and also committee members.

This method enabled us to understand clearly the capacity, roles, opportunities and challenges that the members of women groups experienced in environmental conservation activities. Among some of the notable scholars who have utilized this method are Susan et al. (1992), Chambers (1992) and Nkwi (1992) to mention only but these. This method enabled us to gather rich ethnographic data regarding the experiences of women groups in recycling of polythene papers and water hyacinth plants.

RESULTS

This study indicates that women groups in Kisumu play a vital role in conserving the environment. We also observed that these groups endeavour to earn an income from their environmental conservation activities by recycling various products and making saleable products.

Baskets



Hats



Lampshades and Flywhisks



Figure 1. Baskets, hats and lampshades by Tonney Red women group.



Figure 2. Some of the products made by women groups in Kisumu.

Some of the products they made are shown in **Figure 1**. Figure 1 shows the baskets made by the Tonney Red women group. The group utilizes locally sourced plant materials to make products such as baskets, mats and bags. The products are made in various shapes and sizes according to the intended functions. These baskets are made of sisal and polythene papers; the use of polythene papers for making baskets such as these serves an important environmental conservation function, since many of these papers would have littered the landscape and blocked drainage systems; for example many of the products shown in this figure are sold to the locals as well as tourists. Some of these products are also sold to neighbouring towns such as Kisii, Migori, Homa Bay, Kericho and even to distant ones like Nakuru, Nairobi and Mombasa.

Figure 2 shows some of the products made from the

baskets, mats and ropes. These products are sold within Kisumu Municipality and its environs. **Figure 3** illustrates the ropes made from polythene paper and sisal. These help in reducing the amount of polythene papers that could have littered the environment around the city of Kisumu. These ropes are usually sold to the local people who use them to tether their livestock and tie firewood. These ropes are usually beautifully dyed indicating the aesthetic value with which the local community attaches to the activities that they perform, it also serves to show the norms and values of the Kisumu residents.

In brief, the use of a large volume of polythene papers that goes into the making of these ropes helps in the conservation of not only the physical environment in the city but also in poverty reduction among the members of the women groups, due to the income that they are able to earn through the sale of these ropes.

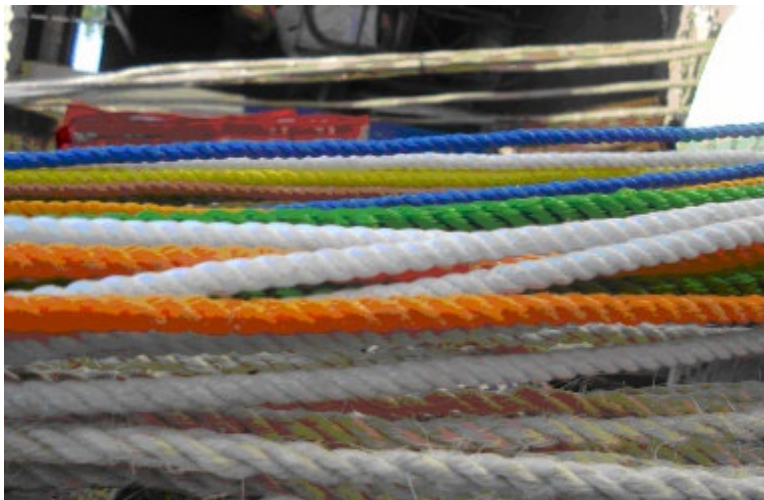


Figure 3. Ropes made from waste polythene papers and sisal.



Figure 4. Hats made from water hyacinth plants.

Main challenges

The group however, faced a range of challenges in their environmental conservation efforts. The following were the main challenges identified by respondents: Lack of adequate finances for the purchase of materials and payment of workers involved in making of the recycled items. Lack of viable markets to sell the items made. Many of the items were thus sold at very low prices. For instance baskets could be sold at Ksh 200 instead of Ksh 300. Lack of facilities for the women involved in recycling efforts, which made recycling work unnecessarily hard which reduced their profit margins. Poor hygienic and sanitary conditions in their working environment. This exposed them to air-borne and water-borne diseases.

Figure 4 shows us the products made by the Orongo women group from the water hyacinth plants. One of the

most prominent ones which are popular among the local residents are hats. The hats are sold at a price of Ksh 100, each and the group sold as many as 200 of them weekly thus earning it Ksh 20,000. We observed that with viable markets these products could help in creating wealth for the women group members as well as helping them to conserve the environment by reducing the amount of water hyacinth in the Lake, since these plants formed the main raw materials for making of these bags and baskets. It is also important to point out that these activities that the women group members engaged in were ideally part of their traditional technologies which is an important aspect of their traditional culture. In this society as in many others worldwide, women are the main transmitters of culture, and they often pass on the culture to the next generation through the socialization of children as well as new members of the society. By mak-

ing these hats, therefore, the women groups killed two birds by one stone, they conserved the environment and also earned income, which enabled them to raise the living standards of their families.

DISCUSSION AND CONCLUSION

Tonney Red Women's Group with a membership of 21 was established and registered in 2000. The group draws membership from women grocery traders at the Kisumu Municipal market. The group was initially formed with the objective of offering home based care for People Living with HIV/AIDS, (PLWHA) orphans, widows and the aged. In 2003, in response to the potential threats to health by the waste generated from the Municipal Market, the group diversified its activities to include waste management. They employed the following strategies in waste management: Members held a field day with other market users and explained or marketed their impending waste management plans; Members contributed Ksh 1,500 each for the purchase of bins; Placing of bins at strategic points within the market. They clearly labeled the bins for respective disposal and sorting of various types of wastes (paper, organic waste, metal, e.t.c). They also liaised with the Kisumu municipal council for periodic collection of unwanted waste: and Liaised with the Kisumu Municipal council officials for allocation of space/premises within the market for storage of plastic waste. The premises also act as the group's "factory."

Initially the group sold the plastics to plastic manufacturing industries in Kisumu. Later, members recognized the potential of generating income from plastic waste. From the members' contributions the group purchased a plastics paper shredder but further required skills on particularly using the machine as well as the general paper recycling technology. Subsequently, five members attended a five-day training organized by the Directorate of Industrial Training (DIT) at the YMCA hostels in 2005.

Since 2005, the group has been using polythene paper as raw material to make various handicrafts. These include ropes, baskets, mats and shopping bags. The products are marketed within the municipality. However, the group reported low sales due to inadequate awareness of potential about their products but also stated that consumers were increasing annually. The group also recycles old nets to make pieces for bathing purposes. These pieces are then sold to local customers and to as far away places like Kisii. One such piece sold at a price of Ksh 100 to Ksh 120 depending on size.

We observed that the recycling of such nets helped greatly in conserving the environment as the nets would have littered the environment. Such nets could block water trenches and thus aggravate the sanitary conditions in the municipality. In brief the recycling of old nets into usable products contributes not only to environmental conservation but also to poverty reduction, as it is

a source of employment for those involved in making the bathing pieces as well as the women group members who have engaged them to make the pieces on their behalf.

We need to emphasize that this activity contributes immensely to environmental conservation since the nets are difficult to dispose off safely since they do not decompose even after being buried in the soil. Left to litter the physical environment they would pollute the environment as they form a good habitat for rodents such as rats, block water in trenches, and pollute the water in the lake, thus endangering the fish and other marine life.

It is known that polythene paper and old fishing nets that this group utilizes as the main raw materials for recycling their products are the most difficult materials to decompose, and so their activities contribute immensely to environmental conservation in the Lake Victoria Basin.

The group also recycles fish remains sold to them by the fishermen at the Lake. These remains could otherwise have been disposed of the Lake shore. The group aims at expanding their ventures but cited inadequate finances as the main impediment.

In brief we observed that the group has enormous opportunities in their recycling efforts, since they could make many products from materials such as water hyacinth plants, polythene papers and old fishing nets. Their activities served to improve the environment by reducing litter and also served as a source of income for the women group members. These opportunities could however, be expanded were the group to secure a willing donor who could provide them with funds to improve their activities. For instance, improve their working environment by working in a well built environment. They need funds to market their products and also pay their workers better pay, in order to motivate them to produce better quality products. We observed that the women group had enormous opportunities to play an even bigger role in environmental conservation activities were its members to be empowered both financially and educationally through better training programmes.

The recycling of the water hyacinth plant by the Orongo women's group

The water hyacinth (*Eichhornia crassipes*) is a floating aquatic plant that varies in size from 8 cm to more than one metre in length. It has showy lavender flowers and leaves that are rounded and leathery, attached to spongy and sometimes inflated stalks. The plant has dark feathery roots. The fresh waters of East Africa are among the last areas to be infested with this plant (Amoding et al., 1999), a noxious aquatic weed that has become difficult to control (Woomer, 1997). One consequence of its invasion is restricted access to aquatic resources; however, this weed may be used to make handicrafts that provide an important source of income for the affected communities (Lindsey and Hirt, 2000).

Sensing a business opportunity in 1998, the Orongo Women's Group, with the assistance of the Kisumu Innovation Centre, developed several handicraft products from the water hyacinth fibre. The group, formed and registered in 1998, has 20 members. Members are mainly involved in the collection of the water hyacinth, preparation of fibre and production of an assortment of products. Furniture and household accessories processed from the fibre include lampshades, napkin holders, breadbaskets, picnic baskets, place mats and floor mats. Office articles include diverse items such as waste bins, file holders, stack trays, pen holders and desk organizers.

These products are then marketed in Kisumu and other major towns in the Lake Victoria region. However, marketing of the products is the main challenge facing the group and some members felt their products are not fetching as much as they should. The production of fibre products by cottage industry artisans in areas most severely affected by the water hyacinth empowers those who would otherwise suffer hardships from reduced access to fishing grounds. In this way, Hyacinth Crafts "*turns gloom to bloom and doom to boom*", as was stated in an article (Olal et al., 2001).

The group also trained its members on solid waste management. For instance, they utilized polythene paper to make items like baskets, art drawings and portraits. Soap making using herbal plants, use of waste paper to make necklaces, using water hyacinth plants to weave various items such as baskets and mats.

Due to the success this group had made it had received considerable support from many organizations such as the young women Christian Association, the USAID, the world Vision, AMREF and Red cross.

The group needs to be attached to more donor organizations that can provide them with the much needed financial support to enable them to continue with their recycling activities.

They need funds to market their products not only in Kisumu city and its environs but also to distant towns where they could fetch much higher prices for their products. The group also needs to send its members to short refresher courses to improve their skills on making quality products out of the solid wastes such as polythene papers, water hyacinth plants and old fishing nets.

One of the challenges of the group is lack of viable markets for their products. As a result of lack of immediate customers some of the products they made took a very long time in the stores thus depreciating in value. The group also needs to network with other groups engaged in similar activities so as to exchange valuable information, knowledge and skills. The activities of this group contribute immensely to environmental conservation since they help reduce the litter that could have been carelessly thrown around the city of Kisumu. Their efforts also help reduce poverty levels among the women group members, since they earn an income from the sale of the

products that they make.

As indicated above the efforts of this group has gained recognition from donor organizations that have provided some financial support to their activities. This support is not however, sustainable and the group is in dire need of sustainable support from the government and donors. Government support may be channeled through relevant ministries such as the ministry of environment and natural resources, women and children and ministry of agriculture among others. During our interview the chairlady confirmed to us that their group received Ksh 200,000 US & 300 from AMREF toward their activities, however, she was quick to point out that that was only a drop in the ocean compared to their needs. In particular from our observations we noted that the group needed more financial support to expand their recycling activities. They needed artisans who can advice them on how to recycle materials and move away from the local methods to new technologies.

The government should identify the efforts of these women and actually expand them. The donors also should consider investing their resources to create good opportunities for the women group members. The economic and environmental benefits of waste reduction (which includes preventing waste, reusing, and recycling) accrue both locally and globally. These activities can

Prevent pollution created by manufacturing new products or products made from virgin materials. Save energy in manufacturing and disposal of products. Decrease greenhouse gas emissions, which contribute to global climate change, conserve natural resources such as timber, water, metals, and fossil fuels. Reduce the need for land filling and incineration, which are expensive to operate and maintain. Protect and expand manufacturing jobs and increase a country's competitiveness. Help sustain the environment for future generations. Create employment opportunities in recycling and re-use establishments, (from collection to processing and manufacturing).

The recycling activities of women's groups, albeit in a small way, contribute towards realization of national conservation objectives. For instance, the EMCA stipulates that "every Kenyan is entitled to a healthy and clean environment". Tonney Red women group for example, through collection and recycling waste, ensures a clean environment whereas the recycling of the water hyacinth improves the portability of water for domestic and Industrial use. Similarly, waste recycling is closely linked to environmental health and sanitation hence these activities contribute to the National Environmental Sanitation and Hygiene Policy. Kenya's resources, especially water and energy are scarce and deteriorating at an alarming rate. Therefore, use of the water hyacinth and polythene paper as raw materials to make various products leads to conservation of scarce resources, which would otherwise have been used as raw materials. In this way, it contributes to the realization of sector conservation stra-

gies, in this case water and energy.

Conclusions

This study indicates that solid waste in Kisumu city negatively impact on the environment if proper management systems are not put in place. Recycling presents an opportunity for extracting economic and environmental benefits from waste. The benefits derived from small-scale waste recycling by women groups in Kisumu range from reducing the amount of solid waste collected for disposal, improving community health and sanitation, restricting environmental pollution, promoting environmental awareness and creating employment and additional income-generating activities. Private and public partnership in waste management is the best option for solid waste management, particularly recycling in Kisumu.

Recommendations

We recommend the enactment and implementation of a policy on source separation of solid wastes and solid waste management legislation to support waste recycling and its application, political support is urgently needed if small-scale recycling programmes are to succeed. The Ministry of Environment and Natural Resources in collaboration with that of Agriculture should assume a leading role in exploring further options for use of water hyacinth as organic compost manure for farming.

Public education on the advantages of using recycled products including environmental benefits in both rural and urban areas need to be promoted with the use of video shows, radio, newspapers and magazines, television programmes and public campaigns.

Deliberate efforts should be made by stakeholders to expand the market for recycled products. Financial and technical support is urgently required in the form of loans, donations, equipment and training by the government, NGOs and urban authorities to the groups involved in recycling and other environmental conservation activities.

Awareness creation to the local community for them to know the existence, and importance of women groups, in environmental conservation activities; and poverty reduction efforts. Enforcement of city by-laws, in support of women groups' initiatives.

Linking women groups with potential donors in order to get support such as finance, equipment and training for capacity building. Encouraging the women groups to network and therefore have opportunities for sharing experiences with other women groups outside their areas of operation. There is need to improve the capacity of women groups in financial and project management skills.

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