ENVIRONMENTAL OBSERVATIONS OF SOLID WASTE MANAGEMENT AT HIGH ALTITUDE IN NEPAL: CASE STUDY ALONG TREKKING ROUTE IN SAGARMATHA NATIONAL PARK

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ABSTRACT

The increasing quantity of solid waste is one of the serious environmental problems in Sagarmatha National Park trekking route. Tourists, trekkers and mountaineers litter the route with plastics, cans, bottles, papers etc. on trails. The lodges, hotels and restaurants also do not have better solutions. The trekking routes from Lukla to Everest Base Camp are littered by more than 30,000 visitors coming to the region within a year. The main reason is due to the concentration of the studies of solid waste mainly in urban areas, lack of environmental awareness and public as well as local participation, lack of understanding of the complex mountain ecosystem and negligence of long term impact to tourism industry.
There have been various initiatives and researches carried out by Sagarmatha National Park (SNP), Sagarmatha Pollution Control Committee (SPCC), Nepal Mountaineering Association (NMA), Ev-K2-CNR and various other agencies including NGOs despite which the situation still remains to be resolved and demand further improvement. This paper describes the observations study on SWM carried out during the trekking by Nepalese and Swedish researchers in April 2010 and recommendations drawn out from the study.
The issues raised and the problems identified during the study would need to be properly addressed, which would be instrumental in finding way forward and augment the planning of the daunting tasks of Solid Waste Management in the region.

KEYWORDS

Awareness, Research, Solid waste, Tourism, Trekking

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1 INTRODUCTION

This study focuses on the problems of Solid Waste Management in Sagarmatha National Park and its Buffer Zone (SNP&BZ) so as to recommend appropriate management options, the focus is on the mass trekking tourism in the park, not the mountaineering expeditions.
Most stakeholders in SNP&BZ have realized waste management as one of the major problem of the area. Some useful initiatives have already been made here, however the lack of specific technical knowledge and lack of environmental awareness and public participation are hampering these initiatives.
This study examines the qualitative characteristics of solid waste, its pattern of generation and evaluates existing management system. Based on the findings, it is envisaged that appropriate management options be recommended, which not only improves the effectiveness and efficiency but also contributes to improve the environmental conditions and help generate economic benefit from it.

SAGARMATHA NATIONAL PARK AND ITS BUFFER ZONE

SNP&BZ spreads an area of 143 sq.Km of Nepal, it has the planet's highest terrestrial ecosystem and the high altitude Sherpa culture. Its location in the Mahalangur Range covers a rugged and steep topography and wide range of altitudinal gradients in the transitional zone between the bioclimates of eastern and central Nepal. This gives the protected area a number of floral as well as faunal species that are globally, nationally and economically significant. In order to protect this remarkable ecosystem and culture, the protected area was declared as National Park in 1976, the National Park was designated as World's Heritage Site in 1979. The adjoining lower region was designated as a Buffer Zone in 2002.

Since the 1990 more than 10,000 tourists a year visit the World Heritage site. In the year 2000 the numbers raised to over 25,000 and the numbers are still rising. This has increased the pressure on the resources in the park.
For the last four decades, tourism in the mountainous area has taken much blame for accelerating environmental problems in the mountain's protected areas despite its contribution to the overall development of the country. The major impact of tourism is increasing forest degradation (due to the increasing demand of fuel wood generated by tourism), solid-waste generation and water pollution.
This paper has studied previous efforts made and observed solid waste management problems and issues and recommendations drawn out from the study during trekking in April 2010 starting from Lukla (Coordinates; 27°41'60"N, 86°43'0."O, WGS84) to Mount Everest Base Camp
(Coordinates; 28°00'18"N, 86°51'22."O, WGS84) by the authors.

BACKGROUND OF WASTE MANAGEMENT IN SNP&BZ

Mountains are thought to be second only to beach locations as the most popular tourist destinations. However, the popularity of mountains as a tourist destination comes at a potential cost to the sensitive mountain environment. Research is divided in its view on the damage being done by tourism to the mountain environment. Experience in Nepal has shown that tourism does damage the environment but it can also be an invaluable means of development and environmental conservation. Solid waste pollution is identified as a component problem of the whole ecological and environment complex which can be mitigated by immediate actions such as creating public awareness and cooperation, and

proper long-term planning for the future development of ecotourism activities [2]. The history of tourism in SNP&BZ dates back more than 50 years still the issues on solid waste was not published until in the late 1980:s.

With the establishment of Sagarmatha Pollution Control Committee (SPCC) thru the support of WWF:s Nepal Program and parts of the Nepalese government, collection of garbage in Khumbu region started in 1991. SPCC is considered a non-governmental and non-profit organization [5].

For sustainable development and environmental conservation to be achieved, a holistic approach to tourism and environmental management is needed that takes account of the needs of the local community, tourists and the environment [7]. Both technical and non technical solutions are needed to tackle this problem. Tourists and tourist associated activities are the major source of solid waste pollution in the Mt. Everest area, see Table 1.

Table 1: Polluters and their Rank (From highest to lowest)

Polluter	Ranks	Remarks
Mountaineers	1	Including porters and guides
Lodges and hotel	2	Associated with tourism
Trekkers	3	Including porters and guides
Local people	4	Involved in subsistence agriculture
Other- e.g. officials	5	Small number

Source: Basnet, 1984

WASTE MANAGEMENT AND RATIONALE OF THE STUDY

The trekking route between Lamosangu and Namche was once nicknamed ‘Garbage Trail’ [5] because of the very visual pollution along the trail. Today the situation has improved some, but the quantity of solid waste that was observed during the LAQUA Groups study in the SNP showed that this is still serious environmental problem. Highlighting that even high altitude areas of Nepal are faced with persistent pollution problems.

Despite the efforts of SNP personal, SPCC and various other agencies, the situation still remains to be resolved and demand improvement. This is basically due to:

a) Government focus more on problems in urban areas like Kathmandu Valley
b) lack of environmental awareness and public participation
c) lack of understanding of complex mountain ecosystem and long term impact of tourism in overall sustainability [2, 3 and 4].

The per capita waste generation of tourist and local people is 0.123 kg/day and 0.109 kg/day respectively. However, since visitors spend on an average 10 days in the park per year, the actual yearly average for visitors is only 3-4 grams per day [5]. Out of this it is a small part that is the large problem made up of by plastic, glass and metal, these constitute 7%, 2% and 2% of the total waste, respectively. Though the amounts generated compared to largely bio-degradable waste is low, these waste types have a high environmental and visual impact.

CURRENT ENVIRONMENTAL MANAGEMENT IN SNP&BZ

SNP and SPCC rules and regulations require expeditions and organized trekking groups to be self-sufficient in fuel (kerosene) upon entering the Park. Organized trekking groups, including the supporting staff, are strictly prohibited to use firewood inside the park. Furthermore, each expedition group has to follow the instruction of garbage clearance certificate before and after leaving park.
Likewise, in order to overcome the problems of empty bottles, the government has banned the introduction of beer, coke and other soft drinks bottles. Only beverages in "Cans" are now permitted inside the park. Visitors will also find several colourful rubbish bins with signs saying "USE ME".

Mountaineering expeditions have to remove all non-biodegradable materials from the park before leaving the area and are made to leave a large deposit to make sure that this is done. The large problem is the 30 000 trekkers every year that do not have such incitements to comply with regulations.

EXISTING SOLID WASTE MANAGEMENT SYSTEM

SPCC has a mechanism for garbage management. Daily it sends collectors in the field to collect and dispose the garbage (burning and burying). Besides this the SPCC supervise and monitor the garbage of the expedition groups in the Himalayan base camps. Annually, SPCC disposes a considerable amount of burnable and non-burnable garbage produced by trekkers and mountaineers in the whole Khumbu region. The SPCC has also placed the rubbish bins along the trails. Gompas and residential areas have also had rubbish bins distributed to collect the rubbish.

Rubbish pits are also dug in a certain places to dispose of the collected rubbish. The collected rubbish is supposedly segregated into two categories, burnable and non-burnable. Here the LAQUA Group discovered large problems during their visit and a big need for education and a lack of environmental awareness among the local people.

Figure 1 Open pit burning in the SNP, highlighting the problem with insufficient sorting.

OBSERVATIONS AND SUGGESTION

During the LAQUA Groups visits to SNP some very clear facts emerged about the handling of solid waste in the park. The main problem in the park today as the group could see is lack of education and interest from the local people. The burning of burnable material in simple constructions like the one in Namche, see fig 2, could work well today. Of course the goal should be to improve on this handling in the future, but for now optimising this handling would go a long way. In all locations were burning was suppose to be done the group observed that the location was used as a dump for all waste, burnable and non-burnable. This is a big problem with no easy solutions, as it would be easy to blame to local people for dumping all the waste and not sorting it. But for environmental policies to work there has to be incentives and education of the people that are to handle this on a daily basis. This has been shown in many places including Sweden many times.

Besides the fact that sorting of waste is not working today and that the burners fill up non-burnable material another large problem is well-meaning donors that donate advanced incinerators to this very remote region. These advanced incinerators work well for some time, but then spare parts run out and there are no resources to get new ones, see figure 2.
It would be much more effective to assist the local people in constructing incinerators similar to the one in Namche and help to raise the awareness for the need of sorting and educate local people about environmental facts. This could lead to a system were burnable solid waste is burned and biodegradable waste is turned into biogas or put back into the soil as manure. The non-burnable and non-biodegradable part of the waste in the SNP&BZ is very small and would preferably be carried back to a bigger city for handling but in the near future it is probably more likely to be buried in the region. This would not be the ideal handling but it would be a huge advance from the handling that is done today.

For the human waste the handling in small villages is not a big problem as it is put back as manure in most places. But with a growing truism industry the handling of human excrement will be a more and more important issue especially the pollution of potable water. There are strict rules for the construction of toilets in the SNP but these are not enforced and many people in the LAQUA Group study, Nepalese and European discovered the issue of dirty drinking water and the problems it can lead to. In Namche the construction of a sewer system will improve the health situation for tourist and locals even if it as this point does not address the issue of water pollution as the waste will be let into the rivers untreated.
Much of the human waste at the lower altitudes could be used for biogas production and some very encouraging programs are making this possible, for example the Biogas Support Programme (BSP). But for the higher altitudes and the small villages that exist in these places the focus should be on education and enforcement of the rules that exists to protect the potable water.

The challenge of cleaning up and keeping the SNP&BZ clean will remain a high task. But a more sustainable approach is desirable, based on the principle of “Polluters Manage themselves or Polluters must pay” [6].This is something that is working fairly well for mountaineering expeditions and something that should be considered for trekking groups as well. Either thru a deposit the same as for mountaineering expeditions or thru a raised fee to enter the park which would enable more founds to be channelled to conservation and environmental work.

WAY AHEAD

- Assist to develop positive attitude of the stakeholders towards waste management,
- Encourage expeditions and trekking team to adopt integrated approach,
- Adopt an additional objective to refrain from waste disposal on the trekking route and slopes
- Plan how to avoid taking unnecessary items and materials and to bring back all waste materials, equipment and logistics along with the Team including human and yak excreta;
- Systematize inventory of waste materials being carried by the trekking and expedition team,
- Develop methods to bring back the waste materials generated;
- Agreement with SPCC for implementation of the Program (Collection of Materials, Human Excreta and control on Incineration of Waste)
- Assisting SPCC for Waste Registry and Clearance Certification and Transfer, and disposal ban in Land, Air and Water including incineration and burial
- Arrange for High Altitude Porters for Collection and Transfer of Human Waste to Lower Areas for composting or Recycling or Reuse
- Collecting market waste and Transfer to Lower altitude for recycling and
- Photographic Documentation and Dissemination of Waste dumped in the Region

Figure 2. Top pictures shows advanced incinerator in Lukla, today it is used just as an open pit incinerator as parts for maintains don't exist. Bottom pictures shows a well design open pit incinerator in Namche that could work very well for its purpose but because of insufficient sorting it is filled up with non-burnable waste.

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