



## RESEARCH PAPER

## OPEN ACCESS

## Shandoor Polo Festival: Is environmental loss greater than economic gain

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### Abstract

Shandoor polo festival, characterized by a unique mountain sport, is played at one of the highest plateaus of the world. The festival annually takes place in the first week of July on the Shandoor plateau almost 4,000 m above sea level. Besides its use as festival ground, the meadows are used by herders from Ghizer and Chitral for grazing their livestock. The festival, in addition to unforgettable joyous moments brings environmental hazards such as solid waste generation. The issue has become a serious concern for organisers of the sport and conservation organisations. Since 2007, World Wide Fund for Nature, Pakistan (WWF – P) has been active in raising visitor's awareness about harmful impacts of the solid waste on Shandoor plateau. At the same time, WWF – P initiated a study on determining trends of solid waste generation during the Shandoor polo festival by collecting data in 2008, 2010 and 2011. The study revealed that 15,000, 4,500 and 13,466 visitors attended Shandoor polo festival during the year 2008, 2010 and 2011, respectively. It was found that per capita biodegradable solid waste (BDSW) generation has increased during the last three events, i.e., 0.083kg in 2008, 0.268kg in 2010 and 0.206kg in 2011. Similarly, the rate of total BDSW increased 30% in 2008; 50.67% in 2010 and 80% in 2011. Average Non-Biodegradable Solid Waste (NBDSW) generation has inconsistently fluctuated during these festivals. It was 0.195kg in 2008, 0.395kg in 2010 and 0.048kg in 2011. Likewise, the rate of total NBDSW decreased 70% in 2008, 49.32% in 2010 and 20% in 2011. In this study level of awareness about solid waste threats to Shandoor plateau were measured and assessed in 2008, 2010 and 2011. In 2008, visitors were not fully aware of the prolong threats of solid waste and mostly preferred NBDSW items than BDSW items. WWF-P took initiative to save Shandoor from adverse impacts of the solid waste and other environmental pollution the awareness level has been increased in the visitors and other stakeholders to save Shandoor from solid waste.

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## Introduction

Solid waste management is one of the challenges facing any urban area of the world (Zerbock and Candidate, 2003). Solid waste generation is one of the global threats to natural environment (Yahaya *et al*, 2010). Solid waste and management is global phenomenon and it is big challenge for mankind on earth (Chandra & Devi, 2009). Manmade generate waste and the ways that waste is handled, stored, collected and disposed off can pose risks to the environment and public health. (Zhu *et al*, 2008).

Solid waste is unavoidable task in urbanization process and it will increase in future and management of solid waste needs planning and more investment (Rode, 2011). Solid waste was an early problem of the globe but a growing one that is of the major issue to the human being (Allende 2009). Solid waste management emerged as a growing problem during the transition from nomadic hunting and gathering to framing but important for urban management support (Schubeler 1996). Solid wastes in festivals are of mixed composition (Kaushik& Joshi, 2011).

In most Asian municipal regions, the most common waste management practice is open dumping, which is the easiest and considered to be the cheapest method of removing waste from the immediate environment (Visvanathan *et al*, 2005). In Asian region 90% of all landfills are non-engineered open dump discarding facilities (Ranaweera and Trankler, 2001). Solid waste management is major cause of the environment degradation in Pakistan. Improper waste management causes hazards to communities' currently solid waste in Pakistan considered to be an improper manner in Collection, transportation and disposal or dumping despite the size of the town. Therefore the Environmental conditions have become a more serious year by year, and people are affecting from living such conditions (Maharet *et al*, 2007).

The average rate of waste generation from all types of municipal controlled areas varies from 1.896kg/house/day to 4.29kg/ house/day in a few major cities (Pak-EPA, 2005). Waste adverse impact on air and ground water due to the improper disposal of waste (Dhere *et al*, 2008).

Solid waste leachate can contaminate ground water quality (Omofonmwan & Esegbe 2009). Festivals in open air with more than 50,000 visitors is a common practice but scarcely studied land- use exercise in many countries of the world, The environmental impacts of the crowds such as litter accumulation and damages to vegetation are increasing being taken into by organizers.

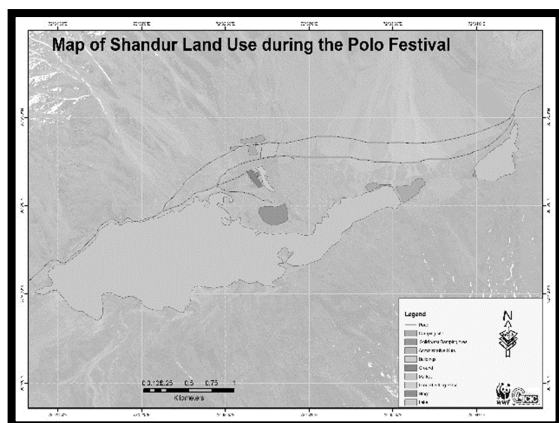
At present, many festivals use overall solid waste amount as an indicator of their waste management performance. However, these operational performance indicators (OPIs) do not reflect either the success of individual litter reduction measures or the damage to valuable habitats. (Carjacks *et al*, 2012). Improper solid waste and mismanagement create diseases supportive after the period of festival occasion (Sharma *et al*, 2010). Environmental impact's assessment is effective tool for waste management (Mondal *et al*, 2010). Segregation or sorting from the source will be very significant to manage the solid waste especial for the under developed countries (Buenrostro *et al*, 2001). This paper is attempted to provide a comprehensive overview on trends of solid waste generation and attitudinal change during the Shandoor polo festival

## Materials and methods

### Study Area

The Shandoor wetland's complex and associated catchment areas are significant ecological niches for agro-pastoral communities of Chitral and Ghizer of Pakistan. The Shandoor plateau lies at 36°04' N and 72°31'E an elevation of 3,353 - 3,810m above from sea level, Geographically plateau widens approximately 10 kms from west to east, lower end of the plateau meet with langar peat-lands complex and fresh water streams.

The Shandoor lakes situated in the alpine zone and Shandoor pass is a junction point of three great mountainous ranges, including Karakorum, Hindukash and Pamir ranges. Shandoor Polo festival between Gilgit-Baltistan (GB) and Khyber Pakhtoonkhwa (KPK) is the most exciting event of the entire mountainous areas of Pakistan held annually in the first week of the July on top of the Shandoor plateau.



**Fig. 1.** Map of Shandoor.

### Methods

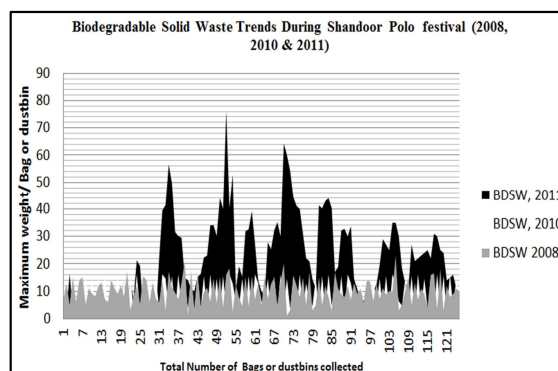
This research paper is based on primary data collection from the field. The study was conducted in years 2008, 2010 and 2011 during the Shandoor polo festival. After observing methodological suitability for this research, data was collected through in-depth interviews, open discussion and personal observation. A total 150 respondents were interviewed during festival, and they represent groups such as tourist, local communities, volunteers, line departments, festival organizers, students, conservationists and scientists. Secondary data was also collected from previous activity reports, relevant research journals, books, research reports and news papers. Minitab 15 and Microsoft excel were used for statistical analysis and generation of graphs. Waste was collected from campaign sites, temporary market, hotels, fruits shops and lake sites in different bags and waste bins before assessment and transportation to land filling sites. Waste was segregated into biodegradable and non-biodegradable from generation points or sources before collection and assessment. Solid waste temporary dumped in a suitable site away from tourists and livestock before assessment. Each solid waste bags and dustbins were weighed to assess average weight of each bag and wastebin per day. Random assessment of each waste bag and wastebin was conducted to assess type, kind and composition of collected solid waste. Waste was transported through tractor's trolleys after assessment of composition, weighing and removing of Reusable materials. Biodegradable solid wastes were disposed off in scientific design land filling sites with help of the clay layers.

### Results

#### *Bio-degradable solid waste trends during the Shandoor polo festival (2008, 2010 & 2011)*

The solid waste assessment and trends reveal that the Biodegradable Solid Waste (BDSW) has been increased during the Shandoor polo festival. The total biodegradable solid waste trends were 1256.3 kgs in 2008; 1206 kgs in 2010 while 2782.8 kgs in 2011. Percent BDWS was 30% in 2008; 50.67% in 2010 and 80% in 2011 correspondingly

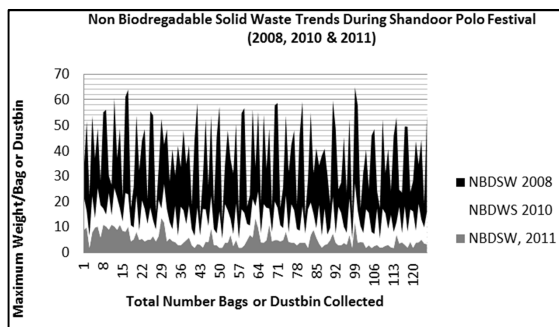
Similarly average per-capita BDWS trends were 0.083kg in 2008, 0.268 kg in 2010 and 0.206 kg in 2011 with the influx of the estimated visitors 15000 in 2008, 4500 in 2010 and 13, 466 in 2011 (Source: Line departments Entry Record). Bio-degradable Solid waste = BDSW Graphic representation of data and Statistical analysis show in Fig. 2 that biodegradable solid waste has been increased with P Value < 0.05, so distribution of values is uneven for entire population samples, P value < 0.05, student z test shall be applied and P value for all is < 0.05 so the results are highly significant at 95% CIs.



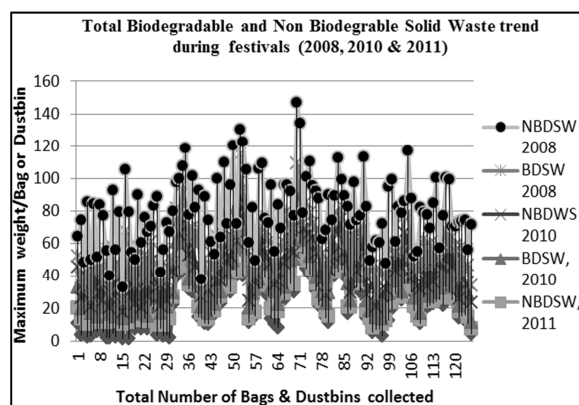
**Fig. 2.** Biodegradable Solid Waste Trends during Shandoor Polo festival (2008, 2010 & 2011).

#### *NonBio-degradable solid waste trends during the Shandoor polo festival (2008, 2010 & 2011)*

Results show that Non Biodegradable Solid Waste (NBDSW) has been decreased 2931.3kg in 2008, 1174kg in 2010 and 653.1kg in 2011. Percentages of NBDSW were 70% in 2008, 49.32% in 2010 and 20% in 2011; similarly per-capita NBDSW trends were recorded as 0.195kg in 2008, 0.395kg in 2010 and 0.048kg in 2011. NBDSW = Non Bio-degradable solid waste. ANOVA of NBDSW proved that there is a decrease in NBDSW (P value < 0.05) in Fig. 3.



**Fig. 3.** Non Biodegradable Solid Waste increasing trends during Shandoor polo festival (2008, 2010 & 2011).



**Fig. 4.** Total biodegradable and Non biodegradable Solid Waste Trends.

#### *Total solid waste trends during the Shandoor polo festival (2008, 2010 & 2011)*

The total solid waste generation trends has been changed during Shandoor polo festival total solid waste in 2008 was 41, 87kg, 2,389kg in 2010 and 3435.9kg in 2011 respectively. One way un stacked (ANOVA) applied for total solid waste trends statistically proved that total solid waste trends has been changed with P value < 0.05, so that distribution of values in uneven for entire population samples, P Value < 0.05, students z test was applied and p value for all is < 0.05 so the results are highly significant at 95% CIs in Fig. 4.

#### **Discussion**

World Wide fund for Nature Pakistan (WWF – P) and it's under Saving Wetlands Sky High Programme and Pakistan Wetlands Programme has been working for protection & conservation of High Altitude wetlands and associated biodiversity of the Gilgit-Baltistan. The Pakistan Wetlands Programme (PWP) is active

national wide while Saving Wetlands Sky High (SWSH) Programme focusing Gilgit –Baltistan in general and Handrab-Shandoor & Utter Ishkoman valleys in specific. In this regard persistently both programmes in close collaboration with other partner institutions and community-based organizations took responsibility to save Shandoor from solid waste and other pollution. Verity of activities conducted to raise awareness includes display of banners, announced electronic messages, awareness raising walks, distribution of awareness raising materials, meetings with line department and tourists. When in 2008 WWF – P started awareness raising and solid waste management campaign to save Shandoor for adverse impacts of the festive events, it was recorded that mostly visitors preferred disposable food items rather than vegetables or fruits.

The result was an ultimate high amount of the NBDSW which was a prologue threat for pastures, livestock and lake water of fragile Shandoor ecosystems. Due to lack of modern waste management facilities this waste remains a threat to the area. Projects team took initiative and brought scavengers from Gilgit and transported non biodegradable solid waste for reuse or recycling, but it was an expensive method to minimize the waste. Project team decided to minimize the non-biodegradable solid waste from sources with help of the consumer behaviour and developed strategy during awareness raising and waste management campaign. In 2010 and 2011 consumers started preferred biodegradable food items and the generation rate of NBDSW reduced compared to waste generated in the year 2008.

#### **Conclusion**

Solid waste management and awareness campaign in the alpine festival is unique practice of conservation organizations. Solid waste generation in and around high altitude wetlands is considerably more threat than in urban center of any country. Because decomposition rate of biodegradable waste in alpine areas is slow and lack of the integrated waste management system.

The non-biodegradable solid waste and infectious solid from the temporary market and mobile hospital need incineration facility, which was not available during festival event. As a result of awareness campaigns the obvious decrease in Non-biodegradable solid waste (NBDSW) was observed and the visitors or tourists of the event preferred biodegradable materials thus producing biodegradable solid waste.

Festival organizers need support from conservation organizations for proper land use planning keeping in view the ecological restoration and values of Shandoor wetlands complex and associated biodiversity. Solid waste management and awareness raising campaigns should be organized in the future jointly with other partners for effective management and to minimize adverse impacts on the alpine plateau.

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