PO-CCS-1-310

Perception vs. Reality

Motivating Citizen Scientists in the Kathmandu Valley

Anurag Gyawali [1] anurag@smartphones4water.org **Eliyah Moktan** [1] eliyah@smartphones4water.org **Anusha Pandey** [1] anusha@smartphones4water.org **Jeffrey C. Davids** [2, 3] jeff@smartphones4water.org

Main Point: Citizen scientists (CS), regardless of whether they were paid or volunteers, were most motivated to take daily measurements during peak monsoon when nearly daily rainfall occured.

Introduction

- Citizen Science driven projects are gaining popularity all over the world.
- Understanding how to effectively recruit and motivate Citizen Scientists (CS), especially in Asia, is poorly understood.
- **Objective:** Understand what personal characteristics and S4W-Nepal motivational efforts were most effective during the 2018 monsoon.

Methods and Materials

- An Android application called Open Data Kit (ODK) used to collect 6656 precipitation measurements.
- Performance of 154 CS in 2018 were evaluated based on personal characteristics (e.g. age) and S4W-Nepal motivational efforts (i.e. paid).

Figure 1: Cheap Soda Bottle Rain Gauges Made by S4W-Nepal for Measuring Precipitation

Results

Heatmap of 2018 S4W-Nepal Precipitation Measurements

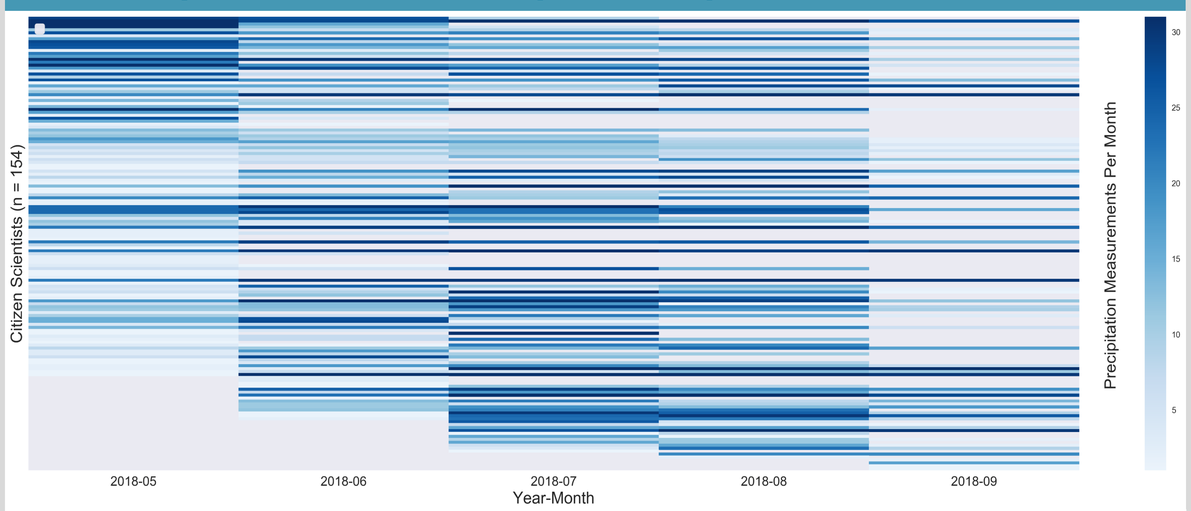

Figure 2. Heatmap of S4W-Nepal precipitation measurements during the 2018 Monsoon Expedition - Count the Drops Before It Stops! A total of 154 citizen scientists too measurements. Each row in the heatmap represents a single citizen scientist. The five columns represent the five months of the year starting with May (i.e. 05) through September (i.e. 09). The number of measurements taken within each month is represented by the color of each pixel. Light blue means fewer measuremenets and dark blue means more measurements.

Impact of Payment, Gender, Age, and Education

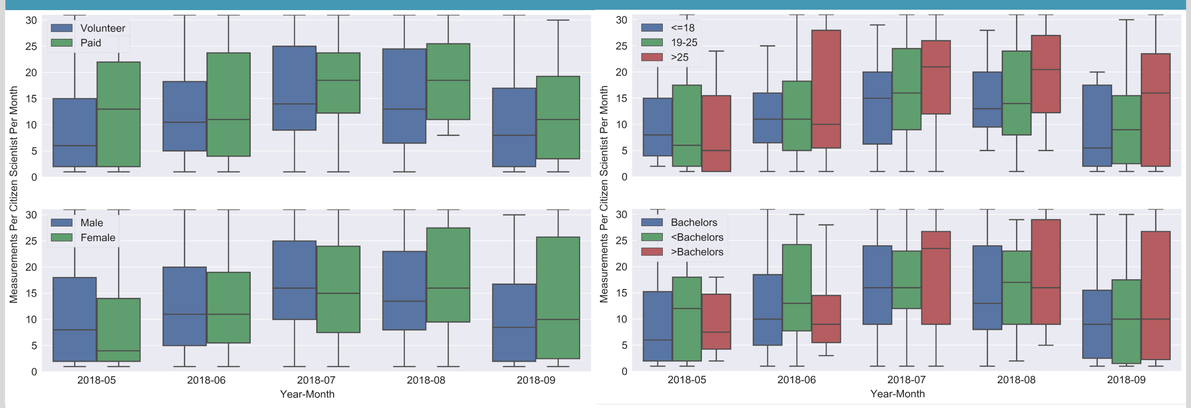

Figure 4. Box plots of the number of measurements taken per month for different categories of CS. of if the CS are paid, gender, age, and education level. Box plots show quartiles for each distribution.

Table 1. Number of CS in each category shown above.

		Gender		CS Type		Age			Education		
Year-Month	Total CS	Female	Male	Paid	Volunteer	<=18	19-25	>25	<Bachelors	Bachelors	>Bachelors
2018-05	121	47	74	21	100	11	87	23	21	92	8
2018-06	106	39	67	26	80	11	76	19	20	79	7
2018-07	96	38	58	30	66	12	63	21	21	65	10
2018-08	93	35	58	30	63	11	64	18	21	63	9
2018-09	64	26	38	20	44	10	43	11	15	43	6

Number of Measurements Per Day

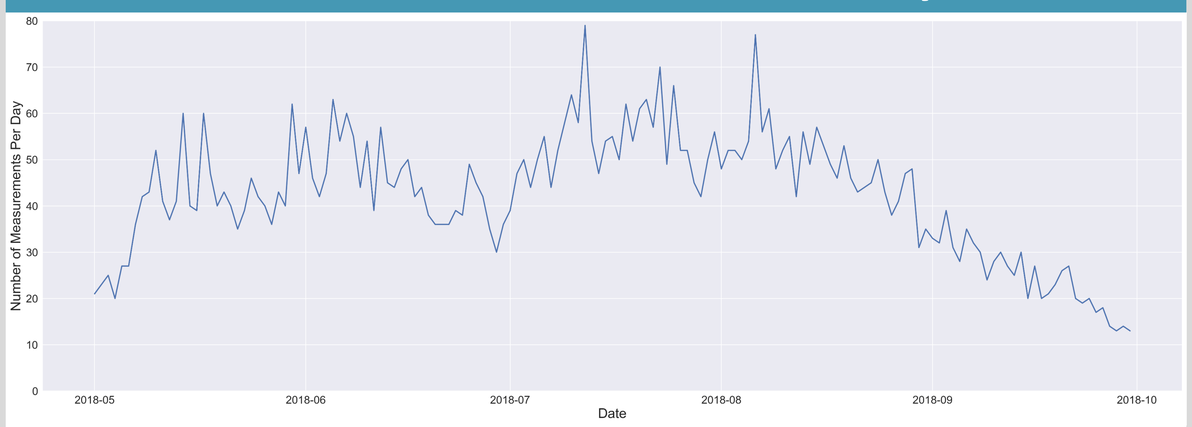

Figure 3. Timeseries plot of the number of CS measurements per day. What explains the gradual decline in measurements from the middle of August through the end of September?

It's Fun to Take Measurements When Its Raining!

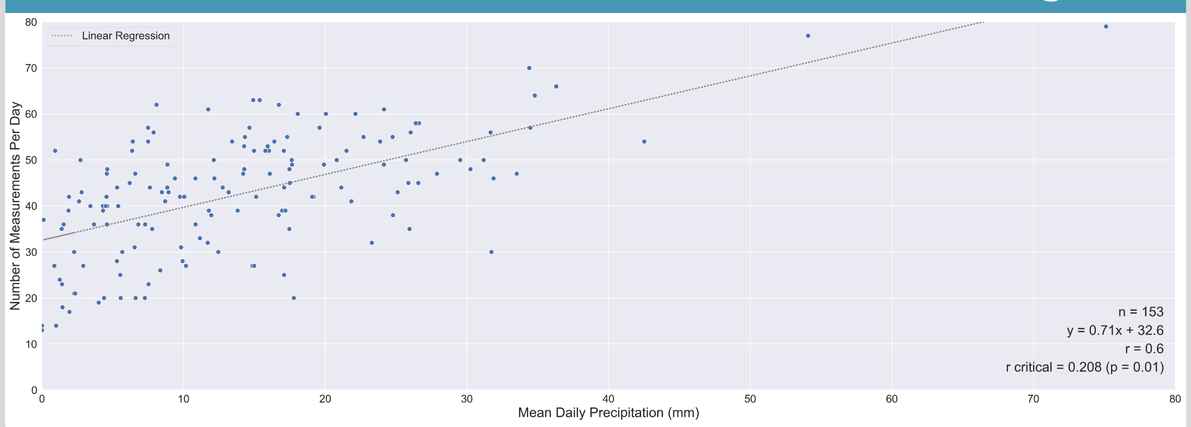

Figure 5. Scatter plot of the number of measurements per day as a function of mean daily rainfall in millimeters (mm). Pearson's r shown in the bottom right.

Discussion

- CS performance varied with varying social and personal characteristics.
- Per month, paid CS took more measurements (i.e. 15.6) than volunteers (i.e. 12.7).
- Gender had a minimal impact on median CS performance.
- Age had an inconsistent (i.e. time varying) impact on median CS performance.
- Education had an inconsistent (i.e. time varying) impact on median CS performance.
- May and June were the primary months for recruiting new CS. There were very few new recruits in July, August, and September.
- Rainfall events were identified as a major motivation for CS to take measurements.

Conclusions and Recommendations

- While payment was an important motivational factor, the presence or absence of measurable rain had the largest impact on CS performance.
- Gender, age, and education had inconsistent and time varying impacts on CS performance. This suggest that citizens with lower educational levels, regardless of age or gender, can play an important role in citizen science project.
- Regular follow ups and personal interactions are recommended to encourage CS to continue taking measurements.
- Mobilizing young researchers should be an important part of implementing citizen science projects in Nepal, as they link local communities and resource managers.

Citizen Science - *scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions. [Oxford English Dictionary]*

TU Delft Delft University of Technology [3]

S4W-Nepal [1]

SmartPhones4Water = Citizen Science + Mobile Technology + Young Researchers

SmartPhones 4 Water [2]