4th International Conference on Environmental Design, ICED2023
Sustainability / Pollution / Energy / Cities-Buildings / Transportation / Erosion / Climate Change / Policy / Social Acceptance / Health Impacts 20-22 October 2023, Athens, Greece

Physicochemical Properties of Soil in Flood Affected and Non-affected Areas of Rajapur, Bardiya

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INTRODUCTION

- A frequently occurring natural disaster, flood causes destruction of life and property in Terai region of Nepal due to heavy seasonal rainfall.
- Flood changes the soil quality by altering the nutrient composition.
- Nutrient contents dictate the type of vegetation and crop, by understanding the impact of flooding in soil, this research can aid in adaptive farming.
- Flood and landslide affected 72 districts across the country in the final week of August and again in October 2021

OBJECTIVES

General Objective:

- To evaluate physicochemical properties of soil in the flood affected areas of Rajapur, Bardiya.

Specific Objectives:

- To undertake assessment of physical properties of soil in the flood affected and non-affected areas.
- To undertake assessment of chemical properties of soil in the flood affected and non-affected areas.
- To compare physical and chemical properties of soil in the flood affected and non-affected areas.

MATERIALS AND METHOD

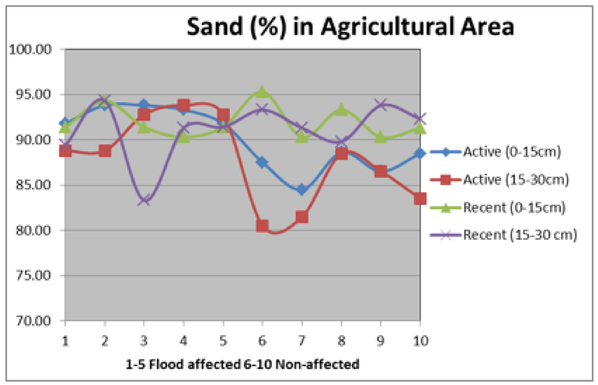
- Rajapur, Bardiya is a fertile Terai plain in mid-western region of Nepal. For this study, 47.4 km^2 area was selected depending on the proximity of Karnali river.
- 120 samples from Rajapur, Bardiya Nepal was collected from 0-15 cm and 15-30 cm from active alluvial plain and recent alluvial plain in flood-affected and non-affected areas.
- Samples were collected in November 2022 after rainy season.
- Physical and chemical properties of soil samples were analyzed and compared in the lab of School of Environmental Science and Management.
- T-test and Mann-Whitney test was applied to quantify the difference between flood-affected and non-affected areas.

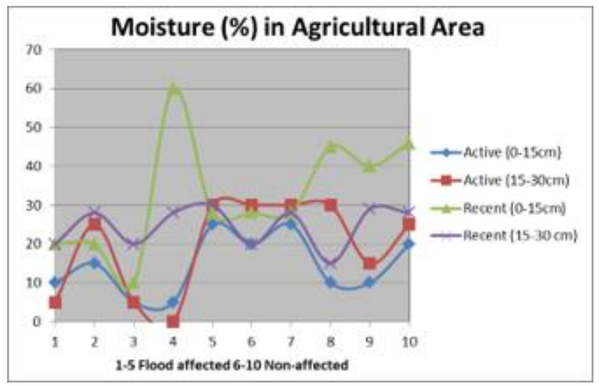
Table 1: Soil properties and method of analysis

Soil Properties		Method
Physical	Color	Munsell Soil Color Chart
	Texture	Bouyoucos hydrometer method (Bouyoucos, 1962)
	Moisture	Moisture Meter
Chemical	Total Nitrogen	Kjeldahl method (Bremner and Mulvaney, 1982)
	Available Phosphorous	Modified Olsen's Bicarbonate Method
	Available Potassium	Flame Photometric Method (Toth and Prince, 1949)
	pH	pH meter
	Soil carbon	Walkley-Black Method (Walkley and Black, 1934)

RESULTS AND DISCUSSION

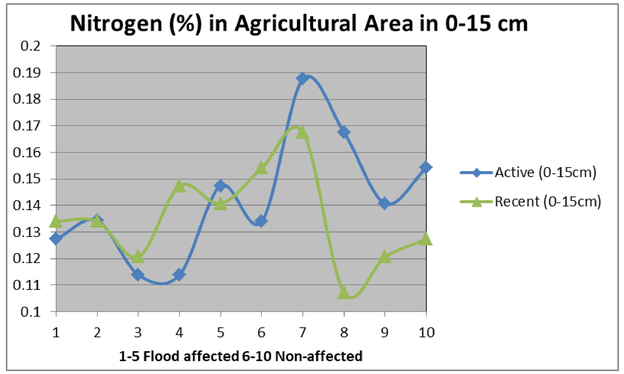
1. TEXTURE AND MOISTURE





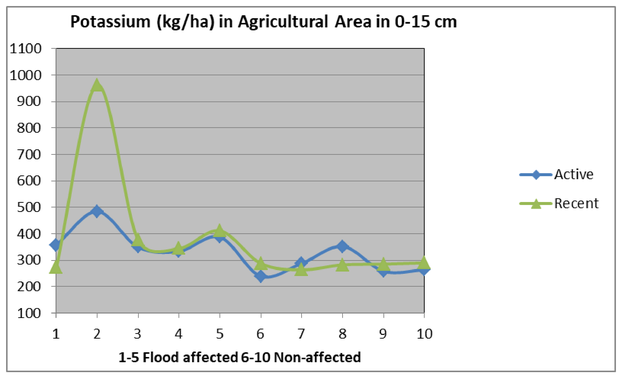
- Sand content and moisture have inverse relationship with each other.
- Regardless of landform and land use, sand content have consistent relationship with moisture.

2. TOTAL NITROGEN



- Nitrogen content was significantly lower in flood-affected areas especially in agricultural areas in active alluvial plain in both 0-15 cm and 15-30 cm.
- Effect was not consistent in forest area and grassland area.

3. AVAILABLE POTASSIUM



- Potassium showed anomalous relationship because it is higher in flood affected than in non-affected areas.
- Potassium value was 382.23 kg/ha in flood affected areas and 351.05 kg/ha in non-affected areas.

4. AVAILABLE PHOSPHOROUS , pH AND SOIL CARBON

- Phosphorus was significantly lower in flood-affected region in agricultural area.
- The effect was not significantly different in forest area and grassland region.
- pH of soil was weakly to moderately acidic with value ranging from 5.0 - 6.0.
- Soil carbon decreased in flood affected agricultural area.
- The effect of flooding in soil carbon was not significant in forest and grassland in active alluvial plain.

CONCLUSION

- Flood inevitably affects the physical and chemical properties of soil.
- The extent of impact is dependent on land use, land forms and depths.
- Agricultural area is more vulnerable to flood than forest and grassland.
- 0-15 cm depth were more affected by flood than 15-30 cm depth.
- Nitrogen and Phosphorus content were negatively affected and Potassium content was positively affected.

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