Application of Terrestrial Laser Scanning to quantify surface changes in blanket bogs of North Spain

Does the rate of surface change differ between restored and unrestored peatlands?

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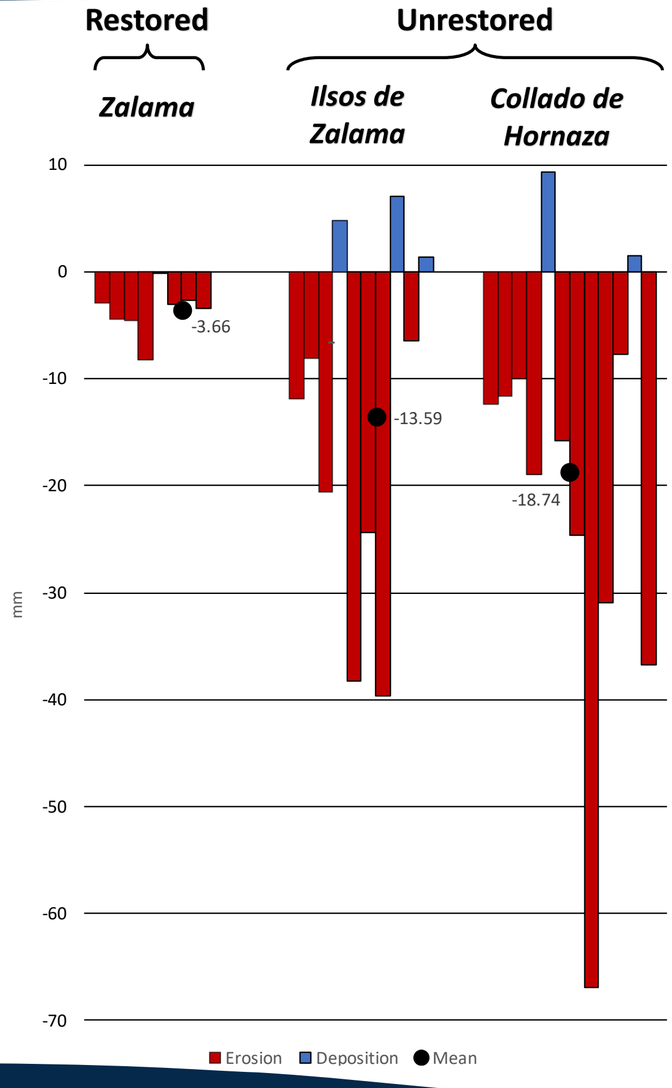
STUDY SITE

In North Spain, a significant number of blanket bogs are unmapped and not protected. This research aims to compare the rate of surface change between two peatlands experiencing grazing in Cantabria (Collado de Hornaza and Ilsos de Zalama) with that measured for a blanket bog undergoing restoration activities in Bizkaia (Zalama).

METHODS

Fixed survey pins were installed in each site to align **multi-temporal data** collected using a terrestrial laser scanner. Surveys were undertaken in May and July 2017 at a resolution of <1.5 mm that enabled **ultra-high** detailed assessment of change to be determined for bare peat surface.

Scanner error was determined from repeat scans and **error of registration** was determined from fixed points. Change was calculated for a number of locations for each site using CloudCompare.



RESULTS

Maximum scanner error was <0.8 mm and registration errors (alignment) ranged from 0.69 to 5.4 mm. For Zalama lower erosion was determined (-3.66 ± 2.32 mm *Mean ± SD*). In the other two areas, where peat is exposed to grazing primarily of bovine and equine stock, greater rates of erosion were identified for both Ilsos de Zalama (-13.59 ± 16.75 mm) and Collado de Hornaza (-18.74 ± 19.83 mm); however, apparent deposition was detected in some areas.

Significant difference was detected between restored and unrestored areas ($p = 0.001$). However, the difference between the unrestored peatlands was not significant ($p = 0.96$).

Scanner error

Site	Error	SD
Zalama	0.30	0.36
Ilsos de Zalama	-0.30	0.97
Collado de Hornaza	-0.48	0.37

Registration error

Site	Error	SD
Zalama	0.69	0.08
Ilsos de Zalama	5.40	0.76
Collado de Hornaza	2.65	1.41

All results in mm

CONCLUSIONS

1 Livestock may be a greater cause of erosion

However the impact of wind and water erosion is currently being assessed in order to determine the relative importance of each mechanism.

2 Unrestored blanket bogs are under threat

and may require urgent protection.

3 Restoration in Zalama appears to be successful

and bare peat stabilisation has reduced the rate of erosion in this area.

Acknowledgments

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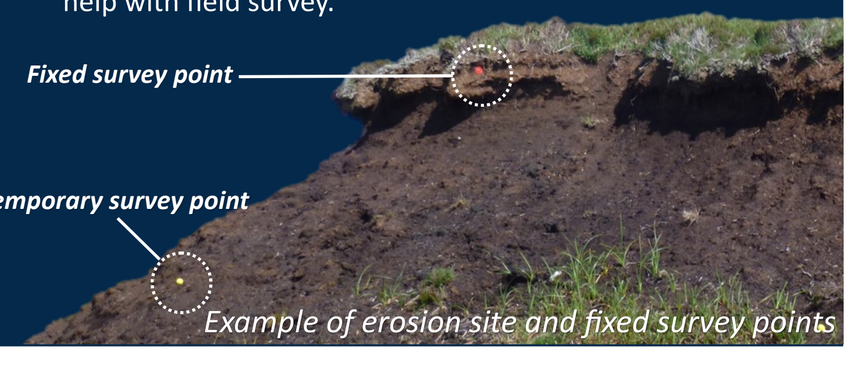

Example of erosion site and fixed survey points