

# Exploring the sentiment of trail users' tweets:

# Can tweet sentiment help assess the effectiveness of Environmental Stewardship Agreements?

## An exploratory analysis of the Pennine Way National Trail, England.

Tom Wilson & Dr. Robin Lovelace | School of Geography | University of Leeds | {gy10tlw}{r.lovelace}@leeds.ac.uk

## Introduction

The Environmental Stewardship Scheme (ESS) represents the most widespread approach to environmental management in England. There are two main levels of ESS: Entry Level Stewardship (ELS) and Higher Level Stewardship (HLS). ELS is open to all farmers and land managers and offers a straightforward and flexible approach to reduce farming intensity and improve the environmental quality of the surrounding area. HLS is a competitive scheme open to the farmers and land managers in specific areas who can deliver significant environmental benefits over an extended period of time. Both ELS and HLS provide monetary rewards when point-based targets are met [1]. Within 5km along its 430 km (268 mile) course, The Pennine Way National Trail (PWNT) corridor passes through 1717 individual ESS agreements.

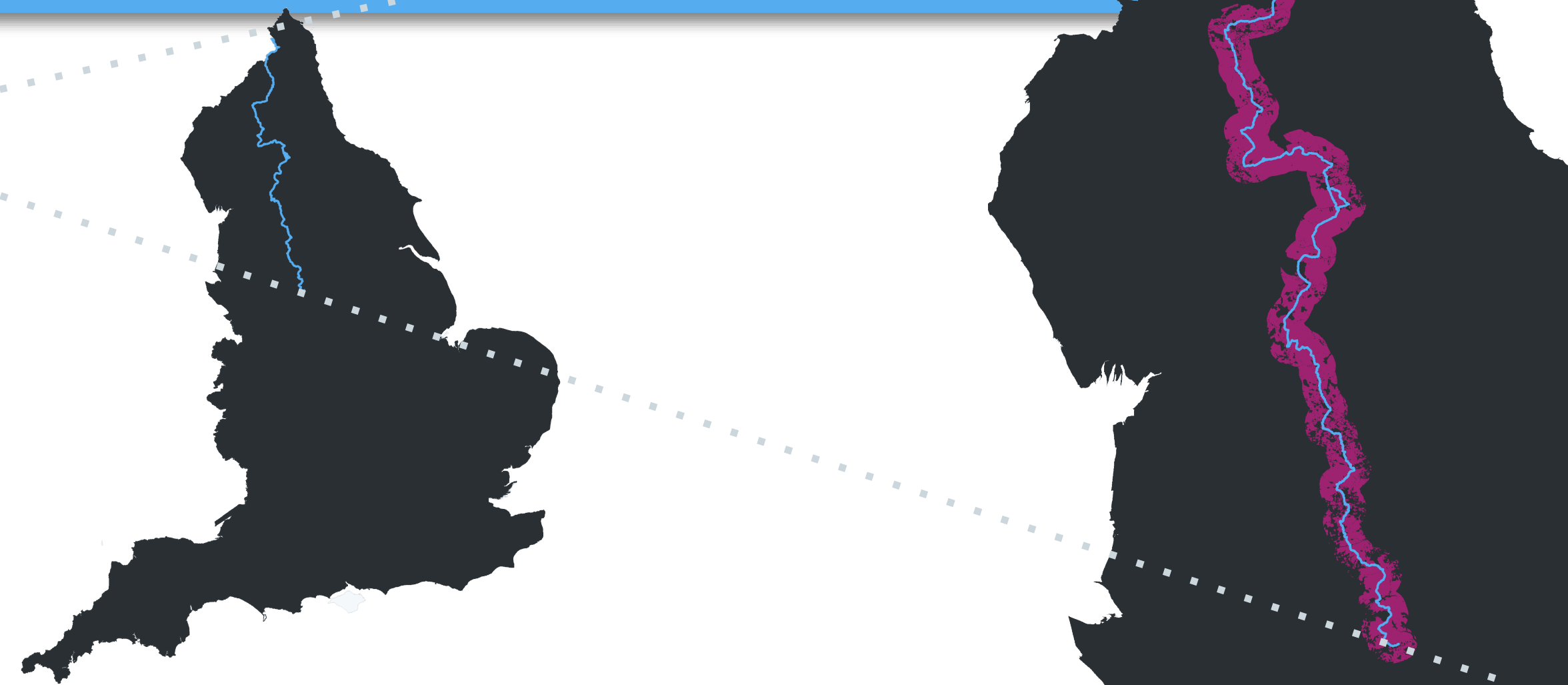
Sentiment Analysis (SA) is the process of extracting positive or negative opinions from text with the aim of analysing people's opinions or sentiment [2]. The growth of the social web has led to an increased interest in SA of short informal text for the purposes of social research, to gain insights into specific events, and to study the affective dimension of the social web [3]. This research performs SA on short informal text collected from the micro-blogging service Twitter to explore whether the sentiment contained within the tweets of trail users can be used to assess the effectiveness of ES agreements in delivering environmental benefits.

## Study Area

The PWNT is the oldest of England's 15 National Trails, officially opened on 24th April 1965 after a 30 year campaign to provide greater access to the English countryside. The PWNT passes through three National Parks, an Area of Outstanding Natural Beauty, two National Nature Reserves, 20 Sites of Specific Scientific Interest [4], and agricultural land managed under ESS. In England both the National Trail system and Environmental Stewardship Scheme are administered by Natural England, an executive non-departmental public body of the UK government.

Figure 1: [left] The Pennine Way National Trail travels 430 km (268 miles) from the Midlands to the Scottish Borders.

[right] Expanded view of the PWNT to show the ES Agreements in place within 5km of the trail.



## Data

- 60,434 geocoded tweets and their associated metadata collected from Twitter between 3rd June 2014 and 25th July 2014.
- A GPX file of the PWNT around which a 5km spatial buffer was calculated - referred to here as the PWNT corridor
- A shapefile of ESS agreement boundaries spatially clipped to the 5km PWNT corridor: The resulting shapefile consisted 1717 ESS (1013 ELS; 690 ELS & HLS combinations; 14 HLS)

Figure 2a, b, c: Sentiment of tweets originating from within 5km of the Pennine Way National Trail.

[a][left] tweets expressing positive sentiment;

[b][middle] tweets expressing negative sentiment;

[c][right] the overall sentiment of tweets obtained by combining the positive and negative sentiment scores.

### Legend

- PWNT 5km Trail Buffer
- ES Agreement boundary
- Positive Sentiment
- Neutral Sentiment
- Negative Sentiment



### Research Objectives

- Conduct an exploratory analysis of geocoded tweets that originated from within 5km of The Pennine Way National Trail corridor between 2014-06-03 and 2014-07-25;
- Develop a methodology to filter relevant tweets from the Twitter dataset;
- Perform a sentiment analysis to extract the sentiment expressed by trail users;
- Analyse the findings and determine whether it is feasible to assess the effectiveness of Environmental Stewardship Agreements' ability to deliver environmental benefits.

## Selected Findings



Expressions of sentiment within tweets [total tweets 161]: 47 positive; 22 negative; 102 neutral. 10 contain both positive & negative sentiment.

Overall tweet sentiment [total tweets 161]: 40 positive; 16 negative; 105 neutral. 7 positive & 3 negative tweets originate from land managed under ESS.

The majority of tweets do not express sentiment i.e. are neutral. Of the 105 neutral tweets 94 (90%) contain a URL to an external source (e.g. to an image or a website).

Regarding the feasibility of assessing the effectiveness of ESS the initial findings are limited in terms of sample size and the sentiment conveyed, and only a small number of tweets originate from land managed under ESS.

## Future Research

- Devise a strategy to encourage social media use as a method of generating feedback
- Develop methods to extract the sentiment, if any, from images that are attached to trail users' tweets; are these images being used to convey sentiment? e.g. [6]
- Combine the findings of this study with other qualitative research of visitors to the countryside, for example Natural England's Monitor of Engagement with the Natural Environment survey [7].
- Analysis of the demographic information of trail-using tweeters. How representative are they? Is it possible to build user-profiles and predict trail use and satisfaction?

## Acknowledgements

Special thanks to Dr. Andrew Evans and Dr. Paul Norman for their academic support and counsel; and to Philippa Swanton, Hazel Thomas and Steve Westwood of Natural England for help regarding Environmental Stewardship and the intricacies of the Pennine Way.

## References

- [1] Lawton, J.H., Brotherton, P.N.M., Brown, V.K., Elphick, C., Fitter, A.H., Forshaw, J., Haddow, R.W., Hilborne, S., Leaf, R.N., Mace, G.M., Southgate, M.P., Sutherland, W.A., Tew, T.E., Varley, J., & Wynne, G.R. (2010) *Making Space for Nature: a review of England's wildlife sites and ecological network*. Report to Defra.
- [2] Liu, B. (2012). Sentiment analysis and opinion mining. *Synthesis Lectures on Human Language Technologies*, 5(1), pp1-167.
- [3] Thelwall, M., Buckley, K., and Paltooglou, G. (2012). Sentiment strength detection for the social web. *J. Am. Soc. Inf. Sci. Technol.* (63)1, pp163-173.
- [4] Walk Unlimited (2014). Pennine Way. [online]. Available at: <http://nationaltrail.co.uk/pennine-way>
- [5] R Development Core Team. (2008). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0. Available at: <http://www.R-project.org>.
- [6] Borth, D., Rongrong, J., Chen, T., Breuel, T., and Chang, S. (2013). Large-scale visual sentiment ontology and detectors using adjective noun pairs. In *Proceedings of the 21st ACM international conference on Multimedia (MM '13)*. ACM, New York
- [7] Natural England. (2013). *Monitor of Engagement with the Natural Environment: The national survey of people and the natural environment. Annual Report from the 2011-12 survey*. Natural England Commissioned Reports, Number 122