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## Carbon Footprints and Fieldwork

**F**ieldwork involves direct engagement with, and impacts on, the environment and so provides many opportunities for Education for Sustainable Development (ESD). Within this context, we developed a bespoke calculator to estimate the scale and components of the carbon footprint of fieldwork activities. It is designed to be applicable to a wide range of fieldwork experiences (e.g. in terms of duration, location, academic discipline), but probably works best for residential fieldwork based at field study centres. The carbon calculator can be used by departments and course co-ordinators to evaluate and manage their fieldwork impacts, perhaps by offsetting their fieldwork footprints or looking into where cuts can be made. However, this is primarily a learning and teaching resource concerned with developing an enhanced understanding of the relationship between individual/group actions and environmental impacts.

The carbon calculator is presented as a Microsoft Excel spreadsheet and is based around four core themes: transport; energy; food; and consumption/waste. The final result (or footprint) is shown in kilogrammes of CO<sub>2</sub>, with a pie chart displaying the relative contribution of different aspects of the field course. A per capita footprint based on the number of field course participants is also calculated. This figure is then extrapolated for a whole year and comparison made with the average annual footprint for a UK resident.

The fieldwork calculator has been shown to offer the potential to engage students actively in ESD in a number of ways. For example, students can be given responsibility for collecting the required data, inputting these into the calculator and monitoring the growth of the footprint in 'real time' during a field course. Indeed if students are working independently of tutors then they will inevitably need to take note of their activities (e.g. distances travelled) for input into the spreadsheet. Experience suggests that a sense of collective responsibility for the calculator can soon emerge. Understanding can also be enhanced through discussion of the strengths and limitations of the tool, an activity made relatively simple through the use of a standard spreadsheet format with transparent formulas. Indeed an 'unlocked' version of the calculator is provided to allow students to directly amend the spreadsheet if this is deemed necessary.

However the greatest value of this resource probably lies in the review and discussion of the final outcomes. For example, the relative size of each footprint component is a good potential topic for discussion and often serves to draw attention to the significance of 'embedded' carbon in food and other aspects of personal consumption. What might have been done differently to reduce the overall field course footprint? Different hypothetical scenarios can be experimented with. What is the lowest feasible footprint for a field course to the same location and of the same duration?



Comparisons can also be made between field courses run within the same department. How much does the location of fieldwork affect the footprint? Do overseas trips always have higher footprints than UK-based trips?

The final figures come more to 'life' when comparisons are used. How does the footprint compare to a typical (non-fieldwork) week? In light of this finding, should departments pursue carbon offsetting strategies, investing in projects which may absorb or prevent the release of equivalent amounts of CO<sub>2</sub>? How does the final field course footprint compare against the reductions predicted to be necessary to counter the worst effects of climate change? Do any current field courses get close to this figure? What could be done to achieve this target? What are the implications of all of this for lifestyle choices in the future?

For over two years now we have used various versions of the fieldwork carbon footprint calculator refining it to suit a wide range of circumstances. The final version of the tool is available to download from <http://gees.ac.uk/resources/hosted/fwCO2/co2fprnt.htm>, along with guidance notes, a completed (hypothetical) example and further commentary on how it might be embedded directly into learning and teaching activities. Experience has shown the calculator offers the potential to engage students actively in an important aspect of ESD and heighten sensitivity to the relationship between personal actions and environmental impacts. Additionally, transferable skills of observation, attention to detail, IT and teamwork are fostered.

The fieldwork carbon calculator was developed with support from a Higher Education Academy Geography, Earth and Environmental Sciences (GEES) small-scale project grant. We would be very interested in any feedback you have about the functionality of the calculator and/or completed examples from field courses, please contact Tamara Hunt with any comments.

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