**The LEFT Tool revealed -insights and tips from an interview with David Benz, one of the creators, based in the University of Oxford’s Long-Term Ecology Lab**

[](https://oxlel.zoo.ox.ac.uk/people/david-benz)

**What is it?**

The Local Ecological Footprinting Tool (LEFT), is a web-based decision support tool which can help businesses minimise the environmental impacts of their activities when they make decisions about how land is used. A user defines an area of interest anywhere in the world using a web-based map and LEFT automatically processes a series of high-quality datasets using standard published algorithms, producing a score at 30m resolution based on five key ecological features (biodiversity, fragmentation, threat, connectivity and resilience).

**LEFT originated from a real business challenge**

The LEFT tool came about through a challenge to Oxford commissioned by a private company, Statoil, the Norwegian petroleum company, who wanted a better way to make decisions. There were times when they needed to disturb the landscape for oil extraction but it did not matter where they did so, so they wanted to minimise the long term environmental harm of the disturbance yet found the commercially available tools could not help them achieve this. The tool is useful for any extractive industry or anyone making changes to a landscape that wishes to minimise ecological damage. LEFT identifies those areas which are more important ecologically so that they can be preserved and the less important ecological areas are identified for absorbing damage.

**Scoping a decision support tool**

To attain a clear set of achievable objectives for the tool, the researchers did a number of things. They:

* spoke with the people in the company who were going to use the tool in the future
* spoke to those who wanted the tool but didn’t have anything like it
* conducted an evaluation of the existing tools that could do something similar, assessing what they lacked
* reviewed available datasets and algorithms to gain an idea of what might be possible to close some of these gaps and achievable within a new tool
* used a standard literature review on the topics and tools of environmental assessment and impact, as well as drivers of damage and sources of resilience in landscapes

Although the researchers set out to build the tool for one specific user group, on realising the scale of investment of time and energy building the tool, they soon realised it would benefit more user groups than the original commissioning company. The initial project was for 2 years, which produced a demonstrator to work at a spatial resolution of 300m. At the end of that period, the researchers had produced a prototype which the company was happy with, and was funded a further 3 years of development to produce the tool available today at a much higher spatial resolution.

**Thinking about the skills and sequencing required to deliver the tool**

The research team for the LEFT tool drew from within their own department and across various departments in the university and externally to create it. This included bringing in skills and capability from:

* Computer Science Department postdocs who set up a system to take in pieces of data and deliver in the output LEFT users would need via the website
* An external web developer fluent in the environmental technical language but able to make the website itself intuitive, attractive and engaging for end users

**Business case for widening access to the decision-support tool**

Statoil were happy for Oxford to retain the IP in return for continued access to the tool. They had realised that to maintain the tool, there would need to be a sustainable funding regime in place, that the tool would need to somehow generate income to cover its running and maintenace. The researchers had to explore different income generating models. They’ve settled on a model whereby initial reports are free but for those requiring GIS layers, there’s a fee that will help generate the income required to maintain the tool and enable the research to continue. The evolution of LEFT remains to be seen, but will be dependent upon the success of the payment model.

**LEFT legacy**

LEFT has already led to development of another tool, [NaturEtrade for Europe](https://www.naturetrade.net/), an easy-to-use ecosystem service evaluation tool and trading being developed for landowners to measure the ecosystem services provided by their lands.

**Data issues encountered**

* Sourcing climate variable data, particularly precipitation, that could provide a consistent record back to the year 2000 to correspond with the MODIS EVI data (for the vegetation) . The datasets they could find were either too short, too coarse spatial resolution or too poor quality. In the end, they used an evapotranspiration product which provided the information required and was a more stable, usable product.
* The sheer volume of data to analyse - for instance, the resilience layer incorporated elements of climate data available at 5minute intervals over 14 years. It took a year just to prepare the data before the team moved the processing onto the university’s supercomputer
* Early iterations of the tool made use of proprietary software on a university licence because the focus at that stage was on solving the challenge, of proving it was possible. This was fine as long as LEFT was being use for research purposes. However, once the team got into a position of looking at different payment models to make the project self-supporting, the team weren’t allowed to continue using those licenses. So, LEFT now is based on entirely open source software.

**Further reading**

[**https://www.left.ox.ac.uk/**](https://www.left.ox.ac.uk/)

The following scientific papers provide complete details of the algorithms used to calculate the component maps within LEFT and a validation of the performance of LEFT:

* LONG, P. R., BENZ, D., MARTIN, A. C., HOLLAND, P. W. A., MACIAS-FAURIA, M., SEDDON, A. W. R., HAGEMANN, R., FROST, T. K., SIMPSON, A., POWER, D. J., SLAYMAKER, M. A. & WILLIS, K. J. 2018. LEFT—A web-based tool for the remote measurement and estimation of ecological value across global landscapes. Methods in Ecology and Evolution, 9, 571-579.
* WILLIS, K., MACIAS-FAURIA, M., GASPARATOS, A. & LONG, P. 2014. Identifying and mapping biodiversity: What can we damage? Nature in the Balance: The Economics of Biodiversity.
* WILLIS, K. J., SEDDON, A. W., LONG, P. R., JEFFERS, E. S., CAITHNESS, N., THURSTON, M., SMIT, M. G., HAGEMANN, R. & MACIAS-FAURIA, M. 2015. Remote assessment of locally important ecological features across landscapes: how representative of reality? Ecological Applications, 25, 1290-1302
* SEDDON, A. W., MACIAS-FAURIA, M., LONG, P. R., BENZ, D. & WILLIS, K. J. 2016. Sensitivity of global terrestrial ecosystems to climate variability. Nature, 531, 229-232