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**Name:** LE DUC, Michael Geoffrey

Qualifications: BSc, MSc, PhD, MIEEM

Current post: Lecturer, School of Biological Sciences, University of Liverpool.

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Date of birth: 5th April 1943

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### Employment Summary

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2004 - Lecturer, School of Biological Sciences, University of Liverpool.

1993-2004 Senior Research Associate, Applied Vegetation Dynamics Laboratory, School of Biological Sciences, University of Liverpool.

1990-1993 Higher Scientific Officer, Institute of Terrestrial Ecology, Monks Wood (now Centre for Ecology and Hydrology), Ecological Processes section.

1981-1989 Postgraduate (part-time) student at Birkbeck College, London University (study for MSc and PhD).

1985-1989 Tutor (part-time), Chemistry and Biology Dept., Southwark College of Further Education, London.

1966-1985 Development, Quality Control and Test engineering with a number of electronic component manufacturers, notably Mullard Ltd.

1964-1966 Assistant Experimental Officer in the Surface Reactions Sect., National Physics Laboratory.

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### Education

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Oct 83-Dec 89 Birkbeck College, University of London (part-time): Ph.D. Comparative ecology of three species of tree seedling in an oak-hornbeam wood.

Oct 81-Jun 83 Birkbeck College, University of London (part-time): M.Sc. Natural Environments & Plant Growth.

Oct 61-Jun 64 King's College, University of Durham: B.Sc. General, Chemistry & Physics, 2nd (June 1964).

Sep 54-Jul 61 Duke's Grammar School, Alnwick, Northumberland: GCE 'A' Level (June 1961) in Physics, Chemistry, Mathematics

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### Teaching

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**Postgraduate:** Course Director for MSc "Restoration Ecology of Terrestrial and Aquatic Environments", and direct responsibility for the modules "Restoration of terrestrial communities damaged by agriculture and other non-toxic development", and "Field Course"; also taught on modules "Application of ecological principles to restoration practice", "Transferable skills and research techniques in designing suitable restoration approaches". Also: MSc "Bioinformatics" workshop "Introduction to CANOCO"; Postgraduate Quantitative Biology workshop "Multivariate analysis in R".

**Undergraduate:** Organiser and teacher for 2<sup>nd</sup> year module "Quantitative Biology 2", and 3<sup>rd</sup> year module "Biodiversity and Conservation"; also taught on: 1<sup>st</sup> year modules "Practical Skills", "Quantitative Biology 1", and "Field Skills", 2<sup>nd</sup> year module "Investigative Methods: Disturbed Environments", 3<sup>rd</sup> year module "Analysis of Environmental Issues". Also ran tutorial groups on "Key Skills" for 1<sup>st</sup> and 2<sup>nd</sup> years, and supervised a number of Honours projects.

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**Professional qualifications / Society membership**


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- Member of the Institute of Ecology and Environmental Management
  - Member of the British Ecological Society, the International Association for Vegetation Science, and the Society for Ecological Restoration
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**Research interest**


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**Woodland ecology and modelling:** soil nitrogen and coniferous plantation; canopy tree invasion, succession and seedling survival; modelling field-layer flora in new plantations; threats to sub-tropical dry scrub woodland in Pakistan; the drivers of variation and change in British woodlands using large data sets; plantations on brownfield sites. (Funded variously by the University of London, FRCC, NERC, EN - now NE, a charity, and the University of Liverpool)

**Bracken control and vegetation restoration in the uplands:** optimal bracken control strategies for infested lands; restoration techniques for pre-existing vegetation, including heather moorland and acid grassland; investigations of the impact of bracken invasion on soil seed and spore banks, and canopy effects on seed rain; impact of bracken infestation and restoration on landscape characteristics. Some work also done with *Molinia*-infested sites. (Funded by MAFF / Defra)

**Mining waste restoration:** Consultations on vegetation restoration methods and experimental design for heavy metal and coal mining spoil in Orissa and Bihar, India. (Funded by the British Council and Tata Mining)

**Heath management and restoration:** heather re-seeding; cool burning methods and optimal conditions; vegetation development and the burning cycle; peat erosion. (Funded by Moors for the Future and private sources)

**Statistics, experimental design, and databases:** statistical approaches to investigating and modelling vegetation changes and their causes, including multivariate methods; quality assurance/control technologies for experimental design, data collection, storage and archiving; database design for complex data sets.

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**Scientific publications - selection**


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**Le Duc, M.G.**, Sparks, T.H. & Hill, M.O. (1992). Predicting potential plant colonisers of new woodland plantations. *Aspects of Applied Biology* **29**, 41-48.

Mitchell, R.J., Marrs, R.H., **Le Duc, M.G.** & Auld, M.H.D. (1997). A study of succession on lowland heaths in Dorset, Southern England: changes in vegetation and soil chemical properties. *Journal of Applied Ecology* **34**, 1426-1444.

**Le Duc, M.G.** & Havill, D.C. (1998). Competition between *Quercus petraea* and *Carpinus betulus* in an ancient wood in England: seedling survivorship and the impact of herbivory. *Journal of Vegetation Science* **9**, 873-880.

Pakeman, R.J., **Le Duc, M.G.** & Marrs, R.H. (1998). An assessment of aerially applied asulam as a method of long-term bracken control. *Journal of Environmental Management* **53**, 255-262.

Marrs, R.H., Johnson, S.W. & **Le Duc, M.G.** (1998). Control of bracken and restoration of heathland, VIII. The regeneration of the heathland community after 18 years of continued bracken control or 6 years of control followed by recovery. *Journal of Applied Ecology* **35**, 857-870.

Mitchell, R.J., Marrs, R.H., **Le Duc, M.G.** & Auld, M.H.D. (1999). A study of the restoration of heathland on successional sites: changes in vegetation and soil chemical properties. *Journal of Applied Ecology* **36**, 770-783.

**Le Duc, M.G.**, Pakeman, R.J. & Marrs, R.H. (2000). Vegetation development on upland and marginal land treated with herbicide, for bracken (*Pteridium aquilinum*) control, in Great Britain. *Journal of Environmental Management* **58**, 147-160.

Pakeman, R.J., **Le Duc, M.G.** & Marrs, R.H. (2000). Bracken distribution in Great Britain: Strategies for its control and the sustainable management of marginal land. *Annals of Botany* **85**, 37-46, Suppl. B.

Collins, Catherine., **Le Duc, M.G.**, Mcallister, H.A. & Marrs, R.H. (2000). The effects of changing weather between 1967 and 1997 on the growth of Corsican pine. *Arboricultural Journal* **24**, 1-13.

- Mitchell, Ruth J., Auld, Martin H.D., **Le Duc, Michael G.** & Marrs, Robert H. (2000). Ecosystem stability and resilience: a review of their relevance for the conservation management of lowland heaths. *Perspectives in Plant Ecology, Evolution and Systematics* **3/2**, 142-160.
- Le Duc, M.G.**, Pakeman, R.J. & Marrs, R.H. (2003). Changes in the bracken rhizome system subjected to long-term long-term experimental treatment. *Journal of Applied Ecology* **40**, 508-522.
- Corney, P.M., **Le Duc, M.G.**, Smart, S.M., Kirby, K.J., Bunce, R.G.H. & Marrs, R.H. (2004). The effect of landscape-scale environmental drivers on the vegetation composition of British Woodlands. *Biological Conservation* **120**, 491-505.
- Milligan, A.L., Putwain, P.D., Cox, E.S., Ghorbani, J., **Le Duc, M.G.** & Marrs, R.H. (2004). Developing an integrated land management strategy for the restoration of moorland vegetation on *Molinia caerulea*-dominated vegetation for conservation purposes in upland Britain. *Biological Conservation* **119**, 371-385.
- Smart, S.M., Bunce, R.G.H., Marrs, R., **Le Duc, M.**, Firbank, L.G., Maskell, L.C., Scott, W.A., Thompson, K. & Walker, K. (2005). Large-scale changes in the abundance of common higher plant species across Britain between 1978, 1990 and 1998 as a consequence of human activity: Tests of hypothesised changes in trait representation. *Biological Conservation* **124**, 355-371.
- Pakeman, R.J., Small, J.L., **Le Duc, M.G.** & Marrs, R.H. (2005). Recovery of Moorland Vegetation after Aerial Spraying of Bracken (*Pteridium aquilinum* (L.) Kuhn) with Asulam. *Restoration Ecology* **13**(4), 718-724.
- Tong, C., **Le Duc, M.G.**, Ghorbani, J. & Marrs, R.H. (2006). Linking restoration to the wider landscape: A study of a bracken control experiment within an upland moorland landscape mosaic in the Peak District, UK. *Landscape and Urban Planning* **78**, 115-134.
- Ghorbani, J., **Le Duc, M.G.**, Mcallister, H.A., Pakeman, R.J. & Marrs, R.H. (2006). Effects of the litter layer of *Pteridium aquilinum* on seed banks under experimental restoration. *Applied Vegetation Science* **9**, 127-136.
- Smart, Simon M., Thompson, Ken, Marrs, Robert H., **Le Duc, Mike G.**, Maskell, Lindsay C. & Firbank, Leslie G. (2006). Biotic homogenization and changes in species diversity across human-modified ecosystems. *Proceedings of the Royal Society B* **273**, 2659-2665.
- Corney, P.M., **Le Duc, M.G.**, Smart, S.M., Kirby, K.J., & Marrs, R.H. (2006) Relationships between the species composition of forest field-layer vegetation and environmental drivers, assessed using a national scale survey. *Journal of Ecology* **94**, 383-401
- Le Duc, M.G.**, Pakeman, R.J. & Marrs, R.H. (2007). A restoration experiment on moorland infested by *Pteridium aquilinum*: Plant species responses. *Agriculture Ecosystems & Environment* **119**, 53-59.
- Marrs, R.H., Galtress, K., Tong, C., Blackbird, S.J., Heyes, T.J., Pakeman, R.J. & **Le Duc, M.G.** (2007). Competing conservation goals, biodiversity or ecosystem services: element losses and species recruitment in a managed moorland-bracken model system. *Journal of Environmental Management*, **85**, 1034-1047
- Ghorbani, J., **Le Duc, M.G.**, Mcallister, H.A., Pakeman, R.J. & Marrs, R.H. (2007). Temporal responses of propagule banks during ecological restoration in the UK. *Restoration Ecology* **15**(1), 103-117.
- Le Duc, M.**, Yang, L. & Marrs, R. (2007). A database application for long-term ecological field experiments. *Journal of Vegetation Science* **18**, 509-516.
- Cox, E.S., Marrs, R.H., Pakeman, R.J. & **Le Duc, M.G.** (2007). A multi-site assessment of bracken control effectiveness across the UK. *Applied Vegetation Science* **10**, 429-440.
- Stewart, G.B., Cox, E.S., **Le Duc, M.G.**, Pakeman, R.J., Pullin, A.S. & Marrs, R.H. (2008). Control of Bracken (*P. Aquilinum*): meta-analysis of a multi-site study in the UK. *Annals of Botany* **101**, 957-970.
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