Putting the past into practice:
Applying historical land use information

Humphrey Southall, Director, GB Historical GIS/University of Portsmouth describes the work of the Great Britain Historical GIS team.

Since 2003, the Great Britain Historical GIS team based at Portsmouth University have done a series of projects analysing historical land use data funded by government agencies:

The Agricultural Change and Environment Observatory was established within the Department of the Environment, Farming and Rural Affairs to monitor changes in agriculture, particularly those arising from the 2003 Common Agricultural Policy reforms. One issue is how changes in the structure of farm businesses affects farming practices, and so the landscape.

One of the Environment Agency's primary responsibilities is for implementing the European Union's Water Quality Directive. One aspect of this is reducing the amounts of nitrates, 'nitrate vulnerable zones' currently covering 20% of England. Given that reducing fertiliser use may make arable farming non-viable, identifying which areas were traditionally pastoral and converted to arable during or after World War II is one way of targeting action.

Natural England exists "to conserve and enhance the natural environment, for its intrinsic value, the wellbeing and enjoyment of people and the economic prosperity that it brings." This includes the Environmental Stewardship scheme, funded by the European Union as part of the Common Agricultural Policy, Pillar 2. UK funding under this for 2007–13 is £4.5bn. According to Andrew Baker of NE, "Place based evidence of long term change will greatly aid in our interpretation of the evidence arising from landscape monitoring programmes such as Countryside Quality Counts". One way this can happen is through better understanding of the landscapes associated with "low input farming", which we are maybe moving back towards.

The GBH GIS team became involved with historical land use surveys because of our unusual expertise in large scale digitisation projects based on historical geo-spatial data. Our most detailed work has focused on the Land Utilisation Survey of Great Britain, based at the London School of Economics and led by Professor L. Dudley Stamp. Most of the country was surveyed between 1931 and 1934, but lack of funds meant it took until 1949 to publish the resulting one inch to one mile maps; 56 sheets covering upland Scotland were never published, but carefully hand-coloured and deposited with the Royal Geographical Society (figure 1). In 2004, DEFRA and EA funding allowed us to scan all the published maps, and in 2005 funding from the Frederick Soddy Trust plus assistance from the RGS and Imperial Mapping Ltd added the unpublished Scottish sheets. These scans have been assembled into a single seamless electronic map which forms part of our open access web site, *A Vision of Britain through Time*, so the whole of the LUSGB has finally been published and can be viewed at **www.visionofbritain.org.uk**

The Second Land Utilisation Survey was directed by Professor Alice Coleman of King's College London and collected more detailed information than the LUSGB. The survey was completed relatively quickly between 1960 and 1963, but publishing the results was again more problematic. Only 15% of the mapping was ever published, but the whole survey is still held privately by Professor Coleman.

The Land Use UK survey was carried out in 1996–7, and largely limited itself to a stratified sample of 1,000 1km grid squares. It did however create a conventional map of the Brighton area. This is of immense interest as it uses the same methods as the earlier surveys for a date when satellite data are available. Our separate *Land of Britain* demonstration web site (**www.landofbritain.org.uk**) presents data from all the sources discussed here for the Brighton area.

Building on this work, DEFRA has funded research into the records of the agricultural census or 'June Survey', taken annually since 1866. The only published data are by county, and we have assembled all available transcriptions so that *Vision of Britain* includes data for at least every tenth year for English counties, and at least for 1871, 1901, 1931 and 1961 for Scotland and Wales. Parish-level statistics exist in

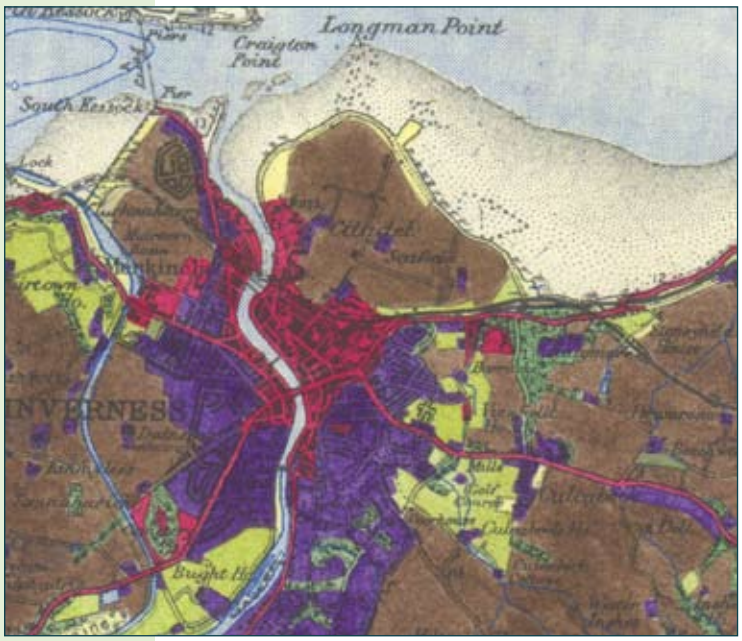

Figure 1 – Hand-coloured Land Utilisation Survey of Great Britain map of the Inverness area

manuscript form in the National Archives. We have located several transcriptions, usually limited to single counties or smaller groups of parishes, but analytic work has concentrated on transcriptions by Coppock covering south-east England in 1877 and 1931(figure 2 & 3). We would be pleased to hear about additional transcriptions of county- or parish-level data.

Natural England funded an investigation of the 1941 National Farm Survey. This is of interest partly because this is the only year for which the original farm-level returns from the June Survey have been preserved. Maps in MAF.73 show the boundaries of every farm in England and Wales. However, in 1941 "surveyors" qualitatively assessed each farmer and farm: "bad" farmers occupying "good" land would be replaced by managers for the duration of the war. Records of the survey comprise about 1.1m. questionnaires and 36,000 maps. It would be possible albeit very expensive to create a conventional GIS from these data, but we concluded that they could be scanned and made accessible on-line for under £200,000.

Funding from government agencies has thus enabled extensive surveys of available data, and a series of feasibility studies for large scale computerisation. The latter has focused on automated methods for converting the existing scanned images of the LUSGB maps into sets of land use polygons represented by vectors, from which the creation of land use statistics by parish or district would be a small further step. We have shown that this is possible, at much lower cost than manually digitising the maps, but the necessary funding has so far been available from neither the agencies nor the research councils.

Our current work is funded by the Frederick Soddy Trust and is aimed at developing broad conclusions on trends in land use since the 1930s, comparing maps from the land utilisation surveys with modern Land Cover mapping. This work focuses on changes at the edges of towns and on conversion of moorland to improved grazing. Rather than trying to vectorise the published LUSGB maps, we are focusing on those areas covered by the original colour separations now held by the LSE archives: six separations were created by the LUSGB for each published sheet, each containing just one colour layer, so they are far easier to vectorise than the published maps (figure 4).

To learn more about how typical rural areas have changed, away from towns and moorland, we are seeking funding for a research student who would draw on all the sources listed here, plus various kinds of historical photography, to study the earlier landscape history of the seven lowland English parishes covered by Natural England's *New Agricultural Landscapes* studies, begun in 1972 and repeated in 1983, 1994 and 2005.

The changing land of Britain has been recorded in remarkable detail over the last century, such that the sheer volume of material is the largest barrier to systematic analysis.

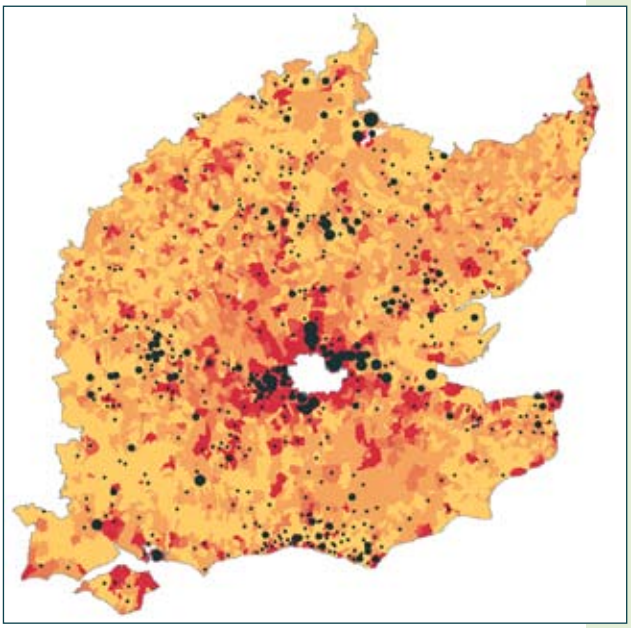

Figure 2 – Cabbage Acreages in 1877 (proportional circles) relative to 1881 population density (colours), from Coppock's sample of parish-level agricultural census data

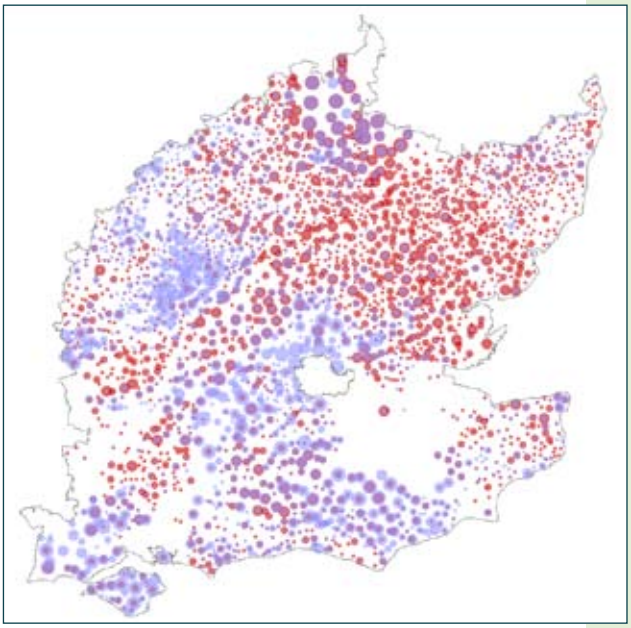

Figure 3 – Cows in milk relative to wheat acreages in 1877, from Coppock's sample of parish-level agricultural census data

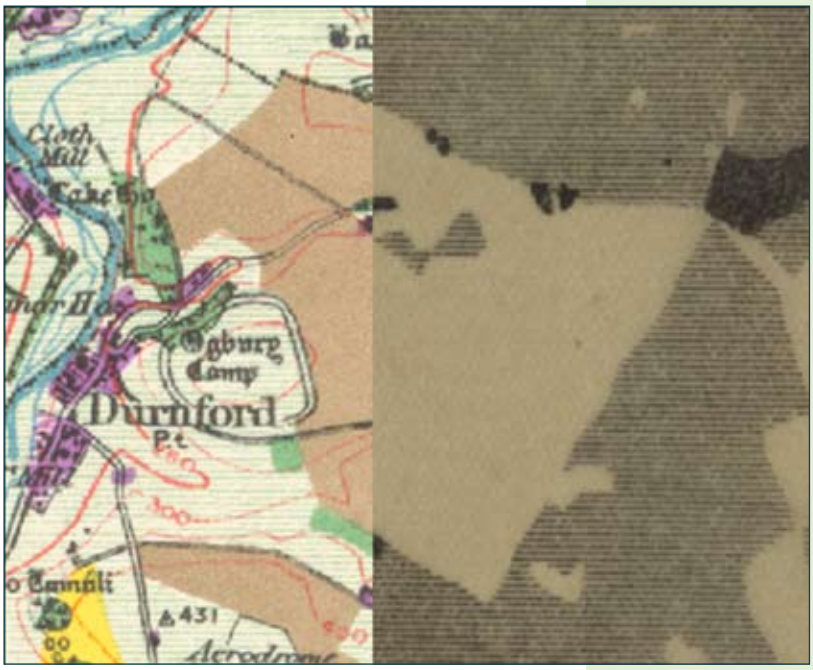

Figure 4 (below) – Comparing the green layer colour separation for part of the Salisbury and Bulford area with an adjacent area of the published LUSGB map. The solid areas on the separation are woodland and the striped areas are pasture.