

A01.1

Developing a Geographic Evidence base in support of Rural Policy

Phillipa Swanton, Department for Environment, Food and Rural Affairs

Introduction

“Definitive corporate datasets of Geographical Information, of required quality and fit for purpose, will be made available to users throughout Defra and to customers, irrespective of their location”

The creation of the Department for Environment, Food and Rural Affairs (Defra) in 2001 brought the responsibility for rural affairs into a single government department. This ensured an important place on the national policy agenda¹ for rural affairs, balancing the needs of the rural economy with policy responsibilities for food and farming, the landscape and the environment.

Defra has recognised that investment in appropriate information services will be required to meet the challenges of delivering better services to the public and reforming the ways these services are delivered. Geographic information will play an important role in the modernisation and development of Defra services. Corporate repositories for land, customer and livestock information will be core components of the Defra information strategy. This paper will outline the current context within which Defra operates, the drivers for change and the strategic approach being developed to ensure geographic information is readily available where and when it is needed.

A number of case studies will be presented to illustrate the current use of geographic information in Defra and the potential for developing a geographic evidence base. More generally, the potential that geographic information has to deliver and exchange information with Defra customers has been demonstrated through the MAGIC web-based interactive mapping service². Defra will build on this success to support key targets for improving the accessibility of services and increasing electronic service delivery capability.

Sustainable development

The overall aim of Defra is to promote sustainable development. Sustainable development encourages environmental enhancement and the sustainable use of natural resources, alongside a thriving rural economy. The Defra England Rural Development Programme (ERDP) assists farmers and land managers to become both more environmentally responsible and more competitive. Funding is provided through land-based schemes to conserve and improve the environment and project-based schemes to enable farming and other rural businesses to adapt to changing circumstances.

Two key land-based schemes that will feature in this paper are the Countryside Stewardship Scheme and the Environmentally Sensitive Areas Scheme. The Countryside Stewardship Scheme is the main scheme for the countryside and aims to enhance, restore and recreate landscapes, wildlife habitats and historical features and to provide opportunities for public access. The Environmentally Sensitive Area Scheme offers incentives to encourage farmers to adopt farming practices, which maintain and enhance parts of the country of particularly high landscape, wildlife or historic value. There are now 22 ESAs in England, covering some 10% of agricultural land.

¹ www.defra.gov.uk/corporate/aims/index.htm

² www.magic.gov.uk

Drivers for change

Although Defra is a relatively new department there are many drivers for change including the modernising of government, the development of evidence-based policy and a recent review of the delivery of rural policy. Government departments are required to provide citizens with the choice of traditional and electronic channels for accessing services by 2005. There are a number of significant e-Business projects underway in Defra. For example, the Rural Payments Agency (RPA) is developing electronic processing for Common Agricultural Policy payments to farmers. The RPA programme includes the capture of geographic information about 1.7 million parcels of land upon which payments are made in the form of a Rural Land Register. The Rural Land Register will also underpin new IT systems being developed for the management of ERDP schemes.

The Prime Minister's Policy Unit was set up in 2002 with a number of aims including the improvement of policy making³. The development of evidence-based policy is encouraged by the Policy Unit to ensure that policy can change in response to implementation as well as vice versa. Amongst the tools described as being required by policy makers are "geographic information systems to be used for collecting, organising and analysing data"⁴. A number of case studies are described in this paper to illustrate how Defra is using geographic information in this way to inform and support policy decisions.

In November 2002 the Minister for Rural Affairs announced a review of the way in which the government's rural policies are delivered. The review highlighted the need to simplify responsibilities for rural delivery to ensure value for money and more streamlined services. It examined rural delivery arrangements at national, regional and local levels within Defra and other rural agencies. Final recommendations from the review are due this Autumn and will focus on improving the efficiency and effectiveness of delivery so there is no doubt that further change will follow. Preliminary findings indicate that the department must in particular prepare for the delivery of a major new agri-environmental agenda in the coming years. The development of a geographic model to support this is discussed in this paper.

Use of Geographic Information in Defra

Defra uses a wide range of geographic information reflecting the wide range of policy interests – this includes almost all aspects of the physical and natural environment, the rural economy and some aspects of the urban economy and environment. GI is used for simple viewing and visualisation of areas through to complex spatial analysis and modelling. Defra is an active user of the full range of GIS technology from desktop systems to web-based interactive maps and from mobile field GIS applications to remote sensing systems. However, there has been to date little corporate control or governance of the use of GI, which has often limited sharing of data and fragmented or duplicated development.

Geographic information based services are already used to provide information to both external customers and internal users. For example, interactive maps available through the Internet provide the basis for the Environment Agency's 'What's in my backyard?' service. They were also a key part of the information provided by Defra during the 2001 Foot and Mouth outbreak and are used to provide information for wider consultation exercises including maps of Open Countryside and Nitrate Vulnerable Zones. Defra is also particularly active in commissioning the creation of national GI datasets needed to inform policies and for operational use, the Rural Land Register being a leading example.

MAGIC is a unique partnership approach led by Defra as a means of bringing together government departments and agencies with a shared interest in rural policy. Information about key rural and countryside designations and schemes from the partners is now available in one place and is readily accessible using web-based GIS technology. As MAGIC is available on the Internet these benefits are also being more widely realised by other departments, agencies, non-government organisations and the wider public. The initial project to implement MAGIC was completed at the end of March 2003 but Defra will maintain MAGIC as a platform for promoting sustainable development through joined-up policies.

³ www.strategy.gov.uk

⁴ Tomorrow's government – holistic, digital, syndicated. Summary of a presentation for the Performance and Innovation Unit's Strategic Thinkers Seminar on Future Structures of Central Governments, 15th June 2001.

MAGIC is also part of a wider culture of change that will support e-Government objectives for a number of organisations and enable greater joined-up working. Throughout the project, partners worked to improve the quality of their own data and moved towards a common baseline of standards that allow other organisations to use their data. From the constructive and positive feedback received since the launch it is also clear that the benefits of MAGIC are already being realised by a larger audience than the formal partnership.

Defra Geographic Information Strategy

In response to the increased awareness of the importance of GI a strategy for the use of geographic information was approved by the Defra e-business sub-committee in December 2002. The strategy covers the use of GI across core Defra along with Defra agencies and non-departmental public bodies⁵. The strategy recognises and fully supports GI for the contribution it can make to meeting business objectives and particularly for the role it can play in improving service delivery to customers. Business areas will still determine where and how GI is used but within an overall corporate framework with key datasets of importance to many business areas being managed as corporate resources and being made widely accessible.

The potential for using geographic information to provide information in a meaningful way to customers is now well recognised. Interactions with Defra customers include subsidy payments, inspections, policy implementation and disease control but to date much information is held by individual parts of the department. This limits the wider exploitation of data and can lead to the duplication of effort and resources. The GI strategy will build on the success of MAGIC to extend the provision of information to customers through electronic transactions, support effective contingency planning and emergency response and enable information sharing internally and externally.

The strategy is being implemented by means of the Defra Spatial Information Project, which will create a consistent, managed view of the geographic information required to support sustainable development within England. Although Defra has responsibilities outside England links with the land registers of the devolved administrations will be undertaken by open standards and interoperability rather than a single solution.

The GI Unit established and developed in the Defra Rural Development Service over the last ten years is the recognised centre of excellence in GI within core Defra. This unit has a proven record of providing GI based services and applications and has received national and international recognition for high profile GI services such as MAGIC. This unit will therefore lead and support the implementation of the Spatial Information Project. Although geographical information is very widely used across the Department and it's use continues to increase, significant cultural changes will be needed to meet the vision of collecting, sharing and maintaining corporate land information. However, the approach will provide benefits not just for Defra but for it's customers, staff and the wider community via the provision of joined-up services supported by consistent spatial information.

Developing an evidence base

Spatial analysis of the distribution and trends in Defra land-based scheme uptake has provided an understanding of the barriers and opportunities that exist for landowners wishing to participate in such schemes. For example, to determine the impact of the England Rural Development Programme, the characteristics of all agricultural holdings (including farm labour, farm size, farm tenancy and farm type) were compared to those holdings that had chosen to join an ERDP scheme.

The analyses of ERDP uptake revealed notable geographic differences in scheme uptake. For example, almost 25% of Environmentally Sensitive Area scheme agreements are upland cattle and sheep farms in comparison to an overall figure of only 7%. This is in part a function of eligibility to join the scheme, as large areas of Environmentally Sensitive Areas lie within upland or Less

⁵ At this stage this includes English Nature, Environment Agency and Countryside Agency but this list may be extended in due course

Favoured Areas⁶. For the Countryside Stewardship Scheme, uptake often reflects the availability of scheme options such as arable field margins. Cereal farms therefore account for 21% of CSS agreement holdings, which is 50% higher than the proportion of cereal farms for all holdings. Conversely, pigs, poultry and horticulture are under represented amongst agreement holdings. This is a consequence of intensive production methods, which are difficult to align with current scheme objectives thus making it more difficult to enter a scheme.

This examination of general trends was supplemented by an analysis of the spatial distribution of scheme uptake. Earlier analyses⁷ had indicated that CSS agreements were generally seen to be widely distributed across English landscapes with more distinctive patterns only seen at a finer regional scale. Overall higher concentrations of agreements are associated with particular environmental targets such as calcareous grassland or designations such as National Parks. Low uptake was seen to be associated with highly productive agricultural areas, urban areas, some remote areas and ESAs.

Using the evidence to develop a new Agri-Environment Scheme

The geographic variation in scheme uptake means that a flexible, geographically-based model is required to assess the impact of policy changes. An Entry Level Agri-Environment Scheme⁸ was recently piloted in England with the aim of encouraging large number of farmers across a wide area to deliver a basic but effective level of environmental management. The pilot scheme introduced management options designed to address a range of environmental issues including diffuse pollution, loss of biodiversity and landscape character and damage to the historic environment.

It had already demonstrated that existing scheme uptake can be constrained by eligibility, location, farm size or the availability of scheme options. As the aim of the pilot was to test the practicability of the scheme design on a representative range of farm types before making it available to all farmers across England in 2005, the pilot areas required careful selection. Critically they would have to be large enough to test the scheme across ordinary farms and to cover a range of farm types representing the main broad landscape types and farming systems. To be realistic in testing whether a scheme could achieve high levels of uptake, each of the pilot areas would need to generate at least 50 applications and it was estimated that between 50 and 80% of farmers might be attracted to join the scheme.

The following landscapes were to be targeted; arable farming in the East of England, pastoral farming in the South West, less intensive mixed farming in the North East or South East and a representative Upland area. A number of geographic areas also had to be excluded from the initial selection process. This included areas designated as Environmentally Sensitive Area, National Park, Nitrate Sensitive Area, Land Management Initiative, Upland or Arable Pilot Areas where much land would already be under active environmental management. Areas of the country which had above average (5.49%) CSS uptake would also be excluded to encourage maximum uptake.

The Defra Agricultural Census was used to identify broad areas of dominant farm types suitable for the pilot areas. The Agricultural Census data indicated that there were 147,347 major agricultural holdings in England with on average 14 holdings per parish. This suggested that the pilot areas should be at least 10 parishes in size (or broadly speaking a 10 kilometre square) to ensure a population of landowners large enough to generate at least 50 applicants in each area. The following factors were then examined in detail for each candidate area; density, number and area of CSS agreements, farm business information including a breakdown of farm-types and holding size profile, number and type of scheduled historic and wildlife sites and information about soil and land classifications in the candidate areas.

Examination of these factors enabled a prioritised list of target areas supported by quantitative information to be produced for discussion with a wider group of stakeholders including partner organisations and

⁶ Less Favoured Areas are designated in Europe to provide special measures for farmers in the designated areas. They are (mainly upland areas) where the natural characteristics (geology, altitude, climate etc.) make it difficult for farmers to compete. The LFA consists of Severely Disadvantaged and Disadvantaged Areas.

⁷ The CSS Scheme, Analysis of uptake 1991- 1997 (D. Askew and P.Swanton, FRCA)

⁸ The Strategy for Sustainable Farming and Food; www.defra.gov.uk/farm/sustain/default.htm

industry representatives. Data was provided for the priority areas and for a grid of eight surrounding squares. The grid allowed the actual location to be moved in response to other more qualitative selection criteria. The extents of the actual pilot areas selected were then mapped to hard boundaries, within which applicants were invited to participate in the pilot.

Following the launch of the pilot scheme, the selection process has been judged as successful in terms of ensuring the pilot areas were representative and of the right size. More than 260 applications were received across the four areas so meeting the uptake target. To ensure that the findings of the pilot are able to influence the development of the national scheme an intensive evaluation exercise is now being carried out. This will focus on a range of issues including uptake, attitudes to the scheme and individual measures and the suitability of the application process as well as involving an assessment of the potential environmental benefits on a sample of applicant farms in all four areas. It will not, however, be possible to directly measure the environmental impacts of the scheme within the short time-scale available for the evaluation.

Assessing the impact of new schemes

The Defra Rural Development Service GI Unit provides both geographic information and an analytical capability to assess the impact of ERDP schemes in conjunction with partner and stakeholder organisations. For example, one of the Defra Public Service Agreement (PSA) targets aims to ensure that 95% of Sites of Special Scientific Interest (SSSI) are in favourable or unfavourable recovering condition by 2010⁹. Current schemes were not designed to deliver the PSA target but in practise are perceived as a key mechanism. Therefore an exercise was carried out jointly with English Nature to establish the contribution of both Defra and English Nature schemes towards achieving this target.

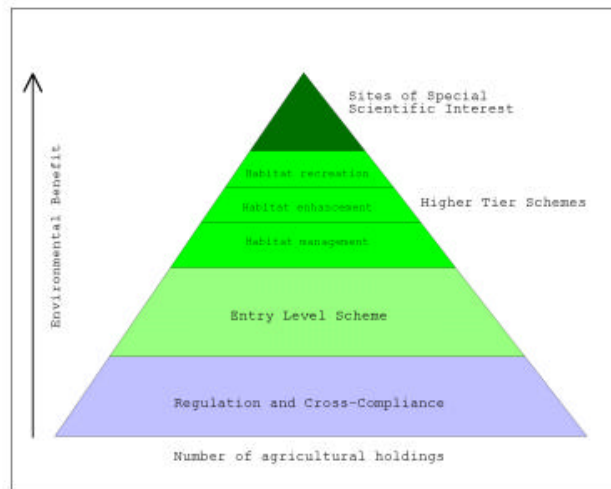
There are nearly 120,000 hectares of Environmentally Sensitive Area scheme agreements, 90,000 hectares of Countryside Stewardship scheme agreements and over 150,000 hectares of English Nature's Wildlife Enhancement Schemes on SSSI land. Land may be entered in more than one scheme so long as scheme objectives are complementary and payments are not duplicated. Initial analysis of the relationships between the different schemes and SSSI condition indicated marked differences in condition status between the uplands and lowlands and between different schemes. For example, 73% of lowland SSSIs are in favourable or recovering condition in comparison with 39% of upland sites. In the Environmentally Sensitive Areas 38% of land is in favourable or recovering condition, as compared to 58% of SSSI land under Countryside Stewardship agreement and 61% under the Wildlife Enhancement Scheme.

As already mentioned current schemes were not designed to deliver the PSA target and a key conclusion of the analysis was that the target cannot be delivered by relying solely on existing schemes. There are also external influences that have major impacts on the condition of the SSSIs and explain the variation for example between upland and lowland areas. This information will therefore inform the mid-term review of the ERDP for consideration of the changes to scheme structure and resources that are needed to ensure the target can be met. The results will be updated annually to measure progress towards the target.

Intelligence gained from all these exercises is now being used to develop a geographically-based model to assess the impact of rolling out the Entry Level Scheme to the whole of England. Based on different levels of uptake figures how much land would be covered, how much land can then be targeted for higher tier schemes and what would the cost of implementing the scheme be? (Higher tier schemes will provide enhanced payments in return for a higher level of environmental management including habitat recreation and capital works).

Scheme uptake can be modelled in the form of a pyramid. At the lowest level all landowners are subject to regulation and many to cross-compliance requirements from other Defra schemes; at the second level, the Entry Level Scheme will be designed to attract a high percentage of applications from landowners; at the next level and based on the evidence from existing schemes, the higher tier schemes would generate a smaller percentage uptake and finally land under SSSI designation is protected by legislation. Environmental benefit increases progressively towards the top of the pyramid.

⁹ www.defra.gov.uk/corporate/busplan/psa2002.htm



The pyramid model is now being populated with geographic data from the Defra Agricultural Census and from the analyses of existing scheme uptake. At the lowest level the input figures will incorporate all agricultural holdings as identified in the agricultural census. Uptake into the higher levels will reflect the known variations in geographic region, farm type and scheme type. For example, the percentage uptake for different farm types, landscapes and farm sizes from the Entry Level Scheme pilot will be applied through the model, which can then be used to assess the likely impact of the scheme and answer the questions posed above. Using the known geographic distribution of farm types then an assessment of impact can be made at a regional level or as required.

It should be noted that the model currently only illustrates one dimension of the ERDP programme – biodiversity or wildlife. Similar models could be developed for the landscape, historic environment and access elements as, for example, work has also been carried out with English Heritage to provide an analysis of the relationship of Agri-Environment Schemes with the Historic Environment. Analysis of Scheduled Monuments in the East Midlands and from the Turning the Plough¹⁰ project, an analysis of surviving Ridge and Furrow grassland, indicated once again significant differences between existing schemes and in different landscapes.

Operational applications of GI in the rural environment

Significant use of geographic information is also made at the operational level, especially by the Defra Rural Payments Agency (RPA) and the Rural Development Service (RDS). The RPA administers a number of schemes under the European Commission Common Agricultural Policy. For example, the Arable Area Payments Scheme offers area-based payments to growers of cereals, oilseed rape and a number of other arable crops¹¹. Applications for these schemes must be made every year under the Integrated Administration and Control System (IACS) which is designed to combat fraud in the Common Agricultural Policy.

To date, applicants have been asked to record the areas of crops using the area indicated by an Ordnance Survey or other professionally produced map. However, RPA is now building an electronic Rural Land Register as part of the modernisation of scheme administration¹². The Rural Land Register will streamline the approach to administering schemes, support the validation of IACS claims and provide information for field inspectors. It will also ensure that Defra meets European regulations, which require the use of GIS techniques in IACS processing by 1 January 2005. The digitisation of fields began in February 2002 and will be completed by December 2003.

¹⁰ Turning the Plough. Midland Open fields: landscape character and proposals for management. English Heritage and Northamptonshire County Council. 2001

¹¹ Arable Area Payments Scheme, Explanatory Guide Part 1 2003, www.defra.gov.uk

¹² IACS, the Integrated Administration and Control System, Part 1 2003, www.defra.gov.uk

In order to build the Rural Land Register 76,000 IACS holdings comprising approximately 1.7 million fields across England are being digitised. Data will be taken from the original paper based IACS maps and from field inspections. This information, along with aerial photography will be overlaid onto large-scale Ordnance Survey digital mapping, which will enable the precise boundaries and areas of fields to be established.

The Rural Land Register will also be used by the Rural Development Service as the basis for mapping future ERDP agreement boundaries. RDS has used desktop GI systems for many years to meet the generic requirements for geographic information in support of ERDP scheme management. The Defra GI Strategy identified a wide potential user base for this information. The GEN-i Online programme was therefore initiated to create an online, generic geographic information toolkit to meet current and anticipated business requirements.

The first version of GEN-i Online is now available for use on the Defra Intranet and provides the data and tools needed to carry out the ERDP initial consultation – the statutory and formal consultation checks that are required as part of the ERDP application process. GEN-i Online has been well received by users and potential users, especially by those who currently have no or very limited access to geographic information. The challenge is to develop an online system that will also meet the majority of requirements identified by the current desktop users whose expectations are somewhat higher!

Aerial photographs for much of England have also recently been made available on the Defra Intranet in a standalone viewer or embedded within GEN-i Online. Potential applications for the photography include informing policy decisions, landscape evaluation, feature visualisation, targeting visits and scheme monitoring. Within RDS, the operational needs of the Project Officers and other specialists have to date been met through the use of hard copy aerial photography for use in farm and field based activities. This has limited the use of aerial photography however, as hard copy photography is not always readily to hand and the non-digital nature prevents ready integration with other sources of geographic information. RDS is increasingly reliant on digital information and ready access to aerial photography will meet a number of key business requirements. However, a number of constraints still remain. For example, the constraints on collecting imagery (including the weather) mean that we still await full coverage for England. Extending the user base for aerial photography will extend the requirement for training in the interpretation of photography to ensure appropriate use is made of it.

Summary

Defra has embraced the contribution that Geographic Information can make towards meeting key business objectives and in support of the drive for modernisation. The Defra GI Strategy being implemented through the Spatial Information Project provides the opportunity to build on the success of initiatives such as MAGIC and GEN-i Online.

The overall aim of the Spatial Information Project is to ensure that Geographical Information will be managed and made available to users throughout Defra and to customers, irrespective of their location¹³. The resource implications and the cultural change that will be needed to meet this aim must not be underestimated but the potential for improving services and contributing to the development of evidence based policy making has been clearly demonstrated.

Acknowledgement

This paper has drawn on a large body of work produced by members of the Defra RDS GI Unit. I would like to specifically acknowledge the contributions made by David Askew, William Froggatt, Liz Lucas, Claire Millar and Sue Newell but the whole team has contributed to this work either directly or indirectly.

¹³ Land Information for Defra: The Way Forward

Scheme Uptake and Entry Level Scheme Pilot Areas

