MITIGATING CIRCUMSTANCES:
What will we leave behind ?

David Hill FIEEM

RPS Group plc, Willow Mere House, Compass Point Business Park
Stocks Bridge Way, St Ives, Cambs. PE27 5JL

Introduction

As professional ecologists, many of us spend a considerable amount of time advising on and designing mitigation for development related impacts and indeed, the theme of this conference is about three facets of mitigation - Restoration, Re-introduction and Translocation. But are we succeeding? Are our mitigation schemes providing a long-term future for wildlife? Or are we simply plastering over cracks and adding to a continual decline in the biodiversity resource? We focus on each project at each site at *the* particular moment in time. How often do we take a broader view – aiming to provide something of lasting value, taking account of how landscapes and ecological resources have changed over the years, even centuries? If we did, could we refocus mitigation to deliver more worthwhile solutions for future generations. Is it not true that as we grow older we appreciate the value of leaving behind something of lasting value? Perhaps we can learn something from our historical past which can inform how we plan for the future.

The main thrust of this paper is about 'thinking big', looking for an alternative approach to mitigation and compensation delivery – one which is successful. I shall firstly give a brief historical perspective (simply because it interests me and will hopefully interest others), followed by a review of the basic status of the ecological resource in the UK. I then describe the term mitigation as it applies to the planning and development control process with which many of us are involved. Finally, I consider one alternative approach which could, with some creative thought, help to substantially improve how we accommodate biodiversity within development so as to make a lasting contribution across the wider countryside.

Products of change

Landscapes and biodiversity have changed much over the centuries. From the time of the receding ice sheets over 8000 years ago, biodiversity has been modified by man and has generally declined to its present, relatively impoverished state today as a result of factors such as forest clearance, hunting persecution, urbanisation, industrialisation, farming intensification and the resultant pollution of an expanding human population. In 1166 Henry II wrote the following words…

'Everywhere outside the houses…are the spacious and beautiful gardens of the citizens. On the north side there are pastures and pleasant meadow lands

through which flow streams wherein the turning of millwheels makes a cheerful sound. Very near lies a great forest in which there are the lairs of stags, fallow deer, wild boars and bulls. There on the north side are excellent wells with sweet, wholesome water … among these are Holywell, Clerkenwell and St Clement's well'.

I find it both extraordinary and shocking that he was of course talking about London. The place he described then is unrecognisable now and of course our values and perceptions have changed considerably since that time. It is difficult to appreciate the richness of wildlife that almost certainly inhabited Britain at that time. Through the intervening years, many factors have taken their toll on wildlife. The industrial revolution, which created sprawling towns choked with smoke (Figure 1) contrasted with farmland where high densities of farmland birds existed until the mid 20th century advent of herbicides, insecticides, fungicides and industrial farming methods. Landscapes can change slowly. An 1897 photograph of the land around the village where I live, Muker in Swaledale, reveals a landscape scoured by lead mining and the clearance of trees for fuel (Figure 2). Today, however, despite substantial overgrazing on the hillsides and moor, the valley is richer in vegetation diversity. Even so, Corncrakes have disappeared as a result of changed farming methods.

Figure 1. Towns grown from the industrial revolution portray a Britain where mitigation for wildlife impacts would not have been a consideration.

The changes which took place between the 1930's and the present have probably seen the greatest man-induced impacts on biodiversity for centuries. The scene is aptly portrayed by two drawings by Roger McPhail. In one, the young man surveys a rich farming landscape of copses, hedges, ponds, partridge coveys, mixed farming, small fields – the idyllic pastoral scene. As an old man, the hedges have gone, the fields are large, the crops monoculture, the trees have died and the only birds are corvids! (Figure 3). It is this landscape with which most of us are now familiar and which typifies

many sites on which impact assessments are carried out. My point is this – the context in which a site is investigated in respect of impacts, and hence the mitigation which is considered necessary, fundamentally determines our view and our ability to think creatively. If a landscape is poor and impoverished to start with, mitigation is rarely used to improve what is currently there. As a result we never succeed in raising the stakes, in providing improvements. The small pond within a housing development might create excellent habitat for shopping trolleys and old tyres but does very little to improve biodiversity at a landscape scale. We should surely be aiming higher than this.

Figure 2. The village of Muker, Swaledale taken in 1897 (top) and 2004 showing the slow change from a denuded landscape ravaged by lead mining to one that is now an AONB and the moorland tops a Special Protection Area for birds.

The legacy of the failure to mitigate for the land use changes of the past are evident from statistics on the biodiversity resource. Since the second world war Britain has lost 50% of its ancient lowland woodland, 150,000 miles of hedgerows, 95% of traditional hay meadows, 80% of chalk downland and 80% of wetland fens and mires. Five species of wildflower are lost per county

every 10 years, five species of butterfly have become extinct since the 19th century, 500 species of invertebrate are classed as endangered, most species of amphibians are in decline, eight of the 16 bat species in the UK are now endangered or rare, and since the 1970's some 52% of Song Thrushes, 54% of Skylarks, 94% of Tree Sparrows, 87% of Starlings and 89% of Corn Buntings have been lost (Hill *et al* in press; Eaton 2004). Alongside these declines, 42% of the 1 million or so hectares of SSSI's are considered to be in Unfavourable Condition, as are 69% of rivers and streams, 65% of upland grassland and heaths, 35% of fen, marsh and swamp, and 33% of lowland broadleaved woodland (Everett 2004). If we ran a business as we run biodiversity conservation, we would have been bankrupt years ago.

Figure 3. These drawings by Roger McPhail aptly portray the dramatic change in a farming landscape as experienced by one man in his lifetime from the 1930's to 1990's.

Scope for mitigation

Essentially, three scales of biodiversity impacts can be defined. First, climatic impacts such as occur during ice ages affect biodiversity at a global scale. Below this, wider land-use/man-induced impacts operate at a country or

regional scale. Below this still, are the development-related impacts, the type with which we are most familiar and where we spend most of our fee-earning time. These scales are diagrammatically illustrated in Figure 4. We have different scales of policies to attempt to mitigate for each of these impacts – global policies such as Kyoto etc, agri-environment, structure fund, and regulations to tackle wider land-use impacts such as agricultural, forestry and water resources, and finally local and structure plans through the development and planning control process to deal with development-related impacts. It is sometimes surprising to realise that most of the UK is rural (see Figure 5) and urbanisation hasn't made massive inroads into the 'greenscape'. However, this hides the pervasive impacts of the Common Agricultural Policy and the intensification of farming across the land as evidenced by the decline in farmland birds described earlier. Nonetheless, it is clear that there is a lot of scope for country-wide mitigation and compensation (these terms are often used interchangeably) in the UK through the restoration of degraded habitats, the reversing of unfavourable condition, the creation of new habitats within the greenscape, and linking with countryside-scale policies aiming to improve biodiversity in the wider environment.

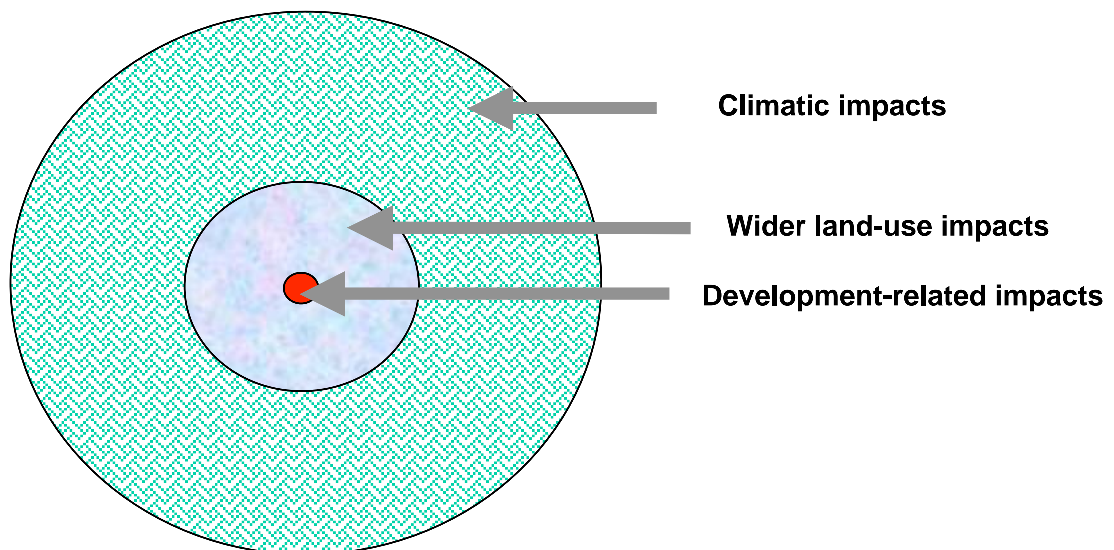

Figure 4. Schematic representation of three scales of biodiversity impact.

Ecological mitigation is defined as '*any deliberate action taken to alleviate adverse effects, whether by controlling the sources of impacts, or the exposure of ecological receptors to them*'. Under UK legislation, proponents of development are required only to recommend suitable mitigation measures, not to demonstrate that they can and will be undertaken. Government guidance currently does little other than to suggest that '*where significant adverse effects are identified, a description of the measures taken to avoid, reduce or remedy those effects should be produced'.* However, there are major failings in the system – resources for enforcement are inadequate or non-existent and insufficient detail is produced to enable proper judgement to

be made as to the likelihood of success. Full detailed mitigation schemes should be submitted at the time of planning application submission.

Figure 5. Satellite derived image showing the relatively small area of land covered by urbanisation in the UK.

These ongoing inadequacies in the planning system have produced a catalogue of failure. Treweek & Thompson (1997) reviewed 194 Environmental Statements during the period 1988-93. In 20% ecology was not mentioned and 66% referred only to 'habitat loss'. Only 11% recommended mitigation but only 3% actually suggested the moving of the development away from the important ecological resource. Screening and landscaping were most often cited as the means of mitigation and only 3% of schemes referred to a mitigation management plan. Treweek (2000) reviewed the position again and found that there continued to be a failure to analyse impacts beyond the site boundary, to quantify ecological impacts at all, to identify and measure cumulative effects and to mitigate important impacts. By and large schemes were considered inadequate because no monitoring was proposed or undertaken, there was no follow up once the development started and there was a serious lack of enforcement by the planning authorities and statutory agencies. Scope for improving the way mitigation is identified, planned and executed is therefore enormous. In terms of the wider countryside however, the task of stitching back its fabric is massive. Under present Countryside Stewardship grants for example, 30,000 farmers received £150 million with a further £150 million or thereabouts being available under the new rules. But, whilst it has provided some welcome gains, each farmer can do little with £5,000 when the cost of restoring the above habitats alone would fall into billions of pounds.

Mitigation types and issues

There is a range of mitigation measures that are seen as solutions, many examples of which are given in these proceedings. They include avoidance of the site of ecological interest through sensitive design, siting of the scheme, avoiding key areas and key periods (eg. bird breeding season), reduction, moderation, minimisation using for example noise barriers, oil interceptors, screens, controlled access during construction/operation, wildlife bridges, tunnels, 'ecoducts', fences, rescue (relocation and translocation), repair (reinstatement, restoration) and finally compensation.

Taking three of these areas, avoidance, translocation and compensation, the work of Treweek & Thompson (1997) found that the designation of a site did not deter development proposals nor did it trigger avoidance measures. If scoped early, however, a project can avoid impacts on sites of nature conservation interest/importance (as is undertaken in the Netherlands). Attention to siting and design needs to occur at the very being of the planning stage of a development since the ecologist can advise on these factors early on. However, in practice any such modifications to a scheme usually occur after the design stage when major changes are then too expensive to implement. The ecologist is then only paying lip service to ecological value. Translocation is rarely shown to be 100% effective and in general the relative condition and siting of the donor and recipient site is crucial to success, soils, hydrology, management commitment and continuity being the most vital components, with wetter communities being more difficult to translocate than drier communities. Finally, compensation measures are generally considered where mitigation has a significant risk of failing to produce insignificant residual impacts. Under the Article 6 assessment process of the Habitats Directive (92/43/EEC) for example, compensation is a measure of last resort if there are no alternatives to the plan or project and if there are demonstrable imperative reasons of overriding public interest. Problems with compensation is that it may not provide like-for-like (witness the provision of inland wetland on the Gwent Levels as compensation for the loss of intertidal habitat at Cardiff Bay), it can be difficult to deliver because of a lack of knowledge of the structure and function of habitats/species, compensation sites may be ecologically dysfunctional compared to natural sites and the time taken to mature can influence their ecological value in the long-term.

Within ES's however, there is often a mismatch between the identified impacts and the proposed mitigation – eg. the promotion of landscaping and tree planting rather than avoidance in the first place. A development often starts with the presumption that the development will go ahead at the location identified without considering ecological impacts first. Proposed mitigation measures are often cosmetic using untried untested methods and approaches. The adverse impacts usually remain and there is too much emphasis on providing an engineering solution without first understanding the ecology. There is almost never a controlled experiment to test ideas, there is always insufficient time provided for mitigation to get up to speed and

changes in personnel – developer or consultant – can jeopardise the scheme being delivered.

As a bare minimum mitigation assessments should state which impacts, their magnitude and significance, are to be mitigated. Detail and more rigour in the analytical approach should be provided where protected species or designated sites are potentially affected. The mitigation solution should incorporate tried and tested methods and the residual impact, ie. that impact remaining after mitigation has been implemented, should be estimated and tested for significance. There should be contingency measures in place should the mitigation fail and there should be a proper route of enforcement, monitoring, feedback and restorative action. The above should be incorporated into a Mitigation Plan, comprising a statement of objectives, assessment of features lost compared to those that will be replaced, a detailed description of actions such as timing of construction, methods, erection and type of screening and planting, and a monitoring and maintenance plan. The Mitigation Plan should be submitted as part of the planning application otherwise there is no means by which to assess the likelihood of success of the mitigation on which a planning permission depends. Similarly, if the compensation route has to be followed, success will depend on a narrow range of objectives, substrate condition, hydrology, long-term and flexible guaranteed finance, a management plan and management commitment, and a feedback mechanism to ensure restorative action is undertaken if problems arise.

A different approach – Mitigation Banking

In my view we spend a substantial amount of money in the UK on poorly designed mitigation schemes, on too small a scale, in the wrong places, with untried and tested methods, on insecure sites, based on inadequate research, without an appreciation of historical context and potential, with insufficient funds and no management commitment. The results are therefore hardly surprising. Of course there are exceptions and it isn't all doom and gloom, but when I asked a number of ecologists to point me to successful mitigation schemes of a reasonable scale, none came forward. After 20 or so years of work in this area, this is more than disappointing. An alternative could be to investigate the nation-wide application of Mitigation Banking (MB) as a means of delivering mitigation and compensation schemes at a scale appropriate to improving the biodiversity benefits and under a more regulated and consistent framework which developers can understand.

The term arose in the United States in relation to wetlands (Treweek 1999) defined as '*the restoration, creation, enhancement and (in exceptional circumstances) preservation of wetlands and/or other aquatic resources, expressly for the purpose of providing compensatory mitigation in advance of authorised impacts to similar resources*'. A Mitigation Bank is not really a bank but an entity that restores, creates, enhances or preserves a wetland habitat. The entity sells tangible units of wetland termed credits, to a developer for compensation for equivalent units that a developer has destroyed, termed debits. The advantages of MB are that large, ecologically superior and robust

wetlands can be and have been created; there are economies of scale through structured and efficient habitat regulation which encourages watershed-based wetland planning; and other habitats such as woodlands, forests, heaths, moors and grasslands can also be provided, managed or restored by MB. In the US Mitigation Banking is a thriving industry and the early problems of poor design, bad engineering and hydrology have now been largely resolved. In the UK there is no industry as yet since such mitigation is not yet required by law. The key conservation laws in the UK are implemented on a piecemeal basis through seeking to inhibit development. However, there are signs that English Nature may look more favourably on such an innovative approach particularly where a proponent has demonstrated that the development has no alternatives and that there are imperative reasons of overriding public interest.

Most recently, a number of port schemes have come to the fore involving the loss of intertidal mud or saltmarsh habitat. At the same time there is concern over the long-term provision of sea defences, especially along the east and south-east coasts of Britain, and the terms managed realignment or managed coastal retreat have become common. One example has been the requirement for channel deepening of 2m to accommodate larger ships at Felixstowe docks which would alter tidal propagation and reduce tidal range with the acceleration of erosion of the intertidal area as a result of additional maintenance dredging (Figure 6). The solution has been to retain 10% of the silt in the system by sediment feeding and the creation of 16.5ha of intertidal habitat on farmland at Trimley through managed realignment of the seawall, to replace the same area lost. Monitoring has shown that sediment recycling is in place and the Trimley realignment has been almost immediately successful.

Similarly, at Bathside Bay, proposals have been put forward for the provision of replacement habitat for 70ha of intertidal mud which would be lost through a port development. A ratio of 1:1.7 has been achieved (ie. for every ha lost, 1.7ha will be provided) at Little Oakley some 5km from Bathside Bay but adjacent to the next door SPA at Hamford Water.

Both of these schemes and many more besides would lend themselves well to the concept of Mitigation Banking particularly if we can overcome the political boundary issues associated with potentially locating the mitigation/compensation habitat some distance from the site of impact. We can draw two conclusions from the port scheme examples – (1) mitigation/ compensation can be shown to work where the habitat affected or to be replaced is a relatively simple wetland such as an intertidal area or estuary, (2) systems based on a high biomass of relatively species poor prey (for waterfowl on which estuary SPA's are largely based) are capable of easier replication since their response time is relatively short compared to many other ecosystems.

The key issues for MB in respect of providing compensation habitats involve no net loss, being consistent about what is being created and what is being replaced, accepting it as a last resort measure when all feasible mitigation has

been undertaken on site, the appropriate compensation ratio (which should be greater for more complex habitats or when adopting the precautionary principle), the habitat should be created and provided before that which it replaces is lost, being realistic about habitat creation and understanding the problems of scientific uncertainty.

Figure 6. Felixstowe docks and the provision of compensation habitat at Trimley (courtesy of C Gibson English Nature).

Mitigation Banking could also be used in association with multiple schemes where developers club together to contribute towards a fund. We might envisage, for example, the creation of major large-scale Great Crested Newt reserves in different regions of the country which would make a greater contribution to newt conservation than is currently capable under present legislation. Further, Defra has identified that 200ha per year of habitat creation is needed in order to maintain the coherence of the Natura 2000 network as a result of sea-level rise. Within 100 years the sea defences along the north Norfolk coast are likely to be unsustainable, providing the potential to create approximately 6500 ha of freshwater, brackish and saline habitat through major realignment of the defences and remnant dune system, forming

a new tidal delta (see Stephen Worrall's paper in this proceedings). Mitigation Banking could in future contribute to such schemes.

New environmental stewardship schemes could also link into Mitigation Banks, enabling greater biodiversity gains. Companies could establish their own stewardship arrangements with local communities to help stitch back the fabric of the countryside that has become so eroded.

Finally, one of the most important aspects for a developer is being able to know the bottom line cost. He is far happier with a known cost predicted for the term of a mitigation project, because he can roll this cost in as capital at the beginning of a scheme. By contrast he dislikes uncertainty which can lead to escalating costs and no exit strategy. Controversially, such a fund might best be provided through a 'development tax' tailored to the scheme and related to the full mitigation costs. Mitigation Banking offers greater fixed certainty to developers and the funds established could simply take on the job of delivering the mitigation using contracted professionals, leaving the developer to do what he does best. This would give more security to the environment, would provide bigger and better schemes, and could be linked into other funding mechanisms thereby giving greater value for money. Without doubt many schemes would not warrant such an approach – the small urban scheme where delivery to local people is important. But it is surely not beyond our capability to devise a process whereby Mitigation Banking could be made to work, particularly for large developments where on-site mitigation will almost certainly fail, if history is anything to go by. Lets try and think big.

Summary

This paper has reviewed mitigation provision in the context of continual changes in landscape and biodiversity. Mitigation is defined. Successes to date are few as a result of a variety of factors notably poor design, ecological inputs being made too late and after the design stage, lack of tried and tested methods, lack of resources and management commitment by the developer, lack of monitoring and feedback and lack of enforcement by planning authorities and statutory agencies.

Some solutions are provided. These include early design input, putting ecology before the engineering solution, demonstrating that measures can and will be achieved by producing a detailed Mitigation Plan at the time of submission of the planning application rather than leaving it until post-permission. Proper enforcement linked to monitoring and feedback is essential as is a better scientific basis for decisions. Government should fund an analysis of ES's with follow up in the field to measure successes and failures, identifying reasons for both. Government should also require results of monitoring to be available on an Ecology and Developments website so that everyone has access to information. Finally, the process and mechanism of Mitigation Banking should be explored as a way of dealing with often intractable and undeliverable mitigation issues so as to vastly improve success and provide a more creative way of contributing to biodiversity

conservation beyond simply the boundary of the site. The controversial but attractive option of a 'development tax' which would provide the funds to a Mitigation Bank as well as certainty and overall lower cost to the developer, is briefly described. The new planning rules make this an even more attractive option.

References

Eaton, M.A., Noble, D.G., Cranswick, P.A., Carter, N., Wotton, S., Ratcliffe, N., Wilson, A., Hilton, G.M. & Gregory, R.D. (2004). *The state of the UK's birds 2003*. BTO, the RSPB and WWT. Sandy.

Everett, S. (2004). The quality of nature in England. *British Wildlife*, 15 (3), 168-173.

Hill, D.A., Fasham, M., Tucker, G., Shewry, M. & Shaw, P. (in press). *The Handbook of Biodiversity Methods: Survey, Evaluation and Monitoring*. Cambridge University Press.

Treweek, J. (1999). *Ecological Impact Assessment*. Blackwell. 351pp.

Treweek, J. & Thompson, S. (1997). A review of ecological mitigation measures in UK environmental statements with respect to sustainable development. *International Journal of Sustainable Development and World Ecology 4*, 40-50.