BIODIVERSITY AND MINERAL EXTRACTION IN THE UNITED KINGDOM: A BIOLOGICAL ACTION PLAN CONTEXT [1]

by

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Abstract. In 1992 the UK Government signed the Convention on Biological Diversity at the Rio Earth Summit. Given the limited resources available, the UK response was based on species and habitats which needed conservation action; 391 species and 45 habitats were identified and Biological Action Plans (BAPs) were published between 1994 and 1999. Where BAP species and habitats occur, these are likely to be an additional constraint on the development of mineral workings in the UK, and will be required to be re-established where planning consents are granted. On the other hand, a commitment to restoring BAP features may release additional areas for extraction, and there is scope for strategic planning on local and regional scales. There is merit in the industry focusing on the small habitat based list suggested by English Nature, the statutory conservation agency. The industry has an important and unique role to play in providing specialist habitats, particularly associated with primary colonisation and early succession. It is concluded that the UK biodiversity targets are an opportunity the industry should grasp, and its implementation could contribute in a significant way to the UK programme.

Additional Key Words: habitats, species, biological resources.

Introduction

In 1992 the UK Government was a signatory to the Convention on Biological Diversity and Agenda 21 at the United Nations Conference on Environment and Development at Rio de Janeiro (often referred to as the Rio Earth Summit (UK Government 1994 a & b)). The former was not only a commitment to conserve existing in situ flora and fauna, and the habitats which support them, but also to rehabilitate and restore degraded ecosystems and habitats, and to maintain and promote the recovery of threatened species. The commitment was also to extend to populations of more common wild plants and animals, along with the habitats which support them, and where possible increase them. This was to be achieved through the development and implementation of plans or other strategies. Agenda 21 was a commitment to sustainable development and in which biodiversity was seen as an indicator of the performance of local and central government.

The UK published its response, Biodiversity: The UK Action Plan, in 1994 (UK Government 1994b). Through a series of committees, 391 species and 45 habitats have been identified, prioritised and targets set (UK Steering Group 1995; UK Biodiversity Group 2000). These lists and targets provide a national framework which is to be implemented through a series of local Biodiversity Action Plans (LBAPs) to be produced as a partnership between the local authority and the conservation bodies. The LBAPs are to set their own priorities and targets at a county level within the national framework.

The term biological diversity (sensu Wilson (1988)) encompasses the whole range of variation in living organisms. However, given the limited resources available, the UK approach is based on prioritising those wild species and habitats which need conservation action the most (Wynne et al

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1995). For species, this includes species endemic to the UK, species threatened with global extinction, species which the UK holds internationally significant proportion of the European population, species exhibiting rapid declining numbers, and rare species. Similarly for habitats, this includes habitats on which priority species depend, habitats for which the UK holds an important proportion of the total world or European resource, habitats rapidly declining in area, habitats of limited area, and habitats listed in the European Union's Habitats and Wild Fauna and Flora Directive.

Nature conservation has in recent times become a significant planning consideration for new mineral workings, extensions to existing ones, and review sites (Department of the Environment 1994), and can be a constraint as to where and how development takes place. The mechanism remains primarily through the statutory protection given to threatened and endangered wildlife sites and species by European Union and UK legislation (eg Conservation of Wild Birds Directive; Conservation of Natural Habitats, and Wild Fauna and Flora Directive, Wildlife and Countryside Act as amended and the Hedgerow Regulations (Horton 1991 & 1992; Department of the Environment 1994)).

The BAPs include a far wider list of plant and animal species than those given statutory protection. The UK BAP/LBAPs take a more holistic approach, and are as much concerned with conserving the fabric and wildlife of the countryside everywhere as well as the rarer and uncommon species.

The purpose of this paper is to explore some possible implications that the Biodiversity Action Plans have for the UK mineral industries.

Implications for New Planning Permits

Legal Constraints and Status

At present there is no additional statutory protection given to the species or habitats listed in the BAPs, beyond those which are currently afforded or are being considered for protection under the European or UK legislation. It is also unlikely that the BAP will be adopted as a statutory instrument in its own right. At first sight, there would seem to be no additional constraint on development due to biodiversity.

As local planning authorities are to implement Agenda 21 as part of their obligation to sustainable development and biodiversity is now central to UK environmental policy (Department of the Environment 1997), the UK and local BAPs are certain to become a planning consideration. In this context, priority species and habitats, and Prime Biodiversity Areas (PBA) (sensu Jefferson et al (1998)) will be major constraints in their own right; even if they are not afforded statutory protection. Listed non-priority habitats and species could also be a similar constraint, albeit less severe. BAP habitats and species could also serve to raise the profile of locally determined non-statutory sites of wildlife importance, and land around them, to almost statutory status in ethical terms.

Non-listed species and habitats are unlikely to be a constraint per se, but the issue of wider biodiversity should not be discounted. It is possible that biodiversity issues could occur even in the wider countryside where no BAP species or habitat is involved. This could arise if an assemblage is of local significance in an area of particularly low biodiversity, or be the result of a mosaic of habitats. In this context, sites could be judged on the sum of their components, rather than the value of the individual parts; the latter being the basis of many assessments in the past. A particular juxtaposition of a site (contiguous or seen as stepping stones or corridors) to listed habitats, species and prime areas could also be a potential constraint on the development of some areas.

There are already good indications that biodiversity and BAPs have become a significant material planning consideration with the Secretary of State for Wales having dismissed an appeal at a Public Hearing against refusal for planning consent for an open pit coal mine site (Anon, 1996).

Need for Additional Data Gathering and Standards for Interpretation

Appropriate information about the occurrence of local BAP species and habitats, and assemblage diversity will have to be collected and considered. This should be part of the initial desk study stage gathering information on statutory and non-statutory sites, species records, etc. Where local BAPs are still being prepared reliance will have to be on the UK national list. In England, the Natural Area Profiles prepared by English Nature can give

helpful guidance about the sub-regional and local contexts, and may list the priorities for each area. There is often a considerable body of local knowledge held by the voluntary sector, although this is often not readily available, and where established, the local authority biological records centres are an essential source.

In any event, it is likely that much more detailed field surveys will be required than have been undertaken in the past. Hence, there will be both time and cost implications for developments, particularly as much of the survey work is seasonal and may need more than one year of collection of data for adequate assessment. Where there is inter-dependency of BAP features and/or biodiversity of the proposed site on surrounding land, this will require assessing too. Ecological surveys must at least include those features which are listed as priority species and habitats in the local BAP, but both the local planning authority and the statutory nature conservation agency may request that non-priority features are included; particularly in potential prime areas. Given the objective of the UK Government to maintain the biodiversity of the wider countryside, the common and widespread species and habitats must also be considered and appropriately recorded.

There are standard methods for the recording of species and habitats relevant to BAPs, and the wider countryside (Joint Nature Conservation Committee 1993; Institute of Environmental Assessment 1995). With the exception of the breeding birds survey (Gregory 1997), there is no standard methodology to collect information on biodiversity of species groups as a whole.

It is also likely that far more detailed information and rigorous examination will be required about the supporting fabric for the features (eg vegetation, soils, hydrology, food supply, and territory), especially for the priority species and habitats, and prime areas. This will also have implications for timing of developments and costs.

The interpretation of ecological survey data is notoriously problematic owing to its snap shot nature and the incompleteness or absence of comparable data from the surrounding locality. Over the years, sufficient experience and information has been gained to be able to judge the significance of data for the less common and less widespread species and habitats (Nature Conservancy Council 1989; English Nature 1994). However, there is no standard methodology for assessing common ones nor their contribution to biodiversity. Diversity indices are available, but these can be difficult to interpret. An alternative index based methodology to assess local biodiversity, and the contribution of species and habitats has been used in the Kent local BAP and in the identification of PBAs (Kent Biodiversity Action Plan Steering Group 1997; Cooke and Sibbett 1998).

If there are to be consistent and objective assessments of development proposals a standard methodology needs to be developed for assessing the biodiversity value of areas and features. In the absence of a standard there is the likelihood that assessment will be neither consistent nor objective, particularly where the local BAP has not been finalised or the issue is simply general species richness.

Opportunities Afforded by Mineral Workings

The mineral industry, central government and its agencies, the Royal Society for the Protection of Birds, and others have drawn attention to the immense opportunities mineral workings provide for wildlife and biodiversity in the UK for BAP and non-BAP species and habitats (Department of the Environment 1996; Anon 1998; Bate et al 1998; English Nature, Quarry Products Association and Silica & Moulding Sands Association 1999; Barnes et al 1999). Some important wildlife sites have been created by the working of minerals (Humphries and Elkington 1980; Davis, 1981; Horton 1984 & 1985). In England alone about 250 former sites are notified as Sites of Special Scientific Interest for their biological interest (Langslow, pers com.).

English Nature et al (1999) have identified six habitats which the mineral industry could make particular contributions to the UK BAP, these were: i) inland rock and disturbed ground, ii) open water and with reed bed margins, iii) calcareous grassland, iv) farmland, v) lowland heathland and vi) saline lagoons. To these could be added vii) upland acid grassland, viii) heather moorland, ix) wet and pioneer broadleaved woodland, and x) riparian habitat.

The restoration of sites for wildlife and nature conservation is not new to the minerals industry in the UK. Examples include open water and associated wetland habitats and species at Sevenoaks in Kent, Brandon in Warwickshire, and Godmanchester in Cambridgeshire. These and others already contribute to LBAPs, as well as to biodiversity in the wider countryside. Most have been retrospective opportunities within approved restoration plans. Recently newer restoration schemes have been designed with BAPs specifically in mind. Some pre-date the UK BAP, but include both listed species and habitats; examples include dry heathland at Sandy Heath in Bedfordshire, acid upland grassland and mire at Nant Helen in Powys, and wet and dry heathland, and birch-oak woodland at Bleak House in Staffordshire.

Typically, restored sites are now designed to contribute to the diversity of the wider countryside; diversified agricultural landscape at Repton in Derbyshire, riparian habitat at Middleton Hall in Warwickshire, and annual flora on cereal field margins at Allerton Park in North Yorkshire being examples.

In the past and currently, opportunities have mainly arisen on an individual site basis, and this is likely to remain the most common situation in the future. However, there are also opportunities for strategic planning of mineral resources and biodiversity initiatives beyond individual sites. Here, the development of mineral workings could enable specific habitat creation or species recovery programs to be achieved on a regional basis. It may take the form of more effective extraction of the resource by integrating the working of several sites together into effectively a single development, or comprise the cumulative effect of individual workings. Examples of where this approach is being considered include the River Tame valley in Staffordshire, and the Swale and Ure valleys in North Yorkshire. From the industry's perspective this approach may have advantages in either releasing additional land for extraction and/or effectively removing constraints to wider development. An example of strategic planning is the proposal to create a large inland wetland in Cambridgeshire to compensate for the potential loss of coastal reed beds and bittern breeding habitat (both BAP priorities) due to sea level rises. Manor Farm within the Unitary Authority of Milton Keynes is an example of where a proposal is likely to release extra land for extraction through a proposal to create flood plain woodland.

The UK government aims to achieve the current BAP by the year 2010 and the weight given to proposals which include BAP initiatives may be balanced against this time-scale. From a planning point of view it is uncertain whether the same weight will be given to proposals that are not manifest until after 2010 or if the targets have been met by other schemes. Given the potential long operating life (some are now thirty or more years) of many of today's mineral workings and the time taken for those being planned to achieve planning consent (ten years is not uncommon) there is a need for longer term planning and visions in respect of BAPs.

Approaches to Biodiversity

A major decision is whether the proposed contribution to the UK biodiversity programme need be based on the BAP species and habitats, or simply the provision of diverse habitats and plant assemblages. If the development affects biodiversity targeted habitat and species, a BAP approach will undoubtedly be required by the planning authority and nature conservation agency as mitigation. If not, then there is a case for considering the more common habitats and species.

Where the replacement of habitat type and species are not required, the six BAP habitats suggested by English Nature et al (1999) and the additional four listed above should be strongly considered. The BAP approach needs careful planning and attention to detail. In the absence of a wider strategy, both the national and local BAPs can be used as frameworks for site restoration and after use. There are already several examples of this approach being incorporated into recent planning applications (egs broadleaf woodland at Allington in Kent; reed beds and bittern at Needingworth in Cambridgeshire, grazing marsh and reed beds at Stonecastle Farm in Kent).

Whilst individual sites will make local contributions to particular species or habitats, there is merit in the industry as a whole adopting a small number of clearly defined targets. The English Nature list could be considered as the industry's specific contribution to the UK programme. The adoption of a short list of target species and habitats enables better strategic planning by all involved in

biodiversity. It is also easier to develop standard techniques for establishment and management, as well as ensuring there is provision of the biological material required. At the present time there is no overall UK national or regional industry strategy or focus. Without this the industry's contribution could be haphazard and less effective than it could potentially be.

In the absence of a strategy there is a danger that species and habitats are simply cited from the BAP lists without consideration to their appropriateness (context) and feasibility. There may be temptation to adopt them cynically as a means to court favour and secure planning consents. Conversely, some planning authorities see the mineral industry as a means whereby their obligations can be achieved. Both have the potential to be counter productive if what is promised or is encouraged is ultimately not delivered or deliverable.

BAP species and habitats are not appropriate in all cases. There is a danger that the more appealing wildlife (eg bats) or habitats (eg reed beds) are automatically selected. Selection should include species and habitats which are important in the local context, and English Nature's Natural Area reports are particularly helpful in this respect and were used in the above examples. In the absence of similar studies in Wales and Scotland, similar considerations of landuse, landscape history and ecology etc, should be undertaken. The Countryside Council for Wales' 'LANDMAP' can assist this process for Welsh sites. An essential guiding principle should be the current or recent occurrence of BAP features in the locality, and ideally in the vicinity of the workings. Examples of this approach include dry heathland at Sandy Heath in Bedfordshire, acid upland grassland and mire community at Nant Helen in Powys, wet and dry heathland at Bleak House in Staffordshire, and acid upland grassland at Clee Hill in Shropshire.

Feasibility is a major issue and needs detailed examination, planning and ultimately resources. It has the potential to be overlooked in the enthusiasm of the project. The essential considerations are those of landform, hydrology and soil materials, and habitat fabric for animal species. Potential BAP features should only be chosen when this information is available. Those on the English Nature list relate to the physical conditions typically found in their respective types of mineral working, and are likely to be more feasible in principle to establish. The list is also habitat based.

Other key considerations are the availability of biological resources (species and habitat), sufficient knowledge of the species and habitat, sufficient long-term finance and commitment. There is no point in advocating the establishment of the species or habitat if there is no source of biological material, and little possibility of their long term management and protection. There also needs to be continuity in the commitment, changing personnel and objectives can prejudice projects. Historically, this has been achieved mainly through the local authorities and wildlife trusts, but at least one company manages some of its prime sites itself.

Details about the biological material to be used must be determined at the outset of the project. Some of the obvious questions needing answers might be the following. How much is needed (is there a minimum viable population or habitat size), and is the required amount available? Will it be collected from existing populations or habitats, and if so what will the effect be on them? Detrimental effects on existing sites must be avoided, even if it means the project cannot go ahead. Is it proposed to use biological material from a local source or one from a distant source or even a 'commercial' origin? The latter is a particularly important consideration as the conservation of genetic resources is intrinsic to the maintenance of biodiversity (Bullock et al 1997).

More is known of some habitats and species than others, and some are more easy to establish and maintain than others. For example, where conditions are right and materials available, heathland and some wetland habitats, wetland bird species and amphibia are relatively easy to establish (Environmental Advisory Unit 1988; Andrews and Kinsman 1990; Giles 1992; Crofts 1994; Gent and Bray 1994; Landuse Consultants 1996). This also applies to the other habitats on the English Nature list, and those additional ones cited earlier. In contrast, certain mammal species like dormouse and some butterfly species are particularly difficult to maintain as viable populations.

In view of the above, it is suggested a guiding principle for BAP species should be emphasis on the establishment of their habitat of sufficient size and quality, rather than attempts to introduce them. This approach should go in hand

with the extension or linking of existing fragments of habitat, and applies to both animal and plant species. It is also less onerous for the mineral company as all that need be provided is the fabric habitat, be it woodland, wetland, grassland or other habitat of the required characteristics, and the provisions for appropriate long-term management. The temptation to be committed to rare species such as some of those suggested in Bate et al (1998) should be avoided, unless there is good evidence they can be established and maintained. It would be unfortunate if the industry failed to deliver the promised initiatives. There needs to be a track record of success, and in many cases a period of well documented recording of examples and, where undertaken, experimentation in respect of certain species and habitats.

There is an urgent need for a set of guidelines for the selection of BAP features if the above are to be avoided. Early discussion with the planning authority ecologist, the statutory nature conservation agency, and other specialist bodies is essential.

The general approach based on more common species and habitats does not have the above limitations. This will be less onerous in terms of commitment required, and easier to achieve success while still contributing to the wider objective of the convention. In practice the industry is already achieving this through its own professional staff or consultants. All that is required is a focus on how restoration and management plan designs might achieve appropriate diversity. This lower level of contribution to biodiversity is no less valuable to UK sustainability in the wider countryside context.

It should not be forgotten that mineral workings also provide a unique opportunity for primary colonisation and early successional stages by plants and animals (Finegan et al 1983); opportunities which are naturally relatively rare in UK conditions. Many of the UK's uncommon plant and animal species occur in such habitats. This is also a valid and valuable alternative approach, particularly when next to existing undisturbed semi-natural habitat. Examples of this approach are Llanclys quarry in Shropshire and Ribblehead quarry in North Yorkshire.

The temporary, but almost continuous creation of these 'raw' mineral habitats such as sand faces, exposed mineral surfaces, lagoons etc during extraction operations also makes a valuable UK contribution in its own right. Many mineral workings can cite examples of birds, such as little ringed plover and lapwing, amphibians, reptiles, dragonflies and beetles using active workings.

Utilisation of Biological Resources Within and Around the Site

It is not uncommon that land holdings of mineral companies (either as leases or ownership) extend beyond the needs of the development as uneconomic, or 'stand-off' areas or areas, which for other reasons, such as close proximity to dwellings or designation as wildlife sites, precludes their development. In some cases these may be small areas whilst in others they can be sizeable. The enhancement of such established areas can provide, through management and introduction (eg planting), significant contribution to local biodiversity, as well as enhancing re-establishment in adjacent disturbed areas. Kings Wood in Bedfordshire and the Blaenwrach-Blaenclairch Nature Reserve in Neath Port Talbot are a good example of this situation. In many cases the contribution of these areas to biodiversity and BAPs may be more readily achievable than attempting it through site restoration owing to site and other limitations.

The disturbed areas, while not ignoring the fact that they have a special interest of their own for species such as solitary bees and wasps, provide perhaps the more obvious opportunities through the creation of new habitat and introduction (seeding, planting, etc). These areas also provide opportunities for specialist and unusual habitats to be created or retained for species of plants, invertebrates, and birds often arising from the exposure of mineral surfaces, and go 'hand in hand' with the exposure of geologically important horizons.

There is also much scope for the use of existing biological resources within sites as they are developed rather than simply destroying them (Humphries 1979). This applies to both 'greenfield' sites and existing workings. There are several benefits to this approach, one of which is that local genetic make-up is maintained and coupled with more rapid re-establishment. The techniques are simple and need not particularly expensive (except where the wholesale transplantation is required in

the case of high quality vegetation). It involves the lifting and re-spreading of the vegetation with an appropriate amount of the 'soil' layer in appropriately prepared sites to provide the necessary conditions.

The approach is particularly successful for grassland, heathland and wetland. Examples of where existing vegetation has been used to create replacement areas include wet heathland at Bleak House site in Staffordshire, cotton-grass peatland and dry heathland at Nant Helen site in Powys, and species rich grasslands at Thrislington in Durham and Keepershield in Northumberland. The approach is applicable for woodland and hedgerow ground flora (eg hedgerow flora at Llanilid West in Mid Glamorgan and woodland ground flora at Allerton Park in North Yorkshire).

Similar opportunities arise during the operation of sites as new habitats are created in the form of water areas, exposed mineral surfaces, etc. These provide opportunities for plant and animal species to colonise and, in particular, can be very important areas for certain bird species such as sand martins, a wide range of invertebrates, as well as early stages of plant communities. These areas should be considered for retention wherever possible, or recreated in the restoration scheme using the biological materials which have become established.

Assessing Achievements

The assessment of achievement should be an integral part of any planning consent (permit) for mineral workings where biodiversity is an issue and/or where it is offered as a positive gain due to the development.

Within the UK BAP framework the adoption of the selected species and habitats means that it is relatively easy and efficient in terms of resources to measure and assess the achievement of the biodiversity goals on a routine basis. For species appropriate targets can be set for their presence, abundance, age and sex classes, breeding success and survivorship, food supply, and habitat quality and extent. For habitats the criteria can be extent, community composition, species richness, and species of conservation interest (Humphries and Benyon 1999). The criteria may be based on the pre-working situation where BAP species and habitats are involved, or if not, on idealised targets.

This simplistic approach has merit as it avoids the difficulties associated with attempting to collect and interpret estimates of biological diversity. It could also be argued that by association other components of biodiversity are likely to be met by the simple approach. Hence, the species and habitat criteria could be surrogate measures of biological diversity in the broader sense. This approach is also likely to find acceptance by both mineral operators and regulators, and as a result is more likely to be implemented in practice. Examples of this approach to assessment are already accepted in the UK and include the Selar, Nant Helen and Gilfach Iago open pit coal sites in South Wales, and the Bleak House and Plenmeller coal sites in England.

Conclusions

Undoubtedly, biodiversity will be an additional potential constraint on some mineral workings in the UK where they involve BAP habitats and species. The constraint could also be unequivocal in areas of high value even though priority groups do not occur, and neither habitat nor species have statutory protection.

An assessment of BAP species and habitats will become a routine requirement of future Environmental Assessments. Additional work and resources beyond that typically undertaken will be needed to address this at the planning stage. There could be a period of confusion and inequality in assessments and decisions, even within the same planning jurisdiction, in the absence of a standardised methodology of surveys and assessments.

BAP species and habitats will be required to be restored on sites where they occur. The offer to establish them at other sites may release minerals which otherwise would not have been granted planning consent. There is opportunity for strategic planning of mineral extraction whereby the working by several sites enable BAP objectives to be achieved at both the local, regional, and national levels. This may also release additional minerals. It is unlikely that the opportunity will be limited to the current 2010 target set by the UK Government.

The delivery of BAP habitats and species is by no means assured. Some will be particularly difficult or may be impossible given the site conditions or absence of biological material, and care

needs to be exercised in the selection. Some are more realisable than others (eg the extended English Nature list). There will also be a considerable commitment in time and money, with unfortunate consequences for failure. It is probably more realistic to concentrate on providing the fabric of the habitat and rely on colonisation of the rarer species. Even with this simpler approach there will need to be a greater commitment in terms of resources to establish and to manage the features for the longer term. The least onerous approach to biodiversity is the general diversification of more common habitats, this is achievable and of no less value.

There is merit in the mineral industry focusing on a short targeted habitat based list and making a specific contribution to the UK's targets. This is likely to be more effective than ad hoc contributions. Of course this approach should not exclude other opportunities, and there will be instances where other targets are more appropriate within the local context.

It should not be forgotten that mineral workings potentially have an important and unique role in providing specialist habitats, particularly those associated with primary colonisation and early succession. This approach will be achievable in practice, and will be less onerous in resources and commitment in terms of sustainable development and its biodiversity component.

Hence, it is concluded that biodiversity is certainly an opportunity which the industry should grasp, and it is one way in which the industry can contribute to the UK's biodiversity action programme. However, the industry must also accept that biodiversity could also act as an additional constraint, will result in additional costs at the planning stage and greater commitments at restoration and subsequently. In this respect it is essential there is monitoring and reporting of the industry's achievements and experiences.

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The site examples cited include proposed projects and restoration work undertaken by Lafarge Redland Aggregates, Hanson Quarry Products Europe, Kent Enviropower, British Coal, RJB Mining, Celtic Energy and English Nature. These are but a few being considered and undertaken by the UK minerals industry.