

Chapter (non-refereed)

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organizations in respect of these matters, and in connection with the notification of statutory Sites of Special Scientific Interest, and the making of nature conservation orders, should be based on the most up-to-date information available, to obtain which there is a continuing need for research to be undertaken by these organizations.

ADAS has an essential role to play in interpreting the results of research to land managers. It is of crucial importance to make research results available in such a form that they can be used in stimulating the interest of farmers and landowners, and in advising them on the conservation of the countryside.

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DISCUSSIONS

The discussions were organized in syndicates, every participant being invited to join one of 3 groups. Each group discussed research needs on the impacts of agriculture on wildlife and natural and semi-natural habitats in (i) lowlands and (ii) uplands, and also (iii) on the effects of agrochemicals on wildlife (with wildlife defined broadly to include soil fauna, as well as terrestrial and aquatic plants and animals). Each syndicate group had a reporter: D F Ball for the lowland discussion, O W Heal for uplands and I Newton for agrochemicals. These 3 reporters each summarized the conclusions or recommendations of the 3 syndicates and their reports follow.

REPORT ON THE DISCUSSIONS OF THE SYNDICATE ON LOWLANDS

D F Ball, Reporter

1 Availability of advice

Before considering the need for further research on the ecological impacts of agriculture on lowland Britain, the syndicate placed a strong emphasis on improved communication of existing knowledge between ecologists and farmers. Farmers should be able to get practical, action-oriented summaries of current

recommendations for habitat and wildlife integration with modern agriculture, through the extension and advisory services of MAFF and the Scottish Colleges of Agriculture, and through the newly co-ordinated Farming and Wildlife Advisory Groups (FWAG). Those organizations concerned with wildlife ecology and with ecology applied to agriculture were urged to respond co-operatively towards providing material for such practical summaries.

2 The background to agricultural impacts in the lowlands

A large majority held the view that efficient modern farming techniques would, and should, be sustained, and optimistically believed that it was not inevitable that current intensive farming, or its extension, need damage other environmental interests as severely as it is now seen to do. An approach that aims to maintain or increase agricultural production could be compatible with minimizing habitat loss and restoring habitat diversity.

Land use in Britain is increasingly influenced by EEC policies. Recently, the Community has decided to cease payment of capital grants related to dairying, with reduced support and quotas for milk production,

while at the upland margin there has been an increase in land with 'less-favoured area' status. It is foreseeable that cereal production may be restricted, with or without support price changes. Some pasture and even arable land may be turned to the production of high value timber or energy crops. If economic pressures and options change, then more diversified farming could result, which in turn may assist the restitution or retention of habitat diversity.

3 Detection and monitoring of changes and their causes

The major impacts of agricultural change on the environment rapidly become obvious, but are we able to identify the early stages of potentially critical ecological impacts of less conspicuous land management modifications, whether these are stimulated by economic and social factors or by evolving agricultural techniques?

It was generally agreed that our ability to detect change, and our quantitative knowledge of past changes were defective. There was acceptance of the need for an effective, quantitative assessment of the current distribution of habitats, nationally and regionally, which should be resurveyed ('monitored') at frequent intervals. Monitoring should not be restricted to key conservation sites, such as those of SSSI status, but should include the broader countryside which, from the landscape and general public points of view, is of more conspicuous significance. However, not all species and site characteristics can be monitored. There must be an element of selectivity. As a result, 2 types of monitoring were envisaged: extensive, broad-brush, national and regional evaluations; and intensive, site-oriented monitoring, focusing on key species or assemblages of species. Irrespective of scale, extensive or intensive, the objectives of monitoring in relation to practical policies and methods need to be constantly borne in mind.

4 The areas and distribution of different habitats effective for wildlife conservation

On balance, it was thought that the present trend towards the consolidation of fields into larger units will continue in the lowlands. This further consolidation of fields will result in a continued fragmentation and loss of small areas of semi-natural habitats which survive in lowland Britain. While something is known of the minimum areas required to sustain some species of plants and animals, more information is needed to take account of the different requirements of mobile and non-mobile species. Biogeographical studies must include work on the effective and optimum size of habitat 'islands' for individual species and assemblages of species. The most appropriate patterns of 'island' distribution to ensure adequate population densities, diversity, and effective dispersal within an agricultural landscape must be studied. This research, allied to autecological and ecosystem studies, should encourage the evolution of management practices that

are acceptable in agricultural terms, but produce reduced ecological damage. At the same time, more needs to be known about the re-introduction of plants and animals in the intensive agricultural environment, and about the re-creation, in patterns compatible with modern farming, of habitats broadly comparable to those which have been reduced or eliminated by recent changes in land use. This approach warrants more attention than it has so far attracted.

5 Ecosystem studies

Autecology is concerned with the distribution of plants and animals. Studies in a range of environmental conditions should be focused on species with different growth requirements and strategies. Particular attention should be paid to soil water relations, a major problem for the maintenance of some habitats and species assemblages in the lowlands, where large areas have been directly and/or indirectly affected by improved land drainage. However, the management of ecosystems necessitates knowledge of the interactions between species, in addition to the responses of individual species. An integrated approach to plant species is required in site management, taking account of water relations and the requirements for, and availability of, nutrients. The effects of agrochemicals (both pesticides and fertilizers) on the occurrence and survival of ecologically valuable but agriculturally 'weed' species need study. These species are often important for their associated fauna, including seed eating birds. There is also a need for comparative studies of agricultural and semi-natural ecosystems in order to determine whether restoration of particular habitats remains a practical option. The role of wild plants and animals as carriers or reservoirs of pests and pathogens of crop plants and animals was also thought to warrant more investigation, for example 'Q-disease' in deer.

6 Major land management experiments

Management trials on a farm scale, as done at the Boxworth Experimental Husbandry Farm (Stanley & Hardy 1984), were discussed. While welcomed in principle, there were reservations about problems of statistical design and interpretation. For the future, would the very considerable resources required for this scale of experiment be better rewarded by a dispersed set of less extensive trials?

7 General issues

Three aspects should be stressed: (i) an over-riding concern that more research should be oriented to management objectives; (ii) ecologists should not be afraid to give advice on less than (unattainably) perfect information (it is not always necessary to do more research); (iii) in seeking a realistic balance between agriculture and the maintenance of the rural landscape, with its attendant assemblages of wildlife, the emphasis should, wherever possible, be on minor modifications of current agricultural practices, and on habitat restoration of acceptable scale and location. Such

actions, eg leaving bands along field boundaries untreated by herbicides and pesticides, may have little impact on crop production, but major beneficial effects on landscape and wildlife.

8 Recommendations

- 8.1 More advice should be provided, as soon as possible, on minimizing the impacts of agriculture on wildlife. This advice should be drawn from existing ecological knowledge and disseminated through the FWAGs and the advisory/extension services of MAFF, and the Colleges of Agriculture, Scotland.
- 8.2 An integrated data base should be established, at national and regional scales, of existing land cover, land use and landscape; this data base should form the basis against which future changes can be monitored.
- 8.3 'Island' biogeographical studies need to be made of the sizes and patterns of distribution of wildlife habitats that could enable selected species and assemblages of species (plant and animal) to be sustained in areas dominated by different types of agriculture.
- 8.4 Autecological studies of key species (plant and animal, mobile and sedentary) are required, taking particular note of water relations (the impact of land drainage) and the flow of nutrients.
- 8.5 On the basis of present knowledge, and as improved by 8.3 and 8.4, experimental work should aim, so far as possible, to re-create habitats, and their associated plant and animal assemblages, which have been lost as a result of recent agricultural developments.
- 8.6 Consideration should be given to the establishment of a series of dispersed trials to test the effects of agricultural practices, changes in these practices, and the results of habitat loss and re-introduction, on the abundance and diversity of wildlife.
- 8.7 Accepting that the interests of productive agriculture and conservation need not always conflict, it is mutually desirable to know more about wildlife as a possible reservoir of pests and pathogens of domesticated plants and animals, and *vice versa*.
- 8.8 Desk studies should be made to predict possible regional impacts on landscape and wildlife of agricultural changes that could follow a modified CAP approach to agricultural production within the European Community.
- 8.9 If interests in agriculture, wildlife, and landscape are to be harmonized, it is essential that effective

mechanisms are established by which environmental impacts can be predicted in advance of potential changes in land use and in management methods.

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REPORT ON THE DISCUSSIONS OF THE SYNDICATE ON UPLANDS

O W Heal, Reporter

An initial basis for assessing research priorities is to identify those areas of the uplands in which agriculture is likely to change and where such changes will influence wildlife, either directly or through consequent changes in other land uses. This basis is provided by Eadie's (1984) scenarios, which also serve to emphasize the need to recognize the variability in the climate, soil, vegetation and land use within the uplands*. The most likely pattern of agricultural development is given below.

- i. In the higher and remote Hill farms, agricultural production as a primary land use objective will continue to decline. Management for nature and landscape conservation and for recreation may depend on artificial maintenance of farming and manpower.
- ii. On Upland farms, particularly those with relatively high proportions of sown pasture, agriculture will remain strong, intensification is likely to continue, and wildlife objectives will have to be incorporated within farm management.
- iii. On the better Hill farms in the less remote areas, the options for change are greatest, and potentially most controversial. The extent of conversion of indigenous pasture to sown grassland will depend on economic incentives and social priorities, but with associated control of the indigenous vegetation through grazing management. Forestry is a major alternative in these areas, again with the potential to minimize conflict through collaboration in defining objectives and through sensitive management.

This generally accepted scenario identifies the broad variation in land use, related to land type, and shows the combinations of user interests which characterize the uplands. The background papers and discussions

*The general term 'uplands' is used for land on which farming is dominated by sheep or sheep and cattle rearing. In Eadie's scenario, the distinction is made between the higher Hill farms where sheep rearing is dominant, and the Upland farms, on lower or better land, with mixed sheep and cattle rearing. This distinction is applied to England and Wales as well as to Scotland.