

**Report of Visiting Group – Forest Research**

**Environmental Research Branch**

**29 – 30 October 2001**

**1. Review Procedures**

On the invitation of Mr Jim Dewar, Chief Executive Forest Research, three independent scientists formed a Visiting Group to review the quality and cost effectiveness of the science of the Environmental Research Branch (ERB) Forest Research. The names and affiliations of the Group are given in Annex 1 and the Terms of Reference in Annex 2.

The Visiting Group visited the Alice Holt Research Station of Forest Research on 29 and 30 October 2001. Secretarial support was provided by FR and the Visiting Group wishes to thank Mrs Jenny Kinnersly for her dedication and good humour. The programme of meetings and discussions is presented in Annex 3. One month in advance of the meeting the Visiting Group members were provided with reports describing in some detail the projects being undertaken by ERB, visions for future science and examples of published work.

The Visiting Group prepared its report on the afternoon of 30 October 2001 and presented the principal findings to the Chief Executive, Chief Research Officer and Head of ERB at that time

The Visiting Group was generally pleased with the arrangements that had been put in place and with the openness during the discussions. However, it considered that the documentation could have been improved. In particular it should have indicated how the ERB was positioned in relation to the other Branches and provided a more detailed breakdown of the financial arrangements across the ERB projects. The financial information was sought by the Visiting Group and duly supplied by Forest Research. It would have been useful for the Group to have seen the Report on ERB from the previous Visiting Group to ascertain particularly whether or not the Report's recommendations had been implemented by Senior Management.

## 2. Funding

The Visiting Group was pleased to have a presentation from Helen McKay, Policy and Practice Division (PPD) of the Forestry Commission. It was noted that the FC had to respond to a very wide user community. The research was therefore very broadly based and there was the need to prioritise. An FC Research Strategy has been developed and the principal research priorities were drawn from this. The Strategy was subject to a 5 yearly review but the research was modified as necessary on a yearly basis. Forest Research staff provided invaluable advice for this process. PPD has a £10m research budget of which approximately £9m is currently allocated to Forest Research. The remaining £1m is available for bids from the wider research community but FR is also permitted to compete for a share and does so. There is an excellent rapport in terms of defining research needs between PPD officers and the Head of ERB, Andy Moffat. The current year's income from PPD to the ERB is £1.185m with £0.35m from external and other sources.

The PPD funds are allocated on an annual basis to specific projects. The Visiting Group judged that these annual funding review arrangements were detrimental to establishing year to year continuity in some research areas. This is of concern to the project leaders. The Visiting Group would recommend that the senior management explore with PPD the possibility of committing funds for 2 or 3 years to a number of key projects while retaining the flexibility to introduce new areas of research through the annual review process.

The Visiting Group would like to see the funding arrangements from PPD being less prescriptive so that the project leader may be given the opportunity to follow some curiosity driven research which spins out from core funded projects. Accordingly Senior Management of Forest Research should encourage PPD to provide 5 – 10% head room through uncommitted funds from within existing budgets.

The Visiting Group was pleased with the many areas of new research identified by the Head of Branch and some of the project leaders in ERB. The Group considered that several of these areas would be attractive to national agencies which commission research. The Group was pleased to note some success in ERB bidding for EC contracts. However, noting that external income is only 13% of total income, it is recommended that there should be a much more positive

policy to expand research contract funding from a wider range of organisations. Ineligibility to apply for NERC funding on a formal collaborative basis with University Departments is a serious limitation to scientific networking, and senior management should seek to develop this opportunity with the relevant authorities.

The Visiting Group found it impossible to address the issue of PPD funding for the ERB in comparison with other FR Branches. It is to be hoped that such assessments are made and that the *status quo* in relation to the distribution of funds is not allowed to perpetuate without good scientific reason. However, in an analysis made of the balance of funding subsequent to our visit, we have noticed what appears to be an imbalance in the Table of financial information. For the year 2001/2, for instance, an allocation of £1,422k is made to ERB, yet only £1196k is accounted as expenditure; there is a similar £200k shortfall projected for 2001-2. We are hopeful, therefore, that some of this shortfall should be restored to allow a modest growth in the activities of this branch.

### **3. Personnel**

The staff of the Branch are largely permanent with personnel on fixed-term contracts the exception rather than the rule. Salaries within Forest Research are not high relative to living costs in the area. This is an impediment to the employment of personnel on fixed-term contracts.

It is more than two years since the last promotion panel was set up. This is bad for staff morale, some of who feel, with justification, that their hard work and commitment has gone unrewarded.

The Visiting Group was informed that appointment procedures were cumbersome and that delays of six months or more were often experienced. This resulted in new projects being short staffed for considerable periods of time. Management should introduce a more flexible system for appointments, placing more emphasis on fixed term appointments and streamline appointment procedures.

The potential for engaging PhD students to work within projects has not been effectively developed. Experience of researchers with PhD students has been mixed. The Visiting Group recommends the establishment of a structured scholarship programme financed by project funds. This would offer the

opportunity to PhD students and their academic supervisors to work with FR researchers on agreed programmes with explicit milestones and deliverables.

#### **4. Branch Management**

The Visiting Group were impressed with the overall management of the ERB, with the Head of Branch showing insight and giving valuable examples of inter-project collaboration both within the Branch and also crossing Branch boundaries. The Visiting Group appreciated that their assessment of scientific performance should relate to the particular demands of the Forestry Industry and Branch customers in general, rather than conventional evaluation which would be used for a University department, for instance. This issue specifically relates to the way that all staff must manage the organisation of their primary research, set against the demands for service advice, with the latter absorbing up to 50% or more of staff time. While the relatively low number of primary scientific papers is in part accounted for by this dichotomy, it could perhaps be related also to the large number of sub-projects being undertaken in certain areas. Another weakness identified was the need for some project leaders to become more proactive in developing new research areas and identifying future priorities for the PPD. This may be encouraged if project leaders are given greater autonomy and control over budgets.

Although generally there seemed to be a good relationship with the PPD, some additional flexibility in allocating budgets outside of the Branch was sought. In particular, the mechanism by which the PPD sought to encourage links between Branches may cause difficulties if not driven by individual project leaders and delays in other Branches processing data or publications could limit scientific output. These links should be used to stimulate research rather than as a means to balance expenditure. A culture of interdisciplinary research should be stimulated by the organisation of an internal and external seminar programme. It has already been noted that opportunities for developing sources of external funding should be encouraged, particularly with more flexible allocation of budgets and responsibility given to project leaders.

## 5. Review of Research Programmes

### 5.1 Soil Sustainability

This is the largest programme within the Branch. The Visiting Group felt that the title of the project did not accurately reflect activity within it: "Ecosystem sustainability" would better represent this.

The project is well structured with many links to other areas of activity both within the Branch and with other Branches. Some of these links have proved very effective but others, some imposed by PPD, have not been entirely satisfactory.

Some of the work of the group is innovative, particularly that involving isotope labelling techniques. The experience of the project leader Fiona Kennedy in the area of critical loads is valuable and appropriate to the project.

The publication of the soil key "The Identification of Soils for Forestry" is considered by the project leader to be her main achievement to date.

Despite the clear structure of the project, the Visiting Group was left with the impression that the project leader found it difficult to integrate its many components. A more explicit prioritisation of these component parts might be useful in this regard. The Group was also of the view that insufficient thought had been given to current and future developments in the industry, *inter alia* modern harvesting techniques and related research needs.

The inter-branch relationship involving the CORE model appears to have been causing difficulties, possibly restricting the development of modelling activity outside the Mensuration Branch.

Output of peer-reviewed publications is below expectation, as is the anticipated number of presentations at external meetings and conferences in the period 2001-2003.

Evaluation of Science : 2 minus [the scoring system used in this section is that given in the FR Terms of Reference - Annex 2] The Visiting Group felt that there is potential for improvement of performance in this project. The Group does not recommend an increase in PPD funding in this area, but external funding opportunities should be explored.

## **5.2 Analytical Facility**

The station's analytical laboratories, which are under the control of ERB, are well equipped for routine analysis of plant tissue and water. Facilities are also available for soil analysis, although they are less comprehensive.

The laboratories are well managed. They operate strictly on a service basis with only limited interaction with research scientists. The bulk of the analyses carried out is undertaken on behalf of ERB.

Quality assurance procedures are well established. The laboratory is a member of several well-recognised UK and European quality control rings.

The operation of the laboratory is undoubtedly expensive. The cost of foliar analysis to external customers appears low, although it is difficult to gauge whether or not this is a real economic charge. Analytical costs are included in the budget of each project as appropriate. It was difficult, however, for the group to establish the proportion of the total research budget absorbed by the laboratories.

Procedures for the replacement of obsolete equipment are haphazard. It is often necessary for the Senior Chemist to make application for replacement equipment annually for several years before his request is granted.

The Visiting Group recommends that serious consideration be given to establishing the analytical facility as a cost centre. This would help to restrict unnecessary analysis and ensure that the true cost of operating the laboratories was reflected in project proposals.

The Group considered it inappropriate to give a research score to this service activity

## **5.3 Climate Change**

The Visiting Group recognised the strength of this team which was reflected in the impressive, well-managed flux-measuring facility and the vision for linking into broader aspects of climate change. In addition, this team has a strong publication record and has undertaken a number of collaborative research projects with a number of UK Universities.

By integrating these approaches with the Level II (Forest Dynamics) studies, together with developing models of carbon exchange and sequestration, this project provides a vital link in the long-term assessment of climate change processes. While this may not seem to inform the decision-making process as directly as some other projects, the national and international relevance of this work represents a high priority for the future.

There was some hesitation concerning the way that modelling approaches currently being developed will feed into the Core Model. Environmental Research, and particularly the Climate Change Programme require a functional stand-level research model of forest growth. If this requirement is to be serviced by the CORE Model team, then action needs to be taken to develop the model to an appropriate stage and preclude unnecessary duplication of effort.

Additionally, the future use of open-topped chambers needs to be evaluated carefully given the possible variation in microclimate within such equipment. However the Visiting Group recognises that without UK plc being willing to invest in a FACE facility for elevating CO<sub>2</sub>, there was little other opportunity for investigating the interaction between plant responses to the gaseous environment (CO<sub>2</sub>, O<sub>3</sub>) and other environmental variables such as drought. The team was actively seeking EU funding and should perhaps review how postgraduate students could integrate more fully with the research programme and develop additional links to Universities.

One threat perceived by the Group was that the area of Forest currently supporting both the Flux tower and Level II study may be subject to commercial pressures in future. The Group recommends that it should be more clearly designated for long-term research. This would allow forest management procedures to be integrated into the long-term measurement programme.

Science evaluation: 2+. The Visiting Group recognised that future outputs based on direct and indirect measurements of carbon sequestration would have the highest impact. The highly effective integration of technology and traditional mensuration approaches, coupled to good scientific output in refereed journals and FR bulletins, are fully meeting customer expectations. Additional funding was being sought from outside agencies (EU, DEFRA etc) possibly in

collaboration with UK Universities to develop the potential of the work via contracts and studentships.

#### **5.4 Reclamation**

The Visiting Group considered the programmes of research to be well thought out and providing a broad range of advice to stake-holder groups. There were effective links with other project leaders within the branch, particularly Hydrology and there was a satisfactory publication record. The project was working effectively with the UK University sector in an area unique to Forest Research, and the leaders were forward looking in their development of web technology. Whilst they had established links with well-funded Government initiatives, there were few resources from these projects feeding back into the ERB project. Additionally, there seem to be many opportunities for commissioned research, but apart from problems of recruitment (discussed elsewhere), perhaps some managerial guidance should be given so as best to exploit these opportunities. One problem may stem from the sheer number of new initiatives currently being developed in-house. Despite the excellent documentation for each of these areas, there still seemed to be many more research issues which could be addressed. Given the likely demands for advice and outreach to such a wide range of users, additional support from staff on short-term contracts would seem to be an essential development for this project.

Evaluation of science : 2. The Visiting Group recognises the practical importance and user-demand for these research areas which is likely to continue in the future. Additional staff from internal or external sources are required urgently to maintain the existing commitment, as well as giving time for the project leaders to explore available funding opportunities.

#### **5.5 Air Pollution**

This project fulfils a mandatory function under the EU regulation for the protection of forests against pollution. ERB is the UK National Focal Centre for the programme. Currently there are ten Level II plots, all under the control of the project in the UK. This is a large number of plots, but the Group are keen to extend the study to include Beech and Norway Spruce: this is logical and should

be encouraged, given current concerns on the impact of climate on vegetation dynamics.

The project is very well managed. The project team has developed a purpose-built database which is available to other Branches within Forest Research. This is a very significant achievement and an important contribution to the organisation as a whole.

The Visiting Group was impressed by the enthusiasm and commitment of the team and concur with their belief in the value of the project to several areas of research within ERB, FR and more widely.

The very large quantity of data generated makes it difficult to adequately exploit the full potential of the project. The team is under-resourced for this and is seeking collaboration with Universities in order to make full use of the data. A document describing a data valuation strategy should, at first glance, be valuable in this research. The team is anxious to publicise its work more widely but is constrained by cumbersome publication procedures within the Commission. It is also anxious to establish a project website but again is hindered by bureaucracy.

There was general agreement that the name of the project did not fully reflect the range of work being undertaken and that an alternative name should be adopted.

The publication record of the project to date is modest. To an extent this reflects the long lead-in time to the production of interesting data but it may also result from a delay in utilising the plots to their full potential. This is something which appears to have been rectified.

Details of a subsidiary project, studying the spatial variability of forest soils, were also presented. This project is interesting and important, but the emphasis on parameters such as pH, organic carbon and exchangeable ions, all of which are subject to considerable temporal, management related variation, was questioned.

Evaluation of Science : 2 The Visiting Group was impressed by both the value and the management of the project. While the project already receives significant non PPD funding (EU), an expansion of the network should be encouraged. However, funding should not derive solely from the Level II programme, with the

possibility that additional PPD funds be directed via Climate Change, as well as encouraging the Group to seek additional external sources of funding.

## **5.6 Meteorology**

The Branch operates, alone or in partnership with other agencies, a number of met stations in England and Scotland. These stations, by virtue of their rural location, make an important contribution in the Met Office network. They are operated, with very limited funding, on an *ad hoc* basis. Their continued viability appears to be highly dependent on David Durrant and the contacts, personal and institutional, which he has established. While the cost effective operation of the network is a matter of satisfaction, the Visiting Group are fully cognisant of the importance of these stations to the work of the Branch and are anxious that this long-term operation should not be compromised.

The Group considered it inappropriate to give a science score to this activity but resources for an automated weather station should be provided by PPD funds.

## **5.7 Archaeology**

Although a strong steer for the development of this project may have come from PPD, the area had originally been highlighted by ERB. Since initiating the project in 1998, the project leader had clearly made good progress both in terms of reviewing the subject area and in personally seeking additional qualifications relevant to this area. Unlike other projects, most advice/outreach was being disseminated via Tim Yarnell [FC], with whom close links were maintained. There were concerns, however, at the delay in launching the discussion document by PPD. Additionally, the Visiting Group wondered whether there was really a long-term research programme and monitoring task in this project. There may, however, be additional opportunities given the expansion of forestry into new land-use situations and broader interest in the spread and proliferation of tree root systems in an urban context. For the immediate future it was felt that the pot trial for root proliferation was not appropriate. Specifically this seems to be an example of a programme which may have a finite timescale. Once the basic research and recommendations for typical site management have been collated, it could revert to purely an advisory role.

Evaluation of Science : 2 – 3 Funding should be maintained for at least a three year period, with the aims and outcomes of the project then re-assessed given the likely successful completion of the core programme

### **5.8 Forest Hydrology**

This is a crucial area of research in that forests and management practices have important effects on the quantity and quality of freshwater. The Visiting Group considered the research programme to be well founded in identifying the principal areas where new knowledge is needed. The project leader Tom Nisbet described several important achievements. He was also able to demonstrate the many links that have been established with complementary projects being undertaken by other research teams both in the UK and Europe. Involvement with EU FOREX project was particularly pleasing. However the Visiting Group was concerned with the number of sub projects that fell within this area, particularly as the project leader only spends some 40% of his time on this research. The remaining 60% is devoted to the provision of guidance and advice to the FC.

There is the need to prioritise the research and possibly stop some of the less important work. The Visiting Group was also concerned that this important area of work would be put at risk should the project leader leave the organisation; he has no deputy. Senior Management should consider how cover could be provided.

The project leader showed a good breadth of vision in relation to topics for future research but without additional resources it is difficult to see how any new work could be introduced. One possibility may be to make greater use of university PhD students or to seek commissioned research and employ new staff on short term contracts. Tom Nisbet had experienced problems with both these approaches. However the Visiting Group considered that they had much to commend them and address these in general terms elsewhere in the report.

Evaluation of science: 2 The Visiting group considered that a modest increase in funding from PPD would be justified particularly to provide some

cover in this important research area. However there are many opportunities for commissioned research funds outside the PPD that should be pursued.

### **5.9 Environmental Change Network (ECN)**

The Visiting Group saw this project as being an important long- term activity. Alice Holt is one of the key forest sites in the UK Environmental Change Network. It is being very well managed by Sue Benham.

It is essential that the level of support from PPD through ERB should be maintained and the Visiting Group is concerned that the funding has recently been reduced from £50k to £40k. The Group would wish to see this restored. It was pleasing that the ECN data with additional data from the Forest site is now being used to assess the impact of climate on the moth population and that a publication is in prospect.

It was surprising to learn that GIS systems with supporting data bases from FC and elsewhere were not in routine use throughout Forest Research in general and ERB in particular. This shortcoming should be rectified as soon as possible.

Evaluation of science: 2            It is essential that an appropriate level of funding should be maintained so that the UK ECN requirements can be met both in the short and long term.

## **Recommendations**

- 6.1            Advance paperwork to future Visiting Groups should show clearly how a Research Branch is positioned in terms of its scientific interactions and finance in relation to other Branches in Forest Research. The Report of the previous Visiting Group and the Management's response to its recommendations should also be available.
  
- 6.2            Management should explore with PPD the possibility of committing funds for 2 or 3 years to a number of key projects while retaining the flexibility to introduce new areas of research through the annual review process.

- 6.3 Senior Management of Forest Research should encourage PPD to provide 5 – 10% head room though uncommitted funds from within existing budgets to enable an element of curiosity driven research to be pursued.
- 6.4 Funding should be transparent to allow the full allocation to ERB to be accounted in terms of allocation and expenditure by groups
- 6.5 There should be a much more positive policy to expand research contract funding from a wider range of organisations.
- 6.6 Staff review and promotion panels should be put in place without delay.
- 6.7 Management should introduce a more flexible system for appointments, placing more emphasis on fixed term appointments and streamlined procedures.
- 6.8 A structured scholarship programme for PhD students, financed through project funds, should be established.
- 6.9 Project Leaders should be given greater autonomy and control over budgets.
- 6.10 A much stronger internal and external seminar programme should be established.
- 6.11 Soil sustainability  
A more explicit prioritisation of sub components of the project should be undertaken and linked to current and future developments in the industry:  
  
Project staff should be encouraged to increase peer review publications and presentations at external meetings and conferences.
- 6.12 Analytical Facility  
Senior Management should consider establishing the analytical facility as a cost centre.
- 6.13 Climate Change

The future use of open topped chambers needs to be evaluated carefully given the possible variation in micro-climate within such equipment.

The Forest currently supporting the flux tower and Level II study should be more clearly designated so as to secure its use for long-term research.

6.13 Reclamation

Additional staff from external sources should be employed with some urgency so as to meet existing commitments.

6.13 Air pollution

A document describing data valuation strategy should be prepared and published and a website developed urgently. Senior Management should ensure that any bureaucratic barriers in FR or FC to the timely production of these important outputs are overcome. This recommendation is also relevant to all ERB published outputs. Resources. Consideration should be given to extending Level II sites.

6.14 Met stations

These are crucial to the work of the Branch and their long-term operation should be secured through more formal funding arrangement.

6.15 Archaeology

The pot trial for root proliferation may not be appropriate and should be re-examined.

The aims and outcomes of the project should be re-assessed after 2-3 years to see whether continued research on this topic is appropriate.

6.16 Forest Hydrology

Senior Management should consider how support and cover can be provided for the forest hydrology project.

6.17 Environmental Change network

Funding which has recently been reduced from £50k to £40k should be restored.

GIS systems with supporting data bases from FC and elsewhere should be installed and made operational; as soon as possible. This recommendation has relevance to other projects in ERB and FC.