CREATING NEW WETLANDS: KEY PRINCIPLES AND A PROJECT MODEL

Report prepared by ELP on behalf of the Broads Authority and Natural England

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SUMMARY

This report reviews real wetland (re-)creation schemes and two theoretical approaches to environmental projects in order to identify best practice and common pitfalls. The results of this review are used to produce a model of wetland (re-)creation which can be used as a template to plan new projects. The model aims to maximise the benefits from new projects and minimise risk of failure.

The review of recent projects generates thirteen key conclusions. They may be summarised as:

1. A broadly-based and easily understood Vision for the project is important.
2. Acquiring the land is a key step which is highly unpredictable.
3. Obtaining the necessary permissions from regulators is a major milestone, requiring detailed studies and a good understanding of the requirements of many functions within the same agency.
4. Building support among the family of stakeholders is essential. Support for wildlife projects cannot be guaranteed, regardless of the size and resources of the organisation.
5. Building support requires time and resources, and cannot be short-cut. It is always worth the investment.
6. High level political support is vital for larger projects and may need engagement by all levels of the hierarchy of the partnership organisations.
7. Partnership works better than single organisation projects, as they bring a range of expertise, help develop stakeholder support and are favoured by funders. There are several disadvantages, however.
8. Detailed technical work may be needed to derive a sound restoration plan. Investment made at this stage is highly cost-effective and the work is usually required by regulators.
9. A considerable degree of tenacity is required to see projects through, combined with a good understanding of technical issues, partnership working and the planning and institutional framework. The project manager is crucial in bringing these qualities to a project.
10. Skimping on the initial capital investment, by under-specifying works or using cheap materials, increases revenue costs in the long run.
11. Site set-up should include allowing machinery access and sustainable grazing to maximise long term management efficiency.
12. Good contractors, especially for the groundworks, are vital and the cheapest quote may not always be the most cost-effective.
13. Linking wildlife sites together is a key strategy for a project’s success, both in terms of biodiversity benefits and in building support.

The Ecosystem Services Approach is explained and the benefits that it offers to wetland projects are described. The approach is particularly beneficial for projects that have multiple objectives. Adopting this approach is important in building support among stakeholders, as the wider benefits become apparent to those who are not wholehearted supporters of wildlife projects.

Similarly, the value of undertaking socio-economic valuations and Impact Assessments is described. A wide variety of models are available to provide evaluations of the social and financial benefits of a project, and to compare environmental projects to competing land uses.
More often than not, such analyses are strongly supportive of biodiversity projects and are very useful advocacy documents.

Case examples are used to describe the benefits of both approaches. The complexity of the disciplines involved, and the fact that they are outside of the normal experience of wildlife planners, are significant barriers to their take-up by the conservation movement.

Drawing on the above material, a model is developed which summarises best practice. The model is a step-wise flow chart guiding a wildlife planner through the key stages and is supported by text which fleshes out some of the key considerations at each stage.

The Case Studies for wetland projects and the applications of Ecosystems Services Approach and Socio-Economic Analyses are presented in appendices. They provide key facts and contacts and sources of further information.
I. INTRODUCTION AND AIMS

The aim of this project is to review real wetland (re-)creation schemes and two theoretical approaches to environmental projects in order to identify best practice and common pitfalls. The results of this review are to feed into development of a model of wetland (re-)creation which can be used as a template to plan new projects. The model provides guidance for conservation planners, to maximise the benefits from the project and minimise risk of failure.

The project was conceived and jointly funded by the Broads Authority and Natural England. It arose out of separate initiatives being carried forward by each of the organisations, where it was recognised a joint approach would yield benefits to both. The Authorities wished to move forward on the integrated delivery at a whole river valley scale, and through this, promote or directly undertake wetland restoration projects on a large scale, perhaps whole catchments. Natural England was also piloting integrated delivery through its Natural England Multiple Outcomes (NEMO) pilots, one of which was situated in northern Broadland. More recently such thinking has been subsumed within Natural England’s Climate Change project, linking it to making the wetlands of the Broads more resilient to the future impacts of climate change. Both initiatives are at an early stage and it was felt they could benefit from a review of experience elsewhere and the production of best practice guidance.

Firstly, a range of wetland (re-)creation projects are reviewed. They include small projects conducted by single organisations to very large partnership projects. Most are in East Anglia but outside Broadland. One is from Denmark. Lessons learned from these projects are drawn together to feed into the model.

Then, two theoretical approaches are examined; the Ecosystems Approach (and as subsequently amended to the Ecosystems Services Approach) and Socio-Economic Impact Assessments. Both have very significant benefits for conservation planners, although technical aspects are sometimes rather opaque and the domain of non-ecological specialists.

It is not the purpose of this report to provide comprehensive information on these approaches. They are very active and growing areas of research, for which this region is a major centre. The reader is directed to sources and centres of research should more depth be required. The purpose of this report is to draw out those aspects which have practical application to wetland projects.

Lastly, using the foregoing information, a model for the planning and implementation of large scale wetland projects is developed. While the model could be used for any wetland project, it is intended to be flexible and to be adapted to the needs of the particular site and its stakeholder community.

In fact, the model is applicable to any large scale biodiversity project or one which involves landscape change on a large scale.
2. WETLAND CREATION CASE STUDIES

2.1 Gathering the Case Studies

A large number of wetland restoration projects, here and abroad, have been completed in the last ten years and much experience accumulated. In order to gather the lessons learned from that experience, a number of case studies (see Appendix 1) were compiled from around the UK and abroad.

The case studies describe how the projects arose, how they were implemented and what the outcomes were. This provides the context for the “lessons learned”. In many instances it was difficult to garner hard facts about the projects as development files had been archived, site officers moved on or because memory fades surprisingly rapidly. However, a number of recurring themes emerged and these will be used to inform the development of a wetland restoration model later in this report.

2.2 Conclusions

The following appear to be key issues that need to be addressed in any large scale wetland programme. Some will be familiar to experienced wetland managers, others perhaps less so:

1. The project needs a strong, simple vision which can be easily communicated at all levels. This should include social and economic benefits as well as environmental ones.

2. Acquiring the land is a key stage which can be highly unpredictable. Agricultural economics and land prices can change very rapidly, across the time span of project development or less. The deal is not done until the ink is dry, as landowners can withdraw even at the last minute. The decision whether or not to sell may not simply be an economic one; landowners may have emotional or legacy interests in their land.

3. Permissions are a key issue. One function of a large organisation may be supportive but another equally important function may not. It cannot be assumed that they talk to each other. Considerable investment in time and fees may be needed to satisfy regulators on even the most straightforward projects. Most projects need some adjustment; this can be minor or can result in significant compromise. In some instances, not included in the case studies, it can halt a project entirely.

4. Building support among the whole range of stakeholders, from regulators, through to local authorities and to local communities, is absolutely crucial. Support for biodiversity projects is not universal, and not everyone loves wildlife. Detractors, who may be articulate and well-connected may affect progress in all aspects of the project, and can do so without using facts or objective arguments. Being a rich and powerful organisation rarely helps. Building a broad base of support is increasingly a requirement of funders.
5. The public relations work and consultation required in order to build support is time consuming, expensive and painstaking. It can rarely be short-cut. However, in the long run it is well worth the investment.

6. High level political support, from Government level to local authority, is vital for larger projects. Building such support may require engagement by all levels of the hierarchy of the sponsoring partners and organisations.

7. Partnerships of organisations tend to work better than single project sponsors. Partnerships bring a broader range of experience, are important in developing stakeholder support and can widen funding opportunities. Partnerships, however, can be time consuming to manage, lack clear direction and involve compromise in objectives or outputs.

8. Sufficient site technical work is essential to produce a sound restoration plan. It will also be needed to satisfy regulators. Money invested at this stage is well worth while in producing optimal design plans that get best value for money from the capital investment.

9. A considerable degree of tenacity is required, combined with a good understanding of technical issues, partnership working and the planning and institutional framework. The project manager is crucial in bringing these qualities to a project.

More minor lessons include:

10. Don’t be tempted to skimp on management infrastructure. Implement the most robust scheme possible and never under-specify or use cheap materials. Revenue costs will be higher in the long run.

11. Bear in mind long-term sustainable management including access for machinery and grazing options. It is worth a higher capital outlay to reduce onward maintenance costs or to make management more efficient.

12. Good contractors, especially for the ground works or any more challenging aspects, are vital. It is not always cost-effective to take the cheapest tender.

13. Linking of wildlife sites is a key strategy for a project’s success, both in terms of biodiversity benefits and in building support.
3. THE VALUE OF THE ECOSYSTEMS APPROACH AND SOCIO-ECONOMIC IMPACT ASSESSMENTS TO WETLAND CREATION PROJECTS

3.1 A Critical Contribution to Large Wetland Projects

The previous section identifies the importance of broad stakeholder engagement and of emphasising the wider, non-biodiversity benefits to the stakeholder community. This section describes two frameworks which are increasingly used in landscape planning and which can make significant contributions to the project goals.

The Ecosystems Approach takes a holistic view of how ecosystems function, broadening the focus from individual habitats and species and incorporating the notion of ecosystem services.

Socio-economic impact assessments evaluate the non-biodiversity benefits of a project to society, focusing on key indicators such as monetary value, employment and social benefits. The following provides an overview of these two approaches, supported by case studies (Appendix 2), and concludes with a summary of the flaws and the benefits they have for wetland projects.

3.2 The Ecosystems Approach and Ecosystems Services

The principles of an ecosystem approach were first outlined by the Convention for Biological Diversity in 2000. The approach has been widely advocated as a means of achieving the goals of sustainable development and managing environmental systems. Other approaches to achieving sustainable land use have been used such as the “Quality of Life Assessment”\(^1\) which is “a sustainability appraisal tool for maximising and integrating environmental, economic and social benefits as part of any land use or management decision”, but such approaches have not been so widely adopted.

The following definition of the ecosystem approach was developed by Maltby in 2000 and is now widely accepted (quoted in Haines-Young and Potschin 2007):

“A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way, and which recognises that people with their cultural and varied social needs, are an integral part of ecosystems.”

The approach became embedded in conservation practice as part of the Convention for Biological Diversity in May 2000 which developed twelve broad principles for its application. Contained in Appendix 3, they attempt to set biodiversity management within a broader context than conservation practitioners have traditionally adopted. They make clear that large areas managed through this approach would require partnership working and a wide degree of stakeholder buy-in. The management of sites with closely drawn

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\(^1\) [www.countryside.gov.uk/LAR/archive/Quality/toolkit.asp](http://www.countryside.gov.uk/LAR/archive/Quality/toolkit.asp)
boundaries and for single objectives does not sit well with the ecosystem approach and requires a potentially uncomfortable shift in thinking for conservationists.

The application of the Ecosystem Approach may be difficult in practice because of the need to satisfy multiple objectives at the same time, although this may also be seen as a major strength. The three major objectives of nature conservation, sustainable use and benefit-sharing are frequently the remit of different departments and organisations in government. Non-governmental organisations are also constrained by their own objectives and structures, which limit their flexibility. The need for partnership working and cross-stakeholder support is clearly central to success.

An example where this has been put into practice, illustrating the benefits and difficulties of the approach, is the West Country Rivers Trust project. The project involved advisors working with landowners in 10 river catchments to produce “Integrated River Basin Resource Management Plans”. These offered win-win solutions to landowners that would achieve both environmental improvements and contribute to wider social and ecological objectives. The following aspects of the project reflect the ecosystems approach:

- The project is based upon the premise of improving the environmental quality of entire catchments, focussing on reducing diffuse pollution through a variety of measures including reduced fertiliser use, reduced soil erosion and reduced pollution from animal waste.
- The catchment scale is appropriate when considering the impacts of pollution and wetland ecosystem functioning, and a farm-scale approach is relevant to individual land owners.
- The project was closely in touch with grass roots concerns and engaging stakeholders on a voluntary basis.
- Changes to management practices were undertaken by individual landowners. The plans worked up for the benefit of the landowners were neither prescriptive nor implemented by regulatory authorities.
- The economic benefit to the landowners (an average of £1369 per farm per year) was the principal motivating factor for the environmental improvements that were implemented.

Another difficulty with applying the approach is in selecting the appropriate temporal and spatial scale of an ecosystem, which is left necessarily flexible in the principles of the CBD (Appendix 3). Often a practical approach wins, as in the West Country Rivers project, as ecosystems are indivisibly linked to the global ecosystem. However, the general principle of “the bigger the better” is now firmly embedded in the large areas concept adopted by conservation organisations.

Both the definition and the principles of the ecosystem approach have been adapted to suit various requirements. For instance, the terms “ecosystem-based approach”, “ecosystem management” and “ecosystem-based management” have all been used when the general guiding principles are broadly followed, but the wording of the actual principles adopted are changed to suit the desired outcome. The term “ecosystem services approach” is now widely used and reflects the emphasis on the output of ecosystem goods and services.
The Millennium Ecosystem Assessment\(^2\) provides an international perspective of the issues surrounding the consequences of ecosystem change for human well-being and brings together the work of more than 1360 experts from around the world from 2001 to 2005. The framework for categorising ecosystem services developed as part of this work is widely accepted. They are defined as:

“the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other nonmaterial benefits”.

In the case of wetlands, provisioning services include food (e.g. fish, wild game, fruits and grains), fresh water, fibre and fuel (e.g. peat), a source of medicines and genetic material.

Regulating services include climate moderation. They act as both a source and sink for greenhouse gases; they influence local and regional temperature, precipitation and other climatic processes. Other regulation services include water purification and waste treatment, natural hazard regulation in the form of flood control and storm protection and pollination.

Cultural services are spiritual and inspirational, recreational, aesthetic and educational.

At a national level, English Nature (now part of Natural England) published “Revealing the Value of Nature”\(^3\) in 2002 which summarised what goods and services ecosystems provide and gives examples of where these provide actual economic benefits. Defra commissioned a position paper\(^4\) that attempts to clarify terminology, review the approach and outline its strengths and weaknesses, and consider how the approach can be used to make an audit of terrestrial ecosystems and therefore help sustain them in the future. Defra have also produced an introductory guide to valuing ecosystem services\(^5\)

More locally, UEA is developing as a strong centre of expertise in this area. Tiziana Luisetti has applied the ecosystems services approach to the Norfolk Broads generally and to lake restoration specifically. She is working on developing a framework to identify the service benefits offered by the Broads wetland.

### 3.3 Socio-Economic Valuations and Impact Assessments

Assigning monetary value to the benefits that accrue from biodiversity and landscape projects is important in building a case for those projects, and for levering funding. The

\(^2\) [www.millenniumassessment.org](http://www.millenniumassessment.org)


\(^4\) [www.ecosystemservices.org.uk](http://www.ecosystemservices.org.uk)

The advantage of adopting an ecosystem services approach is that this can help to clarify what constitutes an ecosystem. However, the economic valuation of ecosystem services is far from perfect and relies upon various assumptions including the monetary value an individual would place on ecosystem goods and services. Another shortcoming of this methodology is that valuations of ecosystem goods and services are assessed at a local level, but there may be benefits to the wider community at a national or even international scale. A more fundamental issue is that there are currently no definitive guides as to how to distinguish between ecosystem goods and services or even defining what an ecosystem service is with sufficient precision to allow such services to be subject to socio-economic analysis.

Socio-economic Impact Assessments, which include cost-benefit analyses, are a group of methodologies which assess the value of a scheme to society. They take into account actual economic costs and benefits but also assign monetary values to non-market societal benefits. This allows both market and non-market costs and benefits to be evaluated on a like-for-like basis.

They can produce some surprising results which provide significant support for either conserving existing sites or making a case for their restoration, and can indicate that wild habitat is economically more favourable than competing land uses. For instance, an evaluation of different land uses for some marshes in Canada showed wetland to be economically the best option (Various, 2005). Three marsh types were considered in the study. The economic and social value of drainage and conversion to agriculture was compared to that of leaving the marshes intact. The net value was $5,800 per hectare when the marshes were left intact on account of the social benefits of sustainable hunting, angling and trapping, which were considerably higher than the value of $2,400 per hectare (excluding subsidies) when wetlands are drained and converted to agriculture.

Societal benefits can be broken down into several categories, but ultimately they are all sub-sets of ecosystem services. This fundamental way of viewing wetlands underpins any economic or social analysis.

Economic valuation methods for the above can be divided into direct methods and indirect methods:

The Contingent Valuation Method is a **direct** valuation technique that is often used and is based on the results of questionnaires which determine how much people would (theoretically) be willing to pay for the preservation or production of a non-market asset.

The Travel Cost method and the Hedonic Pricing method are examples of **indirect methods** that are commonly used to estimate economic values of environmental assets. The Travel Cost method uses differences in the costs of visitors travelling to a site as a basis for assessing the demand for that site. The basis of the Hedonic Pricing method is that environmental characteristics (e.g. beauty of the landscape, proximity to recreational facilities) affect the valuation of residential property.

The results of cost-benefit analyses vary according to the social discount rates that are applied to the calculation. Social discounting is a means of converting future costs and benefits into present day values, so that future costs and benefits can be compared to
today’s values on a like-for-like basis. It takes account of benefits and costs being worth more if they are experienced sooner. In the UK, the government has advised that a rate of 3.5% should apply for public sector projects, but this may vary in the private sector. The higher the rate applied, the lower is the importance placed on future costs and benefits.

For instance, when the cost-benefit of the Skjern River restoration was undertaken (see case study in Appendix I), three increasing discount rates were used (Table 1). The lowest rate (and the one closest to the UK Government recommendation) produces a very good cost-benefit result and one which would be strongly supportive of the scheme. It places a high priority on the future costs and benefits arising from the scheme. As these are essentially positive, it provides a very good advocacy tool for the project.

Table 1: Cost Benefit Results for the Skjern River Restoration, Denmark.
(reproduced from Dubgaard, A., 2003)

<table>
<thead>
<tr>
<th>Social Discount Rate</th>
<th>3%</th>
<th>5%</th>
<th>7%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COSTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project costs</td>
<td>143.7</td>
<td>143.0</td>
<td>142.2</td>
</tr>
<tr>
<td>Operation and mainte</td>
<td>17.0</td>
<td>14.9</td>
<td>14.7</td>
</tr>
<tr>
<td>Foregone land rent</td>
<td>75.8</td>
<td>52.5</td>
<td>41.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>236.5</td>
<td>210.4</td>
<td>198.2</td>
</tr>
<tr>
<td><strong>BENEFITS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saved pumping costs</td>
<td>12.1</td>
<td>7.4</td>
<td>5.4</td>
</tr>
<tr>
<td>Better land allocation</td>
<td>29.7</td>
<td>19.4</td>
<td>15.2</td>
</tr>
<tr>
<td>Miscellaneous cost savings</td>
<td>5.0</td>
<td>2.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Reed production</td>
<td>10.1</td>
<td>5.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Reduction of nitrogen and phosphorus</td>
<td>56.7</td>
<td>34.0</td>
<td>24.3</td>
</tr>
<tr>
<td>Reduction of ochre</td>
<td>40.5</td>
<td>27.0</td>
<td>21.3</td>
</tr>
<tr>
<td>Improved hunting opportunities</td>
<td>15.3</td>
<td>9.0</td>
<td>6.3</td>
</tr>
<tr>
<td>Improved fishing opportunities</td>
<td>89.0</td>
<td>52.4</td>
<td>36.7</td>
</tr>
<tr>
<td>Outdoor recreation</td>
<td>120.1</td>
<td>70.7</td>
<td>49.6</td>
</tr>
<tr>
<td>Non-use value of biodiversity</td>
<td>85.9</td>
<td>50.6</td>
<td>35.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>464.2</td>
<td>277.6</td>
<td>198.6</td>
</tr>
<tr>
<td><strong>Net present value</strong></td>
<td>228</td>
<td>67</td>
<td>-1</td>
</tr>
</tbody>
</table>

Note that the value attributed to biodiversity was relatively small and that most of the benefit was valued on ecosystem services of one sort or another. Were the benefits purely biodiversity, the project would not be economically worthwhile.

There are a large number of aspects of cost-benefit analysis that are uncertain or are prone to subjectivity or variability over time. The outcomes should therefore not be regarded as definitive, but rather a useful tool for comparing different schemes.

The Environment Agency uses cost-benefit analyses on a wide variety of schemes and has developed "benefits assessment guidance" (BAG) to assist in assessing environmental

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benefits. The BAG assesses the benefits and drawbacks of, among other things, the impacts upon groundwater, river ecosystems, freshwater fisheries, habitats, bathing waters and shellfish waters.

Cost-benefit is a burgeoning area of research interest (not least, again, at UEA) with a rich and expanding literature which cannot be fully reviewed here. See for instance English Nature (2002), Broom et al (1999), Turner et al (2001) for reviews. In Appendix 2, case studies of evaluations of real wildlife restoration projects are used to illustrate the practical difficulties and benefits of such studies, and describe how useful they can be when planning a restoration project. These case studies, and the foregoing discussion, show that the whole subject of socio-economic valuation is highly technical, extremely complex and largely the arena of high-level economics. These are not subject areas that ecologists and conservation planners are used to dealing with or feel comfortable adopting. However, as the case studies make clear, they are increasingly a part of the decision making process and are often required by the institutions with which conservation must work. The ecosystem services approach, and the success of large areas for conservation, may increasingly depend on successful engagement with this subject matter.

3.4 Conclusion: The Flaws and Benefits of Adopting the Two Approaches

The outline above and the case studies in Appendix 2 both indicate the great difficulty in attempting to put a value on the benefit accruing from biodiversity projects and from ecosystem services. There is no generally accepted methodology that can be applied to diverse projects in varying geographical areas and socio-economic contexts. Experience from previous studies is difficult to transfer, and consequently the results are always arguable.

However, it is clear that the case for spending the large sums of public money required to restore significant habitat areas always benefits from an economic and social justification. The case studies in Appendix 2, and the other studies that they review, all suggest the economic case for environmental investment is very positive, with benefits far outstripping investment costs. A strong economic case may sway those with no particular interest in wildlife, and may be important in building political and community support.

An understanding of these approaches has the following benefits for conservation planners:

- The focus moves from single-interest concerns (wildlife, bitterns, groundwater-fed fens) which are often not appreciated or understood by non-specialists with whom they need to engage.
- They force conservation planners to consider wider needs and benefits of their projects.
- They encourage holistic thinking and provide a greater focus on sustainability - environmental, social and economic.
- They emphasise benefits which will be valued by the broader stakeholder community.
- They assist the building and sustaining of partnerships, because a broad range of organisations appreciate they now have a role and can benefit from the project.
- The broader, partnership approach is more attractive to funders.
In short, these approaches are at the core of the best and most successful large scale wetland projects described in Appendix 1. However, there are technical issues with their application, especially socio-economic analyses. Conservation planners rarely feel comfortable with the language and disciplines involved, and consequently there are cultural barriers to engagement with them.
4. A MODEL FOR DEVELOPING A WETLAND (RE-)CREATION PROJECT

Figure 1 summarises a model for large scale wetland conservation projects, although the general model can be applied to almost any large scale biodiversity or landscape scheme. There are a number of key stages.

**Concept.** Most wetland projects arise from broad discussions or ideas within a single organisation or group of organisations who regularly discuss common issues. Biodiversity partnerships, and the move towards developing ecological networks, have both given this process a boost, but increasingly individual organisations are developing their own large-scale ideas.

**Vision:** The broad concept needs to be developed into a Vision. The vision is a summary of what the organisation aims to achieve. It should be worded simply and should convey a sense of excitement. It is, first and foremost, a tool for advocacy. It needs to sell the idea to those inside the lead organisations (an audience often forgotten), and to funders and stakeholders.

**Evaluation.** The vision should then be evaluated as to how it can be delivered. The simplest and most efficient route should be selected. In certain situations direct implementation is often the most effective route: for example if the scheme is small-scale, with impacts that are contained within the project land and affecting few or no stakeholders and if the plans are not controversial and if there is an organisation with the resources and desire to undertake the project, then. An example of this approach successfully applied would be the Hen Reedbeds (see Appendix 1).

However, few projects are so simple. Large scale land use change usually requires a broader group of participating organisations and individuals. In such circumstances, single organisations trying to drive through a project usually leads to failure and a partnership approach is often required.

**Building the Partnership.** Building the right partnership is a crucial step. It first requires advocacy – selling the Vision – to obtain initial support. This is the most important first step, as it is probably the first time the Vision has been presented in a place where positive reception is not guaranteed: outside of the “conservation family”. Advocacy may of course involve some leverage on a reluctant partner if past or current failure in delivery of a core duty has been the *raison d’être* for the project. The initial partnership-building must include all the landowners directly affected, as an unwilling landowner can stop a project in its tracks. The Partnership is also the main source of initial funding for project development, which can be expensive.

**Initial Technical Development.** Before a project can progress further, some technical work is essential. It must be demonstrated that the project is feasible, in terms of site hydrology, wildlife outcomes, practicality and impacts on non-participating landowners and stakeholders. It is at this stage that regulators will need to be satisfied that the plans conform to policies, laws and procedures. Securing permissions is one of the most unpredictable stages within a wetland development project and it has been found almost impossible to second-guess the position of
Figure 1: Diagram Showing Idealised Critical Path For Project Development

CONCEPT
- evolves

VISION
- developed

EVALUATION
1. Can it be undertaken by a single organisation?
   - NO
   - Is the land ownership straightforward?
     - YES

BUILD PARTNERSHIP
- Advocacy of Vision
- Building commitment
- Landowner liaison

INITIAL TECHNICAL DEVELOPMENT
- Scope what is already known about the project area
- Scope what is required for (a) development of the project, (b) to secure permissions
  - Commission studies and development work arising from scoping
  - Undertake stakeholder analysis and develop consultation strategy
  - Produce initial designs, advocacy documents and consultation materials

FIRST CONSULTATION
- Initial consultation with stakeholders
  - Initial view of regulators
  - Initial contacts with funders

PROJECT REVIEW
- Review of public consultation
- Review of feedback from regulators
- Review membership of partnership - are additional partners required?
  - Is the review outcome positive?
    - YES
    - NO
    - More than one fundamental issue needs to be addressed
      - Return to initial technical development
        - Vision and overall principles need to be revisited
      - Limited aspects may go to full technical design to maintain project momentum

PARTIALLY
- Most aspects have positive outcome
- Some key aspects rejected and need to return to initial technical development
  - Yes in all main aspects
    - need to be revisited

FULL TECHNICAL DESIGN
- Detailed engineering, ecological and hydrological designs
  - Budgets fully developed with high cost certainty

FORMAL PERMISIONS
- Formal permission applied for with full technical information?
  - Permission secured?
    - NO
    - Obtain feedback from regulators
      - Revisit full technical design as required
    - YES

IMPLEMENTATION
the regulators. The way that a regulation is interpreted can vary between regions and offices of an organisation, and particularly between officers. It is never sufficient to accept the interpretation of a “friendly” function or officer when they are referring to another officer or function. Obtain the view directly from the officer who will make the decision. It is essential that early consultations are held so that the project knows what information must be collected before plans are acceptable to regulators. The process is made much simpler if the regulators are supportive members of the project Partnership.

Also key in the development phase is assessing the necessity for socio-economic analyses and the adoption of the Ecosystem Approach. These methodologies have much to offer as described above, but they can be expensive and time consuming to develop. They are most appropriate for larger, multi-objective projects requiring a broad base of stakeholder support.

An essential step of this phase is to analyse the stakeholder community. There are many methodologies for a Stakeholder Analysis. The essential steps are to:

- Identify who the principal stakeholders are.
- Identify how they can affect the project, and how the project affects them.
- Identify what their role in the project would be.
- Identify how the project should best communicate with that group.

In a society like ours, almost everyone is a stakeholder. The Analysis is designed to identify the critical stakeholders who can most affect the outcome of the project, and to identify how best to engage with that group.

The Stakeholder Analysis should then lead to a Consultation Strategy, which could be as simple as a few sides of A4, as long as it lays out clearly how the project will consult the key stakeholder groups and encourage their support.

The culmination of the Technical Development phase is the production of a package of materials which includes the initial designs, advocacy documents and public consultation materials. It may be wasteful of resources to go to a full technical design at this stage as outline proposals must first be costed, agreements secured and permissions granted. Outline proposals may be sufficient at this stage although advice from regulators will be important to determine the right level of development.

Note that very large and complex projects may need to break down the scheme into manageable portions. The cost and difficulty of designing a wetland re-creation programme for huge areas (such as the Wicken Vision area or the Great Fen) precludes design of the whole vision area. In any case, neither the funding nor the land is likely to come on-stream for the whole area at once. Individual blocks may need to be considered separately, under an overall Vision umbrella, with the blocks progressively joined up as circumstances allow.

**First Consultation.** This is an essential, consensus-building phase when firm plans are first run past stakeholders and regulators. It is at this stage that the majority of issues should emerge, and where the value of good preparation and solid partnership working shows. The Consultation Strategy is implemented and the
results digested by the Partnership. Initial feedback from regulators is received. At this point, initial contact with funders is made to gain support for the project, identify which elements are eligible and how applications should be formulated.

**Project Review.** In this phase, the Partnership takes stock of the project, including the results of the stakeholder consultations. Three outcomes are likely:

- **Project Supported.** The project has the green light in all of the key areas from the stakeholder community and from regulators. In this rare category, usually involving smaller projects with minimal wider impacts, the project can proceed to full detailed design and implementation. Any outstanding issues can be dealt with at the final stages.

- **Partial Support:** The Vision is supported in principle but there are significant areas of concern in the outline design which need to be addressed before the project can progress. The concerns are not so fundamental that the underlying concepts need to be revisited. This outcome requires a return to Initial Technical Development to address issues raised by regulators and may require additional communication with stakeholders to improve their understanding of the scheme. Most schemes of significant size probably fall into this category. It may be possible to take some aspects through to full technical design if maintaining project momentum is important.

- **Fundamental Rejection.** In this rare outcome, the first public phase has highlighted fundamental flaws in the project which go beyond technical adjustment. It requires the project concept to be wholly revised. The Vision either needs to be amended or at least reformulated and the technical aspects redeveloped, in what is essentially a return to the drawing board. This is a fundamental test of the partnership’s resolve. Weaker projects may not recover from this; those with a genuinely strong Vision will re-emerge, often strengthened by the re-evaluation an initial rejection forces. The project returns to the early stages of Figure 1.

**Broad Consensus Achieved.** Once the outline proposals have agreement across the broad range of Stakeholders and regulators, the project can progress to full detailed design, hopefully with a high level of certainty that the main issues have now been ironed out. With complex projects, the partnership should be prepared for more than one iteration of the design process.

**Full Technical Design**

The Plans can be worked up to full specification suitable for detailed budgets with low risk to be developed. Plans should also be sufficiently detailed to allow formal submission of permissions applications. Two outcomes are likely:

- The Scheme is agreed. The permissions and budgets are secured and the project can go forward to implementation.

- The Scheme is not agreed. Assuming the technical work is to the required standard, projects can fail at this stage because a regulator has a change of priority, the guidance on interpretation of the legislation may change, or the legislation itself may change. Other late issues include statutory consultation bringing forward new...
objections, funders changing priorities or available resources, or landowners making new demands or withdrawing from the scheme. Mostly, by this stage, problems can be resolved by tweaking the designs.

**A Final Note of Caution.** A key lesson from reviewing the case studies and from discussions with project managers is to expect the unexpected. Issues and objectors can emerge seemingly from nowhere, regulators may take what appears to be an unreasonably harsh stance, stakeholders may push the project in unexpected directions, and the results of technical appraisals may not deliver the project the Partnership first anticipated. The key to navigating the project through these sometimes stormy waters is a combination of flexibility, level-headed thinking and sheer bloody-minded dogged persistence.
5. REFERENCES


Appendix 1: Case Studies of Wetland Projects

Wetland Creation Projects: Hen Reedbeds

**Project name:** The Hen Reedbeds

**Location**
Rivers Hen and Wang, near Southwold, Suffolk. TM470 770

**Contact**
Dorothy Casey, Alan Miller
dorothy.casey@suffolkwildlifetrust.org
alan.miller@suffolkwildlifetrust.org

**Lead and other partners**
Suffolk Wildlife Trust. Part of the Bittern Life partnership.

**Size of area**
55 ha

**Budget if known**
c. £600,000 in 1997

**Key dates**
1997-2000

**Project Objectives**

1. To create wet reedbed habitat as part of the programme to rescue bitterns as a breeding bird in the UK.
2. To provide additional coastal wetland habitats to compensate for likely coastal retreat.
3. To extend SWT’s Norman Gwatkin Reserve and create a viable-sized wetland.
4. To provide an improved visitor experience.

**Project Preparation.**

RSPB were co-ordinating a nationwide programme of reedbed creation and restoration projects, and were scoping possible partner projects to submit a joint application to the EU LIFE funding programme. The volunteer team at the Norman Gwatkin reserve suggested the marshes surrounding the reserve would be suitable. SWT were also looking at ways to make individual sites such as NG more viable and to expand the coastal reserves. The two land owners originally involved were amenable to a sale or lease. Feasibility work funded through the RSPB showed the site to be viable and the project went to forward to design and budgeting, entering the programme at £600K.

The project was co-funded by LIFE and the Heritage Lottery Fund. Most of the project area was acquired from a single landowner, a process which was relatively straightforward. The original plan was for a much bigger reedbed involving land within
the Henham Estate which the Trust had provisionally agreed to lease. However, the river valley land was within the Estate was part of a Repton landscape. Suffolk County Council landscape team objected to the proposal as they did not feel reedbed was appropriate to the landscape character of the river valley. They also objected to some of the scrub removal proposals and to the bunding work that would be required. Inclusion of Henham land had to be dropped. The remaining part of the site was the Trust’s core reserve.

Permissions were not straightforward. SCC objected to some of the proposals outside of the Henham Estate on landscape grounds but these were resolved through minor compromises. Land drainage consent was eventually agreed when potential concerns over flooding, including of the Henham estate marshes, were resolved. It was originally hoped to impound the River Wang to flood the marshes but removing the Henham Estate land and flood risk concerns meant this would not be possible. This meant the separate marsh areas had to be hydrologically separated. Because of the need to raise water levels to 15cm above ground level, bunding was required which rather absurdly came under the ambit of the Reservoirs Act as the total volume stored exceeded the 25,000m$^3$ threshold. This was simple but expensive. Negotiations surrounding the Henham estate, land drainage consent and planning caused significant delay and compromise in the design although a viable proposal was agreed.

The project was initially planned by SWT Reserves staff and volunteers. The latter, who had been wardening the reserve for more than 15 years, were instrumental in the conception, design and management of the project.

Project Implementation

The implementation was project managed by the former Trust Reserves Manager on a freelance basis, working to a small project team of Trust staff and volunteers. The bunds, sluices and hydrological infrastructure were all designed by external engineering consultants because of the need to obtain Reservoir Act license. The main works contract was let to Lancaster Earthworks. They were exemplary in terms of problem solving, ensuring completion to time and by developing a very good working method.

One of the main issues during implementation was that material to build the bunds had to be sourced in-situ because of the cost of importing material. There was relatively little clay in the marshes and what existed was of poor quality. The bunds were made of very mixed materials including peat; were difficult to work especially in the wet site conditions and were subject to settlement. Consequently significant leakage and maintenance was to be expected, providing a significant revenue cost to the Trust. This was unavoidable.

A second issue was hydrological management. Because the marsh units could not be managed as one, water transfer pipes were engineered between the units. Levelling suggested the units were either at the same level or had small but favourable gradients. The transfers were therefore susceptible to low flow rates and siltation and it is
uncertain how effective they will be in the long term. Because of summer water deficits the reedbeds are likely to require supplementary water, so the pipework may be important for maintaining the required levels.

**Completion**

Despite poor weather and difficult ground conditions, the project as a whole was completed to time and with a very small underspend, and with no significant changes to the design.

Reedbed was very quickly established and bitterns bred in the second summer following completion. The project demonstrates the very rapid response this type of wetland has to creation works.

If building a bunded site again the Trust would prefer the tops of the bunds to be a minimum of 4m wide to enable machinery to run on top. This would enable bund repairs to be undertaken easily and easier vegetation control. Bramble has been a big problem, given that the bunds are subject to an annual inspection under the Reservoirs Act. Invading willow has also been an issue. Making the bunds wider would also have solved the problem of disposing of excess soils from the excavations, which limited the extent of open water.

The jointed plastic twin wall piping used for sluice/over flow pipes has not been effective, since the walls part over time as the ground subsides. Steel pipes with a board sluice chamber would have been preferable and would also help with eel transfer.

The use of internal bunding on the Wolsey Creek compartment has proved its worth in keeping out salt water when the brackish river overtops its banks. Ninety percent has been discharged via the soke dyke without entering the wetland.

Long term management is mainly via grazing and keeping high water levels to reduce the litter build up. Pony grazing using koniks has worked very well but stocking densities during the winter are critical. Currently the Trust is using four ponies, five is probably optimum and six definitely too many. If using livestock, it is vital to have some adjacent land to put them on if grazing pressure becomes too much. This exists for some but not all of the units within the wetland. The Trust would like to add some cattle to balance the pony grazing. The current grazing regime is to put the ponies on Wolsey Creek from May – Oct and the rest of the year on the Wang Marsh.

The intention with regard to cutting is to hire in a contractor for 1-2 days in later years who will use an amphibious cutter/buck rake. The RSPB have used the same for the past four years at Minsmere and found them to be very cost effective.

The long term issues are less certain. The maintenance of the water transfers and the integrity of the bunds may be problematic although both can be resolved through ensuring a suitable revenue budget. Management of the reserve should be sustainable
through a combination of grazing and mowing. Determining the optimum grazing for bitterns (which should maintain an open reedbed with areas of sparse reed near to the water margins) will be challenging but is critical as the Trust would not wish to commit resources to annual management.

The most important threat to the site, especially areas seaward of the A1095, is sea level rise and the maintenance of the coastal defences. It was always known in the long-term that this area would probably be lost, but that inland sites would by then have been developed. However, it is possible that the timescale for this may be shortened with EA considering the future of all the flood defences on the Blyth Estuary.

**Degree to which the project met its objectives**

The scheme as a whole could not go forward because key land on the Henham Estate was withdrawn.

For the main area of the site, all of the objectives were fully met. Bittern, marsh harrier, bearded tit and a wide range of reedbed and wetland birds now breed regularly. Otters and water vole are also beneficiaries.

There remains an issue over whether the hydrological and reed management, key to ensuring the original objectives, can be sustained in the long term without significant revenue cost.

**Lessons Learned**

- Despite the verbal assurances of the owners, no land is secured until the deed is signed. Securing the land is one of the most difficult and unpredictable aspects of any project.
- Securing permissions is also unpredictable, requires a lot of information to satisfy regulators and can take a great deal of time. An iterative process of consultation and design, further discussions and refinement, is usually required, as is considerable flexibility and compromise.
- No site is ideal and the essence of the design is to make the best of what is available.
- Good ground works contractors with experience of this kind of work are essential for the implementation.
- More attention to detail in the design of some of the infrastructure would be helpful for long term maintenance. It is more cost effective to spend more at this stage on more expensive materials and designs than to cut costs and have to undertake repairs later on.
- Design and implementation of the capital works is only the start of the project; long term success depends on the sustainability and revenue funding of maintenance management.
• Site set-up should take more account of the needs of machinery access to reduce the maintenance burden. Post-project management requires constant fine tuning especially in the management of grazing animals.
Wetland Creation Projects: Great Fen

Project name: The Great Fen

Location: South-east of Peterborough, Cambridgeshire


Size of area: c.3700 ha
1500 ha in first phase

Budget if known: c. £15 million for 1st phase

Key dates: 2001-present

Project Objectives

The project has a first phase which is the re-establishment of around 1500ha in the northern part of the project area, centred on the two National Nature Reserves. The objectives for the first phase are:

1. Safeguard Holme Fen and Woodwalton Fen NNRs by restoring their hydrological integrity.
2. Restore a rich mosaic of wetland habitats on 1500ha of drained former fenland.
3. Create opportunities for engaging local people with their Fenland wetland heritage.

The next phase which will address the central and southern areas will have broadly similar objectives although there will not be the focus on the NNRs.

Project Preparation.

Wetland habitats have been lost at an alarming rate in the Fen basin, leaving only remnants such as the two NNRs. The deep drainage of the farmland strongly affected the hydrological and therefore ecological integrity of the NNRs such that “island site” management was of questionable long term viability. The increasing understanding of these specific site-based issues, plus the increasing pressure toward developing large areas for conservation, generated a vision to link the two NNRs and develop the largest wetland restoration project in the UK.
Feasibility studies were commissioned and demonstrated that wetland restoration was still viable. The initial studies also combined hydrological and topographical data to produce an outline plan of the habitats that would be created should the project succeed.

The main issues subsequently were to obtain the land and the funding. A smaller area (83ha, Darlow’s Farm) adjacent to Woodwalton Fen was purchased with funding from Heritage Lottery Fund, and the much larger Middle Farm (183ha) purchased later, again with funding from Communities & Local Government and Grantscape. The rest of the main vision area was locked into two ownerships; the Holmewood Estate (1317 ha) owned by the Crown Estate and Speechley’s Farm (134 ha) in private hands. Both agreed a sale at the planning stage.
The Trust applied to HLF for 60% matched funding, £8.9 million, which was awarded. The remaining matched funding was raised from other sources. To raise such large sums for a single project in such a short time was a considerable achievement.

During the first year the project plans were developed to an advanced stage, in preparation for the implementation year. This included development of people based projects such as education, community outreach and interpretation.

**Project Implementation**

The project lead has been the Wildlife Trust although the other partners have provided technical support and funding. Because of the NNRs, NE has been a key partner.

The main problem has been that, at the eleventh hour, the owner of Speechley’s Farm has pulled out of the land sale. The reason given is that capital gains tax and the change in farm economics (the steep increase in the value of grain crops) means that a sale is not in their best economic interest. The failure to acquire Speechley’s Farm at this stage will affect the short-medium term restoration potential of land next to Woodwalton Fen because Middle Farm and Darlow’s Farm both share a boundary with Speechley’s Farm. The partners are confident that Speechley’s will be acquired at some point but farm economics may need to change before this can happen.

The Trust is working through the implications of this, identifying ways that the project can be adapted to accommodate the loss of this area. One positive sign is the owner of the land next to Speechley’s Farm has indicated an interested in Higher Level Stewardship (despite commodity prices rising). Should this be successful then the link between Holme Fen and Woodwalton Fen, expected with the restoration of Speechley’s Farm, will be achieved.

It is intended that restoration will take place over a long timescale. As the tenancies become available (there are 13 on the Holmewood Estate) they will undergo restoration work, although the opportunity to restore earlier will be taken if the occupier either wishes to enter the scheme or give up their tenancy. 748ha of the Holmewood Estate is expected to be under restoration by 2012.

**Completion**

The project is still in the planning stage. Only Darlow’s Farm, now owned by Natural England, and Summer Standing, owned by the Wildlife Trust, have begun restoration work.

**Degree to which the project met its objectives**

The project is at too early a stage to have met its objectives.
Lessons Learned

- A strong sense of vision can achieve major results.
- Large land areas and large sums of money can be raised for wetland creation if the project captures the imagination and is well planned and presented. In this case the large size of the project worked in its favour.
- Projects that deliver multiple objectives across the social, economic and environmental spectrum will have more support and open up a wider range of funding sources.
- The political legitimacy of the project has been fundamental to securing support from a range of organisations and individuals. A huge amount of work has been done to secure and maintain support locally and nationally.
- Good PR is worth the investment in money, time and energy.
- Obtaining the land is the key milestone. Nothing is decided until the deed is signed as owners and agricultural economics can be very fickle.
- Linking of existing wildlife sites is a key strategy in the project’s success.
- A strong project partnership provides substantial technical, political and financial resource for the project. It is important for the credibility of any large scale project and helps build momentum.
- There are always Chinese whispers. Be prepared to refute them constantly and reiterate the truth. Always be available for those in the local community that help you. Try and manage positive relationships with those against you – but don’t waste your time on those not prepared to listen.
- A considerable degree of tenacity is required combined with a good understanding of technical issues, partnership working and the planning and institutional framework.
- The strategic approach is vital. Projects of this size have significant implications for land use planning so consultation, and preferably a partnership, with the Local Authority is crucial.
Wetland Creation Projects: Wicken Fen Vision

Project name: The Wicken Fen Vision
Location: Wicken Fen, near Wicken, Cambridgeshire
Lead and other partners: National Trust
Size of area: 5,500 ha
Budget if known: Not determined
Key dates: 1999-2100

Project Objectives

The Strategy for the Vision (National Trust 2007) identifies the following aims:

Aim 1. To greatly expand the space for wildlife and people.
Aim 2. To encourage habitats to develop that allow wildlife to flourish through securing the essential resource of water, protect peat soils from further depletion (thereby retaining carbon) and provide opportunities for flood risk alleviation.
Aim 3. To provide opportunities for visitors and local residents to benefit from access to the Vision area and become involved in our work.
Aim 4. To learn continually from our experience and influence wider policy development at a national and international level.
Aim 5. To ensure a secure financial future for the management of the expanding Nature Reserve.

Note that nature conservation is only one aim, albeit a core one. The approach presented is more closely aligned to ecosystem functions and wider public benefit.

Project Preparation

Wicken Fen is one of the last remnants of ancient Fen basin peat habitats remaining. Like most of the remnants it has suffered from loss of hydrological integrity due to drainage of the surrounding farmland. Increasing awareness of the plight of the fen if it remained an isolated fragment gave rise to the Wicken Vision, which saw the restoration of fenland between the River Cam and the eastern highland, and from Wicken Village to Cambridge City. Such a large area was included in the vision as it was appreciated that significant results would only accumulate if the whole hydrological unit was managed for conservation. The boundaries were largely determined in such a way as to include complete IDB units.
Figure 3: The Vision Area (yellow) with land now in NT ownership (green).

The huge area and nearly 120 landowners involved necessitated a piecemeal approach to acquisition of the land. Since inception, the project has accumulated land within the Vision area such that it now has the freehold on 930ha. Most is in a single block around the old Wicken Fen but there are outlier holdings to the south. The Trust's strategy has been to accumulate land through purchase wherever it comes up for sale within the Vision area.

With a 100 year Vision period, these parcels should be aggregated, coalescing into one large, sustainable wetland. The Trust has resisted attaching specific timescales to specific parcels, advocating a gradual approach.

As each piece of land is acquired, individual restoration plans are drawn up. For large blocks with good hydrological control, these plans can and have been quite comprehensive. Other smaller or more isolated parcels may not undergo extensive works until they become part of a larger, more viable landholding.

It is not possible to obtain consents for the development of the Vision area as a whole, although the Trust has put a lot of effort into establishing consensus and in-principle support from the regulators such as Environment Agency. The Trust has undertaken similar consensus building across the spectrum of decision makers and local communities. Much of the current success may be the Trust’s decision to orient the
project towards a multi-objective, ecosystem function approach. Despite this effort, there has also be significant local opposition due to fears about land drainage and flooding, although much of this appears to have been generated from a small number of articulate but ill-informed objectors. It has so far not compromised restoration work.

Permissions are obtained on a piecemeal basis as restoration proceeds on each parcel. Restoration has gone well and there have been no issues or refusals that have compromised immediate works.

The planning approach taken has avoided being prescriptive about the type of wetland to be developed and where. The overall aim is for all wetland types to be accommodated within the 55km² of the vision area and to allow water levels and topography to determine the distribution of habitats. It is not anticipated that the whole area will become wetland as there is insufficient water within the catchment and some areas, especially those near the high areas on the eastern boundary, have soils and drainage conditions only suitable for chalk grassland or woodland.

Currently there seem to be no impediments to success other than the financial resources of the Trust and the willingness of owners to sell. The latter may have lessened in the last 12 months as conditions for arable agriculture have improved.

**Project Implementation**

The project is still at a very early stage of implementation with small areas complete. Restoration is currently being planned for significant areas of the recently acquired land.

The Trust has undertaken all of the restoration work with the assistance of the Environment Agency who have supplied some funding for technical work.

**Completion**

There is 95 years to go before completion, although the rate of acquisition has been much higher in the early years than is needed to complete the Vision area. Around 15% of the area has been acquired in five years.

It is too early to comment on the prospects for completion. At the current stage there have been no show stoppers or significant compromises to the project.

**Degree to which the project met its objectives**

Although the project is still at an early stage, if the current success continues it will achieve all of its objectives.
Lessons Learned

1. Taking an ecosystem function, multi-objective approach is important to build consensus among stakeholders, and that consensus is important in enabling the project to proceed smoothly.

2. Achieving consensus and addressing issues raised by remaining objectors requires a very high level of resources and is required over a long timescale. Involving local communities at the start of the project and engaging them in such a way that they feel some ownership of the project is important for successful implementation.

3. Adopting a very long timescale and adopting a very large project area allows a piecemeal approach where no piece of land is immediately critical. Any piece of land is almost certain to be available for a reasonable price at some point in the period of the Vision.
Wetland Creation Projects: Lakenheath Fen

Project name: Lakenheath Fen

Location: Between Hockwold and Lakenheath. TL 722864

Lead and other partners: RSPB

Size of area: 298ha

Budget:
- £0.6 million (infrastructure)
- £1 million (land purchase)
- £0.5 million (visitor centre)

Key dates:
- 1996 to 2000: Reedbed and grazing marsh created on 190 ha of arable land.
- 1997: acquired a further 56 ha of land.
- 2007: 2 pairs of common cranes attempted to breed.
- 2007: Visitor centre opened.

Project Objectives:
- To create a wet reedbed for breeding bitterns.

Project Preparation:

Although the fens have been drained for agricultural use since Roman times, it is the increased scale and efficiency of drainage and the intensification of farming practices in recent decades that has led to such dramatic losses of wetland habitats and their associated species. It is estimated that 90% of East Anglian fenland has been lost since 1934. The bittern is strongly associated with reedbeds and the loss of this particular habitat has resulted in a catastrophic decline in the population of bitterns to a low point of just 15-16 booming males in the whole of the UK in 1994. The RSPB has sought opportunities to restore and create reedbed throughout the UK in an effort to reverse the trend of declining bittern numbers and was actively seeking land for acquisition within the fens when the opportunity to buy 242ha of land on peat substrate next to a river arose in 1995. A further 56ha of land was purchased in 1997 when it became available. Historically the land was part of a 3,000 square kilometre wetland. The acquisition process was relatively straightforward, and was funded by a grant from the
Heritage Lottery Fund. The RSPB’s land acquisition strategy is driven by the Biodiversity Action Plan process.

**Project Implementation**

The project was initiated and implemented by the RSPB.

There were a few problems that needed to be addressed before the site could be converted to a wetland:

- The soil is grade 1 agricultural land, and as a consequence has to be retained on site. Water levels therefore had to be raised to above the natural ground level in order to achieve the depths of standing water required to underpin wetland habitat creation. The volume of water needed to achieve this resulted in the Reservoirs Act 1975 being invoked, which requires a safety bank or dam to be constructed in order to prevent water escaping if the internal banks failed.
- Because of the presence of sand lenses amongst the peat substrate, a Seepage Interceptor Drain was installed along the southern boundary to prevent water seeping from the reserve onto adjacent arable land (this was requested by the local Internal Drainage Board).
- The sand lenses were of archaeological interest, which necessitated consulting Suffolk Archaeological Unit.
- Because the site lies close to RAF Lakenheath, there is the potential for bird strikes - the RSPB negotiated with the airbase to find solutions that would minimise bird strikes.

The following were the main costs and sources of funding:

- Infrastructure costs (pools, channels, banks, sluices, pipes): £2,000 per hectare (in 2000).
- Reed seedlings: £4,000 for 300,000 seedlings and cuttings, planted using voluntary help.
- Land purchase: £1 million
- Visitor centre: £0.5 million
- EU Life fund grant for work to encourage bitterns.
- Revenue funding: The day-to-day costs are covered by the RSPB’s central funds.

**Completion**

300ha of reedbed and wet grassland were created on former arable land. The original brief was to cover all of the formerly arable land with reedbed, but 25ha has developed into wet grassland. This is regarded as a positive outcome, adding diversity to the habitats and attracting a greater variety of bird species.
The projected costs of the project were very similar to the actual costs.

**Degree to which it met objectives**

In terms of the original objectives, of creating a wet reedbed for breeding bitterns, the project has met these, as the majority of the project area is now reedbed and a male bittern boomed in 2006 and 2007.

Many other wetland birds have also benefited from the project including the particularly surprising breeding attempts by two pairs of common cranes in 2007. They had last nested in the area 400 years ago.

**Lessons Learned**

The key lessons learned from the project were:

- Having people with a range of expertise involved in the project was very useful – including a hydrologist, an ecologist, an engineer and a regional manager. Having a regional manager involved was especially important to facilitate dealing with the politics.
- Co-operative working is more important and effective than an individualistic approach
**Wetland Creation Projects: Skjern River, Denmark**

<table>
<thead>
<tr>
<th><strong>Project name</strong></th>
<th>Restoration of Skjern River</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
<td>Western Jutland, Denmark. The river drains 2,490 square kilometres of cultivated sandy plains in western Jutland and discharges into the Ringkobing Fjord on the North Sea Coast.</td>
</tr>
<tr>
<td><strong>Contacts</strong></td>
<td>Niels Lisborg, Project Manager, Danish Forest and Nature Agency. <a href="mailto:ndl@sms.dk">ndl@sms.dk</a></td>
</tr>
<tr>
<td><strong>Size of area</strong></td>
<td>Total area: 2200ha</td>
</tr>
<tr>
<td><strong>Budget if known</strong></td>
<td>DKK 283 million (35 million euros)</td>
</tr>
</tbody>
</table>
| **Key dates** | 1987. Danish Parliament decides to restore lower reaches of Skjern River  
1999: Construction work started.  
2002: Construction work completed.  
2006: Area designated as an SPA |

**Project Objectives:**

1. Restore the nutrient retention capacity of the river and its valley.
2. Restore an internationally valuable wetland and promote the fishery.
3. Increase the recreational and tourist values of the project area.
4. Safeguard good water quality.
5. Re-establish a meandering river and naturally high water levels and water level fluctuations.
6. Create grazing marshes, hay meadows and open water on former arable land.
**Project preparation.**

In 1987, the Danish Parliament decided to launch a major strategy to restore marginal agricultural land that was formerly of high conservation value. The Skjern River was chosen as a showpiece of this strategy.

The lower reaches of the Skjern River and the adjacent valley were formerly part of a huge expanse of marshland but the river was straightened and deepened and the adjacent land reclaimed for agriculture in the 1960s. The land was initially productive but became less so over the years and by the 1980s had become a source of pollution as the large amounts of fertilizer needed to support arable crops were washed into the Ringkobing Fjord at the river’s outflow.

A working group and advisory board (with representatives from local and national authorities and NGO’s) were set up to assess the different restoration possibilities and act as advisors to the government. A project proposal and an Environmental Impact Assessment were published in 1997 which were then discussed at a public hearing. Ideas and proposals that came out of the meeting were included in the Parliament Act on the Restoration of the Skjern River, which came into force in July 1997. The objective of the Act was to restore the lower 19km of the Skjern by re-establishing meanders, restoring more natural water levels and fluctuations in the water levels, and creating grassland and re-introducing grazing to about 1600ha of the river valley.

![Figure 4: Location and extent of the Skjern River Project, Denmark](image)

**Project Implementation**

The project was implemented by Denmark’s National Forest and Nature Agency.

Earthworks were started in June 1999 and completed by autumn 2002. They included the excavation of a new river channel, removing dykes that had been created in the 1960s and filling in the straightened section of the river. 2.7 million cubic metres of soil
were moved in total, which cost about 35 million euros (DKK 283 million). DKK 25 million of the costs were provided by EU LIFE funding.

Because the area outside the project area remains as arable land, it was necessary to design the water control infrastructure so that when water levels were raised within the project area, this did not result in flooding adjacent areas.

Populations of pike, cormorants and herons have increased as a result of the project, which has led to increased predation of juvenile salmon and trout from 8% to 20%.

A system of trails and three observation towers or hides have been constructed as part of the project, which has resulted in an increased number of visitors to the area. Compensation was given to landowners to allow for public access which amounted to 20,000 euros.

**Completion**

The length of the river was increased from 19km to 26km by the addition of meanders. One of the original targets was to create grassland and restore grazing to 1600ha of the river valley, but the re-wetting of the valley resulted in extensive areas of open water, meaning that the area originally targeted for grassland creation was reduced to 1200ha. The total project cost was DKK 283 million (35 million euros). 1750 ha of formerly arable land were converted to semi-natural habitats.

A cost-benefit analysis was done by the Royal Danish Agricultural University in 2002. This concluded that the project is beneficial at an interest of 5% or less on a 20 year time scale and 7% on an infinite time scale. It was also concluded that the overall cost of the project will be more than compensated for by the local economic opportunities generated by the project.

**Degree to which it met objectives**

By 2003:

- Ground water levels and the extent of surface water have increased within the project area. A new shallow lake of five square kilometres has been formed.
- The transport of nutrients through the system was not significantly reduced as a consequence of the restoration.
- Sedimentation has increased by 5–10% in years with typical flooding patterns.
- The biodiversity of plants, invertebrates and fish have all increased within the river.
- The number of sites where otter spraints and footprints have been recorded has increased from 12 (out of 19) to 18 (out of 20).
- The numbers of wetland birds breeding in the area has increased from 6-8 species in 2000 to 34-36 in 2003 (including four pairs of bitterns and 85 pairs of avocets). The area is also now very important as a feeding and roosting site for migrating wetland birds (including pink-footed goose).
• Plants that were typical of cultivated areas (crop plants, arable weeds) are rapidly
being replaced by wetland species such as Juncus effusus, Deschampsia caespitosa,
Phalaris arundinacea and Phragmites australis.

• There has been a minor increase in the mortality of young salmon and trout as a
result of increased predation by herons and cormorants. (is 8 to 20% minor??)

**Lessons Learned**

The project went well in terms of the wildlife – specialist wetland birds such as
spoonbills, avocets, black-necked grebes and white-tailed eagles have responded well to
the habitat restoration. What did not go quite so well in the early stages was
communication about the overall aims of the project. In 1999 when the project first
started, the local population feared that the government would create a wildlife reserve
with a lot of restrictions and no access for people even though the project staff thought
that they had made a big effort to inform and involve local people. The key messages
learned from this project is that information and involvement are extremely important
in order for a project to be successful, and that when people are involved, there has to
be a willingness to incorporate new ideas into the implementation stage of the project.

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Appendix 2: Case Studies of Socio-Economic Impact Assessments

**Evaluating Restoration of the Eden Catchment, Cumbria**

The Eden Rivers Trust (ERT) was requested by the regional development agency\(^7\) to undertake a socio-economic impact assessment of their project to restore the riverine habitats of the Eden River, which exits to the sea through Carlisle. The Eden valley has very high environmental values, with the river itself being an SAC and the valley having nine sites of international importance, 90 SSSIs, parts of two National Parks, two AONBs and part of the Hadrian’s Wall World Heritage Site. ERT’s principle interest was the coarse and game fishery, which would be improved by restoring degraded stretches of river and improving catchment characteristics such as retention of silt.

The report was undertaken by Mackay Consultants (2003). Their terms of reference were:

- To assess the value that the Eden River has to the community around it.
- To assess the likely socio-economic impact of the programme toward restoring Eden.

The study was predicated on a project cost of £3.3 million, a combination of habitat management and access and education work.

The social and economic driver in the catchment is agriculture, with 90% of the land farmed: mostly through hill farming and intensive lowland livestock, although only 11% of the population are employed through agriculture. At the time of the study, farm income and its overall economic contribution to the community was declining, a trend that may be about to reverse. Tourism was a much bigger employer and revenue earner, and was seen as the main option for economic and social development. Angling was a comparatively small proportion of the economy, although it provided a significant recreational resource. The river was recognised as a key resource for a wide range of local industries, for whom a guaranteed plentiful supply of clean water was an essential requirement. One of the principle users of this resource was the water supply industry. United Utilities extract 435 million litres per day from the catchment, with 9% used locally and 91% exported. The total value of the water invoiced to customers was £91 million/year. Mackays estimated about 290 people were employed in conservation in the catchment of which a third were concerned directly with the river.

Mackays made the following economic benefit assessments:

- The project would benefit agriculture to the tune of £1.3 million, with a benefit: cost ratio of 1:1.5, perhaps the least impressive beneficiary.
- The access and education work was anticipated to increase tourism by 170,000 visitors each year, generating an additional spend of £360,000 per annum and creating 16 jobs.

\(^7\) At that time the Cumbria Rural Development Programme
• Income generation from angling would increase by £1.2 million and create around 42 jobs either on the riverbank or associated support services such as accommodation.

• The report estimated £0.5 million per year of intangible benefits which is composed of £100,000 of ecosystem services and £400,000 of environmental education and visits to improve individual’s quality of life. A further 32 jobs were expected to be generated. The consultants noted the great difficulty in calculating these intangible benefits.

• The benefits to improved natural water quality and supply were estimated at £3 million, although it was noted that this is likely to increase greatly over time as the demand for water increases. The beneficiaries were widespread, not just the drinking water industry, reflecting the broad social dependence on the river for water.

The annual costs were expected to accrue for ten years, and for the purpose of total valuation could be multiplied up. This would provide a total investment return of £14.1 million, more than a third of which comes from ecosystem services.

Overall, it was concluded that the £3.3 million investment would be very good value for money indeed. In fact, ERT report that the rural development agency were wholly sceptical of the report, not believing the environment could be so financially beneficial, even though they recommended the consultants and funded the work.

Note that the assessment of ecosystem services did not take account of the broad range of benefits relating to people’s mental and physical health and the cultural stimulus that the river catchment provides – as an inspiring place to live, a source of inspiration for artists and craftspeople, and a medium for people to maintain contact with wildspace. Attaching a direct value to these costs is extremely difficult, and was not attempted by the consultants. All of these aspects have national Government policy drivers and as such could legitimately have budgeted actions, the value of which could constitute part of any economic valuation. However, attributing aspects of the national or regional budget to specific wetland restoration projects would be problematic. Methodologies for evaluating the economic and social benefits of a wide range of the more intangible ecosystem services simply do not exist.

It was outside of the terms of reference for the consultants to provide a capital value for the environmental features such as SSSIs or SACs. Such a capital value would however indicate an appropriate annual investment for their care, or a capital investment for their restoration. Standard economic methods could then be used to determine an economic argument for the maintenance and restoration of biodiversity. An economic asset such as a building might be valued on the basis of replacement value, but natural systems, along with archaeological fragments, do not fit this model because so many sites and habitats cannot be replaced. Species cannot be replaced once extinct, although the value of successful re-introduction from other populations could provide some basis for economic valuations if there were sufficient certainties this could be achieved. For instance, the value of bitterns could be determined by estimating the cost
of re-establishing a sustainable population, including the provision of suitable areas of habitat. Capital value of habitats could be based on the open market value of the land, but this often militates against marginal land of high conservation value. Again, sound methodologies do not exist for providing a capital value to ecological assets. Conservation organisations might resist placing monetary value on biodiversity assets, and as there is unlikely to be a consensus, this may be a policy cul-de-sac.
Evaluating the Economic Benefit of the Wealth of Wildlife Project

This study (ERM 2004) assessed the economic impact of a programme of habitat and species restoration work, environmental education and public awareness undertaken by the Cumbria Wildlife Trust.

The report concluded that the delivery of Biodiversity Action Plans has important social and economic consequences and that the “…activity of BAP partners is an integral part of rural development and regeneration”. They recognised four groups of benefits:

- Direct Benefits – things that can be consumed directly, such as fish, timber, tourism etc.
- Indirect benefits – essentially ecosystem services such as flood control and carbon sequestration.
- Option benefits – this is the premium placed on maintaining resources for future direct and indirect benefits some of which may not yet be known about.
- Existence benefits – the intrinsic value of resources in terms of cultural, aesthetic and bequest values.

They recognised that the process somehow needed to “moniterise” (what?!?!) these more abstract notions. However, biodiversity is often recognised as a free resource and therefore usually undervalued. ERM examined specific studies relating to the value of biodiversity- or conservation-related activities to obtain direct or empirical estimates of the value of biodiversity. For instance, one study showed that wildlife related tourism in Orkney generated £1.3million/year. Another showed that the addition to the economy of Cumbria of the activities of the National Trust was estimated at £3.5million/year; simply through the direct spend of the organisation. Applying the methods used in these specific projects to others or to different location was complex and fraught with subjective judgements. They suggested a common framework needs to be agreed for transferring methodologies between projects, but at that time such a framework did not exist.

They concluded that the main economic benefits of the Wealth of Wildlife project accrued from nature-based tourism and leisure, and also an increasing awareness of business opportunities that arise from protecting and enhancing biodiversity. In total they estimate that the £1.35million project would generate the following quantitative benefits:

- 28 additional local jobs
- £3.3 million net expenditure by staying visitors

in addition to more intangible benefits that they describe but do not moniterise. (surely there must be another way of expressing this?!)

However, they looked only at the specific criteria used by the rural regeneration agencies for assessing projects, and did not provide an overall monetary valuation on the project benefit. Clearly, it would have been substantially more than the figures quoted above.
Appendix 3: Twelve Broad Principles for Adopting the Ecosystems Approach

These were developed by the Convention for Biological Diversity in May 2000 as guidelines for environmental managers adopting the approach.

1. The objectives of management of land, water and living resources are a matter of societal choice.

2. Management should be decentralised to the lowest appropriate level.

3. Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.

4. Recognising potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should:
   a. Reduce those market distortions that adversely affect biological diversity;
   b. Align incentives to promote biodiversity conservation and sustainable use;
   c. Internalise costs and benefits in the given ecosystem to the extent feasible.

5. Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the Ecosystem Approach.

6. Ecosystems must be managed within the limits of their functioning.

7. The Ecosystem Approach should be undertaken at the appropriate spatial and temporal scales.

8. Recognising the varying temporal scales and lag-effects that characterise ecosystem processes, objectives for ecosystem management should be set for the long term.

9. Management must recognise that change is inevitable.

10. The Ecosystem Approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.

11. The Ecosystem Approach should consider all forms of relevant information, including scientific and indigenous local knowledge, innovations and practices.

12. The Ecosystem Approach should involve all relevant sectors of society and scientific disciplines.