Report No 49

Ramsar Advisory Mission (RAM)

Ouse Washes Ramsar Site, United Kingdom

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Introduction

1. The Ramsar Convention gives special attention to assisting Contracting Parties in the management and conservation of listed sites whose ecological character is changing or likely to change as a result of technological development, pollution or other human interference. This is carried out through the Ramsar Advisory Missions (RAM), a technical assistance mechanism formally adopted by Recommendation 4.7 of the 1990 Conference of the Parties (formerly known as the Monitoring Procedure and the Management Guidance Procedure). The main objective of this mechanism is to provide assistance to countries in solving the problems at particular Ramsar Sites related to the maintenance of their ecological character.

Background

2. On 23 October 2000, the Habitat Conservation and Ramsar unit of the European Wildlife Division in the Department of the Environment, Transport and the Regions (DETR), the Ramsar Administrative Authority for the United Kingdom (now part of the Department for Environment, Food and Rural Affairs, DEFRA), requested the listing on the "Montreux Record" of the Ouse Washes Ramsar Site. In 1990, through Recommendation 4.8, the Conference of the Ramsar Contracting Parties established the Montreux Record as a list of Ramsar Sites where changes in ecological character have occurred, are occurring or are likely to occur. A Contracting Party may request inclusion of a site in the Montreux Record in order to draw attention to the need for action or support, e.g. through a Ramsar Advisory Mission.

3. Together with the request to list Ouse Washes on the Montreux Record, according to Resolution VI.1, the Habitat and Ramsar Team submitted a completed questionnaire providing information for assessing its possible inclusion in the Montreux Record plus a number of supporting technical reports, including six topic papers on the "Ouse Washes Management Strategy" prepared by a number of major stakeholders forming the Ouse Washes Strategy Group, some members of which are also represented on the Habitat Protection and Funding Group, published in 1994 by English Nature and the National Rivers Authority, plus updated information papers prepared in 2000. From this documentation it follows that the main ecological changes occurring at the Ouse Washes

are a decline in the numbers of breeding waders and of wintering waterbirds and changes in vegetation communities.

4. There are two main, but inter-linked, issues that appear to be affecting the features of importance: *1)* an increase in the incidence of summer flooding over the last 25 years, as well as high water levels in winter, and *2)* a decline in water quality affecting the communities of higher plants within the rivers and ditches of the Ouse Washes.

5. In spring 2001, DETR submitted a report prepared for the Ouse Washes Habitat Protection and Funding Group by the engineering consultant company Posford-Duvivier providing an "Overview of various measures to alleviate summer flooding". This report examines seven actions which may reduce the incidence and impact of summer flooding of the Ouse Washes. The purpose of the study was to identify which actions (if any), or combination of actions, merit further detailed consideration towards satisfying the various interests of the Ouse Washes Habitat Protection and Funding Group. These interests primarily concern nature conservation, flood defence and navigation. The report provided essential baseline documentation for the issues to be considered by the Ramsar Advisory Mission team.

The Ouse Washes – from History to Present

6. The landscape of England has changed dramatically throughout the centuries. Few areas have undergone so complete a change as the Cambridgeshire Fens, drastically altered by human interventions. From being wet and frequently flooded land unsuitable for farming, it is now one of the most fertile and productive areas of England. In 1630, the 4th Earl of Bedford saw the potential of the land, if only the flooding could be controlled. He enlisted the aid of other noblemen and landowners and formed a group known as the "Adventurers". A Dutchman, Sir Cornelius Vermuijden, was engaged to turn the watery landscape into one in which agriculture could thrive all year long.

7. Vermuijden began with a project intended to significantly improve the flow of flood water out to the Wash (i.e. the adjacent bay of the North Sea). He excavated a 30 km straight channel between Earith and Salters Lode, replacing the existing meandering route of the river Great Ouse, cutting off the loop through Ely and shortening its distance to the sea by 16 km. The excavation was completed in 1631 and named the "Bedford River". Although the new cut made some improvement, discharges of flood water to the sea were still held back by high tides in the Wash. A further major modification to the drainage system was required.

8. After the end of the Civil War in 1649, Cromwell set Vermuijden to work again, resulting in the creation of a washland, defined as an area of land periodically flooded by overflow water from a river or the sea. A second 30 km channel was dug parallel to the first, named the New Bedford River (or Hundred Foot River), running about 1 km east of the original Bedford River and creating a washland between the two channels. A flood storage reservoir of around 1900 ha was formed between the two new rivers, bounded on the West side by the Middle Level Barrier Bank and on the East by the South Level Barrier Bank. Thus the "Ouse Washes" were born.

9. It is important to look at the entire Fen area as an integral mechanism. The purpose of the Ouse Washes is, through the control of flooding, to enable the Fens to thrive as a

productive agricultural area and home for thousands of people. Since the construction of the Washes, systematic drainage has taken place across 500,000 ha of the Fens and now only 3 per cent of the original wetlands remain. These fragments, including the Ouse Washes, are sanctuaries for internationally important wildlife of many species and a popular recreation area. Keeping the flood waters off the Fens has not proven to be an easy task. Despite the cutting of new channels, creation of embankments, installation of sluices and use of land drainage pumps, it remains a constant battle to keep the Fens free of devastating flood. A major problem is caused by the shrinkage of underlying peat (caused by drainage), which results in the sinking of the embankments and dry land outside of the Washes.

10. The Ouse Washes were created to effectively store and convey flood waters by a system of sluices, pumps and embankments. Towns, villages and valuable agricultural land in this area are protected by the Ouse Washes defences. The Ouse Washes are designed as a flood storage reservoir coming within the ambit of the Reservoirs Act 1975 and act as a safety valve for flood waters in the Great Ouse catchment. The creation of the Ouse Washes has resulted in the largest example of washland in Britain, comprising seasonally flooded washlands with associated habitats which are important for breeding (e.g. black-tailed godwit, snipe), migratory and wintering assemblages of wetland bird species (e.g. swans, teal, wigeon, gadwall and others). There is a rich aquatic fauna and flora with over 300 species of higher plants and a rich variety of invertebrates. Two of the watercourses within the site support an internationally important fish population of spined loach. While farmers benefit from the waters held back from arable land, the flooded areas which are of little agricultural value have become havens for wildlife.

11. The Ouse Washes area is of national and international conservation importance, as testified by its designation as a Site of Special Scientific Interest (SSSI), Special Protection Area (SPA) under the EU Wild Birds Directive, candidate for Special Area for Conservation for the spined loach (cSAC) under the EU Habitats Directive, and Wetland of International Importance (or Ramsar Site). Various conservation interests have a strong presence on and interest in the Ouse Washes, including the Royal Society for the Protection of Birds (RSPB, the BirdLife partner in the U.K.) and the Wildfowl and Wetlands Trust (WWT) who manage reserves on the Washes, three County Wildlife Trusts, and the statutory government advisor English Nature.

12. The Ouse Washes qualify as a Wetland of International Importance under Ramsar criteria 1 (representative example of a near-natural wetland type: washland habitat with unimproved neutral grassland, associated dykes and base-rich, slow flowing lowland rivers with a great variety of aquatic plants), 2 (supporting notably 10 nationally rare water plants, relict Fenland invertebrates, the nationally red-listed large darter dragonfly and rifle beetle, plus an assemblage of nationally rare breeding birds associated with seasonally flooded wet grassland), 5 (regularly supporting c.64,000 waterbirds, namely wigeon, Bewick's swan, pochard, teal, coot, pintail, black-tailed godwit and many others) and 6 (regularly supporting >1% of the individuals of the relevant flyway populations of Bewick's swan 27%, whooper swan 6%, pintail 3%, wigeon 2%, black-tailed godwit, shoveler, gadwall >1%). The long, narrow area of seasonally flooded grassland between two channelised rivers was already included on the List of Wetlands of International Importance on 5 January 1976; it is Ramsar Site No. 77.

13. Much of the conservation importance of the Ouse Washes is due to its continued use as functional washland, with extensive winter flooding and traditional forms of agricultural

management, including grazing and mowing of permanent grassland and rotational ditch management. In recent years, spring flooding (April-May) has adversely affected both the breeding birds and the traditional washland management regime. It also results in *Glyceria* grass (sweet rush) competing with the other grasses and herbs, which may affect food availability for wintering waterfowl. Severe cyclical siltation in the tidal Great Ouse river is a factor affecting the drainage of the Ouse Washes. The new sluice at Welmore lake has however improved the speed of removal of water since its completion in 1999. Nutrient enrichment continues to be a problem, likely to result in the decline of some plant, fish and invertebrate species. Vegetation surveys (1972-2001) show a marked change in plant communities of the open washes with a number of communities now scarce or extinct. These changes have been shown to be positively correlated with periodicity of flooding and are likely also to be related to nutrient enrichment of the site. Wildfowling takes place on the site but is not considered to cause significant disturbance at current levels.

The Ramsar Advisory Mission

14. Together with the Habitat and Ramsar Team of DEFRA, the Ramsar Bureau prepared an on-site mission, initially foreseen for April 2001. Due to access restrictions to rural areas during the wide-scale outbreak of Foot-and-Mouth disease in Great Britain at that time, the mission had to be postponed to November 2001. The Ramsar Bureau invited a hydrology and river basin planning expert, Dr Roel Posthoorn of the Wetlands Advisory and Training Centre (WATC) in the Dutch Institute for Inland Water Management and Waste Water Treatment (RIZA), plus an expert on floodplain and wet grassland ecology, Professor Eckhart Kuijken of the Flemish Institute for Nature Conservation, to take part in the mission. Furthermore, experts of DEFRA, the UK Environment Agency, English Nature, and several non-governmental institutions took part in the mission (cf. detailed list in the Annex).

15. According to its Terms of Reference, the Ramsar Advisory Mission considered three main issues:

    a) The hydraulics and **water management** of the Ouse Washes in the context of flood defence measures for the Fens rural area and drainage of summer floods in the catchment of river Ouse and its tributaries.

    b) The **nature conservation** importance of the washlands, its dependence on the traditional grazing regime, grassland management, and its importance for vegetation development, plant species of conservation concern, breeding, migrating and wintering waterbirds and waders, and specific species of fish and invertebrates of conservation concern.

    c) The **quality of the water** in the river and ditch systems, problems of eutrophication and water pollution affecting plant communities and species diversity.

16. The Mission was made aware of other issues, which however seemed less central. They include the management of recreation activities and the need to limit possible negative effects on wildlife, the need for predator control to increase breeding success of waders and waterbirds, and the need for continued research, survey and monitoring of key environmental indicators.

Review of Current Management Activities

17. "Niet zonder arbeijt" - "Not without labour" was the motto of Cornelius Vermuijden. Also after the creation of the Ouse Washes as a flood storage reservoir, maintenance and improvement of the system is a necessity, so the motto is still applicable. Higher peak discharges of the river Ouse were observed over recent years. They were not proven to be caused by intensified land use upstream. A link has however been shown to climate change in relation to increased rainfall. Sea level rise will have to be faced as well.

18. In the discussions it became clear that the Ouse Washes as a system as a whole is under threat. Hydraulic conditions and water quality are the key issues to both flood defense and ecological functioning. Therefore this report focuses on the water management in and around the Ouse Washes.

The Ouse Washes as Part of the Great Ouse River System

19. The value of the Ouse Washes as a flood defense system is its reason for being. Their primary purpose as a flood storage reservoir remains to date. Additionally, their management has led to the Washes acquiring national and international conservation importance.

20. The increased flooding frequency indicates that the surrounding region depends more and more on the Ouse Washes for its safety. The extensive analyses undertaken by the Ouse Washes Habitat Protection and Funding Group make it clear that the problems inside the Ouse Washes mainly have external causes, and that the opportunities for improvement must be found mainly outside the area.

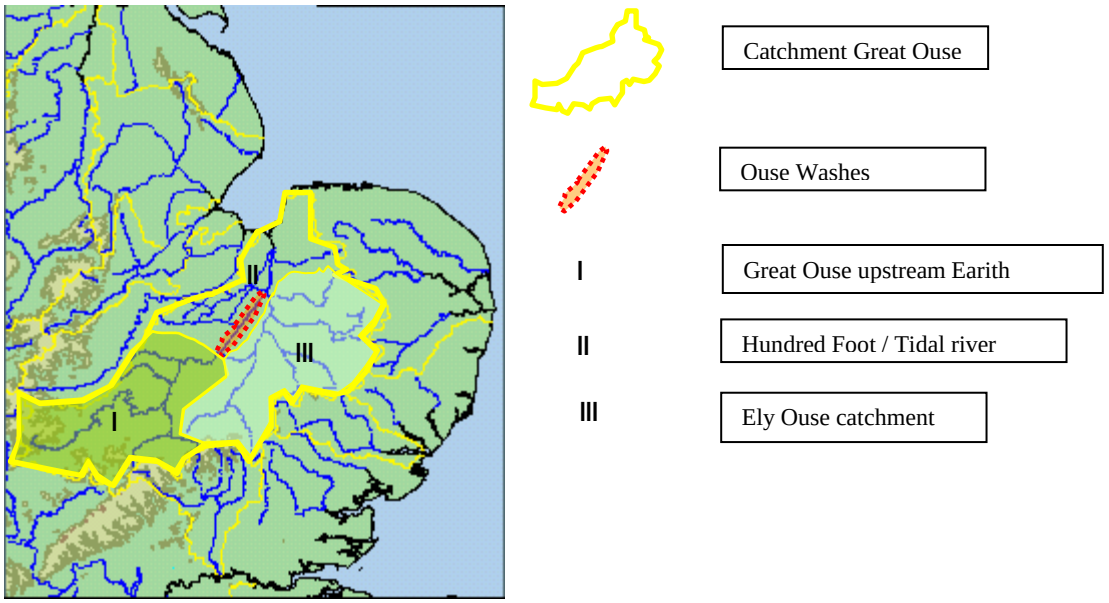
21. Therefore the mission recommends analysing the problems of the Ouse Washes in the context of the entire river basin of the Great Ouse. With regards to water management issues, the river system is divided into three sections to address the questions in the remainder of the report:
    I. Great Ouse river upstream of Earith
    II. The Ouse from Earith to King's Lynn (Hundred Foot, Ouse Washes, Tidal River, Fens)
    III. The Old West River, Ely Ouse and tributaries

Section of the Great Ouse Upstream of Earith

22. The river Great Ouse originates in South Northamptonshire. Several sluices manage water flow in order to maintain sufficient levels for navigation, agriculture and the environment during dry periods. The Great Ouse flows through a mainly agricultural landscape, passing through several towns and villages, like Huntingdon. Most of the sewage treatment plants in its catchment do not have an advanced phosphorus stripping facility. Also, it was stated that the capacity of the sewage treatment system was probably no longer sufficient for present-day requirements, as during peak rainfall periods untreated sewage regularly spills into the river. The Mission was also informed that under current investment programmes AM2 and AM3, all sewage treatment works over 10,000

population equivalent will be upgraded to include phosphorus control by the end of 2004. While this is not enough to control eutrophication on the Washes, it is considered a contribution to this goal.

23. The reports available to the RAM do not describe in detail the upstream part of the river Great Ouse. As water dynamics and water quality at the level of Earith (i.e. the inlet sluice to the Ouse Washes) are mainly dependent on the situation in the upstream part of the Great Ouse catchment, we consider it useful to undertake a new analysis, in this context, of the following parameters:



- The changes in land use practices in the upper catchment: The water retention (sponge) capacity of the catchment basin seems to be very poor. How does this relate to the loss of upstream wetlands, to agricultural practices, and to the expansion of built up areas and towns?

- The discharge figures of the Great Ouse at Offord (and Earith), also in a historical perspective.

- Q/h (surface water flows and human influences) relations at Offord and Earith: A hydrodynamic model of the river system could be useful to analyse and assess the effects of different flood mitigation options in the upstream area..

- The water quality and to identify the sources of pollution and eutrophication.

- The operating rules of the sluices under circumstances of normal and high discharge (and ecological aspects), taking the results of the analyses of the points above into account.

Section Earith – Kings's Lynn

24. This part of the catchment consists of the Ouse, New Bedford (or Hundred Foot river), the Ouse Washes with the Old Bedford river and the Tidal river. The influence of the tide can go as far upstream as Earith, although the tidal range is, under normal circumstances, very limited at this location. The water level in the Hundred Foot river and the river Great Ouse upstream of Earith is regulated to sustain flood defence standards of protection to surrounding land. With normal flow conditions, the Ouse discharges through the Hundred Foot river to the Tidal river and then to the Wash. When discharge is high and a preset level at Earith is exceeded, the Ouse Washes are used as a retention area, storing the water surplus. Because of the huge storage capacity of the Washes, the water level in the Hundred Foot river is effectively reduced to the applied safety standards.

25. The Middle Level (18,000 ha) and South Level (11,000 ha) of the Fens are protected from flooding by barrier banks around the Washes. During wet periods, about 7,000 ha of the Middle Level area, administered by the Sutton and Mepal IDB and Manea and Welney IDB are drained into the Ouse Washes via the counterdrain and the pumps at Welches dam. The Mission was told that this contribution is negligible in comparison to the amount of water that enters the Washes through the Great Ouse at Earith. Arguably, this contribution during periods of maximum pumping could be more important than previously considered? Thus, it might be helpful to prepare a more detailed analysis of the discharge patterns into the Ouse Washes from the different sources.

26. For this section Earith-Kings Lynn of the Great Ouse catchment, further analysis of the following issues could be useful:

- While existing studies have looked at flows in and out of the Washes in relation to arriving flow in the river Great Ouse, the following issues should be analysed in more detail: relative importance of the flow through the Washes, stationary inflow at Earith, and outflow at John Martin Sluice.

- The siltation study concluded that there is a dynamic balance of the discharge capacity of Hundred Foot river in relation to its profile and reduced dimensions as a consequence of silting up. It was, however, suggested that the Environment Agency undertakes a repeat survey to clarify the discharge capacity.

- A more accurate analysis, using entire annual periods, instead of summer periods only, of flooding frequency, duration and depth of the Ouse Washes could be undertaken. Is the period of 20 years of comprehensive data representative? Analysis of data from other periods may provide different suggestions. A simple graph could present different scenarii, whether the Earith sluice trigger is released or not.

- Water level monitoring in the Washes (install data loggers), taking into account that precise contour mapping, based on aerial photos, may be helpful to determine specific problem areas, given the fact that the Washes are not flat.

- The station at Welches dam pumps discharge from the Middle Level Fens into the Washes. The pumping capacity is substantial (over 15 m^3/s), but what is the actual impact on flooding frequency, flooding depth, and the duration of flooding of the Washes?

- In order to analyze the influence of the water inlet during dry periods on the overall water quality in the Washes, figures of the amount and frequency of water inflow, etc. will be relevant. Are there options to increase the internal water storage capacity and reduce the need for intake?

- A hydrodynamic model of the river system, in order to analyze and assess the effects of different options in this part of the catchment, would be useful.

- With regard to water quality improvement, an analysis of the potential consequences of the control of slacker input would be helpful. Furthermore, the quantification of the sediment load deposited during flood events could provide helpful insight, as a significant proportion of phosphorus input arrives in particulate form.

27. Catchment planning and upstream storage of water should include other catchments that impinge on the Great Ouse catchment, such as the Cam. Flow from the Cam can be used to flush the tidal river, so preventing siltation, which has a significant impact on the rate at which floodwaters on the Ouse Washes can be discharged. Under flood conditions on the Washes, priority has to be given to discharging flows from the Washes through John Martin sluice at Welmore lake. Surplus flows in the Ely Ouse are diverted into the Cut Off channel. Therfore, upstream storage of water in the Cam, both to address current upstream urban flooding problems and to accommodate run-off from future development could be beneficial to this regime by providing an extended period over which this flushing can be achieved.

Old West and Ely Ouse

28. This is the section of the river that was cut off when the Ouse Washes were created. It now discharges into the Tidal River downstream of the Ouse Washes at Denver. The reports presented to the RAM indicate that during peak discharges of the Great Ouse / Hundred Foot, the water levels at Earith could be reduced by diverting part of the discharge to the Old West river. In this way a historical connection would be restored. Although at first glance an attractive option, there are at least two considerations: the first is related to the potential effects on the hydro-morphology of the Hundred Foot river (siltation). The second is related to the core of the river basin approach: It is not a pertinent solution to shift the high water level problems of the Ouse Washes simply to another subsystem within the Ouse River basin, without a prior integrated assessment. In this context, the following aspects should be considered:

- A description of the current state of the Old West river and Ely Ouse as a separate subsystem of the river Great Ouse, including the effects of diverting water through the Old West river.

- In order to be able to analyze and assess the effects of flood relief options in this part of the catchment, the Old West and Ely Ouse should be included in the hydrodynamic model of the Ouse river system.

- Effects of peak flow diversions into the Old West river (as investigated by the Environment Agency) as part of an integrated scenario with the creation of wetland habitat for water retention on the South Level Fens.

Working Towards Solutions: a Review

29. The problems in the Ouse Washes are quite broad: the incidence of summer flooding, the deterioration of the water quality, as well as the loss of valuable habitat for breeding waders and grazing opportunities in summer. Also the higher water levels in winter and the longer duration of the winter floods are considered to have a negative impact on the grassland habitat.

30. In order to solve these problems in the Ouse Washes, an impressive effort has already been made. In this process, many of the stakeholders participated actively, thus generating wide support and creativity in formulating solutions that could improve the situation. Several studies were carried out to deal with the increased summer flooding of the Ouse Washes and the siltation of the Hundred Foot river and Tidal river. In a report of July 2000 Posford Duvivier presents a brief overview of the options and measures that have been discussed and analysed so far ("Tidal River Great Ouse. Siltation and flood control: Options past and present"). The 58 options identified are summarized in the following categories:
    - training walls and dredging (8 options),
    - tidal barriers (8),
    - improve flow capacity in the river system (13),
    - storage (5),
    - improve drainage of the Washes (8),
    - operations / management (10),
    - others (6).

31. Most of the options were rejected because of their negative impact on other functions of the Ouse Washes (mainly navigation and agriculture), their environmental impact, their limited contribution to solving the problem, or their costs.

32. Some of the study recommendations have already resulted in actions. In order to improve drainage of the Ouse Washes after a flooding period, the outlet sluice was replaced by a new complex, the John Martin sluice, with a 50% higher capacity.

33. The measures carried out resulted mainly in a shorter duration of flooding of the Ouse Washes. However, further action was required. Thus, the most promising options to alleviate summer flooding of the Ouse Washes were analysed further and presented in October 2000 in a report of Posford Duvivier. The options considered are:
    - reprofile the Tidal river,
    - reprofile the Hundred Foot River,
    - install a tidal barrier on the Hundred Foot River,
    - divert summer floods via the Old West River,
    - raise the Earith Sluice summer flood release drawmark,
    - attenuate summer flood flows,
    - divert summer floods via the Old West River combined with reprofiling the Tidal River,
    - reprofile Hundred Foot river combined with tidal barrier,

- reprofile Hundred Foot River combined with attenuation of summer flood flows,
- attenuate summer flood flows combined with other flow improvement options.

34. The report concludes that, although the effects of some of them are substantial, none of the options meet the desired reduction of summer floods to a frequency of not more than once in four years.

35. The outcome of the above-described process is not very satisfactory. In the process of designing solutions the problem was narrowed to "flooding in spring and summer, not more than once in four years (April to October)". None of the considered options is able to solve this problem in an acceptable way. Thus, the objective was narrowed further to "flooding between May and September, not more than once in four years". Also this objective cannot be achieved. Even when the aspirations are brought back to "flooding not more than once in three years between May and September" none of the considered options brings the solution.

36. In a broader perspective, this outcome is even less satisfactory, since other problems of the Ouse Washes, like eutrophication and the duration and depth of winter flooding, were not addressed at all. In this context, it should be noted that summer water has the highest phosphorus concentrations and therefore summer floods may have a disproportionate impact on the nutrient levels in the Washes and hence on the potential to cause eutrophication.

37. The strategy of reducing the problem by lowering the aspirations obviously does not work in the case of the Ouse Washes. In the process of designing solutions mainly technical options were considered and there was a strong focus on options in the downstream part of the catchment only. The problems, however, derive mainly from the situation in the upstream part of the catchment. Since purely technical options fail, a strategy of creating "more space for water" is relevant. This requires the elaboration of spatial solutions as part of an integrated river basin approach, notably the provision of increased storage capacity in the upper catchment. To this end a review of the existing land use and water use practices in the catchment is needed.

38. To define which options are promising and which are not, an integrated vision of the entire catchment basin, and the position of the Ouse Washes therein, is needed. Within a strategic approach, an order of priority should be established between several proposed solutions. Measures rejected so far *ex ante*, such as increasing the discharge capacity of the Old Bedford/Delph river inside the Ouse Washes, could contribute significantly to solving the problem. If the interventions are limited to the Ouse Washes area, dredging of the Old Bedford would not be a good solution, since it would degrade valuable habitat and generate only a limited contribution (increased discharge) to the solution. However, as but one of several measures in the wider river basin, this intervention inside the Ouse Washes might constitute an acceptable and necessary contribution towards the solution.

Towards an Integrated Systems Approach

39. The outcome of all research so far shows that there is no single and obvious solution, and the RAM does not pretend to be able to propose one either. As the approach followed so far, using very reduced ambitions (accept summer flooding once in three years) did not lead to a workable solution, we would like to recommend a different approach and perspective for the ecological situation in the Ouse Washes.

40. This approach analyses the current system differently: the Ouse Washes were designed to store water from the high ground of the catchment before it reached the Fens, functioning as a safety valve in the river system of the Ouse. In a continuing process during the last centuries, the water storage capacity of other parts of the catchment (the Fenlands) was diminished and increasingly concentrated in the Ouse Washes only. Because of the robustness of the Ouse Washes flood retention polders, for a long time this was not a problem. However, increasing rainfall and runoff in recent decades created more extensive and more regular floods of the Washes. This diminished the capacity of the Ouse Washes, not as a sustainable flood defense system, but to provide particular habitats for those species of concern for which the flood retention area was designated as a Ramsar Site (and SSSI, SPA, cSAC; cf. paragraphs 11-12 above).

41. Thus, the mission recommends a review of the problems of the Ouse Washes in the context of the river basin of the Great Ouse. Key elements of such an approach would be:

42. **Integrated river basin planning**, putting problems into context and linking downstream problems to upstream causes. The long term objective of maintaining the Ouse Washes as a sustainable flood protection ecosystem should be defined at this level. Such an approach would make it possible to elaborate a coherence between ecological requirements, flood protection (of agricultural land and urban developments), and the management of water quantity and quality. This would provide an opportunity to implement the obligations of the EU Water Framework Directive in the Great Ouse river basin.

43. Combining the integrated river basin planning for the Great Ouse with an **ecosystem approach** for the whole region of the Fens, notably also to define the functions of wet grasslands in this context. This valuable type of wetland habitat is rapidly decreasing all over Europe. In the "Wise Use of Floodplains" EU LIFE-Environment project, the Fens provide one of the regional case studies, mentioning a "Wet Fens Vision" and the local initiative "Wet Fens for the Future". Restoration of fens, reedbeds and wet grassland can contribute to the sustainable development of the region. Such initiatives also provide opportunities to create additional habitat to maintain viable populations of godwits and other waders in the Ouse Washes and surrounding areas, as important indicators for the ecological quality of Fen wetlands.

44. A strategic approach to analyse the complex problems in the Ouse Washes is likely to propose **solutions along multiple tracks**. Some contributions will be easy to implement (minor engineering and dredging works), others will need more time (habitat restoration). In order for the long term river basin and ecosystem approach to provide practical solutions for the actual problems in the Ouse Washes, we recommend a pragmatic step-by-step implementation of selected measures. In this context, the current experimental initiatives (of RSPB) to create new breeding habitats for waders adjacent to the Ouse Washes should be encouraged, as they are likely to provide useful experience. Given the urgency to find solutions to stop the habitat degradation, concrete actions need to be undertaken rapidly.

45. The extensive analysis that has been carried out in the Posford Duvivier report provides a solid starting point for the development of a strategy for the Ouse Washes that is both ambitious and realistic. An analysis of the options rejected in this report would be useful, since the assessment of the impact of some of the options, e.g. water storage in the Ouse Fen area, and increasing the buffer capacity within the Ouse Washes, are likely to be evaluated differently within a basin-wide context, as suggested by the approach proposed above.

46. This would lead to a review of the process of designing solutions. So far, it became clear that there is no single solution to solve all problems. Challenging combinations of options can be worked out for different scenarii. As an example, some of the options are combined in a scenario that would be worthwhile to be further elaborated (see figure):

Retaining water upstream, flow diversion and restoration of the wetland ecosystem sponge capacity. Also parts of the Middle Level and South Level Fens are (through their pumping stations) functioning as upstream areas of the Ouse Washes. It is recommended that the Environment Agency models the upper catchment and uses this analysis to identify and progress wetland restoration sites for upstream retention. Wetland restoration can reduce the inflow in the Ouse Washes substantially through:

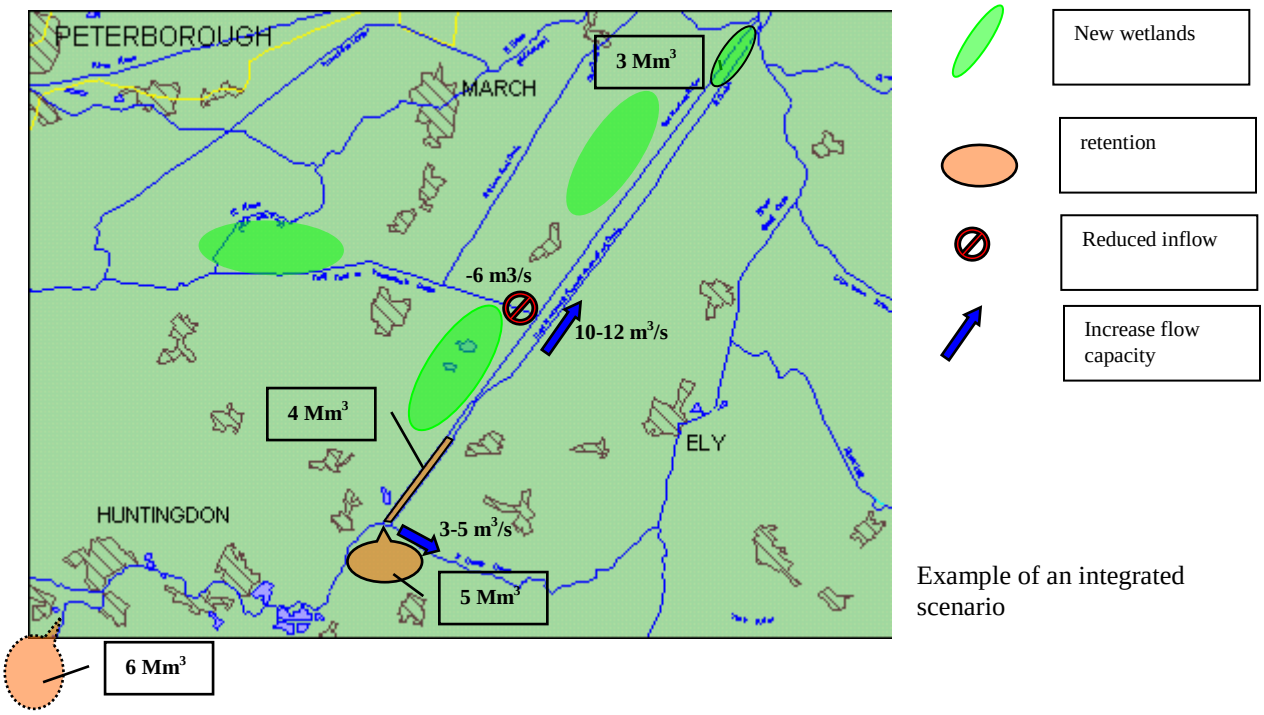
- the creation of retention areas: one of the obvious locations is the area just south of the Ouse Washes (Ouse Fen), another the area just north and east of the Hundred Foot river (NE of the Hermitage marina),
- improving the flow capacity of the Ouse river in such a way that the "Offord trigger" will be at about 35- 40 m^3/s; (i.e. combining options 2.1, 4 and 5 of the Posford Duvivier report).

47. **Improving the water quality** through the following measures:

- reducing flooding of the Ouse Washes, when the above mentioned measures are operational, by creating a storage buffer within the Washes upstream Sutton

Gault and a limited improvement of the flow capacity of the Old Bedford/Delph river (improved through flow to John Martin sluice),

- further reduce phosphorus inputs upstream,
- reduce inflow into the Ouse Washes through the smart use of the sluices, increase the internal water storage capacity, and optimise the system of "wet fences",
- purify inflowing waters through buffer zones (reedbeds) within the Ouse Washes upstream of Sutton Gault.



Example of an integrated scenario

48. **Creation of wetlands** in the Middle Level and South Level Fens, in order to support the development of sustainable populations of typical fenland breeding birds and other wildlife. Such wetlands would also increase the water storage capacity of the Fens and thus reduce the pressure on the Ouse Washes.

Conclusions

49. The ecological values of the Ouse Washes are beyond discussion and well described. Their function as a flood defense system is their reason of being. The existence of large scale wet grassland habitat contributes in a significant way to both biodiversity and flood defense. Lack of proper grassland management, because of increased incidences of flooding in spring and summer, is causing vegetation changes, the grasslands developing into a rough marsh vegetation, carr and woodland. This affects both the current bio-diversity value and flood defense function of the Ouse Washes.

50. All research results show that the ecological problems of the Ouse Washes have external causes. It is not the situation inside the Ouse Washes that is the real problem, but the underlying situation in the catchment of the Great Ouse river. This statement leads

necessarily to a change in approach and perspective. Within a river basin approach, an integrated strategy should be developed to support the ecological, social, economical, historical and landscape values of the area for flood defence, biodiversity, agriculture, and varied leisure activities.

Recommendations

51. The Ramsar Advisory Mission recommends the development of a multiple track strategy in order to prepare lasting solutions for the complex problems of the Ouse Washes. Elements of this strategy could be:

a) The development of an integrated river basin management plan for the Great Ouse and a new analysis of the problems in the Ouse Washes in this context. In order to be able to assess the effects of alternatives options more accurately, a hydrodynamic model of relevant parts of the catchment will be a powerful tool.

b) Since water quantity and water quality issues are closely related, we recommend integrating the strategy of improving the water quality in the Ouse Washes into planning process.

c) Encourage the development of an ecosystem approach for the Fens. In this man-made landscape only some three per cent natural fen habitat remain. The Ouse Washes are a core area of potential wet grassland habitat. Safeguarding the essential ecological functions of the Ouse Washes can be supported by the creation and restoration of wet grasslands, reedbeds and other fen habitats in the South Level and Middle Level Fens.

Acknowledgements

The Ramsar Bureau and its experts want to thank the European Wildlife Division of the (now) Department for Environment, Food and Rural Affairs (DEFRA) of the United Kingdom for inviting this mission to look at the Ramsar Site and discuss its management issues with a wide range of interests to help find the best solutions and to provide a case for a wider audience. The respective colleagues (listed below) of the Environment Agency, English Nature, the Royal Society for the Protection of Birds (RSPB), and the Wildfowl and Wetlands Trust (WWT) did a great job in preparing the logistics for what proved to become a very smooth and successful mission with on-site visits between Earith and Downham Market. We thank WWT, RSPB and DEFRA for their hospitality and the provision of opportunities to meet with many stakeholders at the Welney Wildfowl Refuge and in London, prior to presenting the first impressions of the Mission to the meeting of the U.K. Ramsar Committee on 8 November 2001.

ANNEX

Mission participants and stakeholders met

The Ouse Washes Management Strategy was elaborated by the partners (listed below) of the Ouse Washes Habitat Protection and Funding Group representing the major interests in the area. The Ramsar Advisory Mission was able to meet with stakeholders representing these interests during lunch at Welney Waterfowl Refuge on 6 November (names of individuals present given in brackets):

- Environment Agency (cf. below),
- English Nature (cf. below),
- Royal Society for the Protection of Birds (cf. below),
- Inland Waterways Association (Alan Jarvis),
- Wildfowl and Wetlands Trust (Carl Mitchell),
- Hundred Foot Washes Internal Drainage Board (Peter Robinson, Ian Smith),
- Wildlife Trusts for Bedfordshire, Cambridgeshire, Northamptonshire & Peterborough
- British Association for Shooting and Conservation (Ian Danby),
- Fenland Wildfowlers Association (Steve Calton),
- Ely and District Wildfowlers Association and Wash owner (Graham Downing),
- National Farmers Union Ely & Soham Branch (James Godfrey),
- Graziers (Roger Martin),
- East Cambridgeshire District Council (Rachel Almond).

Besides of this stakeholders meeting, the Mission team was accompanied (throughout or in part) by:

- Linda Smith and Richard Chapman of the Habitat Conservation and Ramsar unit at **DEFRA,**
- Tom Tew, Ben Fraser, and Jonathan Graham of the **English Nature** team for Bedfordshire, Cambridgeshire and Northamptonshire,
- Steve Cook, Ramsar focal point, Keith Stonell, Nigel Woonton and Debbie Jones of the **Environment Agency,**
- John Sharpe, Cliff Carson, Norman Ratcliffe and Sarah Dawkins of the **RSPB,**
- Carl Mitchell and John Kemp of the **WWT** at Welney.

The experts of the Ramsar Advisory Mission were:

- Eckhardt Kuijken, Director General of the Flemish Institute of Nature Conservation and Ramsar focal point for the Flanders Region of Belgium,
- Roel Posthoorn of the Wetlands Advisory and Training Centre of the Institute for Inland Water Management and Waste Water Treatment in the Netherlands,
- Tobias Salathé, the Regional Coordinator for Europe of the Ramsar Convention.

On Wednesday morning, 7 November, an informal site visit was made to the coastal marshes near Salthouse, Cley and Brancaster on the **North Norfolk Coast** to look at ongoing flood defence and habitat restoration measures, undertaken as part of a LIFE-Nature project "Living with the Sea" focusing on coastal habitat management plans (CHAMPS). At this occasion, the Mission team was accompanied by:

- Stephen Worrall, Peter Lambley, David Rogers and Amanda Elliott of English Nature, and
- Peter Doktor of Norfolk Wildlife Trust.

On Wednesday evening, 7 November, Sophia Lambert, **Director of Wildlife, Countryside and Flood Management of DEFRA** invited the Ramsar Advisory Mission Team for an informal dinner in London, together with:

- Jim Park, Head of Flood Management Division, DEFRA,
- Daniel Instone, Head of Water Quality Division, DEFRA,
- Rodney Anderson, Head of Water Supply and Regulation Division, DEFRA,
- Martin Capstick, Head of European Wildlife Division, DEFRA,
- Andy Brown, Director, English Nature,
- Robert Runcie, East Anglia Area Director, Environment Agency,
- Mark Avery, Head of Conservation, RSPB,
- Tony Richardson, Managing Director, WWT.

Itinerary of the mission

Monday 5 Nov. 2001	Arrival of the Mission team at Peterborough Station, met by representatives of DEFRA, EN, EA and RSPB. Travel to Earith via the Nene Washes where the Mission meets local EN staff and has a brief opportunity for an overview. Meet the local EA flood defence staff at Earith on the Ouse Washes. Overview of the flood defence role of the washes and explanation of the channels, flows and gates at Earith. Short stop in the washlands before night falls at Sutton Gault Causeway. Travel to overnight accomodation near Downham Market (Andel Lodge).
Tuesday 6 November	Briefings by EA and EN on the flood defence scheme, natural values and management problems of the Ouse Washes at Denver Sluice complex, followed by a visit to the new Welmore Lake sluice. Discussions over lunch at the visitors' centre of Welney Wildfowl Refuge of WWT with stakeholders (cf. list above). Travel on Middle Level Barrier Bank southwards to Welches Dam nature reserve and visitors' centre of RSPB. Briefings on the development and modeling of important bird populations in relation to spring floods. Travel to overnight accommodation at Blakeney Hotel (North Norfolk Coast).
Wednesday 7 Nov.	Visit of coastal defence and habitat restoration works near Salthouse, Cley-next-the-Sea and Brancaster West Marsh. Lunch in Red Lion PH at Stiffkey. Travel to Kings Lynn Station to take the train to London.

	Informal dinner with national representatives of main stakeholders at Olio's Restaurant in Bayswater (London), hosted by the Director of Wildlife, Countryside and Flood Management of DEFRA (cf. list above).
Thursday 8 November	The Ramsar team discusses its impressions and first findings with the participants of the UK Ramsar Committee prior to their regular meeting in the afternoon (in the DTLR Eland House at Bressenden Square).