

NRA-Wales 19

The Cleddau
Catchment
Management
Consultation
Report
Summary



NRA

*National Rivers Authority
Welsh Region
Guardians of
the Water Environment*

February 1994

INTRODUCTION

The rivers, lakes, estuaries and coastal waters of Wales are subject to large and rapidly increasing demands from the users of water. Many different uses interact, or compete for water or water space, and will inevitably come into conflict with one another. The National Rivers Authority (NRA) was created in 1989 as an independent environmental watchdog. Its prime purpose is to maintain and improve the water environment and regulate the use of water by industry, agriculture and the private water and sewerage companies. The NRA's general duties include:



- Maintenance and improvement of water quality by control of pollution in surface and groundwater.
- Flood defence for people and property.
- Flood warning.
- Management of water resources.
- Maintenance and improvement of fisheries.
- Conservation of the natural water environment.
- Promotion of water based recreation.
- Navigation (in some rivers).

In addition, the NRA has a responsibility to reconcile conflicts between water users and plays a key role in the strategic management of the interaction between users of the water and land environments.

We believe it is important that the interests of all water users are considered in the development and protection of the water environment and have consequently chosen to promote our vision and management proposals via published Catchment Management Plans (CMPs).

YOUR VIEWS

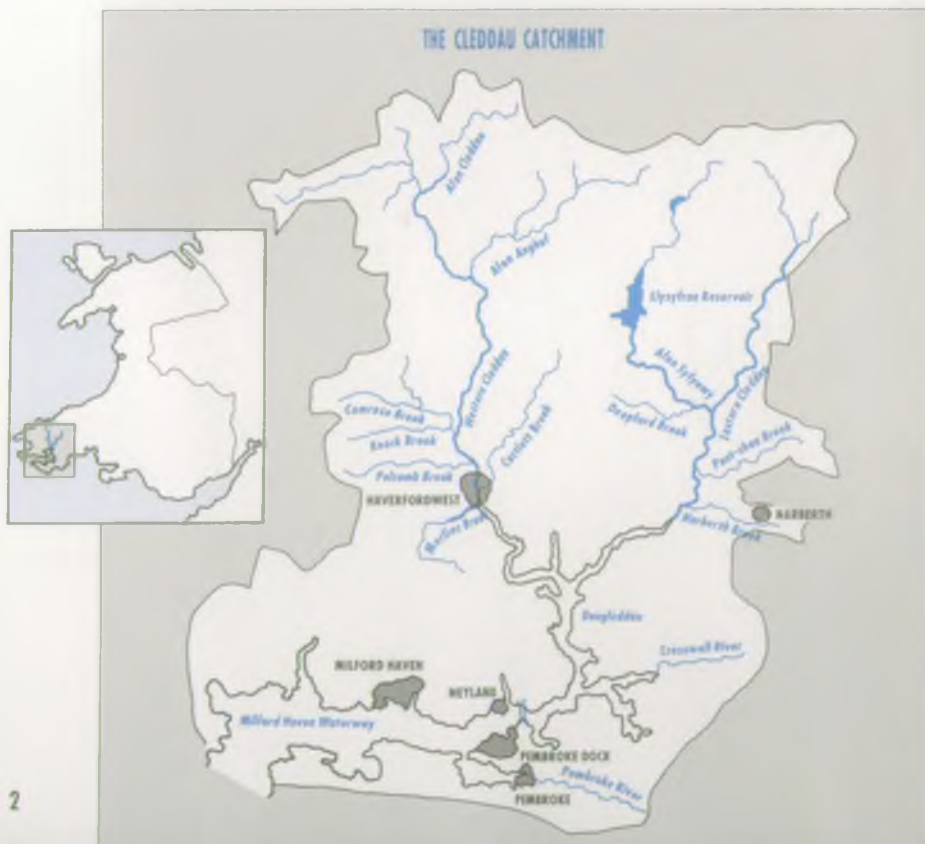
The Cleddau CMP Consultation Report is our assessment of the catchment and identifies the key issues which need to be resolved. These are outlined in the tables at the end of this summary report.

We need your views:

- What do you think about the Plan in general?
- Have we identified all the uses?
- Have we identified all the issues?
- What do you think about the options we propose?

If you would like to comment on the Consultation Report, or receive a copy of the full document, please write to:

THE AREA CATCHMENT PLANNER
NATIONAL RIVERS AUTHORITY
LLYS AFON, HAWTHORN RISE
HAVERFORDWEST, DYFED SA61 2BQ
TEL. HAVERFORDWEST (0437) 760081



CATCHMENT STATISTICS

GENERAL

| | |
|--------------------------|----------------------|
| Area | 810 km ² |
| Population (1991 Census) | 73,450 (provisional) |
| Population Density | 91/km ² |

TOPOGRAPHY

| | |
|----------------------------|--|
| Ground Levels | Max height 536m AOD |
| Sea Levels (Milford Haven) | Mean High Water Springs 3.29m AOD Mean Low Water Springs -3.01m AOD |

WATER QUALITY

Length of River in 1992 River Quality Survey

| | |
|-----------|--------|
| Very Good | 24.1km |
| Good | 34.5km |
| Fair | 2.1km |
| Poor | 0.0km |
| Bad | 0.0km |

Cleddau Estuary

Class A (highest class) 34.7km (100%)

Note: Minor tributaries not included in the above.

WATER RESOURCES

| | |
|--------------------------------|-------------------------------------|
| Annual Average Rainfall | 1250mm |
| Principal Reservoirs (volumes) | Llysyfran 10350MI Rosebush 640MI |

FLOOD PROTECTION

| | |
|--|-------|
| Length of Designated Main River | 181km |
| Length of River on which Flood Alleviation Schemes implemented | 30km |
| Length of River covered by a Flood Warning Scheme | 20km |

FISHERIES

Average Annual Declared Catches

| Rods (10 Year Average 1982-1991) | Salmon | Sea trout |
|----------------------------------|--------|-----------|
| Eastern Cleddau | 52 | 629 |
| Western Cleddau | 27 | 332 |
| Nets (10 Year Average 1983-1992) | 30 | 10 |

THE NRA'S VISION FOR THE CLEDDAU CATCHMENT

The Cleddau catchment is central to the popular holiday area of Pembrokeshire and is rich in wildlife, scenic attractions and opportunities for leisure activities. Some 75,000 people live within an area whose economy relies heavily on tourism and agriculture. The remote geographical location has largely deterred industrial development, apart from the oil industry centred around the deep natural harbour of Milford Haven. One might therefore expect the water environment to be largely undamaged by human activity but this is not the case.

The challenge of managing the catchment will be addressed by implementing solutions to the existing problems and encouraging imaginative proposals to allow sustainable economic and community development to proceed, whilst ensuring protection and improvement of the water environment. The interests of existing users must also be safeguarded.

The NRA's vision for the Cleddau during the lifetime of this Plan is to achieve improvements in water quality through reductions in the impact of sewage discharges and agriculture. In particular, the NRA is keen to see the proposed sewage disposal schemes from Pembroke/Pembroke Dock and Milford Haven become operational within the period of this Plan. The NRA would also wish to have a clear programme agreed with Dŵr Cymru to address inadequate Sewage Treatment Works and sewerage systems that contribute to other problems within the catchment. The impact of agriculture on water quality, and therefore on fisheries, is another major cause for concern within the catchment, particularly in the smaller streams which are so important as nursery areas for migratory fish. Pollution prevention work must realise some real improvements by ensuring that farmers construct appropriate waste disposal systems and implement effective waste management regimes in order that the full potential of the catchment can be realised.

The NRA recognises the high profile now being given to the competing uses of the Haven and Daugeleddau, and welcomes initiatives by the Milford Haven Port Authority and the Pembrokeshire Coast National Park to manage the recreational activities in this area. The NRA will continue to play a constructive role with other agencies where integrated management solutions are required in this, and other parts of the catchment. In particular, the NRA anticipates that this Plan will significantly influence the planning processes of local authorities.

The realisation of the NRA's vision will be achieved through a balanced management approach to all activities so that the optimal potential of the catchment can be obtained and sustained in active collaboration with all users of the catchment.

AN OVERVIEW OF THE CLEDDAU CATCHMENT

The rivers Eastern & Western Cleddau are branches of the Daugleddau, a tidal reach entering the Bristol Channel through Milford Haven. The catchment is characterised by intensive dairy farming although other forms of agriculture, including upland sheep farming and early potato growing, are favoured in localised areas.

The catchment is largely of lowland nature, although both rivers drain at least partially from the Preseli Mountains (536m). The land is sparsely populated, in farms and villages, with centres of population in Pembrokeshire's former market town, Haverfordwest (population 13,000) and in communities around the Haven: Milford Haven (14,200), Pembroke Dock (10,200) and Pembroke (5,500). Pembrokeshire is also renowned as a holiday area and the population increases two-fold during the peak season.

Industry is confined mainly to developments associated with the oil industry which constructed four oil refineries around Milford Haven in the 1960s. Although one refinery was demolished in the 1980s, the complex still has the largest refining capacity in Europe.

FLOOD DEFENCE

The lowland nature of the catchment produces a less flashy river than many catchments in Wales and the predominantly rural landscape ensures that few properties are threatened. The exception, however, is in the lower reaches of the Western Cleddau where the river flows through the town of Haverfordwest. Development has, over the years, encroached onto the flood plain and the main river channel is now inadequate, on occasions, to accommodate peak river flows and/or tidal surges.



Many of the capital improvement schemes undertaken in the past were aimed at providing improved drainage of upland fen areas in order to increase agricultural productivity. These improved artificial drainage systems require regular maintenance in order to maintain their effectiveness, and there is an on-going commitment to their maintenance where landowners have taken advantage of the improved drainage.

In general, tidal defences on the Cleddau do not constitute a significant

problem, although tidal surges can cause flooding in Haverfordwest, and recent storms have highlighted deficiencies in the sea wall at Dale. The latter, together with other sea defence structures, are the responsibility of the District Council and other owners.

Flood warnings are issued for the Cleddau catchment. They are predominantly focused on Haverfordwest and the adjoining flood plain.

FISHERIES

Both the Eastern and Western Cleddau support substantial salmon and sea trout rod fisheries, which are exploited by local people and the many visitors that are attracted to Pembrokeshire.

In the tidal Daugleddau, migratory salmonids are captured by licensed Compass nets. The method of operation is a rare form of stop net fishing and is believed to have been introduced to Pembrokeshire in the nineteenth century from Gloucestershire.

Llysyfran Reservoir (76 Ha.), which is located towards the top of the catchment, is one of the most popular put-and-take trout fisheries in Wales.

Coarse fishing in the catchment is almost non-existent, the only significant site being an unofficial coarse fishery at a flooded quarry in Treffgarne.



Shore based sea angling is only practised on a casual basis in the Haven and then usually off the rocky shores near the mouth, because many better locations are available on the nearby coastline. However, recreational boat fishing is popular in the Haven and its approaches, with mackerel, bass and pollack being the usual quarry.

CONSERVATION

The Cleddau is a river system of exceptional importance to wildlife, providing a range of habitats that support diverse floral and faunal communities. Twenty five Sites of Special Scientific Interest (SSSIs) have been notified, of which twelve are water related, with a further two sites proposed. The SSSIs range in complexity from open moorland, woodland and freshwater marsh communities to the mudflats, saltmarshes and



rocky shores of the Haven. Corsydd Llangloffan is a particularly important wetland SSSI in the upper reaches of the Western Cleddau, and has been designated a National Nature Reserve (NNR) for its range of fen vegetation and associated animals, many of which are locally scarce. Treffgarne Rocks is another important SSSI in this catchment, recognised at a national level as a Geological Conservation Review site. The importance of the Haven for wildlife is also now being recognised and bird counts confirm its internationally important status for wintering wildfowl.

Medieval economies depended on water power and the sites of water mills are nearly all of medieval origin, even if surviving buildings, weirs, ponds and leats may be of later build. The area contains many little studied and lost mill sites but also splendidly preserved examples of later mills such as Blackpool and Carew Tidal Mills.

The catchment area is covered by many ford, ferry and bridging points for a complex communication pattern developed over the last millennium. The lower reaches of the Daugleddau contain early wharves and quays and other sites and features of industrial and maritime archaeological significance. There are also a number of prominent medieval fortified sites; notable examples include the castles of Carew and Pembroke.

RECREATION

The catchment is almost surrounded by the Pembrokeshire Coast National Park, which also includes the Daugleddau. It is this coastline that attracts over 1 million holiday makers to Pembrokeshire each year, taking advantage of improved road links from the east and placing an enormous strain on inadequate sewage disposal facilities. The recently established Daugleddau



Trail now provides an almost complete circuit for walkers around the tidal reaches, upstream of the Cleddau Bridge. Towards the top of the catchment, Llysyfran Reservoir forms the centrepiece of the Llysyfran Country Park. This site is popular with summer visitors who take advantage of the picnic sites, perimeter footpath and the more formal facilities (cafe, shop and information centre). There is considerable water sports activity throughout the catchment. Scuba-

diving is concentrated mainly in the lower reaches of the Haven, especially around areas containing sunken wrecks. Water-skiing, whilst involving only about 5% of craft based in the Haven, is frequently practised in the lower Daugleddau and Haven, and jet skis are now becoming increasingly popular. Canoeing takes place throughout the tidal waterway and at Llysyfran reservoir, which is also used occasionally for dinghy sailing.

Limited numbers of bathers frequent a few small bays, most of which - excepting Dale and West Angle Bay - have restricted access and limited facilities (eg no car park, telephone or toilets).

BOATING & NAVIGATION

Recreational boating activity, and commercial shipping operations, are carried out extensively within the tidal waterway under the control of the Milford Haven Port Authority. There is no public right of navigation upstream of the tidal limits on the Eastern and Western Cleddau.

The Haven is one of the largest natural harbours in the world, and offers deep water access and moorings. Consequently it is used by the oil industry, ferry services, the Royal Navy and the fishing industry, making it the most important port in Wales and one of the largest in the United Kingdom.



In 1992 3,861 dues paying vessels arrived in the Haven (this figure excludes trawlers).

The lower catchment is heavily used by recreational craft, particularly at weekends and over holiday periods. Marinas have already been constructed at Neyland and Milford Haven, whilst small-boat activities and windsurfing thrive at Dale. Yacht and dinghy racing in the Haven and its approaches is extremely popular. Motor boats (private and commercial) and sailing craft utilise over 1100 moorings allocated in the lower catchment, the largest proportion being cruising yachts. The most popular locations for boating activity are in the Llangwm, Lawrenny, Hobbs Point, Pembroke Dock, Neyland and Dale areas. Rowing also takes place in the catchment, mainly in the upper reaches of the Haven, and includes use of the traditional Pembrokeshire longboats which race in coastal waters during the summer season.

The Welsh Development Agency and Wales Tourist Board have been promoting the Haven for a number of years, including its development as a new "International Maritime Park". The 1991 Tall Ships Race started at Milford Haven, part of a strategy to heighten awareness of the potential for recreational development.

WATER RESOURCES

The catchment is an important source of water for many purposes, including drinking, industry and agriculture.

Groundwater supplies are found in the more permeable, highly weathered and fractured rocks. The aquifers are confined to the southern part of the catchment where rainfall is less than 1200 mm per year.



River flows in the lower reaches of the Eastern Cleddau, and its tributary the Syfynwy, have been regulated since the completion of Llysyfran dam in 1971. The major water intake for potable supply is situated at Canaston just above the tidal limit on the Eastern Cleddau although other abstraction points from both rivers are also used.

WATER QUALITY

Water quality in the main watercourses is generally high, 97% of classified reaches being categorised as Very Good or Good in the 1992 River Quality Survey.

The sewage effluents from the major towns discharge to tidal waters which also receive trade effluent from three oil refineries. 48% by volume of all sewage discharged to the Haven is currently only partially treated or untreated. Current schemes and planned investments will substantially change this situation. No areas in the catchment have been identified by Welsh Office as falling within the scope of the EC Bathing Waters Directive, although limited numbers of bathers frequent small bays, and water sports are very popular.

The rapid expansion of dairy farms in the 1970s and the creation of fish farms, both on-river and in floating cages, have caused ecological impact within the catchment. In particular, releases of slurry and silage liquors from dairy farms into watercourses have caused some acute problems and chronic long term effects on river life. This issue has been the subject of intense regulatory activity in order to achieve an improvement in construction standards and site management.



ISSUES AND OPTIONS

The following tables list the issues and options which the NRA has identified in the Cleddau catchment. We would like to hear from you if:

- You think that there are other ~~issues~~ which we have missed.
- You think that we have not considered all the options.
- You have any views on the options suggested.
- You have any other information about the catchment or comment about its future management.

| ISSUE NO. 1 | | Elevated BOD and ammonia, and reduced DO levels as a result of agricultural activities in F and W Cleddau, cause stretches to fail FE1 target. | |
|---|-----------------|--|--|
| OPTIONS | Responsibility | Advantages | Disadvantages |
| <p>Targeted catchment control work in appropriate catchments. Identify farms for remedial waste management works.</p> <p>Propose interim target of FE2 and FE4 in affected stretches.</p> | NRA/Farm Owners | Will achieve improvements in long term. | <p>Costs to farmers are unknown. Costs to NRA dependent on extent of pollution prevention activities.</p> <p>Will not achieve FE1 targets in short term.</p> |

| ISSUE NO. 2 | | Elevated BOD and ammonia levels as a result of agricultural activities in the catchment, and as a result of sewage discharges from Crundale Pumping Station cause unclassified tributaries and the Cartlett Brook to fail the FE Class 1 target. | |
|---|-----------------|--|--|
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Improvement required to Crundale Pumping Station. | NRA/Dŵr Cymru | Long term improvements in WQ to achieve FE Class 1. | Costs: Unknown |
| Catchment Control work is required. | NRA/Farm Owners | Long term improvements in WQ to achieve FE Class 1. | Cost to farmers unknown. Cost to NRA dependent on extent of problem. |
| Set interim targets of FE2. | NRA | Will protect existing quality. | Not achieve FE1 targets in short-term. |

| ISSUE NO. 3 | | | |
|---|-----------------|--|--|
| Elevated BOD and ammonia levels as a result of agricultural activities, and a STW discharge on the Narberth Brook, cause it to fail its FE Class 1. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Narberth STW outfall was relocated to E. Cleddau in 1992. Has reduced loadings of sanitary determinands to the brook. This now allows determination of extent of agricultural problems. | NRA/Farm Owners | Achieve long term improvements in Water Quality. | Costs to farmers unknown. Costs to NRA dependent on extent of pollution prevention measures. |
| Propose interim target of FE2. | NRA | Protect existing Water Quality. | Will not achieve FE1 targets in short term. |

| ISSUE NO. 4 | | | |
|--|----------------|---|---|
| Farming activities impact on the catchment, ranging from chronic localised problems to acute problems causing fish kills, biological, fisheries and aesthetic impacts. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Extension of existing programme of farm inspections/liaison to include all catchments already identified by NRA. | NRA | Improvement of water quality & pre-empting pollution incidents. | Cost: Depends on number of visits. Major resource implications. |
| Improved farm effluent handling storage systems. | Farm Owners | As above, and 50% grant-aid available to farmers. | Cost to farmers unknown. |

| ISSUE NO. 5 | | Elevated BOD and ammonia levels with reduced DO concentrations as a result of localised sewerage problems causing Merlins Brook to fail its FE Class 1 target. | |
|---|-----------------|--|---|
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Improvements to local sewerage system in 1992 reduced sewage discharged from CSO to brook. | NRA/DCC | Result in improvement to WQ. | Costs £198k. |
| There are proposals for the St. Ivel Treatment Works (which discharges to the sewer but spillages/accidents can enter the brook via surface water drains) to be reconstructed on an alternative site in 1994. | NRA/DCC/St Ivel | Indirect improvements to WQ in stream by reconstruction and relocation of treatment works. | Costs unknown |
| Set target of FEC3 to be achieved by 1998. This interim target will allow determination of the extent of any agricultural problems in the catchment. | NRA | Ensure improvements in WQ. | Not achieving FE1 target in short term. |

| ISSUE NO. 6 | | Elevated BOD and low pH in River Sŷfynwy downstream of Rosebush Water Treatment Works. | |
|---|----------------|--|---|
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Improvements to Rosebush Water Treatment Works are planned. Due for completion in 1994. Setting and enforcement of appropriate consent standards to achieve compliance with the FE1 target by 1998. | NRA/Dŵr Cymru | Achieves improvements in WQ. | Costs. Total scheme £3.5m of which approx £700k is for washwater recovery system. |

| ISSUE NO. 7 | | | |
|---|----------------|---|--|
| Poor aesthetic quality in much of the Haven, because of the presence of sewage solids and debris. Highly variable bacteriological quality, frequently exceeding EC Bathing Waters Directive Standards, in high amenity areas. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Installation of sewage treatment at crude outfalls. £11m being spent by DCC before 1995 on Milford Haven, Pembroke/ Pembroke Dock. No confirmed scheme for Dale. | Dŵr Cymru | No discharge of identifiable sewage. Improved water quality in Haven estuary. | Cost £11 million (plus scheme for Dale). |

| ISSUE NO. 8 | | | |
|---|----------------|--|---|
| Occasional blue-green algae blooms at Llysyfran Reservoir, with possibility of eutrophication. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Development of Action Plan during 1993/4 for Llysyfran catchment, together with programme of farm inspections/ liaison 1994/5 onward. | NRA | Quantification of problem and identification of problem sites. | Cost of Action Plan: Unknown. Cost: Depends on number of site visits. |
| Improved farm effluent handling/storage systems. | Farm Owners | Improvement in water quality, reduction in nutrient inputs and pollution incidents. 50% grant-aid for farmers. | Cost to farmers unknown. |

| ISSUE NO. 9 | | Risk to potable water abstractions on Eastern and Western Cleddau from pollution incidents arising from agricultural activity within the catchment. | |
|--|----------------|---|---|
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Continuation of present programme of farm inspections/liasion in sensitive sub-catchments already identified by NRA. | NRA | Maintenance and improvement of water quality & pre-empting pollution incidents. | Cost: Depends on number of visits - ongoing. |
| Completion of time of travel work in the W. Cleddau catchment. | NRA | Intake protection, more accurate information to Dŵr Cymru. | Cost of remaining flow/reach work and report. |
| Improved farm effluent handling/storage systems. | Farm Owners | As above, and 50% grant-aid available to farmers. | Cost to farmers unknown. |

| ISSUE NO. 10 | | Very low level positive pesticide results at potable water intakes on Eastern & Western Cleddau. | |
|--|---|--|--|
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Development of a comprehensive monitoring programme for pesticides/herbicides in addition to existing programme. | NRA | Quantification and identification of sources within the catchment. | Cost: Unknown Resource implications |
| Improved methods of pesticide/herbicide handling/storage/ application within the catchment. | Farm Owners, Local Authorities and other users. | Improvement of water quality & pre-empting pollution incidents | Cost: Unknown |
| Continue liaison between NRA, Dwr Cymru & Environmental Health Depts., of District Councils. | NRA/Dŵr Cymru/ District Councils. | To enable detection of pesticides at potable water intakes. | |

| ISSUE NO. 11 Risk to potable water intake at Canaston on Eastern Cleddau from A40 road drainage. | | | |
|--|------------------------------------|--|----------------|
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Installation of 20m ³ on-line storage, together with oil interceptors, at each of two A40 junctions. Feasibility of diverting discharges downstream of intake should be assessed. | Dyfed County Council/Welsh Office. | Protection of intake 200m downstream from chemical spill entering river via road drains. | Cost: Unknown. |

| ISSUE NO. 12 Combined sewer overflows (CSOs) to the Western Cleddau in Haverfordwest. | | | |
|---|----------------|---|---------------|
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Implementation of remedial measures in the sewerage system identified by the NRA. Up-rating capacity of some sewers & installation of adequate screening. | Dŵr Cymru | Improvement of water quality and amenity value. | Cost: Unknown |

| ISSUE NO. 13 Biological quality, and fisheries status, is poorer than expected in the River Syfynwy downstream of Lllysyfran Dam. | | | |
|---|----------------|------------------------------------|----------------|
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Investigate cause of problem, and assess cost and desirability of taking remedial action. | NRA | Improvement of biological quality. | Cost: Unknown. |

| ISSUE NO. 14 There is an unacceptable impact on water quality and biological quality downstream of some Dwr Cymru operated STWs, resulting in NRA opposition to further developments in their catchments. | | | |
|---|----------------|---|---------------|
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Improvement of treatment at some STWs to comply with environmentally protective limits. | Dŵr Cymru | Improvement of water and biological quality, and removal of NRA opposition to development | Cost: Unknown |

ISSUE NO. 15

Prescribed flows below Dŵr Cymru licences of right (Syfynwy, E. Cleddau & W. Cleddau) are less than 95 percentile flows.

| OPTIONS | Responsibility | Advantages | Disadvantages |
|--|----------------|---|--|
| Desk study to identify if existing conditions do create an environmental problem and, if so, data collection and/or feasibility study of possible solutions. | NRA | Increased knowledge of catchment. Protection of the environment. | Studies will take a period of time and cost-effective solutions may not be apparent. Cost: Desk Study £2k |

ISSUE NO. 16

Abstractions at fish farms continue in low flows causing flows between inflow and outflow to fall below 95 percentile flow.

| OPTIONS | Responsibility | Advantages | Disadvantages |
|--|----------------|---|--|
| Desk study to identify if existing conditions do create an environmental problem and, if so, data collection and/or feasibility study of possible solutions. | NRA | Increased knowledge of catchment. Protection of the environment. | Studies will take a period of time and cost-effective solutions may not be apparent. Cost: Desk Study £2k |
| Enforce discharge consent conditions which require flow measurement. | NRA | Protection of flows and water quality | Cost: Unknown |

ISSUE NO. 17

Flow downstream of the Canaston abstraction, on the E. Cleddau falls below the 95 percentile flow.

| OPTIONS | Responsibility | Advantages | Disadvantages |
|---|----------------|---|-----------------------|
| Desk study to identify if existing conditions do create an environmental problem and, if so, investigate most effective use of reserve of water in Llysyfran for river management purposes. | NRA | Increased knowledge of catchment. Protection of the environment. | Cost: Desk Study £2k. |

| ISSUE NO. 18 | | | |
|---|----------------|--|------------------------------------|
| Abstractions licences for spray irrigation do not protect 95 percentile flows. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Grants to encourage winter storage for spray irrigation would assist in conversion from summer to winter abstraction. | MAFF | Less demand on summer water. Protection of the environment. | Cost: Unknown depends upon demand. |
| Co-operatives between farmers to ensure existing satisfactory winter storage is fully utilised. | NFU/FUW/NRA | Less demand on summer water. | |

| ISSUE NO. 19 | | | |
|--|----------------|---|---------------|
| The state of the Catchment, in water quantity terms, cannot be adequately assessed until a Regional licensing policy is available. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Implement the Regional licensing policy in the Cleddau catchment as soon as possible. | NRA | Improved understanding of resource balance. | Timescale |

| ISSUE NO. 20 | | | |
|---|----------------|--|---------------|
| There are no flow measurement facilities on smaller watercourses. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Hydrometric review of the catchment to assess benefits and cost of installing additional flow measurement facilities. | NRA | More accurate flow assessment to enable better determination of licences and consents. | Cost: £10k |

| ISSUE NO. 21 | | | |
|---|----------------|-----------------------------------|---------------|
| Flow regimes appear to have changed in the catchment in recent years, possibly as a result of land use changes. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Desk study to assess available data, including take up of agricultural land drainage, to determine if there is a change in hydrological regime. | NRA | Increased knowledge of catchment. | Cost: £5k |

| ISSUE NO. 22 | | | |
|---|----------------|-----------------------------|---------------|
| Flood protection standards on the Cortlett Brook, in Haverfordwest, are sub-standard. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Study to investigate problem and identify possible solutions. | NRA | Increased flood protection. | Cost: £10k |

| ISSUE NO. 23 | | | |
|--|----------------|----------------------------|---------------|
| Flood protection standards on the Western Cleddau in Haverfordwest are sub-standard. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Study planned to identify possible solutions. | NRA | Increased flood protection | Cost: £10k |

| ISSUE NO. 24 | | | |
|--|----------------|--|---------------|
| S105 Surveys, to identify the extent of lands liable to flood, have yet to be undertaken. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Undertake surveys. National timetable is under consideration. Priorities to be set in consultation with Local Authorities. | NRA | Flood plain & flood defence problems identified, to enable NRA to advise Local Authorities for Local Plans | Cost: Unknown |

| ISSUE NO. 25 | | | |
|--|----------------|--|---|
| Availability of spawning gravels severely restricted in upper Western Cleddau. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Habitat improvement and/or re-creation. e.g. gravel raking, importation, stabilisation, improving fish access. | NRA | Increased natural productivity of catchment. | Cost: Unknown. Maintenance requirement? |

ISSUE NO. 26

Land drainage schemes, undertaken in the upper Western Cleddau catchment in the 1970s to enable improvements in agricultural productivity, damaged the river ecosystem.

| OPTIONS | Responsibility | Advantages | Disadvantages |
|--|-----------------------------|--|--|
| In-channel & riparian habitat improvement to reverse impact of land use changes/river engineering schemes (review in progress). | NRA | Reverse trend of degradation to benefit of both fisheries and conservation | Cost: Unknown |
| Discussion with land-owners and Welsh Office to determine whether a modified maintenance regime can be implemented. | NRA/Welsh Office Landowners | Reduced cost of maintenance. Allows desired improvements to proceed | Some land may be lost to agriculture |
| Give consideration to applying one or more of the schemes promoted under EC Agri-Environment Reg. EC2078/92, to create water fringe buffer zones throughout much of the catchment. | Welsh Office/CCW/NRA | Allows restoration/improvement of riverside ecosystems | Some land may be lost to agriculture Cost of compensating farmers |

ISSUE NO. 27

Obstructions to the passage of migratory fish.

| OPTIONS | Responsibility | Advantages | Disadvantages |
|--|----------------|--|---------------|
| Identify improvements where appropriate, and implement rolling programme of works. | NRA | Natural productivity of catchment will be improved | Cost: Unknown |

ISSUE NO. 28

Effective fish exclusion screens have not been installed at the intake to Vicar's Mill fish farm.

| OPTIONS | Responsibility | Advantages | Disadvantages |
|---|----------------|--------------------------------|---------------|
| Seek agreement with the owner on the installation of an effective screen. | NRA/Owner | Protection of wild fish stocks | Cost: Unknown |

| ISSUE NO. 29 | | | |
|---|----------------|---------------------------------|---------------|
| Effective fish exclusion screens are not in use at the potable water intake at Camaston, E. Cleddau | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Progress the testing of the existing electric screen, and take appropriate action to ensure an effective screen is operational. | Dŵr Cymru/NRA | Wild fish stocks are protected. | Cost: Unknown |

| ISSUE NO. 30 | | | |
|---|----------------|-----------------------------------|--|
| The fisheries protection scheme, instigated to offset the impact of Ulysyfran Reservoir, has not been implemented successfully. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Determine effective mitigation measures to replace existing procedures and implement. | NRA/Dŵr Cymru | Restore productivity of catchment | Cost: Unknown. Resource implications unknown |

| ISSUE NO. 31 | | | |
|--|----------------|-------------------|---------------|
| "Standards of service" for SSSIs have not been formally agreed with CCW. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Agree "standards of service" and implement. | NRA/CCW | SSSIs safeguarded | Cost: Unknown |

| ISSUE NO. 32 | | | |
|---|--|--|---|
| The invasive plant, Japanese Knotweed, is present in many parts of the catchment. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Implement effective and co-ordinated control measures within the catchment. | NRA/PCNP/DCC/CCW/Local Authorities & land owners | Environmental, and access improvements | Financial and resource implications unknown. Likely to be a long term commitment. |

| ISSUE NO. 33 | | | |
|---|-------------------|---|---------------|
| A long distance trail around the upper estuary, being promoted by PCNP, has yet to be fully implemented (Slebech & Picton Park) | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Continue negotiations with landowners on remaining lengths to enable full circuit to be opened. | PCNP & Landowners | Full circuit complete, providing excellent access around the waterway | Cost: Unknown |

| ISSUE NO. 34 | | | |
|---|-------------------|---|---|
| Limited public access to freshwater reaches of the Eastern & Western Cleddau. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Consider the adequacy of the existing footpath network and take appropriate action. | Local Authorities | Better public access to river in important tourist area | Cost of provision and maintenance Possible disruption to other users, including landowners/occupiers |

| ISSUE NO. 35 | | | |
|--|-----------------------|---|--|
| Development of floodplains, especially in Haverfordwest, conflicts with flood defence requirements. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Close liaison between NRA and Local Authorities to ensure protection standards are not compromised. Keep river banks free from development. | NRA/Local Authorities | No reduction in existing flood protection. Developer pays, not public funds. Ensures existing banks & defences can be maintained and new defences constructed. Banks will be more attractive. | Cost to developer Reduction in land available for development |

| ISSUE NO. 36 | | The A40 London to Fishguard road has been designated a Euroroute and will require upgrading at various locations, in close proximity to watercourses. This will require the NRA to safeguard its interests. | |
|---|------------------|---|--|
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Close liaison between the NRA and Welsh Office to ensure NRA interests are protected. | NRA/Welsh Office | NRA interests are taken into account as scheme developed and implemented. Environment & property protected. | Cost of mitigation works dependent on scheme. |
| Ultimately, representations to Welsh Office/Public Inquiries if matters not resolved to NRA satisfaction. | NRA/Welsh Office | Every effort made to protect NRA interests. Developer may have reduced costs if NRA representations unsuccessful | Cost of dealing with issues at Public Inquiry high. Late changes to schemes can be costly and not as effective. NRA interests may not be adequately protected. |

| ISSUE NO. 37 | | Illegal fishing, particularly in the estuary, reduces the stock of migratory fish for bona fide fishermen and spawning. | |
|--|------------------------------------|---|--|
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Continue enforcement of legislation, in conjunction with other enforcement agencies. | NRA and other enforcement agencies | Protects stocks for legitimate harvesting and spawning. Ensure byelaws controlling fishing in the manner intended | Cost of enforcement activity |
| Review effectiveness of SWSFC Byelaws after a trial period. | NRA/SWSFC | | Cost of monitoring effectiveness and promoting any changes |

| ISSUE NO. 38 | | | |
|--|-------------------------|--|-----------------------------------|
| Conflict within Milford Haven and the Daugleddau between the various boating and water contact sport participants, and also between them and wildlife. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Monitor effectiveness of MHPA zoning arrangements. Amend as necessary in consultation with other agencies and water users. | MHPA/PCNP/CCW | Ensure that the zoning system is having the desired effect. | Cost of the water warden service. |
| Monitor effectiveness of the PCNP water warden service, designed to heighten awareness of the issues and implement the zoning system. Implement changes as necessary after consultation. | PCNP/MHPA/CCW/LAs/Users | Ensure zoning system implemented with the support of as many users as possible | Cost: Unknown |

| ISSUE NO. 39 | | | |
|--|------------------------------------|---|---|
| A range of water quality problems impact on fish farms and shell fisheries, in the Haven, including oil spillages, TBT, chemical spillages & sewage. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Monitor the ecotoxicological effects of discharges and background levels to enable implementation of necessary controls. | NRA in consultation with MAFF/HMIP | Identification of causal factors and sources contributing to effects. | Cost of monitoring and any remedial work/controls identified. |

| ISSUE NO. 40 | | | |
|--|----------------|--|-------------------------|
| Impact of dredging and spoil dumping operations on sub-littoral fauna and flora within the Haven. | | | |
| OPTIONS | Responsibility | Advantages | Disadvantages |
| Continuation of monitoring of impact of dredging activity by CCW & NRA, in consultation with MAFF. | CCW/NRA/MAFF | Quantification and identification of problems. | Costs not quantifiable. |

