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The Common Sea-urchin
Photographer: Paul Kay
(From the book: *Ireland's Marine Life. A World of Beauty*)

HEDGES IN IRELAND

EDITORIAL

By Matt Murphy

IN the past 30 years we have seen the removal of hedgerows and stonewalls from agricultural land throughout Ireland. Many older farmers were shocked at such destruction. They knew that these provided valuable shelter for stock during bad weather and acted as a windbreak for both stock and crops. Also, hedges and trees helped to remove surplus soil water.

Recently many hedgerows and stonewalls have received a new lease of life with the introduction of the EU funded Rural Environmental Protection Scheme (REPS).

Its objectives are:

* to establish farming practices and controlled production methods which reflect the increasing concern for conservation, landscape protection and wider environmental problems.
* to protect wildlife habitats and endangered species of flora and fauna.
* to produce quality food in an extensive and environmentally friendly manner.
* to provide recognition of farmers as guardians of the countryside.
* the scheme is designed to reward farmers for carrying out their farming activities in an environmentally friendly manner.

The uptake on this scheme throughout Ireland has been enormous and its contribution to the protection of the environment for future generations will be immense. Under REPS participants are required to maintain hedgerows and stonewalls in the interest of wildlife and scenic appearance of the area. Care must be taken not to use heribcides, pesticides and artificial fertilisers near hedgerows and stonewalls so as to protect the plant life and animals.

It is difficult to estimate the length of hedgerows and stonewalls lost in Ireland in the past 30 years - a conservative estimate would be 50,000 miles as Britain has lost 209,000 miles between 1947-1990 - enough to girdle the earth eight times. As a result of these losses large parts of Britain, notably in the eastern counties are devoid of both features and wildlife. There the nooks and crannies of the countryside - the field corners, green lanes and old fields have gone.

There the Environment Act 1995 has provided a legal basis for protecting important hedgerows. The environmental group Council for the Protection of Rural England are pressuring government by:

* arguing for more money for hedgerow management and new plants.
* piloting hedgerow surveys
* monitoring hedgerow loss.

The wildlife that inhabits hedgerows and stonewalls is mind-boggling - birds, mammals, insects. Hundreds of plants from the common cowslip to rare ferns and orchids are found in them. (See figure "Life in the Hedgerows" for some of these.)

Surely the time has come for government here to take the initiative and issue guidelines for the protection of hedgerows and stonewalls. Local authorities must look at how they care for roadsides. Much unnecessary damage is done in the cutting and trimming by machines. One realises there is a cost factor but surely the butchery must stop. One can find arguments as to why they should be included with the REPS Scheme funded by the EU.

It is hoped that Brussels will increase the funding of REPS so that farmers receive extra payment for even more environmental care on their lands. Some urban dwellers may have a difficulty with farmers receiving grant aid from Brussels for protecting the environment. They must realise such payments are necessary because of the heavy cost factor in the upkeep of the following:

* hedgerows and stonewalls
* peatlands
* woodlands
* lakes & ponds
* marshes
* historial and archaeological features.

All of us, whether rural or urban dwellers, benefit from the countryside. Therefore it is logical that we should, indirectly through taxes, pay for the privilege. Life would be meaningless without the wonderful features of our countryside.

A final thought - it would be helpful if Bord Failte and Birdlife Ireland took a more vocal role in getting government to put hedgerows and stonewall preservation and restoration higher up the priority list.

Life in the Hedgerows

Ash
Bank-vole
Beech
Blackberry
Blackbird
Blackthorn
Blue Tit
Broad-leaved dock
Bullfinch
Burying Beetle
Buttercup
Cardinal beetle
Celandine
Chaffinch
Cleavers
Cockchafer beetle
Cockchafer larva
Common frog
Common oak
Common Spike rush
Common Vetch
Common Violet
Common Wasp
Cow-parsley
Crab Apple
Dandelion
Dunnock
Earthworm
Elder
Elephant Hawkmoth
Elm
Emperor Moth
Fieldfare
Fuschia
Garden Spider
Gatekeeper butterfly
Gorse
Great Black
Slug
Great Tit
Greenfinch
Grey Partridge
Ground-ivy
Hard Fern
Hart's-tongue fern
Hawkweed
Hawthorn
Hazel
Hedge Bindweed
Hedge Garlic
Hedge Parsley
Hedge snail
Hedge Woundwort
Hedgehog
Herb Robert
Hogweed
Holly
Honey-bee
Honeysuckle
Hop
Humming-bird Hawkmoth
Ivy
Kestrel
Knapweed
Lady's Bedstraw
Ladybird
Lesser Celandine
Lilac
Linnet
Lords-and-ladies
Male Fern
Mason wasp
Mesh-web Spider
Mistle Thrush
Orange-tip butterfly
Painted Lady butterfly
Periwinkle
Poplar
Primrose
Privet
Pygmy Shrew
Rabbit
Red Admiral butterfly
Red fox
Red-tailed bumble bee
Robin
Rose
Rowan
Shield-bug
Small Tortoiseshell butterfly
Soldier beetle
Song Thrush
Speckled Bush-cricket
Speckled Wood butterfly
Stinging Nettle
Stitchwort
Stoat
Traveller's Joy
Tutsan
Violet Ground beetle
Whitethroat
Wild Cherry
Wild Strawberry
Willow
Wood Mouse
Wood Pigeon
Wood Avens
Wren

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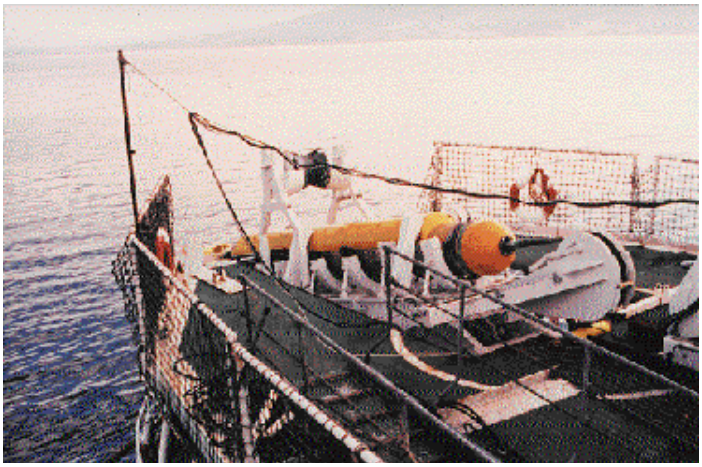
Land Under the Sea



GLORIA - ready for launch

By Raymond Keary

WE are told in school geography books that Ireland is an island of approximately 75,000 kms. sq. I would like to suggest that this idea is out of date. The total area of the country is much more, about 1,000,000 kms. sq. of which only a small part is visible above the water, like an iceberg. Due west of Co. Donegal, it extends beyond the 25 degree line of longitude. To put this in context, remember that the line of 10 degrees longitude goes through Achill Island and that 0 degrees longitude runs through Greenwich, near London. The distance from the west coast to the western boundary of Irish territory is equivalent to the distance from the west coast to the Netherlands. The greater part of this area is almost unexplored. We have a rough idea of the major features on the seabed. Oil and gas exploration companies have looked at some areas which are of interest to them. Academic institutes have looked at a number of small areas.

A million square kilometres of territory about which we know almost nothing is an economic factor which we cannot continue to ignore. What could we use it for? It is under water, varying in depth down to 5,000 metres. In fact it may be as important to us as all the grassland in Ireland.

The shape of the seabed influences the movement of currents, the spawning, breeding and feeding grounds of fish stocks. We have only a very vague idea of its contours.

The currents also have an effect on our weather. In an era of climatic change this may be critical in planning terms. Gas is already being produced off the coast. There is certainly more there in addition to crude oil. As technology develops towards deeper-water production the engineering properties of the sea-bed will become a matter of life or death. The fishing industry is reaching out into deeper water, searching for new commercial species in new grounds. A knowledge of the details of the bottom topography is essential if the correct fishing gear for the ground is to be used.

There is an important mining industry in Ireland, on land. It is probable that there are a large number of valuable deposits of metallic ores on the seabed.

Within the last decade three areas of technology have developed in parallel, creating a situation which makes its feasible to map the seabed over large areas.

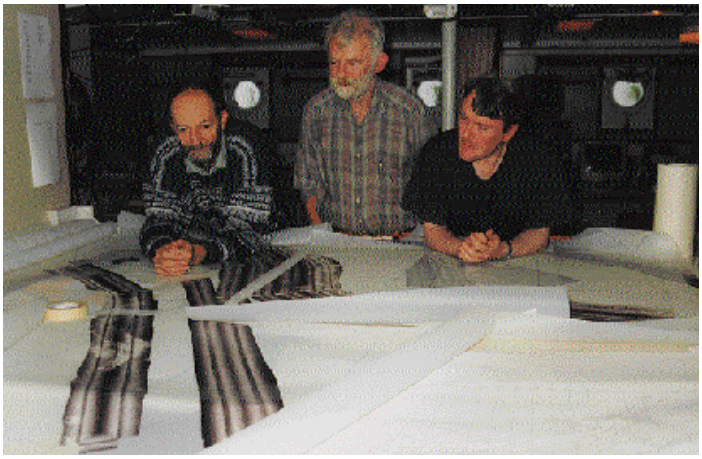
The first is a high accuracy, world wide navigational system known as the Global Positioning System (G.P.S.). This uses satellites to form a base line from which ones position can be obtained anywhere in the world with high accuracy regarding other places. Previous systems were either localised or of low accuracy.

The second is in the acoustic field. Light and radio waves have a limited power of penetration in water. Sound waves, however, work very well under water. The principle of echo-sounding goes back to the Second World War. Its applications were very limited without the ability to deal with very large numbers of calculations quickly and cheaply. This was provided by the development of computers. It is now possible to sail along in a ship at a reasonable speed, always knowing exactly where you are and carrying an instrument which emits numerous acoustic beams which re-echo from the seabed. These return to the instrument, having rebounded from the bottom and can be analysed to tell you, not only the depth, but the type of bottom beneath.

In August 1996, an area of seabed approximately twice the size of the land area of Ireland was surveyed, using such an instrument. GLORIA means Geological Long Range Inclined Asdic. It was designed and built by the Institute for Oceanographic Sciences (now the Southampton Oceanographic Centre - SOC) in England and was made available to Ireland under an E.U. programme. The Marine Institute provided funds for ship charter and other essentials. The Geological Survey of Ireland (GSI) and the Dublin Institute for Advanced Studies (DIAS) set up Government organisations to plan and run the project. At present two students are in Southampton undergoing training in processing the data which was obtained. Over the next year we hope to learn a lot about part of our underwater territory which we did not know before.

This is only a small part of the answer to the problems we face. There is a huge area which has yet to be surveyed at a reconnaissance scale. When this is completed, it will be possible to pick out the areas of most interest from various points of view and examine them more closely. This work, to be useful, will have to be combined with a number of other types of study, within the water column and under the seabed.

Raymond Keary, Senior Geologist, Marine, Geological Survey of Ireland.



Photos: Dr. Peter Readman - DIAS

Neil Kenyon (SOC), Raymond Keary (GSI) and Brian O'Reilly (DIAS) examining the mosaic of scans from the seabed.

INVESTORS WITH A GREEN CONSCIENCE

THE Dutch government recently made investments in green funds fully tax-deductible, in an attempt to attract money for sustainable investments from the Dutch public. And it works. So well, in fact, that fierce competition now surrounds green projects.

Well - meaning companies applying for loans to erect a number of wind turbines on their site generally get short shift from their bank. The return on sustainable investments is just too low for a long-term mortgage. But since 1995, things have been better. In January of that year the government introduced a tax scheme to encourage green investment. Basically, anyone who invests in green shares or certificates pays no tax on the dividend and interest he receives, no matter how high the investment. This has helped the banks attract a great deal of "green money", which they are allowed to invest only in projects approved by the government. Up to now, these have mainly involved wind and solar energy and organic farming. But forestry, nature conservation, eco-friendly technology and agrification (the processing of agricultural products for non-consumptive purposes) projects are also eligible.

Companies have to meet a whole range of requirements to qualify for a "green certificate". The money has to be invested in the Netherlands. The project must not be so profitable that it could be funded in the normal way. But it has to make a certain amount of profit, because the government is offering no guarantees. The banks bear the risks themselves. The projects also have to be technically innovative. Banks cannot slap a green sticker on any old project. They have to ensure that at least seventy per cent of the invested money is spent within two years on government-approved green projects. They are free to use the other thirty per cent as they see fit. They tend to use it for low-risk investments such as government bonds, so that they can cash them in quickly if necessary.

Over-optimistic

The environmental bees have certainly started buzzing around the financial honey pot. Eight green funds were established in the first year, with 1.5 billion guilders' worth of planned investments. More than 850 million guilders' worth of projects have already been approved.

Most of the investments will be spent on sustainable energy - wind turbines being the most popular - and organic farming. Forestry and nature conservation, sustainable housing and innovative environmental technology, the other projects eligible for a green label, have attracted little interest. "It's not like a box full of sustainable ideas has suddenly been opened," says C. van Arendonk of ASN Bank, one of the six banks that have a launched a green fund. "Most of the projects are a continuation of things that already exist.

It might be that people who would really benefit don't know about it yet. Another thing that wind energy has in its favour is that wind turbines are very tangible things. You set them up, and they work."

Although forestry and the conservation of wildlife habitats and the landscape are key features of the green scheme, investments in these sectors are proving less popular. The idea was that 1200 hectares of extra woodland would be planted each year on agricultural land.

However, by the end of last year only one forestry project and a few nature conservation projects had been certified as green. "Trees grow slowly and the return is low," explains Jacques Urselmann, who works at the Ministry of Agriculture, Nature Management and Fisheries, which helped set up the scheme. "We were a little over-optimistic about the yield on forestry projects." The green fund was to encourage farmers to convert their fields to woodland. This is not happening, because it would entail a major loss of wealth for farmers. On average, wooded land is worth a great deal less than agricultural land. Also, investments in forestry are often based on different, non-commercial considerations to investments in the rest of the economy. The availability of cheap loans has done little to change this.

Poorest countries

Foresters, environmental technologists and banks (who are struggling with a lack of green projects) are all calling for an expansion of the green certification scheme. The commercial banks would also like to see "pale green" (less environmentally friendly) investments included in the scheme. Pieter Hamelink of the Dutch environment ministry's Environmental Investment Department is against this. "Then you might get a road tunnel underneath a wood being certified as green," he warns. "After all, it wouldn't damage the wood. But I don't think that's the point. We deliberately made a cautious start with certification to wait and see what happened. Now there's scope for the green scheme to be applied on a broader basis, as long as it has a positive impact on green investment.

The ministry is thus more inclined to listen to the wishes of the environmental sector. A great many adjustments have been made to the tax scheme. Since 1 November 1996, foresters have been allowed to count grants and membership fees as profit. This is important because forests are often entirely dependent on government support. The agriculture ministry is considering including green market gardening companies and livestock farmers with low mineral emissions in the green scheme.

Sustainable new housing was also included in the scheme recently. Here, too, the ministry is starting cautiously. For a trial period of two years, ten thousand new homes can be financed partly from green funds, under certain conditions. Green funding can be used for only part of the purchase price, and only for homes that cost no more than 400,000 guilders. People buying more expensive homes are expected to be able to pay for the environmental investment themselves.

The green scheme will soon no longer be restricted to the Netherlands. In December 1996, the Dutch Parliament proposed that it be expanded to cover the 48 poorest countries in the world (known as LLDCs). The proposal was adopted and the idea will be further elaborated. Most of the people in these countries use electricity at their fuel source, so there is great potential for solar energy. The minister is currently considering how the sustainability agreements concluded with Bhutan, Benin and Costa Rica can also be brought into the scheme.

Boost

The ultimate aim of the scheme is of course to encourage the use of sustainable technology. According to Hamelink, it's still too early to say anything about its effects. "We've assessed the effects of grants in the past, but it's always difficult to say whether things would have happened anyway without the scheme. But a number of projects have been given a major boost."

One example is a project which uses residual heat from the Roka 3 electricity generating plant in Bleiswijk, South Holland, to heat a large area of greenhouse. "This project saves enough energy to power a town with 100,000 inhabitants," says Hamelink. "But it is also technologically innovative. The CO_2 produced by the plant is used to promote plant growth in the greenhouses. And the heat exchanger developed for the project might also be useful to other countries, particularly former Eastern bloc countries where energy is still used highly inefficiently."

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The Hottest Trends in Tyre Recycling

By Jerry Powell

Resource Recycling

AS a rapidly maturing industry, tyre recycling is undergoing significant change.

Tyre recyclers are proving as durable as the product they process. Even as some are making money and others are losing big dollars, huge volumes of tyres are disappearing from the American landscape, and recent industry trends point to even greater success ahead.

Trend No. 1: TDF (tyre-derived fuel) to the top

Fueling the growth in scrap tyre recovery is the fuel market, with the majority of scrap tyres being processed into tyre-derived chips for use in solid-fuel boilers.

Currently, some 80 facilities in 34 states burn tyres to recover energy, including cement kilns, paper mill boilers, electric utility boilers and industrial boilers. In addition, the Scrap Tire Management Council (Washington) estimates that an additional 80 facilities are in various stages of permitting or testing. About 1.3 million tonnes of scrap tyres are used in these plants annually, reports STMC.

Although tyre-derived fuel (TDF) is the volume leader in recovered tyre uses, it is not an easy market to play. When other solid fuels are plentiful and cheap, as they have been for much of the 1990s, TDF producers suffer. For example, National Tyre Services (South Chicago Heights, Illinois), operator of seven scrap tyre processing facilities, filed for bankruptcy in January 1996. Waste Recovery (Dallas), the largest TDF producer, has only recently returned to profitability.

In addition to problems for some processors created by low prices, TDF users are encountering an emerging problem. The presence of zinc in boiler ash has raised the interest of federal environmental regulators. The typical scrap tyre contains about 1.4 percent zinc in the form of zinc oxide, and federal regulations require the reporting of any chemical - including zinc compounds - when the amount exceeds 1 percent by weight of the fuel. Because zinc oxide is not harmful to humans (we put it on our face as a sunblock), efforts are underway to have the U.S. Environmental Protection Agency relax its reporting requirement on TDF users.

Trend No. 2: Civil engineering applications are hot

Scrap tyre chips have many properties that make them good candidates for use in construction projects.

Research by Dr. Dana Humphrey of the University of Maine shows that tyre chips are lightweight (one-third of one-half as heavy as gravel), have low lateral earth pressure (i.e., they won't push walls over), provide good thermal insulation and offer good drainage (10 to 100 times better than some soils). Thus, many contractors are using tyre chips as lightweight fill, for retaining wall backfill, as insulating layers and as drainage material.

For example, a number of landfill operators have put a layer of tyre chips on a capped fill for drainage purposes. Emanuel Tire (Baltimore) has placed nearly 21,000 tons of wire-free tyre chips as a two- to four-inch layer on top of the sealed Garett County, Maryland landfill. The tyre chips, with a soil layer atop, disperse water. Virginia Recycling (Providence Forge, Virginia) has completed several similar projects. The company shreds approximately 150,000 scrap tyres per year for use as landfill cover.

Trend No. 3: Adding that value

As with other high-volume recyclables, the push is on in the tyre recycling industry to produce higher value products. This change in the industry comes in the form of a surge in crumb rubber production and use.

The reason is simple. Tyre-derived fuel often garners just one or two cents (US) per pound. Thus, the economics of TDF production are tip-fee-based (scrap tyre suppliers need to be charged a fee to cover processing costs).

Ground rubber from old tyres, on the other hand, sells for eight to 50 cents per pound, depending on its size and quality. Thus, according to Will Ferretti, NRC's executive director and former head of New York State's recycling market development program in Albany, tyre reclaimers can move towards a "market -based economy."

A number of crumb rubber producers jumped into the field after the passage of the federal interstate highway act in 1991. The law required state highway agencies to use rubber from scrap tyres in growing percentages as an asphalt modifier in federally funded highway construction. As subsequently reported a firestorm of protest from state officials and the conventional paving industry lead to a recession of the federal requirement.

Nonetheless, a number of states, including Arizona, California, Florida and Texas, are still using significant quantities of rubber-modified asphalt, reports Bob Winters, president of Atlos Rubber (Los Angeles). He estimates that the amount of crumb rubber-modified asphalt used in highway maintenance projects increased last year by 5 to 10 percent.

However, the overall effect of the federal highway act was negative, as "too many start-up crumb rubber operations" were launched, says Winters. Many of these producers make poor quality crumb rubber, thus hurting the overall industry, and conducted "little or no market research," Winters notes. Since 1991, he says, "we've shown that all crumb rubber isn't the same." As one industry observer notes, "The tyre recycling industry is full of dreamers, schemers and wannabes."

Trend No. 4: Tyre wire is now a recyclable

Crumb rubber producers want to buy rubber, not tyre wire and the other nonrubber materials found in a scrap tyre carcass. About 10 percent by weight of a scrap tyre is wire, and a concerted effort is underway to recover this material.

Volumes can be substantial. For example, Waste Recovery generates 2,000 tons per month of tyre wire at the firm's four plants that have wire recovery systems.

And this is high-quality, high-carbon, high-strength steel. For example, steel belting wire contains a coating with 66 percent copper content, and steelmakers love to have copper in their mix.

However, steel recovery from scrap tyres "isn't necessarily easy," notes Greg Crawford, vice president-recycling of the Steel Recycling Institute (Pittsburgh). Of great concern to the nearly one dozen consumers of tyre wire is the amount of rubber attached to the wire, because rubber-contaminated ferrous scrap causes changes in steel mill air emissions. A second issue is the difficulty in processing tyre wire, given that most balers are insufficient in producing a furnace-ready bale.

A pile of tyre-derived fuel awaiting transport at Waste Recovery Inc.'s Dupo, Illinois facility, in the U.S.

Trend 5: Some governments are ready to help

Although state activities in other areas of recycling are declining, programs targeting tyre recycling continue.

For instance, the Indiana Department of Commerce (Indianapolis) has awarded a $479,000 no-interest loan to Envirotech Extrusions (Richmond, Indiana) to expand its tyre recycling plant. The company will use 4,000 tons of scrap rubber annually in the manufacture of extruded rubber sheets that are sold to the die-cut industry to make items such as livestock trailer walls, truck-bed liners and landfill caps.

Government efforts to boost tyre recycling are particularly strong in Canada. The Alberta Tire Recycling Management Board intends to spend $13 million ($CN) over three years to help establish and maintain a number of tyre recovery operations. The board has aided a number of firms, and now five Alberta companies shred tyres, with two making crumb rubber in addition to TDF. Two additional companies in the province manufacture recycled products from scrap tyres.

A similar, government-established program operates in Manitoba, and a voluntary tyre recycling system has just been launched in Saskatchewan.

Trend No. 6: Recycled rubber in new tyres

A potentially huge tyre recycling market is being investigated by Michelin Tire Co. (Greenville, South Carolina).

Several years ago, Ford Motor Co. urged Michelin to see if a high-quality tyre could be made that included 10 percent post-consumer tyre rubber. Since that time, Michelin researchers have used finely ground scrap tyre rubber in making prototype all-weather tyres. According to Dr. Kevin Wallace of Michelin, the key properties of recycled-content tyres, such as the degree of wear resistance, roll resistance and tread life, are essentially the same as regular new tyres.

Other industry experts, including Jack Zimmer of Goodyear Tyre and Rubber (Akron, Ohio), contend that such a recycling application just isn't feasible. Zimmer notes that the typical scrap tyre contains four different types of rubber and eight types of carbon black, thus making recovered crumb rubber an unsuitable hodgepodge.

Nonetheless, Michelin scientists are now field testing the recycled-content tyre and determining if it can be made at commercial-production levels. In addition, recycled content is now being tested in other types of Michelin tyres.

Trend 7: Specs and standards are on the horizon

In recognition of the emerging nature of the tyre recycling industry, plus the unreliability of some of the recovered products made by some processors, a set of standard-setting committees are at work within the American Society of Testing and Materials (West Conshohocken, Pennsylvania).

A major impediment to expanded use of crumb rubber is the lack of a universally accepted specification for the material. That may change. ASTM members will soon vote on a draft crumb rubber specification developed by a committee of rubber scientists, tyre reclaimers and crumb rubber users. The draft classification scheme will require crumb rubber producers to list the source of scrap tyres used to make the crumb rubber (whole tyre rubber, tread rubber, tread buffings, etc.), the size of the crumbed product and its composition (including the amounts of fiber, metal, acetone, ash, carbon black, natural rubber, etc.).

A second ASTM standards will describe the preferred equipment and procedures to be used in testing crumb rubber. According to members of the ASTM committee, the development of widely accepted crumb rubber standards will greatly assist in moving this material to a commodity status.

A second ASTM committee is working to develop draft specifications for tyre-chip use in civil engineering applications.

Conclusion

According to numerous industry participants, scrap tyre use will continue to increase, with an industry shakeout expected as recovery systems enlarge and industry standards become widely used. As John Serumgard, chairman of STMC concludes, "The contemporary tyre recycling industry isn't yet a mature industry, though we might be approaching our teens."

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Environmental Impact Study

By Brian Archer

EIS stands for Environmental Impact Study (or statement) and is required by law in certain cases where proposed developments may have potential for causing significant effects on the environment.

EIA or Environmental Impact Assessment is the process by which developers, regulatory bodies, the public, and particularly, the competent planning authorities, consider what the effects will be, whether positive, negative or neutral. This assessment ultimately leads to a decision to either permit, refuse or modify a project.

EIS and EIA are, therefore, primarily intended to lead to sound, informed decision making by bodies such as planning authorities, Bord Pleanala, The Environmental Protection Agency and Departments of State. They are also intended to inform the public of the likely consequences of such projects and to allow them to participate in the decision making process.

In this context sound and informed decisions are those which, to the maximum extent possible, protect the environment and are consistent with what is called "the proper planning and development of the area".

All public bodies, including local authorities, are now required to prepare EIS's in the case of certain large developments.

One very important point to note about EIA and EIS is that they are not primarily intended to be tools for the prevention of development. European Law (EC Directive 85/337/EEC) acknowledges that developments will take place which have significant environmental effects. However, it requires that these effects will be studied, predicted and that steps to minimise them will be built into the consent (planning) procedures. Irish Law requires that ... "where significant adverse effects are identified ... (EIS should include) ... a description of the measures envisaged in order to avoid, reduce or remedy these effects". It does not require, where measures cannot avoid the stated significant adverse effects, that a project must be abandoned or be refused consent to proceed.

In fact, one of the main factors underlying and leading to the EC Directive had very little at all to do with environmental protection. The Council of the EU felt that, to ensure the proper "functioning of the common market ... it is necessary to approximate national laws in this field". In other words, they sought harmonisation, cohesion and similarity of treatment of development projects and consent (planning) procedures throughout all the disparate member states. The reason was in order to avoid "unfavourable competitive conditions" or competitive advantage for any one state over the other member states.

An instance would be the case where an American or Japanese industrial investor, who wished to establish in the EU, might choose Portugal or Greece, for example, over Denmark or Germany, simply because the control and project assessment procedures in the former were perceived to be less onerous than in the latter states.

EIS and EIA are expressions which tend to scare a lot of people. Developers or proposers of projects are nervous that the requirements will involve them in high preparation costs. Interested parties and individual citizens sometimes feel intimidated by the sheer volume of (often highly technical) data through which it is necessary to delve. This latter is the case notwithstanding the legal requirement that a summary in non-technical language should accompany any EIS

This became quite a problem in the early days of EIA in America. The process itself is extremely recent - being required by U.S. law only since 1970. In 1978 the federal agency (Council on Environmental Quality) put a limitation on the size of EISs.

The environmental controversies of 1988 and 1989 in this country, have given the impression that Ireland lagged behind the rest of the developed world in relation to EIA In fact, EIS preparation has been a requirement of Irish Planning Law since 1976 (for certain industrial undertakings). This compares with France (1976), Luxembourg (1978) and the Netherlands (1986). Britain had no national statutory requirement for EIA before the EC Directive became applicable.

In respect of the application of the EC Directive and the 1989 Regulations which translated the directive into domestic law, this country could be accused of an over enthusiastic use of the laws.

For example, between July, 1988 and December, 1990, the authorities in Great Britain required 166 EISs. In the same period, planning authorities in Ireland required the preparation of 123 such studies. Assuming a similar level of construction and development activity in both jurisdictions, it can be seen that in Ireland, the incidence of EIS relative to population was approximately 10 times as great as in Great Britain.

In Co. Cork 85 EISs have been submitted since July, 1988. 28 of these were required before the coming into force of the 1989 Regulations. So, while central government could be criticised for a certain lack of urgency in implementing the EC Directive (it was 1.5 years late), local government seems to have more than compensated by demanding EISs at a rate that has never been equalled since.

The EPA have published draft guidelines on the information to be contained in EISs. These have general application nationally. This is a comprehensive document but it is not intended to lead to overlong studies as occurred in the U.S. In fact it makes it clear that minimal topic coverage is advisable when no significant impacts are likely.

It is important to remember that the impacts which must be addressed in an EIS are the significant ones. A document in which the critically important considerations are lost in a morass of issues of minor insignificant effects is not helpful to the efficient assessment of the project and can, in fact, frustrate the interested individual or group who would wish to play a constructive part in the assessment process (whether in support of, or in opposition, to the project).

An EIS which includes well designed sidetracks leading to a cul-de-sac of red herrings is about as helpful to the assessment process as opponents basing their case on the fact that the proposers were involved in environmental accidents in another country, in another time, using different processes and subject to outdated environmental controls.

The question of the exact details which an EIS should address, and the degree, has also been the cause of some controversy. As the law currently stands (arising from the Merrel-Dow case) the relevant planning authority is solely responsible for determining the adequacy of the EIS. (In the case of an application to the Environmental Protection Agency for an integrated pollution control licence, the EPA would presumably have the same responsibility.)

In practice, most proposers of large projects would have prior consultation with the relevant planning agencies to determine the issues to be dealt with in the EIS This process is called scoping. It can be an extremely worthwhile exercise insofar as it can help to isolate the really important and significant topics which need to be considered. In so doing, it can also help to avoid wasteful concentration on insignificant matters.

Scoping need not be a matter between the proposer/developer and the planning authority alone. Interested bodies also have a part to play and should make their reservations and anxieties known at an early stage. Large investors, such as Sandoz Ltd., have shown a willingness and indeed a wish to consult as widely as possible at the start of the EIA process and before finalization of their EIS.

A formalized scoping requirement for EIS's is being considered at European level and may well become a statutory necessity in the future.

A fundamental requirement of a good EIS is that it should have studied alternatives to the proposal being put forward. The most obvious alternatives are locational. For example, local authorities will always consider alternative routes for major bypasses of towns before opting for the preferred route. Another example would be the case of a high-tech industry which might make a locational decision based on the proximity of an Institute of Technology or a University Town as against, say, an area of high unemployment.

In many cases, locational alternatives do not apply. In the case of mining, for instance, there is often no choice other than the specific location of the mineral source. In this case, the appropriate alternatives to be studied would be methods, (whether open-case or underground) processes and technologies.

The important issue is that an EIS should not simply be a study of the absolute impact of a development but must include a relative study of the impact vis-à-vis alternatives considered. Without this relative dimension, the justification for decisions taken (whether locational or technological) can be difficult to establish.

EIA and EIS are here to stay. It is hoped that they will, with the help of the EPA guidelines, become progressively more user friendly. It should not be forgotten that in this country there are always a minimum of three parties to the consideration of a development proposal. They are the proposer/developer, the Planning Authority or control agency and the receiving population - i.e. the people.

Draft guidelines on the information to be contained in environmental impact statements - EPA 1995.

EC Directive 85/337/EEC

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Brian Archer, Planning Department, Cork County Council, County Hall, Cork, Ireland.

Whooper Swans

The signature tune of the Whooper Swan is its "whooping" call, which immediately distinguishes it from other swans.

By Oscar Merne

AS the last Swallows leave Ireland for southern Africa in the early days of October, the first Whooper Swans arrive here from their breeding grounds in Iceland. Lakes and lagoons in the north-west one day have a few local Mute Swans floating on them; the next day - particularly after a spell of cool north-westerlies and clear skies - the wetlands are alive with new arrivals, excitedly trumpeting their loud "whooping" calls. This is their signature tune and immediately distinguishes the Whoopers from the resident Mute Swans, which utter quiet, nasal snorts, hisses and whistles when excited. The two species are about the same size, but there are other differences besides the vocal ones. At a distance Mute Swans often have arched wings, particularly when they are being territorial. They also have a relatively long, pointed tail which is usually held in a graceful curve. Somewhat closer, or when viewed through binoculars or a telescope, the bills of the two swans are quite distinct. The adult Whoopers have bright yellow bills with black tips, while those of the Mute are orange-red, with thin black margins. Mutes also have a black fleshy knob at the base of their bills. The first-year birds are nearly always with their parents and this helps in their identification. Their bills are much less distinctive, but young Mutes tend to have quite brownish plumage, while young Whoopers are paler and greyer.

More confusing in some areas are flocks of Bewick's Swans, which are often mixed with Whoopers, and appear like small versions of their Icelandic cousins. Apart from being smaller and more petite all round, Bewick's Swans have a relatively short bill, which is black, with yellow at the base. They come here from Siberia and are relatively scarce, occurring at fewer wetlands and totalling between 700 and 2,200 individuals in Ireland in winter.

Whooper Swans breed in the tundra/taiga zones, from Iceland in the west to the Pacific coast of Russia in the east. For the winter the whole population moves south to more temperate wetland regions. The Icelandic breeding population, which is geographically isolated from the continental one, migrates to Ireland and Britain for the winter. Because Iceland is an active volcanic country, hot springs keep some of the wetlands there from freezing in winter, and a small proportion of the breeding population usually stays there for some or all of the winter.

Until the mid-1970s it was estimated that there were only 5,000 to 7,000 Whooper Swans in Iceland, but since then there has been a major increase. A full winter census in Ireland, Britain and Iceland in January 1991 produced a grand total for the Icelandic population of 18,035 birds. A repeat census in January 1995 showed a decrease of 2,193 birds to 15,842. This decrease is explained by reduced breeding success in three summers. In 1995 some 9,855 of the Whoopers were counted in Ireland, 5,016 in Britain and 971 in Iceland. From this it can be seen that Ireland, with 62% of the total population, is a very important wintering area for Icelandic Whoopers.

In the past, when overall numbers were much lower, Whooper Swans were found wintering mainly on lakes and lagoons rich in aquatic vegetation, on turloughs and grassy flood-plains or callows, and sometimes on saltmarshes and intertidal areas with eelgrass (*Zostera*) beds. More recently, with greatly increased numbers and through adaptation (and perhaps these are interlinked), many Whooper Swan flocks are now found on agricultural lands. Particularly favoured are large flat fields close to water, where the swans feel secure from disturbance and predation, and where their limited flight manoeuvrability is not an encumbrance. Here they graze on the protein-rich new shoots of such species as perennial ryegrass and winter cereals. They will also feed on spilt grain in autumn stubbles, and on the leavings of harvested roots such as potatoes and beet. Where the swans are feeding on waste grain and roots there is usually no problem, but farmers are often anxious when large flocks of Whoopers graze their sprouting cereals and improved grass swards. Significant damage can occur in some situations, but such grazing can have beneficial effects too - for example nutrient recycling, tillering, removal of plant parts which would otherwise die back. Where damage is being done or perceived to be occurring, relief comes in the spring when the Whoopers set off again to their breeding grounds in Iceland.

Oscar Merne is a Wildlife Research Officer with the National Parks & Wildlife Service at the Dept. of Arts, Heritage, Gaeltacht and the Islands.

Photos: Oscar Merne

Many Whooper Swan flocks are now found on agricultural lands - particularly favoured are large flat fields close to water, where the swans feel secure from disturbance and predation.

Recent EPA Reports

IPC Licensing and Control - Annual report published

The Agency has recently issued a report on IPC Licensing and Control for 1995. It includes a report on the performance of the first twenty-two industries which were granted an IPC Licence by the Agency. This is the first such report since the setting up of the Agency and covers the period from the receipt of the first applications for IPC licences in July 1994 to December 1995.

The report describes the licensing and control activities of the Agency which include IPC licensing, monitoring and enforcement. Listed in the appendices of the report are details of submissions and objections received in relation to IPC applications, the distribution of IPC applications by county and class, monitoring visits to IPC facilities in 1995 and results of audits completed at licensed facilities.

Copies of the report entitled *Report on IPC Licensing and Control 1995* (price £5) are available from: EPA Publications, St. Martin's House, Waterloo Road, Dublin 4. (Tel : 01-6602511; Fax 01 6605848).

Further Information: *Mr. Dara Lynott, EPA Headquarters, Ardcavan, Wexford. Tel : 053-47120, Fax: 053-47119, Email : d.lynott@epa.ie*

Pesticides in Drinking Water Report

The Agency has recently completed the widest study to date of the occurrence of pesticide residues in drinking water in Ireland. It is generally accepted that the quantities of pesticides used in Ireland are relatively low in the European context. However, any assumption that there is no background contamination of Irish drinking waters by pesticide residues needed some experimental support.

Out of over 3,300 analytical results on the quality of drinking water, spread over 26 counties and serving 1.8 million consumers, only five were above the limit prescribed by European standards. The supplies showing high results were retested and shown to be clear.

The report *Pesticides in Drinking Water (Dec 1994 - Dec 1995),* (price £5) includes details of all samples taken, summaries of the results for each compound and full results from each Sanitary Authority area. Copies of the report are available from : EPA Publications, St Martins House, Waterloo Road, Dublin 4. (Tel : 01-6602511 ; Fax : 01-6605848).

Further Information: *Dr. Ciaran O'Donnell, EPA Regional Inspectorate, Pottery Road, Dun Laoghaire, Co. Dublin. Tel : 01-2852122 ; Fax : 01-2851766.*

Ozone Monitoring in Ireland for 1995

The Agency has published the results of ozone monitoring in Ireland for 1995. The main finding of the report is that, on a number of occasions during the hot summer of 1995, the ozone levels in Ireland exceeded the thresholds set down for the protection of human health or vegetation by the EU Directive on ozone. The levels also reached and indeed exceeded the level above which the public must be informed.

The highest readings were registered during the exceptionally hot periods when the temperature was greater than 25 degrees centigrade and anti-cyclonic conditions prevailed. In these conditions pollutants from the UK and mainland Europe, such as nitrogen oxides and hydrocarbons, move over the country. These pollutants, in conjunction with the high temperatures, cause an increase in ozone levels. However, the occurrence of this situation in Ireland is rare.

The threshold for the protection of human health is based on the average over 8 hours. This was exceeded on 35 days over the six sites in the monitoring network. The population information threshold above which the public should be informed, relates to hourly values and was exceeded for a total of 27 hours on 13 days at three sites.

The highest concentrations in 1995 were recorded at Glashboy on the NE of Cork city. Overall the maximum levels measured during the summer of 1995 from the six stations, were the highest ever recorded in Ireland. However, these readings should be compared to much higher levels of ozone recorded in the worst affected parts of Europe where summer ozone levels may be up to three times as high as the highest recorded values in Ireland.

A detailed listing of all exceedances, as compiled for submission in accordance with the reporting requirements of the ozone Directive, is presented in the report. There were few exceedance events in respect of thresholds for hourly concentrations but significantly more in the case of the lower 8-hour means. The vegetation protection threshold of 65 mg/m^3 over 24 hours was regularly exceeded at most monitoring sites but this is not surprising, as this particular threshold is close to the mean level for tropospheric ozone in northern mid-latitudes.

Data from a network of six monitoring stations were used in the compilation of this report. These are situated at Kilkitt, Co Monaghan; Pottery Road, Dun Laoghaire; Glashaboy, Cork; Kilkenny City; Avondale, Co Wicklow and Macehead, Co Galway. These sites were representative of city suburbs, forests, agricultural areas and of the extreme Atlantic west coast.

A copy of this report price £10, is available from: EPA Publications, EPA Regional Inspectorate, St. Martins House, Waterloo Road, Dublin 4. Tel : 01-6602511; Fax : 01-6605848.

Further Information: *Mr. Michael McGettigan, EPA Regional Inspectorate, St. Martin's House, Waterloo Road, Dublin 4. Tel : 01-6602511 ; Fax : 01-6605848.*

Power Shifts to Sport Fishing

By Bob Marshall

DURING his eight years as a state legislator, Randy Roach had seen some dramatic shifts in political power. But none compared with the sudden swing in 1995 that resulted in gill nets being banned from Louisiana waters.

In the course of one legislative session, the sport fishing lobby grew from minnow to whale.

For several years there was pretty much political parity on the issues between sports and commercial fishing interests," said Roach, who represented Lake Charles in the House from 1988 to '95. "Things went 50-50, or maybe 55-45, one way or the other. It was usually pretty close.

"But in 1995, the sports lobby came back and ... Wham! Suddenly they were on top 90-10. They literally steamrolled the opposition on the gill net ban, something they had been only able to talk about for 10 years.

"I mean, it was no contest. Sudden, complete dominance. That is a very rare thing in politics."

It was unheard-of for sport fishers in Louisiana and the Gulf. Since the early 1980s, when gill nets first sparked their political activism, recreational fishers had made plenty of noise, but won few political battles.

All that changed during a dramatic 18 months starting in November 1994, when Florida voters overwhelmingly approved a ban on gill nets in their waters.

Legislatures in Louisiana, Alabama and Mississippi followed in the spring of 1995 with partial bans on the nets, which critics say are wasteful.

Louisiana's sport fishers capped the turnaround early this year, when Jimmy Jenkins, president of the Gulf Coast Conservation Association — the sport fishers lobby — was named secretary of the state Department of Wildlife and Fisheries.

The changes are part of a larger trend that has shifted the balance of power from commercial fishers to sport fishing interests all across the Gulf of Mexico. It is a battle that could change the way fish are managed and regulations are written for years to come.

But while the sport fishers' victories were dramatic, lawmakers and lobbyists say the turnaround had been building since the mid-1980s, and reflected two key factors for political success: numbers and organization.

The sport fishers have both; the commercial interests never did.

"It was always a matter of time, because of the numbers; there are many more recreationals than commercials," said Mark Hilzim, executive director of the GCCA from 1986 to '92. "Our job was getting the Legislature to recognize our economic impact."

Marine recreational fishing had been quietly building into a major economic power since the 1980s when the Gulf Coast began experiencing explosive growth. Studies credit sport fishing with at least half of the $5 billion to $6 billion generated by the Gulf fishing industry each year. About 57,000 full-time jobs are directly connected to the region's recreational fishing, and the American Sportsfishing Association estimates that 4.6 million recreational anglers fish in the Gulf, a large voting bloc for lawmakers to consider.

But sport fishers say state agencies were slow to acknowledge them because saltwater species are generally considered a commercial commodity. Until recently, for example, biologists assigned to manage marine fisheries at the Louisiana Department of Wildlife and Fisheries worked in the "Seafood Division."

"We never went to the Legislature as favorites," Hilzim said. "Commercial fishing controlled the committees. We were always underdogs."

That began to change in 1986, thanks to a recipe. Cajun chef Paul Prudhomme's blackened redfish became a national craze, and in a few months what had been a relatively unimportant commercial species was fished to the brink of depletion.

Film of commercial boats netting so many of the fish that they had to throw away thousands enraged sport fishers.

The GCCA entered the political arena and, using the redfish as its logo, lobbied to have commercial fishing for the species closed. Commercial fishers responded by using their political clout to temporarily close recreational fishing as well, a move that galvanized sport fishers to action.

After two years of bitter debate, the Legislature finally agreed with the sport fishers, and in 1988 it designated redfish a game fish, making it off-limits to commercial fishers.

Roach considers that decision the beginning of the end for commercial fishing interests.

"That event really was the first time the Legislature said that a recreational fishery was more important than a commercial effort on the same species," Roach said.

The vote was close, but the sport fishing crowd had established a beachhead.

Hilzim, who left the conservation association in 1992 to become secretary of the state Department of Culture, Tourism and Recreation, has watched the continued rise of sport fishing's power with interest and insight, and pinpointed four keys to its current dominance.

"First, the commercials lost important allies on the key (natural resource) committees in the Legislature," he said. "Many times we couldn't get bills onto the floor because of those guys. By 1992, they were almost all gone.

"Two, pure demographics. Politics is numbers. Eventually the sheer weight of the rec numbers — 600,000 of us to 1,500 netters — took its toll on the voting.

"Three, the commercials hurt themselves by refusing to work with the recreational fishing people earlier. They had any number of opportunities to take the initiative. I think there were some commercial guys who knew that and wanted to change some things, but they weren't listened to by their leaders.

"And, finally, the Florida vote."

If redfish was the turning point for recreational fishing in Louisiana, Florida's ban was the benchmark for the Gulf Coast.

"That was the catalyst for what happened in Louisiana," Hilzim said. "Without that vote, I don't think the GCCA would have had the success it had here last year."

Florida outlawed the nets with a 72 percent landslide in a vote of the people that provided powerful precedent. Texas had banned gill nets by government proclamation in 1988, but Florida's public vote was a clear sign that things had changed.

"For a major state, with a seafood industry we can relate to, to take that kind of step was a major factor," Roach said. "The Florida vote, in many people's eyes, validated the GCCA's position on gill nets here. People who weren't that familiar with the issue saw the big margin and said, 'Well, there must be something to the (sport fishers') complaint.'

"Timing is everything. The GCCA was able to capitalize on the Florida vote. Plus it was an election year. Legislators — especially those from north Louisiana — were only hearing one thing from their constituents: Ban the nets."

Like Hilzim, Roach said much of the sport fishers' success was rooted in the commercial industry's two major failings: lack of organization and resistance to change.

Unlike sport fishers, commercial fishers had no single umbrella group representing their interests. And the competitive and independent nature of the business fosters resistance to organization.

"Several of us (legislators) who were trying to strike a balance could not get the attention of the commercials to the reality of the political winds that were blowing," Roach said. "We were never successful in getting them to back off a little and be more realistic."

A week after the Florida gill net vote, Carl Turner, director of the Louisiana Seafood Marketing and Promotion Board, announced a proposal by commercial fishers for dramatic reforms, including a ban on set gill nets, closed seasons, limited entry and other ideas long championed by conservation groups.

When asked why the sudden change of heart, Turner said, "It's amazing what you will do when you have a gun pointed at your head."

But by then, the GCCA smelled blood, and it wasn't willing to back down on the push for a total ban.

Six months later, the recreational fishing lobby flexed its newfound muscles and changed the landscape of Louisiana's coastal fishery politics.

"I don't think commercial fishermen ever faced reality," Roach said, "until it was too late."

Bob Marshall is staff writer with The Times-Picayune *- New Orleans' (US) only daily newspaper.*

The Times-Picayune *won the Pulitzer Prize for public service for its special eight-day series* "Oceans of Trouble: Are the World's Fisheries Doomed?". *The project team - John McQuaid, Bob Marshall, Mark Schleifstein and Ted Jackson - under the direction of editor Tim Morris, worked for more than a year to produce the comprehensive report. The series had previously been honoured by the Society of Professional Journalists, also in recognition of the newspaper's service to the public.*

Contact: The Times-Picayune, *3800 Howard Avenue, New Orleans, LA, USA 70140. (Printed with permission).*

New Land, Ancient Breeds

By Daphne Pochin Mould

ICELAND is a new land - new, geologically speaking. Built of volcanic rock it's still one of the most actively volcanic parts of the world. Eruptions happen about every five years, with land still being created. It's new too in human terms, being the last part of Europe to be settled - in the 9th century. It has no remote and misty prehistoric past as records were kept of who had settled where. People came from Norway, as well as other countries, with links to the Norse settlements in Britain and Ireland, who brought Irish wives and Irish slaves. Icelanders today are proud of their Irish blood, and many have the dark hair and blue eyes we think of as Celtic.

These Viking adventurers and settlers, who were to go on to colonise Greenland and explore the coasts of North America, came in their fast, seaworthy longships, loaded not only with domestic gear but with their domestic animals - horses, cattle, sheep, goats, pigs and dogs. Till then, the only Icelandic mammal had been the Arctic fox and an occasional polar bear, swept in on floating ice to the north coast. Farmer fishermen, the Icelanders spent the long, nightless, summer days making hay for the winter feeding of their animals. Our word "hay" comes from the Scandinavian - Icelandic "hey". They still make hay, but now use modern machines. The hay is rolled into bales and wrapped in white plastic, which dot the green fields like over-sized sheep. Later they are stacked at the farm animal houses, for the cattle and sheep are over-wintered indoors.

Because Iceland is a remote and large island (103 sq. km bigger than Ireland), these ancient breeds of animals have remained unchanged through the centuries. The pigs, however, have died out, though their presence is stamped on the landscape in placenames - including the word "svin", our word swine. The sheep are mostly white, but also black, grey and brown, and traditional Icelandic knitwear uses these natural colours to make patterned pullovers. It is a strong, springy wool, ideal for keeping out the cold and for sportswear. The cows are great milkers but not good beef cattle. They come in all sorts of colours, including tiger stripes, and unlike in the past, today they are dehorned. Recently, under very careful supervision (for Iceland has been isolated from many animal diseases and the native breeds have no herd immunity against them), beef cattle have been introduced. Icelanders drink a lot of milk and eat the traditional "sky", a thick form of yoghurt, which can be eaten as it is, with cream, with the wild blueberries of the hillsides, or with other fruit. Today, Iceland produces a range of yoghurts and cheeses, and is very proud of its ice cream.

The Icelandic dog is a small version of the husky, and plays its part in the herding of sheep and cattle. Every sheep and cow has its Icelandic name.

Photos: Daphne Mould

SHOW TIME: A child competitor at the national Lansmot, 1994. (Horse show)

Careful farmers tag the lambs' ears with the mother's name, so selective breeding is possible. During summer sheep and lambs run free on the hills; in the autumn round-up the breeding animals are brought in, and the lambs for slaughter selected - it is not possible to house large flocks over winter. After a summer feeding on the grass and herbs of the hillsides, Icelandic lamb is claimed to be the best in the world, and probably is.

But the special glory of the Icelandic animal kingdom is the horse. The original Viking horse, immensely strong and immensely intelligent, with its five speeds (walk, trot, gallop, tolt and pace - "tolt" is fast, smooth running), is today an expensive and important export from Iceland. Till very recently, when the Icelanders, almost overnight, jumped from horseback to cars and aircraft, the horse did everything on the farm and was the only transport to go anywhere in the country. In the 1960's, a popular postcard showed Icelanders riding onto the airfield to board an aircraft, and even then Icelandair's old logo was the winged horse. However the Icelanders' new horse was to become the aeroplane.

Today Iceland has riding schools for visitors who want to learn more of the special skills and charms of the Icelandic Viking horse. You can go on long, well organised treks across and around the whole country in summer time, or make shorter trips at any time of the year. Viking horses pick their own way over rough country - leave them to it and only giving them the general direction. They are very friendly, almost dog-like animals, and most unlikely to bite or kick you. No wonder horse lovers all over Europe and in America buy them. There is an international association of Icelandic horse owners, of which Ireland is a member. Its magazine, published in English and German, is called "Eidfaxi", which according to the ancient account, was the name of the first foal to be born in Iceland.

The Icelandic horse is the only unchanged ancient European breed of horse - the one the Vikings rode and loved and carried with them on their voyages to new lands. Today you can get to know some of them here in Ireland, or better still go to Iceland and meet some of the 75,000 animals on their native hills.

Riders herding sheep for shearing. The only farm work the Icelandic horse does these days is herding sheep and sometimes cows.

FROM COD TO SHARKS

Twenty-five Years of Fish Management

By Michael Ludwig

ABOUT four times a year we go to sea to sample fish stocks for data to run models for harvested species quota allocations. Each cruise samples the same general areas, but focuses on locations where fish congregate or some significant element of fish life occurs at the time of the cruise. In New England, the big three species of groundfish (fish that live on or near the bottom) are cod, haddock and pollock. These stocks have been depleted and need to be protected. While we await the Winter Groundfish Cruise statistics, the scientists are reporting their observations from the three weeks of trawling. They sense that things are both hopeful and depressing, depending on where they were between Canada and the Carolinas (U.S.).

Hopeful comments arose about areas that have been closed to protect spawning and early development. The populations of Cod, Haddock and Pollock within those protected areas were more numerous than outside. With the stocks of fish at depressed levels, the increased number was sensed also by commercial fishermen who were fishing for "strays" just outside the boundaries. While near one such "Fish sanctuary," the radar revealed fourteen trawlers working the edges. There was also a sense of hope stimulated by the survey results at the US & Canadian border where our sample stations are integrated with those of our Canadian counterparts. As the vessel moved northward through the Gulf of Maine and crossed the border, the numbers and sizes of the fish increased. This means that there are more fish of various ages in those waters. The more age group representatives there are, the more stable the population is, as it contains individuals that will "replace" fish that reach legal size and are harvested. This finding supports the decision to stop or severely restrict fishing effort in sensitive areas and during sensitive life stages.

The presence of commercial trawlers along the edge of the closed areas, their numbers, those of the sharks and skates in our catches and some very small catches in the open fishing areas led the Cruise's Chief Scientist to draw some depressing thoughts. He offered that twenty-five years of New England Fishery Management had proven that well-meaning individuals can drive a fish community structure from one dominated by Cod, Haddock and Pollock to one in which sharks and skates are the principal members. He expressed that thought after a half- hour trawl brought up just three fish. It was reinforced by a check of previous groundfish cruise logbooks on the number of fish that were found in these same areas.

As the stocks of the big three species declined, we encouraged consumption of "underutilized" sharks and skates. Fishermen responded by shifting their effort to catching sharks and skate for the American and international markets. It seems we did our job of convincing people to eat shark and skate all too well. Now, we again find ourselves faced with excessive fishing pressure on stocks that only a decade ago, were felt a good substitute for depressed stocks. This and some encouragement of erroneous perceptions are complicating shark management.

The "Jaws" movies did more to demonize sharks and encourage their slaughter than all the old sailors' tales and even the worst of the true stories. It spawned Shark Derbies, where numbers killed were valued, regardless of the threat poised by the captured species. Now we have added to that problem by creating an appetite and value for shark and skate meat. It's even touted as a cancer cure! I remember standing on the deck of a research vessel knee deep in sharks looking for a few "good" fish. Now my compatriots catch just three fish an hour and even the sharks and skates are gone.

Many of the sharks bear their young and deliver them alive rather than laying eggs and swimming away. Even the shark species that do not bear their young do not produce a lot of offspring during each reproductive cycle. Because sharks and skates are top predators, they need a lot of area in which to seek their supporting resources. Because of this there are naturally far fewer sharks and skates than there are flounder, cod or haddock. These basic differences in population size and reproduction technique create tremendous problems for sustaining populations once they are pressured by human harvesting. If a shark only reproduces six young every year and we are catching them in large numbers; before they grow to full size and reproduce; or are caught while still carried by their parent, it is easy to over harvest them. Stocks of some shark species have been reduced by more than 80 percent. These sad truths have recently been revealed and managers throughout the U.S. have moved to sharply reduce shark landings. Have we acted fast enough? Only the future will tell. However, don't let anyone tell you that managing an ocean is easy!

Michael Ludwig, NOAA, NMFS, Milford, CT 06460, U.S.A.

What is a Reef?

CORAL reefs are one of the most diverse and biologically productive ecosystems on earth. Their high productivity is the result of efficient biological recycling and a high retention of nutrients in an otherwise nutrient-poor environment. Coral reefs are tropical, shallow-water ecosystems restricted to latitudes 25° to 30° north and south and year-round surface water temperatures of 25° to 30°C. Hermatypic corals (i.e. reef-building or stony corals) are multicellular animals which collectively secrete the hard external skeleton of calcium carbonate that form reef structures. These reefs provide habitats for a wide variety of marine organisms, such as fish, sea turtles, marine mammals, crustaceans and invertebrates. A critical aspect of reef-building corals is their symbiotic relationship with the unicellular algae, zooxanthellae. The algae live, conduct photosynthesis, and process the coral's waste products all within the cells of their host. The entire biological productivity of the coral reef ecosystem rests on this symbiotic relationship.

Corals have very specific requirements for light, temperature, water clarity, salinity and oxygen. Coral growth is relatively slow, especially in areas where sediments are regularly disturbed because silted substrates prevent larval settlement. If light penetration is decreased there is a reduction in photosynthesis by the zooxanthellae algae. Most corals, therefore, are restricted to depths of less than 30 metres. Their lack of mobility makes them vulnerable to environmental disturbances, such as oil spills, through smothering and oxygen depletion.

Coral reefs in Hawaii are fairly well developed but display low species diversity because of Hawaii's extreme isolation and more northerly latitude. The best developed reefs in Hawaii are found on leeward (south and southwestern) coasts or in bays which are sheltered from wave action. Examples includes the Kona Coast of Hawaii, the south coast of west Maui, the north coast of Lanai and Kauai, Kaneohe Bay, Hanauma Bay and Barber's Point, Oahu, and the lagoons of the Northwestern Hawaiian Islands. *Source: Oil Spills at Sea: Potential Impacts on*

ENVIRONMENTAL COURT ACTIONS IN BRITAIN

ROVER Group Limited has spent about £700,000 to prevent pollution and clear up the effects of a spillage that landed the company in court.

Solihull magistrates fined Rover Group £4,000 and ordered it to pay £500 in costs when the company admitted chemical pollution of Elmdon Park Lake, an important local amenity.

A "substantial" number of fish died when trichloroethylene, an industrial solvent used at the Land Rover works at Lode Lane, Solihull, contaminated the lake.

The chemical is directly toxic to fish and potentially harmful to animals and people.

The court heard that Environment Agency officers were alerted following reports of dead fish in the lake. The contamination was traced to the Land Rover works.

The error in spilling the chemical was compounded by a mistaken belief that the spill had been contained within the site. The company accepted that a monitoring system could have substantially reduced the impact on the lake which has been "catastrophic" and had generated a substantial number of complaints.

Prosecuting for the Agency, Mark Knowles said that to its credit, the company volunteered its help with the investigations and committed substantial staff and financial resources to clean up the effects of the discharge.

A company spokesman said staff believed the tank was empty, but when moving it the contents had been spilled. Steps were taken to prevent the chemical entering the drainage system.

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A BRISTOL company which ignored warnings by the Environment Agency that it was acting illegally has had to pay over £51,000 in fines and costs.

Recyclable Metal Services (Bristol) Ltd of Wilson Street, St. Pauls, admitted five offences of illegally depositing and keeping waste on unlicensed land.

Bristol magistrates heard that operations had since ceased at the company's Wilson Street scrapyard and the company was about to go into liquidation.

The court was told that the company made an application in April 1995 to register its scrap metal recycling facility as an exempt activity under waste management licensing regulations.

The Agency told the company that improvements were needed to meet the exemption. But in December the same year, the application was refused because of lack of adequate concreting and sealed drainage and hazardous storage of scrap metal including lead acid batteries.

It was warned on several occasions that it was acting illegally and action would be taken. In 1996, waste staff found that scrap metal was still being accepted on the premises and recycling activities continued.

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NOTTINGHAM waste operator Beverley Soles has been fined £3,000 with £600 costs for the illegal burning of waste.

Soles, 33, of Brookside, Linby Walk, Hucknall, admitted the offence at Nottingham Magistrates Court.

The court heard that Environment Agency officers, visited a site at Wigwam Lane, Bakerbrook Industrial Estate at Hucknall following a public complaint.

They found a large fire of plastics, wood, textiles and cardboard. The site was not licensed to deal with combustible waste - only inert material such as hardcore, sand and soil to be used for levelling the site.

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WHEN Matthew Crocker dumped car parts beside a road in St. Just, Cornwall, he was spotted by a member of the public.

The concerned watcher noted Crocker's vehicle registration number and reported him to the Environmental Agency on its flytipping hotline.

That call resulted in the flytipper's appearance before Penwith magistrates at Penzance and he was fined £250 with £250 costs.

Crocker, of Glen Leigh, Treleigh Estate, Redruth, admitted the offence.

(Court Action)
Environment Action - Environment Agency (UK).

National Monuments and Historic Properties

By Brendan Scully

Introduction

THE purpose of this article is to outline the pivotal role the Heritage Service plays in the protection of Ireland's built heritage. Up to recently we worked as part of the Office of Public Works in providing a conservation service to the State. Since 1996 full responsibility has transferred to the Department of Arts, Heritage, Gaeltacht and the Islands. The Heritage Service, as part of the Department, has three main areas of responsibility:

* protection of our natural heritage by the National Parks and Wildlife Service,
* management of the River Shannon, The Barrow Navigation and our canals by the Waterways Service,
* care of the built heritage by the National Monuments and Historic Properties Service.

The focus of this article is on the monuments and historic properties.

National Monuments

Our national monuments cover well-known structures such as the Rock of Cashel or Newgrange Tumulus but also many less dramatic features such as standing stones. Generally they are pre-1700 constructions of architectural, archaeological or aesthetic importance. Of the 150,000 national monuments throughout the country over 700 sites are in State care. These are carefully conserved by our skilled workers and many are presented to the public to enjoy and appreciate.

Of course our archaeological heritage is far more extensive than the monuments in State care. We have been carrying out inventories of the monuments on a county by county basis. The Sites and Monuments Records (SMR's) of the 26 counties have been completed since 1992 and are now being updated. These are a paper survey of our archaeological heritage. They are followed by a more comprehensive survey (Archaeological Inventories) based on field inspections. 10 of these have been published in book form to date and a further 5 will issue this year. The use of aerial photography and modern surveying techniques has uncovered much more monuments than previously recorded. For example, in Co. Sligo the estimated number of monuments prior to the modern surveys was 2,000 sites. The SMR gave an estimate of 4,500 and when the field surveys were completed it was discovered that, in fact, there were 7,000 sites.

This rich heritage is given statutory protection in the various National Monuments Acts which cover not only the monuments on or under the land but also those under water such as ship wrecks.

Historic Properties

Our historic properties can cover a wide range of sites. They can be designed landscapes of cultural significance or sites associated with an historic event or person. We manage 15 historic properties ranging from the National Botanic Gardens in Dublin to the Great Blasket Island National Historic Park in Co. Kerry. Some of the properties are given formal legislative protection. For example, the Phoenix Park in Dublin is governed by the Phoenix Park Act, 1925. Others rely entirely on State ownership to offer protection to them, an example being Kilkenny Castle and Park. Many of the finest gardens in Ireland are protected as historic properties - Ilnacullin (Garnish Island) in Co. Cork being one outstanding example.

Generally, given the size of historic properties, there is a lot of scope to encourage people to visit them. In all cases, however, access to sites is balanced with their conservation - protection takes precedence. If there is too much pressure on a property public access is managed in such a way as to avoid damage.

Tintern Abbey, Co. Wexford: A Cistercian abbey, founded c. 1200 by William, the Earl Marshall, and named after Tintern in Wales.

Emo Court, Co. Laois: Designed by the architect James Gandon in 1970 for the Earls of Portarlington, its a magnificent example of this neo-classical style.

Capital Programmes

With the advent of EU support through the European Regional Development Fund (ERDF) we have managed to plan an 11 year capital development programme which would normally be done over a period of 30 years. Between 1989 and 1999 we will have spent over £80 million on conservation works to our national monuments and historic properties and on the provision of access facilities to them.

Part of this funding is provided by the EU with the balance provided by the Irish Exchequer. The criterion for such funding is that it must generate an economic benefit to Ireland in the form of increased tourism earnings. Given that our main responsibility is to protect our heritage not only now but for future generations to enjoy we had to ensure that any developments proposed were sympathetic to and in balance with the conservation of the site. So at Clonmacnoise in Co. Offaly, for example, we carefully sited a visitor centre to control the many thousands of people who wish to go to this unique monastic settlement.

Some of our proposals caused controversy where the fear was that the provision of facilities would lead to too much pressure on the sites. One such controversy related to the visitor centre at the Boyne Valley, Co. Meath, which is to act as a gateway to the internationally renowned tombs of Newgrange, Knowth and Dowth. In fact, visitor pressure at Newgrange has already reached saturation point and the new centre will actually draw pressure off the monuments and it is a model for heritage authorities in other countries to follow.

Much of the capital programme relates to conservation works to the sites themselves. The restoration of the Curvilinear Glasshouse in the National Botanic Gardens cost c£4M and the quality of the conservation work recently received recognition in the award of the prestigious Europea Nostra medal to the project. Other nationally significant conservation projects are in hands - one being the restoration of the first Norman castle in Ireland at Trim, Co. Meath.

People

We conserve our built heritage for people. We want Irish people to have pride in their heritage and to have them and visitors from abroad come and visit our national monuments and historic properties. In 1969 65,000 people visited 2 sites which were open to the public then. By the mid 1970's we had 9 sites attracting 191,212 visitors. Last year this had risen to 52 sites facilitating 2,126,744 people. This is not simply a direct result of the capital development programme but also arises from the fact that people care much more about their heritage today and wish to see it at first hand.

Not only have we made more sites accessible to the public but we also help visitors gain a deeper understanding of a site. We do this by providing information panels, exhibitions, literature and guides. We employ 320 guiding staff annually and market research shows that our visitors very much appreciate the service they get from them. Through this deeper understanding we gain greater commitment for the protection of our heritage and we also provide an economic spin-off for surrounding communities based on sustainable tourism.

The Future?

Where do we go from here? The large capital development programme and the management of an increasing number of sites in State care to the highest standards is placing a huge burden on the dedicated staff in the Heritage Service. Although there will always be pressure to accept further properties into State care we will be less likely to expand our portfolio in the future as we do not wish to spread our static current resources too thinly thereby not being able to properly maintain what we already have.

It will be important, therefore, to have adequate legislative provisions in place to ensure that private owners play their part in conserving the nation's heritage. For example, at the moment we are carrying out a National Inventory of Architecture (NIA) on all post-1700 buildings in Ireland. This will cover 1 million buildings and it is a huge task which will take time to complete. The NIA will, however, form the backbone of an improved legislative system enabling local authorities to list and give better protection to buildings of architectural merit throughout the country.

We will, therefore continue to look after the national monuments and historic properties in our care for your benefit but we hope to develop a deeper partnership with local authorities to ensure that the wider built heritage is safeguarded.

I hope to offer you further articles on other aspects of the Heritage Service's work.

Brendan Scully, Head of the Heritage Service, Department of Arts, Heritage, Gaeltacht and the Islands.

Marine Litter

By Edwin Derriman

LITTER in the marine environment comes from two sources. Naturally, boats and ships are the first potential source to be suspected in most instances, when litter is left stranded along the tideline of beaches and estuaries, causing an unsightly rubbish pile. Such litter consists of discarded netting from fishing vessels, cargo sheeting from merchant vessels and "domestic waste" from all vessel types, particularly the increasing numbers of pleasure boats we are seeing around our coasts.

Over the last decade a number of international rules and regulations have been introduced, aimed at discouraging and eventually eliminating the problem. However, the difficulty as always, is the effective enforcement of those same rules. After all, what are the odds of catching someone "red handed" dumping rubbish at sea? I can assure you that the odds are extremely high against. Because of that fact, the message can only be got across to the individuals concerned, by means of education as to their obligations and the consequences of their actions. Progress to date has been frustratingly slow, although indications are now emerging that rubbish is being retained on board the majority of boats, for later dumping in the facilities provided in some ports.

Occasionally it has not been the exclusive fault of the vessel carrying out the dumping. Port facilities range from excellent to the non-existent. Some ports and harbours have imposed charges so extortionate, that masters of vessels have preferred to dump at sea and face the consequences if caught, rather than face the wrath of their owners. In others, skips and bins are not emptied regularly or frequently enough, often causing an overspill into the harbour waters. In a recent survey however, British ports were thankfully seen in a good light.

The second source of marine litter is that originating from land. This source often causes unseen problems to the environment, and is far more insidious, than the unsightly collections of visible rubbish we have talked about previously. All too frequently, it consists of swathes of plastic sheeting which possesses a negative buoyancy, it therefore sinks. The origin of the sheeting is thought to be from certain factories located on the banks of large rivers, such as the Severn. The physical properties and longevity of many plastics based upon polymerised organic compounds, presents a virtually impregnable barrier to the normal physical, chemical and biological processes associated with the seabed. Copious amounts of sheeting are regularly trawled up or netted by fishermen, close to north western coasts of Cornwall and Devon. Fishermen who work that area, claim fish catches have significantly decreased since the appearance of the waste over the last decade.

Unlike the average person ashore, or even most seafarers, who go about their business in blissful ignorance, fishermen have for several years been aware of, and concerned about, the growing accumulations of plastic wastes on the seabed in some areas. These discarded materials are present in a variety of forms, e.g. the previously mentioned sheeting, fertiliser bags and packaging. The numbers of fertiliser bags in some areas have to be seen to be believed. This begs the question, how on earth do they get into the sea in the first place???

It is not certain if the localised fish catches have decreased as a direct result of the plastic sheeting being present on the seabed, or from other possible reasons such as overfishing. The true cause is probably a culmination of many factors and cannot be laid at the door of one particular element. However, there is one theory being voiced by a number of fishing skippers to explain falling catches in areas where plastic litter is a problem. It is thought that trawls being towed along the seabed, pick up the sheeting which tangles around chains and wires, and acts as a scarer to any fish in front of the net. Similarly, set nets or gill nets, sweeping the seabed under the tidal influences, pick up plastic sheeting which drastically affects the efficiency of the net. Whatever the real impact on fish stocks and other benthic organisms, the detrimental penalties on fishing economics can be costly in terms of lost time when clearing nets of the discarded wastes and bagging up for later disposal ashore.

So what is the answer to the international problem of marine litter?

I believe we are already going down the right road. Education of the individual will ultimately bear fruit, if coupled with high penalties being imposed upon the odd vessel or factory which is caught dumping, or releasing, any waste. Teenagers today tend to be far tidier and aware of human interaction with the natural environment, than we were when the Keep Britain Tidy Campaign started many years ago. It will be a long haul, and it has to be recognised that litter can never be totally eradicated, as some is wind borne, or a result of being washed overboard during inclement weather conditions.

I do not believe that the answer to the problem is the introduction of further unenforceable regulations. The only people to obtain any comfort from such legislation are the draughtsmen, lawyers and proposers. Those who are charged with trying to enforce it, are placed in an impossible situation. The sea is a vast expanse and as I have already said, the chances of catching the culprits are minimal.

The marine litter situation has started to improve and we as individuals, committees and companies must ensure that this impetus continues over the longer term, if we are to realise the desired aims of clean beaches and clean seas.

Edwin Derriman, Chief Fishery Officer, Cornwall Sea Fisheries District, Old Bonded Warehouse, Quay Street, Penzance, Cornwall, TR18 4BD, U.K.

Plant Invaders

By Dr. John Akeroyd

"ALIEN" plants and animals are a feature of today's cosmopolitan world. They do not come from Outer Space but they do come from abroad, and have often travelled long distances. For plants follow people wherever they go, between countries and continents. Some plants, like the weeds that infest our crops and gardens, are intimately associated with human life. Some indeed have no known habitat away from disturbed ground and rubbish tips.

Thus many weeds - nuisance plants - have travelled around the world, especially in the tropics. Some grasses, such as the invasive Johnson Grass, now occur in Africa, Asia, tropical America and even the Mediterranean region. It is often difficult to tell where they come from originally. Their seeds contaminate crop seeds, and root fragments spread with road-works and other building projects.

Nearer home we can see how plants invade new territories. Many of the common weeds of Ireland have come in from abroad via trade and invasion. Some have quite exotic stories to tell. Oxford Ragwort escaped from Oxford Botanic Gardens in England in the 18th century. However, it did not spread until a century later as the then new railway network expanded. Its journeys in Ireland began in Cork City, but it really expanded after arrival in Dublin in the 1960s. Its habitat in these islands - railway ballast, rubble and walls - mimics its native home in Sicily. There it grows on Mt. Etna, on volcanic debris and ash. Its success in Britain and Ireland is not only because it has found a home and its plumed seeds are dispersed by wind, but also because it left its natural enemies - like insects and fungi - behind.

Thus alien plants can sometimes expand dramatically with disastrous consequences for native habitats. The invasion of the Killarney oakwoods by introduced Purple Rhododendron is a classic example. Abroad, things are even worse. Tropical garden plants like Lantana and Prickly Pear can run wild and displace native plants and the animals that depend on them.

Oceanic and tropical islands especially are susceptible to plant invasions. Plant-rich islands like St. Helena in the South Atlantic and the Seychelles in the Indian Ocean now have vegetation dominated by exotic aliens. At the same time the native animals have been displaced by dogs, pigs and rats.

We shall never be able to stop plants from travelling. The world is now too small a place and with modern communications plants can reach new continents within hours. Many are well adapted to further spread by wind or caught in clothes or the fur of animals. Too often the responsible authorities take no action until an invasion is underway.

Above all, we like plants and often encourage some of the worst of them in our gardens. In the 19th century the owners of large gardens and demesnes welcomed Japanese Knotweed and Giant Hogweed. Now they are striding across the Irish countryside. Similarly, homesick British and Irish settlers took Gorse and other shrubs to New Zealand and the West Indies. Their descendants are less happy with the subsequent invasions!

Dr. John Akeroyd is a freelance botanical consultant, conservationist and writer. He revised Volume I of "Flora Europaea", *the standard work on European wild plants, is the author of the* "Collins Guide to Wild Flowers of Britain and Ireland", *and edited* "The Wild Plants of Sherkin, Cape Clear and adjacent Islands of West Cork".

Tourism in the Modern Age

© J. Brosa

By Lorenzo Canova

WHAT will the tourist trade of the year 2000 be like? Who will be the tourists of the coming millennium? These are the question which, faced with the extraordinary boom in tourism, experts, tour operators and politicians have repeatedly posed over the last fifteen years. These questions arise either because of the financial profits the tourist industry involves, or from the demands of consumers who show new awareness, habits and lifestyles. In the eighties, mass tourism gradually changed and people began to talk of "tourisms". Expressions such as cultural tourism, sports tourism, religious tourism, adventure tourism or ecotourism have become part of everyday language. In the past, the dominant practice was to take one long holiday to a single destination; today, people tend to distribute their holidays over different destinations and different times of the year.

From a socio-historical point of view, three types of tourist industry can be differentiated. In the case of the industrial tourist, for whom work is the centre of existence, the motivations for travelling can be summed up as rest and freedom from responsibilities. This type is gradually decreasing in number. The hedonistic tourist belongs to the generation that discovered entertainment and consumerism. They like to go on holiday to experiment, to explore the unknown, enjoy themselves, meet other people and relax in unspoilt natural surroundings. These are the majority today and will continue to be so. Finally, the modern age tourist, someone who tends to reduce the polarity between work and play: not just work, but not just fun, either. Their reasons for travelling include broadening their personal horizons and getting back to simple things and nature, with a touch of creativity in the planning of their journey. These are gradually growing in number and in future will form an important segment of demand.

One characteristic in the expectations of the modern age tourist is the capacity to make a critical appraisal of the offer and to influence it. Producers should be more attentive and sensitive to the new demands and be flexible enough to cater for the tourist in search of higher quality. In the third millennium in fact, the concept of quality will have to take environmental aspects more into account. Recent forms of tourism point to a renewed interest in nature and a wish for quality tourism. So much so, that some tourist spots are reorganising their own offers in keeping with these trends. Quality is the result of a complex strategy which is organised day by day. The consumers, whose environmental awareness is constantly growing, will expect to identify, verify and be able to differentiate ecologically correct products from the imitations now invading the market.

The present millennium is coming to an end and is leaving Western countries with a high level of welfare and a large tourist demand to satisfy. Nevertheless, serious environmental problems also plague areas that receive a high influx of tourists. Tourists, tour operators, local authorities and the general public are therefore called on to find new forms of coexistence and the right solutions for themselves and for the survival of the planet.

Lorenzo Canova, ACTA(Associazione, Cultura, Turismo, Ambiente), Italy. (All of uS) 15 - Environmental Education Dossiers.

A TOURIST GUIDE TO AWARENESS AND RESPONSBILITY TOWARDS THE ENVIRONMENT AND LOCAL POPULATIONS AND CULTURES

Aware and Responsible Tourism	Travel Agencies and Tour Operators	Local Authorities	Hotels and Restaurants	Activity Organisers	Tourists
Information for the tourist	Encourage conduct that respects the wildlife and culture in the places visited	Provide information about the area's cultural and cultural values	Provide information on public transport and complementary activities	Organise activities that provide a chance to get to know local values	Find out about local values and problems
Countryside, natural values	Guides are acquainted with natural values and local environmental problems	Regional planning follows environmental criteria and respects the architectural heritage	Carry out environmental impact studies; put restoration before new building	Plan activities so that they do not have a negative impact	Choose offers that do not have an environmental impact; do not expect impossible facilities
Flora and fauna	Destinations where wildlife is threatened or vulnerable are not offered	Protect and safeguard valuable or vulnerable areas	Buildings and grounds are planned with wildlife in mind	Always avoid risking disturbance or damage	Respect animals and plants; do not buy them as souvenirs
Cultural identity	Guides have a good knowledge of the culture of the host town	Maintain cultural identity; plan tourism so that it benefits all local residents	Provide comfort in keeping with local living standards; offer traditional cooking	Help integrate tourists in the local way of life	Turn down tourist "ghettos"; meet the local population; buy traditional arts and crafts
Energy	The visits on offer are nearby and/or accessible by public transport	Facilitate public transport rather than motor cars; protect pedestrian areas	Adopt energy-saving measures and encourage client awareness	Reject activities that consume fossil fuels	Use public transport, walk, cycle or go on horseback
Water	Destinations with problems of water shortage or purification are not offered	Install treatment plants and promote economy measures	Install economy mechanisms and encourage clients to collaborate	Avoid activities that squander water or that have an impact on water resources	Save water and avoid wasteful activities
Refuse	Advertising leaflets use recycled paper	Organise selective collection and recycling; carry out awareness campaigns	Reduce the use of non-recyclable materials	Use equipment and materials that do not generate waste	Avoid non-recyclable containers; always use litter baskets

© V. Navarro

DRAWING THE LINES

By Jim Lichatowich

IF it weren't my job, I wouldn't come back to see what happens to these small streams and the forests that nurture them. Forests produce timber, a valuable commodity. I understand that. But I have a hard time squeezing the streams, the huckleberries, the redwood violets and trillium, the juncos and chickadees into a small corner of the big economic picture. Once I have spent some time in a patch of trees, it's hard to limit my view of the forest community to that of a cultured crop.

I slowly make my way down the side of a steep ravine. A thick tangle of salmonberry hides the slash and logging debris which seems to have the single-minded purpose of tripping me at every step. The bottom of the ravine is the home of a small stream where last spring I watched a little cutthroat trout trying to cross a log jam (I wrote one of these essays about that trout). I pull free of the grasping salmonberry and break into a small, level clearing. It's a good spot to stop and observe. Six months ago a green carpet of oxalis and trillium covered the forest floor here. The delicate plants now lie exposed to the sun, brown and brittle. A few feet away, a single row of oxalis survives by hiding in a thin line of shade along the side of a log - a non-merchantable tree felled and left on the ground. A few trees, mostly small alder, are still standing along part of the stream. The protected riparian zone extends upstream a hundred or so yards above the spot where the little cutthroat assaulted the log jam. Beyond that point the stream is not protected.

The line between protection and no protection is clearly explained in the rule book. The dividing line reflects a hard reality, political reality, the product of compromise among men with differing goals. I wonder where the inhabitants of the stream and its riparian zone would have drawn the line? Of course they won't and can't be asked. To draw the lines that separate productivity from degradation. The lines that either create or solve problems.

Given the present condition of many of our streams, I'd say we drew a few lines in the wrong places. Not all the lines we draw are visible out here on the streams. Some are on pieces of paper and some lines exist only as spoken words. Political compromises are usually in the latter form.

I've spent a lot of time thinking about problems in fisheries management. I've thought about problems from behind a desk and from here on the banks of streams. If we are going to draw the lines in the correct places we need to know what kind of obstacle to productive fisheries we are dealing with. When I try to pick my way through the complicated landscape of fisheries problems, I have found it helpful to recognize three general types of obstacles to productive fisheries. I deal with each type of obstacle in a different way.

The first type exists when the actual productivity of a stream is less than its potential productivity. Something physically prevents a stream from realizing full productivity. When the population in a stream is overharvested, when riparian cover is removed and stream temperatures get too warm, when fine sediments smother eggs in the gravel, when rearing pools fill in with excessive gravel, when jams prevent migration; when these or other forms of degradation reduce the productivity of a stream, we are dealing with the first type of obstacle to productive fisheries. We tend to focus most or all of our attention and efforts at this level. The problems are tangible. Biologists and concerned citzens can roll up their sleeves, put on their hip boots and "fix" the problem. We like to "fix" broken streams.

It's important to "fix" streams, but it's more important to keep them from breaking. To a large degree, degraded productivity in our streams is a direct outcome of the second type of obstacle to productive fisheries which exist when the potential productivity is less than our expectations. When we exceed the carrying capacity of stream through hatchery plants and end up replacing natural production with artificial propagation, when we accept the possibility of a 25 year rotation in our forests, when we assume that the pitifully thin riparian zones in clearcuts protect stream productivity, when harvest rates are based on over optimistic assumptions, we are in the second category of resource problem. When we let politically derived compromises set unrealistic expectations of productivity then let those expectations drive management, we set up the second type of obstacle to productive fisheries. Prolonged acceptance of this situation leads to the mining of renewable resources for short term goals.

Agencies that manage renewable resources are required in their legislative mandates to manage those resources for the benefit of present and future generations. Therefore, there is a reluctance to acknowledge management that mines the resource for short term goals. This reluctance leads to the third type of obstacle which exists when the stated resource management goals are not the true goals. When we put a positive spin on a bad compromise, when we overharvest wild coastal coho stocks under the banner of a rebuilding program, when we call a 25 year rotation "sustainable forestry" we are dealing with the third obstacle to productive fisheries. A close examination of the difference between public relations and reality will show that third level problems are more prevalent than we would hope.

If you are going to participate in an intelligent way in the management of your resources, you have to figure out where you are on the complicated landscape of fisheries problems. Then pick the appropriate strategy for the problem you are dealing with. Not all fisheries problems can be solved with a pair of hip boots and a strong back.

Jim Lichatowich is a fisheries biologist and conservation writer who lives in Sequim, Washington, U.S.A.

UNDERWATER WORLD

From the book: *"Ireland's Marine Life. A World of Beauty"*

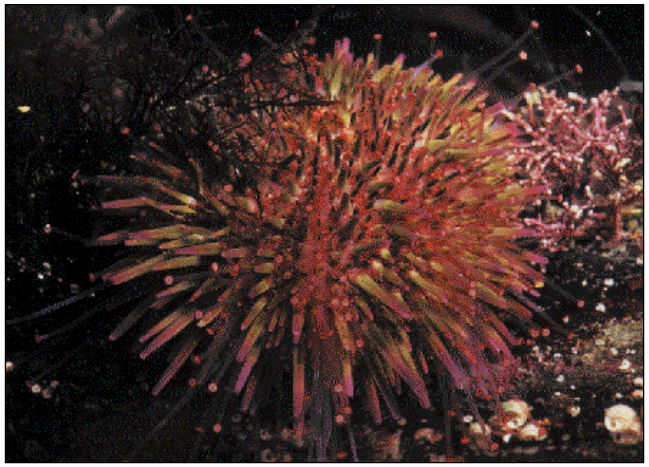
Available from Sherkin Island Marine Station, Sherkin Island, Co. Cork, for £17.99 postage free.

Photography by Paul Kay

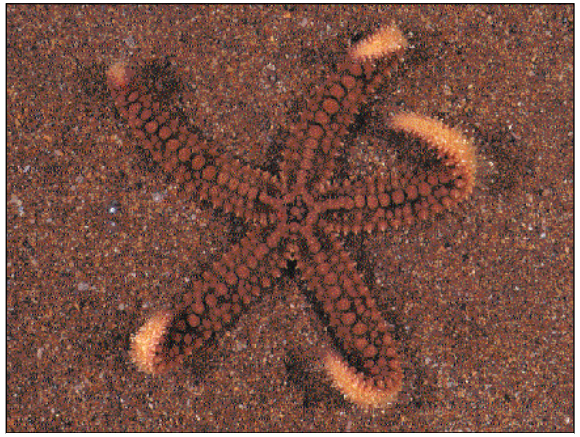
The COMMON PRAWN is often found in rockpools on the lower shore. Its transparency can make it hard to find in the water.

The *XANTHO INCISUS* is a crab which often has disproportionately large claws. Its found among sand, gravel and loose stones on the lower shore and in shallow water.

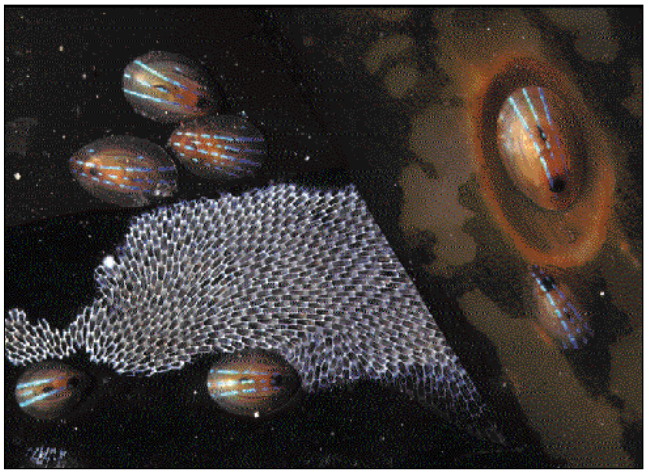
The COAT-OF-MAIL is a mollusc which has a shell of interlocking plates that allows it to roll up into a ball when threatened.



The GREEN SEA-URCHIN is particularly hard to find on the seashore as it is inclined to hide itself with gravel, shell, weed or other debris.



The COMMON STARFISH gets its name from its star-like shape. It five arms each have hundreds of tiny tube-feet that it uses for movement.



The BLUE-RAYED LIMPET, seen here with sea-mat, is often found attached to kelp seaweeds. The shell is smooth and when young it has bright blue lines running from the top of the shell to the edge. These fade and disappear with age.

POLLUTION BY NITRATES

Code of Good Agricultural Practice to Protect Water

Purpose of the Code

THE objective of the Code is to prevent the pollution of groundwaters and surface waters by nitrates from agricultural sources. The primary sources concerned are organic fertilisers such as animal slurries, dungstead and farmyard manures silage effluent, mushroom compost, soiled water and chemical fertilisers containing nitrogen.

Background to Preparation of the Code

The Code has been prepared to fulfil obligations arising under Council Directive 91/676/EEC of 12 December, 1991 concerning the protection of waters against pollution caused by nitrates from agriculture.

What is in the Code?

The Code contains advice and recommendations on farm practices in relation to:

* storage of organic fertilisers,
* standards and specifications for construction of storage facilities,
* when to apply organic and chemical fertilisers to land,
* the appropriate rates of application, and
* precautions to be taken to avoid causing water pollution.

Where does the Code Apply?

The Code applies in all parts of the country and is intended to protect the quality of all surface waters i.e., rivers, streams, lakes and coastal and marine waters, as well as groundwaters.

Status of the Code

This is a voluntary Code designed to promote sustainable farm practices while maintaining high water quality standards. However, should nitrate levels rise to unacceptable levels i.e. close to or above 50 mg/l, it will be necessary to designate the areas of land draining into the affected waters as vulnerable zones. Action Programmes containing more stringent requirements and controls on the management of organic and chemical fertilisers than are provided for in the Code would have to be implemented in these zones with implications for agricultural output and farmers' incomes.

Concerns about Nitrate Pollution

High nitrate concentrations in drinking water supplies, i.e. in excess of 50 mg/l, have direct implications for public health, especially for infants up to six months old (Blue Baby syndrome). There are also concerns about their possible role in the promotion of cancers.

While nitrate pollution is not at present a feature of the Irish environment, nitrate levels in waters are increasing here. They could reach unacceptable levels in the absence of more environmentally aware farming practices and responsible management arrangements for the collection and storage of slurries, silage effluent etc. and for the land application of these organic and chemical fertilisers.

A more immediate benefit of the Code is that the farm management practices recommended therein should contribute to a reduction in phosphorus inputs to waters, a nutrient which is an integral constituent of animal slurries, farmyard manure, silage effluent, etc. Phosphorus is primarily responsible for the increased incidence of slight and moderate pollution of Irish rivers (up from 21.5% of river channel length in 1987/90 to 28% in 1991/94) and to the eutrophication/algal bloom problem affecting certain lakes.

What are the Benefits for Farmers?

Aside from the important benefits for the environment, implementation of the Code should bring financial gains to many farmers through savings in the use of chemical fertilisers. Organic fertilisers such as animal slurries and silage effluent are valuable sources of nutrients which can play a vital role in meeting crop nutrient requirements for growth. These sources of nutrients should be applied to land before any consideration is given to the use of chemical fertilisers. Where the nutrients in the organic fertilisers are inadequate, chemical fertilisers may be used to supplement them and so supply the appropriate recommended rates of nutrients consistent with crop needs and the protection of water quality.

Recent studies have indicated that farmers nationally could reduce purchases of fertilisers by at least £25 million annually by using to best advantage the nutrients present in organic fertilisers and by tailoring overall fertiliser applications to crop requirements.

Consultation on Preparation of the Code

The Code was produced jointly by the Departments of the Environment and Agriculture, Food and Forestry. Teagasc was extensively involved in the preparatory process, while the EPA and the Central Fisheries Board were consulted/provided assistance and advice. The two main farmer representative associations, the IFA and ICMSA, were also consulted and supported the launch of the Code.

Medicinal Reasons for Saving Rain Forests

A NEW study provides a medicinal rationale for saving tropical rain forests. A study of Michael Balick, botanist from the Institute of Economic Botany in New York, and Robert Mendelsohn, an economist from Yale University, estimates the net income derivable from the harvest of medicinal plants from the rain forests of Belize. They estimated that the asset value of land harvested for pharmaceutical products was $4,150 per hectare (ha), more than the $3,980/ha from logging and $425/hectare from farming of the cleared land. Forest plants form the basis of traditional medicine in Belize upon which 75% of the rural populations depend. Many western pharmaceuticals are also derived from tropical plants. *Source: Wildflower*

Antarctic Fact-file

* Antarctica is a continent capped by an inland ice-sheet up to 4.8km thick, containing about 90% of the world's fresh water. The ice-sheet is so heavy that it has pushed the land below sea-level in places. Because of the thickness of the ice sheet, Antarctica has the highest average altitude of all the continents.
* Antarctica is a cold desert, with snowfall equivalent to only 150mm of water each year. This snow builds up gradually, and ice flows towards the coast as huge glaciers. In many places, these extend out over the sea as massive ice-shelves.
* Only about 0.4% of the surface of Antarctica is free of snow and ice. The tops of mountain chains stick up through the ice - the highest is Mount Vinson, 4900m above sea-level.
* The Southern Ocean is a continuous belt of sea surrounding Antarctica. In winter, over half of the Southern Ocean freezes over. Although this seawater ice is only about 1m thick, it has a significant effect on ocean and atmospheric circulation. Nearly all of the sea ice melts in summer.
* The South Pole is 1235km from the closest coastline, and is situated high on the polar plateau (height 2800m). Here it may be as cold as -75°C, but the world record lowest temperature is from an even more remote Antarctic station, Vostok, which logged -89°C.
* There are no native peoples in Antarctica. Eighteen countries operate year-round scientific research stations on the continent and the surrounding islands during summer (Europe's winter) as many as 10,000 scientists and support staff work there, but only about 1,000 in winter. Tourists also visit Antarctica during the summer to enjoy the spectacular scenery and abundant wildlife - currently there are about 10,000 visitors per year.
* Antarctica is a "continent for science". All countries working in Antarctica carry out research, in a surprising range of physical and biological sciences, from the vastness of space to the minute scale of micro-organisms. Activities are regulated by the Antarctic Treaty, which has been in force since 1959 and is signed by all countries operating there. The Treaty reserves the continent for peaceful purposes, and all military and industrial activities are banned.
* Britain has played a major role in the exploration and study of Antarctica. Captain James Cook was the first person to circumnavigate the continent in the 1770s. Later expeditions were searching for commercial opportunities, usually hunting for seals or whales. At the start of the present century, Scott and Shackleton undertook purely scientific expeditions, a tradition which continues to the present.
* The early Greeks suggested that there was a southern land-mass. This remained unknown for several centuries, although "Terra Incognita Australis" - unknown southern land - appears as an immense but quite fanciful continent on a map published in 1531. Even 100 years ago, only small parts of Antarctica had been mapped, and there were several inaccuracies. Only recently have satellite pictures allowed us to build up a complete map of the continent.

Further information can be obtained from British Antarctic Survey publications "British Exploration of Antarctica" and "The Antarctic Treaty". The British Antarctic Survey, High Cross, Madingley Road, Cambridge CB3 OET, U.K.

ACTION AGAINST LITTER

New Litter Laws

THE Litter Pollution Bill was passed into law in 1996 by the then Minister for the Environment, Mr. Brendan Howlin, T.D.. It was necessary, he said, to support the Action Against Litter initiative.

What it does is to spell out more clearly what occupiers of property must do to keep their property free of litter. It also sets out the powers and duties of local authorities who have the responsibility for preventing and controlling litter.

The Bill contains extensive provisions, including the following:

* The basic duty on occupiers of property to keep their premises free of litter is extended to include also the footpath or pavement in front of their premises; this applies to all built-up areas within the confines of restricted speed limit areas.
* Local authorities are able to issue a mandatory notice to the owner/occupier of any place that is heavily littered requiring the person to clean-up and take measures to prevent a recurrence.
* Local authorities are able to issue mandatory notices to the occupiers of certain types of premises such as fast food outlets, or shops whose business activities tend particularly to create litter, to take ongoing measures to keep the vicinity of their premises free of litter.
* Organisers of major public events such as football matches or outdoor concerts have to ensure that proper litter control arrangements are provided in the general vicinity of the venues.
* Dog owners are required to clean-up if their dog fouls in certain public places, including on the street or at a park or beach as well as in the garden of another person's house.
* The placing of advertising leaflets on the windscreens of vehicles is prohibited and local authorities are now able to regulate or prohibit the distribution of advertising material in the street.
* Maximum fines are increased from £800 to £1,500.
* The power to issue on-the-spot fines, up to now the sole responsibility of litter wardens, is extended to the Gardai.

It is expected that local authorities will significantly step up enforcement of these new laws so that offenders will be prosecuted.

THE ST. CROIX ESTUARY PROJECT: Citizen Action for Coastal Conservation

By Robert Rainer

ACROSS North America, there is widespread interest and involvement in community-based environmental conservation initiatives. At heart, these initiatives entail mobilizing local people and organizations to assume greater responsibility for the protection of air and water quality, the conservation of natural resources, and the development of social and economic opportunities related to healthy "natural capital."

In the four Atlantic Canadian provinces (New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland), public support for community-based conservation has been advanced in the 1990s through the *Atlantic Coastal Action Program* (ACAP), a federal program conceived and administered by Environment Canada. Through this innovative program, core financial support has been provided in recent years to 13 non-profit, community-based organizations to help these groups tackle local and regional environment-development problems in primarily coastal settings.

One of these groups is the St. Croix Estuary Project (SCEP), based in the southwest New Brunswick seaside community of St. Andrews. Founded in early 1992, SCEP exists to "foster a community-based response to primarily local environmental challenges, towards maintaining or restoring ecosystem health and therefore community sustainability."

Coastal waters, lands and communities served by SCEP are found within the "St. Croix Estuary Area," an estuarine/marine area that straddles the international border between Canada and the United States. The St. Croix Estuary is the only international estuary on the eastern coast of North America and is part of the St. Croix International Waterway which forms the easternmost boundary between the two nations.

In mid-April, 1997, almost five years to the date of its founding, SCEP released *St. Croix Estuary Area: A Profile* and *Caring for Our Coast: A Plan for Community Management of the St. Croix Estuary Area*. These two documents culminate nearly two years of intensive effort to develop a broad physical, biological and socio-economic profile of the estuary area, and to derive a practical management plan that covers a comprehensive range of environment-development issues.

Todd's Point is a prominent part of the coastal landscape of the St. Croix area. Behind the point is Oak Bay where several major clam flats are found.

The St. Croix region was and remains the home of the Passamaquoddy people, one of several culturally-linked aboriginal groups stretching from the U.S. state of Maine to Cape Breton in Nova Scotia. The rich biological environment of this region, based on the highly productive waters of the Bay of Fundy, supported a pre-European aboriginal culture that existed for at least 3,000 and likely as long as 10,000 to 12,000 years.

With the arrival of French explorer Samuel de Champlain in 1604, the natural and socio-economic environment of the St. Croix region began to rapidly change. "White" settlement, particularly in the late 1700s in the aftermath of the American Revolution, when United Empire Loyalists fled north to colonize places such as St. Andrews and the upriver towns of St. Stephen, New Brunswick and Calais, Maine, resulted in some displacement of the Passamaquoddy people and the beginning of profound ecological change. In the past 200 years, commercial and recreational fisheries have been depleted, many populations of various wildlife species have been reduced due to local, regional and global habitat loss, and the original Acadian forest with its mix of hardwood and softwood trees and massive white pines, has been largely replaced by a younger and less diverse forest.

On the positive side, water quality in the St. Croix River has improved greatly due to substantial investments in industrial and municipal pollution prevention and control. Where the lower river was, for decades, unfit to support many species of aquatic life, including the treasured Atlantic salmon, it is now much cleaner, and fish, shellfish and other aquatic species are not significantly impacted by contamination.

As identified in *Caring for Our Coast*, however, there are numerous issues requiring action. Indeed, the estuary management plan recommends 50 actions in relation to about 30 specific problems. Critical actions identified by SCEP include:

- reducing bacterial discharge from certain local wastewater treatment plants;
- developing a local contingency plan for oil spill response;
- conducting an educational and prevention-oriented campaign related to the introduction of non-indigenous aquatic species through ballast water discharge;
- establishing new public access points to coastal waters and shores;
- assessing the environmental impacts of salmon aquaculture in Passamaquoddy Bay;
- studying the environmental effects of scallop and urchin dragging; and
- completing a critical research program related to the environmental effects of harvesting the marine macroalgae *Ascophyllum nodosum* (popularly known as "rockweed").

As a community-based organization, SCEP is determined to pursue funding to undertake many of the actions directly, and to continue to encourage other groups, both government and non-government, to assume the lead on other actions. Over time, the ongoing use of specific indicators of the ecological health of the St. Croix Estuary Area will provide an objective means of assessing whether progress is being made in relation to the management plan, and any subsequent, updated versions of the plan as a "living document."

Within a broader context, the work of SCEP is linked to efforts by many other community-based and government organizations around the Bay of Fundy and the Gulf of Maine, the latter a massive land and water area encompassing most or parts of three U.S. states (Massachusetts, New Hampshire, and Maine) and two Canadian provinces (New Brunswick and Nova Scotia). In the past five to ten years, there has been increasingly intense interest in the ecological health of the bay and gulf. Now, citizens, scientists, public officials, and fishermen and other resource users are increasingly engaged in collaborative efforts to understand these waters and important trends and changes, and to formulate strategies to maintain and restore ecological health.

Community-based groups like SCEP remain at the forefront of this work. The great strength of the community-based approach to conservation is the ability of local groups to tap into local or "traditional" environmental knowledge and harness the volunteer energy of citizens who care passionately about their home waters and lands. In the St. Croix Estuary Area and around the Bay of Fundy and Gulf of Maine, citizen action for coastal conservation is making a difference.

Robert Rainer, Program Director, St. Croix Estuary Project, St. Andrews, New Brunswick, EOG 2XO, Canada.

CHLORINE - The Good and The Bad

by M.A. Toole

PERHAPS more than any other element, chlorine illustrates the paradoxes of Chemistry. An element of great benefit to mankind, it has also, directly or indirectly, brought many dangers. Though a deadly poison when pure, it is eaten by us all, in appreciable quantities every day. It has given us great advances in health and hygiene and has saved countless lives. It has also destroyed many lives. It has alleviated much pain and caused much suffering. It has proved indispensable to modern civilization, yet threatens us with an ecological disaster from which the earth may take decades to recover.

An extremely reactive, non-metallic element, chlorine belongs to a group, or "family" of similar substances known as the halogens. The other halogens are the even more nasty fluorine and bromine, the less troublesome iodine and the rare and radioactive astatine.

Discovered by the Swedish chemist, Karl Scheele, in 1774, it was named, in 1810, by Humphrey Davy as a result of its colour. The choking toxicity of this dense, green gas was quickly observed, though it was not put to hideous use until 1915, when it became the first weapon of a new and particularly horrible kind of warfare. An estimated 5000 allied soldiers died within days of the first chlorine attack, while 15000 more suffered effects ranging from skin irritation to permanent blindness. Gas attacks rapidly came to be feared perhaps more than the bullet or the high explosive.

Because of its highly reactive nature, chlorine is never found in Nature as the pure element. It always exists combined with other elements in the normally harmless forms of metal chlorides. The most common of these is sodium chloride, the salt we eat every day as a food flavouring and preservative.

Chlorine and other valuable by-products, hydrogen and sodium hydroxide, are manufactured from this cheap and plentiful raw material by a process in which an electric current is passed through a solution of the salt. In one variation of this, one of the electrodes used is made of the liquid metal, mercury. This is continuously re-cycled, though inevitably, traces escape into the effluent and contaminate the products. In the 1950s, a series of illnesses and birth defects which occurred around Minimata Bay, in Japan, were traced to mercury present in effluent from local industries which used chlorine compounds. Rather than being dispersed into the ocean, this mercury was concentrating in the stagnant mud of the bay and entering the food chain, eventually poisoning the people who depended on the fish or their livelihood.

A high proportion of manufactured chlorine is used to make solvents for oil and grease, or chemicals used as aerosol propellants and refrigerants. These compounds were originally employed because they were found to be extremely stable. And they are, under normal conditions. They disperse into the atmosphere where, for the most part, they remain harmless.

Over a period of years, however, small but significant amounts diffuse into the upper regions, where they are exposed to intense ultra-violet radiation which splits up the molecules to release chlorine atoms. These attack and destroy the ozone molecules which protect the earth from ultra-violet rays. Each chlorine atom will destroy more than a thousand ozone molecules before it is itself removed from circulation.

Ironically, it is the stability of some compounds which leads to another problem. Dichloro-diphenyl-trichloroethane (DDT) for example, and other chlorine-based insecticides have been instrumental in the control of many insect-borne diseases, such as malaria. Their use has also led to huge improvements in crop yields. However, they are not destroyed by soil bacteria, and so persist for many years in the food chain, where they reach a concentration which kills birds and small mammals. Even creatures living as remotely as Antarctic penguins now have appreciable quantities of DDT in their tissues.

These disadvantages of chlorine need to be weighted against its benefits and those of its compounds.

The brighter aspect of chlorine's toxicity lies in the fact that in very low concentrations, too low even to be detectable by humans, it is lethal to bacteria. For this reason, it is added to swimming pools and even tap water, and forms the basis for most household disinfectants and bleaches. It has thus proved indispensable for the maintenance of hygiene and cleanliness and has virtually eliminated waterborne diseases in the modern home.

The principle agent in such activities is not chlorine as such, but a much more manageable chlorine compound such as sodium hypochlorite.

And here lies another of the paradoxes of chlorine. Sodium hypochlorite, formed when chlorine reacts with the alkali, sodium hydroxide, is an unstable chemical, which slowly decomposes to form sodium chloride and atoms of oxygen. Rather than the chlorine, it is this atomic form of oxygen, much more reactive than the normal molecular form of paired atoms that exists in air, which kills the bacteria. The same mechanism is responsible for the bleaching action of chlorine and sodium hypochlorite.

Other chlorine compounds, such as hexachlorophene and trichlorophenol (TCP) also act as anti-bacterial agents, while chloroform has been used as a powerful anaesthetic to eliminate pain during surgical operations.

Hydrochloric acid is the cheapest of the industrial acids and is widely used, and though very strong, causes few problems when handled properly. It dissolves rust from steel prior to galvanising, and as a component of "aqua regia" is the only common acid able to dissolve gold.

In a more natural context, hydrochloric acid is secreted onto food in our stomachs, where it plays an essential part in the digestion of that food.

Many important plastics, such as poly-vinyl-chloride (PVC) contain chlorine. Others, like nylon and terylene are frequently made from chlorine compounds. Many dyes are manufactured from chlorine-based intermediates, while photography depends on the ability of silver chloride and the related silver bromide to decompose to silver under the action of light.

The dangers of chlorine and its compounds have not always been apparent until their use has become widespread. If we learn from past ignorance then we may avoid future mistakes, for the benefits of chlorine are not in doubt, and ensure that it will remain high in the list of important elements.

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Growing Fuel by the Field

FIELDS full of low-emission fuel are no longer a dream: taxis burning chemically prepared rapeseed oil have already traveled over two million kilometres.

Rudolf Diesel himself hit upon the idea of using vegetable oil to fuel his self-igniting engine. Unfortunately, as Mercedes-Benz developers discovered in extensive tests some time back, pure oil from the rape plant destroys the engine after around 600 hours. However, if pure rapeseed oil is converted by a chemical process into rapeseed oil fatty acid methyl ester, the diesel engine can handle it with no problems, as dozens of taxis in various German cities have confirmed. In Freiburg alone, 29 taxi drivers conducted their daily business in cars powered by the esterified oil. Altogether, they burned 240,000 litres of the "biodiesel" fuel, traveling around 2.5 million kilometres in the process.

Nonetheless, according to the experts, rapeseed oil will not replace fossil fuels in the future. Mercedes-Benz developers estimate that the plant-based fuel will be able to replace at most around ten percent of conventional fuels. To convert all diesel cars to rapeseed oil is neither realistic, nor is such a step intended.

As far as the environment is concerned, the plant-based fuel has a lot to recommend it. Rapeseed oil is non-toxic and biodegradable. It burns without releasing sulfur diox-

PORTUMNA FOREST PARK

Páirc Fhoraoise Phort Omna

Location: Adjacent to Portumna on the northern shore of Lough Derg.

Habitat: The park is easily accessible by water and road. The forest is mainly coniferous but also contains a wide variety of broadleaved trees, both native and exotic. In addition to woodlands there are wide open spaces aplenty, green fields, scrub, marsh, water and numerous off-shore islands. This intermix of forest, open area, water and islands gives a wide choice of habitat to support a great variety of flora and fauna.

Length/Type of Trails: Forest Road, Long Walk and Nature Trail.

Main Tree Species: The forest is mainly coniferous, but it contains a wide variety of broadleaves as well. The main conifer species are Scots pine, larch and Norway spruce. There are knarled old oaks which have been here for centuries, majestic beeches which dominate the skyline, giant evergreens from Western North America, colourful larches from Europe and Japan, blue Atlas cedar from Africa, maples from Canada and Europe and practically all of the native tree species, including our two native conifers, the yew and juniper. The latter is widespread throughout the area, but only in the prostrate and shrub form.

Fauna: Sixteen species of wild mammals reside within the Forest Park, of which the smallest is the pigmy shrew. The largest and most conspicuous is the fallow deer of which there is a large herd within the forest. Less conspicuous is the otter and probably the most elusive mammal of all is the pine marten (known locally as 'the cat'), a native tree-dweller which, until recently, was on the verge of extinction. The red squirrel, stoat, badger and fox may also be encountered. Bird life abounds in and around the Forest Park and eighty-five different types breed here, while many others pass through. The mute swan may be seen on the lake while the tiny goldcrest is a permanent resident of the forest. The lake and the shore are official sanctuaries and here wildfowl in their thousands can be observed from some of the observation points within the forest. Portumna Forest Park has one of the largest inland breeding colonies of cormorant on one of the islands.

History: The name Portumna derives from the Irish Port Omna, meaning the landing place of the oak tree. Portumna Forest Park was acquired in 1948 and covers almost 600 hectares (1,500 acres). It was formerly owned by the Clanrickarde family. There is an old abbey, now under the care of the Dept. of Arts, Heritage, Gaeltacht & the Islands, within the Park which dates back to the 15th century. The castle nearby, on which considerable restoration work has been carried out, dates back to the 17th century and was the seat of the Earl of Clanrickarde. An earlier castle was located on the lake shore, east of the harbour, while yet another was constructed in the late 18th century where the main car park is now located. This was destroyed by fire and subsequently demolished.

Facilities: There are forest and lakeside walks, car park, toilet facilities and observation points. There is a viewing tower along the nature trail where one gets a bird's eye view of the forest, lake and lakeshore. Adjacent to the park is a marina giving access to the Shannon waterway system.

"Discovering Ireland's Woodlands. A Guide to Forest Parks, Picnic Sites and Woodland Walks", produced by Coillte Teoranta - The Irish Forestry Board, provides details of forest parks, picnic sites and forest walks. Portumna Forest Park is one of these forests. *Price: £2.00.*

Stephenstown Pond and Nature Park

By Louise Collier

A UNIQUE Community effort has restored a 5 acre derelict pond and woodland into a beautiful local amenity.

Stephenstown Pond and Nature Park is outside the village of Knockbridge which is situated about 5 miles south-west of Dundalk.

History

The pond was originally built under contract by William Galt in 1817 for Matthew Fortescue, the landowner of Stephenstown Estate. The water was needed for the recently constructed gardens and to drive the grinding mills in the farmyard. It was the golden age of tree planting in Ireland and William Galt (who was married to Agnes Burns, the sister of the famous Scottish poet Robert Burns) adorned the whole site with a bewildering array of trees and shrubs. He stocked the pond with a variety of coarse fish. The great diversity of plant life has remained here ever since.

Sadly, in recent years, the site has been neglected. Derelict and overgrown it was used as nothing more than a rubbish tip by local people. It wasn't until 1995 that a group of highly motivated and committed people from the Knockbridge area gathered together with the intention of renovating Stephenstown Pond. The main objective of the project was to develop the area into a core tourism product with emphasis on fishing, amenity and ecological interpretation. The Stephenstown Pond Trust Ltd was formed. The trust purchased the pond site in 1995 on behalf of the Knockbridge community and the daunting task of fund-raising began. Letters were sent out to everyone in the area offering a lifetimes fishing in exchange for a donation. Pub quizzes were organised and begging letters sent to just about every organisation imaginable. The end result of all this effort was an incredible £30,000 collected locally, £10,000 from the International Fund for Ireland (IFI) and a further £49,000 from the Louth County Council under the EU Rural Towns and Villages Programme. This made an amazing total of £89,000. The money was used to pay for contract workers, machinery and materials. Stone walls were built, sluice gates constructed, trees planted and areas of debris cleared. The bulk of the manual work was undertaken by students under the Summer Job Scheme and FAS Community Employment workers. Stephenstown pond was officially opened on the 14th July 1996. The Knockbridge/Louth Village Community Employment Scheme, which incorporated the development of Stephenstown Pond, won the Environmental Category of the FAS Community Initiative Awards for the North East Region in 1996.

Ecology

Stephenstown Pond encompasses approximately 5 acres of woodland, willow copse, wild flower meadow, water meadow and pond habitats. The pond provides an oasis for a fascinating variety of wildlife. There are at least 88 wild flower species and some 57 species of tree and shrub present. These play host to more than 47 species of bird and other wildlife such as colourful butterflies, dragonflies and damselflies. The lake is once more stocked with a variety of coarse fish and is surrounded by a lovely varied wildlife habitat.

Stephenstown Pond is a very biodiverse environment with a variety of habitats. Woodland surrounds the outer drier areas of the pond. Beech copse dominates the roadside while wooded areas elsewhere around the pond are dominated by sycamore with a hawthorn understorey. The woodland floor is scattered with wild flowers such as wood garlic, herb robert and lesser celandine. On damper soils nearer the pond margin are scattered areas of willow copse. This habitat is dominated by willow species and alder trees. Bogbean dominates the ground flora. A great variety of ruderal (weed) species are found around the woodland and pond habitats. A wild flower meadow lies at the northern end of the pond. These areas are colourful and diverse. Along the pond margins are large areas of water meadow dominated by water lilies, with reeds and yellow irises at the waters edge giving way to sedges and rushes on drier slopes.

Photos: Louise Collier

Stephenstown Pond: encompassing approximately 5 acres of woodland, willow copse, wild flower meadow, water meadow and pond habitats.

Facilities

Stephenstown Pond has been developed as a carp fishery, public amenity and site of ecological interpretation. There are two fishing stands at the pond, one accessible to people with disabilities. There are picnic and car-parking facilities. For those not interested in carp fishing, there is a lovely lake shore walk around the pond going through the various habitats. There are illustrated interpretative boards to enhance enjoyment and appreciation of the site. Nature booklets and brochures about the site ecology are also available.

Louise has written a booklet "Stephenstown Pond", which is available from Brodigan's Shop in Knockbridge, Co. Louth.

The Stephenstown Pond Trust Ltd, formed by a group of highly motivated and committed people from the Knockbridge area, purchased the pond site in 1995 on behalf of the Knockbridge community to develop the area into a core tourism product with emphasis on fishing, amenity and ecological interpretation.

When the Well Runs Dry:

The Risks of Global Water Scarcity

A TRICKLE of water sputters out of Ramesh and Manorama Patel's well in Boriya village in Gujarat State, India. Their vegetable fields need at least two more good irrigations to come to harvest, but their well is going dry again. They have already spent all of their savings deepening the well twice, but the water table has continued to fall. Ramesh and Manorama believed that tube-wells, which replaced traditional wells that drew up water through human- and animal-powered lifts, were a good idea when they came into the area. The pumps for the tubewells run on electricity, which the government provides almost free of charge. Therefore, drawing up water from tubewells is much cheaper. With the electric pumps, wells can also go down deeper and draw up water faster.

But now, after spending so much money to deepen the well, they can't get enough water for crops in their fields. Even the village drinking wells are drying up. Manorama has to go out to the tubewell in the field for household water instead of using the well beside her house. And what she gets is no longer sweet water, but salty.

Ten other farmers in the village have wells. All have noticed the falling water table, but none of them, including Ramesh and Manorama, have decreased the amount of water under their land, but they and their neighbours are all pumping from the same underground water table. So if Ramesh and Manorama don't pump today, they can't be sure all the water they need will be there tomorrow. And even if all the villagers agreed to cut back, farmers in other nearby villages could continue to deplete the source of underground water by using it indiscriminately.

Excessive use of water is lowering groundwater levels in the Middle East, North Africa, and South Asia including Ramesh and Manorama's village in India. If the world's supply of fresh water were evenly distributed and properly used, it would be adequate to meet people's needs for the foreseeable future. But water is poorly distributed across regions, within countries, and across seasons. Virtually all developing countries, even those with adequate water overall, suffer from debilitating seasonal and regional shortages. About 20 countries today are water scarce, with lack of water severely limiting their social and economic development and environmental quality. By 2020, the number of water-scarce countries could approach 35. With more than 200 bodies of water shared by two or more countries, competition for water is becoming more acute, increasing the potential for conflicts between different groups of water users within countries and for water wars between countries.

"The world does not consider water the scarce resource that it is," says Mark Rosegrant, a research fellow at IFPRI who has studied water issues extensively. "Unless this changes, increasing water scarcity could make water one of the central polarising forces of the 21st century."

The damming of rivers upstream often causes conflicts with countries downstream. Tension is mounting between Turkey, Syria, and Iraq over Turkey's Greater Anatolia Project, now under construction. The project, which will encompass 21 dams and 19 hydroelectric power plants, could cause Syria to lose up to 40 percent of its water from the Euphrates and Iraq to lose as much as 90 percent. Ethiopia is upriver of Egypt on the Nile River, and Egypt is totally dependent on the Nile for water. Although Ethiopia has never claimed rights to use the water of the Nile before they reach the vast reservoir behind Egypt's Aswan High Dam, such a claim could threaten Egypt's lifeline. India and Nepal want to exploit the Ganges-Brahmaputra basin's huge hydroelectric power-generating potential, while Bangladesh wants the water managed in a way that will minimise flooding during monsoon months and water shortages during dry months. Of equal concern are water conflicts between states in India that share river basins.

Excessive water use harms the environment. Between 0.3 and 1.5 million hectares of land are lost each year world-wide from waterlogging and salinization that result from overuse of water and leakage from irrigation canals. In Pakistan, salinization of soils makes some areas of once fertile land look like they are covered in snow. Because of the great costs involved in recovery of affected land, severe salinization is essentially irreversible.

Agriculture is the large user of water in developing countries, accounting for an average of 80 percent of the water used. But most current government policies affecting water use encourage waste. In many areas, urban and rural water users receive massive subsidies. Water for irrigation, the largest use, is essentially free. With water provided by public systems at little or not cost to the user, there is little incentive to conserve. As a result, water is waste and scarcities result.

Water scarcity could be prevented through water policy reforms. Such reforms include establishing secure, legal rights to water use and transferring management and ownership of water from government to private associations made up of farmers. Creating water rights among water user associations encourages farmers to use only what they need and sell what they do not need. Adopting such an approach, Chile has completely turned over its water companies to private control.

"A marketing solution can make a great contribution to solving water scarcity in the future and can make investments in water infrastructure more cost-effective in the present," says Renatio Gazmuri, former secretary of agriculture in Chile. "Farmers will not approve unprofitable capital improvements. Because of their increased water efficiency, Chilean farmers now irrigate 22 percent more land with the same amount of water as before. An investment of about US$400 million in new irrigation infrastructure would have been required to generate such water efficiency gains."

According to "A 2020 Vision for Food, Agriculture, and the Environment" initiative from the International Food Policy Research Institute, 1200 Seventeenth Street, N.W., Washington, D.C., 20036-3006, USA. Web http://www.cgiar.org/ifpri.

What Do the Poor Pay for Water?

SEVERAL studies show that the urban poor pay high prices for water supplies and spend a high proportion of their income on water. For example, in Port-au-Prince, Haiti, the poorest households sometimes spend 20 percent of their income on water; in Onitsha, Nigeria, the poor pay an estimated 18 percent of their income on water during the dry season compared with upper-income households, who pay 2 to 3 percent; and in Addis Ababa, Ethiopia, and in Ukunda, Kenya, the urban poor spend up to 9 percent of their income on water. In Jakarta, Indonesia, of the 7.9 million inhabitants, only 14 percent of households received water directly from the municipal system. Another 32 percent buy water from street vendors, who charge about $1.50 to $5.20 per cubic metre, depending on their distance from the public tap. In some cases households purchasing from vendors pay as much as twenty-five to fifty times more per unit of water than households connected to the municipal system. This phenomenon is also found in Karachi, Pakistan; Port-au-Prince; Jakarta; Nouakchott, Mauritania; Dacca, Bangladesh; Tegucigalpa, Honduras; and Onitsha. *Source: World Bank*

Trigger Happy in Irish Waters?

By Declan T. Quigley

THE trigger fish (*Balistes capriscus*) is normally found in tropical waters on both sides of the North and South Atlantic and in the Mediterranean Sea where it inhabits rocky outcrops and coral reefs. The species owes its name to the structure of the first dorsal fin which is supported by three strong spines. The first spine is exceptionally robust and is hollowed out behind to receive a bony knob at the base of the second spine. Once erect, the first spine remains immovable until the second, which acts like a trigger, is depressed. If it is threatened by predators, the trigger fish use its dorsal fin spines either in defence or to wedge itself securely amongst rocks.

Photo: Paul Kay

The trigger fish is now regarded as a relatively frequent summertime visitor to North West European waters.

For many years the trigger fish was regarded as rare in Irish waters. Indeed, between 1847 (when the species was reported) and 1958 only six specimens were recorded. However, since the late 1960's increasing numbers of trigger fish have been appearing in Irish waters, culminating in a phenomenal influx during the early 1990's. What caused this massive invasion of trigger fish and where did they come from?

Research has shown that the trigger fish has been gradually extending its range and abundance throughout the North and South Atlantic during recent decades. Prior to 1970 the species was regarded as relatively rare off the west coast of Africa. However, between 1971 and 1980 a huge increase in trigger fish abundance occurred sequentially from Ghana to Mauritania. Indeed, during the mid 1970's it was estimated that the species accounted for over half of the total fish biomass on the continental shelf between Cape Verde (Senegal) and Nigeria. The dramatic proliferation in trigger fish was accompanied by an equally dramatic collapse in the west African sardine fishery. Both incidents are thought to be related and associated with significant changes in oceanographical conditions. During the same period, similar, albeit less dramatic increases in trigger fish abundance and range have been recorded off the coasts of North and South America.

The trigger fish is now regarded as a relatively frequent summertime visitor to North West European waters. The main influx occurs off the south west coast of Ireland during July/August and continues through to November. The species is now frequently sighted by SCUBA divers and is captured by anglers. There is no evidence, as yet, that the species breeds in European waters. Indeed, it is thought that the trigger fish probably dies at seawater temperatures <12°C. It currently is unclear where the Irish trigger fish originate from; they could be migrating from either side of the tropical Atlantic. Perhaps the recent exceptionally warm summers may have contributed to the phenomenal increase in trigger fish abundance. Whatever the case, it is becoming increasingly apparent that uncommon species, and particularly those on the edge of their distribution, can be essential indicators of environmental change. Fish, more than their terrestrial counterparts, can move more freely in response to changes in environmental conditions.

Declan T. Quigley, Gaelic Seafoods (Ireland) Ltd., Derryclare Hatchery, Recess, Co. Galway.

HEDGE MANAGEMENT

HEDGES are important to agriculture, the conservation of wildlife and the scenic quality of the countryside. On the farm, hedges provide stock-proof barriers, deterrents to trespass, and shelter for stock and crops. Hedges need good management to maintain these functions, especially on farm boundaries.

To help in the cost-effective management of hedges for the benefit of farms, wildlife and landscape conservation, this leaflet deals with:

* The benefits of hedges;
* The management of hedges;
* Considerations on hedge removal;
* Costs.

Why have hedges?

It is often said that hedges waste land and impede mechanisation, and that farm efficiency requires large fields. However, the shelter provided by hedges can, in some cases, increase yields of livestock and cereals by up to 20% by increasing soil temperatures and reducing evapo-transpiration which lead to the earlier growth of grass and crops. Hedgerow trees also help to remove excess soil moisture and can provide a source of domestic fuel.

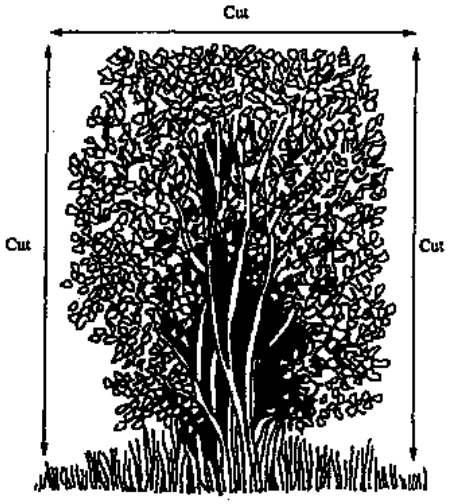
Wild birds are the most efficient 'insecticide' we have, and two-thirds of our birds breed in hedges. As hedges occupy more land than all our nature reserves and national parks put together, it can be seen that hedges are a vital wildlife habitat. Well-managed hedges contribute to the scenic character of the countryside and, as such, benefit tourism and, in contrast to neglected hedges, enhance the value of farms.

How to manage hedges

There are three main methods of trimming a hedge:

* The reciprocating cutter bar is most suitable for soft growth on hedges which are trimmed annually, and for clearing out hedge bottoms.
* The flail cutter is very efficient for slightly heavier work involving two or three years growth. When used correctly it will leave an excellent result with mulched cuttings.

  Too often, however, flails are used on heavy woody growth resulting in an unsightly and ultimately useless hedge which is open to decay through the frayed branches.
* The circular shape saw should be used instead of a flail on heavy growth, and is ideal for shaping up overgrown hedges or for coppicing.



The traditional practice of hedge laying by hand has almost disappeared because of the time and labour involved. Once a hedge has been laid, however, it can remain stock-proof for 15 years with only occasional trimming.

What is the best shape and size?

To be an effective stock-proof barrier, a hedge should be at least 1.8m (6ft) high.

Hedges should ideally have good growth at the bottom to provide cover for wildlife and adequate shelter for stock. A tall, thin, gappy hedge is undesirable for farming and wildlife.

When is the best time to cut?

* Trim during winter to fill slack periods of farm work.
* Avoid disturbing nesting birds by not trimming during spring or early summer. Autumn trimming can destroy birds' winter food supplies such as berries.
* For the best economy and least wildlife disturbance, trim only every three years.
* By trimming hedges in rotation around the farm (i.e. always some uncut) trimming can take place from late August to February with minimal wildlife disturbance.

How to deal with neglected hedges

Hedges can grow too tall and wide, and so waste land and cast excessive shade. Neglected hedges can also become thin and gappy at the base, with bare, exposed banks. The main methods of rejuvenating neglected hedges are:

* **Trimming** - If the hedge has value for shelter, it can be sidetrimmed with a circular shape saw. It may need planting or further trimming to encourage thickening.
* **Coppicing** - All growth is cut down to 75 mm (3 in) above ground level and left to re-grow. Coppicing on a 6-10 year rotation is an effective and economic method of hedge management in arable areas and provides a valuable source of firewood.
* **Gapping Up** - A hedge will deteriorate over time if gaps are not replanted. Gaps should be cleared out and cut back to healthy vegetation. Dig in well-rotted manure, otherwise hawthorn plants will not grow in an old hawthorn hedge. Plant staggered rows, 500 mm (18 in) spacings, of hawthorn, blackthorn or beech. Young plants should be weeded and protected from stock by a temporary fence.
* **Protective fencing** - Where a hedge bank has been exposed through excessive trampling and grazing by stock, a temporary fence, such as an electric fence, can be erected to allow bank vegetation to regenerate.

Removing hedges

Some hedges may still need to be removed if fields are very small. When deciding which hedges to take out, consider the effects on shelter, game, wildlife and the landscape. Remember that hedges which run north-south have a minimal crop-shading effect, yet provide maximum shelter from prevailing winds. A large hedge, effective as a windbreak, compensates for the space it occupies by its positive effects, whereas a small hedge with many gaps may serve no purpose at all, the area it occupies being wasted.

Hedgerows are important corridors for the movement of game and wildlife. Retain hedges which join woods, wetlands, or other areas of value of wildlife. If hedges must be removed, it may be an idea to plant up areas which are awkward to cultivate, such as field corners or steep slopes.

Hedgerow trees

Allowing hedgerow saplings to mature is a source of 'free' trees which are already well established. they need minimal maintenance and can provide useful source of timber as well as contributing to the character of the landscape. Space at 10 metre intervals they can eventually act as narrow shelterbelts. Good straight saplings can be tagged with a strip of fertiliser sacking to warn the hedge cutter operator; the vegetation around these saplings can be cleared with a billhook.

Hazards to hedges

Weed infestation, especially by scutch grass, may be a problem. Spraying the hedge bottoms with weed-killer is not the answer as it offers only a temporary solution. It also destroys many plants which are used as food by game birds and crop-pollinating insects. If scutch is a problem, keep a 2 metre strip regularly cultivated near the hedge.

Straw-burning can cause severe damage to hedges, and great care must be taken to avoid accidental damage. Before burning, plough a 2 metre strip near the hedge, do not burn on a windy day and never leave fires unattended.

Costs

It is not possible to give more than a rough guide to some of the costs of hedge maintenance, which are in any case cheaper than the cost of stockproof fencing. An agricultural contractor will usually give an estimate of trimming according to the length of hedge, its condition, location and accessibility.

Costs likely to be encountered are about £14-15 per hour. The cost of establishing a new hedge is about £150-200 per 100 metres (including cultivation, planting and fencing).

References

British Trust for Conservation Volunteers, Hedging - A Practical Conservation Handbook. BTCV, 36 St. Mary's Street, Wallingford, Oxfordshire, OX10 OEU, UK.

ENFO Briefing Sheet 10 Hedgerows

Further Information

An Taisce, Tailors Hall, Back Lane, Dublin 8.

Irish Wildlife Federation, 132A East Wall Road, Dublin 3.

Irish Wildlife Conservancy, 8 Longford Place, Monkstown, Co. Dublin.

Issued by ENFO - The Environmental Information Service, 17 St. Andrew Street, Dublin 2. Tel. 01-679 3144 Fax 01-679 5204.

Publications of Interest

"Nurturing Nature - Guide and Directory of Environmental Groups"

Compiled & Edited by Ciaran C. Ryan

The Cardinal Press, Maynooth/£4.00 (plus p&p)

Available from Ciaran Ryan, 9, Glenview Drive, Killarney, Co. Kerry.

This directory consists of a comprehensive series of entries for all the major, and many of the smaller, environment-type organisations, groups and individuals in Ireland. They are organised county by county with contact names, number of members, status, nature of work and resources. An essential book in any conservationist's or environmentalist's bookshelves.

"Seeking a Partnership Towards Managing Ireland's Uplands"

Edited by D. Hogan and A. Phillips

Irish Uplands Forum, c/o D. Hogan, Cloon, Cleggan, Co. Galway/1996/£10.00

This book contains over 30 papers given at a conference organised on the future of Ireland's Uplands. The paper by Noel Kavanagh, Bord Failte "The Long Term Sustainability of Ireland's Uplands" shows a most interesting chart in 1901. The aggregate population in town areas was 21% in 1901 and by 1991 it had increased to 51%. He states: "For those Irish people who do not live on or are not of the land, there is a need to understand that maintaining a rural population through sustainable agricultural practices is of prime importance in socio-cultural terms. The shift from the land to urban conurbation has been relentless since the beginning of this century. This is illustrated in the following census figures for aggregate town populations and aggregate rural populations from 1901 to 1991.

It is important that the decline in rural populations is minimised to maintain a balanced rural quality of life. This is also important in order to maintain small towns and villages as vibrant social and cultural centres, where they service the social needs and cultural requirements of their rural hinterlands. Should the hinterlands population decline, so also will the small town and village."

Many of the papers have so much to offer anyone interested in rural Ireland's Uplands. Planning officers and politicians should have this book as a reference.

"Proceedings of the International Symposium on North Pacific Flatfish"

Alaska Sea Grant College Program, P.O. Box 755040, Univ. of Alaska, Fairbanks, Alaska 99775-5040, U.S.A./AK-SG-95-04/1994/$25.00

ISBN: 1-56612-034-9

This book covers 35 of the papers presented at the International Symposium on North Pacific Flatfish, which was held in Alaska. The keynote speech by the Director of the International Pacific Halibut Commission stressed the need for research to better the understanding of Pacific Halibut. He suggested more survey data to correlate with commercial catch data. Halibut by-catch was also discussed. Eleven papers on early life history focused on nursery habitats of flatfish, distribution and abundance of flatfish eggs and larvae. Other papers addressed feeding, growth, abundance, biomass, distribution and disease.

Reading this book one thought came to the fore - we do not have any such data on flatfish in Irish waters. Sadly that situation will not change in the coming years - or should I say decades? An excellent book.

"High Latitude Crabs - Biology, Management and Economics"

Alaska Sea Grant College Program, P.O. Box 755040, Univ. of Alaska Fairbanks, Fairbanks, Alaska 99775-5040, U.S.A./AK-SG-96-02/1994/$30.00.

ISBN: 1-56612-039-X

Why cannot someone here in Ireland understand that such research is needed on our crab populations? Can one imagine the replies from the Marine Institute if one asked for information on research into crab management, distribution and abundance, reproduction, age and growth, size, feeding etc... In particular the paper in the proceedings: "Crab Research in Alaska: An Interagency Long-term Plan" should be read by all those interested in developing Ireland's crab species. They may learn something. Yes, with this book and the book on flatfish by the Univ. of Alaska we as a nation are put to shame with the little research we do on our sea resources.

"The Fresh Waters of Scotland - A National Resource of International Significance"

Edited by P.S. Maitland, P.J. Boon, D.S. McLusky

John Wiley & Sons/1994/£75.00

ISBN: 0 471 94462 9

Based on the 50th meeting of the Scottish Freshwater Group, this book gives a contemporary account of the fresh waters of Scotland. Scotland is fortunate in being richly provided with numerous rivers and lochs. The extent of the fresh waters, their value and uses are examined as well as the threats they face alongside possible remedial measures. The book also looks at the water's flora, fauna, paleolimnology and archaeology. It concludes by reviewing present controls through pollution prevention, planning, nature conservation and agency management, at both national and international levels. It has 37 chapters and will be of interest to all professionals and students concerned with fresh water resources. Highly recommended.

"The Ecological Basis for River Management"

Edited by David M. Harper and Alastair J.D. Ferguson

John Wiley & Sons/1995/£79.95

ISBN: 0 471 95151 X

This book is the result of an international conference of the same name held at Leicester University in March 1993 to mark the first four years of the National Rivers Authority (NRA) in England and Wales. Over the past decade river management has become a multi-disciplinary profession and this book addresses the underlying ecological issues in the six major operational functions of river management i.e. water quantity, water quality, fisheries, recreation, conservation and planning. The forty chapters are written by leading authorities in this area. They include: "The Ecological Basis for the Management of Flows Regulated by Reservoirs in the United Kingdom", "The Ecological Basis for the Management of Water Quality", "Acidification: Causes, Consequences and Solutions", "The Importance of Investigatory and Analytical Techniques in Biological Water-Quality Investigations", "The Ecological Basis for the Management of the Natural River Environment", "The Management of Riverine Vegetation", "Ecological Impact of Angling". All these, and others, are relevant to Ireland.

"Particle Analysis in Oceanography"

Edited by Serge Demers

Springer-Verlag Berlin Heidelberg/1991

ISBN: 3-540-51763-4
0-387-51763-4

Individual cell and particle analysis in aquatic sciences is involved in many aspects of oceanography and limnology, including optical physics of particles, phytoplankton physiology and ecology, marine and aquatic microbiology and food web interactions. This book concentrates on the optimal utilization of flow cytometry and image analysis and the ways in which oceanographic and limnological problems can be uniquely or better addressed using these techniques.

The book stresses the need to work on merging scales in order to increase our understanding of the productivity of aquatic systems and emphasized the use of flow cytometry as a powerful tool for rapidly integrating large amounts of information over a wide range of particle scales.

In the future, it is recommended that some members of the international community of ocean scientists continue the transfer of techniques and methodologies developed in other fields, taking into account the challenges of analyzing marine samples.

"Whales, Dolphins & Seals" (Collins Watch Guides)

By François Moutou

HarperCollins Publishers/1995/£5.99

ISBN: 0 00 220089 9

This Collins Watch Guide can be taken out, whatever the weather, without the risk of spoiling it. The pages are laminated with a sprial binding. There are simple explanations with excellent colour photos of whales, dolphins and seals. A superb beginners' guide to take to the seashore or on a boat.

"'Spiders" (Collins Gem Photoguide)

Text by Paul Hillyard

HarperCollins Publishers/1997/£3.99

ISBN: 0 00 470904 7

This Collins Gem on spiders is a photographic guide to over 200 spiders from around the world. The guide also has information on their likely habitat and range, together with a useful introduction on the biology of spiders.

IUCN Publications

"Paradise on Earth"

Harper-MacRae & Associates Inc./1995/£25.00

ISBN:0-646-19397-X

For its beautiful animal photography alone this book is fascinating. My favourite is a leopard savouring its prey on a tree in Zaire's Garamba National Park, followed closely by a picture of two young grizzly bears in Kluane National Park, Alaska.

This book is a journey of discovery and wonder to some of the world's National Parks in over 45 countries worldwide. Nanda Devi National Park in India is an area of 155,692 acres from 6,890ft to 225,646ft above sea level. This park is now closed to almost all visitors, except a handful of professional mountaineers. Although it was only opened to tourists in 1949 it has suffered a rapid and brutal decline due to carelessness.

All parks in this book are World Heritage sites and all are selected for their outstanding universal value. There are hundreds of beautiful photographs with wonderful text giving such information as where they are and what is needed to be done to protect them for all time. With the title of the book "Paradise on Earth" it is aptly named. Oh, to be able to visit them in the flesh!

"Caring for the Earth - A Strategy for Survival"

By Mitchell Beazley

IUCN/1993/£19.99

ISBN: 1 85732 168 5

Caring for the Earth is a plan of action for the survival of our planet and its inhabitants. It is the considered view of three major global conservation organisations. It sets out the principles and actions on which the future of our societies depend.

The first part of the book explains the issues of conservation and of social and economic development. The second looks more deeply into the problems of human activity and the environment; each chapter deals with one area - such as forests, oceans, farm and range lands, and industry and commerce - and ends with a series of priority actions that summarize needs and point the way to the future. The final part of the book looks at the implementation of the proposed strategies and gives further, more general, action points to support the detailed plans. Each chapter is beautifully illustrated in colour with pictures from around the world that show the problems and some of the solutions.

A book for the school library or as a present. Beautiful colour photography!

"Oceans"

General Editors: Danny Elder and John Pernetta

IUCN/Mitchell Beazley/1991/£19.99

ISBN: 0 85533 923 3

Jacques Cousteau, in his introduction to this book states "The health of the global water system rooted in the ocean is vital to the future welfare of our planet, and is of particular concern to me as an ocean explorer. The future needs of society will be well served, however, only if we change our short-term mentality and often arrogant indifference to the results of our actions and focus on long-term considerations and a sound attitude in the use of all our resources."

The book has six sections. We firstly learn of the ocean's origins, its floor, its moving waters, climate and weather. The next section - The Living Sea - includes bio-diversity, life styles, feeding and food webs, and reproduction. Other sections include harvesting the seas, the various oceans and finally the challenge of conservation.

The map section is the most interesting section of this beautiful and informative book. It is an excellent book for the school library or a birthday present for young people and more so for their mums and dads!

"Wetlands in Danger"

IUCN/Mitchell Beazley/1993/£19.99

ISBN: 1 85732 166 9

Much is written about the destruction of the rain forests, the pollution of rivers and the seas but somehow the world's wetlands have rarely received such attention. These marshes, floodplains, peatlands, lagoons and swamp forests have been perceived as wasteland, obstacles to the overriding need for agricultural and urban development.

Many dozens of birds and other wildlife have been brought to the verge of extinction because of irresponsible governments worldwide, draining and exploiting and polluting these wetlands.

The main section in the book visits 19 regions worldwide. Each begins with a preview of the regions' wetlands, their special value and the conservation policies that have been set up to stop the threat of conversion or to reverse its effects.

When one reads that in Canada 71% of the original wetland areas have been lost over the past 70 years, it begs the question, how much of Ireland's wetlands have been lost in the same period?

This book leaves one in no doubt that wetlands should receive equal billing with the rainforests in the conservation league. The photographs throughout the book are superb.

Let us contemplate on the words of the poet, Gerald Manely Hopkins: "What would the world be, once bereft of wet and of wildness? Let them be left!"

"From Care to Action - Making a Sustainable World"

By Martin Holdgate

Earthscan/IUCN/1996/£15.95 (Pk) £35.00 (Hdk)

ISBN: 1 85383 306 1 (Pk)/
1 85383 317 7 (Hdk)

This book is yet another contribution from IUCN (The World Conservation Union) to the most important debate in the in the world - how nearly 6 billion people alive today can shape the course of development so that the 8 to 10 billion people expected to inhabit the earth a century from now, may live peaceful lives of high quality, in harmony with the world of nature, on which we depend. It lays out the guidelines for such action, such as the problems to be faced and how people must be educated and informed. It tells us how to understand nature and how to sustain the use of forests and improve the use of the oceans and coastal and inland waters. The final section, "Moving Forward", has a special reference for personal and community action for sustainability. If we all could take these on board for our everyday living we could then help to reverse the great abuse of the environment.

JUNIOR PAGES

SAVED

I went to sea in a small fishing boat,
wrapped up in warm clothes
and a waterproof coat.
With howling winds and crashing waves,
I spotted some rocks
on a beach by some caves.
I tried to turn back,
but the waves were too strong;
I got thrown on the rocks,
and before too long
my boat had a leak, the water poured in.
It filled up my small boat,
right up to the brim.
I spotted a blue light, heading my way;
There was a lifeboat to save the day.
They saw me there
and took me on board;
I'm only alive 'cause of them, thank the Lord.

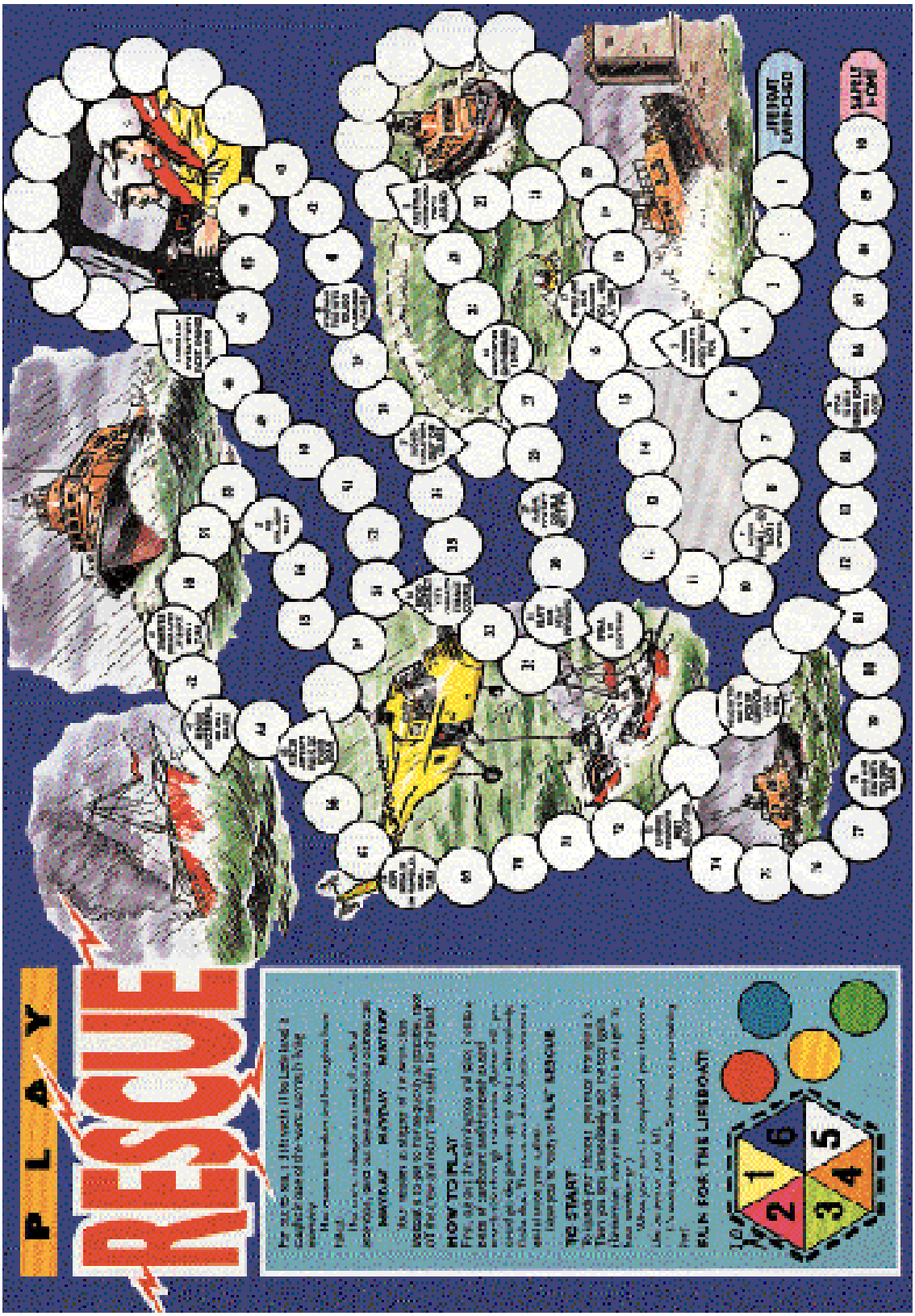
By Paul Stevens (10) of Cowes, UK. In *"Storm Force News"*.

Join "Storm Force", the RNLI's club for young people, and you will be sent an exciting members' pack filled with lots of goodies. Four times a year you will receive the action packed *Storm Force News* magazine full of exciting stories, paintings, ideas or jokes to Storm Force headquarters.

To join just send your name and address, with a cheque/P.O. for £5.00 to Storm Force HQ, RNLI, 15 Windsor Terrace, Dun Laoghaire, Co. Dublin.

(The following game has been reproduced from "Storm Force News".)

Royal National Lifeboat Institution



HALF WAY

Write your answers Across in the grid. Each answer is a word of four letters of which the last two letters form the first two of the next word. Answers below.

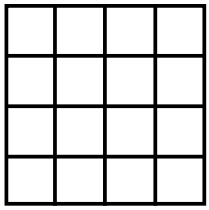
1				an extinct bird
2				an amount of medicine
3				reproductive germs of flowers
4				the cutting side of a blade
5				tackle; tools; equipment
6				parched or dry
7				a thought in the mind
8				direction of sunrise
9				celestial body
10				a curved structure in a building
11				to scorch or burn
12				an open space
13				everyone taken separately

SQUARE ROUTE

All of these letters will fit into the squares provided. The words will read the same down and across:

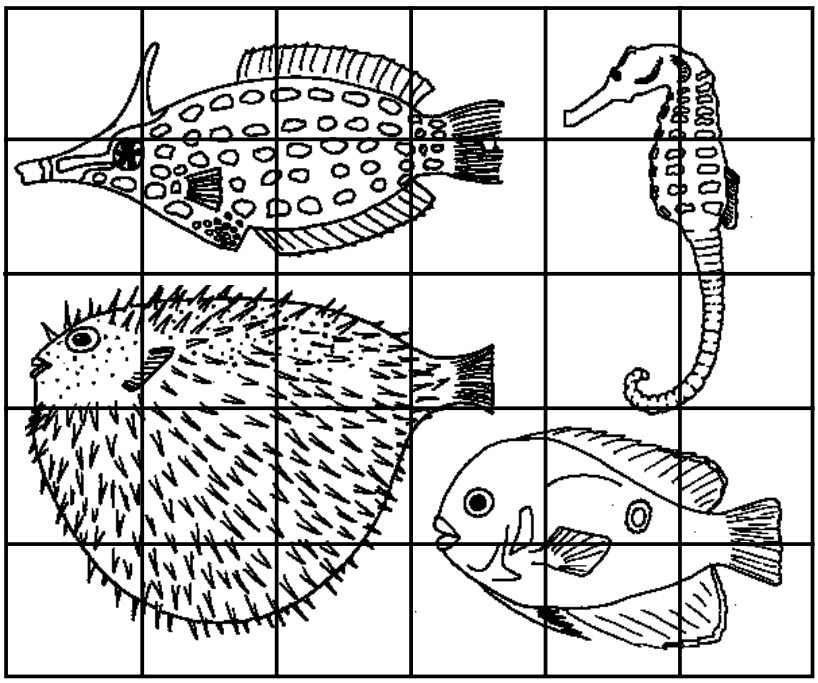
e i i i i i i k l l l r s s w w

Answers below.



Draw & Colour Us

To help you draw these unusual fish, redraw the boxes as we have drawn them below and copy the fish, square by square. You can then colour them in.



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Bárdas Chorcaí
Cork Corporation

ACT ON IT AGAINST LITTER

WHICH IS?

1. Which is the third farthest planet from the sun?

a. Pluto; b. Uranus; c. Saturn; d. Neptune.

2. Which island is the largest in the world?

a. Madagascar; b. Greenland; c. Ireland; d. New Guinea.

3. Which is the longest river in the world?

a. Nile; b. Yangtze; c. Liffey; d. Amazon.

4. Which is the largest ocean in the world?

a. Atlantic; b. Indian; c. Arctic; d. Pacific.

5. Which is the largest lake in the world?

a. Michigan; b. Superior; c. Caspian Sea; d. Victoria.

6. Which mountain is volcanic?

a. Mt. Blanc; b. Everest; c. Mt. Etna; d. Matterhorn;

7. Which is the longest river in Europe?

a. Seine; b. Danube; c. Rhine; d. Elbe.

8. Which rock is the molten rock below the Earth's crust?

a. magma; b. granite; c. limestone; d. clay.

9. Which scientist measures earthquakes?

a. zoologist; b. chemist; c. seismologist; d. geologist.

10. Which is the biggest continent?

a. Europe; b. Asia; c. Antarctic; d. Australia.

Answers below.

ANSWERS: WHICH IS? 1. b; 2. b; 3. a; 4. d; 5. c; 6. c; 7. b; 8. a; 9. c; 10. b.
HALF WAY: 1. dodo; 2. dose; 3. seed; 4. edge; 5. gear; 6. arid; 7. idea; 8. east; 9. star; 10. arch; 11. char; 12. area; 13. each.
SQUARE ROUTE:: kiwi; iris; will; isle

Ballyteige Burrow Nature Reserve

Co. Wexford

THIS is the first in a series of articles on Ireland's 76 nature reserves, where areas of natural importance are given protection by the Heritage Service under the Wildlife Act. Some of our nature reserves are well known - such as Lough Hyne, near Skibbereen in Co. Cork. The articles feature the lesser known reserves, starting with Ballyteige Burrow in Co. Wexford.

The reserve, near Kilmore Quay, covers almost 530 hectares of dunes and estuary and is 9 kilometres long. This is the remnant of a large estuary reclaimed over 100 years ago. The influence of man goes back much further than this. For example, in the middle ages, the monks at the nearby Tintern Abbey established a rabbit warren at Ballyteige and they harvested up to 4,000 rabbits annually there.

Ballyteige Burrow has great physical diversity - some of the dunes are upto 20 metres high and the developing acid heath there is unusual in Ireland. It supports internationally important numbers of birds such as Brent Geese and Bewick Swans and it is the main location in Europe for Wild Asparagus. Its importance was recognised when it was declared a nature reserve in 1987.

The main aim in looking after the reserve is to maintain the diversity of nature at the site. This does not mean excluding human activity. Cattle grazing is necessary to maintain the rich variety of wild flowers there - without such grazing the reserve would be dominated by a lesser variety of plants. So the task is to balance our activity with nature; the level of cattle grazing is controlled, horse training which occurred at the reserve has been discontinued but people are still welcome to walk and enjoy the splendid wildness of the reserve.

One of the more novel projects at Ballyteige Burrow is the creation of ponds to see if the Natterjack Toad can be introduced there. The Natterjack is rare in Ireland being confined to parts of Co. Kerry. The experiment is aimed at spreading the toad population so that it is less vulnerable to extinction.

If you want to know more about Ballyteige write to the local ranger, Eugene Wallace, Ross Road, Taghmon, Co. Wexford, who will be glad to help you.

Ballyteige Burrow is the main location in Europe for Wild Asparagus.

Lemon-scented Salmon Burgers

These burgers with a difference are a tasty treat for kids - but they are good enough to appeal to adult taste buds too. Cook them outdoors on a barbecue for a Hallowe'en bonfire party, indoors on the pan for a substantial, delicious T.V. snack.

Ingredients:

1lb/450g salmon fresh - minced
4ozs/110g breadcrumbs
1 spring onion - finely chopped
1 clove garlic - finely chopped
Grated zest and juice of 1 small lemon
Salt and pepper
Little oil and butter to fry

BIM
Bord Iascaigh Mhara
Irish Sea Fisheries Board

To serve

4 burger buns
Shredded lettuce
Sliced tomato
4 tablesps. crème fraîche with lemon zest added
Chopped chives

Method

- Add breadcrumbs, spring onion and garlic to salmon.
- Season and moisten with lemon juice.
- Form into patties. Chill for at least 1 hour.
- Fry burgers in oil and butter mixture or if preferred cook on barbecue.
- Place on toasted buns with lettuce and tomato.
- Top with a spoonful of crème fraîche and sprinkle with chopped chives.
- Serve with salad or baked potato.

Special Mouths

LOTS of things make fishes different from one another.

Some fishes are big; some are small. Some live on the bottom; some live in the open ocean. Some are good-looking; some are ugly. You can probably think of many other differences among fishes.

There is one difference, however, that is very important: No two kinds (species) of fishes living in the same area feed in exactly the same way.

Why is this so important?

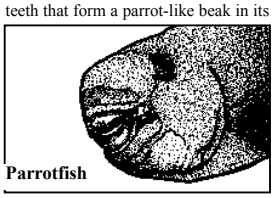
Although the sea holds a vast supply of food, that supply has its limits. There is only so much food available in an area to survive, they must share available resources. Feeding differences ensure that each kind of fish has its own place at Nature's dinner table.

In some cases, what helps a fish to be different in the way it feeds is its mouth. Some fishes have mouths adapted for unusual ways of feeding.

Let's zoom in on some fishes with special mouths and see how they use them.

The Parrotfish

This tropical fish lives in shallow water around coral reefs. There are several kinds of parrotfish, the largest of which grows about four feet long. But large or small, a parrotfish has teeth that form a parrot-like beak in its mouth. With this hard beak it bites off chunks of coral.



Parrotfish

That is quite a feat, one that would not be possible if the parrotfish had ordinary fish teeth. Coral, as you probably know, is the hard stuff that gradually builds up to form coral reefs. It is produced by millions and millions of tiny animals called polyps (pronounced pol-ips). Imagine yourself trying to bite off a piece of coral. It would be like trying to bite off a piece of a concrete sidewalk.

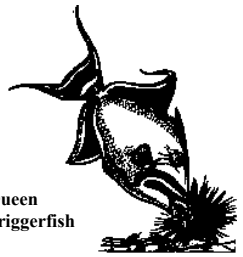
Scientists aren't sure whether the parrotfish bites off coral to eat the coral polyps in it, or to eat algae (algee) - a form of plant life - that grows among the polyps. It doesn't really matter which of these the parrotfish is after because each is food.

After the coral has been bitten off, it passes through a set of special grinding plates at the back of this fish's mouth. By the time the coral has passed through the parrotfish's insides and is passed off as waste, it has been made into fine sand. In fact, it is estimated that in every acre of reef, about 1 ton of coral is turned into sand each year by this beaked fish. With its special mouth, this fish not only feeds in an unusual way; it also contributes to the building of sandy tropical beaches!

Incidentally, the parrotfish is a noisy eater. If you are in the water near a feeding parrotfish, you can hear its beak munching on the coral!

Triggerfish

Triggerfishes also live among tropical coral reefs. All members of this family have a mouth that sticks out a little bit, as though it were swollen.



Queen Triggerfish

The triggerfish's jaws are powerful and each is spiked with eight strong, chisel-like teeth. With these big teeth the triggerfish crunches through the shells of oysters, mussels and other hardshell prey.

What is even more interesting, one member of this family - the Queen triggerfish - is one of the very few fishes that attacks and eats the long-spined sea urchin. This urchin looks like a golf-ball size porcupine. The top and sides of its round body are covered with long, poisonous spines. Most fishes steer clear of this prickly character, but not the Queen triggerfish-thanks to its special mouth. With its long, strong teeth it grabs the urchin by its spines and flips it onto its back, exposing the urchin's spineless underside. With its sharp teeth, the triggerfish bits into the underside and begins to eat the urchin. It may eat only the internal organs, or it may eat the whole urchin - spines and all!

This reef fish has another technique of overturning sea urchins. It shoots a strong stream of water from its mouth and blows the urchin over. Mighty mouth!

Goatfish

The goatfish, another tropical species, is something like the freshwater bullhead (catfish). Members of the goatfish family are bottom-feeders. They have a pair of long whiskers - called barbels (bar-bulls) - under their chins. With these sensitive organs they feel their way over the sea floor, detecting bits of food and tiny animals in the sand. The goatfish's mouth is well positioned for bottom-feeding. Finding food, this fish sucks its up - along with a mouthful of sand! Yuk! This is no problem, however. The goatfish keeps the food it takes in and gets rid of the sand by puffing it out through its gills.

Goatfish

The special mouth of the goatfish lets it touch-and-feel its meal and then suck it up.

Rays

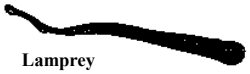
This is flounder-like fish with a diamond-shaped body and a whippy tail. Its mouth is a slit on the underside of its head. Rays look much like skates, but they are much, much bigger. They glide slowly over the sea floor by rippling the thin outer edges of their body. (These edges are called pectoral wings.) Rays - there are several species - are bottom-feeders. We have already seen how another bottom-feeder, the goatfish, finds its prey by feeling the sand with its barbels. Rays work differently. In search of shrimp, worms, crabs, small fishes and other food they like, they stir up the sand by flapping their pectoral wings. When they do not immediately catch fleeing prey in their mouths, rays trap them beneath their flappy bodies and manoeuvre themselves so their mouths can reach them

Ray

The devil rays are especially interesting. In this species, the body edge extends forward to form a flappy "wing" on each side of the head. The mouth in this ray is not located on the underside, but just below the front of the head. A devil ray uses its "wing" to funnel fishes and other prey into its mouth. If you think of the "wings" working something like hands, you could say the devil ray's special mouth is a mouth-with-hand!

Lamprey

This is an eel-like fish that lives in freshwater and saltwater. It has the oddest mouth in the world of fishes.



Lamprey

When closed, its mouth is a slit that runs lengthways on the underside of its head. When open, the mouth expands into an almost-round disc armed with many horny, hooked teeth arranged in 12 or so circular rows.

If Count Dracula has been a fish, he would have been a lamprey. This fish is a blood-sucker. Using its teeth and the sucking power of its oval mouth, it clamps onto the side of another fish.

Its teeth gradually work their way through the skin of scales of that fish until the lamprey is able to suck its victim's blood. Sometimes as many as three or four lampreys attach themselves to the same fish. When its victim has been sucked dry - and dies - the lamprey moves on to another fish.

Here again, a special mouth enables a species - the lamprey - to live on a kind of food which few other fish can share.

Mackerel

The mackerel lives in the open sea. You may have seen this fellow in fish markets. It is a plump, cylindrical fish between 14 and 18 inches long. Wavy black bars cross its back, and its sides and belly are whitish. The mackerel's scales are so small its skin feels smooth to the touch. This species has an ordinary-looking fish mouth filled with small, slender teeth. What is special about the mackerel is that it can feed in two rather different ways.

Mackerel

Like many species, it can use its teeth to capture smaller fishes. But when such prey is not available, the mackerel can filter small organisms from the water that passes over its gills. A part of its gill structure called the "gill raker" is adapted to this work. It sifts out microscopic plants and animals found in plankton (masses of plant or animal organisms that drift with the current). Many fishes have gill rakers of one kind or another, but in most cases these are not adapted for food filtering.

Sharing Resources

No one of these special mouths is better than any other.

Each serves its owner quite well.

The point, again, is that a special mouth allows a fish to eat food that is not available to most other fishes. I'll eat what you can't eat, and you eat what I can't eat. This is sharing. This system helps ensure that there is enough food for everybody.

It is important to realise, however, that special mouths play only a part in the sharing of resources among sea creatures. Other things help to bring this about, too. For example, many fishes may eat the same kinds of prey, but they eat them at different times, and in different places. Most fishes, furthermore, can eat a wide variety of foods. In other words, they live on a mixed diet. And the mixed diet of one fish is not exactly the mixed diet of another fish. This, too, spreads food resources among all species. Another think that ensures sharing is that some fishes feed at night, on certain kinds of prey, while other fishes feed in the day, on other kinds of prey.

Many things contribute the sharing of resources in the sea.

Special mouths is just one of them.

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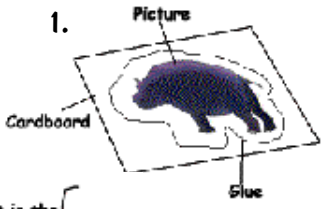
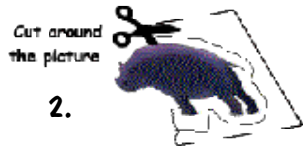
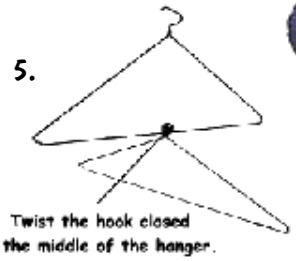
Make a Mobile

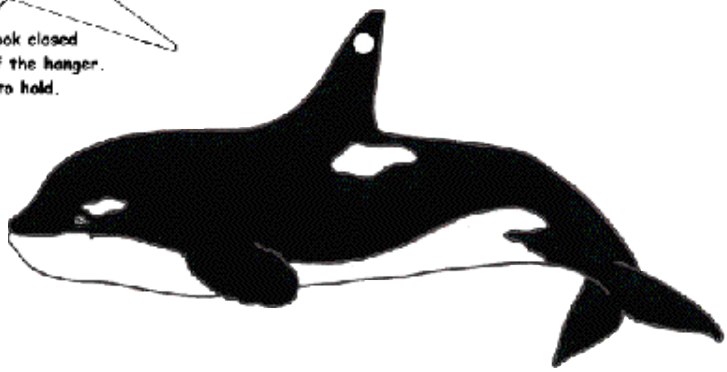
HERE'S a chance for you to make a mobile for your bedroom. You can use these drawings or other pictures you like from magazines (make sure you ask your parents first before you cut up anything!).

YOU WILL NEED:
A scissor
Cardboard (perhaps a cornflake box)
Glue
String
2 wire clothes hangers
Cellotape



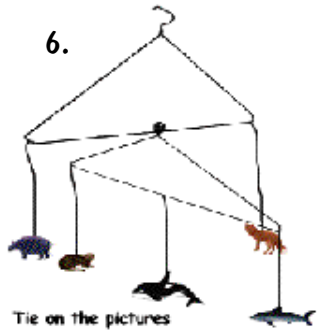






1. Roughly cut out the drawings and glue them to the cardboard to make them stronger.
2. Now that they are glued onto the board you can cut around the pictures more carefully.
3. Make a hole in the picture where its marked.
4. Cut five pieces of string, each 18 inches long. Tie a big knot at the end of each piece of string and thread one through the hole in each picture.
5. Hook one of the hangers onto the bottom of the other hanger and squeeze the hook closed. (You might need a strong person to help you.) Make sure that the bottom hanger is at a right-angle to the top one. (If you looked from above they would be shaped like a cross.) Use a piece of cellotape to hold the bottom hanger in place in the middle of the top hanger.
6. Tie a picture to each end of the hangers and then the last one in the middle of the bottom hanger.

You are then ready to hang up your mobile.

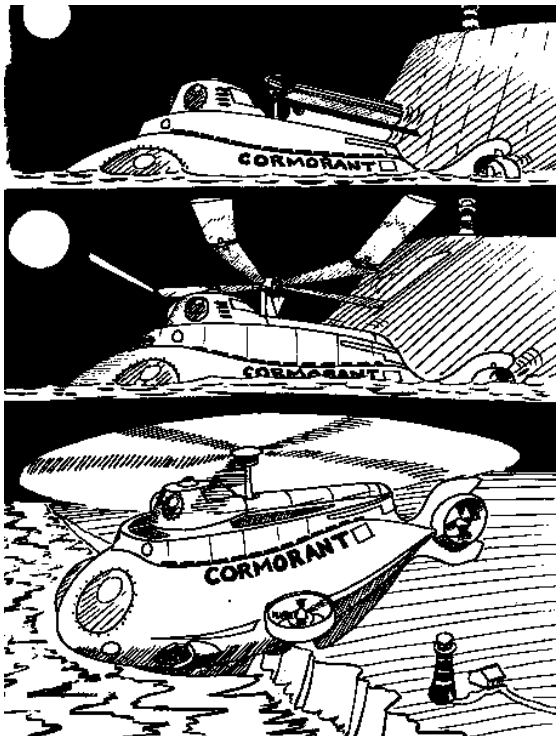


Captain Cockle & the *Cormorant*

by John Joyce

Abridged in four parts.

Episode One - The Flying Submarine!



HAVE you ever been so keen about something that you couldn't talk about anything else? Well that's the way William was about submarines.

His sister Jenny thought he was crazy.

Jenny was mad about animals. It was Jenny's dream to have a dolphin for a friend, and when she walked along the shore she always had her eye on the horizon hoping to see one. But she hadn't . . . not yet!

Their parents blamed these wild ideas on Jenny and William's grandfather - Captain Horatio Nelson Cockle - the famous submariner and inventor, who had built a laser powered can opener which had exploded on television, covering a well known personality in baked beans.

Captain Cockle had met his wife Catherine many years before, when she had been a doctor in the Navy, and they both lived in a lighthouse keepers' cottage down by the sea. There was even an outside workshop where the Captain could tinker with his new ideas, since Doctor Cockle insisted that any workshop of her husband's must be as far from the house as possible, in case his exploding inventions scared her medical patients.

William and Jenny always visited their grandparents for their holidays. They would swim in the bay with their masks and flippers, or watch the big black cormorant birds flying in untidy formations and diving beneath the waves to chase fish.

And it might have gone on that way, had it not been for an amazing adventure which happened one summer, just after William's ninth birthday, and just before Jenny was twelve.

One evening on the television, news came through of a terrible accident in the North Sea. Two divers had been trying to blow up an old drilling platform, when it had collapsed on top of their submarine *Deepstar*, burying them under hundreds of tonnes of steel. The men inside had just over a day's air to breathe, and there was at least one other unexploded charge left, ticking somewhere in the wreckage.

Captain Cockle was unusually silent all though supper. Then he made one phone call from his study with the doors closed. Jenny and William could just make out the words "need more time . . ." "hardly tested . . . " and "do my best . . ." before their grandmother called them into the kitchen to do the washing-up.

When they came back, Captain Cockle had disappeared out to his workshop. He didn't even come back to read William his usual chapter of *20,000 Leagues Under the Sea* before bed.

Something strange was going on!

The next day, there was still no sign of Captain Cockle - until William discovered a secret lever in his grandfather's workshop and found himself below ground in a huge cavern leading to the sea. The first thing he noticed was a beautiful yellow submarine, with the name *Cormorant* painted on the side, standing on a ramp leading down into a pool of dark water. And the second thing he noticed was his grandfather, staring at him with the same guilty expression William himself had when was caught doing something he shouldn't.

Captain Cockle explained he had discovered a way to pack enough electricity to power a small town, into a single battery the size of a pocket torch. This had made the super secret submarine *Cormorant* possible. Captain Cockle was going to use it that night to rescue the two trapped divers, and William could come too - as long as he didn't tell a soul.

"Especially your grandmother," said Captain Cockle. "She'd only worry!"

But as they tried to sneak out of the house that night, who should flick on the light switch but Dr. Catherine Cockle - looking trim and shipshape in her old navy uniform - and Jenny, all done out in her jeans, jumper, life jacket and the smuggest expression you ever saw. They were coming too!

"Men!" said Dr. Cockle to Jenny. "I bet those two haven't even thought to pack any medical supplies for those poor divers they hope to save. Let alone for themselves!"

"As a matter of fact . . ." began Captain Cockle. But of course, he hadn't.

So Captain Cockle, Dr. Cockle, Jenny and William climbed aboard the *Cormorant* and dived down along the secret tunnel leading to the sea. They had just surfaced in the moonlight, when Dr. Cockle had a thought.

"We're hundreds of miles away from those poor men," she said. "Their air is bound to run out before we can sail round to them in this submarine!"

Captain Cockle smiled and reached for a big blue lever.

"Now it's time to show you why I called her the *Cormorant* , my dear!" he said.

There was a whirring noise behind the conning tower, and the back of the submarine split open like a pea pod. Long rotor blades folded out like dragonfly wings, and the good ship *Cormorant* pulled herself up out of the water in a cloud of spray, soaring into the clear night sky towards the moon.

"The *Cormorant*'s no ordinary submarine," said Captain Cockle. "You'll be amazed at the things she can do . . ."

And you'll be amazed too ... in the next episode - ***Monsters from the Deep*** - only in *Sherkin Comment.*

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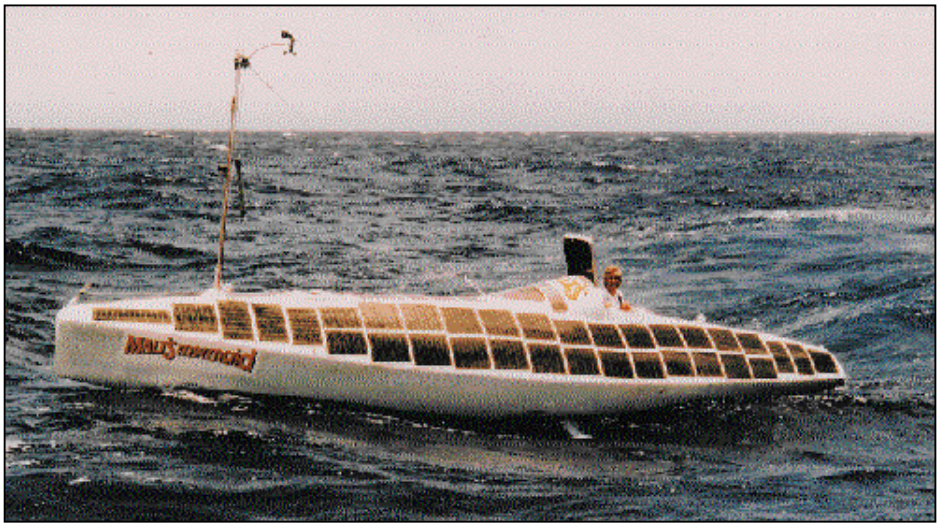
*Abridged by the author from "**Captain Cockle and the Cormorant** " - published in Ireland by Poolbeg Press and available in all good book shops, price Ir£3.99*

Check out Captain Cockle on the Web at the Captain Cockle Home Page on: http://www.cockle.com

Trans-Pacific Voyage in a Solar-powered Boat Built of Recycled Aluminium

By the CADDET Japanese National Team



Introduction

The first solo crossing of the Pacific was made in 1962 by Mr. Kenichi Horie in a tiny yacht called "Mermaid". In 1996, Mr. Horie made the first solo, non-stop, trans-Pacific voyage in a solar-powered boat made of recycled aluminium. The boat, called "Malt's Mermaid", sailed 16,000km from Ecuador to Tokyo in 138 days. The themes of the project were preserving the environment and using resources efficiently.

Malt's Mermaid

The "Malt's Mermaid" is shaped like a cigar, and has an overall length of 9.47m, a breadth of 1.64m and a displacement of 900kg. The shape of the boat was selected to ensure its stability for maximum safety during the voyage.

At present, 70% of small boats such as fishing vessels are built of fibre-reinforced plastics (FRP). However, aluminium is attracting interest as a shipbuilding material as calls for environmental protection rise, because aluminium is recyclable in contrast to FRP which is difficult to dispose of. Increasing requests for high-speed boats are also expected to contribute to the expansion of demand for aluminium ships.

With a view to utilising resources effectively, "Malt's Mermaid" is constructed of a material called "alloy 3004", recycled from aluminium cans for drinks. Alloy 3004 adds strength to aluminium without degrading its workability and corrosion resistance, by adding manganese to the aluminium as a main constituent. Magnesium (1%) and a little silicon are also present as minor constituents in the alloy. Besides aluminium cans, alloy 3004 is extensively used for building materials such as precoated aluminium sheets, shingles and door panels. The use of this alloy for ships has not yet been authorised in Japan; however the Ministry of Transport gave special permission for "Malt's Mermaid".

To make the boat light, aluminium plates of 1-2mm thick were used so that the hull itself weighs just 370kg. The amount of aluminium used to construct the boat is equivalent to 22,000 beer cans. The boat was designed by Mr.Osamu Takai, and built by Goriki Shipyard Co. Ltd., which had already constructed more than 50 aluminium vessels.

Solar Power System

The deck of the solar-powered boat, is covered by 12m^2 of crystalline silicon photovoltaic modules which have power output of 1.5kWp. The boat is equipped with two newly developed nickel-hydrogen storage battery systems; one driving the boat's motor and the other supporting the living area. The battery systems, composed of five blocks, weigh about 170kg in total and also act as ballast. When fully charged, the motor power system, rated at 6.2kWh (12V x 130Ah x 4), will run a 200W motor for 24 hours. The average service speed of the boat is 3 knots.

The battery system that supports the living area supplies power for equipment such as a small refrigerator, lights, radio communication and video systems. The photovoltaic technology for this solar-powered boat was supported by experienced technical staff at Sanyo Electric Co. Ltd., who set the record for transcontinental solar-powered flight over north America in 1990.

The voyage of the "Malt's Mermaid" started on 20 March 1996, from the port town of Salinas in Ecuador, a country located right on the equator, at twelve noon when the sun, the boat's only energy source, was at its zenith. The boat passed the Galapagos Islands on 28 March, cleared the Hawaiian Islands on 28 May and crossed over the International Date Line on 14-15 June. After passing the Ogasawara Islands on 24 July, the boat berthed in Tokyo Harbour in the afternoon of 5 August, finishing the 16,000km voyage in 138 days.

This article has been reprinted with permission from CADDET Renewable Energy Newsletter, a quarterly magazine published by the CADDET Centre for Renewable Energy, ETSU, Harwell, Oxfordshire OX11 0RA, U.K. For further information on this article contact the Japanese Team at NEDO Information Center, Sunshine 60, 30F, 3-1-1, Higashi-Ikebukuro, Toshima-ku, Tokyo 170, Japan.

Sherkin Island Marine Station Environmental Award 1996

Mr. Tony O'Mahony

By Matt Murphy

I HAD great pleasure in presenting the Sherkin Island Marine Station Environmental Award for 1996 to one of Ireland's finest botanists - Tony O'Mahony. Tony is the greatest authority of the 19th and 20th century on wild plants in Cork County and I do not make that statement lightly. He has amassed more data in 30 years on County Cork flora than anyone else in the past 150 years.

What must be realised is that wild plants are his hobby and not his fulltime occupation. In this he follows in the footsteps of the great Irish botanists - Colgan, Hart, Praeger and Scully.

Tony's life long interest in Irish wild flowers developed in early childhood and by 1966 he became joint botanical recorder for County Cork with Maura Scannell, who was then in charge of the National Herbarium at Glasnevin Botanic Gardens. This on going, time consuming work has entailed the collation of data on the distribution and frequency of native and naturalised plants.

In 1986 he contributed 18 years of ecological/botanical data to Cork County Council for inclusion in the County Development Plan. Upto 1996 he has written 24 papers dealing with Irish Botany. His major task at present is to put into the public arena all the data he has gathered in over 30 years on Cork flora.

Tony's work has never received the recognition he deserves. I have no doubt if he were a part of the establishment things would be different but a prophet is rarely recognised in his hometown. If Tony had the benefit of state funding we would now have a flora book on the County Cork flora. This may be difficult for people to understand but we in Ireland have only a flora for a dozen of our counties and most of these were written in the 19th and early 20th century.

I have known over the years the dedication and the financial sacrifices that Tony has to make to fulfil his lifetime commitment to recording the wild plants of County Cork. In 100 years his work will still be a major reference on Ireland's flora, along with Colgan, Hart, Praeger and Scully. That statement can be made about very few people that pass through life.