SHERKIN COMMENT

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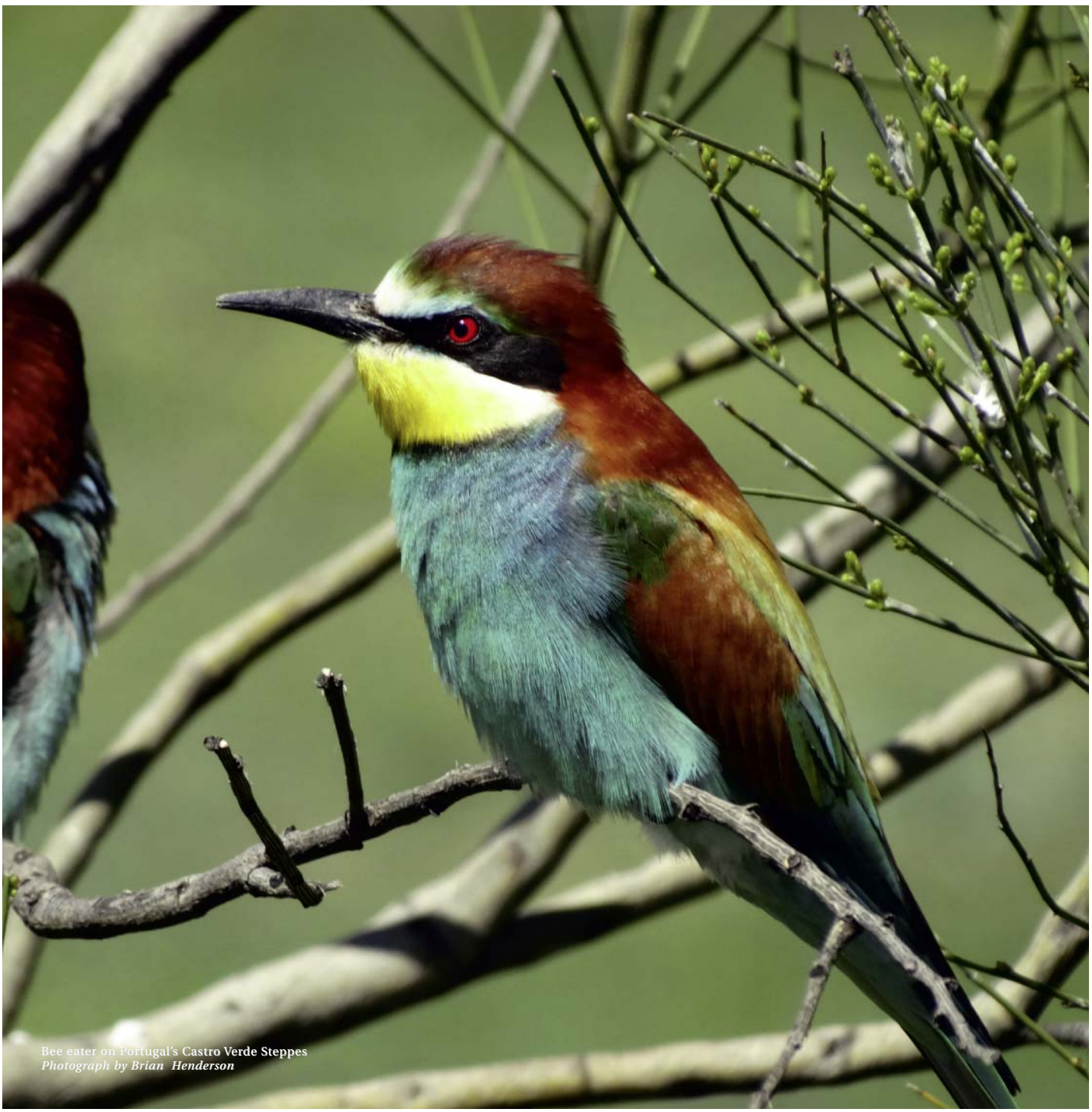

Bee eater on Portugal's Castro Verde Steppes
Photograph by Brian Henderson

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Editorial

The Value of Our Drinking Water

By Matt Murphy

THIS editorial is just to remind us of the value of having safe drinking water. When we turn on the tap clean water is instant. We don't consider it a luxury but in reality it is. Yes, there may be the odd occasion in some areas when the supply is affected by pollution and people have to recourse to bottled water or tanker supply through their local council. It is fair to say that the majority of the population have been connected to a public water supply. I have had the experience of both worlds. Growing up in Cork City in the 40s and 50s the only worry we had with our drinking water was burst lead pipes in those very cold winters of ice and snow. In those days I spent my holidays with cousins on a farm near Kanturk. I learned quickly that the water for the house and farm had to be drawn from the hand pump in buckets and it was not limitless. One learned to spare it as drawing water to farm animals was not an easy task for a young 13-year-old teenager.

Time moved on and in my late teens I took up canoeing and started to spend time canoe-camping. We got water for cooking and drinking from a local farmer. However the pots and pans were mostly washed in the nearby river. These early days developed in to canoeing camping holidays for children on the River Blackwater near Banteer, Co Cork. Often we had up to 60 children each day throughout the summer. The water to cook and wash came from a surface well near the campsite, which local people used daily. Everyone drew the water by bucket, using a small container to fill it. Can you imagine how many buckets a day we used to look after all those children? In time a local water group scheme was set up in the area and everyone had piped water. Our site was fitted with a tap and there was a yearly water charge, which we were delighted to pay.

In the mid sixties when we purchased a house on Sherkin there was no mains water supply. Water for all things, except drinking and cooking, came from a concrete tank on the side of the dwelling, which was from rainwater saved off the roof. Drinking water came from a small hole in the ground some 400 yards from the house and had to be drawn by bucket. Water became a major problem when we organised adventure holidays for children. Then it had to be drawn in milk churns by horse and cart from two public hand pumps down the island. This water had to be left settle overnight as the iron in the water oxidised and sank to the bottom. We had to use it sparingly as it was not limitless. In time we dug a well near our house with crowbar and sledgehammer – it was 5 ft square, through rock down to 20ft. In summer this gave us around 300 gallons every 24 hours. It was like winning the Sweepstakes (now the Lotto).

Piped water arrived in the mid 1970s from the mainland via an underwater pipe, it was then piped throughout the island. The water was free to householders but at the Station we had to pay a yearly sum for the amount we used. The relief we got – no more drawing water, no more shortage, just turn on the tap.

At the station we are still paying water rates. If I smoked, it would be the cost of 10 cigarettes a week. Put it another way, it would be the cost of a pint of beer or a cheap bottle of wine. Water is the most previous gift we have and need. Having experienced times in my life without piped water it is a cheap price to pay.

Presently a huge amount of water is wasted in Ireland. Officially obsolete public piping accounts for 41% of this. Add to it the water wasted by households up and down the country and the figure is much more. This water has cost money to produce. The new body, Irish Water, must first address the public piping issue and there must then be a carrot to stem the massive amount of water wasted in households. Give households a reasonable amount of free water and then charge for the excess over that figure.

In Ireland we are privileged to have an excellent supply of drinking water. To put our situation into perspective, it is worth looking at how other countries are fairing. For example, in Brazil drought has forced 140 cities to ration water. Some 6 million people are said to be affected by the worst drought in decades. In Malta, the country is running a major risk by not capturing its rainwater. Its groundwater is over-exploited and 90% shows nitrates levels that exceed EU limits. The authorities have now announced a plan to recharge the groundwater resources with treated wastewater.

In California, in the US, a $644 million emergency drought relief bill had passed through its legislature. The bill will provide money for conservation projects to clean up polluted groundwater and make irrigation more efficient. It will also increase penalties for illegal water appropriation. In Israel, the country is facing its worst drought in a century and extra desalination facilities have been established.

The European Environment Agency's recently published study "Assessment of cost recovered through water pricing" considers water pricing in several EU countries. Among the key findings is that households use around a third less water when they are charged for the actual amount. The public seems to support being charged according to the volume of water they use – 84% of EU citizens agree with this principle to some extent according to a 2012 Eurobarometer survey.

Very soon households in Ireland will be following those in many other European countries and will be paying for their household water use. It is essential that much of the charges be put into the public networks to help reduce the 41% of water wasted though obsolete piping. If, as already mentioned, a reasonable amount of free water is provided to begin with, perhaps consumers will see the benefits of putting a price on this essential resource. To strengthen this, Irish Water must put time and money into educating the public about the importance of water conservation and they should continue to support educational programmes in schools such as the Green Flag programme.

Matt Murphy, Sherkin Island Marine Station, Sherkin Island, Co. Cork.

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The Little Egret

Images courtesy of Cian Merne

Little Egrets – left, above and right: Before breeding commenced in Ireland, Little Egrets were rare vagrants here, with the first record in 1940.

By Oscar Merne

IN my recent article on *Irish Birds – losses and gains* I mentioned the commencement of colonisation by Little Egrets in Ireland in 1997, and suggested this was probably due to climate change allowing the species to spread northwards from its traditional Mediterranean breeding range. However, any climate change effect is likely to have been preceded by a population increase and range expansion in the 20th century following decimation of much of the European egret population due to the plume trade in Victorian times. Unfortunately, at that time it became fashionable to create ladies' hats from the exotic plumes of various birds, including the Little Egret. The finest plumes were from the adult breeders and large-scale commercial raids were made on the nesting colonies, slaughtering the birds to collect the feathers. Happily, this prompted a reaction from people concerned about bird protection, leading to the founding of organisations such as the Royal Society for the Protection of Birds in Britain. Campaigning against the plume trade, together with changing fashion (and possibly the growing scarcity of surviving egrets!), brought this to an end. The population began to recover, slowly at first, but exponentially in recent decades. When the EU Birds Directive came into being in 1979 the Little Egret was still considered to be a "species of conservation concern", with an EU breeding population of only c.20,000 pairs, and was therefore placed in Annex I of that Directive. With more effective protection and the establishment of Special Protection Areas (covering breeding colonies and their important wetland habitats) throughout the EU, the Little Egret population is now estimated to be in excess of 200,000 pairs. A great conservation success story!

Since the first Irish breeding colony was discovered in East Cork in 1997, the Little Egrets have spread quite rapidly in Ireland, first along the Waterford and Wexford coasts, then up the east coast as far as Dundalk Bay, on to inland locations, and even to the west coast near Galway. The final results of the recently-completed four-year Breeding Atlas survey are not yet fully available, but the distribution map of breeding Little Egrets will show a remarkable change from the position shown in the last two breeding atlas surveys in 1981-1991 and 1968-1972, when there were precisely no Little Egrets found nesting in Ireland and Britain. There are probably now several hundred pairs breeding here.

Before breeding commenced in Ireland, Little Egrets were rare vagrants here, with the first record in 1940. Between 1957 and 1965 a total of 13 individuals were found here, while between 1966 and 1986 there were more frequent records – in 16 of the 21 years, including 18-19 individuals found in 1970. Most of these records occurred in spring and early summer, the time when Little Egrets would be expected to be migrating north to breeding areas. Clearly a northwards range expansion was beginning to manifest itself.

In the 1970s and 1980s my family and I spent many summer holidays on travelling/camping holidays in France. In the early years, driving south through France, we encountered hardly any Little Egrets until we reached the Mediterranean coast, where the birds were quite common in the saline lagoons and marshes stretching from the Camargue (on the Rhone/Saône Delta) to the border with Spain near Perpignan. However, as the years went by, we found we were encountering more and more Little Egrets progressively further north, first as far as the Loire Valley and eventually all along the English Channel (La Manche) coasts of Brittany and Normandy. I recall thinking at the time that it would not be long before they started breeding in southern England. Sure enough, they did, but to my great surprise they also started nesting in Ireland – much further to the north-west – at about the same time.

In the autumn, after the breeding season, the adult and young egrets disperse from the colonies and in September 2011 a total of 704 were recorded at the main Irish wetlands by the Irish Wetland Bird Survey (I-WeBS). Being aquatic birds, Little Egrets are dependant on there being unfrozen waters in their wintering areas so that they can continue to feed successfully – on small fish and invertebrates. They are partially migratory and clear off south to avoid severe winter conditions. We've had a couple of very hard winters recently and the numbers of egrets remaining here in mid-winter went down noticeably: in January 2012 only 149 were recorded by I-WeBS. One young bird, raised at a colony near Galway, possibly following an ancestral instinct to move south-west in autumn, flew 2,133 km over the Atlantic Ocean to the island of Terceira in the Azores Archipelago. Happily it was found alive and well, but we don't know if it managed to get back to Ireland in the spring.

Our Little Egret, *Egretta garzetta*, is one of a Genus of 13 species that are distributed around the globe. Most breed in warmer zones – areas with Mediterranean-type climates, the tropics and in warm-temperate latitudes, usually south of 50º N and north of 45º S. However, in South America a couple of species wander south to Patagonia and as far as Tierra del Fuego. The Little Egret is the most widespread of the egrets, with an almost continuous range in the Old World, from Ireland in the west to Japan in the east. Five other closely-related sub-species extend to Africa, SE Asia, Australia and even New Zealand. The Little Egret of the Old World is replaced in the Americas by the very similar Snowy Egret, *Egretta thula*. The largest of the *Egretta* egrets is the Great White Egret, as big as our common Grey Heron, while the Little Egret, at half the size, is, as the name suggests, one of the smallest of the Genus.

Oscar Merne retired from Ireland's National Parks & Wildlife Service in January 2004. Before he died in January 2013, Oscar wrote a number of articles for Sherkin Comment to be published in future issues.

Greening the LAVENDER LAKE

By Walter Mugdan[1]

January, 2014

"LAVENDER LAKE" is the derisive name given by local residents to the infamous Gowanus Canal, arguably the most heavily polluted waterway in the United States. It is called "lavender" because of the lurid colours of the oils and coal tar that form perpetual sheens on the water surface. Elsewhere toxic pollutants are measured in parts per million, billion or even trillion; in the Gowanus Canal they are measured in parts per hundred.

Less than two miles long, the canal was once one of the busiest waterways in New York's harbour. In the mid-1800s the canal was carved out of a Brooklyn salt marsh that had been the scene of some of the most important moments in the 1776 Battle of Long Island. (In that fight George Washington's troops were badly beaten by the British redcoats; the fledgling American army was saved Dunkirk-style by an overnight evacuation to Manhattan.)

Industry sprang up along the newly built canal, including three manufactured gas plants. These turned coal into the gas that provided lighting for homes and streets in the decades before electricity became dominant. They left behind a hideous residue called coal tar. A gooey substance that never really hardens, it sinks into the ground where it is dumped; when it reaches an obstruction like bedrock or clay it oozes horizontally, often into the adjacent waterways by which the coal reached the plant. Coal tar is infused with a witches' brew of toxins, dominated by a class of chemicals known as polycyclic aromatic hydrocarbons, or PAHs.

PAHs make up nearly 5% of the mud in some parts of the canal. The mud also contains a potpourri of pollutants from many other industries, including polychlorinated biphenyls (PCBs), an assortment of pesticides, chromium, copper and other heavy metals.

The canal has also long served as the sewer that drains the surrounding residential communities of Park Slope, Carroll Gardens and Cobble Hill. The narrow waterway is poorly flushed by the tides, so the sewage settles out to become putrid, gelatinous mud more than ten feet thick. So much accumulates that at low tide the mounds of sludge are exposed above the waterline creating an intolerable stench. For generations, routine dredging – required to keep the canal open to navigation – provided temporary relief from the worst of the foul odours; but by the latter part of the 20th century there was little commercial navigation, and there hasn't been any dredging since 1955.

By that time, of course, most sewage was conducted to treatment plants away from the canal. However, like most older cities, New York originally built a "combined" sewer system. This means that sanitary waste (from toilets, bathtubs, dishwashers, and so on) flows in the same pipes that also carry storm water when it rains. The pipes, and the treatment plants to which they lead, were designed to accommodate only *dry weather* flows. During *wet weather* a nasty mixture of raw sewage and rain water is intentionally discharged into nearby waterways through "combined sewer overflows" or CSOs.

The Gowanus Canal receives nearly 400 million gallons of CSO discharges annually. These discharges contain huge volumes of solids (sewage plus runoff from streets), resulting in accumulations of as much as 5" per year in some places. During heavy rainstorms a wave of brown glop washes down the canal, an exceedingly unpleasant phenomenon known locally as a "poonami" (you can watch one at http://www.mnn.com/earth-matters/wilderness-resources/blogs/watch-a-canal-overflows-with-sewage-in-brooklyn).

Not only does the sewage smell, but it carries plenty of bacteria and viruses. The decomposing sewage also robs the water of oxygen, making it harder for marine life to survive. And the fine, silty particles act like toxin magnets, attracting the PAHs, PCBs and other chemicals welling up from beneath or dribbling in from the sides. (The colour and consistency of the accumulating mud caused EPA researchers to dub it "black mayonnaise," but one would be ill advised to try it on a ham sandwich.) PAHs also continue to enter the canal via the CSO discharges themselves.

Image of US EPA

Gowanus Canal, Brooklyn, New York, arguably the most heavily polluted waterway in the United States. (Study area in blue.)

Image of Katia Kelly www.pardonmeforasking.blogspot.ie

Gowanus Canal is known as the "Lavender Lake" because of the lurid colours of the oils and coal tar that form perpetual sheens on the water surface.

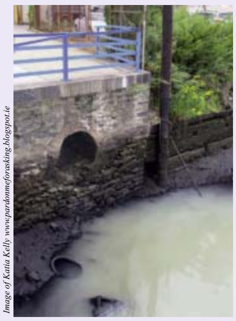

Image of Katia Kelly www.pardonmeforasking.blogspot.ie

Less than two miles long, the canal was once one of the busiest waterways in New York's harbour.

Image of Katia Kelly www.pardonmeforasking.blogspot.ie

The canal was designated a Superfund site in 2010 and the cleanup plan is expected to take 8–10 years.

To add insult to injury, the Gowanus Canal is pictured in urban lore and literature as a dumping ground for murder victims (of the Mafia and other malefactors).

Already by the late 1800s local residents were clamouring for a canal cleanup. In 1911 the City opened the Flushing Tunnel, an underground conduit through which clean(er) water from the open harbour is pumped to the head of the canal, thus creating a steadier downstream flow. It worked off and on during the last century, and was recently refurbished and reopened. But it was never enough to render the waterway tolerable for the long-suffering neighbours.

Then, in 2009, the U.S. Environmental Protection Agency (EPA) proposed to add the Gowanus Canal to its "Superfund" list of the most heavily contaminated sites in the nation. ("Superfund" is the nickname of the law through which EPA ensures proper cleanup of these sites.) Being home to a Superfund site is a distinction many communities wish to avoid. But the residents near the canal were virtually unanimous and very passionate in supporting Superfund designation – they even created buttons reading "Superfund Me" and "We Trust EPA." They concluded that after 150 years of insufficient action (alternating with inaction) by the City of New York, intervention by the national government might achieve the results for which they have long hoped.

On the other hand, there was intense opposition from New York City's municipal government. The City worried that Superfund designation would create a "stigma" that would deter the hoped-for redevelopment of the area with new residential buildings. Events proved this concern to be unwarranted. One large developer did pull out after EPA finalized the Superfund designation in 2010, but another quickly stepped in to snap up the parcels in question. Indeed, the Gowanus area experienced a 52% *increase* in land prices between 2008 and 2012, the period when the U.S. housing market bubble burst, land values elsewhere plummeted, and the global financial crisis reached its height. As if to underscore the point, in December, 2013 a new Whole Foods supermarket opened on the banks of the canal. (Whole Foods is a very upscale grocery chain catering to the higher end of the income scale; indeed, it is known in some quarters as "Whole Paycheck.")

New York City also opposed Superfund designation because it feared that EPA might require, as part of the canal cleanup, dramatic reductions in CSO discharges, an expensive proposition. This fear was justified.

In September, 2013 EPA issued its final cleanup decision for the Gowanus Canal. The plan requires the removal of some 600,000 cubic yards of contaminated mud (the aforementioned black mayonnaise), followed by capping of dredged areas. The plan also requires significant CSO reductions, at an estimated cost of $78 million. The overall cost of the canal cleanup plan, including the CSO controls, is estimated at $506 million. Cleanup of the three manufactured gas plant sites, also underway, could cost another $500 million.

The cleanup work will be performed and paid for by the "responsible parties." These include the corporate successors to the gas plants and other factories that closed decades ago, and of course New York City. (Also among the 25 or 30 responsible parties is the U.S. government itself, which during the World Wars operated shipyards and piers on the canal.) The work is expected to take 8-10 years.

Though the cleanup won't leave the Gowanus Canal pristine, the improvements will be extraordinary. Area residents can now look forward to the time when the name "Lavender Lake" will be an obscure anachronism.

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[1]Mr. Mugdan currently serves as Director of the Emergency & Remedial Response Division in the Region 2 office of the U.S. Environmental Protection Agency, located in New York City. However, any opinions expressed in this article are his alone, and do not necessarily represent the views of the EPA.

Wetlands in Ireland

By Nicola Dwyer

The Ramsar Convention defines wetlands as *"areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres"*. Wetlands can also incorporate riparian zones and coastal zones adjacent to wetlands.

WETLANDS are areas where water is the primary factor controlling the environment and its associated plant and animal life. In Ireland, water makes up approximately one quarter of the total area of the country, with the result that Ireland hosts a broad variety of wetlands. Our *Marine and Coastal Wetlands* include sand dunes, saltmarshes, our popular sandy beaches, and our sea cliffs and stacks which provide some of our most spectacular scenery and support internationally important concentrations of many species of breeding and wintering birds. With our ample rainfall supply, the island of Ireland hosts a broad diversity of *Inland Wetlands* including marshes, fens, bogs, rivers, lakes and ponds several of which are also of international importance to biodiversity. Our rivers and streams link our wetlands from the mountains to the sea, and act as corridors for migratory fish species - the salmon, eel, lamprey and shad. Some wetlands, such as bogs and turloughs, are unique in Europe and internationally, across the global landscape. *Human-made Wetlands* like Poulaphuca reservoir and the canal systems of the country are also important and support important wetland species. Each of these categories of wetlands (Marine & Coastal, Inland and Human-made) is the focus of the Ramsar Convention, or Convention on Wetlands, the mission of which is *"the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world"*.

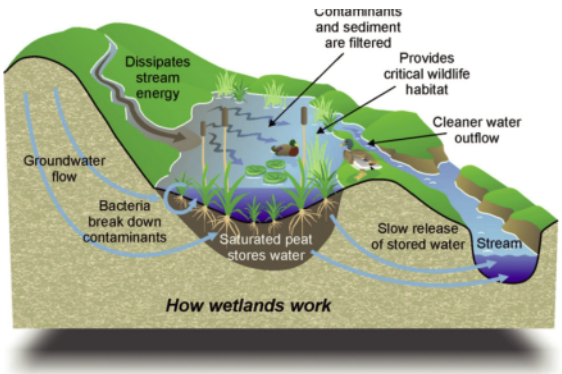
Our wetlands are a vital component of the water cycle; they fulfil many important functions and provide important ecological services. Many act as sponges, retaining large quantities of water during periods of high rainfall, which contributes to flood protection and helps to prevent damage to land and property. This retained water is slowly released in times of drought or low flow in rivers, which helps to maintain the water table throughout the year. Wetlands create a diversity of physical habitats that can be colonised by a wide range of plant and animal species - leading to high biodiversity. This in turn makes wetlands ideal locations for learning about nature, the environment and environmental and ecological issues. Many are important areas for leisure activity - for fishing, boating, swimming, or just lazing at the seaside! Wetlands also help to maintain and improve water quality by acting as natural filters to remove high levels of nitrogen, phosphorus and silt, thereby purifying water. Bogs and fens, particularly active ones, can reduce the impacts of climate change by absorbing carbon to act as carbon sinks. Many rivers, lakes and coastal wetlands are a source of food including shellfish, fish and seaweeds, and a source of employment for people who work in these areas. All of these functions, uses and values of wetlands can only continue to exist if the ecological processes of wetlands are allowed to continue functioning.

Unfortunately, wetlands are one of the worlds most threatened ecosystems. In Ireland, water extraction, drainage of lands for agricultural purposes, extraction of peat, and afforestation result in drying out of wetlands, either through drainage or by lowering the water table. In addition, development including road construction, housing, etc. impacts on wetlands, resulting in loss of wetland habitat, increased flooding in areas previously free of flooding, and loss of biodiversity. Pollution resulting from sewage, chemical waste and run-off from agriculture also changes the ecological structure of wetlands and results in loss of biodiversity and function. Invasion by alien species including Japanese Knotweed, Giant Hogweed, American mink and Zebra Mussel also alters the species composition and functioning of wetlands.

The Ramsar Convention was adopted in 1971 and today there are 163 signatories (countries), including Ireland. The Convention encourages its signatories to designate Wetlands of International Importance - Ireland has included 45 sites on the "Ramsar List", comprising around 67,000 hectares - to maintain the ecological character of these wetlands, and to plan for the wise use, or sustainable use, of all wetlands within their territories. The Convention promotes wetland education, provides advice to contracting parties, and has published handbooks on how to achieve wise use of wetlands (these are available on www.ramsar.org). The Convention also promotes the establishment of National Ramsar Committees and, in 2010, the Irish Ramsar Wetland Committee (IRWC) was set up to assist Ireland in meeting the requirements of the Convention. IRWC includes members drawn from a variety of government agencies, scientific and technical institutions, regional and local authorities and non-governmental organisations, and our principal objective is to promote the wise use and protection of all wetlands in Ireland. We do this by raising public awareness of wetlands, supporting wetland education and providing advice to policy makers. Our website www.irishwetlands.ie contains information on wetland events, useful reading materials and links to wetland information.

Nicola Dwyer, SEA Research Fellow, SEA Section, Office of Environmental Assessment, Environmental Protection Agency, Regional Inspectorate, Inniscarra, Co. Cork.

Wetlands provide many ecological services from a global scale (storing carbon to help reduce the impacts of global climate change) to a local scale (providing food for our dinner!).



Our wetlands are a vital component of the water cycle and fulfil many important functions including water purification and water retention.
(Image courtesy of Westford Conservation Trust, UK, www.westfordconservationtrust.org)

Ireland has included 45 sites on the List of Wetlands of International Importance (the "Ramsar List"), comprising around 67,000 hectares.
(Image courtesy of Irish Ramsar Wetland Committee)

Food waste offers unforeseen benefits

Disposing of food thrown away by those rich enough to be able to afford to do so is an expensive problem – but it can provide renewable energy and other benefits.

By Paul Brown

SOCIETIES all over the planet are running out of holes in the ground in which to dump their waste, so they're under increasing pressure to find alternative solutions.

In the European Union one of the problem wastes is food – rich people buy too much in the supermarket and throw a lot away. This is a disaster for local authorities that have to find a way of disposing of it, and a problem for the planet because rotting food produces large quantities of methane, a global warming gas 23 times more potent than carbon dioxide.

Pressure to do something about the problem has been increased by ever-growing taxes on local authorities and companies who throw away waste in landfill, making it more expensive every year to rely on holes in the ground.

A successful solution to the problem has been found in Oxfordshire in England, which not only solves the waste problem but also produces gas to provide electricity and fertiliser for local farmers. One of the local authorities involved is the Royal Borough of Windsor and Maidenhead, which collects the food waste from Windsor Castle, one of Queen Elizabeth's favourite homes.

Each household in the borough puts its food waste into containers provided by the borough, which then collects them, takes them to a processing plant and turns the contents into a thick soup. Other organic waste from food processors, large supermarkets, restaurants and green waste from forestry, which would also go to landfill, is added to the mixture.

This is then fed into a sealed container, called an anaerobic digester, which is designed to allow bacteria – in the absence of any oxygen – to eat the waste, producing methane in the process. The methane is extracted, cleaned and used to generate electricity.

For rich and poor alike?

When the bacteria have done their job all that's left of the food is a carbon-rich fertiliser prized by farmers. The entire process takes about 100 days, so a whole series of digesters is needed to keep up with the flow of waste and to provide a regular supply of gas to the electricity turbines.

The plant, not far away at Wallingford in Oxfordshire, processes 45,000 tonnes of waste a year and cost £10 million to build. It produces 2.3 megawatts of electricity annually, enough to meet the needs of over 4,000 average British households.

Each year it produces enough fertiliser for 2,500 acres of local farmland, replacing fertiliser made from fossil fuels, a further saving of greenhouse gases. The company that runs the plant, Agrivert Ltd, claims that it avoids the release of 22,000 tonnes of carbon dioxide annually. Agrivert runs a second plant nearby, which produces 2.1 MW.

The big question is whether this system can be used globally, or just in rich societies. Agrivert points out that poor people don't throw food away – and in any case it's always cheaper to chuck waste in a hole in the ground or in the river, especially if the person throwing it away does not have to pay the clean-up cost.

But it is not just waste food that can be treated in the digesters. Most organic waste from food processing and forestry and other green wastes can be put in them, converted to gas and used to make electricity and fertiliser. Alexander Madden, Agrivert's chief executive, says palm, coffee, and banana plantations all produce waste that is ideal for digesters.

Worthwhile gains

Hylton Murray-Philipson, one of the company's founder shareholders, says: "The technology can be applied anywhere, but you need the regulatory framework at both ends of the process, to make sure a steady supply of waste is collected for the digesters and that there is a market for the electricity at the end of it."

In Britain, he said, the company had 20-year contracts to provide the service and to sell the electricity. It had been so successful that it had made the Oxfordshire local authorities taking part in the scheme among the top ten best recycling authorities in Britain.

At the moment Agrivert has its two plants up and running in Oxfordshire providing electricity for 8,000 homes, with another under construction in Surrey. Other companies are also building plants elsewhere in Britain and many other EU countries as a way of disposing of this difficult waste, but until now British government help has been lacking.

Mr Madden says the growth potential of digesters will ultimately be limited by the amount of waste available, about four million tonnes a year in Britain, enough to feed 150 medium-sized plants. At the moment only 25 have been built.

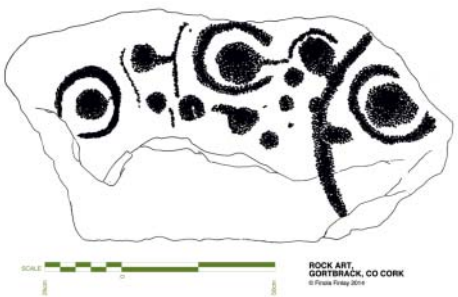
Paul Brown, Climate News Network – a free, ready-to-use factual service that brings you the latest news of climate change science. Website: www.climatenewsnetwork.org

The Rock Art of West Cork

By Finola Finlay
& Robert Harris

YOU'VE been hiking all day on the hills in the south west corner of Ireland. You are heading homewards when suddenly your attention is caught by curious patterns on a rock outcrop. Lit by the slanting rays of the low sun, you see small round depressions surrounded by concentric rings and you realise that they must have been carved deliberately. But by whom? When? How? And most of all, why?

What you have just seen is an example of prehistoric Irish rock art. And you've been lucky! While most people are aware of the much better known megalithic art - think Newgrange and Knowth - few people have seen Irish rock art. Passage tombs and their carvings are dated from about 3200-2900 BC, but establishing an exact date for rock art is difficult. Like passage grave art, it may have started in the Neolithic or early farming period, about 5,000 years ago, but cupmarks in particular seem to have persisted well into the Bronze Age and beyond.

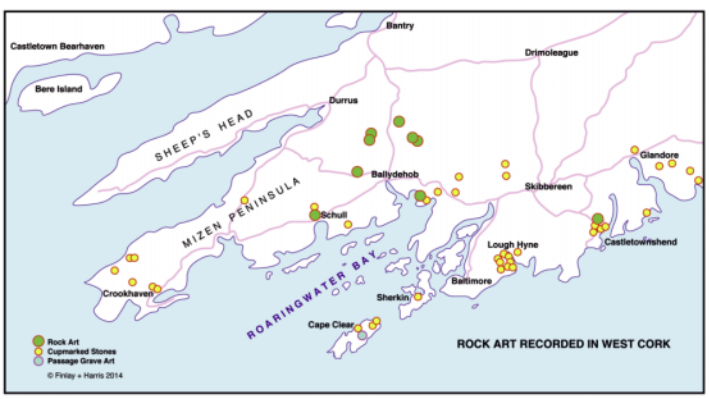


Drawing of rock art from Gortbrack, Co Cork.

Instead of the spirals, zigzags and lozenges typical of megalithic art, the 'classic' motif of rock art is the cupmark, a concave depression, often surrounded by one or more concentric rings, and sometimes with a radial groove from the cup to the outermost ring or beyond. Cupmarks can occur in clusters or grouped within larger circles (rosettes) and circles can occasionally lack a central cup. Straight or curved lines, sometimes joining to form loose grid patterns, are found. Rocks may have been carved over time, with successive carvers adding elements to already-existing motifs, or carving new ones. To our modern eyes it does not seem that a conscious overall composition or design was involved in most rock art panels: rather, the motifs appear to us to be randomly scattered over the surface.

Picked markings at Derreenaclough, Co Cork – a recently found panel with elaborate carvings.

In comparison to megalithic art, which is found on built structures such as passage graves, rock art is normally found in the open on natural outcrops or earth-fast boulders. It occurs in many locations in Ireland, with significant concentrations in Kerry, Cork, Carlow, Wicklow, Meath, Louth, Monaghan and Donegal. In West Cork, the National Monuments Service (www.archaeology.ie) makes a distinction (not made in most other Irish counties) between 'Cupmarked Stones' (where there is no carving except for cupmarks) and 'Rock Art'. There are examples of rock art motifs also on movable rocks, standing stones and on some built monuments such as boulder burials and even the well-known Drombeg Stone Circle near Glandore.



Map showing distribution of rock art in West Cork.

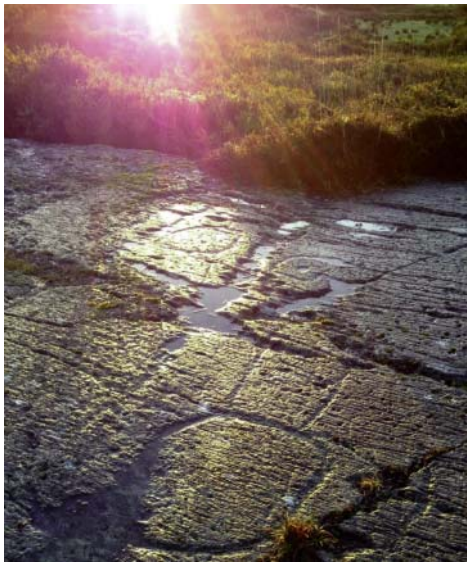
A carved stone beside Knockdrum Fort, Co Cork.

In West Cork, the local sandstone provides the canvas for all the rock art. The carving technique was mainly that of 'picking' using a pointed stone implement and a hammer. Even when deeply picked it can be quite hard to discern, especially in grey weather and is best viewed when the low sun creates shadows that make the carvings stand out.

Observers of rock art always ask the same question: What does it mean? Alas, the carvings are enigmatic and there is no definitive answer as to what the motifs themselves may represent. However it is clear that they must have some meaning, since they are so persistent over time and space. There are numerous examples all along the Atlantic seaboard, from Norway to Portugal, with significant concentrations in Britain and northern Spain. Rock art is known throughout the world, and all the continents have examples, some figurative, but cup and ring marks are found in all areas. Interpretations of Irish panels have included maps, solar and lunar symbolism, access points to other worlds, and figures influenced by altered states of consciousness but we may never know exactly.

But we can also ask, Why was it done? And again, Why was it done on *this* rock, when there are so many other surfaces available nearby? Rock art researchers have noted for a long time that location seems to be important - carved rocks are often located with specific views, of the sea, for example, even where quite far inland, or of valley entrances. They may have marked routeways through the landscape, or territorial boundaries. They may have been done as part of other rituals - those that involved the whole community or those that were the exclusive domain of a group.

Yet another function may have been observatories. We already know that Neolithic people were intimately familiar with the movement of the sun and the moon and orientated many monuments towards the rising or setting sun at the solstice or equinox. Several West Cork stone circles were built in this way, the best known being Drombeg. Perhaps carving on a rock was another way of marking a specific location from which an ancient astronomer could use the surrounding undulating landscape to chart the movement of the sun. From that spot, one might observe the summer solstice sun set at the topmost peak of a nearby mountain, or the spring equinox sun rise in a notch in the hills.



Images courtesy of Finola Finlay & Robert Harris

Rock Art at Ballybane West, Ballydehob, Co Cork, lit by the rising sun.

Regarding conservation, there is cause for alarm in West Cork and elsewhere. Rock art can be hard to see and farmers engaged in rock-breaking activities may not recognise it. We have seen evidence of heavy equipment driven over panels of rock art, and cases where construction is so close to rock art panels that it may have unwittingly destroyed some of them. Weathering is, of course, an ongoing challenge, as is the effect of lichen, roots and plants on a rock surface. Some panels previously identified can no longer be found so it is impossible to verify if they are still safe.

If you find rock art, please contact the Archaeological Survey of Ireland at http://www.archaeology.ie/ArchaeologicalSurveyofIreland or your local county archaeologist, county museum or university archaeology department.

For more photographs, an excellent resource is the site of photographer Ken Williams, www.shadowsandstone.com. For more on rock art as ancient observatory sites, see Mike Wilson's website at http://mega-what.com.

The authors are working with CRAG (Cork Rock Art Group) at UCC.

Scaled drawing of the Derreenaclogh rock art panel, Co Cork.

Loophead and its Natural Charms Discovered!

Clockwise from top left: **Striking coastal rock formation at Loophead, Co Clare; Vertical distributions and abundance on rocks; An assemblage of seaweeds; Fleabane, common in late summer; James on the beach during a spring research trip; Participants in a rocky shore exploration with Carmel; The Bridges of Ross, spectacular natural sea arches at Loophead; The Hedge School's shell collection from Ross Beach; Carmel holding Furbellows kelp; A winter scene, with a cormorant family that moved inward as a storm approached; Gem Anemone in a rockpool.**

Image courtesy of Carmel Madigan

By Carmel T. Madigan

AS a native of Loophead with strong ancestral linkages to the area stretching back for hundreds of years, it seems amazing that people like me could let decades pass without flitting an eyelid at the extensive natural beauty that surrounds us. Reared almost blind folded, the first thought provoking comment actually came from an Inspector to our primary school, who stated that we lived in one of the most beautiful places he had ever visited. This raised an eyebrow. Still, Kilkee with all its sweet shops, horseshoe shaped sandy beach, and swinging boats in the summer, was our Mecca. Not that we didn't use the cliffs and smooth sandstone flags as our playground, played vigorously with Beadlet Anemones in the Rockpools, not knowing what they were, but knowing that they stung. We were sent to the Beach with a tin can on Fridays after school to collect Bárnachs for our dinner, whilst my entrepreneurial teenage brothers collected netting, formed it into lobster pots which they sunk off the cliffs and sold the Lobsters and Crayfish collected to local agents, leaving the unwanted crab claws to be toasted on our own open fire – a real tasty treat! Siocháin was collected by my dad during the Winter/Spring months and boiled with home cured bacon, providing another tasty meal. My parents enjoyed Dilisk, known to them as 'Sea Grass' and they dried large batches of it for domestic use. I could never warm to its salty flavour.

Roll on decades, whereby I moved away from Loophead to study at the University of Limerick and take on a working career, a hubbie and a young family. Our visits to Loophead were at first all about visiting my parents. Hubby, Peter, inherited his family home there, so we had our own place to look after as well. With my third son, James, however, things began to change. James loved nature, loved David Attenborough, and all nature programmes. He bought lots of nature books, and when I stumbled upon one that had a section on wild flowers, whilst in his company, we had a sudden 'meeting of minds'. It was early Summer 2006. We took ourselves around the meadow, to see what we could identify using the book. To our amazement, we found that there was very little in common, but the seeds of our passion had been sown, so our 'wildflower' books piled up as our walks took on longer distances, different habitats, coastal moorland, coastal shingle, waysides, hedgerows, verges, drains, ditches and meadows. It unfolded into an enthralling fun-loving exercise that we both cherished, a voyage of discovery driven by ourselves. We used the resources of Google images, whereby we typed up our description of the flower that we had in front of us and viewed what came up. The hardest flowers took up to two years and many hours to identify, as no single book had every flower encountered. Some of our rarities included Elecampane, Marsh Mallow, Babington's Leek. Some of our favourites included Sheep's bit, Common Centaury, English Stonecrop and the abundant Montbretia. In all more than 120 flora were recorded by us in the Western Loophead Region, in a project that felt as native and natural to us as, perhaps, fishing! It was the August of 2011, when I decided to work on the publication of our newly researched knowledge in the form of 'The Wild Flowers of Loophead', a first book ever written on any natural history topic for the Region.

Our coastal shingle flora research had taken us back into Ross Beach, the beach where I had collected the Bárnachs all those decades ago. I had not been at that beach in several decades, even if I passed it quite often, because of its roadside proximity. Gradually, we found ourselves being dragged down to the lower shore, looking at the Barnachs/Barnacles, Seaweeds and Anemones. We found ourselves cherishing our fortnightly trip from Barefield to Ross Beach, to conduct evermore research, take photos, take heed of changes, seasonal variation, study it through our pile of books and other resources, and mesmerizing ourselves with the sheer diversity of the compact habitat. We divided it into micro habitats/zones, shingle foreshore, salt marsh, subtidal, lower shore boulder and pool and so forth. One of our exciting findings during all this time was the discovery of a somewhat migratory pattern for the Sandalled Anemone (Fried Egg). Normally a sub-tidal species, below the level of our subtidal investigation, we found that in late December for the past four years, they have migrated upshore to middle shore pools, only to leave again by the end of March. The same pools are chosen each year. We conducted several micro-surveys on Limpets, shell gravel, and we followed the growth seasons and patterns of the main seaweeds. To date our research has led to the discovery of 85 seaweeds, identifiable to the naked eye, 60+ shore creatures, 30 beach flora and 10 shore Lichens. Our entirely voluntary research work continues.

In 2012, I set up the Loophead Summer Hedge School, an environmental and creative Summer School, based around our new found knowledge of the natural habitats of Loophead, combined with my work as a professional artist. Our first year, brought us participants from as far away as Hawaii, and for all a connection or a reconnection with nature at its wonderful best. The Loophead Summer Hedge School will run from July 12 – August 23 2014, and more information can be found on my Facebook blog. Facebook.com/Loophead Summer Hedge School.

Carmel Madigan, Loophead Summer Hedge School, Loophead, Co. Clare.
www.carmelmadigangallery.com

Integrated Catchment Management (ICM)

A Pathway to the Future

By Donal Daly & Micheal Ó Cinnéide

GOOD water management is critical to the future well-being of Irish society. We need an adequate supply of good quality, safe water for drinking, sustaining ecosystems, attaining Water Framework Directive (WFD) objectives and *Food Harvest 2020 (FH2020)* goals.

However, achieving good water management is difficult. While our approaches to-date are dealing successfully with large point pollution sources, such as wastewater treatment plants, it is clear that **diffuse** sources (agriculture, forestry, urban areas) and small point sources (farmyards and wastewater treatment systems such as septic tank systems) are more challenging. The experience across Europe is that a top-down 'command and control' approach to water management on its own will not be successful in dealing with diffuse and small point sources.

It is clear that the environmental authorities need to engage more actively with the agri sector, particularly dairy industry, to ensure that the increased intensification in agriculture is undertaken in a sustainable manner that improves or maintains water quality. We will need to work together, so that the WFD objectives can be achieved but also that the FH2020 goals will not be compromised.

There are solutions. We will need closer engagement, the hard yards of outreach and a common framework. In our view, a key part of the solution for mobilising towards water quality is **'integrated catchment management'** (ICM). This is an approach that is increasingly seen internationally as essential to successful water management; it is used in areas like the Murray Darling basin Australia and more recently in England, where it is called the catchment based approach.

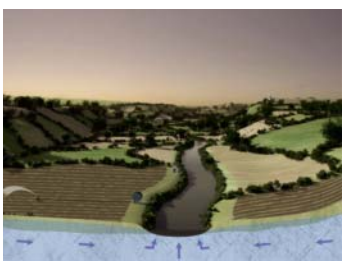
What is **ICM**? It is a new way of thinking and working, although it builds on past successes and experiences. It provides the 'organising principles' and 'organising framework' for successful water management. In simple terms, it includes all of the following elements (if one or some are missing, it is no longer ICM):

- We need to see Catchments in 3 dimensions, as shown in the graphic, to follow the flow of water.
- Catchments as the land based units of water management; they are 3-D physical entities, mapped at a scale that best fits to enable the issues, solutions and consultations to be targeted effectively.
- A focus on pollutant pathways, both surface and subsurface, that link pressures with receptors, and enable critical source areas (CSAs) to be delineated.

Images courtesy of the EPA

Integrated catchment management is an approach that is increasingly seen internationally as essential to successful water management.

- Partnerships with local communities and citizen engagement that includes identifying key stakeholders, public awareness and outreach campaigns, identifying issues of concern, and obtaining and taking account of feedback, collectively devising practical solutions to issues raised, and providing assistance to implement measures and change where necessary.
- Genuine integration and learning.
- A change from the top-down, 'command and control' approach to a combination of bottom-up and top-down.
- Systematic communications and social learning between policy, science and operations as a means of dealing with the complexities caused by working cultures, remits and priorities.
- Linkages, co-operation and networks rather than 'silos', both internally in organisations and between organisations. In particular, good communication and co-operation between public bodies such as local authorities, Teagasc, Irish Water and the EPA will be needed.
- Looking at 'ecosystem goods and services' in a systematic manner, including putting a 'value' on water resources, geosystems and ecosystems, and the potential contribution to the 'green economy'.
- A broad range of 'tools' in the 'toolkit', ranging in a continuum from local participation and partnership to enforcement.
- Enhancement of the local environment for people, businesses and wildlife, while achieving the WFD objectives required by the EC.
- A series of interconnected steps: creating and communicating a vision of ICM; building partnerships; characterising the catchments; finalising goals; identifying and evaluating possible management strategies; designing an implementation programme; and implementing the programme and making adjustments, if necessary.



A 3-dimensional view of water catchment.

Creating a new vision is one of the big challenges at the outset of ICM. We are proposing a vision of a **healthy, resilient, productive and valued water resource, that supports vibrant communities,** branded as a **'healthy catchments programme'**.

We are at a cross-roads in Ireland in terms of our water management. New governance arrangements are being discussed, but we are struggling to meet WFD deadlines for the next cycle of River Basin plans. There is a danger that, although agri-industry and Bord Bia appreciate the need for good water quality as the basis for marketing Irish food products abroad, *FH2020* could be constrained by our inability to achieve water quality objectives.

The integrated catchment management approach, backed up by adequate resources, provides an organising framework. EPA looks forward to working with the River Basin groups, the local authorities, Teagasc, Inland Fisheries Ireland and with the farming sector to tackle the water quality challenges while building a sustainable rural economy. ICM is part of the future!

Donal Daly & Micheal Ó Cinnéide, Environmental Protection Agency, Johnstown Castle, Wexford. www.epa.ie

Birdwatching on Portugal's Castro Verde Steppes

Booted eagle.

By Anthony Toole

JORGE, our guide, certainly knew where to find the birds and when. He had convinced us to abandon the comforts of our hotel at 7 am, and had negotiated with the management to provide us with a packed breakfast to bring with us. In the early morning light even the white storks nesting on the hotel rooftop seemed lethargic.

We had enjoyed two very warm days on the Portuguese west coast, observing large numbers of wetland birds. Now, we had moved inland, the temperature had fallen significantly and a strong wind caused us to wrap up well. Between the hotel and the nearby village of Albernoa, we passed wheatfields, vineyards and olive groves. On the road south toward Castro Verde, the trees gradually thinned and the low hills slowly transformed into grassy plains.

After a few miles, we turned onto a side road, and almost immediately stopped to watch a pair of Montague's harriers circling over an adjacent field. But that was only the start. Crawling along the road, we spotted a stonechat, colourful bee eaters and birds I was seeing for the first time, such as azure-winged magpies, a roller, a woodchat shrike and a calandra lark. Then came the one we were hoping to see.

Jorge stopped the car suddenly and leapt out, carrying his telescope. He pointed across the grasslands toward a distant hill. Even with binoculars I could only make out a pale brown object that could have been a rock. Through the telescope, however, it became Europe's heaviest bird, and one of the largest flying birds in the world, a great bustard. These huge, rare and endangered birds are wary of humans, so that these open, sparsely populated grasslands are ideal for their breeding. They can also hide effectively amid the tall grasses, and so are not easy to spot.

Before stopping for breakfast, we even saw its smaller relative, a little bustard, at closer range, poking its head above the grasses of a meadow it shared with a small number of cows.

We continued south for another few miles, and detoured into the Vale Goncalino Biodiversity Station, where we became fully aware of the true extent of the Castro Verde grasslands. The Education and Visitor Centre stood on a slight rise overlooking an undulating expanse that resembled a prairie. There were no hedges and very few, widely scattered trees. Yet this seemingly natural environment was created entirely by agriculture.

The primeval Mediterranean forests that once covered the area had given way to pasture land on which many generations of sheep had grazed. During the 20th century, the government decided that the land should be used for the growing of cereal crops. This led to traditional rotation farming, in which the cultivation of wheat and oats alternated with the land lying fallow. The result was the pseudo-steppe that now lay before us. Though the agricultural methods employed lack a modern efficiency, this ecosystem is ideal for the birds such as those we had seen earlier, and in 1999, the steppe was designated a Special Protection Area.

We followed a footpath down from the centre, past a nesting tower perforated by more than twenty holes. These were occupied by a surprising selection of birds that clearly did not object to each others' company, a lesser kestrel, a roller, starlings and pigeons. Two black-bellied sand grouse flew over the plains, while a pair of kestrels mobbed a booted eagle.

Despite the cool breeze, a heat shimmer rippled the ground. We moved uphill to a huddle of abandoned farm buildings, beyond which the land rose gently to the skyline, on which stood our second great bustard.

We adjourned to the town of Castro Verde for lunch, then drove to Sao Pedro das Cabecas. We paused by a river to watch some terrapins basking on the rocks, then carried on to a hilltop that commanded a superb view over the whole Castro Verde region.

The summit itself was occupied by a small hermitage, built in the 16th century to commemorate the Battle of Ourique, fought in 1139, in which the Christian forces of Prince Afonso Henriques defeated a much superior Moorish army, a victory that led to the creation of the Portuguese state.

The only notable bird we saw from the summit was a short-toed eagle that circled over the eastern slope, searching for the snakes that were its main prey. Among the grass and flowers, however, was a beautiful swallowtail butterfly, one of the largest in Europe.

We spent the rest of the afternoon meandering along side roads farther east, before heading back toward Albernoa, adding a black vulture, red-legged partridges, a black kite and grey shrike to our bird total. And on the final stretch, a little bustard flew in front of the car, then hid from us amid the flowers and tall grasses of a roadside meadow.

The next day, we left the hotel after a more leisurely breakfast, and drove east from

Great bustards.

Black-winged kite.

Black stork.

Great-spotted cuckoo.

Images courtesy of Anthony Toole

Roller

Nesting tower, Vale Conçalinho Biodiversity Station.

Guadiana River gorge.

Wolf's Leap waterfall (Pulo do Lobo).

Steppe landscape, Vale Gonçalinho Biodiversity Station.

Can marine ecosystems be re-balanced while fish go with chips?

A WELSH PERSPECTIVE

By Ivor Rees

WHELKS, whiting and whitebait are all wildlife together with a host of other marine organisms taken by Welsh fisheries. While farming on land is based on selectively bred or introduced species, marine fisheries exploit natural wildlife resources. In spite of this obvious and fundamental difference, in most countries administrative responsibility for fisheries tends to get tagged onto the much larger remit of agriculture departments. Nevertheless, throughout the 20th century some scientists in the government fisheries laboratories were able to undertake fundamental work on planktonic and benthic ecosystems often under the guise of investigating the food of commercial species. Only in the last decade have the concepts of ecosystem based fisheries percolated the corridors of power. In Wales the fiasco last year over Marine Conservation Zones showed how far the ecosystem concept is from being understood, let alone implemented. It is too early to judge whether Natural Resources Wales (an amalgamation of Countryside Council for Wales, Environment Agency and Forestry Commission) can live up to the title and really bridge the gulf between barely restrained "tragedy of the commons" patterns of exploitation and the sometimes unrealistic demands for marine wildlife conservation.

It is easy for politicians to utter platitudes about socio-economics and sustainability, but it is more challenging to decide where detailed policy measures should be leading in the longer term. In his book *The Unnatural History of the Sea* Callum Roberts undertook an exercise in historical ecology, gathering data from many sources to show how fish populations and some seabed habitats have been degraded since the mid 19th century. Even before there were fisheries statistics, old lithographs of fish being sold show how many more large fish of some common species there used to be. Early photographs of fish quays confirm this. One of the key measures used in fishery science is Catch per Unit Effort. By stepwise comparisons between vessels as each technological improvement came in, it is possible to compare the catching power of mid 19th century sailing vessels with modern trawlers, assisted as they are by many electronic aids. Such comparisons suggest that one modern vessel has the catching power of 50 sailing trawlers. Fish landings in England and Wales peaked in the late 1930s coinciding with the era when there were fleets of steam trawlers operating from Milford Haven and Swansea, fishing particularly for hake. Taking into account catching power the real peak was probably back in the 1890s. Coming to the present day, there are concerns about "fishing down the food web". This concept relates to those situations where, having removed the prime fish, smaller species and the invertebrates they once fed on are now targeted. Siren voices can be heard requesting development funds for new fisheries. History tells us that too often it is only after such stocks have crashed that funds are then made available to investigate their life-histories and population dynamics.

Apart from a general decline in fish sizes and the near extinction of a couple of rays, the greatest fishery induced environmental degradation in Welsh waters was to beds of native oysters (*Ostrea edulis*). Historical records show that there must have been a series of beds all round the coast from Mumbles to Moelfre. At the time in the 19th century when they were dredged out the way oyster larvae selectively settle on old oyster shells was not understood so the crucial habitat structure was lost as well. Experience in America with a different species shows that oyster reefs can be brought back but depositing many thousands of tons of shell is hardly practical here. This is just one illustration of the need for strategic thinking on the whole ecosystem wherever a marine wildlife species is to be harvested. Like it or not commercial marine fish species are wildlife and interdependent with the ecosystems

Many readers will be familiar with the Habitats Directive. In Welsh waters there are several large Special Areas of Conservation, though fisheries management measures barely acknowledge this. Some readers will also be aware of the Water Framework Directive, which is largely concerned with pollution but also takes account of algal blooms induced by eutrophication. Potentially more far reaching is the Marine Strategy Framework Directive (MFSD) (2008/56/EC). Such official documents are not easy reading, but within them are many of the things that need to be urgently considered in managing Welsh seas in the period between now and 2020. These range from rebalancing the age and size distributions of fish populations, managing mixed fisheries and avoiding damage to seafloor integrity. This goes well beyond the old approach of aiming for maximum sustained yields of a few target species while in practice just trying to avoid their breeding stocks falling below safe biological limits. The MFSD covers targets for restoration. mentioning setting aside representative sea areas, monitoring protocols for a series of issues including sea borne litter and much more. In theory "Over the Side is Over" as far as dumping non biodegradable items from ships and fishing vessels is concerned. From markings fisheries related waste washing up on Welsh beaches a significant amount comes from across the water. Wales itself may "have previous" when it comes to evading European environmental directives, nevertheless the MSFD should provide new impetus for closer alignment of fisheries and marine wildlife conservation policies.

Ivor Rees formerly a lecturer at School of Ocean Sciences, Bangor University, Bangor, Wales, UK. This article first appeared in the quarterly magazine NATUR CYMRU – NATURE OF WALES. Annual subscription £15. For further information www.naturcymru.org.uk

Castro Verde. Abandoning the main road, we entered the Guadiana Natural Park, along a narrow, twisting road that ran over and around a maze of hills and valleys, clothed with pine and holm oak woodlands. It is into these woods that it is hoped to re-introduce the Iberian lynx from a Spanish breeding population during the next five years.

Quite early on, we spotted the bird that we had decided was to be our target species for the day, a Spanish Imperial eagle. We watched it circling over a nearby hill for about two minutes, until it flew away to the north. A short distance farther along the road, we stopped to watch a juvenile golden eagle, just recognisable in the distance above a conifer wood.

We passed through a gate onto an unsurfaced road, and walked the last few hundred metres downhill to the spectacular Pulo do Lobo, or Wolf's Leap waterfall. Here, the broad river squeezed through a narrow gorge and crashed over a 20-metre drop, the highest in South Portugal. Even on our rocky viewpoint above the river, we were drenched by the spray.

This gorge is a nesting place for black storks and rock buntings, but though we saw neither, we were compensated by the presence of a beautiful blue rock thrush that perched on a crag above us.

Black-eared wheatear.

We drove through the historic town of Mertola, that seemed to cling precariously to steep slopes above the river, and continued eastwards, taking another narrow side road through the village of Corte Pequena. We walked down a track to where the Guadiana again flowed through a rocky gorge.

As we approached a weir at the bottom of the track, a grey heron flew away to the far bank. The reason for his interrupted vigil became quickly apparent, as we saw numerous fishes leaping into the air trying to clear the weir. Some landed on the rocks to the side and flapped in panic as they tried to regain the river. No doubt the heron would return as soon as we departed. And while we watched this spectacle, a golden eagle circled high above us.

Our final detour brought us to a small lake, and though no birds graced its surface or shores, a stone curlew and a hoopoe flew across the track into the surrounding scrub.

From a high point on the road, we looked east to the Spanish border, which was being washed by heavy rain showers. The sun, however, stayed with us, and on our return to the hotel, I had the time, before dinner, to swim a few lengths of the open air pool, watched by the storks nesting on the roof and a pair of azure-winged magpies in the surrounding trees.

Useful information

I flew from Heathrow to Lisbon with TAP Portugal airline: www.flytap.com as a guest of Alentejo Tourism: www.visitalentejo.pt/en/

Black vulture.

The trip was organised through Sunvil Discovery: www.sunvil.co.uk who can arrange tailormade visits to the Alentejo region.

Our extremely knowledgeable guide was Jorge Safara of Birdwatch in Alentejo: www.birdwatchinalentejo.com

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Images courtesy of Anthony Toole

Hoopoe

More Island Life and Lore – An Island Going

By Daphne Pochin Mould

My dream is of an island-place
Which distant seas keep lonely,
A little island on whose face
The stars are watchers only:
Those bright still stars! they need not seem
Brighter or stiller in my dream.

First verse of "An Island
by Elizabeth Barrett Browning

THERE may be some of us who like to live on large landmasses, where we can drive in any direction for a thousand miles without being stopped by the sea. On these great landmasses we build cities and factories, hospitals and laboratories, observatories with telescopes to study the stars, trying to figure out how this wonderful world came to be.

Others prefer the seclusion of islands. Some islands are very, very old - their rocks date back to very long ago, to the first decades of the geological record. If you want to see the ancient crystalline Lewisian Gneiss take a ferry or plane to Scotland's Outer Hebrides where the Lewisian Gneiss formed them. Meet the grey outcrops of "the old Boy", as old Scots geologists called it for they came upon none older. They came to study many much younger rock, from lava flows of various ages, sometimes forming regular hexagonal columns, including The Giants Causeway in Ireland, Fingal's Cave in the Scottish Hebrides, and many other places. No magic, no giants, just molten rock cooling down and taking up a shape natural to brand new solid rock. Islands can be of any sort of rock, from loose mounds of sand to soil. Some have been formed by natural erosion; many have a brief existence and are swept away, leaving a headland far out to sea. The waves and winds erode its flanks and even cut tunnels through. There are tunnels through the Old Head of Kinsale's softer rock and hard storms can end with the sea breaking right through and making a natural arch from the mainland. Further erosion of the headland can cause the arch to fall and a new island is formed, which can often be very difficult to get to with the old bridge gone.

There is a famous fortress on the Scottish east coast Tantallon Castle and out to sea the bird haunted Bass Rock. There's an old saying "Ding doon Tantallon! Mak' a brig to the Bass." Today brigs or bridges are no more possible than in the past and tunnels through rock and building ridges has made life a lot easier for many islanders. Of course the light aeroplane, the helicopter and reliable engines on small boats has made island-going much easier and safer.

The British Isles and Ireland are surrounded by whole groups of islands, including the Scottish Hebrides, Orkneys and Shetland, Scilly Islands and more remotely the Channel Islands, Lundy and the Aran Islands. There are islands that stand alone for one reason or another: Iona, Malta, Lundy, St. Michael's Mount, Skelligs, The Blaskets and between Scotland and Iceland, the Faroes. I visited all the Faroe Islands in the days when the old boats still SERVED THE ISLANDS and remember an old steamer in her last year. Landing can be difficult in fog and Faroese sunshine. Iceland Air flew DC3s into the islands and the island's landing stripe was not an easy approach in poor weather.

Icelanders joke that the Faroes were inhabited by the sea sick who got to the first dry rocks they could find. There they composed a living tradition of music, song and dance. Faroese was not written down however but lives in daily use and people's minds and in the ancient ring dance. Any number can join in this dance, footing it round with traditional steps. A central person sings a long ballad to which the dancers give the responses, rather like a sea shanty. The person in the centre may also hold a bottle for the dancers refreshment.

The Faroes ring dance takes place when the islanders have something to celebrate, a big take of fish or some other success. It survived mostly in song and verse until the 19th century when scholars became interested, studied it and had it written down.

Icelandic was a written language from early times and Icelanders are a nation of poets and writers, who put their early history in sagas and stories. Icelandic homes have libraries and read books. Icelandic poetry is very formal and carefully crafted, not just free verse put together any old way.

Whereas Iceland gets a fair share of sunshine, the Faroes are in a foggy patch of ocean and mist. The fog is known as "faroese sunshine". I arrived there in a DC-3, the reliable old workhorse of the world, flying low over a grey sea under low grey clouds. I looked in wonder to see if a sudden wall of rock might appear. The Faroes have some of the world's highest cliffs for birds to perch on.

Islands are of every shape and size, fruitful or storm swept. The Channel Island gives us early potatoes and flowers, the Scillies are bright with early flowers and the Australian settlers planted their convicts in Norfolk Island where grew the biggest pines they had ever seen.

Island going is a bit of an addiction. When your boatman nuzzles his vessel close to the rocks and says to step lively, you find yourself in a world just all your own. Remember that you can be stranded on an island by a storm as I was on Skellig. Go prepared for any weather, any length of stay and have store provisions.

Image courtesy of NASA

Faroes Islands in the North Atlantic.

Advice to Island-goers

Communications – the old large scale 6 inches-to-the-mile ordnance maps give much information. Marine charts and tide tables are also vital as the sea is not always the same place. You could be insulated by a high tide but that all changes when it is low. Important are two-way radios (transceiver), mobile phone batteries fully charged and all electric gear in a waterproof pack. Be aware of where to go get help - Gardai, lifeboat, mountain rescue coastguard. At sea always wear a life jacket and dress for bad weather. Study met and local weather patterns and current forecasts. Ask locally for advice both at sea and on land. When on the islands let sleeping dogs lie, likewise bulls and do not disturb nesting birds. Be equipped with first aid and some instructions if possible. Most islands have some source of water. If you have doubts about it there are tablets to kill the bugs. Take plenty of non-perishable food and one of the new seaweed books as many seaweeds are good eating. Islands may be rich in shellfish, cockles and mussels, scallops, limpets – I have seen an American professor eat them raw but its better to have a safe portable stove. Remember though to keep anything flammable away from vegetation or branches and timber. I have seen wild fire at large in America and Australia and don't want them here.

Do not be afraid of being alone with yourself on an uninhabited island. You have the whole vastness of space, the miracle of its as yet unspoilt existence. Indeed "what a wonderful world".

There's a schooner in the offing,
With her topsails shot with fire,
And my heart has gone aboard her
For the Islands of Desire.

I must forth again to-morrow!
With the sunset I must be
Hull down on the trail of rapture
In the wonder of the sea.

Excerpt from "The Sea Gypsy"
by Richard Hovey

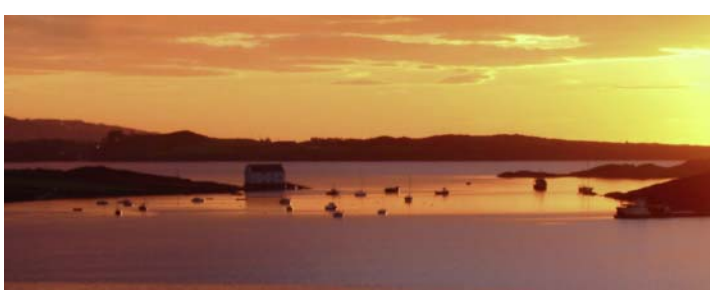


Image courtesy of Robbie Murphy

Overlooking Baltimore Harbour, with Sherkin Island in the background.

What's in a Collection?

A typical cupboard of herbarium specimens: the red covers are used for unique 'type' collections, used for descriptions of new species.

The oldest Herbarium wing, build in the 1870s, housed about a fifth of Kew's specimen collection.

Image courtesy of the Royal Botanic Gardens, Kew

The Reflora programme digitised nearly 50,000 of Kew's Brazilian specimens during 2013.

Thanks to large-scale herbarium data analyses by the Sampled Red List Index project, we now have a vastly improved understanding of threats to plant species around the world.

By William Milliken

THE initial reaction of most visitors to the Herbarium at Kew is an audible gasp. The transition from modern foyer into the extraordinary Victorian three-storey 'vault' known as Wing C, with its elaborate ox-blood ironwork, spiral staircases, floor-to-ceiling wooden cupboards, boxes and bundles of specimens wrapped in newspaper from the four corners of the globe, and the elusive odour of innumerable exotic dried plants, gives the sensation of walking back in time. It would be no great surprise to find Darwin bent over a microscope in one of the many window bays, quietly poring over a rare South American sedge.

Innumerable is about right; we're still not exactly sure how many herbarium specimens are held at Kew. It's somewhere in the region of seven million, with about thirty thousand new additions every year. Roughly every thirty years since its original construction in the 1870s, another wing has had to be built to house this expanding library of the world's plant diversity. The latest is a state-of-the art affair with temperature-controlled vaults and compactor shelving, designed for optimum storage conditions and minimum risk of pest damage. Maintaining this collection in good order is a huge and expensive task.

This needs to be justified. Natural history collections were all the rage in the 19th century, when documenting and describing the natural world was seen as a justifiable end in itself. Nowadays, institutions such as Kew are expected to demonstrate how their collections, and the work of their scientists, are helping to solve global challenges. This is as it should be, and it isn't hard to do. First and foremost these specimens, in the right hands, allow us to name plants accurately. An accurately named plant opens the doors to a wealth of information: its distribution, its uses and its ecology. Effective conservation, sustainable use of natural resources, climate change adaptation, ecosystem restoration... – all are dependent on this ability. "Why do you need so many of them though – isn't it enough to have one example of everything?" The answer to this common question is a resounding "no".

Herbarium specimens are still prepared in much the same way that Sir Joseph Banks was using on the Endeavour, or Darwin on the Beagle. The plant, preferably with flowers and fruits, is arranged and pressed in a sheet of newspaper (Banks was using copies of a commentary on Milton's *Paradise Lost*), dried in the sun or over a stove, and ultimately mounted on a piece of card with a label. The label ideally includes a description of the plant, its geographical location (which we can now pinpoint to within a few metres on the Earth's surface), its habitat, the date, the collector, and sometimes notes on common names and uses, or miscellaneous ecological observations.

Each specimen thus comprises a complex piece of data, and the more data we have access to the better able we are to address our most pressing issues. Each represents a point in time and space for a species (Kew's oldest herbarium specimen dates back to 1699), allowing us to build up a picture of its global distribution and how this is changing. This in turn allows us to prioritise our research and conservation efforts, and to monitor the effects of global change and habitat loss. Specimens also tell us at what time of the year plants are flowering and fruiting around the world, and how this may be shifting over time. Many tell us something about the relationship between species and habitats, allowing us to understand ecosystems better, or provide the keys that help us to apply plants to human needs such as health and food security.

The challenges, now, are harvesting and interpreting this massive 'database', and making the information widely and easily accessible. Natural history collections around the world, Kew included, are feverishly 'digitising' their specimens for access via the Internet, making high-resolution images and comprehensive databases available for all. For collections the size of Kew's this is a gigantic endeavour, but in the course of doing so we're disinterring vital information that's been lurking behind cupboard doors for decades or even centuries, whilst facilitating botanical research in countries without access to the specimens.

Interestingly, we're also discovering new species in the Herbarium, some of which may already be extinct. Keeping a collection up-to-date with the latest concepts of names and relationships is a Stygian task, and without taxonomists to do this it soon begins to lose value. At Kew we're approaching the end of complete reorganisation of the Herbarium, based on new understanding of plant families made possible by molecular systematics (genetic research). Many families and genera haven't been revised by specialists for decades, and it's not uncommon for a specimen to be filed away as 'indetermined' (unidentifiable) until somebody with a sufficient knowledge of the group recognises it as something previously unknown to science. In 2012 for example, an orchid specimen I collected in the highlands of New Guinea twenty years earlier was finally described as a new species.

So it's not just the specimens and data that are important in biological collections – it's also the people who maintain and study them. And it's not just the major collections that are important; smaller ones (such as Sherkin's) are vital sources of local information on biological diversity. Taxonomy is as important as it ever was, but increasingly hard to fund and there are ever fewer courses available to train the next generation of specialists. Raising funds for curation is harder still: biological collections around the world are struggling to keep themselves going and many have closed down. Yet we need them, and we need to keep investing in them for the future. However unfashionable they may seem right now, generations to come will wonder what on Earth got into us if we let them go.

William Milliken, a former volunteer at Sherkin Island Marine Station, is Head of Tropical American Botany at the Royal Botanic Gardens, Kew, UK.

An Expectation of Climate Scientists

By Alex Kirby

WHY DO so many of us expect climate scientists to meet standards of accuracy so much more rigorous than in most other fields? Why do we demand that they should always be precise and unfailingly correct before we'll condescend to believe a word they say? Why do we stoop to accuse them of manipulation, lying and outright conspiracy to trick us into accepting that climate change is a reality - which it is?

You think that's too strong? You doubt that the climate doubters really make accusations as serious as that? Have a look then at the book written by one Republican senator in the USA, James Inhofe. It's called *The Greatest Hoax: How the global warming conspiracy threatens your future*.

In fact, most of us don't make such preposterous demands. But the climate deniers, a small, shrill, assertive minority wielding influence out of all proportion to the strength of their arguments, insist that climate scientists should be held to a gold standard of precision.

They've been at it for years, and the UN climate conference in Copenhagen in 2009 must have seemed a godsend to them. That was when the fortuitously leaked emails from the University of East Anglia helped to erode public trust in the scientists' findings. The emails were rapidly followed by the discovery of a serious error in the 2007 assessment report from the Intergovernmental Panel on Climate Change.

The IPCC managed to get an important figure badly wrong. Instead of saying that the Himalayan glaciers risked melting by 2305, they said this could happen by 2035. You could dismiss it as a careless, unwitting transposition of digits, which the evidence suggests it was: a clear case for a rigorously old-fashioned copy editor. Or you could argue that it was evidence of a determination by the IPCC to harden the evidence that climate change is an urgent threat, even if that meant printing blatant falsehoods. Given the IPCC's record that would have been very unlikely, but it's impossible to prove beyond all doubt that they were acting in good faith.

Of course the mistake should never have happened, though in a voluminous report it's all too easy to miss a misprint. Understandably, in the circumstances, the deniers objected vociferously.

Penitent, bloodied but unbowed, the IPCC went on its way, and in September 2013 produced the first tranche of its latest report, AR5 in the jargon (the Fifth Assessment Report).

Himalaya-gate, the botched story of the glaciers, was only one tiny part of the IPCC story. For a quarter of a century it has teased apart the tantalisingly confusing and incomplete science of climate change, has developed the best explanations it can of what is happening to the planet - and why - and spends much of its time trying to test those explanations to destruction. So far, it has failed to destroy them: the laws of physics won't let it. Or, to quote a former US senator, the late Daniel Patrick Moynihan: "Everyone is entitled to his own opinion, but not his own facts."

The reaction of the deniers - perhaps climate fantasists better describes many of them - to the IPCC's 2013 report was instructive. The Global Warming Policy Foundation, headed by the former British Conservative politician Nigel Lawson, issued a press release on AR5 which was headed: "The Global Warming Policy Foundation is criticising the IPCC for its deliberate attempt to obscure the reality of an ongoing temperature standstill and its failure to come clean about the failure of its models." The GWPF argues that temperatures have stood still since 1998, and that this proves climate change has stopped. They haven't, and it hasn't, and if the Foundation was ready to accept the sort of uncertainty that pervades many other areas of life it would probably agree that much of the extra heat which formerly went into the atmosphere is now going into the ocean depths. Granted, we need to know why that's happening. But few climate scientists doubt that that is an entirely credible explanation - one of several possible ones - for what is happening now. Yet the GWPF, with its talk of a "deliberate attempt to obscure" reality and "its failure to come clean" accused the IPCC not simply of bad science but of bad faith as well.

You want certainty and exactitude? We didn't get that from the bankers in 2008. OK, so you need no scientific qualifications to be a banker. But there are many other branches of science where most of us are - in practical terms - willing to settle for the best on offer, even though it may be unproven; where we accept that certainty is unattainable, and that the whole scientific enterprise is a work in progress, something undergoing constant revision.

I've never thought that medicine is an exact science, but I'd still go to a doctor if I were ill. I'd want the best treatment available, and I'd accept that that was more likely to be dispensed by someone who had spent years learning about it than from someone whose scientific track record was as modest as my own.

Those who challenge the overwhelming scientific majority seem themselves sometimes quite hazy about the fundamentals of climate science. Last year I went to

hear a prominent critic of the IPCC speak at a public meeting. His argument, I think (it's sometimes hard to be sure) was that a temperature rise of up to 4°C above pre-industrial levels (which the IPCC and other scientists think is quite possible by 2100) would not be a cause for worry, because humans are adaptable creatures. I asked him whether he thought the natural world would show a similar adaptability, and was very surprised by his answer. "Don't worry about the polar bears", he said. "They'll manage."

But I hadn't wanted to know about polar bears. I was concerned about creatures like nematodes, microscopic worms which live in the soil. Some of the 20,000-odd kinds of nematode destroy pests, and so they help to sustain agriculture. Will they survive unchanged in a warmer world? No. Researchers say that since 1960 they have been shifting north and south at an average speed of three kilometres a year to escape the growing heat. Yet the speaker didn't mention a single species so potentially vital to humans which could be at risk as the thermometer climbs. Perhaps he forgot.

We all want certainty in all sorts of areas of our lives. But as we grow up we come to accept that it's often impossible to be sure, and that the best we can do is to accept the best available explanation, however improbable it may seem, and to learn to live with that. That's what we have to do with climate change, if we're to have any hope of surviving it - because it's a threat multiplier, the joker in the pack that's helping to make so many other problems even more insoluble than they were.

This is not a plea that we should abandon scepticism, but the opposite. Sceptics suspend belief. They refuse to believe what they're told until they're given the evidence they need to let them accept it. Cynics though withhold belief, refusing ever to accept whatever they have decided to reject. In one sense it's easy enough to see why the climate deniers are so cynical about the IPCC and those of us who argue that climate change is real and urgent and (perhaps) still within our power to affect. The sort of society that takes anthropogenic climate change seriously and takes serious action to prevent it would be very different from the one we have.

The real sceptics, the people who deserve the name, are the climate scientists themselves. In 1998, in my last week at the BBC, I talked to one of them, a man who was one of the British team working with the IPCC. He told me: "The big problem is the uncertainties. But the science is hardening up quite a lot, and it's come on by leaps and bounds since the Intergovernmental Panel on Climate Change first met in 1988.

"There's been enormous progress in observations, in our understanding of the processes and our modelling of them - they've all moved on brilliantly. The more you understand, though, the more you realise how much you don't understand. In some areas our ignorance is woeful."

It still is, in some areas. But the underlying trend points unambiguously in one direction - and it's not a good one.

Alex Kirby is joint founder-editor of the Climate News Network (www.climatenews-network.net/)

A Viking House and Garden at Glasnevin

By Matthew Jebb

Images courtesy of National Botanic Gardens, Glasnevin

The 19th century round tower in Glasnevin Cemetery was built to commemorate the great Liberator, Daniel O'Connell. It is interesting when you realise that in the 10th Century this was a normal combination of building styles. To modern eyes they seem a world apart.

THE National Botanic Gardens have built a replica of a Viking-age Dublin house at Glasnevin. Over the summer the house will be surrounded by a garden including crops and useful plants that would have been present in a city garden 1000 years ago. Those who have experience the beautiful buildings and smell of wood smoke at the National Heritage Park at Ferrycarrig in Wexford will know the sense of immediacy and delight a well-crafted building can bring to the past.

Having an outdoor building of this quality, close to the mediaeval excavations at the centre of Dublin, was one of the major inspirations for the project at the Gardens. The plan has been to recreate a typical Fishamble Street house with its attendant garden, as evidenced by the excavations undertaken at Wood Quay and Fishamble Street between 1974 and 1981. Another reason for building the house this year is to mark the millennium anniversary of the Battle of Clontarf. The site of the Gardens, on the banks of the Tolka River, was no doubt witness to some part of the fighting. The House and its attendant garden will, we hope, form a graceful addition to the Gardens for many years to come.

There are several reasons why building such a replica fits well with our mission. The Gardens run an extensive education programme and cater for many thousands of visiting school children. The aim will be to take groups of up to 30 children at a time into the house and talk about life in Hiberno-Norse Dublin a thousand years ago.

One of the most striking features of these buildings is that they are, of course, entirely organic and constructed exclusively from plant resources. The amount of raw material needed to construct such a building, the land area required to supply these materials and the years for that to be replenished, will become a feature of many of our sustainability-focused garden tours and workshops. A large proportion of the world's population still live in such buildings, and the house will provide an excellent focus on sustainability and the importance of plants then and now.

Visitors will be able to understand the construction of houses of the time, as well as how evidence can be gathered from fireplaces, floors and bedding areas, to interpret the way people lived, the foods they ate and the plants they used. This will have a direct bearing on both the junior and senior cycle curriculums. We hope it will also be an inspiration to young minds as to how archaeology teaches us about the past and the possibilities of a career in this area.

The National Botanic Gardens is a scientific institution and one of its many research interests is the origins of the Irish flora. Many species of flowering plants - our native flora - reached Ireland by entirely natural means over 9,000 years ago. However, it is likely that people introduced a further 100 or so plant species -so called archeophytes - between the neolithic and mediaeval eras. The surrounding garden will therefore exhibit not only the crops and utility plants of the time, but importantly the weeds of cultivation that we know were abundant at the time. Examples of ash, hazel and oak trees will demonstrate the source materials of the building, as well as plants used for thatching, bedding material or wild-sourced plant foods will make the garden a fascinating piece of living archaeology.

Master craftsman Eoin Donnelly of Enniscorthy has been overseeing construction of the building with assistance from Botanic Gardens staff. Eoin manages the woodland from which he harvested the Oak, Ash and Hazel. Peter Compton, a thatcher from County Cavan, trained in Denmark and his techniques and terminology are firmly rooted in the Norse world.

The building phase, during March and April, has been a major attraction at the gardens. A master craftsman and thatcher at work give a wonderful insight into rural crafts and are a delight to younger and older generations of visitors. A diary of photographs and commentary on progress is available on the Gardens website (www.botanicgardens.ie /Viking).

The house has come about through the enthusiastic support of many partners especially Dublin City Council, the National Museum of Ireland and the School of Archaeology, University College Dublin. We have received generous financial assistance from the Irish Museums Trust and Dublin City Council.

Matthew Jebb, Director, National Botanic Gardens, Glasnevin, Dublin 9.
(See pages 16 & 17)

Peter begins the roof. The Thatcher uses a pole mounted between 2 boom hooks as his movable scaffold. The boom hooks are nicknamed 'Tritelas' in Denmark because of their resemblance to a 3. The hook penetrates the thatch and rests upon a rafter and is then hooked up behind the next higher rafter on the roof - an ingenious and easily moved support.

A Viking House and Garden at Glasnevin

Applying the bundles of reed. The Thatch is imported Polish reed. This is the only element that had to be imported for the sad reason that most Irish reed beds are now so polluted with nitrates that the reed has grown too quickly and is weak and short-lived.

Eoin preparing the house posts.

traditional tools adze and spoke shave.

Eoin using the brake to remove the bark from an ash pole.

Splitting ash poles using the cleaving brake.

House corner.

Peter explaining the finer points of thatching.

Eoin Donnelly, Master craftsman, throwing a bundle to thatcher Peter Compton.

The roof battened out. The roof rafters and battens are made from Ash, either in the round or split lengthwise.

The reeds are patted into position.

Crows and a boom hook. The green painted ash pegs are known as Crows and are used to temporarily hold the thatch in place while it is being worked.

First of the battens.

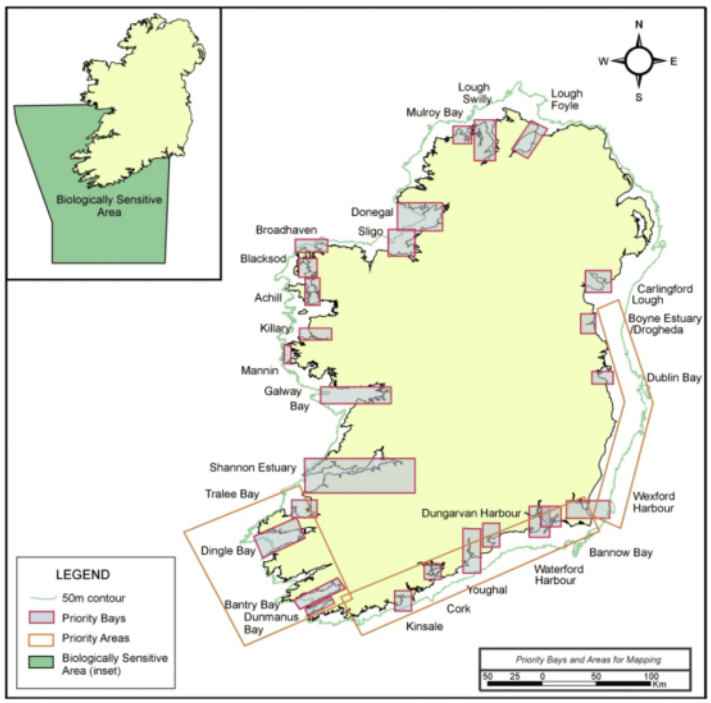
Beginning the roof.

Beginning the wattle walls. The wattle walls are made from hazel rods.

Walls half way up. The trestle supports are made from Oak, as are the house posts.

Walls complete.

Mapping the Seabed of Roaringwater Bay



Images courtesy of Marine Institute

Figure 1: INFOMAR priority bays and areas.

By Kevin Sheehan

Introduction

ROARINGWATER BAY in West Cork, and the surrounding area were surveyed during July and August 2013 as part of the national seabed mapping programme, INFOMAR (INtegrated Mapping FOr the Sustainable Development of Ireland's MArine Resource). The survey was undertaken utilising the Marine Institute (MI) research vessel RV *Celtic Voyager*. Roaringwater Bay is a Special Area of Conservation (SAC) for marine mammals and for a variety of other biological and geographical reasons. As such, an application to survey the area was made to National Parks and Wildlife Service (NPWS) prior to commencement of operations. A license was granted with certain stipulations, and these were adhered to throughout. Operations within Roaringwater Bay SAC took place in daylight hours and a Marine Mammal Observer (MMO) was on duty throughout.

Figure 2: RV *Celtic Voyager*.

INFOMAR Background Information

The INFOMAR programme is a joint venture between the Geological Survey of Ireland (GSI) and the MI. The programme succeeded the Irish National Seabed Survey (INSS), which ran from 1999 to 2005. The INSS was one of the largest marine mapping programmes ever undertaken anywhere in the world and concentrated principally on mapping Ireland's offshore territory in greater than 200 metres water depth. Total mapping coverage by the INSS to end of 2005 was 432,000 km². INSS delivered an important baseline dataset which is a national asset and can assist in policy making for present and future economic, environmental, infrastructural, heritage, social and policy issues.

The INFOMAR programme is focussed on areas not mapped by the INSS. Initially 26 priority Bays and 3 Priority Areas (Figure 1) were identified for mapping between 2006 and 2016.

Bays and Areas were selected based on strategic importance in terms of navigation, environmental, economic, cultural, legislative and other requirements. The strategy has three major programme components:

1. Data Acquisition, Data Management and Interpretation: To contribute to the management of activities and resources in Irish inshore areas by completing a comprehensive mapping and data interpretation programme for defined priority areas and bays to the period to end 2016 followed by the remaining areas and bays in the period to 2026;
2. Data Exchange and Integration: To establish processes and procedures to create a mechanism for the enhanced integration of marine survey data and the dissemination of data and information products to policy makers, academia, private sector and the public;
3. Value Added Exploitation: To deliver a range of value added opportunities linked to user demands, commercial markets and external funding sources.

Survey Methodology

INFOMAR routinely collects high resolution multibeam echosounder, singlebeam echosounder, sub-bottom profiler shallow seismic, magnetometer, sound velocity profile and groundtruthing data. Multibeam echosounder systems provide information on the bathymetry and backscatter over a wide area at either side of the boat's track, typically 3 or 4 times the water depth beneath the survey vessel. Sub-bottom profiler provides information on sediment thickness and depth to bedrock in approximately the top 30 metres of the sub-surface. A magnetometer towed behind the vessel provides measurements of the Earth's magnetic field and any made man object that has an associated magnetic field, i.e. certain wrecks. In addition, a variety of techniques are used to obtain groundtruth information, i.e. grab samplers, corers and video imagery.

Survey Vessel

The RV *Celtic Voyager* (Figure 2) has wet, dry and chemical laboratories, which are permanently fitted with standard scientific equipment and can accommodate 6 - 8 scientists with a maximum endurance of 14 days. The vessel is manned by a very experienced crew who are highly skilled with the handling and deployment of scientific equipment.

It has a hull-mounted high resolution EM3002 multibeam echosounder specifically suited for mapping waters less than 200 metres depth. It has a hull-mounted pinger system for sub-bottom investigations. CNAV, a Global Navigation Satellite System (GNSS) provides high resolution positioning data for all sensors.

Survey of Roaringwater Bay and Surrounding Area

The RV Celtic Voyager departed Cork city on 10th July to commence survey operations in the South Priority Area (SPA), Clonakilty Bay. Multibeam echosounder, shallow seismic sub-bottom profiler and magnetometer data were acquired on all survey lines in the area. Water depths ranged from 10 to 100 metres. An area of approximately 1000 km² was mapped during the period to 7th August. Figure 3 is the bathymetry image of the area surveyed, colour coded for depth. The dark blue areas are deepest and the reds represent the shallowest depths.

A number of wrecks were mapped, some of which were

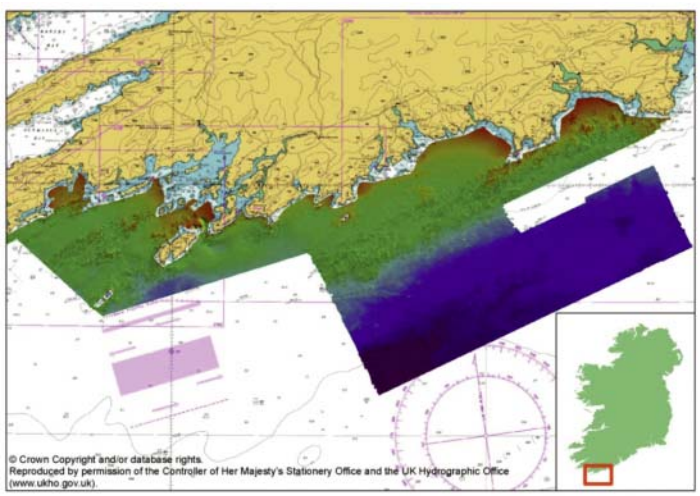


Figure 3: Multibeam bathymetry image for entire survey area.

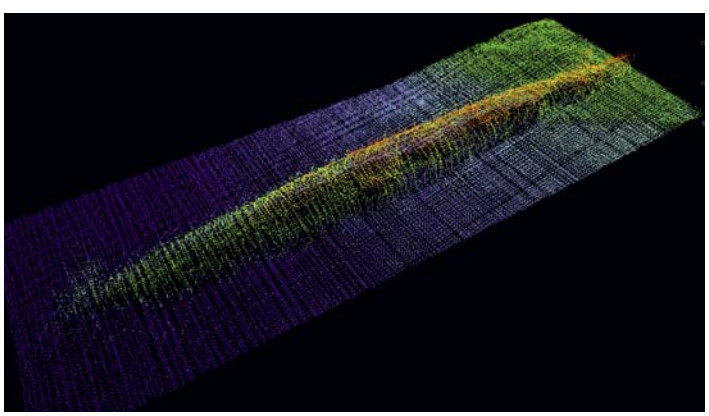


Figure 4: Multibeam image of previously uncharted wreck.

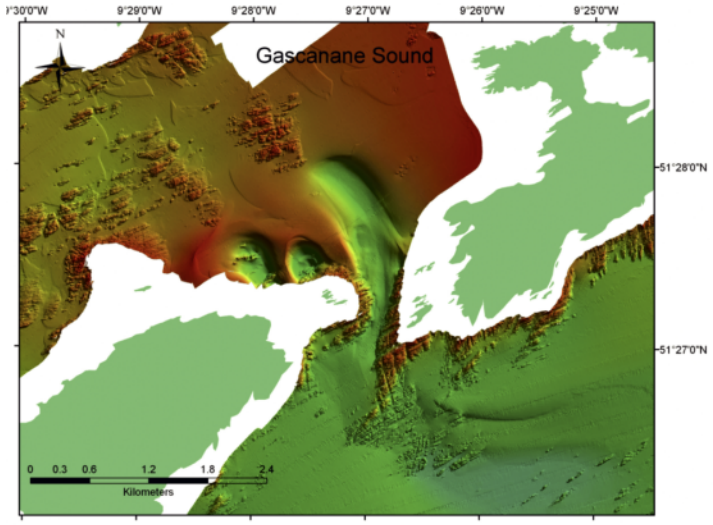


Figure 5: Multibeam bathymetry of Roaringwater Bay.

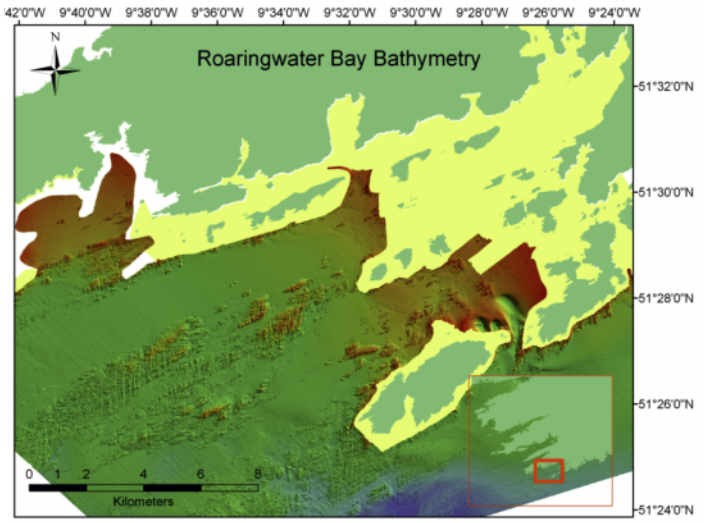


Figure 6: Multibeam bathymetry Gascanane Sound.

previously uncharted. One such wreck appears to be a submarine (Figure 4).

The wreck was not previously charted. Efforts are currently being made to identify it. The exact location is not being disclosed at this time.

A portcall took place in Kinsale on 24th July and survey operations recommenced on 25th July in Roaringwater Bay. Given its location, the number of ports in the area, its importance in terms of flora and fauna, and its popularity as an area of recreation it was decided to map it as part of INFOMARs 2013 survey programme.

Figure 5 shows the extent of the survey coverage within the bay. Operations were limited to depths greater than 15 metres for this survey. It is anticipated that INFOMAR's shallow draft vessels will complete the shallow water parts of the bay in future years.

Figure 6 is an image of the bathymetry of Gascanane Sound which marks the channel between Sherkin and Cape Clear Islands. Strong currents flowing through the sound have scoured the seabed and formed holes greater than 50 metres deep. Scoured sediment has been deposited in the northeast part of the area. The smooth parts of the image represent areas of soft sediment and the rough areas represent bedrock outcrop on the seabed.

Figure 7 shows the multibeam backscatter of the bay. Backscatter is a measure of the relative hardness of the seabed. Dark areas in this image represent areas of relatively hard seabed and light areas represent areas of relatively soft seabed. Some of the dark areas represent bedrock outcrop and other dark areas are scoured seabed. The bathymetry shaded relief and backscatter images combined are a powerful tool in determining the seabed character. Seabed character is an important factor when it comes to the zoning element of marine spatial planning; e.g. the routing of seabed cables and pipelines or deciding the location of wave energy devices.

Kevin Sheehan, Marine Geophysicist, Marine Institute, Rinville, Oranmore, Co. Galway.
www.marine.ie

Images courtesy of Marine Institute

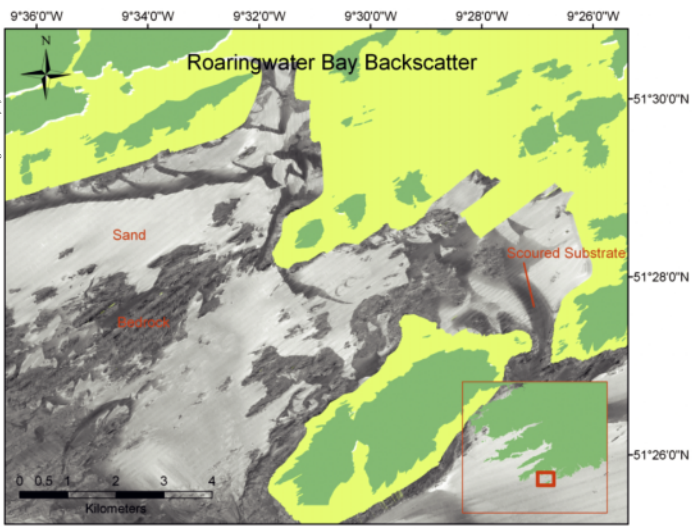


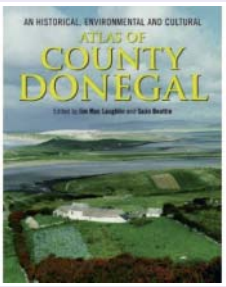
Figure 7: Multibeam backscatter image of Roaringwater Bay.

Image courtesy of Robbie Murphy

A view of Roaringwater Bay from the top of Slievemore, Sherkin Island, Co. Cork.

Dissecting Donegal

John Akeroyd reviews an encyclopaedic account of Ireland's most northerly county.



THE new Atlas of County Donegal* provides an intimate and varied glimpse of a fascinating county. County Donegal lies on Europe's far north-western fringe, a beautiful land of remote districts and ancient survivals. It is a place of mountain and sea, where Ireland's oldest rocks – hard gneiss, granite and quartzite – form steep mountain scenery, similar to the Scottish Highlands, and great sea-cliffs. The indented coast has extensive complexes of sand dunes, machair, marshes and inlets, with shifting shorelines and stunning views. The county has a rich human history, with numerous relics from the Mesolithic, through the Bronze Age and monastic times, to the turbulent medieval period when local chieftains fought for control of what was then Tír Chonaill, while staving off invasions from Vikings and Normans (Donegal derives from Dún na nGall, fort of the foreigners). Donegal is also a county rich in biodiversity and, as this book demonstrates, cultural activity such as weaving, music, writing and the visual arts. The county encapsulates the spirit of Ireland but also illustrates many of Ireland's problems, past and present. It has long attracted researchers seeking authentic fragments of older 'Celtic' Ireland.

The editors of this large impressive Atlas (more an Encyclopaedia) have done their native county a great service. In a feat of editing they have assembled essays from more than 50 contributors – academics, independent scholars, journalists and other writers, all deeply immersed in Donegal's history and geography. In their own introductory chapter, they elegantly summarise the past and present situation of a county where farming was hampered by poor or thin soils and fishing never developed properly (although it made the medieval lords of Tír Chonaill rich), leading to the high levels of emigration of the 19th–20th centuries. They and their contributors emphasise Donegal's links and influences far outside the county, as well as the creativity and affability of the inhabitants.

The first section of the book is ten chapters on the physical environment and wildlife of Donegal: geological and glacial history, coastal geography, climate, habitats, and plants and animals. The county bears a distinctly northern ecological stamp, especially a suite of Arctic-Alpine and Boreal plants that occurs on Slieve League and elsewhere, even at lower altitudes. Donegal is, for example, the Irish headquarters of Globeflower (Trollius europeaus), a showy buttercup-like plant of northern and montane Europe widespread by the rivers and lakes. The coasts especially have colourful displays of wild flowers, although generally Irish botanists have neglected the county since Henry Chichester Hart (1847-1908), gifted polymath, explorer and athlete, published The Flora of the County Donegal in 1898. Donegal is also rich in butterflies (which are well studied) and moths, marine and land mammals, and a wide range of birds of which 85 species breed there, including waders and seafowl. An account of the reintroduction of Golden Eagles to Donegal completes this section of the book, showcasing a project that is a symbol of hope for the future of biodiversity in what remains an impressively wild landscape. One particularly important message emerges from this work: that farmers and country people suspicious of conservation measures apparently imposed from outside often respond well to the folklore and cultural traditions associated with eagles and other wildlife. Biodiversity thus links in directly with the wider cultural heritage of Donegal that is the theme of this Atlas.

The remainder of the book is a cornucopia of information on the human inhabitants of the county, their history, tribulations and many great achievements, their lives linked to the land through the long farming tradition and to the sea through fishing. The diversity of biological resources helped create prosperous societies from the Bronze Age through to the end of old Gaelic Ireland with the Flight of the Earls from Lough Swilly in September 1607. This last momentous event has its own chapter. There is much too within these pages to interest the landscape historian, ecologist or naturalist, but particularly Chapter 21 on the decline of rundale or communal open-field farming, and Chapters 44 and 45 on changes brought about by the modernisation of agriculture.

The life of farming communities in Donegal was one of the aspects of the county that attracted researchers. Rundale (roinn daíl) involved small farming communities living in a cluster of houses, the clachan, surrounded by open strip fields that were regularly re-distributed among families. These fields were devoted to potatoes and cereals, whereas more distant and less productive land was used for communal grazing. This type of communal land use was once widespread in parts of western Ireland and Scotland, and a similar system persists in Transylvania in Romania. In the early 19th century, overcrowding, pressure from landlords and the march of modern agriculture overwhelmed this ancient system in Donegal and the open fields were enclosed – creating the apparently 'old' countryside we see today, of hedgerows and dispersed farms. Small subsistence farms survived into the 1960s, after which larger dairy and beef farms replaced traditional mixed agriculture and tillage. Forestry plantations now cover much wet and marginal land that small farmers cleared in the 19th century.

Donegal political activist and author Peadar O'Donnell (Chapter 67) wrote of the modern county: "It's a better Donegal. But it's not my Donegal." Today, after the Celtic Tiger years and the building boom, it is a place of new communities, and most people, visitors or residents, use the countryside for leisure rather than work. Donegal has thus changed markedly over the last century but, though the quieter if physically harsher world of small self-sufficient rural settlements has gone, much of their accumulated tradition endures, as the various contributions in this fascinating Atlas confirm. Donegal is a microcosm of modern Ireland, retaining ancient memories and a sense of place in the face of modern life. Fortunately, the magnificent scenery and much of the wealth of biodiversity have persisted.

*** An historical, environmental and cultural *Atlas of County Donegal.* Jim MacLaughlin & Sean Beattie (eds). Cork University Press. 2013. Price: €59. pp 638. ISBN: 978-185918-494-3**

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Town and villages of Donegal. In the first decade of the twenty-first century, one in five people in Donegal were living in Letterkenny, Buncrana, Ballybofey or Stranorlar. Today almost one third of the county's inhabitants are in towns with a population of one thousand inhabitants or more and half the population of the county is in large-to-medium towns and villages.

Images from "Atlas of Donegal"

Ballyhillen, Malin Head, Co. Donegal. The raised shorelines of Inishowen are particularly well developed at Ballyhillen, where they form a cliffed shoreline landward of the modern gravel beaches. **(Photo: Andrew Cooper)**

The Status of Bass in Ireland

By Ciaran Byrne

BEFORE one considers the status of bass, an iconic marine sportfish species, it is worth thinking a little bit about one recent theory in ecology originally developed by the eminent ecologists Robert MacArthur and E.O. Wilson, based on their work on island biogeography. The theory in question is the r/K selection theory and in its simplest form it divides fish species based on their parental investment; r-selection species spread parental investment across many offspring whereas K-selected species focus theirs on a few offspring. When fisheries ecologists compared theoretical life history patterns in terms of r and K selected species to actual life history patterns of fish they found significant agreement between the theory and observed patterns. Thus unsurprisingly some fish species adopt r-selection strategies and others adopt K-selection strategies. What's interesting is when you look at the broad characteristics of the two life history patterns – r-selected fish species have: i) low age at first maturity; ii) rapid growth rates; iii) small body size; iv) high rates of mortality and v) shorter life span. By corollary K-Selected species have: i) high age at first maturity; ii) slow growth rates; iii) longer life spans and iv) larger body size – this means that K-Selected species are highly susceptible to overfishing and once depleted recovery could take a long time if it occurs at all. It is important to note however, as is the case with many ecological theories, some species will fit perfectly with the theory and others will not.

Armed with this theoretical ecology information one can consider bass and compare some of its life history characteristics to those of herring for example. In Irish waters bass live for a long time and it is not unusual to have fish live as long as 20 years; they first achieve maturity at between four and seven years, and they can reach weights of up to 8kg and the specimen angling weight is 4.5kg. By contrast herring achieve maturity at two to four years old, they can live as long as 12 years and reach weights of up to 700g. Yes, bass is a K-selected species and herring is a r-selected species and theoretical ecology shows that K-selected species are highly susceptible to overfishing and take a long time to recover, if ever.

Following extensive overfishing in the 1970's and 1980's the 1990 Bass Conservation Order was put in place to provide for the recovery of the stock. From that point forward bass has been managed as a recreational angling species and there has been no commercial fishery. Bass is the only marine species to be managed for angling in Ireland. It has taken almost 25 years to get to a point where the stock has had only a partial recovery to a fraction of its former abundance level. Yet this partial recovery in abundance has allowed a viable recreational angling industry to develop, and Ireland now has one of the best recreational bass fisheries in Europe which generates a significant economic return. The management measures adopted in Ireland are much lauded in other jurisdictions and add substantially to the marketability of the bass angling resource here.

Although widely distributed bass are more common along the east, south-east, southern and south-western coastline. Effectively the angling fishery extends south of a line extending from Galway on the west coast to Dundalk on the east coast; however with warming oceans we are beginning to see the natural range of bass extending further northwards. Targeted angling for bass is generally concentrated on venues within these confines. The majority of the known bass angling marks or 'hot spots' are located in the south of the country with >72% being located in four counties – Wexford, Waterford, Cork & Kerry.

Inland Fisheries Ireland is firmly of the view that in the case of bass the biological and economic realities must not be ignored. Bass is a long lived slow growing species which has previously been overfished and is only now showing signs of a partial recovery almost a quarter of a century later, although very recent anecdotal evidence suggests recreational catches have declined again. The recreational fishery is to a large extent a catch and release fishery and in this context could be considered the most sustainable method of generating a positive return from the resource without impacting on its conservation status. Bass angling generates millions of euro each year to diverse sections of the rural community including guest house providers, hotels, tackle shops, pubs and restaurants. The recent socio-economic survey of recreational anglers in Ireland produced by IFI reported that between 33,000 to 44,000 domestic anglers would target bass. A further 4000 trips from Northern Ireland and 28,000 trips by overseas anglers also targeted bass. Unfortunately it is impossible to place an overall value on bass angling due to multiple species targeting by the majority of anglers. Findings from the survey indicated that each domestic bass angler spends €2,685 annually on their sport, while other species anglers that target bass would have a proportion of their spend on bass also. The survey also identified that tourist bass anglers recorded amongst the highest average expenditure per trip of angling category. Spending up to €576 per individual per trip, excluding flights and ferries, the total spend could be estimated at up to €28 million annually in the Irish economy (a maximum if they targeted no other species during their visit). So the message is that for rural coastal communities on the Southern coast bass anglers are high net worth individuals. They stay, they spend and they come again and again and again but only if we keep to our side of the bargain and protect the stock.

Inland Fisheries Ireland has established a National Bass Programme to collect data on bass in order to provide scientific advice to support management and conservation of Ireland's bass resource.
(Image courtesy of Henry Gilbey/www.fisheriesireland.ie)

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www.fisheriesireland.ie

(see page 29)

STURGEONS

(Family: Acipenseridae) in Irish & NW European Waters

By Declan T. Quigley

Beluga (*Huso huso*) Photo courtesy of www.FishBase.com

STURGEONS belong to a small family (*Acipenseridae*) of anadromous and potadromous fishes, currently represented by 4 genera and at least 25 species, which are all confined to temperate and sub-tropical regions of the northern hemisphere (Table 1). Extant sturgeons are considered as "living fossils" because they belong to an ancient order of bony fishes (*Chondrostei*) which also includes the related Paddlefishes (*Polyodontidae*), dating from the Jurassic Period, 201-145 million years ago. Living sturgeons have retained some unique primitive morphological features which are also evident in fossil specimens: most of the endocranium is cartilaginous, the notochord is retained in the adult stage, they have a heterocercal tail, and the body is armed with five rows of bony scutes. As a group, *Chondrosteans* also share a few unusual genetic characteristics which allow them to hybridize easily. Indeed, many interspecific and even intergeneric fertile hybrids have been found in nature (and artificially produced in fish farms) which all adds to an already confusing situation regarding species identification.

Many species of sturgeon, such as the Beluga (*Huso huso*), can reach an enormous size (>2 tonnes & 5m in length) and live to a great age (118 years), while others are relatively tiny and short-lived. For example, the Dwarf Sturgeon (*Pseudoscaphirhynchus hermanni*), which is endemic to Amu Darya & Syr Darya rivers (both tributaries of the Aral Sea, USSR), only attains a maximum size and age of 55 g (27.5cm) and 6 years respectively. Many species are extremely slow-growing and late maturing with long intervals between spawnings which can be a major obstacle in managing wild populations. For example, in the wild, Siberian Sturgeon (*Acipenser baerii*) males mature at 20-24 years and females at 25-30 years and females only reproduce every 4-5 years. Fortunately, however, the age of maturity and spawning intervals can be significantly reduced under captive breeding programmes.

Due to centuries of over-exploitation and habitat degradation, all species of sturgeon are currently considered to be vulnerable. Indeed, the vast majority of species are now either endangered or critically endangered. Despite the fact that all sturgeons are protected under a plethora of national and international conservation laws and conventions (e.g. IUCN, CITES, EU Habitats Directives), several species are currently on the brink of extinction and some may already be extinct. In 2003, the *World Sturgeon Conservation Society* (www.wscs.info) was established in order to help co-ordinate urgent joint international conservation efforts.

Wild Fisheries & Aquaculture

Sturgeons have been exploited since pre-historic times, primarily for food (e.g. flesh and caviar). High quality wild Beluga caviar currently retails at up to €10,000/kg. The dried swim bladder or *isinglass* (a form of collagen) has also been utilized since the middle ages for the clarification of beer and wine and also as specialized glue. More recently, sturgeon by-products have been developed for medicinal health products, cosmetics and leather. There is also an increasing trade in live sturgeon for stocking angling waters and as ornamental pets. Indeed, the legal and illegal release and/or accidental escape of allochthonous sturgeon species into the wild by aquaculture units, anglers and, when they inevitably out-grow their aquaria, by pet fish owners, may pose further risks to the survival of already critically endangered wild stocks through possible interspecific competition, hybridization and disease transfer. Since 1993, large numbers of non-native species of sturgeon and various hybrids have been reported in the wild in many areas of NW Europe e.g. Beluga, Siberian Sturgeon, Sterlet (*A. ruthenus*), Russian Sturgeon (*A. gueldenstaedtii*), White Sturgeon (*A. transmontanus*), Beluga x Sterlet Hybrid ["Bester Hybrid"], and Siberian x Sterlet Hybrid.

From a peak of 32,078 tonnes in 1977, global production of wild sturgeon fisheries catastrophically collapsed to only 408 tonnes in 2011 (Figure 1). The following countries contributed to total wild fisheries production during 2011: Canada (31%); USA (27%), Iran (20%); Russian Federation (14%); Serbia (5%); Hungry (1%); Turkmenistan (1%); and Kazakhstan (1%). During 2011 wild fisheries accounted for <1% of total global production.

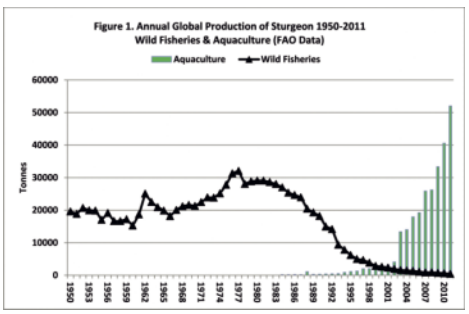
Since the mid-1980s, global aquaculture production of sturgeon has continued to increase exponentially, from 150 tonnes in 1984 to 52,049 tonnes in 2011, with China currently accounting for 85% of the production. At least 14 individual species along with several interspecific and intergeneric hybrids are farmed worldwide. Chinese aquaculture production is primarily based on Siberian Sturgeon [42%], Amur Sturgeon (*A. schrenckii*) [15%], and various hybrids (38%) [e.g. Kaluga (*H. dauricus*) x Amur Sturgeon; Siberian x Amur Sturgeon; and *"Bester Hybrid"*].

Sturgeon in NW European Waters

Only two native species of sturgeon have been definitively recorded from the NW European waters: the European Sturgeon (*A. sturio*), and the closely related Atlantic Sturgeon (*A. oxyrinchus*), which is indigenous to the NW Atlantic (USA & Canada). However, at least 7 more species have been recorded from various parts of southern Europe and Eurasia, including the Mediterranean, Black and Caspian Seas. Nevertheless, recent research has shown that two of the latter species, the Adriatic Sturgeon (*A. naccarii*) and Beluga may have inhabited the Guadalquivir River in the southern Spain and possibly the Tagus in Portugal during historical times. Indeed, it is interesting to note that although the European Sturgeon is generally considered to be the only species of sturgeon known to have occurred in Irish waters, there are two unconfirmed anecdotal records of Beluga dating from 1845 (1.6 km off Cork City) and 1847 (River Bride, Carrigeen, near Curriglass, Co. Cork). Recent research also suggests the possibility that the Atlantic Sturgeon may also have frequented Irish waters too.

For many years it was hypothesized that North American migrants of the Atlantic Sturgeon naturally colonised the Baltic Sea (and also formed land-locked populations in Lake Ladoga & Onega) as recently as c.1200 years ago and were apparently confined to this region until the 1960s. However, recent genetic research on sturgeon, previously considered to be European Sturgeon, housed in Polish, French and British museums, as well as sturgeon remains recovered from several archaeological sites, revealed that some of these specimens were actually Atlantic Sturgeon. Furthermore, it was discovered that the Atlantic Sturgeon had colonized European waters much earlier (c.5000 years ago), and had had a much wider distribution than previously thought, extending from the Baltic as far south as the Bay of Biscay where it continued to exist until at least the mid-19th century. Indeed, two sturgeon specimens from the River Seine dating from 1823 and 1858 were found to be hybrids between Atlantic and European Sturgeons, providing clear evidence of sympatry (co-existence) in NW European waters up until the mid-19th century. Since both of these species of sturgeon are difficult to tell apart on the basis of external morphological and meristic characters, the results of the recent genetic research calls into question the true identity of all "European" sturgeons currently housed in NW Euro-

Table 2. Distribution of Irish Sturgeon Records by County & Habitat				
County	**Coastal**	**River**	**Totals**	**%**
Dublin	47	5	52	21.4
Louth	29	2	31	12.8
Irish Coast (unspecified)	22	0	22	9.1
Cork	18	2	20	8.2
Donegal	17	0	17	7.0
Down	12	5	17	7.0
Wexford	9	7	16	6.6
Limerick	0	15	15	6.2
Waterford	6	8	14	5.8
Kerry	6	4	10	4.1
Meath	0	8	8	3.3
Galway	5	0	5	2.1
Derry	1	2	3	1.2
Kilkenny	0	3	3	1.2
Clare	1	1	2	0.8
Tipperary	0	2	2	0.8
Wicklow	2	0	2	0.8
Irish Sea	1	0	1	0.4
Mayo	0	1	1	0.4
Tyrone	0	1	1	0.4
Antrim	1	0	1	0.4
Totals	**177**	**66**	**243**	**100.0**



European Sturgeon (*Acipenser sturio*)
Photo courtesy of Richard Lord, RL Lord@Sustainable Guernsey

Table 1. List of currently recognised extant Sturgeon species, together with summary details on distribution		
Common Name	**Species Name**	**Distribution**
European Sturgeon	*Acipenser sturio*	Eastern Atlantic, Mediterranean & Black Seas
Russian Sturgeon	*Acipenser gueldestaedtii*	Eurasia (Black & Caspian Seas)
Adriatic Sturgeon	*Acipenser naccarii*	Adriatic Sea
Ship Sturgeon	*Acipenser nudiventris*	Eurasia (Black & Caspian Seas)
Persian Sturgeon	*Acipenser persicus*	Eurasia (Caspian Sea)
Stellate Sturgeon	*Acipenser stellatus*	Eurasia (Black & Caspian Seas)
Sterlet	*Acipenser ruthenus*	Eurasia (Black & Caspian Seas)
Beluga	*Huso huso*	Adriatic Sea & Eurasia (Black & Caspian Seas)
Atlantic Sturgeon	*Acipenser oxyrinchus*	Western Atlantic (Hamilton River, Labrador, Newfoundland to NE Florida) & Eastern Atlantic
Shortnose Sturgeon	*Acipenser brevirostrum*	Western Atlantic (St John River, Canada to St Johns River, Florida)
Alabama Sturgeon	*Scaphirhynchus suttkusi*	Western Atlantic (Mobil basins in Alabama)
Pallid Sturgeon	*Scaphirhynchus albus*	Western Atlantic (Missouri & Mississippi)
Shovelnose Sturgeon	*Scaphirhynchus platorynchus*	Western Atlantic (Mississippi & Rio Grande)
Lake Sturgeon	*Acipenser fluvescens*	Western Atlantic (Great Lakes, Hudson Bay, Mississippi)
White Sturgeon	*Acipenser transmontanus*	Eastern Pacific (Alaska Bay to Monterey, California; landlocked Columbia & Colorado Rivers)
Green Sturgeon	*Acipenser medirostris*	Eastern Pacific (Aleutian Islands, Gulf of Alaska to Ensenada, Mexico)
Amur Sturgeon	*Acipenser schrenckii*	Asia (endemic to Amur River system)
Yangtze Sturgeon	*Acipenser dabryanus*	Asia (China, Yangtze River system & Korea)
Chinese Sturgeon	*Acipenser sinensis*	NW Pacific (China, Japan & Korea)
Sakhalin Sturgeon	*Acipenser mikadoi*	NW Pacific (Bering Sea, Tumnen River to N Japan & Korea)
Siberian Sturgeon	*Acipenser baerii*	USSR & Asia (Siberia: Ob, Irtysh, Yenisei, Lena & Kolyma Rivers)
Kaluga	*Huso dauricus*	Asia (Amur, Ussuri, Sungari, Zeya, Bureya basins)
Syr-Darya Shovelnose Sturgeon	*Pseudoscaphirhynchus fedtschenkoi*	USSR & Asia (endemic to Syr Darya basin of the Aral Sea)
Dwarf Sturgeon	*Pseudoscaphirhynchus hermanni*	USSR & Asia (endemic to Amu Darya & Syr Darya rivers)
Amu Darya Sturgeon	*Pseudoscaphirhynchus kaufmanni*	USSR (Amu Darya river)

pean museums, as well as the authenticity of many historical and anecdotal references.

Sturgeon in Irish Waters

For many years it was thought that Sturgeons were rare in Irish waters and that the only species recorded here was the European Sturgeon. This assumption was based on a paucity of records within the scientific literature. However, a recent review of Irish newspaper archives dating from 1738 yielded no less than 243 individual reports. It was clear from these reports that the landing of a sturgeon, particularly specimens of exceptional size, was considered to be a relatively rare event that generated media attention. Many of the reports were published by Dublin fishmongers who frequently claimed to be official purveyors of this exclusive product to the reigning monarchs and associated nobility (i.e. those who could afford to buy sturgeon), but they also invited the general public to gawk at the specimens in their premises.

Although the vast majority of sturgeon records from Irish waters date between 1840 and 1970, there is no reason to doubt that the species was just as frequent (if not more frequent) in its occurrence during previous centuries *i.e.* prior to the general availability of newspapers, journals and/or other popular magazines (Figure 2). The average weight of sturgeon increased significantly throughout the 19th century, from 67 kg during the period 1800-10 to a peak of 156 kg during the early part of the 20th century (1900-20). Although a reasonable number of sturgeons continued to be recorded in Irish waters up until the late 1960s, the average weight of sturgeons catastrophically collapsed to 37 kg during the 1930s and continued to decline thereafter to an average of only 11.5 kg during the 1980s.

The vast majority (73%) of sturgeons were recorded from Irish coastal waters, particularly from the Irish Sea [45%] (Table 2). Riverine specimens (27%) were mainly found in estuarine waters. The Rivers Shannon and Barrow / Nore / Suir accounted for almost 50% of the riverine specimens.

Although there is no direct evidence of sturgeon spawning in Irish rivers, there is some circumstantial evidence that they may have. Sturgeons have been reported from Irish waters during each month of the year, but the vast majority (75%) between April and August (Figure 3). Atlantic Sturgeons are known to spawn over an extended period (March – August) when water temperatures rise above 13°C. It also is interesting to note that the condition factor of Irish sturgeons gradually increased during spring and reached a peak during the summer and autumn (May to October) before declining again during the winter months (Figure 3). During June 1865, a female sturgeon weighing 114 kg was captured in the River Suir near Mount Congreve, Co. Waterford. It was reported that *'The amount of pea found in her was considered sufficient to populate the whole River Suir from its source to its mouth with sturgeon'*. During April 1944, a juvenile sturgeon weighing 0.5 kg was captured and released alive off Malahide, Co. Dublin. During the summer of 1955, an unauthenticated juvenile sturgeon was captured (and released alive) in an upstream tributary of the River Lee (near Lough Allua), Co. Cork. It is worth noting that the later specimen was captured during the period (1952-57) when two hydro-electric dams were being constructed on the River Lee.

Ireland's "Royal Sturgeon"

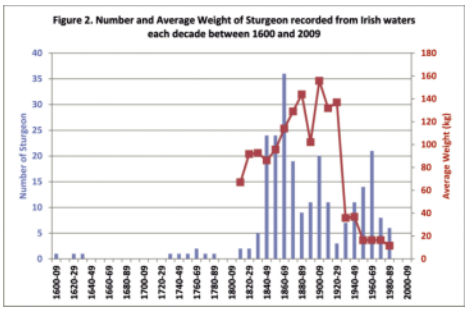
Sturgeons have long been regarded as valuable fish with noble status. Sturgeons are depicted on coins dating from 600 BC in Karthago (Tunisia). Aristotle (384-322 BC) mentions the use of isinglass for wine clearing. Ovid (43 BC – 18 AD) refers to sturgeons as noble fish in his '*Halieuticon*'. Pliny the Elder (23-79 AD) pointed out their importance in his '*Naturalis Historia*'. The need for sustainable management of sturgeon stocks was recognised during Roman times by limiting the minimum legal size as indicated by a marble plate of the fish located at the '*Forum Piscarium*' (fish market) in Rome. An Act of King Edward II (1307-1327) stated, inter alia, that *"the King shall have the wreck of the sea throughout the realm, whales and great sturgeons"* taken in the sea and elsewhere.

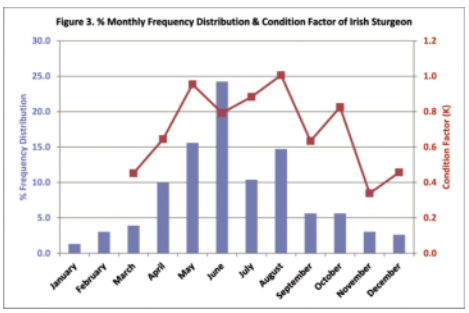
It is interesting to note the significant role which sturgeon have played in Irish political history. For example, during 1608, the last hereditary native chief of Inishowen, Sir Cahir O'Doherty (1587-1608), was insulted one day in a most open and wanton manner in the streets of Derry by the Governor of Derry, Sir George Pawlett (1553-1608). Incensed and outraged, Sir Cahir returned to his native wilds and after the manner of *Rehoboam*, sought the counsel of his chiefs. As it happened, a remarkably fine Sturgeon had just been caught (presumably near Inishowen) and Sir Cahir was advised by the elder and more peacefully disposed of his chiefs to send it as a peace offering to the Governor of Derry. This Sir Cahir did and it is obvious from the nature of the transaction that the Sturgeon was considered to be not only of high status, but also an eminently suitable political gift. However, soon after the Sturgeon was delivered, Sir Cahir sacked Derry and killed Sir Pawlett. Shortly afterwards, Sir Cahir was killed near Kilmacrennan by a counter attack under Lord Powerscourt.

In keeping with the spirit and tradition of King Edward II's edict, a number of Irish-caught sturgeon were presented to various nobility during the period when Ireland was under UK Rule, including Monarchs (e.g. Queen Victoria, King Edward VII & King George V), Peers (e.g. Sir Richard Boyle, 1st Earl of Cork), MPs (e.g. Daniel O'Connell, Charles Stuart Parnell & William Gladstone), Lord Lieutenants of Ireland (e.g. Archibald Montgomerie, 13th Earl of Eglington), and Governors of Northern Ireland (e.g. Earl of Granville, Lord Wakehurst & Lord Erskine of Rerrick).

However, despite having finally rid itself of UK Rule after the formation of the Irish Free State (*Saorstát Eireann*) in 1922, it is clear that some dithering elements within the newly fledged government continued to adopt 'Royal Rules' with regard to the legal beneficiary of Irish sturgeons. For example, in October 1929, General Risteard Mulcahy (Acting Lord Lieutenant of Ireland & Minister for Local Government and Public Health in the newly formed *Saorstát Eireann*) was presented with a sturgeon which was captured at Castlemaine, Co. Kerry. However, the following month (November 1929), King George V was presented with a sturgeon captured off SW Ireland, albeit probably because it was captured by a UK-registered vessel and landed at Swansea. Following the establishment of the *Republic of Ireland (Eire)* in 1937, 'Royal Rule' continued to be adapted and a small number of sturgeons were subsequently presented to several Irish Presidents (e.g. Sean T O'Kelly, Eamonn de Valera, Erskine Childers & Cearbhaill O'Dalaigh). However, in most cases, and in order to assuage any quasi Anglo-Irish scandal, the President usually discretely and generously donated the fish as a 'top-up' to some deserving charity.

Despite its royal status, the European Sturgeon is now considered to be critically endangered with only one small self-sustaining wild population left in Europe: River Gironde (France). Since the early 1990s, various international laws and conventions have undoubtedly taken precedence over King Edward II's 14th century decree, and any sturgeon captured are now required to be returned alive and unharmed to the waters where they were taken. The last known sturgeon recorded from Irish waters, weighing 10.5 kg, was captured off the Kish Lighthouse, Co. Dublin during April 1987 and sold on the Dublin wholesale market for €112/kg. Although a "kingly bite" was apparently offered to the President, this unique 'living fossil' was eventually served up by *'Whites on the Green'* (Dublin) to the last vestiges of Irish nobility and burgeoning Nuevo Hiberno-Gastronomes.





Atlantic Sturgeon (*Acipenser oxyrinchus*)
Photo courtesy of the Swedish Museum of Natural History.

Declan T. Quigley, Dingle Oceanworld (Mara Beo Teo), The Wood, Dingle, Co Kerry. Mobile: 087-6458485 Email: declanquigley@eircom.net

Publications of Interest

How Irish Scientists Changed the World

By Seán Duke

Londubh Books

www.londubh.ie

ISBN: 978-1-907535-25-3

Price: €14.99/2013

Ireland is famed for its writers, musicians and actors, yet the huge impact of its scientists from the 17th century right up to today remains a largely untold story. This book brings to life the lives and works of seventeen scientists "whose brilliance changed the world". It is written in a very accessible way, immediately giving the reader a sense of time and place in relation to each scientist. The book has four parts: Part 1: Maps, Earthquakes, Electricity and Climate; Part 2: Telegraph, Steamships, Submarines and Space; Part 3: Atoms, Radio, Pulsars and Spiral Galaxies; Part 4: Experiments, Evolution, Life and Logic. The first we are introduced to in Part 1 is Francis Beaufort (1774-1857) who became Chief Hydrographer (marine map maker) to the British Admiralty. Under his leadership their Hydrographic Office was built up into the world's leading marine map-making and meteorology centre. Today his name is linked with the Beaufort Wind Scale, a means of accessing wind speed, which is still in use. In Part 2, one of the scientists we meet is John Holland (1841-1914) from Co. Clare. We meet him in 1878 on the banks of the Upper Passaic River, New Jersey, as he launches his new invention - the submarine. Holland went on to design the world's first combat submarine for the US Navy in1900, sold Holland class designs to the British Navy and even built submarines in 1904 for the Japanese Navy.

In Part 3 we meet one of the more well-known scientist, The Wireless Wizard Guglielmo Marconi (1874-1937). Half Irish (his mother) and half Italian (his father), Marconi is considered the father of radio and was the first to transmit a wireless signal across the Atlantic. He was a joint winner of the 1909 Nobel Prize in Physics. In Part 4, among those featured is John Tyndall (1627-91), who was born in Leighlinbridge, Co. Carlow. He is considered the father of meteorology and climate science as he discovered the presence of greenhouse gases in the earth's atmosphere. He helped establish science as a profession rather than a hobby for wealthy amateurs and churchmen, as it had been considered up to the 19th century.

This is a fascinating book, with gripping accounts of these seventeen scientists. I would love to see young students reading it. I have no doubt it would inspire some to follow their dream whether in science or business. To a parent or grandparent put this book on your present list for a birthday or Christmas.

Heritage Bridges of County Cork

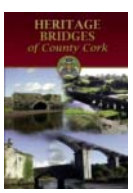
Heritage Unit of Cork County Council

www.skibbheritage.com/Shop.htm

ISBN: 978-0-9525869-6-8

Price: €14.00 /2013

Bridges are an integral part of our landscape and our daily lives. This publication on Heritage Bridges of County Cork sets out to convey to the reader the importance of bridges in the development of places from the earliest times, right down through the century. It discusses the general history, physical development, and environmental settings of bridges in Cork and then goes on to look at specific examples in more detail. Some of the basic characteristics of these 30 bridges are outlined and the way they have changed through time and evolved to meet changing demand has been examined. The first to be highlighted are the two simple Ballingeary Clapper Bridges in West Cork. Constructed from limestone slabs, the footbridges cross a silted up meander in the River Lee. My favourite bridges must be the ones at Lombardstown, Mallow, under which I canoed in the 50s and 60s. The most spectacular is the Ballydehob viaduct, a 12-arch bridge that crosses the mouth of Bawnaknockane River where it enters Roaringwater Bay. Beautifully illustrated, the book has numerous pictures, all showing the magnificent workmanship of the bridges, some over 200 years old. Space made it impossible to feature all the bridges in the county but we get a pictorial record of an additional 34 bridges at the end of the book. The Heritage Unit of Cork County Council has put a spotlight on the wonderful bridge heritage of Cork County. Perhaps they could encourage primary schools children and transition year students to document the bridges in their own localities. What a legacy that would be for future generations. The final sentence sums up the subject of the book beautifully: "Bridges are history and art, architecture and recreation, society and home, all in one."



Heritage Trees of Ireland

By Aubrey Fennell

Collins Press

www.collinspress.ie

ISBN: 978-1-84889-159-3

Price: €29.99/2013

The author of this book, Aubrey Fennell, is a tree surgeon who grew up surrounded by trees in the corner of an old estate in Co. Carlow where his family had a farm guesthouse. A visit to Mount Usher Gardens in Co Wicklow awakened his lifelong interest in naming and planting unusual trees. In 1997 he became aware of the Irish Tree Society and their shared passion. It was to be the beginning of a fifteen-year quest to try to hunt down and record the important trees in Ireland. Supported by the Society, the Tree Council of Ireland and National Botanic Gardens, he became a champion tree hunter and authoritative voice on behalf of the trees. During this time, he recorded over 10,000 champion trees in Ireland for the Tree Register of Ireland's database at the National Botanic Gardens. Now 150 of these remarkable trees are presented in this book, each photographed and with descriptive text - their historical background, measurement, location and accessibility. The book is divided into 12 sections including: Great Oaks, The Europeans, Scared Trees and American Giants. In the Great Oak section he has the Squire's Walking Stick at Tullynally Castle, Co Westmeath, the Turkey Oak of Ballymenoch, Holywood, Co Down, the Pumpkin Oak at Mote Park, Co. Roscommon and the twisted trunk of the Hanging Oak of Shane's Castle, Co. Antrim, which may be 400 years old. The Gormanstown Yew Cloister, Gormanstown College, Gormanstown, Co Meath, must be one of my favourites of the yews. In the 18th century Lord Gormanstown planted the yew walk. This was to represent the cloisters of a monastery and a beehive-shaped cell for contemplation. Read the text for the reason why he planted them! The most unusual photograph is a hawthorn - St. Kieran's Bush at Clareen, Co. Offaly. It is considered a sacred tree and is festooned with offerings and pieces of cloth tied to its branches. I cannot finish without mentioning the Golden Cypress at Church Cross, Skibbereen, Co. Cork. This is a tree I have passed many times in the past 40 years and one that I have always found fascinating. I am delighted to see it featured in this book. Put simply, it was hard to put this book down! An ideal present.

The Great Blasket (An Blascaod Mór) *A Photographic Portrait*

By Dáithí de Mórdha & Micheál de Mórdha

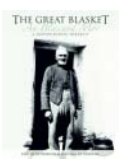
The Collins Press

www.collinspress.ie

ISBN: 978-184889-1753

Price: €24.99/2013

What a wonderful insight this photographic book gives of the people that lived on the Great Blasket Island. It has been written by Dáithí de Mórdha and Micheál de Mórdha from Dunquin, Co. Kerry, where the islanders settled after the evacuation in 1953. They developed a photographic archive at the Great Blasket Centre as an integral part of the social and cultural record of the lives of the islanders. A visitor Charles R. Browne took the first photographic record of the Blasket people in 1892. It was of three men, one of whom was Tomás Ó Criomhthain, then in his 40s. He was author of "The Islandman" which was his account of growing up on the island and its way of life, much of which centred on the sea. There are many photographs of the naomhóg (Currach), constructed of wooden ribs and covered with black canvas, and an integral part of the islanders' lives. This was the only way the islanders could travel to and from the mainland - for transporting their animals, going to Mass, collecting the doctor, the priest, a coffin when someone died - and above all they were used for fishing - their livelihood. A series of photographs show islanders preparing to lift a cow into a naomhóg to bring her to the mainland. The cow had horns and it reminded me of Michael Carney's wonderful book "From the Great Blasket to America, the last memoirs by an Islander" and how on a trip to the mainland a cow put its horn through the side of a naomhóg. Luckily they were saved by one of the boatmen putting his cap in the hole to stop water coming in. The conditions the islanders had to endure were dreadful. There are photographs of the pathway to the so-called harbour, with its little slip. At times it must often have been a difficult or impossible place to land. There it no doubt the State just paid lip service to improving conditions for the islanders and had little or no interest in their wellbeing.



There are over 200 photographs in this breathtaking book, with informative short text in both English and Irish. Peig Sayers, Tomas O Croimhthain, Muiris Ó Súilleabháin and Michael Carney, whose books are classics of life on the island, feature in a number of them. Schoolchildren outside their little school and portraits of many islanders show strong determined people. We see also throughout photographs of many of the islanders who emigrated to the USA. How they have adopted American style is fascinating - showing a totally contrasting way of life. Peig Sayers' beautiful daughter Neili, born on the island and then emigrated, looked so elegant in one of those photos. Yes, this book owes so much to the photographers that recorded moments in the lives of these resilient people.

Lough Hyne *From Prehistory to the Present*

By Terri Kearney

www.skibbheritage.com

ISBN: 978-0992624200

Price €37.00/2013

Lough Hyne is a saltwater lake situated 5km south west of Skibbereen in West Cork. This is the author's second book on the Lough, her first was a fascinating photographic book documenting the history of the Lough's scientific research, which in 1981 became Europe's first Marine Nature Reserve. Her latest book covers the Pre-history to the Present of the lake and the surrounding townlands. Chapter one brings one through the Stone, Bronze and Iron Ages. We learn that around 2000 BC the lake change from a freshwater to a saltwater lake. From analysis of pollen taken from the lake itself, there is clear evidence of human presence in the area at that time. A copper mine at Lick Hill, 1 km from the lake, though not been dated, is consistent with the type of fire-setting mining methods used in the Bronze Age. The number of sites of a ritual or religious nature within the 11 townlands around the lake are particularly high. These include cupmarked stones and cairns of the Bronze Age, an Early Christian ecclesiastical centre, holy wells, mass rock and a medieval church. An archaeological find places a Viking presence between 11th and 13th century.

Chapter Two focuses on The O'Driscolls. Between the 6th and 17th century they were one of the chief families of the region. We read of their rise in power and their spectacular fall in the 17th century. The next chapter on Pre-Famine Lough Hyne sets the scene for the most intriguing chapter in the book "The Great Famine at Lough Hyne". The devastation that the famine brought is shown in the population figures for the townlands from 1841-1911. In 1841 it was 1049 persons, by 1851 it had halved to 578 and by 1911 the population had dropped to 260. We read of the famine relief response in 1845 and 1846 within the Skibbereen Union. In responding, Charles Trevelyan, Head of Treasury in London, refused aid for the famine-struck country because he believed that the poor state of Irish society was a result of the moral failings of its people and that the Famine had therefore been sent by God. Some of the descriptions of what the poor people in the Skibbereen Union (including Lough Hyne) suffered were horrendous. A soup kitchen was established in Skibbereen and by early 1847 8,600 people per day were supplied with relief. Newspaper headings at the time include "Awful State of Skibbereen District - Destruction of the People - Famine, Disease and Death, "The Deaths from Starvation at Skibbereen". Evictions were everywhere. Just one townland alone in Lough Hyne - Highfield - saw 21 evictions totalling one hundred people. Yes, the Great Famine was a terrible period in Ireland's history and it is a credit to the author that she has documented this history for the Lough Hyne area so that it will never be forgotten. Other chapters in the book include the Ecology of Lough Hyne and its Marine Research there, as well as a Miscellany of stories from Lough Hyne, including its formation, set dancing, Lough Hyne schools and more. This book I so recommend if only to read about the effects of the Great Famine in the area, which is a micro for the country at large.

SALMON, PEOPLE AND PLACE

A Biologist's Search for Salmon Recovery

A review by Matt Murphy

IN 1990 we at Sherkin Island Marine Station organised a three-day international workshop, inviting ten fish biologists from Ireland and overseas to discuss "The Effects of Stocked Salmon and Cage Escapees on Resident Wild Salmon Stocks". We published the concerns and recommendations from the workshop and 23 years on they are still relevant. One of the invited biologists was Jim Lichatowich, a habitat fish biologist for the Jamestown S'Klallam Tribe, a Native American tribe from the Olympic Peninsula in Washington State, USA. His then job was to check on logging operations across the northern Olympic Peninsula as part of Washington State's Timber, Fish and Wildlife Program. He, along with other Tribal and State biologists, reviewed proposed timber harvests and recommend measures to protect stream habitats.

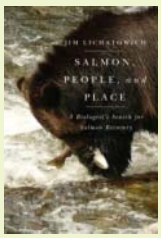
In informal chats during Jim's stay at the Marine Station, he told me of the damage done by clear cut logging of vast forest areas in the Peninsula by multi-national companies and how it had destroyed the salmon habitats in many streams. I soon learned that Jim had no hidden agenda, his only concern was the future of the Pacific Salmon. Over the next few years we published 17 wonderful articles written by Jim on the Pacific salmon and trout, with such titles as "The Value of a Single World Fish", "It's the Economics, Mr. President", "A Question of Values".

In 1993 I was privileged to visit this remarkable man and his beloved wife Paulette in the Olympic Peninsula. There I saw for myself the horrendous damage done by clear cut logging. One day we stood on high ground and for miles around us we saw vast areas of desolate hillside divested of trees. I wondered then who was more in the wrong, the logging company or the State of Washington that gave them the permission to do such a clear fell. Near Jim's house, outside the city of Sequim, the forest was untouched. There old trees abounded and to just touch them was a miracle in itself. During that visit I learned more and more about this extraordinary man who from his earliest days as a biologist has dedicated his life to protecting the Pacific salmon.

Images by Matt Murphy

Jim Lichatowich in 1993.

A stream near Jim's former home on Washington's Olympic Peninsula.



Salmon, People and Place
A Biologist's Search for Salmon Recovery
Price: US$22.95
ISBN: 978-0-87071-724-6
www.osupress.oregonstate.edu

Jim has written two books on the subject: the first in 1999 *Salmon without Rivers – A History of the Pacific Salmon Crisis*. It includes the evolutionary history of the salmon, the destruction of the salmon's habitat, the development of the commercial fishery, the salmon canning industry and the History of the Salmon hatcheries. The latest book *Salmon, People and Place – A Biologist's Search for Salmon Recovery* has recently been published in the US by Oregon State University Press. The story of this new book is in two parts: Part 1 has four chapters that describe the Pacific salmon's problem, what is preventing salmon recovery and why the billions of dollars spent on wild salmon restoration programmes have not been effective. Part 2 describes what needs to be done to remove the impediments to salmon recovery.

The book draws on his experiences throughout his career. Scientists and bureaucrats will find his commonsense hard to take. In his chapter on The Meeting, he talks of attending a meeting concerning the salmon on the Columbia River. He said "I've been listening for forty five minutes and the word salmon is not among those being carefully released into the room. The talk is about budgets, authorities, future funding, and who should have a seat at the table. Those subjects are important to the institutions these men and women represent and they must believe they are also important to the salmon, but I have my doubts."

He addresses recovery plans for the salmon. About ninety years ago the first plan for Pacific Northwest was produced. Ever since a recovery plan has been part of salmon management. He suggests that given the number of recovery plans produced one could conclude that the Pacific Salmon is the most restored species group in the world. Obviously he says most of these recovery plans failed to achieve their goal. From his experience of reading past and present plans he asks five questions that each new plan must answer. Did the author:

- demonstrate that they understand what actions were proposed in the earlier recovery plans for the same or similar salmon populations and watersheds?
- explain why the earlier recovery actions either succeeded or failed?
- describe how their plan will avoid the mistakes and failures of the past?"
- show that the agency has an organisation structure capable of implementing all the elements of the plan?
- describe who is responsible for carrying out all task and how their workloads would be shifted to accommodate the new duties?

The chapter "A Look at the Year 2150" he takes an imaginary journey forward a hundred years in time and thinking about what he might find. His fishing companion is Charlie, his great, great, great... grandson and they set out to visit the Ben Franklin Regional Water Centre on the river Columbia as he is really anxious to see the river. It was a special part of his entire life, it was a friend and a refuge where solitude and contemplation came easy. As they drive he sees familiar signs in the landscape that signal the approaching river, but the river is not where it should be. They arrive at the Water Centre and then when they enter the main buildings with its series of displays and brief film they learn the river and other rivers do not exist. They were replaced by "an efficient, engineered water capture and delivery system". The full story makes stark reading. Will it happen? More probable than possible with man's lust for water. Then ask yourself could a similar centre evolve here in Ireland in the year 2150?

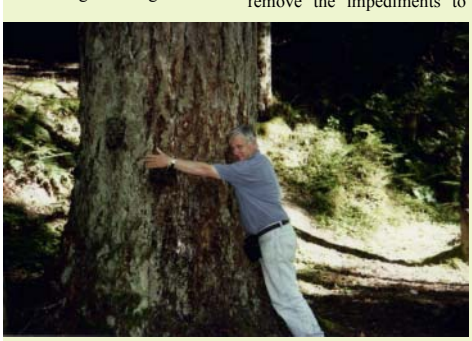
Jim is very critical of hatcheries. He calls them fish factories and states that "the ecological costs for each hatchery should be assessed using information currently in the literature, applying it to specific hatcheries with conservative assumptions and analysis. This should include some of the following steps:

- Quantify risks to wild populations for all hatcheries. Describe the acceptable tradeoffs in natural production and the monitoring program that will ensure the tradeoffs will not be exceeded.
- The impacts of hatchery programs should be reported as life stage survival rates of affected wild populations.
- Each year determine the cost to produce a harvested fish from each hatchery program and provide that information in a form accessible to the public.
- Adopt a stock transfer policy that prohibits moving fish and eggs between watersheds.
- Use the latest scientific information regarding hatchery impacts on wild salmon to develop a set of standards for hatchery operations. Those hatcheries that cannot meet the standards within three to five years should be closed. The standards should be peer reviewed before implementation."

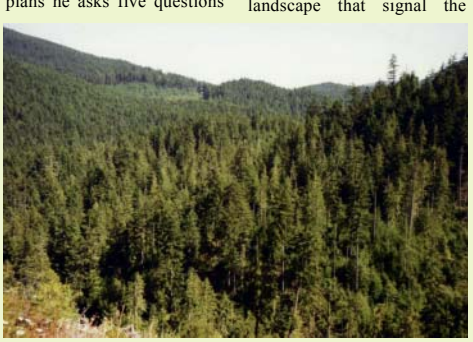
All those that have an interest in the well-being of wild salmon must read this book. It is hoped that by doing so they will take an objective look at where they stand in their work with wild salmon. Many will have to change their thinking if the wild salmon is firstly to survive and then prosper. That could be the hardest challenge as so often scientists, administrators and anglers believe they will lose face if they change their viewpoint. If they do not then Jim's chapter "A Look at the Year 2150" will become a reality. This is an incredibly important book; it is a classic and will become the reference on wild salmon for many decades to come.

Jim Lichatowich is a unique fish biologist. Above all he is a naturalist and follows in the footsteps of Aldo Leopold whom he describes as "one of the most influential spokespersons for conservation". Leopold's book "A Sandy County Almanac" (1966) has inspired Jim Lichatowich throughout his career.

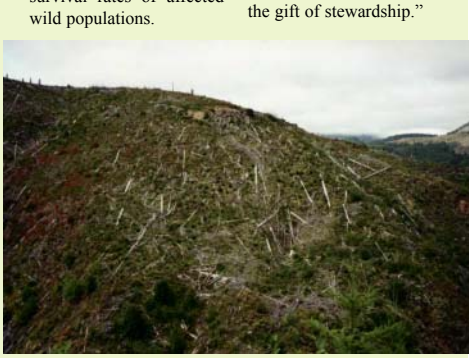
Finally let us ponder on these words from his book: "We enthusiastically accept the gift of salmon, but failed to treat it with the respect it deserves. We failed to meet our obligation to return the gift in the way that only humans can. We failed to return the gift of salmon with the gift of stewardship."



Matt Murphy in 1993 showing the girth of one of the magnificent trees in the Olympic Peninsula.

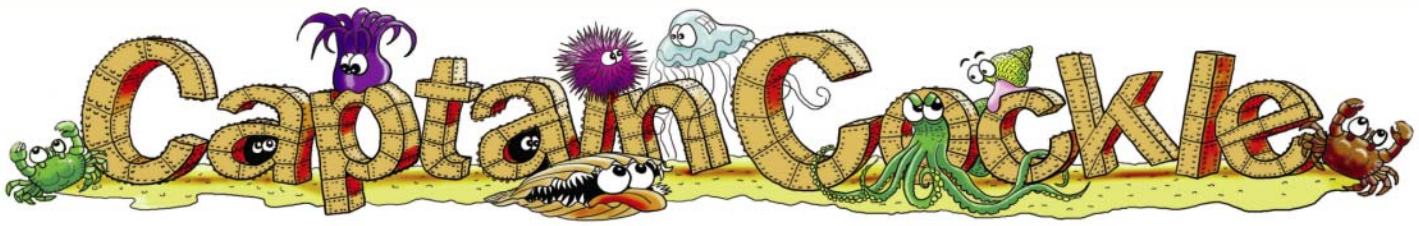


The vast forest landscape of the Washington's Olympic Peninsula.

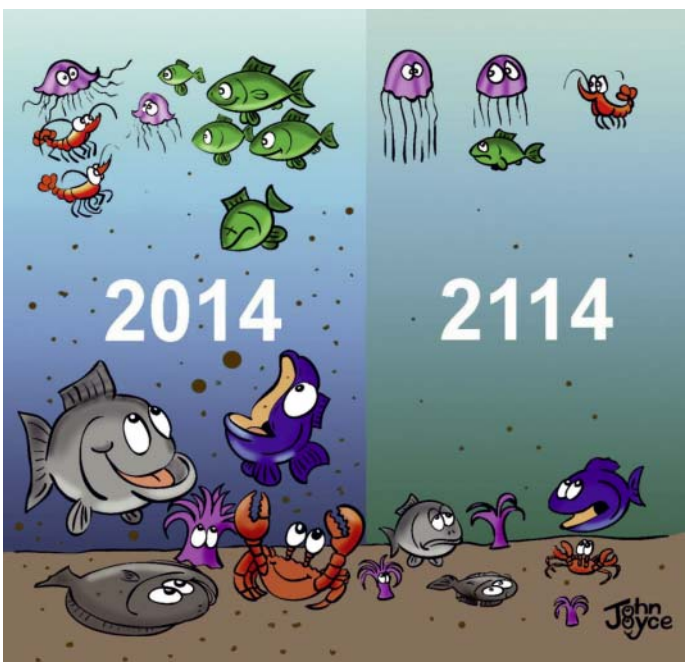


Clear cut logging in 1993 on the Peninsula, a practice which had destroyed the salmon habitats in many streams.

JUNIOR PAGES



Major Reductions in Seafloor Life Predicted



Marine life living on the sea floor of the Atlantic could decline by as much as 38% over the next hundred years, according to a new international marine study, carried out by the National Oceanographic Centre in Southampton, UK and other partners. The study suggests that this reduction could be driven by the effects of climate change, including reduced ocean circulation and the creation of a warmer, less salty layer of seawater near the surface. This would reduce the number of animals and plants that live in shallower waters, which would also reduce the amount of food reaching the animals at the bottom.

Dr. Daniel Jones, who led the study said, "We were expecting some negative changes around the world, but the extent of changes, particularly in the North Atlantic, were staggering. Globally we are talking about losses of marine life weighing more than every person on the planet put together."

Changes such as these may not take place all over the world, but most oceans will be affected in some way. It is estimated that all key marine habitats - from coldwater coral reefs, to seamounts and submarine canyons - will experience losses in the numbers of animals and plants living there. The research also predicts that marine animals living on the bottom of the sea will become smaller due to lack of food. This will have an impact on seabed fisheries and marine ecosystems as a whole.

The study was carried out as part of the Marine Environmental Mapping Programme (MAREMAP) and involved researchers from the National Oceanography Centre, the Memorial University of Newfoundland, Canada, the University of Tasmania, and the Laboratoire des Sciences du Climat et de l'Environment, France.

For detailed information see: http://noc.ac.uk/news/major-reductions-seafloor-marine-life-from-climate-change-2100

by John Joyce

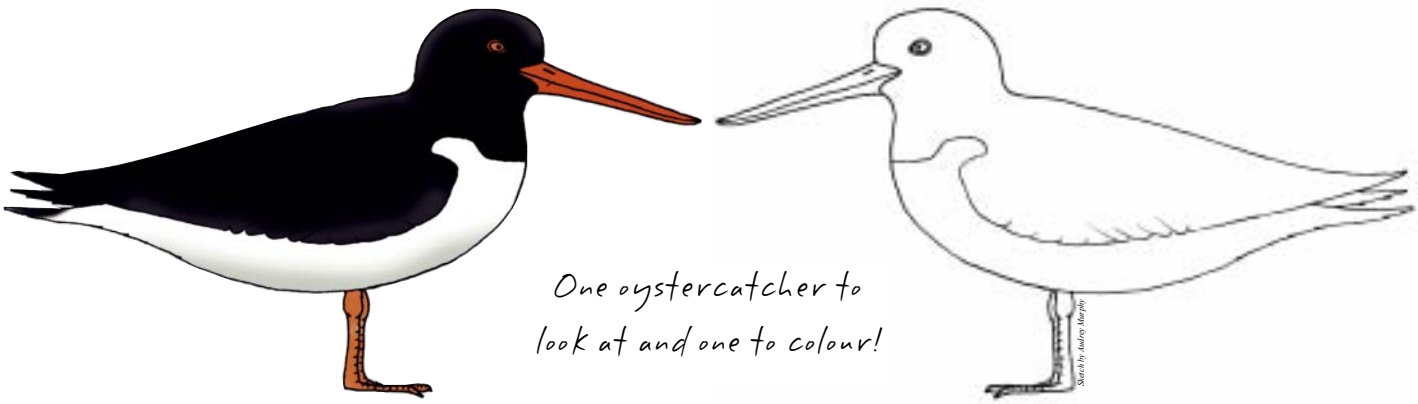
For more Fun Facts check out www.spindriftpress.com

Mesolithic Marine Tours?

Evidence that humans undertook sea voyages of up to 40 miles as long ago as 700,000 years ago has been discovered on the island of Crete, off the Greek mainland in the Mediterranean. While Crete has been separated from mainland Europe for about five million years, stone axes and other tools dating back to between 130,000 and 700,000 years have been discovered close to shelters on the island's south coast. Previous evidence of open-sea travel in Greece dates back 11,000 years and, worldwide, to around 60,000 years, although these figures have been disputed.

Meanwhile, the world's oldest surviving sea-going boat was discovered in Dover, UK, in 1992 and is estimated to be some 3,500 years old - when Stonehenge was still in use and when Tutankhamen was still the ruler of Egypt. A team of workers are currently building a half-size replica of the oaken boat and plan to demonstrate how it could have been used to cross the English Channel.

OYSTERCATCHERS



One oystercatcher to look at and one to colour!

Sketch by Audrey Murphy

Scientific Name: *Haematopus ostralegus*
Irish: Roilleach

The oystercatcher is a wading bird that usually gathers in large, often noisey flocks on rocky and sandy shores and on mudflats. Resident in Ireland all year round, it is also a winter visitor from Iceland and the Faeroes. Its black and white plumage, orange beak and reddish-pink legs make it very easy to identify. The strong bill digs deep for worms and it is able to open shells, either by hammering them or prising them open.

To build a nest the female oystercatcher lines a scrape in the sand, gravel or grass with shells and pebbles. If danger approaches the nest and young, the oystercatcher flies around drawing attention to its self by calling loudly to distract the predator away.

Fact File

Colour: Black and white plumage, pink legs, long orange bill, red eyes with an orange ring around them.
Length: 39-44 cm
Diet: Worms and shellfish such as mussels.
Habitat: Flat beaches, estuaries, coastal farms and fields.
No. of eggs: 2-3

DO OYSTERCATCHERS CATCH OYSTERS?

With such a name, you would think that oystercatchers are eating oysters all day, everyday. But that is not so. Oysters do not normally form a large part of their diet as the oyster's shell is extremely difficult to prise open.

Photo courtesy of Robbie Murphy

Large numbers of oystercatchers can be seen in Ireland from September to March, on all coastal habitats.

How much do you know about... Flowers

How much do you know about flowers? Find out with this fun quiz. Choose one of the answers and see how many you can answer correctly.

1. When is the snowdrop most likely to appear?
a. In Winter
b. In late Spring
c. In Summer

2. Which flower has five yellow petals?
a. Buttercup
b. Daisy
c. Heather

3. The seedhead of which flower is thought to tell the time?
a. Primrose
b. Dandelion
c. Rose

4. The thistle is the symbol of which country?
a. Ireland
b. England
c. Scotland

5. Which of these flowers grows from a bulb?
a. Daisy
b. Daffodil
c. Honeysuckle

6. What flower is named after the German botanist Leonard Fuchs?
a. Forget-me-not
b. Fuchsia
c. Foxglove

7. What flower is usually given as a symbol of love?
a. Nettle
b. Dandelion
c. Rose

8. Pick a tree that has beautiful flowers in spring:
a. Apple
b. Sycamore
c. Oak

9. Which of these flowers belongs to the pea family?
a. Water Lily
b. Sweet Pea
c. Bluebell

10. What liquid in flowers attracts bees?
a. Nectar
b. Water
c. Milk

11. Which flower grows the tallest?
a. Primrose
b. Bluebell
c. Foxglove

12. Which one of these flowers prefers to grow near the sea?
a. Sea Holly
b. Wood Avens
c. Marsh Marigold

13. Which animal does not feed on flowers?
a. Butterfly
b. Crocodile
c. Bee

14. How many petals has the daisy flower?
a. Four
b. More than 10
c. Two

15. What is a person that studies flowers known as?
a. Carpenter
b. Artist
c. Botanist

16. Which one of these flowers has spiny leaves?
a. Buttercup
b. Thistle
c. Daffodil

17. Which flower is also part of your eye?
a. Iris
b. Lily
c. Tulip

18. What is the flower in the picture called:
a. Sweet pea
b. Tulip
c. Heather

19. What would help a wild flower last longer:
a. Trampling on it
b. Picking it
c. Photographing it

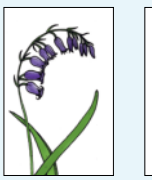
20. Which flower name is used as a girl's name:
a. Foxglove
b. Dandelion
c. Rose

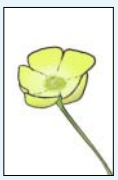
Answers on page 31.

Sweet Blooms

All the flowers below are mentioned in the quiz on page 28. Can you find them in the wordsearch?
Answers on page 31.

N	X	R	Q	I	X	X	Q	C	F	V	V	F	T	C
Q	B	D	F	K	Z	N	L	D	U	T	U	O	R	H
E	U	W	L	W	Q	O	F	G	K	B	N	T	D	E
I	T	S	T	L	V	O	B	P	F	E	E	I	V	A
H	T	T	E	E	E	B	Y	W	M	P	P	D	C	T
E	E	X	R	F	Y	B	U	T	Q	T	E	Q	O	H
V	R	R	Q	H	O	N	E	Y	S	U	C	K	L	E
O	C	Z	B	G	U	G	X	U	I	W	L	Z	O	R
L	U	F	L	R	R	N	O	I	L	E	D	N	A	D
G	P	G	U	O	O	Z	H	D	T	B	B	Q	R	K
X	H	O	F	C	K	B	F	I	K	D	J	A	Z	Q
O	L	K	N	E	H	K	E	Y	S	I	A	D	V	G
F	I	M	N	V	Z	S	O	R	E	J	X	L	B	P
A	Z	Z	D	K	T	A	I	H	T	K	Q	A	U	W
P	R	I	M	R	O	S	E	A	X	P	Y	R	O	L

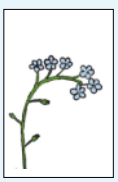

Bluebell


Buttercup

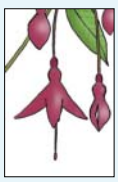

Clover


Daisy

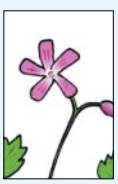

Dandelion


Forget-me-not

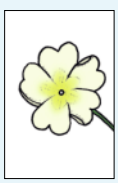

Foxglove


Fuchsia


Heather


Herb Robert


Honeysuckle


Primrose

GAISCE – the President's Award and Brú Youth Service

Images courtesy of Gaisce – the President's Award

President Michael D. Higgins presented the first three youth members of the Brú Youth Service with their "Gaisce Gold" awards on 11th February 2014.

By Jody Garry

IN 2008, when the Brú first opened and new groups were being established, we had three young people who were pro-active, committed and showed great potential to be young leaders in our developing youth service. The group decided to take on the challenge of doing 'Gaisce - The President's Award - Bronze Level.' The young people needed to commit time to a 'personal challenge, community involvement and physical activity' as well as completing a 25km hike. The young people and youth worker took on the challenge. There was no certainty from youth workers whether we would run the programme again, it was quite simply a challenge which we decided to give a go.

What emerged from that programme surpassed any expectation that the youth worker could have had. A number of intended outcomes came from the process, such as something positive to put on the CV and young people completing a full programme. However, it was the unintended outcomes that were quite astounding. The three young people, through the Gaisce Award became really involved and present in the youth service. Their level of commitment to the award, the shape they helped to put on our new youth service and the leadership they displayed to other young people that attended the youth service was incredible. The achievement and pride that both young people and youth worker felt at the completion of the project was infectious. It led the three young people going on to sign up for Gaisce Silver and left other young people in the Brú asking 'When can I sign up to do my Gaisce.' Being involved in this programme became equated with being respected within the youth service, a young leader and being involved in worthwhile and interesting programmes.

Now, in 2014 we have had our biggest achievements to date, the first three young people who set out to get their Gaisce Bronze in 2008, this year, completed 'Gaisce Gold', which is the highest award that can be awarded to any person in the country. This award was presented to our three young people by President Higgins on the 11th of February 2014 in Dublin Castle. All three young people are currently in third level education, are extremely active in the community through sports coaching and the volunteering in the Brú Youth Service. They are a credit to themselves and are leaders in our community rather than followers – it is a fantastic thing to role model to many vulnerable young people who attend the Brú Youth Service. Anything can be achieved with hard work and commitment. The level of reflection that has developed by the young people which was displayed in their portfolios for Gaisce Gold was incredible.

To date we have had 32 young people complete the Gaisce Bronze Award, 7 young people achieve their Gaisce Silver Award and have over 20 young people who are currently signed up at various levels of the award. Some of the activities we have worked on across the categories are included in the table (right).

What the above displays, is that in youth work, you can tailor a programme to fit the group that you are working with and their needs. 'Gaisce' within a youth service is often run differently than how a school might approach it. In a school the young person may go away and individually complete the various aspects of the award. However, in a youth service we pitch our programmes at groups of young people. In working on the projects in a group the young people have peer support and the support of a youth worker to fulfil the aspects. We meet with these young people typically twice- three times a week to fulfil aspects of the categories below. It allows the youth worker to challenge the young people to take on a project that they may have been reluctant to join in on. Young people are more open to doing it, if they feel that it also goes toward a personal achievement like the Gaisce.

Many youth services are worried that the Gaisce is too time consuming, challenging and will mean having to make a programme fit the young people, thus not meeting their needs. However, the beauty of Gaisce to a youth service is the flexibility of the programme. Youth workers are very skilled in developing new and unique programmes for their young people. For each group they can tailor make the programme to fit into the above categories, such as the 'personal development group' as outlined above. The programme can also help you strengthen your relationships in the community as you can approach volunteers, artists, film editors and community sports officers to aid you in developing elements of the programme.

I personally could not praise the award enough in setting challenges for the young people. Also, many of the young people we work with could not afford financially to go off and pay for the various elements of the award if they were doing it individually, such as 'guitar lessons' in the personal element or the overnight hike. However, doing the award as a group allows young people to do the award without any financial barriers or worries to participation.

Jody Garry, Youth Worker in the Brú Youth Service, Crumlin, Dublin.

For information on Gaisce - The President's Award see www.gaisce.ie

Personal Skill	Community Involvement	Physical recreation
Cooking and baking **First Aid** **Youth Leadership Programme** **Personal Development Group;** eg. 5 weeks sexual education, 5 weeks drugs and alcohol awareness, 3 weeks self esteem and identity programme. **Guitar Lessons** **Conflict Resolution** **Copping On** - Crime and anti social behaviour programme **Film Making**	**Localise Community Project** In this project the young people reflected on the needs of their community, deciding to focus their project on the elderly. The young people then organised the quiz, made a menu, made each elderly person that attended a gift to take home and managed a budget for prizes etc, as well as decorating the room. **Community Drama** **Community Art Projects-** Identity Project- how does the community view young people and how can art challenge those stereotypes and show young people in a more positive light. **Equality Programme –** Educational programme looking at global and local inequality through group work, activity sheets and popular culture, such as photographs, music and you tube clips. **Volunteering in Youth Club with younger age group** **Brú Le Cheile- Youth Forum**	**Girls Fitness Programme-** (Supported by the community sports officer) 4 week taster in Zumba, 4 week taster in self defence, 5 weeks of boxercise **Boys Fitness Programme-** (Supported by the community sports officer) 5 weeks BMXing, 5 weeks fencing and 4 weeks self defence) **Walking group** **Camogie** **Football** **Swimming** **Teen Gym** (Supported by the Community Sports Officer)

Some activities worked on across the categories

STAMP COLLECTING

By Matt Murphy

IN Ireland today you rarely hear of anyone collecting stamps. I started to collect them when I was a young teenager. I had become curious about them when my Mum told me that her father was a collector when he was young. Unfortunately my grandfather's collection was lost when he moved house but I soon began to build my own collection. It started when I got presents of a few pence. I would visit Woolworths in Patrick Street in Cork City, which had part of a counter devoted to stamps. Having purchased packets of 25 or 50 different stamps from around the world, I couldn't wait to get home to look through them. Of course they were of little value but I got great satisfaction separating the stamps into different countries. I would then carefully mount each stamp with a special stamp hinge and place into a small album. Each page in the album was devoted to three or four countries. As an altar boy at the nearby Dominican church, I began to ask some of the priests to help me collect foreign stamps from the letters they received from fellow priests in foreign countries, especially Trinidad and Tobago. This helped to build up my collection. I also continued to save what money I could and bought more stamps. My great joy was when I won a beautiful stamp album as a prize. I got it for having collected the largest amount of money for the Christians College Newboy's Club annual flag day one Saturday in Cork City. I continued to collect into my early 20s, which by then the stamps fitted into a number of albums and to this day, at nearly 80 years of age, I still have my collection.

Some Canadian stamps I collected in my youth.

What people might not realise is that over 20 million people collect stamps. It is one of the most popular hobbies in the world. Some collect a single country such as Ireland, Great Britain, USA or Australia. Others collect stamps with themes: you can collect the flora and fauna of the world on stamps, or even flags, islands or railways. Some collect Irish First Day of Issue Covers (these specially produced for collectors by An Post on the first day a stamp is shown to the public). If you visit An Post's website www.anpost.ie you can see the various types of stamps they produce and various items produced especially for stamp collectors. You don't have to spend a lot of money collecting stamps. Ask family and friends to keep unusual stamps they receive on letters. An Post produce beautiful stamps that can be purchased at the post office. You could then research the subject of the stamp and write a short note about each one. The web is a great place to learn about stamp collecting (the official name is Philately) and about the various themes they feature. Every year An Post issues a number of commemorate stamps on some person or event. This year they will include the poet Seamus Heaney, Viking Heritage and World War I (1914-18).

I found stamp collecting taught me a lot about geography. Collecting stamps from each country made me keen to learn where in the world these countries were located. Every now and then I take out my stamp collection and see that many countries or territories have had their names changed or have merged with other countries e.g. Newfoundland, New South Wales, Zanzibar, Transylvania. Though I still collect Irish stamps only, I cherish the stamp collection of my teens and early 20s. It is a hobby I never regret having started and if you start one, it will give you a lifelong interest every time you see a letter arrive in the post!

Matt Murphy, Director, Sherkin Island Marine Station, Sherkin Island, Co Cork.

FREE Stamps for Young Collectors

I get great enjoyment from the wonderful hobby of stamp collecting and would love to see young people become collectors. Padraig O'Shea of Raven Stamps in Cork City (www.ravenstamps.com), the largest stamp dealer in Ireland, has kindly given *Sherkin Comment* 10 sets of 200 different world stamps so that you can start your new hobby. The first 10 requests by postcard, letter or email will receive a set (limit of one request per family).

ANSWERS FROM PAGES 28 & 29:

HOW MUCH DO YOU KNOW ABOUT FLOWERS: (1) a. In Winter; (2) a. Buttercup; (3) b. Dandelion; (4) c. Scotland; (5) b. Daffodil; (6) b. Fuchsia; (7) c. Rose; (8) a. Apple; (9) b. Sweet Pea; (10) a. Nectar; (11) c. Foxglove; (12) a. Sea Holly; (13) b. Crocodile; (14) b. More than 10; (15) c. Botanist; (16) b. Thistle; (17) a. Iris; (18) b. Tulip; (19) c. Photographing it; (20) c. Rose.

SWEET BLOOMS: (Over, Down, Direction) Bluebell (11,10,NW); Buttercup (2,2,S); Clover (9,1,SW); Daisy (13,12,W); Dandelion (15,9,W); Forget-me-not (4,11,NE); Foxglove (1,13,N); Fuchsia (3,9,SE); Heather (15,2,S); Herb Robert (1,5,S); Honeysuckle 95,7,E); Primrose (1,15,E).

Giving Rivers Back to Nature

By Mike Ludwig

IN an age when possessing renewable energy generation sources such as hydroelectric are desirable and suitable sites are in demand, the US is undertaking the most extensive dam removal program ever attempted. Why? Because in most instances dams create adverse impacts to riverine systems and aquatic resources not only obstructing fish movements but altering habitat in their pools and the natural channels above and far below their location. Many of the dams along our nation's waterways no longer serve the purposes they were built to provide. Anadromous fish and catadromous eels are the most obvious benefactors on dam removal but we are finding entire waterways as well as their surrounding uplands (catchment area) benefit from a naturally flowing system. Yes, some of the dams being removed are safety risks due to their age and condition, others are simply not profitable to run for hydroelectric generation, and others have been abandoned by industries that have closed or relocated. Other dams have had their operations diminished by sediment filling the storage pool and their power generation limited to the flowing water. But, some dams are just not "right" for the site and their impacts are potentially reversible.

Today we are revisiting some of the dams that are not contributing to our energy, water supply or flood protection and removing the destructive and unnecessary ones. The goals of these removals are almost as plentiful as the dams themselves. They include removal of outdated and unsafe dams; restoration of access to former spawning and nursery grounds; restoration of natural sediment transport to replenish sand on coastal beaches and reduce beach erosion; improving habitat below the dam; and improve habitats for wildlife in general. Invoking these objectives is a critical component in the negotiations leading up to a dam removal. If the benefits of removal are undefined there is less interest in removing a dam.

The history of dam construction in the US is one in which the environmental consequences of the installation were often ignored or minimized for the sake of the "greater good" of the community or owner. The earliest dam installations were often driven by the simple and single fact that the site possessed attributes that colonial technology could capture and use for its benefits. As a result the anadromous Atlantic salmon spawning in the Connecticut River was ended by poorly considered dams placed at Hartford, Connecticut. However, not all of the Colonist's dam sites were environmentally destructive. In coastal New England, especially where tides are large, we can still see the remnants of tidal power projects where the incoming tide was captured and allowed to flow out through a mill. These systems allowed finfish and shellfish to flourish in the dammed tidal waters creating early forms of aquaculture. For the Tennessee Valley Authority (TVA), created in 1933, their dams on the Tennessee River in Tennessee and Kentucky are a part of a very successful effort to bring regular flooding under control and ensure use of important farm land on the river's floodplains. Another benefit of the TVA dams was the use of the captured water to generate electric power for rural Americans living in the catchment area.

Our dams have cumulatively degraded thousands of miles of natural riverine habitat. Many think it is time to release these captured rivers and return them to their natural conditions (perhaps not exactly like they were originally, but in a close approximation and with some necessary constraints). For instance, on the east coast, the removal of the Great Works dam will kick off a larger effort to improve aquatic resource and recreational access to nearly 1,000 miles of Penobscot River system habitat in Maine. On the west coast, the 106-foot high San Clemente Dam removal and Carmel River Reroute Project is the largest restoration projects on the West Coast. When complete, the dam will be gone and twenty-five miles of watershed restoration should restore life within and along the Carmel River.

With any dam removal project one of the most difficult issues is determining what to do with the sediment which has accumulated behind the dam. Not all of the choices have been wise. Much of the Polychlorinated biphenyls (PCB) problem in the Hudson River came about as the result of a poorly considered dam removal decision by its owner and not involved in the pollution problems. At the San Clemente dam it is estimated that there are 2.5 million cubic yards of sediment behind the structure. That sediment would be of immense value to the eroding beaches at the mouth of the Carmel River but relocating it from the former dam pool is impractical. However, in the future, sediment in Rivers like the Carmel and Penobscot will be transported again to sand starved coastal beaches after supporting aquatic life in the waterway.

Image courtesy of NOAA

San Clemente Dam on the Carmel River, California, USA.

Dam removal has many restoration attributes for natural systems long disrupted for reasons that may no longer be valid.

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