SHERKIN COMMENT

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& The Environment

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An aerial view of Cork Harbour.
Photograph © Port of Cork

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Editorial

The Bottled Water Dilemma

By Matt Murphy

IS BOTTLED water a fad, a necessity or a luxury? People are paying between 1,000 to 10,000 times more for bottled water than tap water and huge global multi-national companies are currently making billions of euros on water that they simply extract from the ground and bottle.

At present in the US there is growing opposition to bottled water. The annual statistics for bottled water in the US show $15 billion sales, with the average person drinking 30 gallons (115 litres) of bottled water annually. There, 40% of bottle water comes from public water supplies according to a National Resources Defense Council Study. Some 90 US colleges and universities have banned, or are about to ban, the sale of bottled water on their campus. They include the Universities of Washington, Vermont and Harvard School of Public Health. Some universities issue reusable bottles to students to fill their own from tap water sources on campus. At least 4 major US municipalities, New York, Seattle, San Francisco and Chicago's Cook County have banned the use of government money to purchase bottled water.

The amount of crude oil needed annually to produce and transport the over 50 billion plastic bottles is 40 million barrels. This is enough to keep 1.5 million cars on the road for one year. Unfortunately, just 25% of these 50 billion empty bottles are recycled, with over 75% of them ending up in landfill, lakes, streams and oceans and take many years to decompose.

The only country where bottled water consumption is declining is Australia, where the percentage of people drinking it has reduced from 26% in 2007 to 23% in 2011. A recent survey has also found that it is the younger age groups that are leading the way by saying "no" to bottled water. Like in the US, some Australian colleges, universities and public buildings in towns have banned bottled water.

All that brings us to Ireland where bottled water consumption is increasing. The average person now drinks nearly 50 litres of bottled water – much of which is imported into the country. The total sales have reached a staggering figure of over €300 million.

For what reasons do people purchase bottled water when we are assured by the EPA and local authorities that our tap water is safe to drink? There may be several reasons for this, such as:

- The poor taste of the water.
- A fear of disease.
- The convenience, easy to carry around.
- A lack of information from the local authorities as to the quality of tap water.
- A lack of drinking fountains in public areas.
- Effective advertising by the major bottled water companies.
- A fear of pollution in rivers and lakes – the source of most drinking water.
- A lack of confidence in the water suppliers.
- Fluoride in the water.

There is no doubt that incidents such as the Cryptosporidiosis outbreak in Galway City in 2007, the number of boil water notices in place in recent years and the number of water supplies that were adversely effected by high rainfall events, may have all dented the general public's confidence in the quality of their tap water. But do we really know why so many people are buying bottled water in this country? Should we find out and have the reasons addressed? Who should do this?

Here in Ireland the authority that supervises our public drinking water supplies is the Environmental Protection Agency (EPA). It has the power of enforcement to ensure that action is taken where the quality of public drinking water is not up to standard. In its most recent report "Provision & Quality of Drinking Water in Ireland 2010" it states that each year it collects and analyses over 250,000 monitoring results from Water Services Authorities for all drinking water supplies. The safety of the water supplies is determined by comparing the results of monitoring tests carried out on 945 public water supplies, 671 group water schemes, 497 private group water schemes and 1284 small private supplies with the drinking water standards.

It also carried out audits of drinking water treatment plants – 83 were carried out in 2010 and found improvements across all key indicators examined, with the exception of source protection and reservoir security (e.g. river/lake pollution), which were identified as areas for further improvement. The report also points out that "source protection is the first barrier for the protection of safe drinking water quality". In 2010, the EPA issued nine legally binding directions to seven local authorities that they must undertake proper security to improve the relevant public water supplies.

The report is critical in that only half of the Water Services Authorities (19) are currently publishing some or all of these drinking water quality data, as is required by the Minister for the Environment's circular on 20th July 2009.

Each local authority needs to become much more pro-active and provide up to date information on the quality of their public water supply to the general public, so that they can have confidence that the water they are drinking is safe. Indeed, all Local Authorities, the EPA and the Department of the Environment should initiate a national information and communications campaign to explain to the general public where their water is coming from, how it is treated and the testing that is undertaken on it to ensure that it meets the standards and that it is perfectly safe to drink.

Consumers should be encouraged to contact their local authority if they have any concerns about their water quality and this should be made easier by having a drinking water section on the homepage of all local authorities. Consumers might also gain confidence in the quality of their tap water if local authorities and state bodies installed tap source water fountains instead of having bottled water in their premises. From an economical point alone this should be their approach, with the same applying to the private sector.

One cannot deny that there is a need for bottled water in some instances, especially where there is an outbreak of E. coli or cryptosporidium in the water supply. It seems ludicrous to be paying for bottled water when clean tap water is freely available. Even when water charges are introduced the difference in price will still be enormous.

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Sherkin Island Marine Station website: **www.sherkinmarine.ie**

Return to Turnstones

By Oscar Merne

A COUPLE of years ago I wrote an article for *Sherkin Comment* (Issue No. 50) on *Advances in Marking Birds for Migration Studies*. In this I highlighted the remarkable migratory journeys of Turnstones from south-east Australia to Siberia, via Taiwan, and back to Australia via Alaska and central Pacific islands – a total of 27,000 km. I mentioned in the article that these Pacific Turnstones are the same species found around the Irish coast during autumn, winter and spring, and this article now returns to Turnstones with more details about the birds in this part of the world.

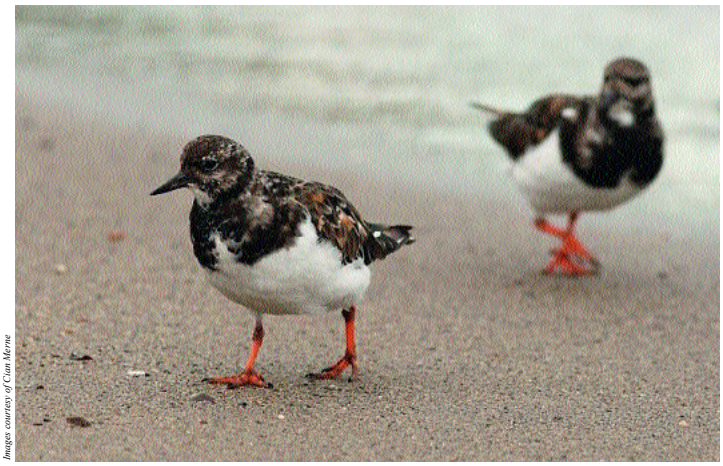
The Turnstone is named Ruddy Turnstone in North America, because of its ruddy plumage in the breeding season, and to distinguish it from the Black Turnstone found on the Pacific coast from Alaska to Mexico. It is a Holarctic breeder, i.e. found right around the northern hemisphere in North America and Eurasia. Its breeding range extends across Arctic regions from Alaska to Baffin and Ellesmere Islands in the high Arctic of north-east Canada, northern Greenland, and from Norway to the Bering Straits in eastern Siberia. The species breeds as far north as Svalbard (80º N) and as far south as the Baltic Sea and parts of Denmark (55º S). The breeding season starts about mid-May and finishes about mid-August, with the majority laying and incubating their eggs and raising their chicks in June and July, in the short high-Arctic summer. The remainder of the year is spent on the wintering grounds and undertaking the long migratory journeys between their summering and wintering areas. Turnstones are true globe-spanners, with large numbers moving south in autumn to Chile and Argentina in South America, the coasts of Africa as far as the Cape of Good Hope, and to south-east Asia, Australia and New Zealand. So, the movement of Turnstones between south-east Australia and Siberia, mentioned above, may not be exceptional, though their ability to cross the Pacific Ocean diagonally, with just one stop to rest and feed, is truly amazing for a small migratory bird.

From a small number of recoveries of ringed birds it appears that the Turnstones that occur in Ireland in winter and on spring and autumn migration come mainly from the populations breeding in northern Greenland and on Ellesmere Island in Canada. Some birds may come to Ireland from Scandinavia and the Baltic coast too. When in Ireland Turnstones are exclusively coastal in distribution, and are found on both rocky shores and "soft" shores, including estuaries and saltmarshes. Our latest estimate of numbers wintering here is c.25,000 birds, from a "flyway" population of 100,000–200,000. This flyway population is the discrete one that breeds in north-east Canada and Greenland and spends the winter on the coasts of Europe, north-west and west Africa.

To fuel their long-haul migratory flights the Turnstones must feed voraciously and store body fat to keep them going for non-stop flights of up to 7,000 km on some routes. Long-distance migratory waders, including Turnstones, are known to increase their body weight by 50% in just a few weeks of intensive feeding before they set off. They burn up all or most of this excess fat during their long flights, and, in adverse conditions (e.g. strong head winds) can even survive by using their "reserve tank" of normal bodily fat.

When you watch a flock of Turnstones on the shore the birds always seem to be feeding busily, mainly on small insects and their larvae, crustaceans such as sand-hoppers, and shellfish, stopping only to rest for a while when the high tides cover their feeding grounds. Even then, opportunistic birds sometimes continue feeding on dry land, as, for example, at Bray Harbour near my home, where they eat bread that people scatter for the resident Mute Swans. They will also scavenge on dead fish and other animals on the tideline, and there is even a report of Turnstones feeding on the facial muscles of a dead human corpse! There is still much to learn about these fascinating small waders, and catching some and fitting them with electronic data-loggers, as was done in Australia, would tell us more about their movements between Canada/Greenland and western Europe and Africa.

Oscar Merne retired from Ireland's National Parks & Wildlife Service in January 2004.



Images courtesy of Cian Merne

The latest estimate of Turnstones wintering in Ireland is c.25,000, from a "flyway" population of 100,000 – 200,000.

Turnstones are known to increase their body weight by 50% a few weeks before setting off on their long-haul migratory flights.

In Ireland, Turnstones (here with Oystercatchers) are exclusively coastal in distribution and are found both on "soft" and rocky shores.

Into Tasmania's Gordon River Wilderness

By Anthony Toole

THIS was a grim place. Fragments of redbrick walls stood proud of the grass and appeared to be struggling to hold back the encroaching forest. The stunning beauty of the surrounding pristine wilderness seemed to be tempered by a silence, which sucked in the sounds of the guide's voice and the incessant birdsong. For this was Sarah Island, site of the earliest, and perhaps most brutal of Tasmania's penal settlements.

I felt a little uncomfortable with the buffet I had just enjoyed on the upper deck of the luxury catamaran, *Lady Jane Franklin II*: potato salad, vegetable salad, smoked salmon, ocean trout, smoked wallaby, washed down by a choice of beverage; an extreme contrast to the fare of Alexander Pearce and other escapees from the prison, who in desperation, had resorted to the most gruesome of diets.

Some five hours earlier, we had sailed out of Strahan, the tiny port at the northern tip of Macquarie Harbour, Australia's largest, six times the size of Sydney's, situated on the west coast of Tasmania. The sky was overcast, with mist hanging over the surrounding hills, but a few encouraging patches of blue to the west. Our boat had followed a long curve, south swinging round to north-west, and out through the narrow, rocky gap of Hell's Gates into the Southern Ocean.

To the north of the gap, waves broke over a broad sand spit, which ran on toward coastal dunes. This sand once threatened to block the harbour, a problem that was solved by the construction of the 'training wall', a long line of rocks just inside the mouth, which channelled the tidal currents so as to scour the entrance without the need for constant dredging.

Named by the convicts, Hell's Gates is the narrowest harbour entrance in Australia, allowing the passage of vessels no larger than 3000 tonnes. Nevertheless, it was once a busy thoroughfare, carrying ships built in Strahan from Huon pine, many of them laden with copper ores mined in nearby Queenstown.

Guarded by a lighthouse, Hell's Gates was always dangerous, accounting for sixteen shipwrecks over the years. The most poignant of these, in 1907, involved the family of the lighthouse keeper, who watched helplessly as his wife and two children drowned, while returning from a holiday on the SS Kawatiri.

After a brief taste of the comparative roughness of the Southern Ocean, we returned through Hell's Gates and took a course along the south shore of Macquarie Harbour. The hills above this shore were less wooded with exposed crags. The button grass that covered the hills leaked tannins into the water, staining it a dark brown, which was churned up by the boat's wake. The combination of fresh water in the upper layers and salt water beneath is ideal for the farming of salmon and trout, in the numerous cages we passed, each holding up to thirty thousand fish.

Images courtesy of www.puretasmania.com.au

Gordon River, where you can reach out and touch the temperate rainforests of the World Heritage Area.

***Lady Jane Franklin II* going through Hell's Gates, Strahan, Tasmania.**

Sarah Island, site of the earliest, and perhaps most brutal of Tasmania's penal settlements.

The boat continued, passing Sarah Island for the first time, and on to the mouth of the Gordon River, where we entered the Tasmanian Wilderness World Heritage Area.

Here, everything changed. The open freshness of Macquarie gave way to a sense almost of claustrophobia. On both sides, a dense forest crowded down the steep hillsides to squeeze the river. The boat slowed, so as not to create a wake that might damage the pristine growth. The slopes were coated, without a break, by countless variations on the theme of green, representing trees with exotic names like myrtle beech, leatherwood, blackwood, pandanus, tree fern and sassafras. Many of these are found only in Tasmania, having evolved on the ancient super continent of Gondwanaland, becoming isolated when that landmass fractured between 130 and 160 million years ago.

The most important tree is the Huon pine, which after the North American bristle-cone pine, has the longest lifespan of any organism on Earth. Specimens have been found that are 3000 years old. Its wood rots with glacial slowness, and it resists virtually all known marine borers. This, in the nineteenth century, made it one of the finest shipbuilding materials in the world.

The 1.38-million-hectare Tasmanian Wilderness is one of the few remaining temperate rainforests in the world. Its UNESCO World Heritage status is supported by seven out of the ten criteria that govern such classification, four of them natural and three cultural. Of the 890 sites throughout the world, only Mount Taishan, in China, boasts as many criteria. This pristine wilderness, which encompasses one-fifth of Tasmania, is therefore almost unique in the world, and hence extremely precious.

But this was not always realised. In 1982, a proposal was made to dam the Franklin River, a tributary of the Gordon, and flood huge areas of the forest. An unprecedented campaign by environmentalists was launched, which split families, put the State Government at odds with the Federal and went international. Eventually, the environmental case prevailed, and the rainforest was saved.

Vigilance is still needed, however, as the threat of fire is ever present. The rains carried by the Roaring Forties winds help to minimise this risk, but not eliminate it. Trees such as Huon, King Billy and pencil pines are so slow-growing, that a major fire would destroy much of the forest beyond recovery.

As we followed the snaking river, the atmosphere took on more of the primordial. A wedge-tailed eagle flew across, and a flock of colourful rosellas, while the piercing calls of unseen currawongs ricocheted over the water, shattering a silence that was becoming mysterious, almost hypnotic.

At the northernmost reach of a long loop in the river, about six miles from its mouth, the boat pulled in to a jetty, Heritage Landing, where we disembarked for an up-close view of the forest. A wooden boardwalk led us through the dense growth, over mud flats dotted with mounds that marked the dwellings of the uniquely Tasmanian burrowing crayfish.

A pademelon foraged in the undergrowth. Farther on, a rare white-lipped snake lay coiled on a fallen Huon pine, then slowly stretched itself and slid into a darker crevice.

The pine itself had been estimated as 2400 years old, and though it had fallen, was still growing and providing a habitat for more than 140 plant and animal species.

Arriving back on board, we were greeted by the lavish buffet, which was only the latest in our sequence of refreshments. Throughout the afternoon, we had been continually supplied with drinks, including champagne, and various tit-bits. This meal occupied our attentions while we floated back downriver and across to Sarah Island for our final excursion.

Apart from the ruins, there was little to see. A sad, abandoned atmosphere clung about the place. Broken walls, mounds of grass covering foundations. The original forest had been cleared in 1822, but fast-growing opportunist trees had now re-colonised the space. A small number of Bennett's wallabies had been brought onto the island, by the Tasmania Parks and Wildlife Service, to control the grass. The only other animal life consisted of whip snakes and skinks, though birds like currawongs, black cockatoos and cormorants were common. Numerous swallows swooped low over the ground.

The penal settlement opened here in 1821, and for the following twelve years, its convicts worked from dawn to dusk, cutting down the Huon pines and building ships. Over these and succeeding years, more than 130 ships were built around Macquarie Harbour.

Conditions for the prisoners were brutal, and many attempted to escape, though with little success, because of the wildness and density of the all-encompassing forest. The most notorious escapee was Irishman, Alexander Pearce, who twice ran away with companions, resorting on both occasions to murder and cannibalism in order to survive.

Pearce's story caught the imagination of Tasmanian film maker, Jonathan auf der Heide, who made the prizewinning film, Hell's Gates, as a graduation project while studying at Melbourne University's School of Film and TV. He developed the theme in the more recent production, Van Diemen's Land, which opened in Australian cinemas, to critical acclaim and commercial success, in September 2009. An earlier film, The Last Testament of Alexander Pearce, explored the same compelling story.

Sarah Island closed as a penal colony in 1833, the remaining convicts being transferred to the much larger and now more famous, and better preserved, Port Arthur. The buildings of Sarah Island were allowed to crumble to their present state of decay.

In recent years, Australia's convict history, once regarded as utterly shameful, which in most respects it was, has come to be recognised for its importance in the building of the nation. Australians now actively seek and proudly proclaim the presence of a convict in their ancestry. This attitude should ensure that sites such as Sarah Island, until now virtually unknown, will take their rightful place in the telling of this history. Indeed this significance fulfils one of the criteria for which the Tasmanian Wilderness claims World Heritage status.

Dusk was approaching as we returned to Strahan, which we reached at around 8 pm. The cruise had lasted a fascinating and thoroughly enjoyable six hours. We strolled along the quiet street, back to the site of our camper-van. The falling darkness enhanced the impression that we were clinging to a tiny patch of human settlement, isolated by the sea to the west and the pristine wilderness to the east. It was a strange but not at all unpleasant sensation.

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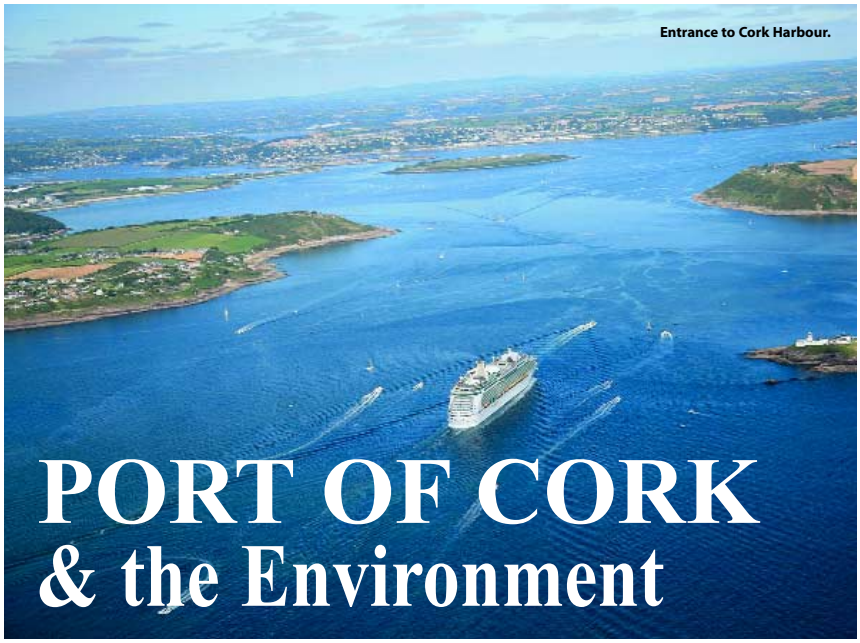


Entrance to Cork Harbour.

PORT OF CORK & the Environment

Aerial photograph of the Port of Cork premises in Custom House, Cork City, which also shows the merging of the North and South Channels of the River Lee.

Tivoli Container Terminal, Port of Cork.

Images courtesy of Port of Cork Company

The Port of Cork City Marina.

By Sinead Kavanagh

PORT OF CORK is the premier port on Ireland's south coast offering sheltered deepwater facilities close to the main shipping lanes to Northern Europe, the Mediterranean and North America. The Port handles all six shipping modes with annual traffic of 10 million tonnes approximately.

Port of Cork is committed to the development of modern and efficient systems, with the maintenance of an Environmental Management System identified as a key strategic challenge which the port continuously strives to achieve. As such, environmental management is dealt with as a prime business consideration across all of our operations. Port of Cork commits itself to lead the wider port community to minimise environmental impacts through co-ordinated environmental management, respecting the principles of environmental sustainability.

The Port of Cork is the only port in Ireland with a dedicated cruise berth in Cobh. The Port can also handle cruise liners in Ringaskiddy Deepwater Quay and the City Quays. The 2012 cruise season will see a total of 60 Cruise Liners visiting the port between April and November bringing over 100,000 passengers and crew to the region. With an average spend per in-transit passenger of approximately €73 per day, the cruise business has a very positive impact for business in Cork and is estimated to create 197 full-time equivalent jobs. By bringing some of the world's largest cruise liners to Cork, such as the Independence of the Seas and the Queen Mary, the cruise terminal in itself proves to be a popular tourist attraction with crowds flocking to Cobh to see these magnificent vessels. Waste from cruise liners, and all vessels that call to the Port, goes to Greenstar for disposal and recycling. Greenstar upgrades and trades a total of over 200,000 tonnes of recyclable materials annually such as cardboard, paper, plastic and metals and is the largest exporter of recyclable commodities on the island of Ireland. Efficient waste management is critical in such a busy port, like Cork, which sees over 3,000 vessels entering the harbour each year.

In the four years since the Port of Cork first introduced a Corporate Social Responsibility Strategy, some key projects have been completed, including the Port of Cork City Marina. The Marina is ideally located in the heart of Cork City offering 150 metres of berthage with 24hr security, water, and electricity and refuse facilities. This Marina is a long term investment for the City of Cork which the Port of Cork implemented as part of their Leisure and Recreation Strategy for Cork Harbour. The primary focus of the strategy is on water based Leisure and Recreation activities in and around Cork Harbour in which the Port of Cork aims to play a leading role in providing and supporting improvements of amenities in these areas.

Cork Harbour offers significant potential for further development of the marine recreation sector as an important source of enjoyment and economic gain for the local residents and visitors. The Port of Cork, primarily providing commercial services to its customers, is conscious of its responsibility to all other stakeholders in Cork Harbour.

In Cork, the world's second largest natural harbour, it is critically important for both commercial and leisure to work together in harmony. Other projects which the Port has been involved in include the clean-up of the Sirius Garden in Passage West which was completed in 2010. Paving was used instead of grass, to allow for easier maintenance of the area and self-draining methods were used to prevent the garden from flooding.

Any collected rain water, can now be used to water the new plants in the garden. The Sirius shaft was re-painted and Passage West Town Council re-planted the garden. An eye catching informative sign was erected in the garden, on behalf of the Port of Cork, which offers walkers and visitors to the garden an insight into the history of the Sirius Steamship and its links with the area.

The Port has also significantly invested in growing a Schools Initiative over the last seven years which is aimed to educate primary school children in the harbour area of the Port's operations and functions. This year alone, over 500 children participated in the initiative which invited schools to submit projects on the theme 'Ships, Steam Trains and Seaplanes – A Cork Harbour Connection'. Each participating class were given a boat tour of the harbour and a visit to the Titanic Experience or the Cobh Heritage Centre in recognition of their work and to further develop their knowledge of Cork Harbour and indeed, the Port of Cork. The winning school, Crosshaven Boys National School were treated to a visit onboard the spectacular *Caribbean Princess* when she called to Cobh in May. The Port of Cork aims to continue to grow the Schools Initiative and schools interested in participating in the project can get involved by contacting the Port of Cork headquarters in Custom House.

To ensure that the Port's environmental policies and standards are maintained and continuously development across all the company's locations and operations, every staff member is given environmental training upon joining the company and on a yearly basis thereafter. This is an integral element of the Port's environmental management system and covers areas such as minimising emissions, minimising noise, managing resource consumption, promoting sustainability and enhancing energy efficiency. The Port adopts a leader approach to these policies and works closely with port users, tenants and customers in promoting and monitoring the implementation of systems to ensure all of the standards set by the Port are being met.

The Port of Cork continually works to develop and improve its environmental management systems and will continue to respect the principles of environmental sustainability. There are many other environmental issues within the Port that are constantly reviewed and updated and Port of Cork management is fully committed to maintaining the Port's position as a leader in environmental management in the ports and harbours sector at European level and continue to set new objectives across all port operations in order to achieve this.

Sinead Kavanagh, Port of Cork Company, Custom House Street, Cork, Ireland. www.portofcork.ie

Windmills arriving in Cork.

Ships docked at Ringaskiddy, Co. Cork.

The work vessel "Denis Murphy".

The Sirius Garden, Passage West, Co. Cork

Addressing the Licensing of Aquaculture Sites in Ireland

MATT MURPHY, Editor of *Sherkin Comment*, put fifteen questions to the Department of Agriculture, Food & the Marine on the aquaculture industry in Ireland. From their responses, published here in full, it would appear that the EU Birds and Habitats Directives overshadow the re-issuing of over 500 licences, 95% of which are for mussels and oysters. In the light of the information supplied by the Department, a serious question does arise for industry. What conditions are in force for aquaculture licences in France and Spain? Is there a level playing field from Brussels for all countries in the EU? Solutions must be found and one wonders what they can be. With coastal villages and towns losing their young people by the thousands, our seas must surely play a part in creating much-needed employment.

Image courtesy of Robbie Murphy

Mussel lines.

Q: The aquaculture industry has for a number of years been very critical of the State in not addressing licensing of aquaculture sites. Is this criticism fair?

A: Applications for aquaculture operations are subject to the provisions of the 1997 Fisheries (Amendment) Act.

In 2007 the European Court of Justice issued a judgement against Ireland for breaches of EU Birds and Habitats Directives. As most aquaculture activity takes place in areas designated as Special Areas of Conservation and/or Special Protection Areas for birds (known as Natura 2000 sites) it is necessary to undertake an 'Appropriate Assessment' of the effects of aquaculture activity on these areas before any new licence can be issued or any existing licence can be renewed. This process is hugely resource intensive and represents a major investment by the State to ensure the continued sustainable development of the aquaculture industry while maintaining the maximum protection for our coastal environment.

To achieve this, the Department, in conjunction with the Marine Institute and the National Parks and Wildlife Service of the Department of Arts, Heritage and the Gaeltacht, has been engaged in a major programme to gather the necessary baseline data appropriate to the conservation objectives of aquaculture sites located within designated Natura areas. This comprehensive data collection programme together with the setting of appropriate conservation objectives will enable all new and renewal applications to be appropriately assessed for the purpose of ensuring compliance with the EU Birds and Habitats Directives. Once the relevant data has been collected, conservation objectives for each site are set by the National Parks and Wildlife Service (NPWS). The establishment of these conservation objectives by NPWS allows individual licence applications to be assessed against the conservation objectives. This work is ongoing but a great deal of progress has been made to date.

Q: Why has there been so little progress in renewing over 500 such licences?

A: The Department has been engaged in an extensive range of scientific, technical and policy actions designed to eliminate the backlog of licence applications awaiting processing. This backlog has built up over a long period of time and arises due to the absolute need to achieve full compliance with EU and national legislation in relation to environmental protection.

Q: How long will it take to address the backlog?

A: A crucial factor in addressing the backlog is the availability of Appropriate Assessments for sites located in 'Natura areas'. The first stages of the work plan agreed with the EU Commission has focused, by necessity, on the collection of necessary benthic, ornithological and other data relevant to Natura sites. This data is required for the development of Conservation Objectives in those sites. This setting of Conservation Objectives allows the sites to be appropriately assessed. In summary, the availability of Appropriate Assessments will enable the progressive roll out of licensing determinations in line with Natura obligations providing all other licensing requirements have been met.

Q: Does any fault lie with the aquaculture industry in holding up the issuing of new or renewable licences?

A: It is important for all involved in the aquaculture industry to understand that the sustainable development of the industry and the creation of long term employment from aquaculture into the future can only take place if there is full compliance with all EU and national legislation on environmental protection. Ireland's reputation as a producer of top quality seafood is predicated on the implementation of a sound regulatory system which has the confidence of the public in general and also the EU Commission.

The state has rigorous systems in place for the protection of the environment and the regulatory authorities ensure that best practice systems are rigorously enforced. The State's monitoring protocols in relation to fish farms are fully enforced and for example sea lice controls are regarded as representing best practice internationally.

Q: The industry claims they cannot apply for capital grants to BIM because applicants must have a current aquaculture licence. Is this comment fair?

A: Applicants for a grant under the Commercial Aquaculture Development Scheme must have a full, valid aquaculture licence, i.e. the period of validity of the licence must not have expired before funds are drawn down.

Q: Can the Department confirm that Castlemaine Harbour, Co. Kerry, and Roaringwater Bay, Co. Cork are at present their priority? If so, when will the licences in these two areas be renewed/issued?

A: Both Castlemaine Harbour and Roaringwater Bay remain high on the list of priorities for licensing determinations. Appropriate Assessments have been completed and the licensing implications are currently being examined by the Department.

Q: Are there questions the Department need addressed by the industry in these two areas before licences are issued?

A: In arriving at a recommendation for Ministerial decision, the Department will gather all necessary information and in that regard ongoing communication with relevant stakeholders, including the applicants for licences, is an important feature.

Q: How many new and renewed licences were granted by the Department in each of the last five years?

A: Seventeen aquaculture licences were granted since 2007.

Year Licence Granted	No. of Licences	New/Renewal
2008	1	New
2009	6	1 New , 2 Trial & 3 Renewals
2011	6	1 Renewal & 5 New
2012 – to date	4	New
	Total 17	

Q: I believe the Department has a new licence template. When will it be launched?

A: The new licence templates were launched by Minister Coveney on 5th December 2011.

The existing aquaculture licence templates have been comprehensively updated to make them 'fit for purpose' to meet the challenges and opportunities facing the industry. Significant work has gone into devising this new updated suite of licences, creating a balanced set of rights and obligations for the industry suited to the current era. Key features of the licence templates include:

- a move to Standing Stock Biomass for finfish as the means of measuring production capacity at an aquaculture site;
- enhanced provisions on environmental monitoring;
- greater clarity on the requirements for operators in relation to operational conduct and monitoring;
- the possibility for the group-marking of sites for navigational purposes,
- specific provisions covering company registration/dissolution, tax certificates, payment of fees etc;
- the new licence templates are also species specific.

Information seminars on the new licence templates have been provided for the industry.

Q: How is the Department going to address NATURA 2000 areas?

A: See answer to questions 1, 2 and 3 above.

Q: What are the EIS requirements for new and renewed licences?

A: Regulation 5 of the Aquaculture (Licence Application) Regulations provides that it is mandatory to submit an Environmental Impact Statement (EIS) with the following applications:

- An application for an Aquaculture Licence in respect of seawater salmonid breeding installations.
- Seawater fish breeding installations with an output which would exceed 100 tonnes per annum;
- All fish breeding installations consisting of cage rearing in lakes;
- All fish breeding installations upstream of drinking water intakes;
- Other freshwater fish breeding installations which would exceed 1 million smolts and with less than 1 cubic metre per second per 1 million smolts low flow diluting water.

In the case of other applications the legislation requires the applicant to submit an environmental impact statement if it is considered that the proposed aquaculture is likely to have significant effects on the environment.

Q: What is the situation with non-active licences? Are they being revoked?

A: Section 69 of the 1997 Fisheries (Amendment) Act states

''(1) Where aquaculture in respect of which a licence has been granted has not commenced within two years after the date on which the licence was granted, the licence shall cease to have effect

(2) Where aquaculture in respect of which a licence has been granted has ceased for a continuous period of two years, the Minister shall, without compensation to the licensee, revoke the licence.''

The Act also states:

A licensee who considers that there are exceptional circumstances why aquaculture has ceased or is likely to cease may apply to the Minister, giving those reasons, for a determination not to revoke the licence.

Q: Can licences be transferred or sold?

A: Licences may be assigned with the specific prior approval of the Minister.

Q: Is there an information pack available for licence applicants?

A: Information in relation to applying for an aquaculture licence is available on the Departments website www.agriculture.gov.ie and is available on the following link: http://www.agriculture.gov.ie/fisheries/aquacultureforeshoremanagement/formsdownloads/ (see "Aquaculture Licence Form" and "Aquaculture Guidelines").

Q: Finally, Minister Coveney in his public statements sees aquaculture growth as crucial in the seafood component of the Food Harvest 2020 Strategy. Can this be achieved with the present licensing problems?

A: There is great potential for all types of aquaculture including deep sea finfish farming, shellfish farming, and in the future, multi-trophic aquaculture. This means the farming of plants and animals at different trophic levels, together in the one location, so as to maximise sustainability and minimise environmental impact.

Image courtesy of Robbie Murphy

Pacific Oysters (*Crassostrea gigas*)

It is envisaged that the production of Irish organic farmed salmon will be rapidly expanded by creating new fish farming production areas in deeper waters. The placement of farms in deep waters will ensure that there is no impact on Natura 2000 sites, no significant environmental or visual impact, no interference with migratory salmonids, wild sea fisheries or navigation or tourism interests.

In relation to licensing in Natura areas, the Appropriate Assessment process as agreed with the EU commission is ongoing and steady progress is being made.

Department of Agriculture, Food and the Marine, National Seafood Centre, Clonakilty, Co. Cork.
http://www.agriculture.gov.ie/fisheries/

The International Gardeners

World exploration from the 16th century on brought all sorts of new trees, plants, fruits and vegetables to Europe.

By Daphne Pochin Mould

MOST people like flowers and are pleased with a bunch of roses, or more costly, orchids. They are less aware that life on earth depends on plant life, from the great rainforests to the little mosses, liverworts, lichens, water weeds and the great sub-ocean seaweed beds. The planet is covered in vegetation of one sort or another. We destroy it at our peril; with only sun and wind and heat/cold, we would be left with a dry waterless desert, growing nothing, sheltering nothing. Over grazing hill pastures can bare the mountains to naked rock, reckless ploughing of thin but fertile soils, create dust bowls.

Farmers and gardeners have learned how to grow and develop plants for our benefit and the world's over long centuries. They planted herbs; monasteries and others had their physic gardens and prepared medicines from them: coltsfoot for coughs, foxglove and the heart, and so on. Our synthetic medicines take origin from nature.

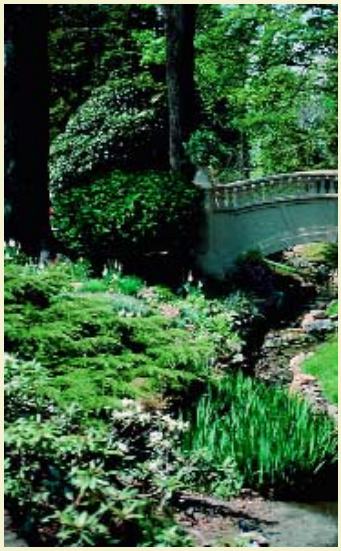
World exploration from the 16th century on brought all sorts of new trees, plants, fruits and vegetables to Europe. New items included the potato, sugar, tobacco, cotton for fabric, coffee and tea and gardens grew up round the big house and on big estates. The tower house, Barry's Court Castle in Co. Cork, has a garden of plants being grown at the time.

People had always caged, kept a few wild animals, the origin of our zoological gardens. Now it was the plants turn. From the great gardens of the big estates it was a short step to the public pleasure ground to the Botanic Garden, which received news of all the new plants, grew them if it could, and studied them – no photography, but careful drawings and paintings and dried specimens (the Herbarium). Long sea voyages with no ability to freeze things, did not help, but new plants got through. New not only of exotica but of new food plants, for the farm.

The sciences are international and even during war men might correspond with each other. On February 4, 1789, L'Abbe (priest) de Commerill from the Abbey of St Victor in Paris wrote to Dublin about the Mowing Cabbage of which he had been making trial under the Paris gardens supervision. The last winter had been extremely cold and killed turnips wholesale but not the mowing cabbage.

He writes: "The plant is a sort of wild cabbage that may be cut four, five, six times in the year; each cut is as plentiful as trefoil or lucerne; we leave it afterwards for the winter. In about the month of February, it shoots and the leaves of it may then be cut. But in the month of April it begins to grow up and send out stalks and bears its seed, which may be gathered in June. The first year, the cabbage does not send out stalks, its leaves appear to arise immediately out of the ground, which allows it to be cut for grass, it may also be dried for hay. Its leaves extend to ten, twelve, fifteen inches in length, and six to eight inches broad. They do not have the bitter or herbaceous taste of other cabbages. It is also very agreeable for man during the whole year, and as fodder equally good and plentiful for all kinds of cattle." (The 18th century called all the big farm animals 'cattle', including horses. Cows are 'horned cattle'.)

He named the plant "Choux a Souche". Dr Lettson of London had good reports of it from Russia and from the West Indies but warns "many of the London seedsmen impose the seed of the beet instead". This is cutting edge 18th century farm discovery and research; a modern botanist would have described the flowers and seed, putting the plant among its nearest relations by using Linneaus' great naming system.



Botanic Gardens around the world are working to educate us, preserve endangered plant species and research climate change.

The 18th century was one of new ideas, adventure, and discovery. Of poets, writers, artists, musicians: here are the roots not only of cabbages but of the sciences, geology, archaeology, engineering, the steam engine at the century's end. The industrial revolution had begun, the horticultural one meant your garden could blaze with all the colours of the earth.

If not in your ground, the splendour was to be seen and enjoyed in the Botanic Gardens in Paris, in London (Kew), in Edinburgh, in Dublin, in Glasgow. There was a world wide movement. You do not have to be a plants person, or "green", or a botanist to enjoy a Botanic Garden, for they are beautiful places, ideal to stroll in. It does not matter if you do not know a daisy from a dandelion. Just enjoy. But the gardens are doing much work, preserving endangered plant species, researching climate change, for we are now well aware that the world is not a static place but one to be cared for and cherished.

Our Glasnevin has come a long way from mowing cabbages. In 2010, Glasnevin was the location of the 4th Global Botanic Garden Congress where the next moves in conservation worldwide were debated. Dr Peter Wyse Jackson became director of our national gardens and said: "I believe I contributed to a new sense of self-confidence in Glasnevin, nationally and internationally. Ireland has a role it needs to be proud of, and a sense of understanding among Irish people that this is a garden with a purpose, not just a park."

In September 2011, another very famous botanist, Peter Raven retired from the great Missouri Botanical Gardens in St. Louis, USA and Dr Peter Wyse Jackson took his place. Dr Matthew Jebb is the new man in Glasnevin. *Ad multos onnos.*

All his life Dr Peter has been fascinated by plants, their histories, uses and stories and has made this into a book of 300,000 words and 300 pictures. It is making this into a book published jointly by Glasnevin and Missouri, the title is "Generous Nature: Irish Ethnobotany". Look out for it.

Ref: Irish Times: April 28th, 2012. Paddy Woodworth "A world from Wyse Jackson, our botanist in Missouri". With photo of Peter embracing a Round Island Bottle palm (Mauritius).

Who Needs NGOs?

By Alex Kirby

ONE of the first stories I wrote for BBC Radio News after becoming its environment correspondent in 1987 was (as I remember to my undying shame) based on an NGO release. If you lived in the Channel Islands, it said, you should eat tomatoes sparingly, because many were grown on land fertilised with local seaweed. And that had probably been irradiated by discharges from the nearby French nuclear reprocessing plant at Cap La Hague.

Was there a risk? Yes – a very small one indeed. How probable was it that any Channel Islander would swallow a dangerous dose of radio-activity? It was so improbable that it was meaningless – as many irate listeners pointed out, you would have to spend years eating unfeasibly large quantities of tomatoes day in and day out if you were to have the remotest cause for concern. I learnt fast that NGOs were not always reliable guides.

A few years later an NGO told me that several German energy companies wanted to end their contracts with British Nuclear Fuels Limited for the reprocessing of their waste. A German Government source confirmed the story to me, and it ran on the main radio and TV evening bulletins. Two days later BNFL threatened the BBC with legal action unless it retracted my report, which – against my urging – it did (the BNFL press office had told us shortly before the story went out that we clearly knew more about it than they did!). Some years later I met the BNFL director who had rubbished the story. He told me: "If I had known then what I know now, I wouldn't have criticised your broadcast."

The moral of this incident, perhaps, is that journalists (and environmental specialists, and all of us) cannot afford to disregard NGOs, because they often know more than the rest of us. It's not surprising: they concentrate effort and resources on shining a light into some obscure corners, and quite often they come up with facts which otherwise might remain hidden. Often they have real expertise which deserves a wider audience.

But they usually have something else as well – their own agenda. There's nothing wrong with that, so long as everyone acknowledges that that's the reality. NGOs are usually campaign groups, and the world would be the poorer without them. But if you're a campaigner you have a message to convey, and that may not always help people who simply want information.

As citizen journalism and social media continue their advance, one of the few strengths the traditional media can still offer is flinty scepticism. That's by no means limited to professional journalists, and we're certainly not always as sceptical as we should be. But if we're not always prepared to test to destruction any story we're told, we'd really do everyone a favour if we moved to jobs outside journalism where we could do less harm.

Many NGOs today are very different from what they were a quarter of a century ago. Charlie Kronick of Greenpeace UK says: "We're campaigners, and we don't pretend to be something we're not. That said, we've always checked what we put in a press release or a report, but now we do it with double, triple or even quadruple the rigour we used to. These days, with dirty tricks and hacking always a risk, we check our stuff to within an inch of its life. The level of accuracy we hold ourselves to is now far more robust."

Rigorous NGOs, sceptical media, a well-informed public – isn't that enough? Sometimes NGOs will spark a debate. Take the Brent Spar, the North Sea oil storage buoy which Shell planned in 1995 to dump in the North Atlantic, provoking a determined Greenpeace campaign for it to be dismantled on shore. Greenpeace was convinced it was right, but some knowledgeable experts disagreed. Sometimes the most an NGO can do is to focus attention on an issue that would otherwise slip past unnoticed. That's important. Sometimes, like Friends of the Earth's campaign for a phase-out of ozone-destroying chemicals, it can go further, influencing popular opinion and even changing government policy.

What does often worry people is the involvement of many NGOs in international conferences and organisations, for example at the meetings of the UN climate convention, the International Whaling Commission and CITES, the Convention on International Trade in Endangered Species. Good intentions apart, none of these three bodies can yet claim to have gone far to achieve its aims. Is that because the NGOs have disrupted the governments' work? It's likelier that most NGOs speak for the people who can never get near the conferences, and who want governments to transcend their perceptions of national interest.

It's misleading anyway to treat NGOs as a homogeneous mass. Most, agenda-driven as they are, are scrupulous in seeking accuracy, though they vary in achieving it. Some are large and powerful: at the 2009 UN climate conference in Copenhagen Greenpeace had 13 press officers meeting the demands of the 24-hour news cycle, while the Intergovernmental Panel on Climate Change had one. And NGOs (like journalists) can highlight problems without offering solutions. Sure, many of us would like to leave the remaining oil beneath the sand or the ice where it is now. But we want our hospitals to stay open and our homes to remain warm and welcoming. So something's got to give.

All told, I'm glad of the NGOs. If they didn't exist, we'd have to invent them. I belong to several. But we have to remember that we exist for different reasons.

PS: When BNFL forced the BBC to broadcast its apology for my report it scored a resounding Pyrrhic victory. The Corporation's retraction went out on the day when news of a Royal separation was leading the bulletins, so when the newsreader turned to my allegedly craven behaviour the nation's thoughts were stubbornly fixed elsewhere. It was almost enough to make you thank a higher providence.

Alex Kirby is a former BBC News environment correspondent.

Reforested park area – all trees planted by UCPC volunteers in early 1990s, now over 20–25' tall.

A Slice of Nature Preserved in the Metropolis

By Walter Mugdan

Aurora Pond after restoration.

Images courtesy of Udalls Cove Preservation Committee

NEW YORK CITY ... the images that probably come to your mind are of towering sky scrapers, crowded and fast-paced city streets, and the lights of Times Square. It is unlikely you'd envision a bucolic and thriving salt marsh with herons, egrets, kingfishers, ospreys, muskrats, and even an occasional fox; or a pond with frogs croaking and turtles basking in the sun. But that's what you'd find if you visited the Udalls Cove Park tucked up against the City's northeastern border.

The park is a narrow sliver of undeveloped land nestled between tracts of one- and two-family homes (some modest and some rather grand). Udalls Cove is an inlet of Little Neck Bay, itself part of Long Island Sound. At the head of the Cove is a salt marsh of nearly 100 acres. Behind that Aurora Pond lies at the centre of freshwater wetlands, bounded by steep, wooded slopes. Gabler's Creek runs down a ravine that extends through half of the one mile long park; it then flows through the pond, the salt marsh, and out to the cove.

That this remnant of the natural world continues to exist at all is due to the efforts of the Udalls Cove Preservation Committee (UCPC), a volunteer organization dedicated to its preservation and restoration. Since the first Europeans arrived, the wetlands that surrounded much of what is now New York City were gradually filled. Manhattan's shoreline today is in some places hundreds of feet further out than when Henry Hudson first sailed here.

By the 1950's filling of the wetlands had reached the City's northeast corner. Scores of houses were built where just a few years earlier salt hay had been growing. A golf course was to be built on the last acres of marsh not yet filled. The wooded uplands were being whittled away also, as development encroached from all sides. And the few remaining acres of marsh and woods had become dump sites, littered with garbage, demolition debris and wrecked cars.

Then one woman said, "Enough." Aurora Gareiss, a feisty, middle-aged resident whose home looked out on Udalls Cove, determined that what remained should be conserved. On a Saturday morning in April, 1970, on the occasion of America's first Earth Day, a dedicated group of residents assembled at the lovely pond that now bears her name. They committed themselves to preserving the last remnants of undeveloped marsh and wooded uplands in the Udalls Cove watershed. Ms. Gareiss died in 2000, but she lived long enough to see the organization she founded achieve that goal.

There is, however, still much to occupy those who have come after her. Aurora Pond itself was in dire need of restoration, having been nearly completely filled in with silt running down from the steep slopes around it. That project, costing over $1 million, was completed by the City in 2006. Since then, UCPC has invested nearly $200,000 in restoration projects throughout the park. Concrete rubble dumped decades ago has been carted away; countless tires have been dragged out of the waterways; alien species have been removed and replaced with native trees and shrubs; and footpaths have been laid out. A significant fraction of the funding for these projects has come through a series of grants from the State and City of New York, but much has also come from UCPC's membership of about 200 families and individuals.

UCPC promotes environmental awareness and conservation education among the young people of the community. The group makes presentations in local schools and works with scouts and other youth organizations, providing them with opportunities for community service in an enjoyable, outdoor setting where they can briefly forget they live in one of the world's largest cities. They have helped remove thousands of pounds of garbage; cut vines that strangle trees; built paths and foot bridges; spread hundreds of cubic yards of wood chips on trails; and installed hundreds of feet of attractive split rail fences where the park abuts local streets.

And every spring since that first meeting in 1970, UCPC has conducted a cleanup of the wetlands, woods and shoreline. During the first cleanup seventeen car wrecks were hauled out, along with literally tons of other refuse. Fortunately, those days are past. In recent years the cleanup crews have been occupied primarily with collecting the large quantity of mostly plastic refuse that floats in on the tides – flotsam tossed by careless people onto the city streets, from where it is washed into the bay through storm sewers.

Aurora Gareiss who was determined that what remained of Udalls Cove should be conserved.

Though it is by no means a pristine wilderness, Udalls Cove Park is nevertheless a sparkling little reminder of the natural beauty that once prevailed throughout the great metropolis that is now New York City. And it serves, too, as a reminder of what a small group of dedicated and persistent individuals can achieve.

Walter Mugdan, President, Udalls Cove Preservation Committee, Inc., 251-31 42nd Avenue, Little Neck, N.Y. 11363, USA.
http://www.littleneck.net/udallscove/

Helping to install an osprey nesting platform near the shoreline. Ospreys building their nest on the platform two weeks later.

Work crew at annual cleanup.

BSc Botany has been discontinued in the UK

By Mike Johnston

THE last student to be awarded the BSc Botany degree by any University in the UK will graduate in 2013. Is it possible to predict the consequences of this event? Moreover, should you ask "Has Botany been lost from a University near me?"

Many children in primary school are just as interested in plants as in animals. Later, as they move on from their first school it is common to find they favour animals, because to them animals seem attractive and animals do things. In contrast, plants just grow, flower and set seed! Of course in time they do come to recognise the primary role of plants in the capture of energy and the importance of energy flow among life on earth. However, the preference for animals rather than plants remains.

Young people are engaged by media stories of global warming and by the facts on human population growth and the concomitant need for more food. In the study of plants like possible solutions to reducing carbon dioxide in the atmosphere and to improve quality and quantity of food production. Logically, therefore, there should be a burgeoning of interest in Botany in school and later. Furthermore, biodiversity receives considerable publicity. It is easy to believe there should be a strong enthusiasm for and wish to study, the extraordinary diversity of plants on land and in water.

Indeed there is no lack of botanical research worldwide in universities, research institutions and commercial organisations. Moreover, money is being found to open new research facilities, such as The Sainsbury Laboratory, University of Cambridge. A quotation from the web site of this 21st century institution is apposite *"Plants are the foundation of virtually every ecosystem and agricultural system on Earth"*.

The evidence is clear, plants are important! This fact is widely accepted and anyone with access to the web can, with care, become informed. There is a role here for advisors and others to bring accurate facts on careers in Botany to the attention of students of biology at an early stage in their education so that they can make informed decisions.

There is a paradox: on the one hand a disinterest in botany among students while on the other a real need for botanists. Is this accounted for by an underlying educational deficiency, namely a bias in the teaching of biology? Syllabuses define what is taught at secondary school and they do require more knowledge of animal biology and of human health and physiology rather than plants. Allegedly some biology teachers favour, with disproportionate time and effort, the animal-life components of the syllabus, but in any case the real demand on a teacher today is to ensure success in examinations. It is hazardous for even the most enthusiastic teacher to depart far from the syllabus.

This brief article could have been entitled *Death knell sounds for botany degrees* but that title is used by Sally Nex who states the facts. (*The Garden* January, 2012 page 13). So my question is "Did the authorities make this decision to discontinue Botany on a well thought out policy to replace an outworn subject?". In a press release one of the last universities to close the botany degree to new applicants said *"Unfortunately, this year we had only one applicant and when you are down to that level it questions the viability of running the course, so sadly we will no longer be offering botany as a degree subject"*. Implicit in this statement is the decision to end teaching botany was due to one reason: few if any applicants applied for botany. Lack of demand, rather than a review of professional need, led to Botany being axed.

Image courtesy of Robbie Murphy

Wild Thyme – *Thymus polytrichus*

Courses such as Plant Science, Plant Biology and others do exist. Time will tell whether the word Plant will succeed in attracting applicants while in the past Botany failed, but surely, there is no ambiguity in the term Botany. Therefore, perhaps more thought is needed on why students choose other branches of biology. Fortunately, there is an excellent article, available on the web on this subject. It is *The end of the Botany Degree in the UK* (Sinead Drea. 2011, www.bioscience.heacademy.ac.uk/journal/vol17).

Can plant courses available today train students with all the expertise needed in the future? I fear the fabulous success of model systems (such as *Arabidopsis*) could lead to a loss of empathy for plant ecology, for field studies, for plant taxonomy and a neglect of the many groups of plants that cannot be exploited for use in agriculture or medicine.

World class research on plants today is driven by Geneticists, Biochemists, Developmental Biologists and others as well as classically educated Botanists. Without Botanists will future research on plants lack an essential input?

Dr Mike Johnston, retired lecturer, formerly of the Dept of Zoology, Aberystwyth, Wales, UK.

Lampriforme Fishes in Irish, NE Atlantic & Mediterranean Seas

By Declan T. Quigley

OPAHS, Velifers, Tube-eyes, Crestfishes, Tapertails, Ribbonfishes & Oarfishes belong to a small order of bizarre marine fishes (*Lampriformes*) composed of 7 families, 12 genera and about 21 species. Six families (excluding the *Veliferidae*), represented by 7 genera and 8 species, have been recorded from the NE Atlantic and Mediterranean Seas, including 5 species from UK waters but only 2 species from Irish waters (Table 1). The *Lampriformes* are characterized by having no true spines in the fins and a unique type of protrusible upper jaw.

Opah (*Lampris guttatus*)

The Opah is a relatively large (200cm TL & 275kg) oceanic epi-mesopelagic (100–500m) species found worldwide in tropical and temperate waters. A closely related species, *L. immaculata*, appears to have a circumglobal distribution in the sub-antarctic zone and the distribution of both species overlap in the temperate waters of the southern hemisphere. Although the opah is still regarded as scarce in Irish inshore waters (<200m), in recent decades it has been discovered that the species is more frequent in its occurrence in offshore waters (Quigley, 2001; Quigley *et al*., 1997a).

Image courtesy of Declan Quigley

Opah (*Lampris guttatus*) captured west of Slyne Head, August 1995.

Tube-Eye (*Stylephorus chordatus*)

The Tube-Eye is a bathy-mesopelagic (300–800m) species which is mainly known from tropical and subtropical waters of the North & South Atlantic and Eastern Pacific. There is only one record from the NE Atlantic (Scotland) [Quero *et al*., 2003]. Recent genetic evidence suggests that the Tube-Eye may be more closely related to the *Gadiformes* (Cods) rather than the *Lampriformes* (Miya *et al*., 2007).

The Tube-Eye is an extremely elongated fish; although its maximum body length (standard length – SL) is only c.32cm, it has a pair of tail fin rays that triple its total length (TL) to c.90cm. Its eyes are tubular in shape, resembling a pair of binoculars. It also has a large tubular mouth through which it sucks in seawater, enlarging its oral cavity by up to 40 times its original size, expelling the water through the gills and leaving behind the microscopic copepods on which it feeds. In common with many other planktivorous fish, it migrates vertically diurnally from deep to surface water layers in pursuit of its prey and like many other species of *Lampriforme* fishes, it swims in a vertical position which probably minimizes capture opportunities (hence their apparent rarity).

Image courtesy of www.wikipedia.org

Tube-Eye (*Stylephorus chordatus* Shaw, 1791)

Crested Oarfish (*Lophotus lacepede*)

The Crested Oarfish is an oceanic bathy-mesopelagic (0–500m) species which is found worldwide albeit rarely recorded. There are only a few records from the Mediterranean Sea dating from 1845 and only one record from the NE Atlantic (Portugal) [Dulcic & Soldo, 2008]. The species attains a maximum TL of 200cm. When threatened, the species has the ability to eject a cloud of ink-like fluid in order to confuse potential predators.

Tapertail (*Radiicephalus elongatus*)

The Tapertail is considered to be a bathy-mesopelagic (250–600m) species. However, since it was first described in 1917, very few specimens have been examined (maximum TL, 76cm) albeit these have been discovered over a wide area of the Eastern North & South Atlantic (from Spain & Portugal to South Africa) and the Eastern Pacific. When threatened, the species has the ability to eject a cloud of ink-like fluid in order to confuse potential predators.

Dealfish (*Trachipterus arcticus*)

The Dealfish is a bathy-mesopelagic (183–914m) species which appears to be confined to the North Atlantic; ranging from Norway & Iceland southwards to Madeira and from New York southwards to Florida. However, it has been suggested that Western Atlantic populations may constitute a separate species (Robins *et al*., 1986). Prior to 1985, the species was regarded as rare in Irish waters (Nolan & Quigley, 1987) but since then numerous specimens measuring up to 300cm TL have been recorded from offshore waters, particularly as a by-catch in pelagic trawls (Quigley *et al*.,1997b; Quigley & Flannery, 2005 & 2008).

Image courtesy of Declan Quigley

Dealfish (*Trachipterus arcticus*).

Mediterranean Dealfish (*Trachipterus trachypterus*)

The Mediterranean Dealfish is a bathy-mesopelagic (100–600m) species found worldwide in tropical and temperate waters. Although adults (measuring up to 300cm), juveniles and larvae have been recorded from the Mediterranean Sea (Dulcic, 1996), the species has only been rarely recorded from as far north as Portugal in the NE Atlantic (Figueiredo *et al*., 2007; Farias *et al*., 2010). However, it is possible that the species may occur further northwards. Dealfish are very fragile and invariably damaged when captured in nets. Indeed, *T. trachypterus* can only be reliably differentiated from *T. arcticus* by using vertebral counts [84–96 *vs* 99–102 respectively] (Figueiredo *et al*., 2007) and few, if any specimens from NW European waters have been examined in such detail.

Scalloped Ribbon Fish (*Zu cristatus*)

Although the Scalloped Ribbon Fish is generally considered to be an oceanic meso-pelagic (0–800m) species with a worldwide distribution in tropical and temperate waters, records are relatively rare. Indeed, outside of the Mediterranean, where adults (up to 118cm), juveniles, larvae & ova have occasionally been recorded (Psomadakis *et al*., 2007; Bianco *et al*., 2006; Bottaro *et al*., 2005), there is only one (unpublished) record from NW European waters: September 2001, East Rockall Bank (56º 20'N, 14º 00'W), trawl 380m (Gordon Henderson, *pers. comm*.). However, considering its worldwide distribution, it is likely that the species occurs in Irish offshore waters.

Image courtesy of Dr Soledad S. Garibay

Scalloped Ribbonfish (*Zu cristatus* Bonelli, 1819) [juvenile 29cm TL, 08.03.2007, Phillippines]

Oarfish (*Regalecus glesne*)

The Oarfish, the longest of all known bony fishes (*Teleostei*), reaching a length of up to 8m (Wheeler, 1969), is probably responsible for many anecdotal sea-serpent stories. Although the species is found worldwide and generally considered to be bathy-mesopelagic (20–1000m), the vast majority of specimens examined have been found stranded in shallow coastal waters. Despite occasional records from both Icelandic and Norwegian waters and >100 records from UK waters (primarily from the North Sea coast) [Hedley, 1997], it is surprising that the species has never been recorded from Irish waters.

Image courtesy of Michael Kunzler

Oarfish (*Regalecus glesne* Ascanius, 1772) [Isla San Marcos, BCS Mexico, 01.09.2007]

Commercial Exploitation of *Lampriforme* Fishes

The vast majority of *Lampriforme* species have no commercial value either because they are rarely captured and/or are generally considered to be unpalatable. However, a few species are of minor commercial importance as a seasonal by-catch in some areas. Some species are used for direct human consumption (e.g. Sailfin Velifer *Velifer hypselopterus* and Polka-dot Ribbonfish *Desmodema polystricum* in SE Asia & Opah in the Pacific & Atlantic) while small quantities of other species are used in fish meal production (e.g. Dealfish in the NE Atlantic).

Figure 1 summarizes annual global landings of *Lampriforme* species. During 2010, Opah accounted for 86.7% of global landings; 79% was taken as a by-catch in the North Pacific by USA long-line vessels (Hawn *et al*., 2004). During the same year, Dealfish accounted for 13.2% of global landings (64% during 2009); 80% was taken by Faroese vessels as a by-catch in the Blue Whiting (*Micromesistus poutassou*) pelagic fishery (Heino *et al*., 2007). During the late 1990s, small quantities of Oarfish were landed by New Zealand vessels.

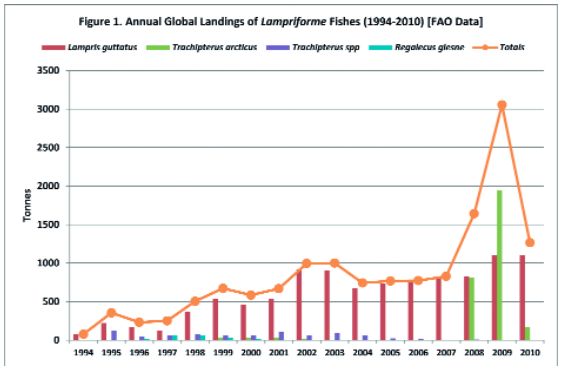


Table 1. Order *Lampriformes* in Irish, NE Atlantic & Mediterranean Seas

		North-East Atlantic									
Family	Global No. Species	Common Name	Scientific Name	Norway	Iceland	Ireland	UK	France	Spain	Portugal	Mediterranean
Veliferidae	2	Sailfin Velifer	*Velifer hypselopterus* Bleeker, 1879								
Lampridae	2	Opah	*Lampris guttatus* (Brunnich, 1788)	v	v	v	v	v	v	v	v
Stylephoridae	1	Tube-Eye	*Stylephorus chordatus* Shaw, 1791				v				
Lophotidae	3	Crested Oarfish	*Lophotus lacepede* Giorna, 1809							v	v
Radiicephalidae	1	Tapertail	*Radiicephalus elongatus* Osorio, 1917						v	v	
Trachipteridae	10	Deal Fish	*Trachipterus arcticus* (Brunnich, 1788)	v	v	v	v	v	v	v	
		Mediterranean Dealfish	*Trachipterus trachypterus* (Gmelin, 1789)							v	v
Lophotidae		Scalloped ribbon fish	*Zu cristatus* (Bonelli, 1819)				v				v
Regalecidae	2	Oar fish	*Regalecus glesne* Ascanius, 1772	v	v		v	v	v	v	v

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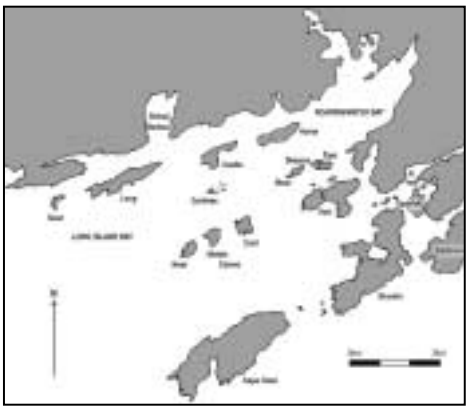
Roaringwater Bay's smaller islands

JOHN AKEROYD looks at some small islands around the Bay



"Carbery's Hundred Isles": The islands of Roaringwater Bay and Long Island Bay.

Images courtesy of Robbie Murphy

Goat Island, with Long Island in the distance.

Sea Aster (*Aster tripolium*)

WEST CORK is famous for its scenic indented coast and the panorama of "Carbery's Hundred Isles". Having been lucky enough to visit even the remotest and less visited islands scattered across Roaringwater Bay, in this series I've tried to give readers of *Sherkin Comment* a flavour of the Calfs, Skeams, Castle and Horse, and in the last issue Long. Now I'll say something about some of the smallest islands, especially Goat and adjacent Little Goat, which lie in the north-western part of the Bay, where it meets the Atlantic Ocean, and the Carthys group, which lies exposed to the ocean between the Calfs and Long. Biologists from Sherkin Island Marine Station have visited all these islands over three decades and thus we've some knowledge of their marine animals and seaweeds, as well as their remarkably well-developed land flora.

Goat, surrounded by steep rugged cliffs and almost split into two by the sea, rises to 32 m, about the same height as the larger island of Long to the east. The vegetation is a mix of rock-dwelling plants, wind-cropped Atlantic heath that is brightly coloured in late summer with dwarf gorse and heathers, and more rank vegetation dominated by coarse grass, bracken and Hogweed. Little Goat is a sea-stack, a rocky bird roost with little vegetation – although we've recorded 23 plants! Geologically, like nearby Long and other islands in Roaringwater Bay, Goat and Little Goat are formed of hard purplish mudstone rocks of the Castlehaven Formation of Upper Devonian age (350 million years ago). By contrast, the four Carthys are built of younger, softer grey Carboniferous shales, and thus more eroded and low-lying.

Number of plant species found on the various islands

Goat	74
Little Goat	23
Carthy	67
Catalogues	148
Jeremiah's	68
Quarantine	60
Badger	27

The name Carthys comes from Oileáin Uí Charthaigh (O'Carthy's Island) – the O'Carthys held lands in north-eastern Roaringwater Bay. The islands, rocky but with some shingle, are home to gulls and other sea-birds. The vegetation includes shingle vegetation and coastal grassland, but consists mostly of strand communities and patches of coarse nitrogen-demanding weeds such as Hogweed and thistles that thrive on the trampling and accumulated droppings of the birds. The exposed maritime nature of these small islands is emphasized by the vigorous growth of Sea Radish, a floral speciality of the Roaringwater Bay strands, its tangled growth producing drifts of pale yellow flowers in summer. Sadly, none of these islands have any other rare or unusual plants, which would be well protected by sheer isolation!

Unlike some smaller islands towards the head of Roaringwater Bay, none of these outer small islands, so exposed to strong salt-laden winds, possesses trees. Shrubs too are almost absent, but for low-growing Western Gorse and prostrate Creeping Willow on heathy ground on Goat, while some Gorse bushes occur on the Carthys. Other habitats, especially wetlands and blown sand, present on the larger islands and the mainland, are absent and associated plants such as sedges are rare. Some plants adapted to severe coastal habitats occur on all of them: for example, Thrift, Rock Sea-spurrey, Sea Campion (apparently absent from the Carthys), the attractive pinkish-flowered Kidney Vetch, a clover-like plant of cliffs and coastal rocks and heaths, and the large-fruited coastal variant of Curled Dock, its tall brown spikes conspicuous in late summer, which thrives on shingle strands and coastal rocks.

Of these remote islands, only Goat was ever inhabited. Remarkably one can still see remains of a small farm and its fields huddled in a slight hollow high up at the centre of the eastern part of the island. It is vivid evidence of how Ireland was once densely inhabited, and people farmed far into the hills and right down to the strands in West Cork and elsewhere. The nearest we have to knowing what life may have been like for a hardy small-island farmer or farming family is a 1994 memoir of West Skeam farm life by Joseph O'Regan, who described a tough, isolated existence before the family left in 1943. The O'Regans kept a few pigs, cows and chickens, and grew potatoes, roots, cereals and flax, but West Skeam is somewhat larger than Goat and has deeper soil. Yet, like West Skeam, Goat provides rough heathy pasture, and seaside rocks would have certainly have yielded shellfish and edible dulse and carrageen seaweeds.

Other smaller islands or island groups include the Catalogues, Jeremiah's and Quarantine, towards the more sheltered head of the Bay, also Badger off the west coast of Sherkin and Bird off the north-east coast of Cape Clear. All of these have some vegetation and are home to sea-birds and visited by otters, as well as supporting rocky shores, even small shingle beaches and, on Jeremiah's, a miniature salt-marsh with fleshy, seawater-adapted plants such as Glasswort, like a tiny pale green Christmas tree, and the elegant Sea Aster. This last species, autumn-flowering and similar to the Michaelmas daisies of gardens, is more a plant of cliffs, but one that favours small islands, even growing on Badger, which is little more than a rocky bird roost. So, never miss any of those rare opportunities to land on even the smallest islands in Roaringwater Bay – every visit may yield something new.

The Carthy Islands.

John Akeroyd, who has been visiting Roaringwater Bay since 1986, edited The Wild Plants of Sherkin, Cape Clear and adjacent islands of West Cork (1996) *and co-authored its* Supplement (2011).

Ireland's newest renewable energy source
Indaver Waste-to-Energy Facility

Images courtesy of Indaver

The Indaver waste-to-energy facility in Co. Meath.

By Maurice O'Callaghan

IRELAND'S first waste-to-energy facility in Co. Meath has now been in operation for over a year. The facility took over two and a half years to complete at a cost of €140 million, representing the largest ever single investment in solid waste management infrastructure in Ireland. This facility uses the most advanced technology available, processing over 200,000 tonnes of waste each year and generating enough energy to fuel 20,000 homes.

The Indaver group provides high-quality, integrated solutions for sustainable waste management throughout Europe. Indaver operates its Irish business from its head offices in Dun Laoghaire, logistics office Cork and a hazardous waste facility in Dublin Port. In 2011, the Indaver group treated over 3.2 million tonnes of waste and had a turnover of €500 million.

Renewable Energy Generation

Indaver Ireland Ltd has joined other electricity generators such as ESB and Bord Gais in the electricity market. Indaver's Waste-to-Energy facility in Duleek, Co. Meath is converting waste into energy and exporting it in the form of electricity to the national grid.

The Indaver facility in Meath has been operating successfully as Ireland's first large scale waste-to-energy plant for 200,000 tonnes of residual municipal waste since 2011. An important element to the facility however, is the recovery of energy and its export from the site in the form of electricity. Beyond the extraction of energy from the boiler system, the infrastructure requirements for energy recovery involved the building of an electricity substation on the site, a connecting underground cable to the nearest substation which was 4kms away in Rathmullen, Co. Meath, a steam turbine and generator.

Energy from a waste-to-energy facility is similar to a conventional coal/oil/peat power plant in that it gives a steady, constant and predictable supply of electricity. But it is also similar to green electricity producers such as wind/solar/wave in that it produces renewable electricity. Over 50% of the electricity is considered renewable electricity, which comes from the biomass fraction of waste. This contributes to Ireland's security of energy supply and decreases the amount of fossil fuel needed in the country. The Meath facility exports approximately 16MW of electricity, which is equivalent to 20,000 homes or the population of Navan. This facility is also run by a majority (87%) of staff from the North East region, which means Carranstown is a local facility run by local people.

How it all Works

Reception Area

On entering the facility, waste trucks make their way to the reception hall. Here the waste is offloaded into large bunkers for storage. The air in the reception area and in the bunkers is maintained at a lower pressure than outside (negative pressure) and this prevents odours escaping.

Combustion Chamber

The cranes transfer the mixed waste from the bunker to the furnace 'hopper'. Combustion takes place at temperatures of 850 – 1100°C, the temperature at which odorous gases and all dioxins will be destroyed.

Flue Gases

The combustion process produces flue gas containing water vapour, nitrogen, carbon dioxide, nitrogen oxides, oxygen and particulate matter. Some of these compounds are harmful to health and therefore the flue gas is thoroughly cleaned before it is discharged to the air. The flue gas cleaning equipment of a modern incineration plant is complex and can take up about half of the space within the plant.

Electricity Generation

A boiler converts the energy from the combustion into high pressure steam. The combustion chamber is surrounded by water tube walls, which are heated by radiation from the combustion. The hot flue gases release additional heat in additional tube panels in the boiler. The steam goes into a turbine, which drives an electric generator.

Bottom Ash

At the end of the incinerator the solid waste has been completely burned out. The remaining residue is called bottom ash, which is ejected at the bottom of the combustion chamber. The ferrous metals in the ash will be extracted using large magnets and sent for recycling. The remaining bottom ash is non-hazardous and while it could be used in other applications such as an aggregate in concrete or for road building, it is currently sent to non hazardous landfill in Ireland.

North East Region has all the pieces of the puzzle

The North East is the first region in the country to have the full set of infrastructure in place to deal with household and commercial waste. This comprises bring banks, recycling centres, mechanical treatment facilities, compost facilities, landfills and now one waste to energy plant. This means that the region has taken a sustainable approach in dealing with its household waste by putting facilities in place to reduce dependence on landfill. The benefit of this infrastructure is that the North East region is helping Ireland meet its environmental targets; reduce its reliance on landfill, increasing the generation of renewable energy and the overall aim of reducing the effects of climate change from the waste sector. This established and working waste management solution is not only important for the reasons listed above, but also an essential element in attracting corporate investment into the region.

Waste- to-Energy and EU Policy

Waste-to-Energy (WTE) delivers a number of real and immediate benefits which have the capacity to assist Ireland meet its EU waste policy commitments.

While WTE is still somewhat new to Ireland, it is accepted throughout Europe as a highly effective and beneficial means of waste disposal and treatment.

WTE actively diverts waste from landfills helping Ireland meet its Landfill Directive diversion targets. It is also regarded as a recovery operation under the Waste Framework Directive as it actively recovers energy from waste. This energy recovery process assists Ireland in complying with this Directive.

WTE contributes to reducing greenhouse gas emissions by diverting waste from landfills. WTE is also a source of renewable energy by producing renewable and sustainable electricity, replacing traditional fossil fuels and positively contributing to our national energy security and supply. Finally, WTE is recognised as the most energy efficient way to treat residual municipal waste.

What are the benefits of WTE to the wider economy?

WTE energy can contribute hugely to economic development by providing a safe and cost effective means of waste disposal. It is not an economic luxury; it is an economic necessity. It is also a fundamental part of a competitive, modern economy.

WTE facilities can deal with all types of waste, whether commercial or household. There are a number of specialised industries in Ireland which are particularly suited to WTE energy, such as the pharma-chemical sector. This sector is hugely important to the Irish economy. It employs over 50,000 people and exports over €50 billion in products annually.

Efficient and effective waste disposal services are a key requirement for all Irish businesses. WTE offers a real solution to business to dispose of their waste in an efficient and convenient way.

The control chair and window.

Control screens.

A truck in the tipping hall.

The booking in gate.

Missouri Botanical Garden St Louis, USA

Images courtesy of the Missouri Botanical Garden

Shoenberg Temperate House **(1990) at Missouri Botanical Garden. It features plants from five regions of the world that share a "Mediterranean" climate: coastal California, the cape region of South Africa, the central coast of Chile, southern Australia, and the Mediterranean Sea basin.**

By Peter Wyse Jackson & Liz Fathman

IN September 2010, one of us (PWJ) moved from Ireland, from the National Botanic Gardens Glasnevin, to become President of the Missouri Botanical Garden in St Louis, U.S.A. As one of the finest botanic gardens in the world, this invitation to head a remarkable institution was a wonderful opportunity, a testament too of the prestige and reputation of Ireland's own National Gardens.

This article describes the work, facilities and collections of the Missouri Botanical Garden. It highlights the important role and responsibility that such institutions have to be effective centres for safeguarding plant diversity and raising public awareness of the fragility of our environment, and how necessary it is for all of us to be its protectors.

History

The Missouri Botanical Garden began life as a public botanic garden, a place to study and display plants. Today, the 79 acre Garden is the oldest botanical garden in the United States and a world leader in botanical research.

In the autumn of 1819, 19-year-old Henry Shaw, an Englishman recently landed in the river town of St Louis, took a half-day journey on horseback out of town. Riding westward through marshy ground, past sinkholes and Indian burial mounds, he came at last to a narrow path cutting through brush, and found himself on elevated ground overlooking a prairie. "Uncultivated," he recorded, "without trees or fences, but covered with tall luxuriant grass, undulated by the gentle breezes of spring." Shaw never forgot that piece of land, and resolved to return to it after making his fortune in the bustling dynamo of boomtown St Louis.

During a visit to Chatsworth in the UK in 1851 Shaw conceived of building a botanical garden. From the beginning, he intended the garden to be a place of beauty, but also of science, and sought the advice of preeminent botanists of the day.

In June of 1859, the Missouri Botanical Garden officially opened to the public. During the 30 years before his death in 1889, Shaw expanded and enhanced his gardens and collections. Shaw also established a school of botany at Washington University in St Louis in 1885. Upon his death, Shaw willed his Garden to a board of trustees, who selected Harvard-trained Dr. William Trelease, the first Engelmann Professor of Botany at Washington University, as the first director of the Garden. To this day, the Garden's director is always a botanist on the same faculty.

The Missouri Botanical Garden opened at a pivotal moment in history: 1859, the same year that Darwin's *On the Origin of the Species* was published. From its inception, the Garden was conceived as a place of research, learning, and knowledge. Today, the Garden's science and conservation work worldwide plays a major role in supporting the achievement of major international plant conservation goals, such as the United Nations' *Global Strategy for Plant Conservation*...

Research and Plant Conservation

The Missouri Botanical Garden operates the world's most active research and conservation programme in tropical botany. Garden scientists are documenting the world's dwindling flora, but discovery and documentation are not enough in the face of habitat destruction and global climate change. Missouri Botanical Garden researchers work to conserve plants around the world. In addition, Garden-led community-based programs empower local populations to protect their natural resources, thus protecting the web of life—and the future.

Although its research is carried out all over the globe, in St Louis, the Garden's research headquarters is home to the Garden's renowned herbarium and library. The Science and Conservation division offers excellent resources for researchers visiting from around the world, including:

- One of the world's largest herbaria with over 6 million specimens.
- An excellent botanical library with significant rare book holdings.
- Living collections with more than 17,000 species and varieties.
- TROPICOS™, one of the world's largest botanical databases (www.tropicos.org).
- Botanicus.org, one of the world's largest digital libraries with free and improved access to historic scientific literature.
- The William L. Brown centre for Plant Genetic Resources.
- The centre for Conservation and Sustainable Development.

Horticulture

In addition to promoting the study and preservation of biodiversity around the world, providing sites of beauty and reflection is an essential part of the Garden's mission, and is a primary means by which we make connections between people, plants, and the environment. Presenting landscapes that are beautiful and restorative is essential to inspire in the public a love of nature. From this inspiration, the desire to grow plants, to cultivate a garden, can lead to a more sustainable lifestyle. The Garden's Horticulture Division actively promotes biodiversity by cultivating and showcasing historic, heirloom, rare, and endangered plants in our collections. Another way is by promoting the planting of native species, educating about the risk of invasive plants, and encouraging all home gardeners to "grow green" by composting, conserving water, and recycling.

Sorting plants into families and making preliminary identification to facilitate further study.

A central highlight of the Garden's horticultural work is The William T. Kemper centre for Home Gardening at the Garden. It is the largest gardening information centre of its kind in the U.S. The 8.5 acres around the centre for Home Gardening consist of 23 residentially scaled, landscaped gardens filled with ideas for home gardens.

Education

Education is a major component of the Garden's programmes. Garden educators teach on Garden grounds through scheduled classes, drop-in programming, and themed educational displays. They also offer field trips and camp experiences at the Garden's outstations: Shaw Nature Reserve, Butterfly House, and Litzsinger Road Ecology centre. In addition, the Garden engages in teacher training through workshops and classes, a resource centre and library, and MBGnet, an online resource for teachers.

Plants and their ecosystems continue to be adversely affected by many of the choices we make related to the food we eat, the construction and maintenance of our homes and buildings, the products we produce and consume, and the transportation methods we use. Within the St Louis region, the Garden is a leader in educating and demonstrating sustainable lifestyle choices that seek to minimize our current and future impact on plants, our local environment, and the world at large.

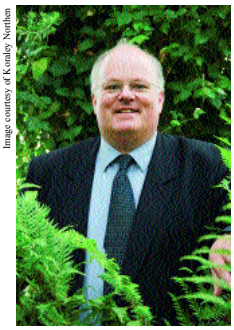


Image courtesy of Kenley Northen

Dr Peter Wyse Jackson, President of the Missouri Botanical Garden.

Missouri Botanical Garden, 4344 Shaw Blvd., St. Louis, MO 63110, USA.
www.missouribotanicalgarden.org

Clockwise from left: **Collecting in the field; A research trip to Páramo de Sumapaz, Colombia; Tree measurement in Ecuador.**

Missouri Botanical Garden

ST LOUIS, USA

(see article on page 15)

CHINESE GARDEN – A highlight of the outdoor Garden is a Chinese garden, built in 1995. It is modelled on the "scholar's gardens" of the southern provinces of China, near Nanjing. It is said that a Chinese garden is built, not planted. Architectural elements such as walls, pavilions, bridges, and pavings are of central importance, while plantings are used sparingly. The garden commemorates the longstanding scientific and cultural exchanges between the Garden and Chinese botanical institutions.

THE CLIMATRON – One of the most recognizable icons of the Garden is the Climatron conservatory. It was the first geodesic dome to be used as a greenhouse. Built in 1960, the structure, designed according to the principles of R. Buckminster Fuller, rises 70 feet in the centre with no interior support, allowing more light and space for the half-acre of tropical plants within.

The Climatron contains a lush lowland rain forest in a humid 85°F environment, complete with waterfalls, tropical birds, and some 2,800 plants. Highlights of the collection include the cycads, primitive relatives of conifers dating to the age of the dinosaurs. Some of the Climatron cycads were exhibited at the 1904 World's Fair held in St Louis and are thought to be close to 200 years old.

Images courtesy of the Missouri Botanical Garden

THE LINNEAN HOUSE - One of the Garden's most historic buildings is the Linnean Greenhouse, built in 1882. It is the oldest greenhouse in continuous operation west of the Mississippi River. It is named in honour of the famed Swedish botanist Carl Linnaeus (1707–1778), the creator of the standard binomial ("two names") system of naming plants and animals. His bust adorns the façade along with two prominent 19th-century botanists, Thomas Nuttall and Asa Gray.

CHILDREN'S GARDEN – Opened in 2006, the *Doris I. Schnuck Children's Garden: A Missouri Adventure* introduces youngsters at an impressionable age to the significance of plants and nature in innovative ways. Experiences in the Children's Garden revolve around the interdependence of all of nature – humans, plants, insects, and animals – in a variety of ecosystems. The ecosystems currently include a wetland, prairie, woodland, pond, river, and cave, and are scattered along the four main paths of the Garden.

JAPANESE GARDEN – One of the most famous features of the Garden is its Japanese Garden. At 14 acres one of the largest traditional Japanese gardens in North America, the *Japanese Garden, or Seiwa-en* (1977), the "garden of pure, clear harmony and peace," consists of gently rolling ground with a central lake. The garden was modelled on the *chisen kaiyu-shiki,* or "wet strolling garden," a style developed by wealthy landowners of the late Edo period in 19th-century Japan. (*Right:* the garden in winter.)

SHAW NATURE RESERVE – One of the most important parts of the Missouri Botanical Garden is its associated Shaw Nature Reserve. Located just 35 miles southwest of St. Louis at Gray Summit, Missouri, the Reserve has over 2,400 acres of Ozark-border landscape and an extraordinary diversity of native plant and animal habitats. The Reserve focuses on native habitat management and restoration: prescribed burning, correctly timed field mowing, selective thinning of woodlands, invasive species control, plant diversity enhancement, and reconstruction "from scratch" of prairies and wetlands. The Reserve offers 14 miles of hiking trails through a diversity of Ozark-border landscapes, including floodplain forest, upland woods, dolomite glades, tallgrass prairie, oak-hickory woodlands and savannas, and wetlands. Restoration of these habitats provides the Reserve's visitors a uniquely varied experience of Missouri's rich biological heritage. The reserve also includes 5-acre demonstration garden on native plant species.

Cleaning up the Mess We Made

Part 3 of a 3-Part Series

By Walter Mugdan[1]

IN my previous articles I've described how the chemical wastes created by the new endeavours spawned by the Industrial Revolution were haphazardly discarded – often in the worst possible locations, thus creating thousands of dangerous, toxic waste sites across the length and breadth of the developed world. During the 1960s and 1970s a new environmental consciousness arose, and people began to recognize the need to address these ticking time bombs. That raised the novel question: how does one clean up a toxic waste site? And embedded within that question was another particularly difficult one to answer: how clean is clean … or, at least, clean enough? It is a question on which people can and do differ widely. (Consider the different standards of cleanliness that might be adopted by a teenage boy and his mother.)

Tasked by Congress to clean up the worst toxic waste sites in the country, EPA had to come up with guidelines to help develop the answer, and over time these guidelines have become generally accepted. Here's an important example: EPA requires that the remaining or residual risk from a site *after a Superfund cleanup has been completed* should not exceed one extra cancer death per 10,000 people (assuming all 10,000 would have a 70-year lifetime of exposure to the site). That's a very small number, especially considering that about one out of every three or four Americans dies of cancer. EPA's guidelines go further, and state explicitly that the *preferred* outcome (called the "point of departure" when considering the matter) is even more stringent: ideally, the residual cancer risk after cleanup will not exceed one extra death per 1 million people.

Once a cleanup target is set for a toxic waste site, one has to figure out how to get from here to there. The engineering challenges can be even more difficult than the scientific and policy questions. Approaches will vary depending on the contaminants present and what "media" are contaminated – soil, groundwater or surface water.

Over the past three decades a variety of techniques have been developed, providing remediation professionals with a choice of "tools in the toolbox." Following is a summary of some of the typical approaches used for various classes of contaminants commonly found at various kinds of toxic waste sites:

Soil Contamination

The cleanup techniques utilized depend on the nature of the soil contamination. A common approach is excavation of the contaminated soil, followed by off-site disposal at a secure, licensed facility. This approach was used extensively in the early days of the cleanup program; since then other methods have become available as a result of technical advances over the years, including:

Organic Contamination:

For volatile organic contaminants such as TCE, PCE, benzene, toluene, xylene, etc., the most common alternative cleanup techniques involve heat treatment and soil vapour extraction (SVE). Both work on the principle of separating the organic chemicals from the soil matrix by evaporating them, followed by capture and treatment of the chemical gases or vapours. Heat treatment can be performed via low temperature volatilization or high temperature incineration. Low temperature systems collect the chemical gases for further treatment; incinerators destroy the off-gases in a high temperature after-burner.

The Welsbach/General Gas Mantle Contamination Site, located along the Delaware River waterfront, New Jersey, USA. Two former incandescent gas mantle manufacturing facilities used the radioactive element thorium in their manufacturing process, which has contaminated the site. Part of the clean up involves excavation and off-site disposal of radiologically contaminated soil and waste materials.

Images courtesy of US EPA

Cleaning up of zinc and copper-contaminated sediments from the Iron Mountain Mine Superfund Site, near Redding, California.

SVE can be used if the chemical contaminants will evaporate or volatilize easily and the soil matrix has significant core space (e.g., sandy soil through which the vapours can move easily). For SVE, perforated pipes are driven into the contaminated soil and a vacuum applied which causes the chemical contaminants to evaporate. The vacuum draws the chemical gases through carbon filters where they are captured. At some point, the carbon is sent off-site for treatment or disposal. (For certain contaminants, it may be possible to use "biofiltration" with microbes in place of carbon to treat the chemical off-gases.). A big advantage of SVE is that it is performed in-place or *in-situ* and does not require excavation of the contaminated soil. It uses far less energy than either heat treatment process and is considerably less expensive.

Some organic contaminants lend themselves to bioremediation, involving the addition of appropriate nutrients to enhance the activity of microbes that can break down the contaminants in the soil. This approach can be used where the organic contaminants biodegrade over time to non-toxic constituents.

Inorganic Contamination:

By far, the most common technique involves solidification/stabilization (S/S) of the soil, which acts to bind or immobilize the inorganic chemical contaminants so they cannot leach or migrate into groundwater or the environment. The soil is mixed with agents like fly ash, lime or cement to create a solid underground block, preventing any contaminant leaching. This S/S process can be performed either *in-situ* or *ex-situ*. S/S is generally not chosen for organic contamination because of uncertainties about its long-term effectiveness. Although not as common, soil washing can be used to remove inorganic contaminants in some cases. At a large site in New Jersey, an innovative soil washing process has been used to remove arsenic from sandy soil, allowing nearly 95% of the soil to be returned to the site clean.

The Libby Groundwater Superfund Site is located on the western edge of Libby, Montana, USA. A wood-preserving operation contaminated the soil and the groundwater at the site with two wood preservatives.

Radiological Contamination:

Unfortunately, radiological contamination does not lend itself to any form of treatment, and the contaminants can remain toxic and dangerous for many thousands, millions or even billions of years. As a result, radiological materials must be removed via excavation and transported to a facility specifically developed and approved for such long-term disposal. Excavation and off-site disposal is therefore the selected remedy for such Superfund sites.

Metal Contamination:

Bioremediation can sometimes be used to extract contaminants (typically metals such as arsenic or lead) from soil. Fast growing plants such as ferns, or trees such as willows or poplars, can draw the metals out of the ground; the plants themselves must then be harvested and disposed of at an appropriate, licensed disposal facility.

Under some circumstances, the chosen approach to manage the risks from contaminated soil is containment. In a containment remedy, the goal is to isolate the contaminants in place, preventing humans or other organisms from being exposed to them. This approach is typically used for large landfills and for some contaminated sediment sites (described further below).

Groundwater Contamination

Groundwater remediation techniques have evolved over the years. Early on, pump-and-treat remedies were almost exclusively chosen to clean up groundwater contaminated with both organic and inorganic chemicals. More recently, treatment techniques such as *in-situ* chemical oxidation (ISCO) and *in-situ* bioremediation have been shown to be effective in dealing with certain kinds of contaminants. And sometimes doing nothing is a satisfactory solution, allowing natural processes to carry out the cleanup.

Pump and Treat Systems:

This involves installing extraction wells in contaminated aquifers and construction of a treatment plant to remove the contaminants. The contaminated groundwater is pumped from the wells, treated in the plants, and then either pumped back into the ground (aquifer recharge) or discharged to a nearby surface water body. A considerable number of these extraction and treatment systems continue to operate today, and may have to remain in operation for decades. Although pump-and-treat remedies may still be appropriate in some cases, other less expensive techniques are being employed with increasing frequency. Among them are —

In-situ Technologies:

Chemicals (for ISCO) or nutrients (for bioremediation) are pumped into the ground through wells, allowing the contaminants to be treated in place. In an ISCO system the introduced chemicals react with the contaminants to form harmless or much less toxic compounds. In bioremediation, nutrients stimulate microbes which degrade the contaminants.

Reactive permeable barriers:

RPBs are a newer, innovative method for dealing with lower levels of groundwater contamination. In a typical installation, a vertical underground "wall" containing iron filings or other reactive material is installed in the path of a groundwater plume. As the contaminated groundwater passes through the wall, the organic chemicals react and are oxidized to form harmless compounds. As a passive approach, RPBs offer potentially large cost savings compared to more energy-consuming remedial technologies.

Monitored natural attenuation:

MNA is often a component of today's groundwater remedies. MNA (sometimes referred to as Mother Nature's way) can deal with inorganic contaminants which attenuate or stick to soil or sandy particles in aquifers. It can also address lower-level or residual organic contamination (e.g., via biodegradation or even simple dilution).

Landfills

Due to their large size – often covering dozens of acres – as well as the typical comingling of wastes and contaminants, landfills containing toxic wastes are almost always remediated through some combination of containment approaches. There is simply too much material in a large landfill for it to be excavated and moved to another, better landfill. The purpose of a containment remedy is twofold – first, to isolate the contaminants so that humans and other organisms don't come into contact with them; and second, to keep the contaminants from 6migrating through the ground or groundwater.

Capping is almost always part of the containment system. Appropriate material is placed on top of the landfill to prevent exposure and reduce the amount of rainwater that can percolate down through the landfill wastes and further contaminate groundwater below. Caps can range from a very simple layer of a foot or two of clean soil, to a complex, multi-layered system that includes a dense clay layer and an impermeable plastic layer to prevent any rainwater from percolating down. Some landfills also require the installation of an underground vertical wall around them to further inhibit the movement of contaminated groundwater away from the landfill. Such underground walls are typically made by pouring a slurry of clay-like material into a deep trench; they are therefore known as slurry walls. A leachate collection and treatment system handles contaminated water drawn off from underneath and near the edges of the landfill, preventing further migration of contaminants.

There is not much that can be done to reuse a closed landfill that has been capped. The cap needs to be maintained indefinitely; in many cases this means that trees cannot be allowed to grow on the cap since their root systems could destroy its integrity. Golf courses have been built on top of some old landfills; and recently it has been recognized that closed landfills may be excellent locations for solar energy installations. The solar panels can be installed on top of the landfill, taking care that the installation doesn't damage the cap. Alternatively, there are now plastic landfill caps that have photovoltaic cells built right into them; these kill two birds with one stone, acting both as an impermeable barrier to prevent infiltration of rainwater, and as solar panels to generate electricity.

Images courtesy of US EPA

This site was the location of Brockton Gas Works, Brockton, Massachusetts, from 1989 to 1963. The potential for contamination meant it was designated a brownfield site, so it held little appeal for redevelopment. Following remedial activities and capping, the site was turned into a useful, renewable energy source with the installation of approximately 1,400 solar panels, providing 425 kilowatts of electricity directly into the local grid each day.

Treatment Technologies

At the end of the day, many of our cleanup approaches don't actually turn toxic wastes into benign substances. Rather, they focus on managing contaminants so as to reduce or eliminate risks to humans and other organisms from exposure to the dangerous substances. Even if contaminated soil or sediments are excavated and transported to a secure, licensed, permanent disposal facility (a high-tech landfill), their toxicity has not been reduced – just relocated to a much safer and better managed resting place.

The same is true for a typical pump-and-treat system that rids groundwater of TCE, PCE or similar common pollutants. The groundwater is pumped to a treatment plant. There the water may be passed through a stripper, in which air is bubbled through the water extracting the organic chemicals in a gaseous form; these gasses then pass through a column of granular activated carbon (GAC — something like ground up charcoal), which extracts the chemicals before the air is vented back outside. Alternatively, or in addition, the water itself can be passed through a bed of GAC which similarly extracts the chemicals leaving clean water to be discharged. Either way, the contaminants are now out of the water but in the GAC. From time-to-time, therefore, the GAC has to be replaced. The spent GAC is itself then either disposed of in a secure facility; or, depending on the contaminants and the economics, it can be reconstituted by heating it to drive off the contaminants. The contaminants, now liberated from the GAC, can be passed through an afterburner and – finally! – converted by combustion into less harmful compounds like carbon dioxide and water vapour. But even at this stage of the process some harmful air pollutants are formed (for example, from the chlorine atoms in the TCE and PCE). These, in turn, will typically be captured by an air pollution control device called a scrubber; and, of course, the scrubber waste may now be contaminated with hydrochloric acid, that gets neutralized by the addition of lime, forming a sludge that is typically disposed of in … a secure, licensed facility!

Contaminated soil or sediment can also be "washed" with various chemicals to remove the contaminants. Typically, about 80% of the original volume ends up clean; the remaining 20% is where the contaminants are concentrated. This residual is generally sent to … you guessed it, a secure disposal facility.

Contaminated soil or sediment can also be treated with thermal destruction. The material is subjected to high heat in a furnace or kiln. Organic contaminants like oil, benzene or toluene may be completely converted to essentially harmless carbon dioxide and water vapour. The chlorine atoms in common chlorinated compounds like TCE, PCE or PCBs will be captured in the air pollution control device and eventually disposed of in … yes, a secure disposal facility.

Sometimes, serendipitously, contaminants can be treated with other chemicals so that the end product is completely non-toxic and may even have some commercial value. Regrettably, it is relatively rare that this is both chemically feasible and economically worthwhile.

The point is: there is no "free lunch." Once created, it is very difficult to really get rid of a toxic chemical. Somewhere along the way there will very likely be a residue of the toxic contaminants that can only be dealt with by placing it in a licensed hazardous waste landfill. We are very good at creating toxic chemicals; but not so good at eliminating them.

[1]Any opinions expressed herein are the authors own, and do not necessarily reflect the views of the U.S. Environmental Protection Agency.

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October, 2011

Mitigating the Threats Posed by Aquatic Invasive Species

By Dr Joe Caffery

What are invasive species and what threat do they pose?

Invasive species (synonym alien species) are non-native species whose introduction and/or spread threaten biological diversity or may have other unforeseen impacts. It should be noted that not all non-native species are invasive and that many represent the life-blood of agriculture, forestry and other important national industries. Others, however, can grow and proliferate unchecked and have the capacity to cause considerable ecological, economic and even health damage in infested areas. Invasive species represent one of the greatest threats to biodiversity worldwide, second only to that caused by direct habitat destruction. They also pose the greatest threat to fragile ecosystems, such as islands. Because rivers, lakes and watercourses generally provide efficient conduits for the dispersal of many invasive species, these habitats are particularly vulnerable to the spread of invasive species.

The estimated damage from invasive species worldwide totals more than $1.4 trillion – or 5% of the global economy. An estimated $100 million is spent annually to control aquatic weeds that clog waterways and alter natural ecosystems in the U.S. Controlling invasive aquatic species and repairing the damage caused by them costs European economies in excess of €12 billion each year. A recent report estimates that invasive species cost the British economy at least £1.7 billion annually.

'High Impact' Aquatic Invasive Species in Ireland

Aquatic invasive species represent a serious problem in most countries worldwide, and Ireland is no exception. Being a small island on the edge of Europe, Ireland has experienced fewer invasions by non-native species than countries on mainland Europe. However, increasing globalisation is accelerating the rate of non-native species introductions to Ireland, as evidenced by the fact that most of the problematic aquatic invasive species present in Ireland today were introduced in the last 20 years. Indeed, some have been first recorded here as recently as 2010.

The aquatic non-native species that are most invasive and that currently represent the greatest threat to biodiversity and commerce in Ireland ('high impact species') include the fishes – chub and dace, the macroinvertebrates – Asian clam, Zebra mussel, Chinese mitten crab and Bloody red shrimp, the riparian plants – Giant hogweed, Knotweed species (including Japanese, Giant and Bohemian) and Himalayan balsam, and the aquatic plants – Curly leaved waterweed, Nuttall's waterweed, New Zealand pigmyweed, Parrot's feather, Fringed water lily, and Water fern. Risk analyses would indicate that a number of high impact invasive species that have not yet been recorded in Ireland or have only been recorded in very localised situations could present serious environmental hazards in the near future, if urgent action is not taken to halt their introduction and spread. These include Topmouth gudgeon, zander, Killer shrimp, Signal crayfish, Creeping water primrose, Water pennywort, among others.

What is being done to stop the introduction and spread of aquatic invasive species?

Inland Fisheries Ireland (IFI) is the lead agency responsible for the control and management of invasive riparian and aquatic species in the Republic of Ireland. IFI works closely with the National Parks and Wildlife Service (NPWS) and Northern Ireland Environment Agency (NIEA) to coordinate its response to this ever-growing threat. Additional funding to support IFI in this effort has been sourced both nationally and from Europe. In this regard IFI has been successful in receiving European funding through the Life+ (CAISIE, Mulkear and Duhallow) and Interreg (CIRB) Programmes.

In recent years IFI has commenced many biosecurity initiatives aimed at preventing the introduction and spread of invasive species and fish pathogens. Foremost among these has been the creation of awareness among key stakeholders and the public at large regarding the serious threats posed by invasive species and what measures can be taken to halt the advance of these harmful organisms. To this end IFI has produced and widely disseminated informative literature (including calendars, information leaflets and posters species alerts) regarding the invasive species that are present in Ireland, those that could invade in the near future. Advice concerning what to do if you encounter a potential invasive species and how to prevent the introduction and spread of these species is also provided. This literature is supported by regularly updated and interactive websites (e.g. www.fisheriesireland.ie, www.caisie.ie) and through social media such as Twitter and Facebook. Traditional media outlets have also been utilized to spread the work and significant coverage for invasive species has been given by the written media, and local and national radio and television.

Signage that alerts the public to the presence of invasive species at a site or in an area, and that presents information on the imminent threat, is vital. IFI is currently erecting highly visible invasive species signs at infested sites throughout the country and the reaction to these has been very positive.

Education relating to invasive species is crucial and IFI has produced a diversity of materials and initiatives to promote this. Something Fishy (www.somethingfishy.ie) is an education outreach programme, funded by IFI, that promotes learning about fish and the environment among primary school children. This national curriculum programme currently features a module on invasive species and is being well received by schools throughout the country. The IFI website also supports an invasive species TV that presents video identification for some of Ireland's high impact invasive species. To further aid in the identification and control of invasive species, IFI scientists have conducted ID training courses and given practical demonstrations on control methods (e.g. www.faw.ie/himalayan-balsam-bash/) to a wide diversity of stakeholder groups throughout the country. These have been supported by the production of laminated identification cards on a key ring. In addition, information articles and scientific papers have been produced to ensure the widest dissemination of information.

It is clear that the public and stakeholder groups are concerned with invasive species and are anxious to be involved in stopping their introduction to and spread within the country. Towards that end, IFI has made available a 24 hour, manned emergency number (1890 343724 or 1890 FISH 24) that can be used to directly report invasive species sightings. Additionally, an app for smart phones (both android and iPhone) has recently been launched by IFI. This will aid users in the identification of invasive species and permit them to take georeferenced photographs that will immediately be uploaded to the IFI server. The information so received will be reviewed, uploaded onto the IFI species database and, if the sighting is of something new or particularly worrying, will trigger an immediate on-site survey by IFI staff.

A suite of biosecurity protocols has been produced by IFI (www.fisheriesireland.ie). These detail the correct procedures that should be taken to disinfect field sampling equipment, angling tackle, boats or scuba diving gear that could act as vectors in the spread of invasive species or harmful fish pathogens.

A major biosecurity initiative undertaken by IFI in recent years has been the roll-out of a coordinated disinfection procedure for use at freshwater angling competitions. Competitors are informed in advance of the event that they will be required to disinfect their angling nets, net carrier bags and waders before they can register for the competition. Marked disinfection bins, rinse bins and invasive species disposal bins are provided. Having disinfected their gear the anglers are presented with a coded wrist band, which they present as proof of disinfection at the competition desk. The feedback from anglers towards this initiative has been extremely positive and it is anticipated that disinfection will become an integral part of most angling competitions in the future. IFI is currently exploring the possibility of having permanent disinfection facilities at key angling centres, although such facilities are present at only a few locations at present.

It is in everyone's interest to stop the introduction and spread of invasive species and fish pathogens. IFI is to the fore in advancing biosecurity initiatives that will promote responsible angling and water-based recreational usage. However, without the assistance and cooperation of key stakeholders and the public, all of this effort will be for naught. The basic identification and reporting tools are available and those interested are strongly urged to be watchful for unusual and potentially invasive species and to immediately report such sightings to IFI.

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Lake Monitoring & Water Quality

Images courtesy of EPA

Derryclare Lake in Connemara. Classified at high status for all chemical, biological and morphological elements.

Significant alterations to the lake outlet, such as this dam at Accorrymore Lough in Mayo, results in an otherwise high status lake being downgraded to good status.

An accumulated phytoplankton bloom on L. Cullaunhyeeda in Co. Clare. This lake was classified as moderate ecological status for both biological and chemical elements.

Submerged aquatic plants like these pipewort (*Eriocaulon aquaticum*) and water lobelia (*Lobelia dortmanna*) are used to assess the biological status of lakes.

By Ruth Little

Introduction

Since the introduction of the Water Framework Directive (WFD) in 2000, there has been a new approach taken to how lake water quality is monitored in Ireland. Biological measurements of the plants and animals in each lake are now included in the monitoring programme, in addition to the traditional chemical measurements, to give an overall picture of ecological status as opposed to just water quality. In order to meet the requirements of the WFD, the Environmental Protection Agency (EPA) has established a national lake monitoring programme and developed a series of biological tools and chemical standards to allow for the classification of lakes into five status classes, High, Good, Moderate, Poor and Bad. The objective of the WFD is to ensure that all lakes are of at least good status and that lakes of high status do not deteriorate.

National Lake Monitoring Programme

Over two hundred lakes are currently sampled as part of the national lake monitoring programme (Figure 1). Most of the lakes are located west of the Shannon or in the border counties reflecting the natural distribution of lakes in Ireland. The surveillance monitoring lakes are used to measure long term trends in water quality while the operational monitoring lakes have been identified as at risk of failing to meet the requirements of the WFD.

The national lake monitoring programme began in 2007 and runs on a three year cycle. Water samples are collected from each lake at least four times a year and tested for a wide range of chemical parameters. As biological communities usually respond more slowly to gradual changes in their environment, the biological sampling is carried out once every three years, apart from phytoplankton which are sampled annually. Fish, aquatic plants, phytoplankton and benthic diatoms are used to assess water quality and a number of biological tools have been developed specifically for this purpose. These biological tools and the boundaries used for the status classes have been compared with methods and boundaries used in other countries in Europe to ensure their comparability.

Assigning Status

Both the biology and chemistry are used to assess water quality and assign status. The concentrations of ammonia, dissolved oxygen, total phosphorus and the level of pH are indicative of pollution levels. Certain priority dangerous substances – pesticides and heavy metals are also monitored to assess chemical status. Diatoms and phytoplankton, microscopic algae found along the lake shore and in the water column, assess status based on how sensitive to pollution the species found in each lake are. Different measurements of the plant community, for example, the average depth at which plants can be found growing or the maximum depth of colonisation, are also used to assign status, as are the amount of fish present in a lake and the species caught. The results of the chemical and biological assessments are combined to produce overall ecological status. A "one-out-all-out" rule is used in that it is the lowest status which assigns overall ecological status. High status is dependent upon agreement among both biological and chemical scores. But if any single element is a different status, then the overall classification is based on the lowest status recorded. Lakes cannot be at high status if they are infested with certain invasive species such as zebra mussels or roach or if it they have significant alterations at the outlets e.g. a dam or a weir. In such cases, high status lakes will be downgraded to good status.

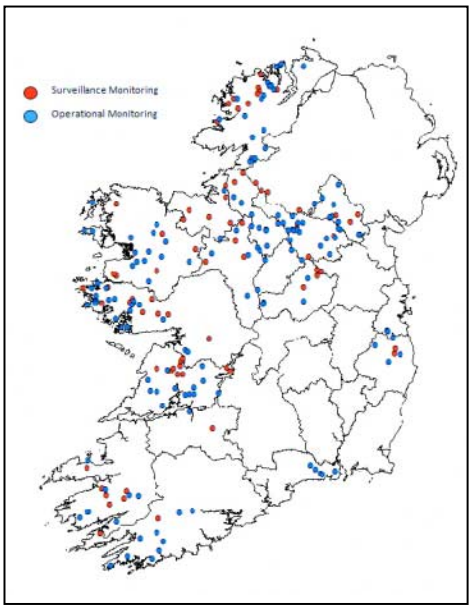

Figure 1. The 222 lakes sampled as part of the WFD national lake monitoring programme.

In the period 2007 – 2009, 20 of the 222 lakes sampled were classified as being at high status (Figure 2). Three lakes at high status were downgraded to good status because of significant alterations to either their shorelines or their outflows. Eighty five lakes were considered at good status and ninety two lakes at moderate status. Twenty five lakes were classified as being in either poor or bad ecological status.

Overall, the EPA's monitoring programme indicates that 47% of the lakes sampled are in high or good status, with the majority, 38%, in the latter category. 53% of the lakes sampled were moderate status or worse and currently do not meet WFD requirements. Lake water quality has remained relatively static over recent decades as lakes respond slowly to measures to reduce nutrient inputs. Phosphates and nitrates remain the main cause of pollution in Irish lakes. Too much of these nutrients leads to excessive growths of phytoplankton in the water. Excessive amounts of algae can turn a lake green – and being green is not good for lakes. A programme of measures has been drawn up detailing a range of actions to combat pollution with a view to meeting the objectives of the WFD. The main task facing catchment managers is to reduce the amount of phosphorus, in particular, that flows into our lakes each year. Nutrients from town sewage, farming, septic tanks and forestry have to be strictly controlled in order to improve the ecology of our lakes. Any actions taken to address river pollution are also the key to improving lake water quality as very few lakes have direct discharges to them.

Ruth Little, Environmental Protection Agency, John Moore Road, Castlebar, Co. Mayo. www.epa.ie For more go to http://www.epa.ie/downloads/pubs/water/

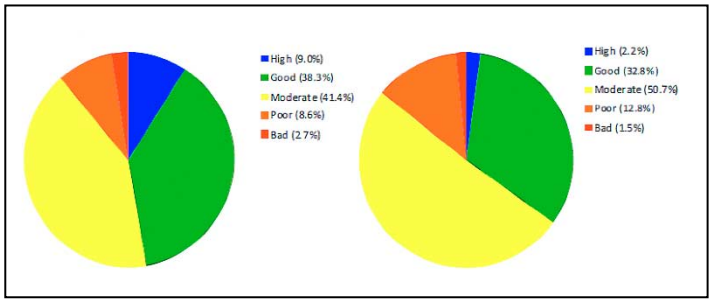

Figure 2: Final WFD Ecological Status based on (a) the percentage of lakes and (b) the percentage of lake area surveyed assigned to each ecological status category.

CORK COUNTY COUNCIL'S *Environmental Awareness Strategy*

By Mary Stack

In light of Ireland's recent ratification of the Aarhus Convention, which says that the public, both present and future generations, have the right to know and to live in a healthy environment, why is Cork County Council the only local authority with a dedicated strategy?

THE Environmental Awareness Strategy is a guide to the general public on key environmental awareness issues being promoted in Cork County and areas for their participation. It is intended for internal use by Council staff and its networking partners. The Environmental Awareness & Research Unit (EARU) manages the implementation of this strategy.

The Environmental Awareness Strategy aspires to promote environmental awareness in all societies throughout all regions of Cork County. It desires to increase environmental knowledge in the general public, and specifically targets businesses, industry, educators, youth, community groups, and NGOs.

An increase in environmental awareness can be achieved through a range of communications and by supporting community actions and behavioural change programmes. Ultimately these actions will drive our society towards an ecologically sustainable life style and sustainable work practices.

The EARU has many case examples to support the success of the programme and some of these are discussed here.

The five year strategy (2011–2015) outlines key areas of waste prevention, litter pollution, water conservation and pollution, biodiversity and climate change issues that require integration into education programmes.

Many of the objectives proposed in the Environmental Awareness Strategy work in harmony with other Council policies and plans. The strategy is driven by the Council's priorities as identified in the strategic and corporate plan, the Environment Directorates Operational Plan and the Waste Management/ Litter Plans and Climate Change Strategy.

Successful implementation will bring a positive relationship between local government and civil society, a collective responsibility for our environment and an ethic of partnership building. Citizens will be environmentally educated, aware and conscious. People will care for and protect their environment. Environmental quality will improve in terms of air, water and land.

The Environment Directorates Strategic Policy Committees (SPC) requested this strategy to give guidance and direction on environmental awareness for Cork Citizens. The Strategy promotes the involvement of citizens in environmental matters and thereby supports the Aarhus Convention.

Images courtesy of Cork County Council

From top left (clockwise): Helping Fota Wildlife Park reduce its carbon footprint; Environmental education through play; Educating the public on composting at Fota Wildlife Park; Helping street traders to green the Midleton Food Festival; Supporting Tidy Town groups and other committees; Helping Coolagown village near Fermoy, Co Cork, to reduce household waste; Greening Council swimming pools; Working with marina owners to achieve Blue Flag status.

Examples of case studies

Case study 1: Fota

Assisting Fota Wildlife Park in making the park environmentally sustainable in its day to day operations may not be an obvious assignment for a Cork County Council employee. However, such actions are exactly what local authorities encourage and support in the implementation of their regional waste management plans.

Fota Wildlife Park is set on 70 acres on the scenic Fota Island in the heart of Cork Harbour – only 15 minutes from Cork City. Across the world, zoos are being greened through reducing the potential for any negative impacts on the local environment. As over 400,000 visitors visit every year, the public's footfall, while welcomed, places a strain on this wonderful natural habitat. Fota Wildlife Park is committed to reducing its carbon footprint by reducing its energy, waste and water consumption in its day to day operations. It is a great example of how the Council and business can work together and improve our environment through sustainable tourism.

Case study 2: Tidy Town Groups/Festivals

Working with Tidy Towns groups. Community groups such as Midleton Food Festival & Midleton Tidy Towns, Cobh Tidy Towns & Cobh Regatta committees have successfully greened their street festivals in 2010, 2011 and 2012. EARU provides consultation, advice, training and assistance to street traders, festival organisers and local town council staff in preparation of their festival. It is all about selecting partnership models that can support and compliment each others aims. We have a successful regatta, now can we run it in a sustainable way.

Case study 3: Swimming Pools

The EARU has successfully greened the Council's swimming pools at Fermoy, Mallow, Cobh and Dunmanway and have also trained numerous small businesses in waste prevention, water conservation and diversion of food waste from landfill.

Case study 4: Public offices & Buildings

EARU provides assistance to public offices and public buildings. From 2010–2011 an awareness programme was run in east Cork. It introduced environmental improvements in Town Councils and libraries. Waste and water conservation audits underpinned the action at work and programmes were generated for each building with staff trained and made aware of their role in reducing the Council's carbon footprint.

Case study 5: Blue Flag Marinas

Two privately owned marinas in Baltimore and Sherkin Island, West Cork are piloting the Local Authority Waste Prevention Programme & Clean Marinas Initiative. The initiative, sponsored by the EPA and Cork County Council, aims at introducing sustainable and best environmental practices for boat users. Through waste prevention, efficient use of nature's resources and avoiding pollution users can assist the marina owners to achieve Blue Flag status for Marinas.

Case study 6: Action at Work

Since 2008, through the EARU, Cork County Council is to the fore in implementing sustainable practices both across its own organisation and in assisting local businesses. Cork County Council has a strong commitment to waste prevention and through its participation in the Network is well placed to meet any commitments likely to arise from European and national polices.

Case study 7: Coolagown Village

In 2009, Coolagown village near Fermoy in Co Cork, took part in a pilot project aimed at reducing household waste. Assisted by the EARU, 22 householders in the village set out to reduce the amount of waste they were sending to landfill, as well as conserve water and energy in their normal day.

Case study 8: Green Schools

Green-Schools is an international environmental education programme and award scheme that promotes and acknowledges long-term, whole-school action for the environment. It promotes environmental management and sustainable development education for schools. The approach is a combination of learning and action for improving the environment of schools and their local communities. The programme influences the lives of young people, school staff, families and NGOs. The programme is implemented by An Taisce with the assistance and sponsorship of local authorities, such as Cork County Council.

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Sustainable Rural Development

By Catherine McMullin

THE 'urban – rural' divide is often quoted to explain disagreements between town and country dwellers over planning policies in particular. Life in the open countryside is compared to city living and it is not surprising that opinions are poles apart. However, comparing smaller towns and villages with the open countryside shows much less of a divide.

Many people believe that towns and villages are 'foreign' to Ireland and not really part of our heritage. It is true many of our principal towns were founded by invaders, be they Normans or Vikings, but quite a few began in the 7th century as monastic sites, e.g. Cashel, Clonmacnoise and Kildare. By the 11th century, many monasteries had developed paved streets and market places for local farmers to sell their produce. The Normans frequently built their settlements beside these earlier monastic sites

At the time of the Famine, it was estimated that about 90% of the population lived in the open countryside, compared to ca. 40% today. The earlier editions of the Ordnance Survey maps show that houses tended to be in groups. In the west of the country the 'Rundale' system of farming developed after 1700, where farm houses were in a cluster, called a clachan, with fields radiating out from them. The clachans were not villages in the normal sense, as they did not have shops, churches or other services for the rural dwellers.

The Gaelic revival of the late 18th/early 19th century created an interest in the Irish language and many people learnt it in the Irish speaking areas of the west. Other aspects of the local culture, such as old customs, music and story-telling, were also studied and a belief developed that the true heritage of the Irish nation had been preserved in rural areas only. De Valera's famous 'comely maidens' speech is an example of the thinking of the time, with much emphasis on rural areas and neglect of towns and villages. Indeed, up until the mid 20th century, it was felt that the smaller towns and villages had no economic future and should be allowed to 'die gracefully'.

The introduction of the Planning Acts in 1963 required local authorities to draw up Development Plans for their areas, showing where development could, or could not, take place. It was realised that building houses in towns and villages was much more cost-effective than in the open countryside. Usually services, such as water and electricity, were already in place, while access to church, school, shops and pubs reduced the need for private transport.

Meanwhile, in the open countryside, changes were also taking place. Rural electrification allowed machinery to be used for jobs that were done by manual labour previously. Tractors and other farm machines were introduced and reduced the workload considerably. There was no longer the need for a large workforce and many rural dwellers left the land to find jobs, either in nearby towns or abroad. The result was that the population in more remote areas began to drop significantly but rose dramatically in areas close to towns and cities where jobs were available. At the same time, many urban dwellers bought sites for houses in the countryside as the motor car now allowed them to commute to work. It is believed that at least half of the people living in the open countryside now have no direct connection with it and work elsewhere.

The Planning Authority recognised that urban generated housing is very damaging, particularly in scenic areas. There are other issues also, e.g. the necessity for relatively large sites (min. 0.2 ha) to allow for on-site domestic waste treatment systems, like the septic tank. Much good agricultural land is being lost to housing and it is becoming apparent in recent years that many treatment systems are defective and give rise to water pollution.

The planners tried to limit permission for houses to those who had a genuine need to live in the countryside, such as working there, but this led to much opposition from rural organisations. As a consequence, 'Sustainable Rural Housing Guidelines' were issued in April 2005, permitting persons with 'family ties' or 'roots or links to the local area' to get planning permission for houses on family land.

There are obviously benefits in permitting people to build close to their workplace but, at present, most of the permissions granted are to family members who work a considerable distance away and use private transport, which is getting much more expensive and is unsustainable in the long term. It is claimed that they need to live on the family land so that local schools, GAA etc. can survive and revitalise the area. In practice, these facilities are most likely to be found in the nearest small town or village, which is often suffering major population loss.

The official definition of a rural area used by the Central Statistics Office includes the open countryside and villages up to a population of 1,500 persons. This is perfectly sensible as country dwellers use the services and social facilities of the village and know the inhabitants. The Guidelines also recognised the importance of the smaller towns and villages but, by encouraging children of landowners to build on family lands, an opportunity to revitalise the villages and surrounding area is being lost.

The present situation is unsatisfactory from a planning point of view because there is no way of predicting where landowners will give sites to their children or where extra rural services, such as water, electricity and roads, need to be provided in the future. If more people could be encouraged to settle in the villages, it would strengthen them and make the loss of the school, post office, garda station etc. less likely. They would still be close to the family farm and their relatives and friends but would have better access to services, including pubs and public transport, not to mention job opportunities.

Bibliography

F.H.A. Aalen, Kevin Whelan and Matthew Stout (Editors). *Atlas of the Irish Rural Landscape.* Cork University Press, 1997

Patrick Shaffrey, *The Irish Town, an approach to survival,* The O'Brien Press, Dublin, 1975.

John Crowley & John Sheehan, (Editors). *The Iveragh Peninsula, a Cultural Atlas of the Ring of Kerry.* Cork University Press, 2009

Sustainable Rural Housing. Guidelines for Planning Authorities. Dept. of the Environment, Heritage and Local Government. April 2005

Urban Ireland, The Curriculum Development Unit, City of Dublin Vocational Education Committee, Trinity College, Dublin. O'Brien Educational Ltd.1982

Catherine McMullin is a member of An Taisce in Killorglin, Co. Kerry.

Publications of Interest

Field Guide to the Micro Moths of Great Britain and Ireland

Phil Sterling & Mark Parsons

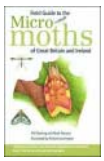
Illustrated by Richard Lewington

British Wildlife Publishing

www.britishwildlife.com

ISBN: 978-0-9564902-1-6

Price: £29.95stg/2012



The pioneering *Field Guide to the Micro moths of Great Britain and Ireland* finally arrived this summer. The smaller, but equally fascinating and beautiful moths have often been neglected, even by moth recorders, from perceived identification difficulties. This guide promises to change all that. Over 1500 artworks and photographs, displaying moths in their natural resting postures, bring to life more than 1000 micro-moth species in one most comprehensive field guide. Accompanying these figures in an easy-to-use format are highly informative texts for each species, 900 up to date distribution maps and a wealth of additional information to assist the beginner and expert moth recorder alike to enjoy, become familiar with and contribute to our knowledge of these under recorded creatures.

Gary Hedges

Françoise Henry in Co. Mayo
The Inishkea Journals

Janet T. Marquardt (Editor)

Four Courts Press

www.fourcourtspress.ie

ISBN: 978-1-84682-374-9

Price: €35.00 (hb) €17.50 (sb) / 2012

Françoise Henry, who taught at UCD, was one of the most important 20th century historians of Irish art. In 1937, she visited the remote island of Inishkea North (Co. Mayo) in advance of excavations to search for early medieval remains. She also returned in 1938, 1946 and 1950. With each visit, she kept detailed technical notes on the archaeological material on the island and also kept personal journals of the natural world and local culture of the island at the time.

These journals were recently discovered in the records of the Royal Irish Academy, translated from the French by Huw Duffy and edited by Prof Janet T. Marquardt, Illinois University.

Henry was a most determined woman and seemed to be a person without any fear. Throughout her journal she gives detailed accounts of her interactions with the locals she employed, some were wonderful exchanges, other not so affable! Henry was very hard and stern taskmaster to those who brought her on her visits to the islands and helped her on the excavations.

She gives some wonderful accounts of the island's natural environment. Her description of the miracle powers of the Naomhóg, a statute that was brought to Inishkea North by one of the early Irish saints, is beautifully told.

There is a real heroine in these journals – Ann Cawley who was introduced to Henry in 1938 when she returned to the Mullet to begin her formal excavations of Inishkea North. She worked for Henry on her visits to the island each time she returned and was without doubt the 'go between' between Henry and the men who did the work for her on the island and transported her by currach. These journals give an insight into the highs and lows that Henry experienced whilst working on this remote island. They also highlight the difficult and at times horrendous conditions that the islanders off the west coast had to endure in years gone by when their only mode of transport was the currach.

Matt Murphy

Rooted in the Soil
A history of cottage gardens and allotments in Ireland since 1750

By Jonathan Bell & Mervyn Watson

ISBN: 978-1-84682-327-5 (pb)

Four Courts Press

www.fourcourtspress.ie

Price: €45.00 (hb) €24.95 (sb)/2012

This book examines the development, social history, cultivation techniques and even the wider political significance of small garden plots in Ireland over two and a half centuries. A constant theme is the value of cottage gardens, small urban plots and allotments to agricultural and social improvement in a country where poverty has long been a problem.

The 19th century saw the growth of moves to improve small gardens from pre-Famine potato (and cabbages) patches to productive plants that incorporated advances in horticulture and an ever-greater variety of available seed. Schools began to take a greater interest in leading 'rural science', including Padraig Pearse's famous St. Edna's School. Allotment Acts in Northern Ireland and the Irish Free State helped promote an allotment movement, which gained momentum during the food scarcity of two World Wars. In the 1970s, supermarkets nearly finished allotments but they have survived to witness a major revival.

The authors show how it is still the public good what benefits from these small productive plots – they are a manifestation of the sustainable environmental policies promoted by today's governments – just as in the days when well-meaning reformers saw gardening as a means to help and 'improve' the poor. Above all, the book shows how allotments engender good health, good food, satisfaction to their owners, and a convivial social atmosphere out in the plots. The book has plentiful footnotes and an extensive bibliography of often obscure literature.

John Akeroyd

The Grasses of Ireland

By John Feehan, Helen Sheridan, Damian Egan

ISBN: 978-1-905254-61-3

Teagasc

www.teagasc.ie

Price: €30.00/2012

Ireland is a land of grass – the Emerald Isle famous for centuries for its grazing lands, cattle and dairy produce. Grassland, 90% of Irish agricultural land, skill lies at the heart of the nation's farming and culture. This book bravely seeks to help those who wish or need to know more about Irish grasses, most of whom will be non-botanists (even most botanists are deterred by grasses). It is both an illustrated account of the native and principal introduced genera and species, and an identification guide. There are keys (by Tony Farragher) to flowering and vegetative grasses, notes on identification – tips of leaf-sheath colour, hairy- or bristly-leaved species, form of the spikelet and inflorescence etc.. – and a comprehensive bibliography. The accounts of the genera and species are discursive and copiously illustrated with historical coloured drawings and contemporary photographs. Introductory sections explore the external farm, structure, (wind) pollination and evolution of grasses, also their role in human society and maintaining biodiversity. The authors stress the ecological value of grasses, showing that Irish agriculture may at last be moving on from the green 'ryegrass' desert of the second half of the 20th century.

John Akeroyd

Paddle
A long way around Ireland

By Jasper Winn

Sort of Book

www.sortofbook.co.uk

ISBN: 978-0-95600-388-1

Price: £8.99stg/2011

Jasper Winn has been an adventurer since his first trip away from home at sixteen, when he hitched and busked through France and Spain – his mother having called time on his formal school education. Instead he trained falcons to hunt, rode horses and watched birds as well as serving apprenticeship as a harness-maker.

His first attempt to canoe around Ireland with his then partner Elizabeth ended just four days into the trip whilst waiting to round the Mizen. At midnight he woke in their tent in agony and by mid-morning was in hospital. The diagnosis was gallstones. Twelve months on he set out alone to canoe around Ireland. From the beginning of this extraordinary journey Jasper talks of his ups and downs. Again it was at the Mizen that he had his first major crisis, whether to continue or not. The Mizen is a place known for its harsh seas and unruly waves crashing under the lighthouse. Having successfully rounded it, he cited "now I'm paddling around Ireland for real". We journey with him across Bantry Bay through Dursey Sound, meeting there a basking shark competing with the sprat for tiny plankton. Paddling past the Skellig Islands, round Valentia Island and heading across the fourteen miles to Dingle Peninsula he gets caught in the tide. We live his nightmare of being away out in the open sea, his exhaustion, his chest heaving for breath as he make little or no progress, wondering will he end up out in the Atlantic. Eventually after seven hours paddling he makes Ventry Harbour.

The first 500 miles, the journey along the west coast to Malin Head took him two and a half months to paddle and only two and a half weeks to cover the next 500 back to the Mizen. However in between paddling he had great craic in the local villages and towns. In between his descriptions of his exploits around Ireland we learn much about Jasper's early years – stories of a free spirit. A wonderful read.

Matt Murphy

MEFEPO North Western Waters Atlas
2nd Edition – August 2011

By C. Nolan et al

Marine Institute

Download from: http://hdl.handle.net/10793/640

ISBN: 978-1-902895-49-9

Free/2011

The purpose of this atlas is to provide a broad overview of the ecosystem of the north western waters of Europe. It provides updated information on the physical and chemical features, habitat types, biological features, birds, fishing activities and other human activities taking place within the region. The information has been present through a blend of text, tables, figures and images. There is a glossary of terms and a list of more detailed scientific references for those interested in following up certain issues.

Each of the 20 sections includes an introduction with excellent maps. For example in one chapter we learn of the important spawning areas, where we are shown maps of the spawning and nursery grounds of the main fish stocks. Although this atlas is aimed mainly at stakeholders it would indeed be most useful education tool for schools. It can be downloaded at http://hdl.handle.net/10793/640.

Matt Murphy

Earth Wars
The Battle for Global Resources

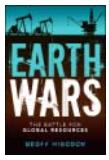
By Geoff Hiscock

John Wiley & Sons Singapore Pte. Ltd

www.wiley.com

ISBN: 978-1-118-15288-1

Price: £19.99stg/2012



Earth Wars takes an in-depth look on how interconnected our world has become in terms of the supply and demand for all sorts of resources, covering the four essentials; food, water, energy and metal's. Geoff Hiscock, a journalist and Asian business expert takes a in-depth look at our energy future, discussing the geopolitics behind the upcoming struggle that the world will face as the eminent energy crises approaches. The Chapters are sectioned into the relevant topics giving the read a more text book feel. Concisely put together they present a wide range of key facts incorporated well into the text, allowing not only the academic community to enjoy this highly researched publication but also anyone who takes a keen interest in these current affairs.

Matthew Sellwood

Children, Citizenship and Environment
Nurturing a democratic imagination in a changing world

By Bronwyn Hayward

Earthscan from Routledge

www.routledge.com

ISBN: 978-1-84971-437-2 (sb)

Price: £23.99stg/2012

This scholarly masterpiece explains how the foundations of global security lies in the hands of our children and that it is our responsibility as adults to provide them with the means to succeed. Bronwyn Hayward provides an educational model that nourishes democratic imagination and citizenship in children to deter them from neo-liberal thinking so that we may change, through the education of ecological citizenship the scaffolding of our society. This is a book full of hope that we can unite and re-structure politics so that it is one of collective thinking, critical reasoning, compassion and reliance on each other to maintain a sustainable world. I implore everyone to read it; it is inspirational and above all crucially instructional in how we can mould the social handprint of future generations for an environmentally just world. A self-help bible for societies worldwide in the combat against environmental destruction.

Jessica Richardson

Maritime Transport and the Climate Change Challenge

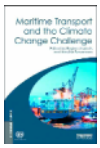
Edited by Regina Asariotis & Hassiba Benamara

Earthscan from Routledge

www.routledge.com

ISBN: 978-1-84971-238-5

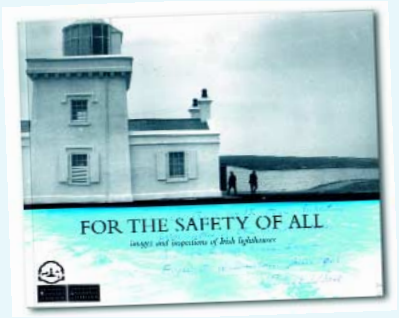
Price: £65.00stg/2012



Maritime Transport and the Climate Change Challenge is a collection of papers by some of the worlds leading authorities on climate change, global transport logistics and maritime engineering. It brings together the core issues drawn up and discussed at the United Nations Conference on Trade and Development's (UNCTAD) meeting on the impact climate change will have on global shipping. A concise and informative collection of information and opinions, it is unique in allowing the reader to, not only, access the diverse range of related topics; but, also the vast collection of contributor's insights. Whilst not a casual read the topics covered will undoubtedly be informative and insightful, on the future of global shipping, to those with close personal and academic links with the maritime industry.

Stuart Sheldon

For the Safety of All



A Review by Matt Murphy

IN 1883 the Commissioners of Irish Lights engaged the services of Dr Robert Stawell Ball, astronomer and mathematician, as their Scientific Adviser, to assist them in the optical development of lighthouse technology. In doing so they not only gained scientific knowledge but also one of the most talented amateur photographer of the late 19th century.

For 29 years Sir Robert Ball (he was later knighted) was part of the committee that annually inspected the lighthouses, beacons, buoys, perches and lightships around the entire coast of Ireland. As a scientific advisor, Ball was consulted on many aspects of lighthouse equipment, especially the functioning of the beam. On those visits he took photographs of the people and coastal communities of the period, along with images of lighthouses and ships and the operational methods and equipment used at the time– in short a unique visual history of the Irish Lighthouse Service.

The National Library of Ireland in association with the Commissioners of Irish Lights published a magnificent photographic book of some of these photographs, taken over 100 years ago.

Sir Robert Ball's images, which were in print, glass negative or glass lantern slide format were stored away, in some cases for over 100 years. They only came to light in recent years when a review of historical material was being carried out in the archives of the Commissioners of Irish Lights. The entire collection was donated to the National Photographic Archive – the photographic section of the National Library of Ireland – where it could be professionally cared for and made accessible to the general public.

The book, featuring a selection of photographs from the collection, is divided into eight chapters: *The Annual Tour, Landings, Inspection Time, The Fastnet, Old Stones, Vessels, Any Shape or Form* and *Keepers*.

The photographs begin with a magnificent view of the old Mizen Head bridge, the first reinforced concrete arch bridge in Ireland (which has recently been replaced). Throughout the book the dangers of these visits are obvious, with the relief ship anchored in the distance and equipment, supplies and people being landed by row boat. To see how the foundations to the Mizen Head Fog Station were carried out is fascinating and there is a wonderful picture of a man with a hand pick breaking rock for the foundations and then another of the completed building. The book has beautiful images of children on Inis Mór, Aran Islands, where they acted as tour guides. We also see the keepers' children at Fanad, Co. Donegal and Galley Head, Co. Cork, dressed in their Sunday best for the inspectors' visit. What is so striking throughout the book is that most of the men have either moustaches or beards!

The real gems are the photographs of the construction of the new Fastnet Lighthouse in 1903–4. We see how the 2074 granite blocks were hoisted into place – all hand-operated by means of ship's tackle and rigging. There is a view of the new tower and the nearly demolished old tower. There is an extraordinary photograph of workers sheeting the dome of the unglazed lantern, which would house the lamp and optic. The three men have no safety harness and are 170 ft up. The present day Health and Safety people would have a field day!

These are only a few of the over 100 wonderful images in this book. We are very fortunate that these images (along with the many others in the collection) have been preserved in the National Library of Ireland and that they have been brought to life in this book – they are a treasure. The book is an ideal present for anyone interested in the sea.

This book called For the Safety of All – images and inspections of Irish Lighthouses *costs €13.00 per copy plus packaging and postage at the following rates: Ireland: €3.00 / Overseas: €3.75. Payment by cheque only should be made payable to the Commissioners of Irish Lights, and posted to: Corporate Services Department, Irish Lights Office, Harbour Road, Dun Laoghaire, Co. Dublin, Ireland. Published by National Library of Ireland in association with the Commissioners of Irish Lights. ISBN: 0907328369.*

Images courtesy of National Library of Ireland

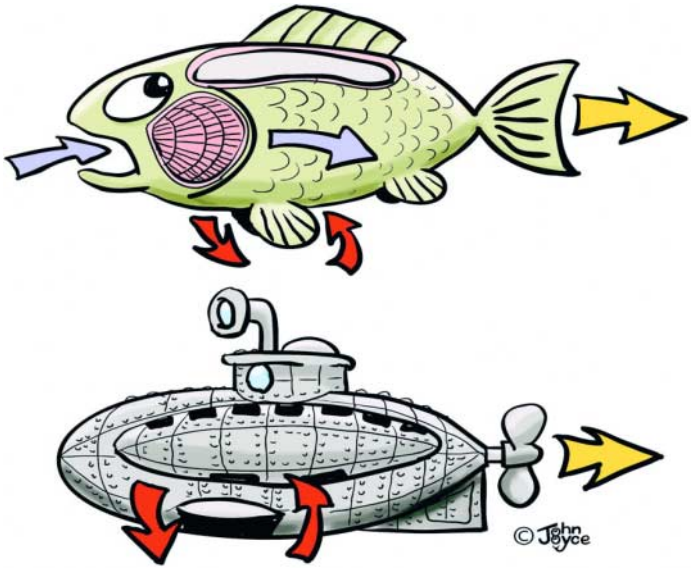
The new Fastnet tower, off the coast of Co. Cork, and the remains of the old tower being demantled.

Crew members hauling in a buoy sweep, in what began as white uniforms. One wonders who did the washing?

A bosun's chair, used to hoist men on to or off stations where landing conditions were poor, as shown here at Fastnet.

JUNIOR PAGES

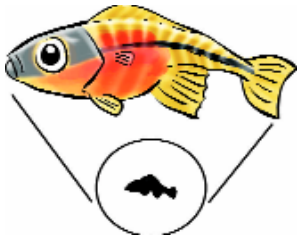
FASTEST, LARGEST, SMALLEST – The Fantastic World of Fish



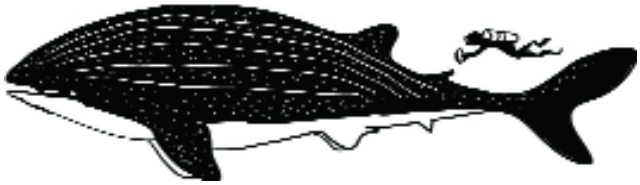
Fish – Nature's Natural Submarines!

The developers of the modern submarine must have got their inspiration from that natural submarine – the fish. Like a fish's swim bladder, submarines have 'ballast tanks' containing air that allow them to float at 'neutral buoyancy' without having to put any effort into staying at a particular depth. The fish's powerful tail is replaced by a propeller and the fins that allow a fish to 'fly' underwater are replaced by diving planes. Unlike the crew of a submarine however, fish can even breathe underwater with their gills – blood filled membranes that absorb oxygen from the water and allow carbon dioxide to be released.

The Smallest and Largest Fish



The smallest fish so far recorded lives in the forest swamps of the Indonesian island of Sumatra and belongs to the carp family – which includes the common goldfish. It is only 7.9 mm long and so small that it will easily fit onto your fingernail.



The largest fish in the world is the Whale Shark, which is harmless and feeds on plankton by filtering seawater. The largest ever recorded was 12.65 metres long and weighed 21.5 metric tonnes. The largest gathering of Whale Sharks occurred in 2011 when over 400 gathered off the coast of Mexico, to feed on eggs produced by tunny fish.

Captain Cockle's Log

Log onto
www.captaincockle.com

Speedy Sailfish Clock Over 100 Kms per Hour

The Indo-Pacific Sailfish (*Istiophorus platypterus*) lives life in the fast lane! Not only is it the fastest swimming fish in the sea – clocking up an incredible 100 kilometres per hour (68 miles per hour) – faster than a cheetah can run – it also grows at an incredible rate. Young sailfish hatch from eggs within 36 hours and grow to be two metres long within twelve months. They feed on squid, flying fish and anchovies and can retract their large dorsal fin when travelling at speed.

Sailfish are found in the warmer water regions of the Pacific and the Atlantic, where they grow to a maximum size of around three metres. The largest sailfish ever captured was caught in 1994 and weighed 64 kilos.

To see a great video of sailfish in action, check out the great National Geographic video on http://www.youtube.com/watch?v=spkjQ3c_AjU

Fish that Fish for Fish

Unlike Sailfish, Angler Fish wait for their food to come to them. Deepwater species have a luminous lure powered by phosphorescent bacteria to catch unwary prey. In the deep oceans it is so difficult for a female Angler Fish to find a mate that male fish, once found, actually attach themselves to the female's body.

Other species, that live in shallow European waters, disguise themselves to blend into the bottom and then jiggle their lures to fish for food.

Learn about birds with BirdWatch Ireland

Feeding Wild Birds Leaflet
Download this leaflet from the Learn about Birds section on BirdWatch Ireland's website at www.birdwatchireland.ie

Learn how to identify the birds in your garden with our **Free Garden Bird Charts**. Send a SAE to: *BirdWatch Ireland, P.O. Box 12, Greystones, Co. Wicklow.*

BirdWatch Ireland has over 10,000 members and has branches throughout the country which organise events and outings in your area. Why not get your school to join? Write to us or visit our website for details: www.birdwatchireland.ie

BirdWatch Ireland has two educational web sites, catering for learning about birds in schools.

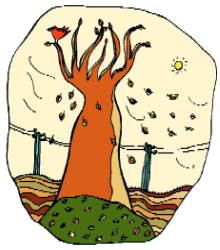
- Visit the Working with Birds web site to learn about watching and feeding birds

Simply go to **www.birdwatchireland.ie** and go to the 'learn about birds' section

BirdWatch Ireland, P.O. Box 12, Greystones, Co. Wicklow.
Tel: 01-2819878 Fax: 01-2819763
Email: info@birdwatchireland.ie

Website: www.birdwatchireland.ie

Birds & Weather



BIRDS are eye-catching. Because of this it is easier to see the effects of weather on them than on other wildlife.

By BirdWatch Ireland

Wind Direction

Wind from the north is cold and from the east is cold and dry. Wind from the south is warm and from the west is warm and wet.

A north or east wind may make the birds move south or west, to escape cold weather. In spring, a south or south-west wind may help the summer visitors migrating to this country from Europe and Africa.

- Watch the TV weather forecasts for details of wind directions.
- Work out how this might make birds move.

Measuring Wind

Use a local weather-vane to find the direction of the wind and:

- Note down the wind direction at the same time every day for a week.
- Note down whether the wind is light, breezy or strong.

At the same time, watch what the birds are doing. Are they mostly flying or perched (sitting), are they out in the open or sheltering?

Air Pressure

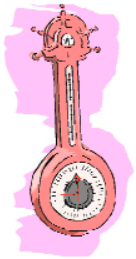
When pressure falls, weather becomes wet or windy. As it rises, weather improves. Birds move away from low pressure to avoid bad weather and choose times when the pressure is high to set out on long migratory journeys.

Image courtesy of Robbie Murphy

Gulls move inland during stormy weather.

Measuring Air Pressure

Use a barometer to measure the pressure at the same time of day for a week. If you have no barometer, use the 'state' of the weather instead.



- 'Bad' weather (cloudy, wet, windy) means that pressure is low.
- 'Good' weather (clear sky, dry, calm) means that air pressure is high.
- Watch the TV weather maps to see the high and low pressure areas. Work out how they will affect the birds.

Conclusions

- What connections can you find between your weather records and the numbers of the birds in your area and what are they doing?
- How important is the state of the weather to the birds staying alive?

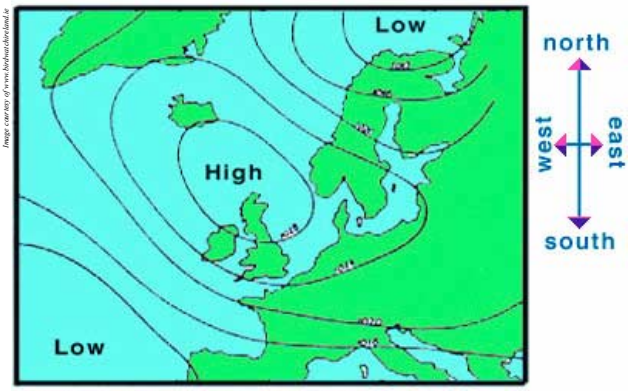


Image courtesy of www.birdwatchireland.ie

In winter high pressure like this would cause dry but very cold weather over Ireland.

Image courtesy of Robbie Murphy

In spring, a south or south-west wind may help the summer visitors (such as the swallow) migrating to this country from Europe and Africa.

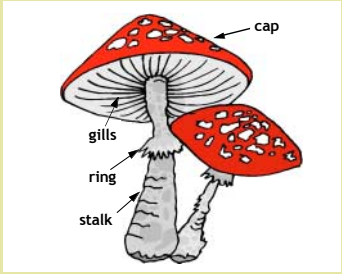
MUSHROOMS & FUNGI

MUSHROOM WORDSEARCH

autumn
cap
food
fruiting bodies
fungi
gills
kingdom
medicine
poisonous
puffball
spores
stalk
toadstool

(Answers below)

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



By Jenna Poole

MOST of our large mushrooms and toadstools emerge in late summer and autumn and can be found in woodlands and unimproved grasslands (those without too much fertiliser or pesticide applied). Species are identified by the presence of gills or pores, their size and colour, and even the smell!

Mushrooms and toadstools are types of fungi. They are the fruiting bodies of much more complex organisms. These organisms are made up of hidden networks of hair-like strands (called hyphae), which send up the more obvious fruiting bodies when reproducing.

All fungi lack the chlorophyll that makes plants and trees green, and they reproduce by spores, instead of pollen-fertilised ovules that become seeds.

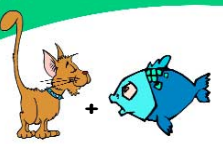
Once called non-flowering plants, fungi now have their own Kingdom (in the same way as animals and plants do). As well as mushrooms and toadstools, this Kingdom also includes yeasts and moulds.

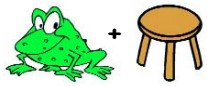
Fungi actually have a very important role within most ecosystems. They break down organic matter such as leaf litter and dead wood, which helps create fertile and healthy soils. Man uses a number of fungi species to make medicines, most famously penicillin, which Sir Alexander Flemming discovered in 1928.

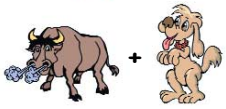
(Text from "Nature's Web" No. 15 www.naturesweb.ie)

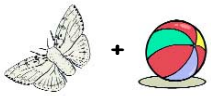
Mushrooms should never be collected without help from a knowledgeable fungus expert, as many species can be DEADLY POISONOUS!

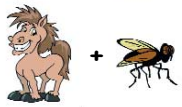
In Other Words

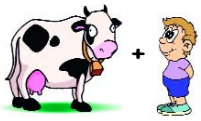
a  =

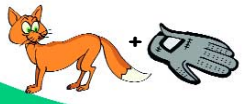
b  =

c  =

d  =

e  =

f  =

g  =

Join the two words to make a new word!

(Answers below.)

WORDS WITHIN WORDS

Mycology is the study of mushrooms. How many words of two or more letters can you make from the word MYCOLOGY?

We can find 20. Can you find more?

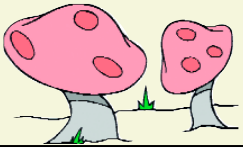
(See list below)

Hidden in Plain Sight

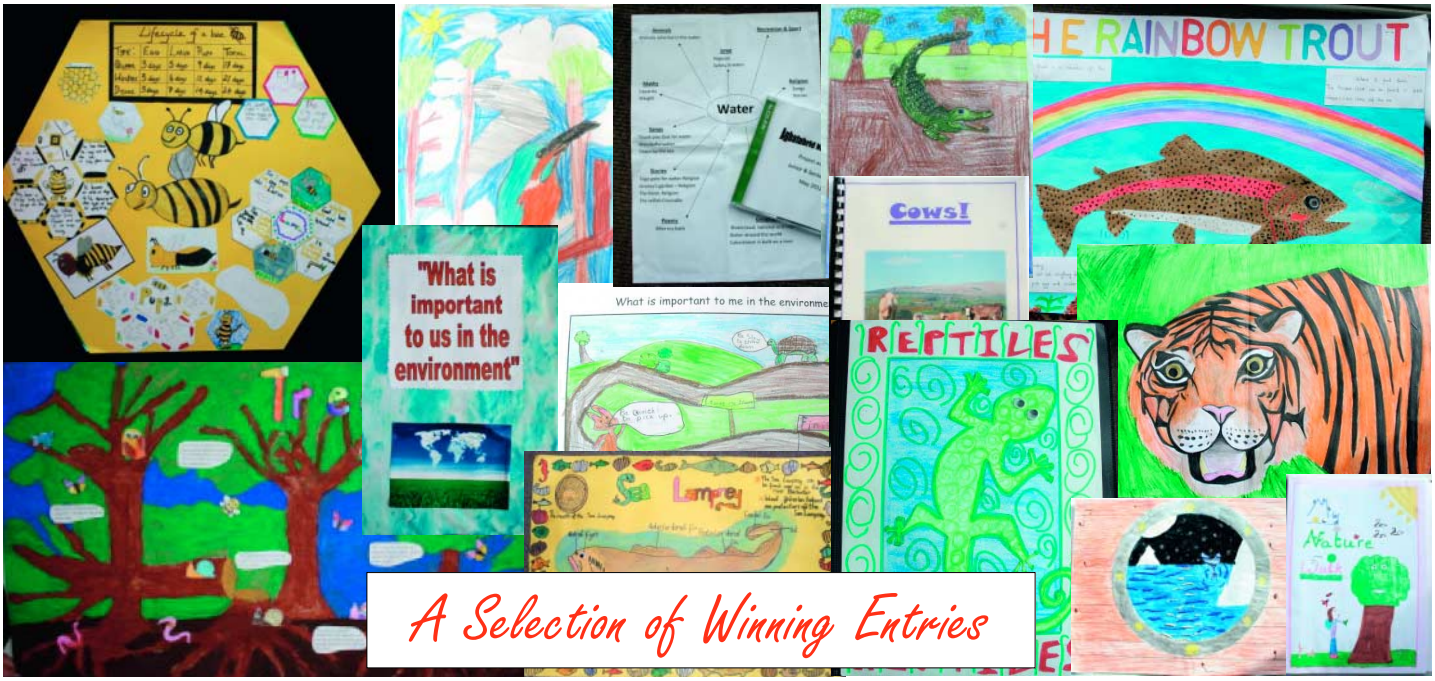
Hidden in these sentences are words relating to mushrooms. Can you find them? Answers below.

1. The captain sailed the ship into port.
2. Yoyos are fun gifts for children.
3. Thomas talks about the different colours of the rainbow.
4. A ball of string is a useful thing.

Answers below.



ANSWERS: Mushroom Wordsearch *(over, down, direction)*: autumn (4,23,E); cap (9,19,W); food (6,4,NW); fruiting bodies (6,6,S); fungi (3,4,S); gills (5,9,SW); kingdom (1,20,NE); medicine (9,12,NW); poisonous (9,16,SW); puffball (1,12,N); spores (4,3,SE); stalk (5,14,W); toadstool (9,22,W). **Words Within Words:** go, lo, my, cog, coo, coy, gym, log, loo, moo, clog, cloy, cool, logo, loom, covly, gloom, gloomy, myology, mycology. **In Other Words:** a. catfish; b. toadstool; c. bulldog; d. motherball; e. horsefly; f. cowboy; g. foxglove. **Hidden in Plain Sight:** 1. cap; 2. fungi; 3. stalk; 4. ring.



Sherkin Island Marine Station's

Environmental Competition for Primary School Children in Munster 2012

Sponsors: Dept. of the Environment, Community & Local Government; Bord Iascaigh Mhara; City Print; Cork City Council; Cork County Council;Evening Echo; Inland Fisheries Ireland; Janssen Pharmaceutical Ltd; Nature's Web (www.naturesweb.ie); Pfizer Ireland Pharmaceuticals; Sherkin Comment.

GAISCE – the President's Award Continues to Thrive

President Higgins presenting a Gold Gaisce Award to Hillary Ennell from Enniscorthy Co.Wexford.

Images courtesy of Gaisce – the President's Award

President Higgins with Gaisce volunteers and participants at the Dublin seminar in Bolton Street College of Technology.

GAISCE – The President's Award which was established by the Government in 1985, which was International Youth Year, continues to develop at a rapid rate. Since the Award was established over 300,000 young people have participated.

Last year 20,536 young people registered for the Award programme and they are supported by 1,200 voluntary President's Award Leaders (PALs) nationwide.

President Michael D. Higgins, who is the patron of Gaisce, has been hosting seminars around the country as part of his initiative entitled 'Being Young & Irish'. The seminars were held in Dublin, Cork, Monaghan and Galway and were for young people aged 17 to 26. The objective is to gather the opinions of young people on what they believe it is like in the current day to be young and to be Irish. In other words, the good things, the interesting things, the proud things, the positive things, the not so good things and what could be better. These regional seminars culminated with a national seminar in Áras an Uachtaráin where the outcomes from the seminars and the online submissions were presented in workshop format and collated in a manner to produce a final 'Declaration on Being Young & Irish'

This Declaration was then presented to appropriate government and other agencies with a view to maintaining the positive aspects of Being Young & Irish and to taking action on any negative feedback on Being Young & Irish.

Gaisce Award holders acted as volunteers at each of the events around the country by assisting with the facilitation and logistics of the day.

This very innovative initiative of the President is meant to give young people a voice and to let them know that their opinions are valued and listened to.

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

President Higgins pictured with Gaisce alumni, from TarÉis Óir, TÉÓ, at Áras an Uachtaráin.

Colour Me!

Coastal Storm Surprises

By Mike Ludwig

HURRICANE/Tropical Storm (TS) Irene struck North Carolina in August of 2011, slowly moved up the US coastline, and died over northern Maine. It made history for the numbers of people in its path—some 65 million— and caused 11 deaths as well as billions in property damages. It was the first tropical cyclone (winds move in a counterclockwise direction) to make landfall in New York City since the turn of the last century. In September 2011, TS Lee landed in Louisiana and meandered northward across the eastern US, inland from the coastline but along a path similar to Irene's. The two storms deposited upwards of 24 inches of rain in less than a month and caused damages similar to a severe hurricane.

People often go years without experiencing a serious storm and that tends to affect memories. Faulty storm memories can create expectations that future storms are not a cause for concern. So, even dire predictions by weather experts and the evidence that storm impacts have worsened with Global Climate Change are not making the public cautious. Such was the case when Hurricane/ TS Irene and TS Lee swept the East Coast. Persistent winds and torrential rainfalls that approached or exceeded hurricane dimensions caused significant damage along much of the east coast and yet the public may not have understood the situation. The principal public and political response was anger that post-storm recovery took more than a week in many locations due to fallen trees and loss of electrical power. Public concern about future storms may not have improved.

Storm damage is becoming more extensive because climatic changes are altering the severity of weather patterns and more and more people have moved into harms way within the coastal zone. Today, more than 50 percent of the US population lives within 50-miles of a shoreline. Experiencing severe weather is educational, if in a safe location during the observations. Without that experience, some people assume warnings are overly cautious and if necessary, rescue is possible. However, today, many communities tell residents that when an evacuation is ordered, there will be no emergency rescue response during the storm. Simply, "you have been warned, why should others risk their lives to correct your bad choices?" Some Emergency Services Agencies now ask people who refuse to obey evacuation orders to provide "next of kin" information.

The northeast had not experienced a storm like Irene or Lee with protracted winds from the southwest for almost three decades and the volume of rain was unprecedented. Previous coastal storms that made landfall in the area had lost severity, generally, upon striking shore. Adding to that is the growth of the coastal population many of which are new to the area and possess little or no severe storm experience. When Irene and Lee reached the greater New York City area they were Tropical Storms with winds of 39 to 73 miles per hour (63 to 118 kilometres per hour). (Note: a one-mile/kilometre per hour difference in wind speed is the difference between a TS and a hurricane [73 to 74 mph or 118 to 119 kph]!) When the storms' progress slowed in the New York area, their persistent winds coupled with unusually high tides, a storm surge approaching 4.5 feet, and 11 to 15 inches of rainfall a week apart created damages typically associated with hurricanes.

Sewage treatment plants failed throughout the region as they were flooded or overwhelmed with untreated waste and rainwater. To save plants the incoming flows were often, redirected to bypass outlets that discharged into local waterways. In the lower Hudson River alone, more than 50 treatment plants went to direct discharge into the River. Adding to those flows were the unprecedented storm drainage flows and the materials they eroded from the land.

Similarly, protective shoreline structures or natural armour against storms from the northeast were overwhelmed by forces from the southwest. Structures buckled and failed under the one-two onslaught of the two storms. Natural and man-made sandy beaches, shorelines and homes disappeared as millions of yards of sand were eroded. Fortunately, most of the beach season had passed and repairs could extend until the 2012 season.

Image courtesy of NOAA

Homes built too close to shore can be destroyed by waves during storms.

We had a number of unanticipated consequences from the storms within the estuarine zone. Homes that had stood for decades were swept away. With so much freshwater in rivers, estuaries became fresh. Salinity records for the month of October and early November of 2011 show a disappearance of the normal, salinity, mixing zone. Harbours became full of freshwater, estuarine habitat conditions moved outside normal mixing zones and unprecedented volumes of sediment settled into navigation channels and berthing areas. These changes caused massive dieoffs of estuarine plants and animals unable to relocate or escape the almost month long low salinity conditions, burial by the deposition of sediment or a combination of those events. Fortunately, we were monitoring a number of areas and saw the destruction as well as the beginnings of recovery.

Storms are natural events but with their increasing severity, relying on experience is not a particularly good idea. The Irene and Lee combination has proven that finding.

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[This article was written prior to Superstorm Sandy, which hit the US East coast at the end of October 2012 – Editor]