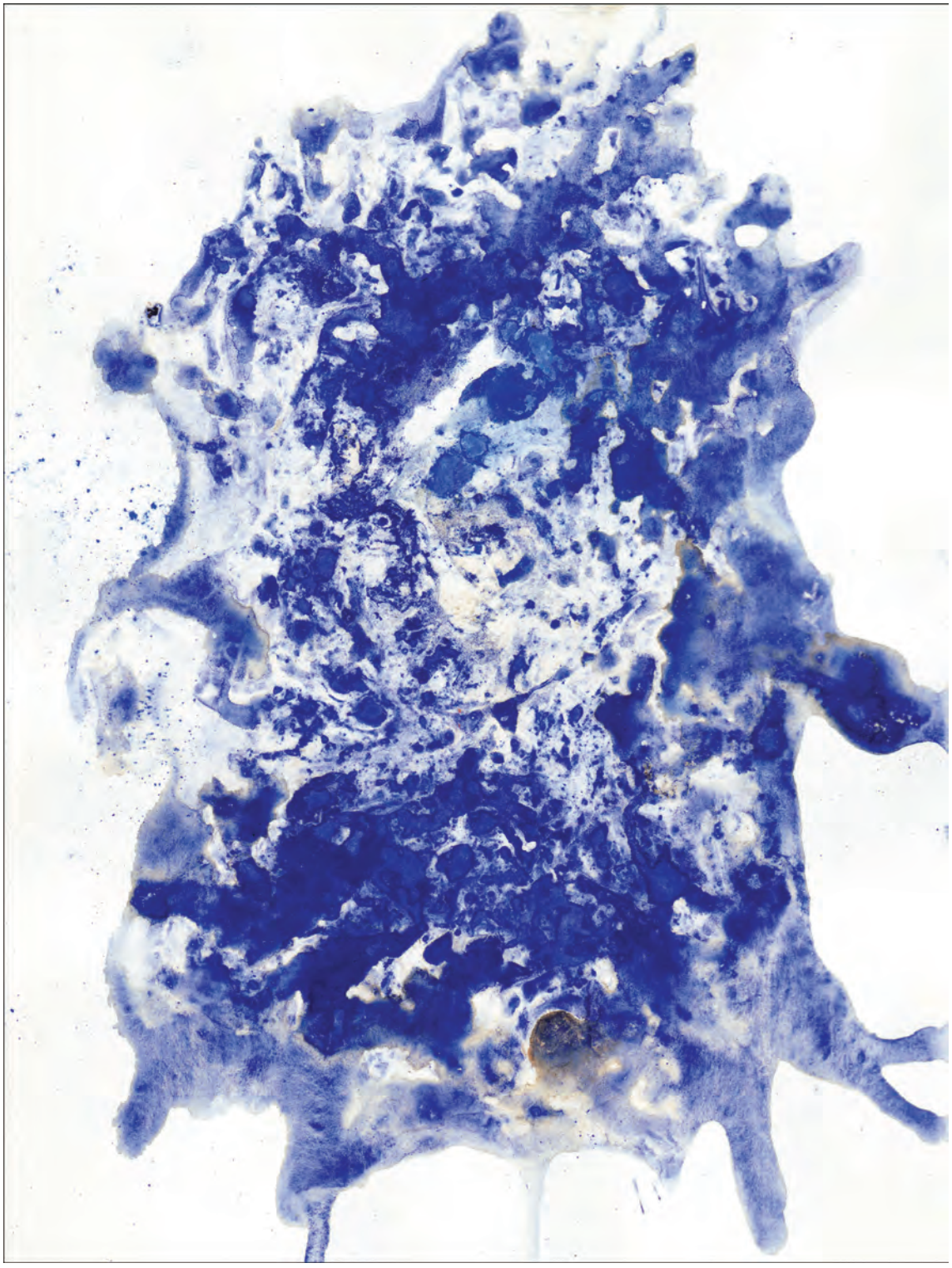

THE ALGAE SUMMIT

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15-18 JUNE 2017

SELECTED RESEARCH DOCUMENTS

The Value of Seaweed in Bygone Days

Fergus Islanders reaped rich harvest

In by-gone days and before the advent of fertilisers there was much demand for seaweed by the farmers on both sides of the lower Shannon for the purpose of manure for their farm crops. The most extensive growth of the weed was to be found around the off-shores of the Fergus islands and the weed being so valuable the boundaries among the rocks on which it grew were as well kept as the farm boundaries on the islands. It was a strict understanding between the islanders that the rocks and stones on the mud flats directly opposite the different farms from the high to the low water and on which the weed grew were the property of the different farmers concerned.
This ownership was honourably observed whether the weed drifted on to the shore with the incoming tide or not.

Islands in the River Fergus

Recent Law Case

It would appear from the report of a recent legal action that a similar understanding exists on the Atlantic seaboard at Killeenaran for generations but that in the case referred to, two neighbouring farmers cut the weed on the same day before the incoming tide in expectation of its drifting on to their respective foreshores, but by some unforeseen change of wind or current the weed got mixed and all drifted onto one of the men's shore, which he claimed, resulting in a law case.

The islanders on the Shannon and Fergus invented a means to avoid this trouble by making what they called seaweed ropes. These ropes were spun from straw called segaun and of great length. When a certain amount of the weed was cut this long straw rope was placed in a circle around the weed and a small wisp of the weed was then twisted around the rope to its full length and secured with a light segaun. When the tide flowed in all the weed floated and a man holding each end of the rope slowly drew the whole lot onto the shore with the incoming tide, amounting in some cases where the weed grew thick and heavy to ten tons when gathered at highwater mark on the shore.

This job was alright on a mild day but on a cold March day the men drawing the rope would take an hour to reach the shore by which time the seawater would have almost reached their armpits; nevertheless the teenagers used to be delighted to be put on the job. The knives the men cut the weed with were made from the blades of scythes by the local blacksmith and it was amazing to watch how deftly the men cut the weed off the stones as close as a barber shaving a client.

The Use of Boats

Where the weed grew a long distance from the shore large boats named lighters had to be used. Those boats carried six tons and it was very hard work to cut the weed and load them by two men in the short time of four hours or less. The boats had to be rowed off from the island while the tide was high to the place where the weed was growing, then cast anchor and wait until the tide receded and the boat landed on the berth among the rocks. The men then got out and started to cut as fast as possible and when they concluded that six tons was cut they started to load but had to draw the heavy weed in a handbarrow. This consisted of two strong pieces of wood with handles at the ends and lathes across the middle on which the weed was placed. The men then raised the barrow, one at either end, and walked with their load over the rough and slippery stones to the boat and lift the barrow over the gunwale of the boat. When the incoming tide came near their boat they had to board and wait until the craft refloated. This was very hard work and whether the day was wet or windy they had to endure all.

Sixty Years Ago

Over sixty years ago there were three large sailing boats owned by

A Lighter on the Fergus

Lowislanders to carry the weed across the Shannon to Beighcastle and up the Maigue River to the Ferrybridge. Those boats had to be loaded from the lighters by throwing the heavy weed abroad with foursprong forks and discharging by similar means when destination was reached. However, the farmers were so anxious to get it that in fact they were waiting at the pier to help unload the boats and take the cargo away with them.

Low Island and Coney being the two furthest from the mainland had the most supplies, therefore Coney concentrated in supplying the Clare farmers the bulk of what was unloaded at Latoon Quay between Clarecastle and Newmarket on the Limerick Road. This entailed a trip of about five miles from the rocks so it can be understood what hard work it was to row those six ton lighters to Latoon and home again.

As the islanders had to attend to their farm work there were a number of men from the mainland who came to the islands each year to be employed at this work, especially to Low Island where the islanders had to watch and pilot incoming sailing ships with cargoes to Clarecastle for the town of Ennis. Two well-known shipwrights also came each year from the seaports of Kerry to build and repair the boats required for the seaweed trade. Their names were Steve Kellagher and Thade Murphy.

Money and Employment

It may be seen therefore what an amount of employment and money was in circulation among the islanders and villagers in those far off days. The islands were thickly populated and after the hard work was over, song and dance came next so that all looked forward to what was known as "truck time" as the men that came from the mainland were known as truck men. The changes from those far off days are unbelievable. On the census returns of 1840 the population of Low Island showed 130 persons, to-day there are not a dozen. There were six licensed pilots, to-day there are none, and no school. During the lifetime of the writer six families have left the island leaving the one time happy homes of song and dance derelict.

An Armed Guard

So valuable was the seaweed in those days that a watchman armed with a musket was employed to watch raiders from the Limerick side of the Shannon at night time but so fearless were they that even in daylight they made a quick raid on small boats. The Shannon and Fergus being crowded with boats it was impossible to distinguish whether they were fishing or otherwise, except by constant watch with a telescope or as they used to call it a "spyglass" from the banks of the river. To-day the seaweed is growing and drifting away with the tides although a good price can be obtained for it but alas nobody is left to cut or gather it. These are only some of the changes brought by the march of time, but not all.

M.J.T
Clare Champion, Saturday, May 5, 1956

Back to Seaweed Industry in County Clare

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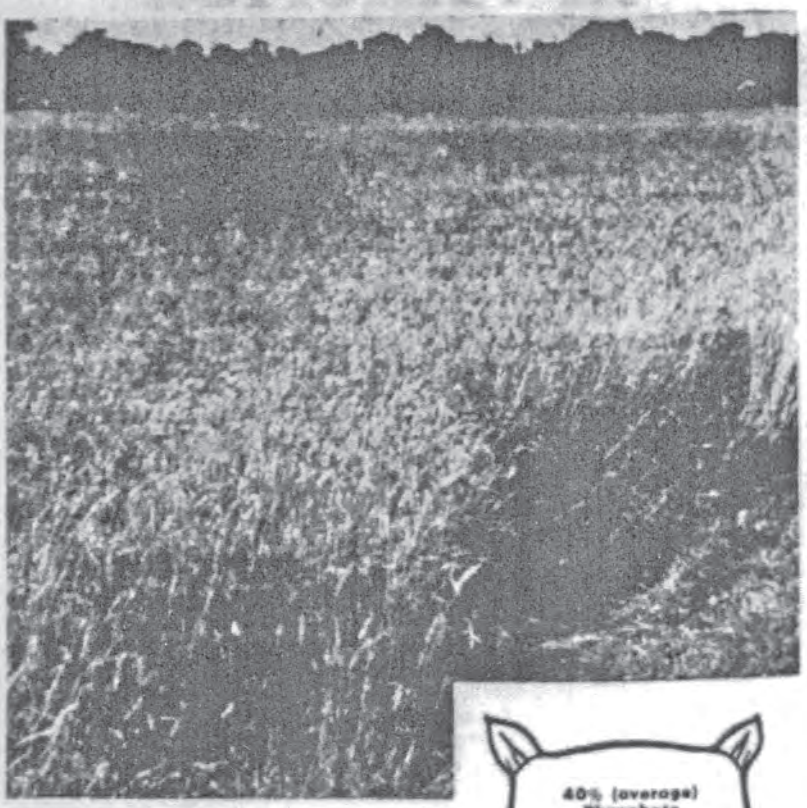

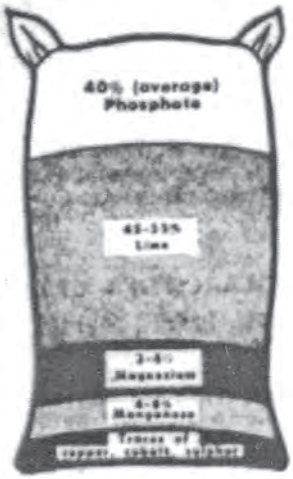

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Sea change in the west: deal divides seaweed harvesters

The decision to sell a local firm to a Canadian company has shocked some in the industry

Sat, Jun 18, 2016, 12:00

Lorna Siggins Galway

Follow @lornasiggins

Johnny Cloherty harvesting seaweed near Carna, Co Galway. Photograph: Joe O'Shaughnessy

When James Bond was despatched to Japan in *You Only Live Twice*, access to the formula for a lucrative seaweed extract was one of many twists to the tale.

The screenwriters who adapted Ian Fleming's novel could equally have chosen Ireland as an authentic location, given the State's enlightened decision over half a century ago to take advantage of the commercialisation of sodium alginate in brown algae.

Now, however, recent developments in the seaweed sector have prompted some in the industry to suggest it would make for yet another Bond plot, with one of the "good guys" being modelled on sharp-suited former marine minister Simon Coveney, who now has responsibility for foreshore within the planning section of his new brief.

The issue relates to the purchase of semi-State seaweed company Arramara Teoranta by Canadian multinational and world leader Acadian Seaplants. The price and terms of the May 2014 deal concluded with ministerial approval are the subject of a ten-year confidentiality clause.

Hailed as a significant boost by Gaeltacht agency Údarás na Gaeltachta, the sale has caused serious upset in an indigenous industry worth €30 million but with the potential to reach multiples of that and outstrip salmon farming.

Demand for certain seaweeds cannot keep pace with the supply of wild material in some countries, and Bord Iascaigh Mhara (BIM) has identified several species suitable for farming here which could cash in on the global market for farmed seaweed, worth €6 billion in the health food sector alone in 2014.

Global food markets

Founded more than 30 years ago by Louis Deveau, Acadian Seaplants employs more than 300 people in eight countries and exports to more than 80 countries. Now run by Louis's son Jean-Paul Deveau, it supplies seaweed-based products to the food, biochemical, agricultural and agri-chemical markets and cultivates seaweed for the Asian and global food markets.

Canada regarded the Irish acquisition as so important that its trade finance agency provided assistance to Acadian Seaplants in the form of a loan guarantee.

Academics at NUI Galway (NUIG), who are collaborating with the new owner on research, say it will give a fillip to a sector which hasn't reached its potential since Arramara was founded in 1947.

Ireland has more than 500 types of seaweed and has a " long history" of using it as a food source and a fertiliser in places such as the Aran Islands, as experts Prof Mike Guiry and Liam Morrison of NUIG recently wrote in the *Journal of Applied Phycology*.

Kelp was burnt in many areas for ash to be used in soapmaking, dyeing, paper- and glass-making and bleaching linen in the 18th and early 19th centuries. From 1820, the ash was also a source of iodine for medicinal and photographic use.

The "alginate phase", as Guiry and Morrison call it, dates from the 1940s, when Arramara was founded. Initially, the company focused on carrageen moss and purchased dried sea rods (*Laminaria hyperborea*) and kelp fronds (*Saccharina latissima*) for export.

Exports to Scotland for alginate dried up in 2009 after synthetic alginate was developed. The Scottish shareholder cut its involvement to 18 per cent. This was then bought by the State as part of an arrangement which transferred responsibility for Arramara from the department of the Gaeltacht to Údarás na Gaeltachta in 2006.

In 2012, Arramara had an average annual turnover of more than €2 million, but Údarás na Gaeltachta opted to seek a new "strategic partner" to take it to a further level. It hired consultants RSM Farrell Grant Sparks to assist.

However, it appeared as if the wheels had been set in motion several years before. On November 4th, 2010, Oireachtas Public Accounts Committee chairman Bernard Allen queried why €30,000 was spent by Údarás on seven different trips by senior officials to look at "seaweed projects" in Halifax, Canada, between 2007 and 2008.

Acadian Seaplants confirmed to *The Irish Times* that it was "first approached by Údarás na Gaeltachta in 2007". It said it was not until the middle of 2010 that it was formally invited by consultants, acting on behalf of Údarás, to submit an expression of interest in acquiring the Irish concern.

The decision to sell Arramara Teo outright came as something of a shock to an industry which has a number of indigenous players dependent on Arramara for raw material.

BioAtlantis managing director John D O'Sullivan told an Oireachtas committee on environment, culture and the Gaeltacht on July 8th, 2014, that when he became aware of the sale, his company made an offer of €5.7 million for Arramara, comprising €1.5 million initially and €4.2 million in the post-investment phase, and had been given just 12 days to prepare the bid.

Lack of transparency

He said he understood that two foreign companies – Acadian Seaplants and French company Setalg – had been given more than a year to prepare their bids. He claimed that Acadian's bid was €1.8 million and the French bid was €2 million for initial purchase, and that the rating was "changed" when the

final bids were in. No details had been released and the lack of transparency was "frightening" in relation to the final sale, he said.

The ten-year confidentiality clause means that these figures can neither be confirmed nor denied, but have not been disputed to date.

The only figure in the public domain is a confirmation by Acadian that it is investing €2 million as part of the sale agreement, while Údarás na Gaeltachta says it has approved a capital grant towards this which is "subject to conditions contained in the legal agreement".

In another twist, a decision by Arramara to apply directly for harvesting licences on 20 per cent of the coastline between Clare and north Mayo has created further waves.

This is a departure from Arramara's established practice of relying on individual harvesters, holding a mixture of folio or traditional rights under the Foreshore Act 1933.

Coincidentally, the department of the environment confirmed in 2014 that a review of seaweed-harvesting licensing was in train in the context of amending the Foreshore Act. This review is still ongoing within the new Department of Housing and Planning for which Simon Coveney is responsible. Alarmed at the developments, seaweed cutters attended two public meetings in Connemara. When UN chief of fisheries and aquaculture development Rebecca Metzner visited Galway in February of this year at the invitation of Coastwatch Ireland, a group known as Cearta Feamainne Chonamara, or the Connemara seashore and seaweed rights committee, expressed its fears about the implications for coastal communities of potential "privatisation" of access to the material.

BioAtlantis described it as a "resource grab" by Arramara /Acadian. Acadian's chief executive Jean-Paul Deveau confirmed at the Oireachtas sub-committee hearing in July 2014 that he had met officials from the departments of marine and the environment as far back as 2007 in relation to "licensing, the regulatory framework, and the process by which one could apply for a licence".

The company has denied that purchase was dependent on securing harvesting rights.

O'Sullivan and former Arramara chief executive Tony Barrett, who says he had tried unsuccessfully to buy the company out in 2006, are critical of the fact that two former executives of Údarás are now employed by the new owner.

Dónall Mac Giolla Bhríde, who was running Arramara's Cill Chiaráin plant before the sale, has been hired for the same job, as has Jim Keogh, formerly Údarás enterprise and employment manager. Údarás confirmed Keogh was part of a senior executive team that was involved in managing the Arramara sale to Acadian.

Keogh told *The Irish Times* he saw no conflict and passionately believed in the potential of seaweed and aquaculture for coastal communities. He said he retired from Údarás in 2014, was retained on contract until April 2015 and then stepped down. He said he was "surprised and flattered" to be offered a post as director of European strategic affairs by Deveau in July 2015.

"It's not easy to get an industry to invest in coastal communities, and this is something I have over 40 years of experience of," Keogh said.

Keogh said the licensing application by Arramara was aimed to ensure regulation and responsible environmental management and was not intended to exclude any players. He said several Irish seaweed companie

also had licence applications filed with the Department of the Housing, Planning and Local Government (formerly environment).

The department has not published Arramara's application on its website and said this was because it was "not yet deemed complete". The company understands this is due to a need by the department to check on existing folio rights.

A decision by Arramara to fly in several small vessels to undertake trials on a new method of harvesting has complicated matters. A department spokesman said any new method would require prior approval, and it had received no licence application as of May 13th.

Hand-harvesting is tough, labour-intensive work, and seasoned Connemara cutter Johnaí "Dubh" Clochartaigh from Mweenish says it is not particularly attractive to the younger generation.

Clochartaigh, who was one of a group of Connemara harvesters flown to Canada to witness Acadian's activities , welcomes the takeover, but says using vessels would not be safe in Connemara.

Údarás na Gaeltachta has defended its handling of the issue and has said that a decision to sell outright, rather than engage with a partner who would invest in the company, was based on "legal advice" . It said it was advised that a "put and call option", which would give 100 per cent ownership to Acadian, was preferential. This would allow for 40 per cent to be clawed back by Údarás if the new owner didn't meet its commitments, it said.

It said there was no requirement to publicly advertise the sale or seek Cabinet approval, and the sale was not contingent on price only, nor on the harvesting rights which Acadian is seeking. It said the agreement included protection of existing stakeholders, ranging from the 20 employees to harvesters and hauliers, to customers, including BioAtlantis and Brando

Read Next

'Fair price'

Acadian/Arramara said it was committed to paying a "fair price" to Irish harvesters, and one of its first actions on acquisition was to increase the price paid per wet ton from €35 to €38.

BioAtlantis said that while Acadian fulfilled an agreement not to increase the supply price in the first year, it has since risen by 7 per cent, a figure confirmed by Arramara.

Late last year, a lawsuit filed on behalf of shorefront property owners in Maine in the US sought a declaratory judgment from Maine's superior court to determine definitely who has ownership of intertidal "rockweed".

One Canadian company with experience of Acadian said the Irish industry was right to be upset. Matt Dugas, chief executive of Maritime Rockweed, told *The Irish Times* that his company had applied for a lease to harvest *Ascophyllum nodosum* along a 220km stretch of shoreline where there had been little or no activity since the early 1990s.

After it had informed Acadian of this, he said, it learned the company had submitted an application for part of the same area.

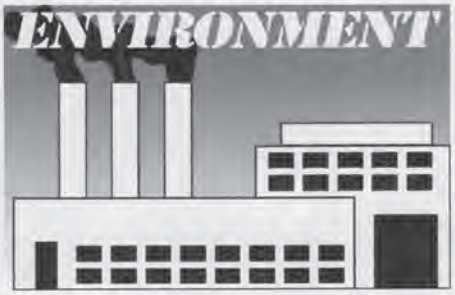
"We have no problem with healthy competition, but we do have a difficulty with a competitor seeking exclusive rights," he said.

Company president Jeramy Boudreau, who formerly worked for Acadian, said the company controlled more than 75 per cent of the resource in Nova Scotia, with the remaining 25 per cent shared by four other companies. A spokeswoman for Acadian said that the lawsuit filed in Maine would take two

years to determine. In response to Maritime Rockweed's claims, she said she was "not familiar with that company".

Dugas said the value of *Ascophyllum nodosum* and other algae is going up all the time due to the rich nutrient content and wide variety of uses.

"Seaweed is a very lucrative business, and I would recommend that you guys keep your industry in-house and try to develop it yourselves," he said.



SEAWEED SECRECY

THE ADVERTISING gurus who market Ireland's Wild Atlantic Way will soon be able to supplement the romantic imagery of rugged coastline, dolphins and pony-riding with dramatic footage of giant robots tearing thousands of tonnes of seaweed from our pristine bays. Plans by Tralee firm BioAtlantis to bring submersible machines into Bantry Bay later this month to begin an experimental harvesting of 1,800 acres of mature kelp algae has refocused attention on the murky world of Irish seaweed.


John T O'Sullivan

BioAtlantis boss John T O'Sullivan applied for a foreshore licence way back in 2009, and the Department of Housing and Planning gave him a 10-year licence in 2014. In a remarkable feat of covert operation, the department involved at least six State agencies in the licensing decision without the public catching wind of it until this year. The "public consultation" consisted of a notice in Bantry Garda Station for 21 days around Christmas 2009 and an ad in the *Southern Star* newspaper giving notice of an intention to cut some seaweed – no clues that this would be the first mechanical harvesting of seaweed in Irish history affecting more than 80% of Bantry Bay's kelp.

Then last year marine expert Karin Dubsky of the Coastwatch NGO stumbled on the licence in a backwater of the department's website, and revealed it on RTÉ TV's *Eco Eye* this February. Shock and outrage ensued and Minister Simon Coveney is now coming under pressure to suspend the licence. Dubsky and others warn of an ecological disaster, insisting the plan to cut at 25cm from the root will kill the kelp, which is the basis of a centuries-old ecosystem of marine life. O'Sullivan, who slammed the *Eco Eye* episode as "sensationalised", claims the kelp will grow back, but we won't know until the first monitoring takes place in 2019 by which time the robots will have been working for three seasons, harvesting 400 acres a season.

If the Bantry operation goes ahead and the robots do well, a similar fate may be in store for coasts from Clare to Mayo, as Connemara seaweed outfit Arramara Teo has licences pending that cover 100,000s of acres. Seaweed is now a multibillion-euro global industry with uses in health food, animal feed and cosmetics. While O'Sullivan's BioAltantis is cast as the villain of the Bantry Bay narrative, he played the underdog in another seaweed saga – that of the sale of semi-State Arramara to Canadian giant Acadian Seaplants in May 2014 in strange circumstances.

That sale was another master class in transparency: the price and terms are the subject of a 10-year confidentiality clause. Irish rivals were shocked by Acadian's takeover of Arramara; O'Sullivan claims he made a higher offer of €5.7m for the semi-State and was given just 12 days to prepare his bid, whereas Acadian, it subsequently transpired, had been approached in secret by civil servants as far back as 2007. Also, the fact that Arramara applied for harvesting rights to huge sections of the west coast just before the takeover led to suspicions that the Canadian firm had made these rights a condition of the deal. Traditional harvesters who have sold to Arramara for years now fear they will lose their rights to harvest.

O'Sullivan described the lack of transparency around the Arramara sale as "frightening", but the experience evidently did not motivate him to share his own plans for Bantry with the public.

The EPA, in its State of the Environment Report 2016, describes kelp forests as "significant carbon sinks (as well as important biodiversity reservoirs) that need protection". One wonders how the EPA feels about the looming decimation of Bantry Bay. Perhaps the agency was kept in the dark along with everyone else?

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THE ISLANDS ON THE FERGUS

Landmarks of Other Days

Now that the project of reclamation for the flooded areas of the Fergus has been mooted more than once, it may be of interest to the readers of the Clare Champion to learn of its tributaries, channels, mud flats and the islands situated thereon.

The division between the Shannon and Fergus begins at Kildysart Quay, and the island of Innishcorker directly opposite. There is a shallow channel dividing the island from the mainland, but this can be travelled over when the tide recedes, so that the solitary family can cross over to the field where the annual Show is held and drive farm stock also over the passage. Innishcorker runs in a south-easterly direction for over a mile, with the Shannon on its right or outward side and a small river enlarging into the creek which flows to the Quay on the inward side. Coasting schooners used to sail up this creek laden with coal from Wales up to fifty years ago. There are corcass lands on the sides of this creek both on the island and on the mainland, and which have been flooded from time to time in bad weather and high spring tides. At the end of Innishcorker and the mouth of the creek, a narrow deep channel allows the waters of the Shannon to enter with great force to meet the Fergus, and this current divides the island from Innishtubber. There is a small uninhabited island between the two, but it is merely a home for wild fowl. Innishtubber is a very high island on which a warning light was kept during the last war as a signal for the pilots of the huge flying boats heading for Foynes. The island is now unoccupied. Directly opposite this island stands Canon Island but separated by a very deep channel from which the Shannon also runs in a very strong current.

TOWER and MONASTERY.

Canon Island, famous for its high tower over the site of its Holy Monastery of bygone days runs from west to east, the Abbey on its extreme east end. The island is fairly high at both ends, but hollow in the centre, over which the sea water runs, allowing boats to be rowed over on a few occasions.

There was once a famous quarry in its extreme west end, and from there stone was conveyed in big boats called "Flats" and towed up the Fergus to Islandavanna about 70 years ago when the sloblands there was being reclaimed. There were three families on this island but are now reduced to two.

THE HOME OF THE PILOTS.

Low Island, the home of the Fergus pilots, a half-dozen at one time, in the hectic days of sail, but now reduced to one, lies only a half-mile to the south-east of Canon Island. The distance between is cover by a hidden reef of rock, exposed at low water when a person could practically walk over. Those rocks were almost as valuable as gold nuggets 60 years ago, as an abundance of rich, oily seaweed grew on them and which was cut and loaded on to boats and supplied to farmers on the Limerick side of the Shannon before the advent of fertilisers. It was hard work but a good price was obtained for the crop.

Four families have left the island during the lifetime of the writer, and the population has declined from over one hundred persons to less than a score. There are a group of small uninhabited islands lying off the island, close to the Beeves Roch Lighthouse to the mouth of the Fergus; one named Sand Island being nearest to the lighthouse, while another Fergus island is nearest to the mouth of the Fergus, where sailing ships bound for Clarecastle anchored to await the spring tides, as many as four at a time.

After covering this group of islands from Kildysart to the mouth about five miles, we now turn north and follow the course of the river to Coney Island, a distance of about three miles. This area is covered with slobland at low water, until the eastern shore opposite Rineanna is reached. The island has the ruins of a church near the shore, now the burial ground for the islanders. The island rises abruptly from the shore to the summit, on which a monument stands to the memory of a family named Fitzgerald, of Carrigoran. On the western shore, there runs a long strip of land called the Luraga, and from which a long stretch of rocks runs into the river.

The islanders supplied a big amount of seaweed to the farmers surrounding Newmarket, unloading it from their boats at Lisrom Quay at a good price, 60 years ago.

Deer Island lies a half-mile distant from Coney, but separated by a very deep channel and on occasions had to give shelter to the Coney islanders when returning home from Mass in their boats, it being too dangerous to cross this channel until the tide recedes on a stormy day. From Coney Island to Islandavanna, except for a narrow channel at low tide, it is practically one huge area of slobland. From the latter island we now turn westward along the mainland coast via Lisheen until we reach a creek at Fortfergus, which runs to Ballycorick Bridge and quay, to where the Clondegad river flows into and from Fortfergus to a creek at Rosscliff, which flows close to Ballynacally quay and over. From the latter creek there is almost a continuous bank keeping out the waters of the Fergus from reclaimed slobland, to the mouth of Kildysart creek, from whence we started, but unfortunately this bank was broken some years ago at Rosscliff and never repaired. This land, which gave much heavier crops of hay than on high ground, has now reverted to its original pure state—sloh.

The changes brought to the Islands by the march of time are sad to contemplate. There were three churches on the group—on Canon Island, Coney and Deer Island, now in ruins except for Canon Island, which has been renovated this year at much cost. There were three schools on Low Island, Coney and Horse Island; all three now closed for want of pupils.

SONG AND DANCE.

Over a half-century ago, the islands were noted for song and dance, as on every Sunday night until midnight a dance was held in some home on each island and a general dance held in one of the schools.

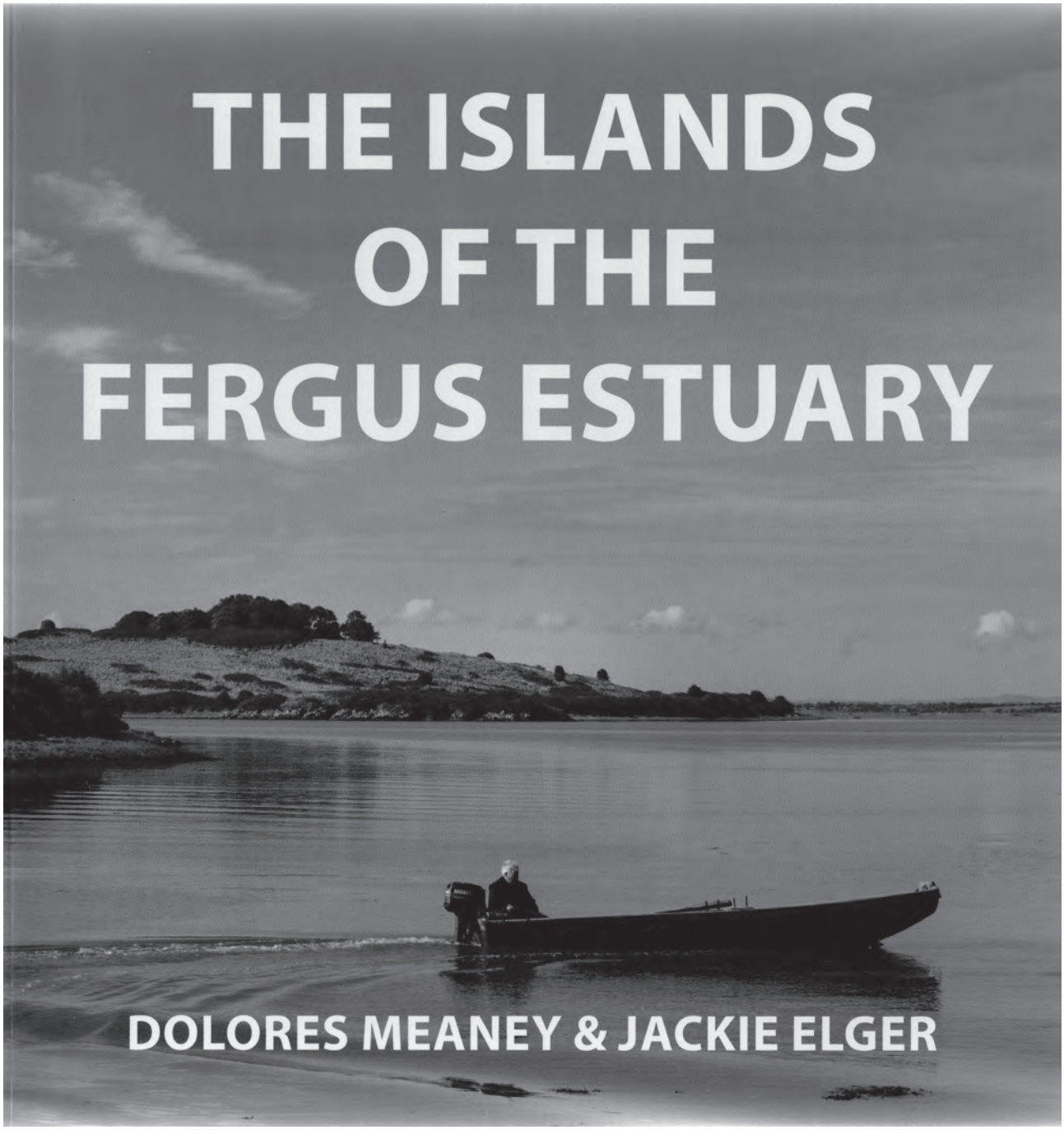
They had their own orchestra—a violin, melodeon and concertina—and of course the old-time dances. The changes brought about by the coming of the cinema and dance halls have killed the dances held in the farm houses, now replaced by the Jazz music from the Pacific Islands. Instead of the "Walls of Limerick," the "Siege of Ennis" and the old-time waltz, we have the tango and the jitterbug.

SEAWEED INDUSTRY.

Now that the processing of seaweed for many purposes is expanding rapidly as an industry in Kilrush, there may be still some hope that, with Government assistance, all the Fergus Islands may not be left derelict.

If the Government takes the matter in hands as it has done with the bogs, it could erect huts on the uninhabited islands. Then, advertise for men and employ them to quarry large stones, as there is one quarry in Canon Island and one on Shore Island. Those stones could be spread over big areas of slobland and in a short time would supply thousands of tons of seaweed and give much employment for nine months of the year, cutting the seaweed crops off the stones and drying it on the foreshore and fields, and fishing and swimming during rest hours, and so, perhaps, people might come to live on those islands permanently.

M. J. TUOHY.


THE ISLANDS
OF THE
FERGUS ESTUARY
DOLORES MEANEY & JACKIE ELGER

Coney Island

Inis Dá Drom (Island of the Two Backs)

This island is situated near the centre of the Fergus Estuary. The name Inisdadrom translates as Island of the Two Backs which describes the physical appearance of the island with its two hills. The island is recognisable from the mainland on both the Kildysart and Newmarket roads because of this distinctive shape. The name Coney comes from 'coinín', a rabbit. These were present in large numbers there but ironically they have virtually been wiped out with myxamatosis in recent times. The highest point on the island is known as the 'Big Hill' where the view encompasses the other estuary islands as well as Shannon Airport, Limerick and Kerry. The island itself is about one mile long and three-quarters of a mile wide.

There is a landing quay on the island for boats. From there, a road makes its way up past the National School through the village of four houses and onwards towards the 'Big Hill' and the old churches and graveyard.

Rose Anne Ginnane's House on Coney Island

The family names of Coney Island remain constant throughout the 1800s and 1900s with Ginnane/Guinnane/Guinane being the most prevalent. The last two inhabitants of the island were both called Tom Ginnane, distinguishable as Long Tom and Small Tom. They lived on the island until the 1980s. Normoyle is another name associated with the island throughout records as well as Kerin/Keiran and in the last century, Meaney.

Size: 262 statute acres

Parish: Kildysart but school records show Kilchreest and the island would be closely linked to the latter. It was recorded as part of Tradree in older times.

Population

Year	1659	1841	1851	1861	1891	1901	1911	1951	1996
Population of Coney Island	3	145	129	119	48	44	35	23	0

In 1703, Moland's Survey of the Thomond Estate records only one cabin on the island[1]. The population of the island peaked in the mid-19th century before Famine times. Eighteen households were on the island in 1841, sixteen by 1851, fourteen in 1861, eleven in 1891, twelve in 1901 and eleven in 1911 census.

View south from the 'Big Hill' on Coney Island

Above l-r:
Michael Meaney jnr, AnnetteMeaney, Michael Meaney snr, Jackie Meaney

Above l-r: Marian & Annette Meaney, Michael Meaney snr.
Photos courtesy of Mary Meaney

Family Names

In 1664, Nicholas Parsons was listed as occupier of Inisdadrom for Subsidy Tax purposes[2].

Coney is recorded in Dineley's Journel of 1681 as belonging to Henry, 7th Earl of Thomond and continued as part of the Thomond Estate into the 1700s. [3]

The landlord in the 1800s was Sir John Fitzgerald of Carrigoran. The Folklore Survey records that the older inhabitants of the island spoke highly of this landlord - 'he was just and kind and would not see them wronged'.

In the 1826 Tithe Applotment Books compiled to ascertain how much landholders should pay towards the upkeep of the Church of Ireland, Coney Island surnames included Ginnane, Normoyle, Rowland and Kerin.

The 1841 list of applicants to the Registry of Freeholders which names people entitled to vote at elections included the names of all Coney Island farmers – Darby, Edmond, James, , Jeremiah, John, Patrick, Patrick Junior and Thomas Guinane, Darby and Pat Guinnane, Andrew Kerin, John, Pat and Patrick Normoyle and Michael Rowland. A freeholder was someone who either owned their land outright or held it in lease.

In 1855 Griffiths Valuation, the surnames were Ginnane, Kieran, Normile as well as landowner Sir John Fitzgerald. This valuation was used to determine the amount of tax liable to be paid by a landowner/ occupier towards the upkeep of the Poor Law system.

In the 1901 Census, the island had forty four inhabitants. These are listed below and it is interesting to note the number of separate Ginnane families. James and Bridget Ginnane with their eight children Mary Anne, Jeremiah, Patrick, Bridget, Annie, Catherine, Margaret and James; Mary Normoyle and her children Kate, Daniel and Patrick; Patrick Ginnane, his brother John and children John, Patrick and Bridget; Catherine Ginnane and her children Patrick, Jeremiah and Nora; Anne Normoyle and her brother Michael; Frances Quilty (Servant); Jeremiah and Mary Ginnane and their child Lizzie; Catherine Guinnane (48) and her siblings Susan (46) and Sinon (45); Thomas Ginnane and his children John and Mary; James and Mary Ginnane; Annie Dundon, National Teacher, Boarder; Patrick Ginnane (50) and Mary Ginnane (42), brother and sister; Michael Karin and children Nora, Michael and James.

In 1911, the family names were Ginnane (eight different families), Kelly, Kerin and Normoyle.

The Meaney family lived on the island from c.1915 to 1968. Michael and Margaret Meaney had seven children - Mary Agnes, Toddy, Anne, Peggy, Michael, Thomas and Jackie. Six of these children emigrated to England as adults and only Michael remained on the island. The example of this family shows how emigration affected the population of the islands during the last century.

The Clare Roots Society recently recorded the gravestones on Coney Island. Not surprisingly, the majority of the graves belong to Ginnanes apart from one Normoyle grave and a McMahon grave from 1885.

Above l-r: Michael Meaney snr, Margaret Meaney, Michael McCarthy (in lap), Nora Normoyle

Above l-r: The Meaney family c.1930, Jackie Meaney (the baby) Margaret, Mary Agnes, Toddy, Anne, Peggy, Michael & Tommy (the twins).
Photos courtesy of Mary Meaney

Then & Now: The Meaney homeplace on Coney Island

Occupations of Inhabitants

The main occupation was farming, the land being very fertile and the abundant seaweed used as fertiliser. In 1837, Lewis says much of the island was under tillage.[6] The island had originally been one large tract of land but it was divided up with stone walls at the end of the 1800s. To ensure that each family had a fair share of good land, fields were divided up equally regardless of location on the island. As a result, a farm could be scattered over different areas of the island and farmers had to walk distances over the island to check on and water cattle.

Cattle were transported on 'lighters', flat raft-like large boats with an enclosure in the middle. Traditionally, when being sold at a fair, they were transported to the mainland the night before as the 'lighter' had to be rowed out by four men. Co-operation between neighbours was all-important in such an isolated community. Cattle reared on the island were well sought after) and cattle dealers from Limerick made trips to the island to buy stock. Cattle, sheep, pigs, horses and ponies were all raised. Sheep were kept in large numbers and the lambs were sold to the butcher in Kildysart.

Above: Michael Meaney, (1925 - 1995)
Below: 'Long' Tom Ginnane & Morgan McMahon (Horse Island).
Photo courtesy of Veronica Row.

"The island people always did butter.... made beautiful butter and they'd separate the milk morning and night and then they'd churn it of a Friday and 'twould take about an hour and a half. The butter was something beautiful, country butter and then they'd wash it in cold water for a couple of turns, you know, and then put it into butter muslin and bring a big bucket of it out to the mainland for to sell in the shop...'twas part of their living...and the buttermilk you'd forever drink it ...of course they'd great land on the islands."

Mary Meaney, Ballynacally, 2012

Butter-making was an important industry for all the islanders, Marcella Crowe noted that each household had a separator in 1937. These were used for separating the milk from the cream and speeded up the butter making process. The markets for both butter and eggs were in Ballynacally and Kildysart. Rose Anne Ginnane noted that there was little need for 'shopping' on the island as so much of the household food was home grown with cows/cattle, sheep, goats, pigs, hens, turkeys, geese and ducks kept as well as mussels and occasional fish.

Seaweed harvesting was another island industry. Rocks around the island were valuable for this and M.J. Tuohy recorded that large amounts of seaweed from around Coney Island was provided to farmers around Newmarket and unloaded at Latoon Quay.

Left: Fintan Ginnane (Horse Island) as a baby, visiting the home of his grandparents' Catherine & Pat Joe Normoyle on Coney Island, with his mother Nora Ginnane and on the right the house as is is today.


Coney Island Church

Archaeology

The SMR (Sites and Monuments Record) lists five archaeological sites on the island: a ringfort, a holy well, two churches and a graveyard.

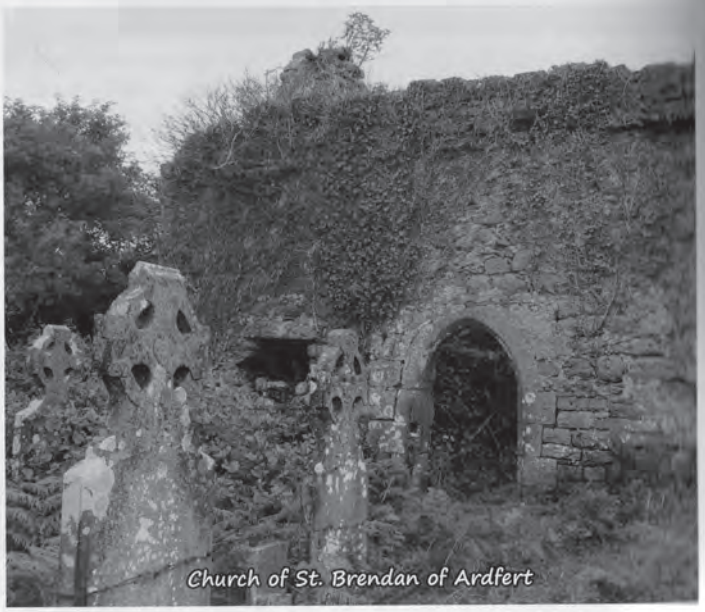
The ruins of two churches exist on the island, one is attributed to St Brendan of Ardfert and was founded c.550 AD. The medieval remains can be dated by the shape of the pointed doorway in the south wall of the larger church. The graveyard is situated around it. The smaller church is located to the east of the first and was known as the 'Priest's House'.

The holy well is called Tobarbreeda. A nunnery of St Brigid existed on Feenish in the 5th century so the well may be named after that saint. The Folklore Survey records a well dedicated to St Brendan, the patron saint of the island.


Coney Island Church

It is believed that in 977, the Viking Chief Imhar and his two sons were slain on Coney Island, this is said to be recorded in 'Wars of the Gaedhil with the Gaill'.[7] Scattery Island had been taken by the Vikings c.950 and it had remained a stronghold. Frost quotes from the Annals that Brian Ború visited Scattery in 977 and 'seized everything possessed by the Danes there, as well as in the other islands of the Lower Shannon and Fergus. He slew eight hundred of the foreigners, and took prisoner their chief Imhar with his two sons Amlaff and Duvchunn'.[8]

A medieval castle also existed on the island. It belonged to Teige MacConor O'Brien in 1580 [9] but no trace of it remains.



Church of St. Brendan of Ardfert

Archaeological evidence remains of seaweed harvesting in the kelp walls that were located around Coney Island and Deer Island, these date from the eighteenth and nineteenth centuries.[10]

There is a monument on the Big Hill, the highest point of the island, erected by Sir John Fitzgerald in dedication to his son Captain John Foster Fitzgerald who died in India.

Above l-r: Anne Meaney, Breeda Markam, Patrick Ginnane, Michael & Mary Meaney
Below right: The Monument and left: its inscription. The inscription is now faded from the stone.

Sacred
to the memory of a much beloved son.
This monument was erected by his father
Lieutenant General Sir John Foster-Fitzgerald Knight
Commander of the Bath of
Carigoran Family in the County Clare
Captain John Foster Fitzgerald of the 14th or
Kings Dragoons who fell mortally wounded in
a desperate charge made by that regiment on the
Siagh's cavalry on 22nd November, 1848 on the
banks of the Chenab in the Punjab, East Indies.
Aged 27
None who knew him need be told
a warmer heart death ne'er made cold

Folklore and Stories

Thomas and Margaret (Peggy) Meaney contributed to the Folklore Survey. They recalled some of the traditions of the island. On May morning, a sprig of hawthorn was picked for the house to bring luck and people washed their faces in dew to prevent disease. Easter water was shaken on all stock on May Eve. St Brigid's Crosses were made on 1st February and placed in the rafters of the house and fathers made the cross of St Patrick on the left shoulders of their children on St Patrick's Day to help protect them. Bonfires were lit on St John's Eve and Friday was considered a lucky day.

Crowe recalled a marriage that took place on the island on St Patrick's Day, a common day for weddings on the island. Tar-barrels were lighted on the quay of the island and bugles blown and a dance was held in the farmer's house until 7.30am the next morning. Mary Meaney recalls the Stations as a big event for the islanders when mass was said in an islander's house by the visiting priests and the graveyard blessed. The islanders were well-known for their hospitality to visitors, a fact re-iterated by Rose Anne Ginnane and Marcella Crowe. The Survey also records a story about when St Brendan landed on the island in a rush basket. A spring sprang up where it landed which can be reached at low tide and the water is perfectly clear. It was said that if you drank water from this well for three consecutive mornings, your home would be on the island. The spring is known as the Curragh spring.

View towards Deenish Island

Seaweed harvest traditions around Ireland, current situation and needs

Seagh Mac Siurdain, historian and community organiser

Karin Dubsky kindly invited me to speak at this conference, on the basis of my personal experience of seaweeds and my background of work as a Community Organiser with Conradh na Gaeilge, and my recent experience as a Community Welfare Officer with the Department of Social Protection in the South Conamara Region.

In 1980, I wrote my Geography thesis on how the kelp industry influenced emigration patterns in North-West Ireland and I have maintained an interest in the Seaweed Industry since.

As a Community Welfare Officer I am an Officer of the Irish Civil Service. So I cannot comment on Government policy in regard to the seaweed industry. That restriction does not constitute a problem, as I am unable to discern Government policy in this area.

This is a Conference taking place in an academic context so I know I should avoid as much as possible referencing personal observations, personal experiences and anecdotes and emphasise research and facts in this area. Well, I am sorry, but given the lack of research you will have to tolerate a lot of the former and as much as I could gather of the latter.

I have two areas of personal experiences of seaweed, an East Coast experience and a West Coast experience, commencing in my childhood and extending through my teenage years.

The East Coast experience was on Dundalk Bay. My father had a small market garden. After the spring tides we gathered storm cast and made a very large pile of seaweed. This was left for a year to allow the rains to wash out excess salts. The previous year's harvest was then dug in to the beds.

My West Coast experience took place with my later Uncle Thomas on the Leitrim Coast. Yes, there is a Leitrim Coast, all of 3.5 km long. It involved harvesting sleabhac (Nori), carrageen and dilleasc and it was where I learned to enjoy eating saccharina latissima, sweet kombu, while rock fishing.

You can imagine which experience I remember with most fondness, the East Coast or the West Coast one, but I am of an age group in Ireland that was the last to have regular personal experience of seaweeds.

The 1960s and 1970s saw great change in Ireland, mostly for the better. But this was not the experience for those who worked with and derived an income, usually a supplemental income from sea weeds.

Up to the 1960s and in areas up to the 1970s the Spring fairs saw carts and lorries of seaweeds sold as fertilizers. The Autumn fairs saw the sale of bags of dillisk and carrageen, much of it making its way for miles inland.

The growth of the cattle and sheep markets saw an end to what was a long tradition of selling seaweeds that went back into our history, to antiquity.

Michael Gibbons, the Conamara based Archaeologist has a lot of unpublished data on the importance of seaweeds in the coastal

communities from antiquity to the 1950s. He states that the most common forms of archaeological intertidal structures are seaweed farms, indicating that seaweed farming is the earliest form of aquaculture in Ireland.
Michael states that there is a seaweed farm in Dundrum Bay, Co. Down, that is recorded in the 14th century and that extends for miles. All other written records start with the growth of the kelp industry in the 18th Century. Michael is of the opinion that the builders of the seaweed farms had to have been building on previous experience but if academic rigour applies then we must say that no definitive evidence is available.
Seaweed farms extend from Dundrum Bay all around the Ulster Coast to Ardara, Co. Donegal where they peter out.
They recommence at Murrisk, Co. Mayo, below Croagh Patrick with excellent examples also at Camus, Conamara and Aughinish Island on the Burren Coast. There is a plethora of seaweed farm structures in the Shannon Estuary.
So what is the contemporary position with the seaweed industry in our coastal communities?
Again I have to fall back on my personal experience in researching the potential of setting up a drying station. I have spoken to seaweed harvesters from Creevy, Co. Donegal, along the West Coast, down to Spanish Point, Co. Clare. Regrettably the average age of harvesters was in the sixties.
The exceptions to this observation were those areas where seaweed processors are operating. In these areas knowledge is being passed down the generations but I do not know how comprehensively. I have to express my gratitude for Prannie Rhatigan's comprehensive book "Irish Seaweed Kitchen", for the list of processors, which indicates the growth of interest in the area.
That said, there is only one processor with a long tradition on the Coast. That processor is Arramara Teo., located in Cill Chiaráin, Conamara. It was established in 1947 and recently was sold to Acadian Sea Plant, a Canadian processor and producer of seaweed products.
I am grateful to Tony Barrett, owner of Irish Seaweed Processors Ltd., who was Manager and CEO of Arramara Teo., from 1999 to 2007, for his insights and information on the importance of the industry to the local coastal communities in Conamara.
The coastal communities Arramara buys from and from which it derives its work force has a population of 8,000 persons. It buys from 310 families, approximately 280 of them in Connemara. I say 310 families rather than 310 harvesters, as harvesting is frequently a family operation. In an area of 8,000 persons, Arramara's wages bill is in excess of €1 million and payments to harvesters are approximately €760,000.
This gives an indication of the possibilities in a structured development of the seaweed industry to the marginalised coastal communities of the West of Ireland.

The National Seaweed Forum Report was published in 2001. It is time, and past time, to implement its findings. These were, inter alia as follows:

1. Training and education of harvesters.
2. Establishing a database.
3. Giving overall responsibility to a specific organisation or department.
4. Re-establishing the Irish Seaweed Industry Organisation and consulting with it.

In November 2014, Forum Conamara, through the Irish Seaweed Consultancy, specifically Dr. Anna Soler and Dr. Maeve Edwards, organised a one week training course on sustainable harvesting. 14 people attended the course. Of thee, 5 are now working in the Seaweed Industry. This from a one-week course!

The recently released film "Atlantic" looks at the folly in 1974 of giving away our fishing industry without being aware of its value.

Let us research and be aware of, the value of the last national resource still in our ownership, our seaweeds.

An overview of relevant legislation and policy in Ireland

Marinella Pellé Coastwatch and John Wilde Crosbie, BL

Seaweed resources have an enormous value from an environmental point of view, as well as from a cultural, social and economic one.
The management of seaweed resources in Ireland has been characterized as fragmented in the recent Dail Environment committee report. Traditional seaweed harvesters' activities are local with no national overview. From a law and policy point of view, seaweed protection and management of harvesting covers many topics and policies – nature law, traditional users rights, public participation and information, water, planning and quality protection. All these areas are interconnected: hence, a general overview is essential.
The Nature Directives – Habitats and the Birds Directives, as transposed into Irish law in the Wildlife Act and Regulations, are the prime instruments to protect seaweed ecosystem, that is seaweeds with all the other life associated with it. The Habitats Directive aims to ensure the conservation of a wide range of rare, threatened endemic animal and plant species and habitats and one way of doing this is for EU member states to identify and designate Special Areas of Conservation (SACs). The Birds Directive aims to protect birds and habitats for endangered and migratory species. Certain criteria are set to establish which areas are most important for birds listed in the Directive. These Special Protection Areas (SPA) have to be identified to protect these birds. Often SACs and SPAs overlap.
Under the Habitats Directive, seaweeds can be listed as a feature of interest when governments designate certain marine SACs and SPAs – like estuaries and bays. However, while seaweeds are mentioned in some Irish site descriptions – the so-called site synopses – they have not been listed specifically as features for which the site was designated. Any commercial harvesting requires a Natura statement if it possibly affect a Natura 2000 site or protected species. However there is near zero awareness of this.
The appropriate assessment process consists of a four-stage process. Each stage determines whether a further stage in the process is required. The four stages are: screening to determine if an appropriate assessment is required; appropriate assessment; consideration of alternative solutions; Imperative Reasons of Overriding Public Interest/Derogation. From our research so far small scale harvesting activity in Natura 2000 sites is neither monitored nor regulated unless the harvesters or processor seek organic certification.

The Foreshore Act 1933 establishes the state ownership of the foreshore and empowers the Minister to make leases and grant licences and prohibits the removal of "beach material" from any area of the foreshore. Individual or companies seeking to harvest wild seaweed from the Foreshore require a Foreshore licence to be granted by the Department of the Environment. However, while that is the foundation here are the exceptions: 1. Not all foreshore is state owned; 2. Even if state owned, harvest rights may be recorded in landowner folios; 3.Deed of privately owned land adjacent to the foreshore may in some instances

grant limited harvest rights. Until recently traditional users have harvested seaweed without any licence and those who inquired were told they need not. So the law has not been applied literally. Even considering the Foreshore Act, questions remain over legal access and licensing.
At the international level, the Committee on World Food Security officially endorsed The Voluntary Guidelines on Responsible Governance of Tenure (VGGT) on 11 May 2012. Since then, G20, Rio+ 20, United Nations General Assembly have encouraged their implementation. The VGGT aim to improve governance of tenure by providing guidance and information on the rights to use, manage and control of land, fisheries and forests. The VGGT recognize that land, fisheries and forest have social, cultural, spiritual, economic, environmental and political values to indigenous people and other communities, even where tenure rights are informal

The Department of the Environment website, now shows a number of seaweed harvest applications and decisions. This may not represent all the application, but does help increase access to information. The demand for seaweed harvesting license is intensely increased in the last years, rising to 7 in 2014 - Still small if compared to house planning applications in a given local authority. Since 2007, 17 applications for seaweed harvest are on the Deaprtement of the Environment, Community and Local Government website (http://www.environ.ie/planning/foreshore/applications/applications-and-determinations). Out of these 7 have been granted, and 4 of these have now run out. 1 of the licenses is large scale 785 ha and for mechanical harvesting. The activity has not yet commenced.

Public information and participation as well as access to justice are fundamental rights in a democratic system. The UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, known as the Aarhus Convention, was adopted on 25th June 1998 at the Fourth Ministerial Conference in the 'Environment for Europe' process. It has been ratified by Ireland on 20th June 2012. It lays down a set of basic rules to promote the involvement of citizens in environmental matters and improve enforcement of environmental law. The first two pillars of the Convention have been transposed in European Law by the Directive 2003/4/EC and by the Directive 2003/35/EC. And in turn these directives have been transposed into Irish law in the European Communities (Access to Information on the Environment) Regulations 2007 to 2014. The Aarhus Convention and the Irish national laws complying whit it can be considered as powerful tools in order to enhance the role of the public in the environmental decision-making process. However, if we look at some case study, there is still much to do so as to reach the international goals in term of public participation and information in the environmental decision making process.
In 2009 Bioatlantis Ltd has applied for a seaweed harvest licence in Bantry Bay. The application was advertised in a local paper on Dec 12th, 2009 for 21 days with detail lodged in a local Garda station. Despite of it being the largest area application in the state and in Bantry Bay, which had a history of officially, funded coastal zone management process, there was no press, no oral hearing, no public

knowledge and no public comment. Details appeared on the department website after the license was granted. They do not include the full submissions by official bodies that were notified and responded.

There is a relevant body of water legislation. The Marine Strategy Framework Directive seeks to ensure that EU member states apply an ecosystem-based approach to the management of human activities while enabling a sustainable use of marine goods and services. The preamble of the Directive notes that priority should be given to **achieving or maintaining good environmental status** in the Community's marine environment, to continuing its protection and preservation, and to preventing subsequent deterioration. The Directive also sets the legal frame for producing a coherent network **of Marine Protected Areas** and finally a list of 11 descriptors was adopted to monitor and ensure we do reach Good Environmental Status. To comply with this directive Coastwatch urges government to prepare seaweed management plans, to select MPAs for seaweed ecosystems, to put sufficient capacity in place to monitor, enforce and report on action under this directive. Considering the lack of biodiversity, foodweb and seafloor integrity indicators and information we argue that there is no justification to permit mechanical and large boat rake seaweed harvesting.
The EU Water Framework Directive (WFD) requires member states to develop biological indicators and ecological classification for assessment of the ecological quality status of rivers, lakes, coastal and transitional waters (estuaries). In Ireland the EPA monitors a seaweed assemblage of about 80 species in reference sites. So far these reference sites are not protected from harvesting.
Ireland has made a commitment under the OSPAR convention to protect the marine environment and the biodiversity of the North East Atlantic.
The Convention on Wetlands, also known as Ramsar Convention, has played an important role in establishing the need and the urgency of wetland protection and conservation. It recognizes the role of traditional users in the sustainable management of natural and marine resources.
Through the 2030 Agenda for Sustainable Development and its 17 goals, the United Nations are determined to protect the planet from degradation. The goal number 14 addresses the urgency to conserve and sustainably use the ocean, seas and marine resources for sustainable development by implementing international law as reflected in UNCLOS, which provides the legal framework for the conservation and sustainable use of oceans and their resources.
The United Nations Convention on the Law of the Sea (UNCLOS) defines Member States' right and responsibilities in the management of sea and oceans. It established several guide lines aimed to control environmental negotiations and national resources management.

With reference to planning, In order to provide a high level of protection of the environment, the Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment (SEA Directive), promotes the integration of environmental consideration into the preparation of plans and programmes, notably in those plans and programmes which are likely to have a significant

impact on the environment. If Ireland produces a national or indeed regional seaweed protection and harvest plans these would be subject to this directive.
Moreover, in July 2014, the European Parliament and the Council adopted a legislation to create a common framework for maritime spatial planning in Europe. The Marine Spatial Planning is a process by which the relevant Member State's authorities analyse and organize human activities in marine areas to achieve ecological, economic and social objectives. The need of a Marine Spatial Planning mainly comes from the new competition for maritime space – for renewable energy equipment, aquaculture and other growth areas. An efficient management is therefore required, to avoid potential conflict and create synergies between different activities. The Directive obliges all coastal Member States to establish maritime spatial plans by 2021. Member States must transpose the Directive into national law by 18th September 2016. The Department of the Environment, Community and Local Government of Ireland has drafted regulations intended to transpose the Directive into Irish law. Submissions are invited on the draft regulations. (http://www.environ.ie/planning/maritime-spatial-planning/consultation-draft-regulations-tranpose-msp-directive-irish-law). The regulation draft states that "a maritime spatial plan shall be duly prepared either as a single maritime spatial plan for the maritime area or as separate maritime spatial plans in respect of different constituent parts of the maritime area." and a "maritime area" means the area of sea comprising, among others, — (a) the foreshore.
Most issues raised here are similar across the world and have been addressed or indeed solved in different ways before.

Regarding organic seaweed production, the Council Regulation 710/2009 on organic aquaculture animal and seaweed production, applies to organic aquaculture and wild seaweed harvest. It sets out the need to draw up a sustainable management plan for wild seaweed, taking any potential impact on the aquatic environment into account. ARTICLE 6.2 states that Harvesting shall be carried out in such a way that the amounts harvested do not cause a significant impact on the state of the aquatic environment. Measures shall be taken to ensure that seaweed can regenerate, such as harvest technique, minimum sizes, ages, reproductive cycles or size of remaining seaweed.
According to the Council Regulation 834/2007 on organic production and labelling of organic products, the collection of seaweed shouldn't affect the long-term stability of the natural habitat as well as the maintenance of the species. Hence, in all stages of production, from collection of seaweed to harvesting, sustainable methods shall be used. **The new organic regulation contains a big challenge: coastal waters where organic seaweed is harvested (or grown in aquaculture) must be of "high ecological quality", as defined by the water framework directive (WFD 2000/60). This idea can make us conscious of how much the environmental legislation is interconnected.**
Finally, a good management of seaweed harvesting is relevant also in order to preserve the huge archaeological heritage located on the Irish foreshore and mainly still undiscovered. For this reason, the National Monuments Acts 1930 and its

amendments of 1954, 1987, 1994 and 2004, should be considered as another useful tool to preserve seaweed resources, also avoiding mechanical harvesting.

Concluding, there is considerable body of custom, guidance and legislation including European and wider international to draw on. On the basis of this and of the enormous value of our seaweed resources, several measures need to be undertaken. We need an update of legislation, improved public awareness and participation, research and data banks and the ownership system and rights registration procedures to be adequately clarified.
Coastwatch drafted a list of recommendation for government which has been passed around and will be discussed in workgroups. Among these update of legislation, access and public participation and enforcement are key elements.

OUTLINE:

Context

Seaweed harvesting and areas in law and policy to consider

Nature

Traditional Users Rights

Public Information and Participation

Water

Planning

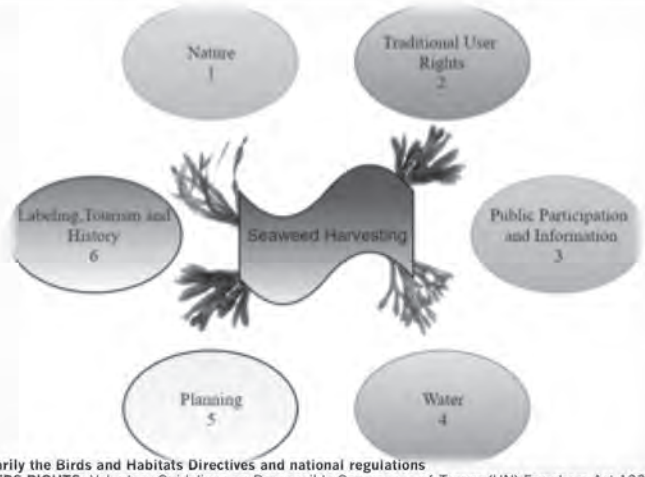
Quality Protection

Conclusion

Context:

- Massive growth in demand for seaweed
- New uses are being discovered
- Enormous **value** (environmental, social and economic) of the seaweed resource
- Traditional harvesters and complicated rights

Seaweed harvesting and areas in law and policy to consider



NATURE law primarily the Birds and Habitats Directives and national regulations
TRADITIONAL USERS RIGHTS: Voluntary Guidelines on Responsible Governance of Tenure (UN),Foreshore Act 1933 as amended and lan and Development Act (National Law)
PUBLIC INFORMATION AND PARTICIPATION**: The Aarhus Convention**, Directives and national law implementing it
WATER**: The Marine (MSFD) and the Water frame work Directives (WFD)** as well as OSPAR and RAMSAR Conventions and UN Agenda r Sustainable Development
PLANNING**:** the SEA Directive 2001/42/EC. (At time of writing the applicability of the Irish planning Act is also being explored).
QUALITY PROTECTION: LABELLING, TOURISM AND HISTORY: Council Regulation 843/2007,and 710/2009 on organic production an belling, and national archaeology law

1. Nature

- Habitat Directive (92/43/EEC) → aims to ensure the conservation of a wide range of rare, threatened endemic animal and plant species and habitats, taking account of economic, social, cultural requirements.
- Bird Directive (2009/147/EC) → aims to protect habitats for endangered and migratory species.

Natura 2000 – Birds and Habitats Directives Ireland

Site type
Birds Directive sites SPA
Habitats Directive sites pSCI, SCI, SAC
Sites – or parts of sites – proposed or designated under both Directives

European Environment Agency

2.Traditional Users Rights

a) NATIONAL LAW

- Foreshore Act: State ownership of the foreshore and Minister' power to make leases and grant licenses (art 1- 3)

EXEPTIONS:

1. Not All the Foreshore is State owned
2. Harvest Rights may be recorded in land owner folios
3. Deed of privately owned land adjacent to the foreshore may in some instances grant limited harvest rights
4. Harvesters may have established rights by continuously harvesting certain areas and showing that

b) INTERNATIONAL GUIDELINES

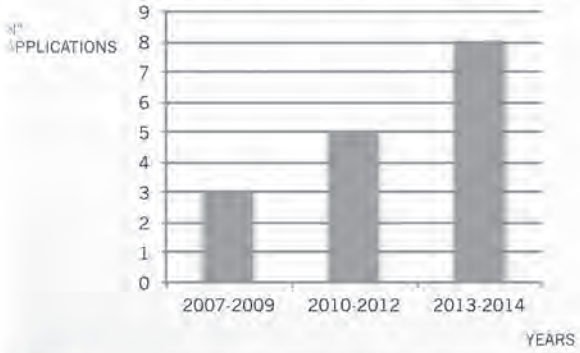
- Voluntary Guidelines on Responsible Governance of Tenure (VGGT): aim to improve governance of tenure of land, fisheries and forests by providing guidance and information on the rights to use, manage and control of land, fisheries and forests. The VGGT recognize that land, fisheries and forest have social, cultural, spiritual, economic, environmental and political values to indigenous people and other communities, even where tenure rights are informal.

- Planning and Development Act, 2000 as amended: supports economic renewal and sustainable development.

WHO IS APPLYING FOR A SEAWEED HARVESTING LICENCE IN IRELAND?

(PUBLISHED APPLICATIONS)

- Since 2007, 17 applications for seaweed harvest have been presented
- 7 out of 17 have been presented in 2014
- 7 out of 17 have been granted, 4 have now run out
- 1 out of 17 allows mechanical harvesting



AREAS and SPECIES:

- Often SAC and/or SAP or adjacent sites
- From 4 ha to 1062 ha
- Ascophyllum Nodosum; Laminaria Saccharina; Laminaria Digitata; Alaria Esculenta; Himanthalia Elongata; Fucus Serratus; Rhodymenia Palmata; Chondus Crispus; Gigartina Stellata; Ulva Lactuca

REQUIREMENTS TO GET A LICENCE:

- Lack of transparency
- Need EIS to be required in specific case

3. Public Information and Participation

- The Aarhus Convention (Ratified by Ireland on 20th June 2012) → It lays down a set of basic rules to promote the involvement of **citizens in environmental matters and improve enforcement of environmental law**.

→ Directive 2003/4/EC on public access to environmental information

→ Directive 2003/35/EC providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment

CASE STUDY: The Bioatlantis Ltd project on mechanical - boat suction and cut - kelp harvesting in Bantry Bay was advertised in a local paper on Dec 12th, 2009 for 21 days with detail lodged in a local Garda station. There was no press, no oral hearing, no public knowledge and no public comment. Details appeared on the department website after the license was granted.

4. Water

- Marine Strategy Framework Directive (MSFD) → seeks to ensure tha EU member states apply an ecosystem-based approach to the management o human activities while enabling a sustainable use of marine goods and services.
- Water Framework Directive (WFD) → requires member states to develo biological indicators and ecological classification for assessment of the ecologica quality status of rivers, lakes, coastal and transitional waters (estuaries).
- The OSPAR Convention → Ireland has made a commitment under th OSPAR convention to protect the marine environment and the biodiversity of th North East Atlantic.
- The Ramsar Convention → establishing the need and the urgency of wetlan protection and conservation, the convention also attempts to preserve traditional user rights recognizing the role of traditional users in the sustainable management of natural and marin resources.
- The 2030 Agenda for Sustainable Development → Goal number 1 addresses the urgency to conserve and sustainably use the ocean, seas an marine resources for sustainable development
- The United Nations Convention on the Law of the Sea (UNCLOS → defines Member States' right and responsibilities in the management of sea and oceans. I established several guide lines aimed to control environmental negotiations and nation resources management.

5. PLANNING

- The SEA Directive → promotes the integration of environmental consideration into the preparation of plans and programmes, notably in those plans and programmes which are likely to have a significant impact on the environment.
- Marine Spatial Planning (Directive 2014/89/EU) → a process by which the relevant Member State's authorities analyze and organize human activities in marine areas to achieve ecological, economic and social objectives. In Ireland a regulation draft has been issued in order to transpose the directive into Irish law.

Any good practice to look at?

- **THE NEW CHILEAN NATIONAL SEAWEED POLICY**:
  - 90% of seaweed exported by Chile to the ROW corresponds to natural seaweed bed made by artisanal fishermen, while only 10% is the result of farming areas;
  - The new policy aims to increase seaweed production though farming;
  - The main goal of the seaweed Chilean policy is to recover the seaweed coverage of natural beds in Chilean territory, setting at the same time a sustainable increase of domestic production and exports.

6. QUALITY PROTECTION: LABELLING, TOURISM AND HISTORY

- **The Council Regulation 710/2009** → sets out the need to draw up a sustainable management plan for wild seaweed, taking potential impact on the aquatic environment into account.
- **The Council Regulation 834/2007** → the collection of seaweed shouldn't affect the long-term stability of the natural habitat as well as the maintenance of the species. Hence, in all stages of production, from collection of juvenile seaweed to harvesting, sustainable methods shall be used.
- **National Monuments Acts 1930** and amendments of 1954, 1987, 1994 and 2004 → provide for the protection of national monuments and archaeological heritage through the use of preservation orders.

Conclusion

There is considerable body of custom, guidance and legislation including European and wider international to draw on. On the basis of this and of the enormous value of our seaweed resources, a several measures need to be undertaken.

SEAWEED CITIZEN SCIENCE - DRAFT 2 for Island of Ireland

Coastwatch

Karin Dubsky Coastwatch TCD Dublin 2 kdubsky@TCD.ie and www.coastwatch.org

This seaweed citizen science pilot pack is to provide information to both those curious about seaweeds and to society which is grappling with how to protect this amazing wealth of species and habitats. **It is suitable for individual, family and school use and adaptable from primary to forming part of secondary school biology and geography field study modules. Use** during the Coastwatch autumn survey or on shore visits during the year where you see a range of seaweeds in situ and washed up.

In view of rising seaweed harvest and aquaculture interest, one urgent concern is how to ensure that sufficient high value sites are protected and that harvesting is sustainable for the marine ecosystems which depend on those seaweeds. That requires more information, especially about our brown seaweed forests and the animals which live there or need them at key times such as laying eggs. The guide also touches on climate change and how this may be effecting different seaweeds so we jointly keep an eye open for changes in seaweed cover and species.

A small number of relatively easy to identify macro algae are included with simple sketches. We recommend you look them up on line or invest in Prannie Rhatigan's identification booklet for kitchen use seaweeds http://irishseaweedkitchen.ie/

This is a pilot pack and we would love your feedback on how it might be improved. To return information you can use the Seaweed results input programme on www.coastwatch.org.

CONTENT Select the pull out sheets relevant to you.

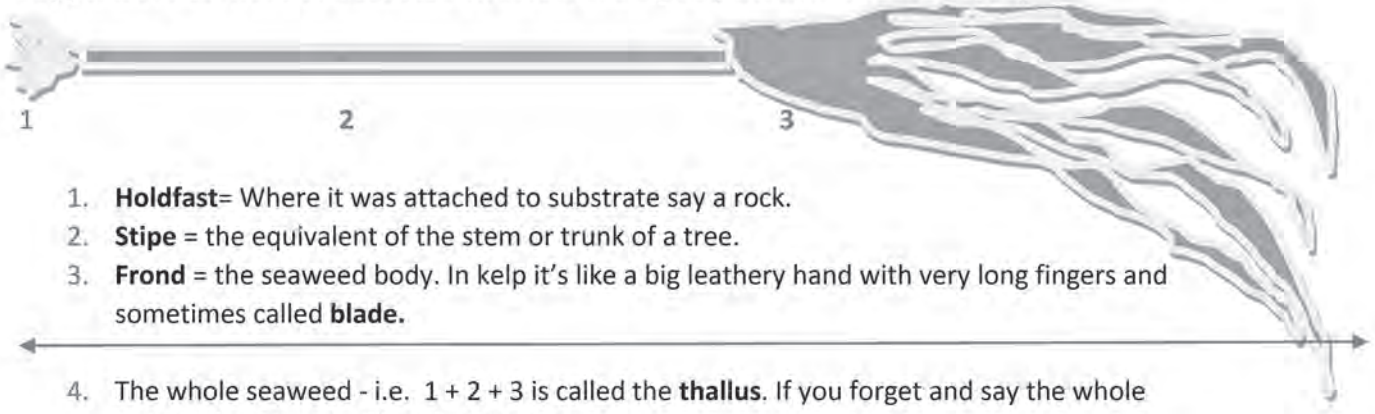
Survey Forms	Content	Where to Use	Page
A - A first impression of seaweeds on this shore.	Seaweed treasure hunt Questions about seaweeds on your shore - growing and swept up	On shore ideally an hour before spring low tide, so you work your way down the shore.	1 Leave back blank for sketches and notes
B **Egg wrack *Ascophyllum*** as Intertidal forest: high intertidal biomass (& largest volume harvested)	Check - how long egg wrack grows, estimate biomass, sensitivity and who lives with and on it	A shore where egg wrack grows. - up to 2 hours either side of low tide	1 page with questions, back blank
C **Kelps: Swept up from Underwater forest.** (Diver's C version in prep)	Measure lengths - where are the tallest??? Estimate biomass and check for signs of life on kelp 'trees' .	Use along tide marks up to an hour either side of full tide. In spring tides calm weather a low water check	1 page with questions, back has kelp ID notes
D Invasive Alien seaweed Table made out for *Sargassum muticum* as most widespread.	Seaweed part has notes and questions on Sargassum, Insert other species if found – eg Japanese kelp	Use when you suspect you found some growing or washed up.	1 page with questions,
E - The litter menace	Seaweeds examined for evidence of litter and micro litter. Questions and app	Seaweed growing (low tide) & washed up. Also suitable for harvesters.	1 page, plus micro litter app.

Ireland has over 500 species of seaweed due to its range of rocky and intertidal mudflat and boulder habitats, range of exposure, water transparency and temperatures. Our seaweed diversity is greater, or terrestrial diversity poorer than most other EU countries.

Terminology,

Seaweeds are either **macro algae** which generally grow attached to a hard surface attachment, or **planktonic** - only visible under the microscope or indirectly by masses of tiny phytoplankton clumping together in water during a bloom so the water may be discolored and turbid.

Key parts of a seaweed as illustrated on sketch of a big kelp which has been swept up



1. **Holdfast**= Where it was attached to substrate say a rock.
2. **Stipe** = the equivalent of the stem or trunk of a tree.
3. **Frond** = the seaweed body. In kelp it's like a big leathery hand with very long fingers and sometimes called **blade.**

4. The whole seaweed - i.e. 1 + 2 + 3 is called the **thallus**. If you forget and say the whole seaweed everyone will understand too.

Growth

Seaweeds need light for photosynthesis like plants on land. Some seaweeds are annual and some live many years (perennial).

The point where they grow – the **meristem** – is in different locations in different species. It's essential to know where that is if you want to harvest part of the seaweed without killing it. Examples: **Egg wrack** grows longer by adding extra length at the tip of the frond and an annual extra 'egg' airbladder to keep that new extension afloat. In **kelps** like **Oarweed** *Laminaria digitata* sketched above, growth cells are located where the stipe and frond meet. As the seaweed gets worn and eaten at the frond tips, new tissue is produced lower down. The stipe gets longer and the frond size increases until the seaweed ages after a few years. In winter growth slows down or even halts, but the tips are still being worn by the waves and munched by hungry animals so the frond may get worn shorter. Special ways to keep the frond up to catch light have evolved in different species. Many have **air bladders**, some a **strong stipe** and some a **ridged calcium** reinforced structure like *Corallina*.

Seaweeds have different ways of reproducing but many have **reproductive structures (receptacles)** In **Bladder wrack** these form at the tips of the fronds, like yellowish strawberries with jelly inside. In **Egg wrack** the receptacles grow out of the stipe on stalks like wild cherries on a tree.

Seaweed Monitoring

There are over 100 coastal and transitional water sites around Ireland where scientists from the EPA and NI Heritage services monitor seaweed species diversity and presence/absence of indicator seaweeds as part of the water framework directive (wfd) implementation. Elevated levels of opportunistic macro algae (seaweeds) are a negative sign and can be enough to downgrade the quality report for an estuary. – e.g. the Moy estuary is deemed 'moderate' rather than 'good' now, because of the amount of green seaweeds observed at the monitoring sites.

In the Coastwatch autumn survey question D3 on 'green algae - whether present as 'thin line or patch or carpets on mudflats' picks out that element of the WFD quality indicators. This part of the citizen science data is also useful, especially where nitrate tests (see Coastwatch autumn survey Question B2) have highlighted nutrient enrichment from small inflows or there is a known sewage treatment deficit. Citizens information may not be as comprehensive but still valuable information on set species and habitats and areas where there are data gaps. – e.g. there are no official wfd seaweed monitoring sites in Bantry Bay, Co Cork where a mechanical kelp harvest license for over 750 ha has been granted and trial harvesting is about to start.

Photo: Coastwatch Seaweed monitoring training trial in Bantry Bay Co Cork.

Climate change

About 100 kilometres of kelp forests off the western coast of Australia were wiped out by a marine heatwave where sea temperature rose by 2 degrees between 2010 and 2013 http://science.sciencemag.org/content/353/6295/169 . About 90% of the forests that make up the north-western tip of the Great Southern Reef disappeared over the period and with it the majority of fish and lobster which dependent on it. So far they are not re-establishing.

Warmer sea temperature is not the only stress, as there are also changes in water transparency, when plankton blooms are prolonged with high nutrient loads. So less light reaches the sublittoral seaweeds like kelp forests who need it for photosynthesis. On the other hand the hot dry weather patches with baking sun appear to be causing more bleaching of some red coral seaweeds around low tide and rock pools.

A greater storm frequency is likely to cause more seaweed hold fasts coming off or moving stones which challenges especially the taller seaweeds. Also more shifting sediments can bury and then expose rocks more often. Much of this is poorly understood and requires more research.

Invasive Alien Seaweeds introduced to Ireland, like the very fast growing Sargassum (held by two volunteers in this picture) come from warmer pacific seas and do better as our sea temperature increases. Especially if the native seaweeds are stressed by changing weather patterns or high temperatures, or gaps to settle in open up by over harvesting.

Seaweeds are likely to be impacted in different ways by climate change. We know very little about their resilience to adapt. Additionally to any new citizen science work we are also keen to get feedback from people who have lived by the sea most of their life and might have noticed changes or cycles in seaweed growth. So if there is a spot where you knew a long lived kelp bed could you find it now? Or have you noticed other seaweed changes?

Protection

Most of the over 500 seaweed species identified as growing around Ireland are not protected. Only 2 seaweeds have been selected for special protection under the habitats directive. These are red seaweeds which create coral like structures called Maërl. Examples of it include the Kenmare river estuary and Blacksod Bay. Both are designated as Special Area of Conservation (SAC) under the Habitats Directive with stated goals to 'Conserve the high quality of the Maërl-dominated community, subject to natural processes' https://www.npws.ie/protected-sites/sac/002158

In Northern Ireland and the UK, the list of protected seaweed species is a little longer. Apart from those which must be protected under the Habitats Directive, government selected 'priority species' for special protection - see http://www.habitas.org.uk/priority/intro.html . The long brown **Egg wrack**, also known as **Knotted wrack** and lately **Asco** after its Latin name ***Ascophyllum nodosum*** is the only one on the short list of priority species seaweeds which most people would be familiar with). The NI work on priority species also includes seeking public participation – see extract in box below:

There is a role for individuals, community groups, landowners and companies within the conservation of Priority Species through for example, practical conservation work or species recording. The individual species pages suggest ways to get involved and organisations to contact.

In some areas of Northern Ireland there are Local Biodiversity Action Plan (LBAP) Officers who co-ordinate biodiversity conservation action. To contact these officers to discuss opportunities to get involved in your local area see the link below:

Biodiversity NI

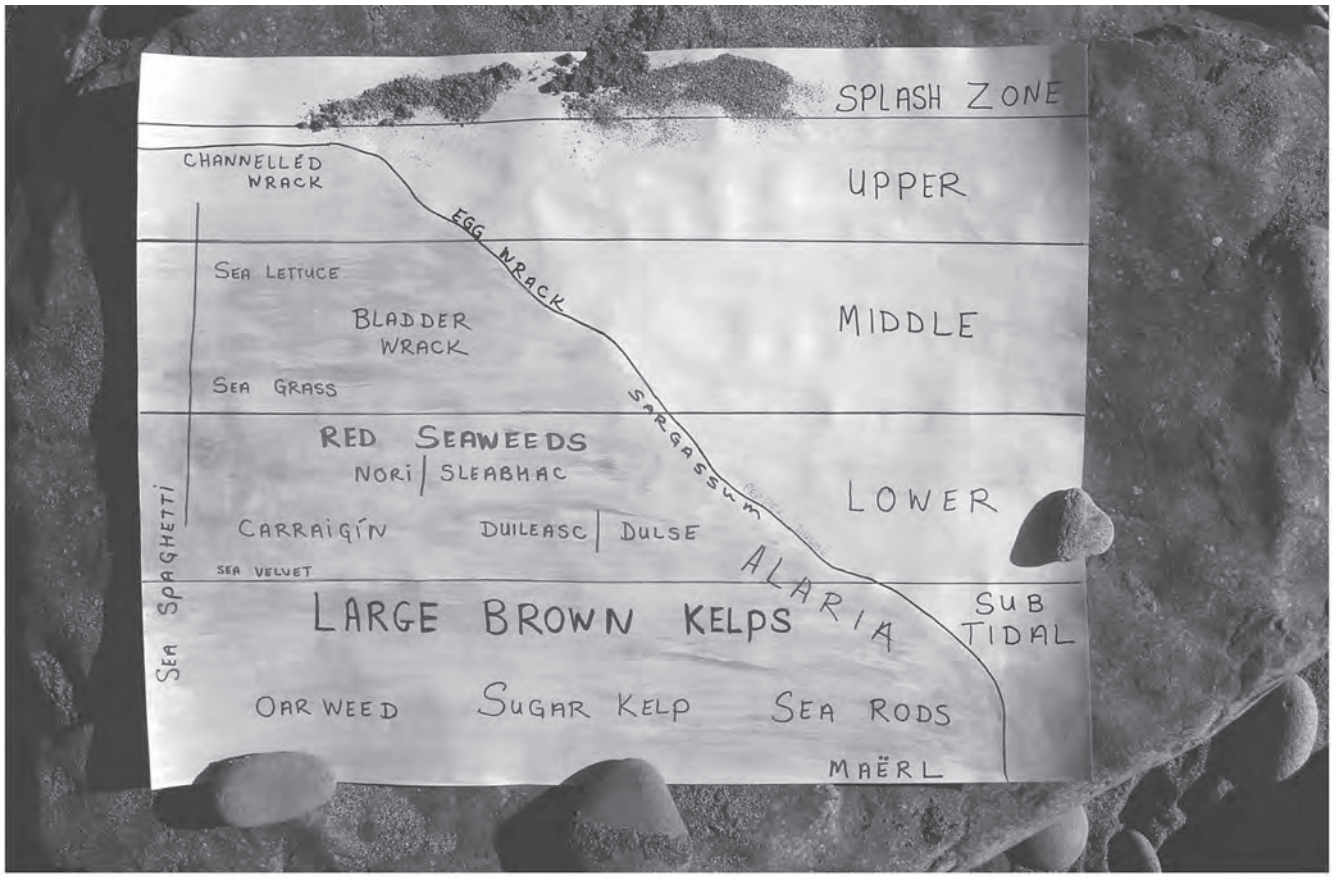
Text written by Biodiversity Unit, Northern Ireland Environment Agency.

Potential for special seaweed sites to be protected

Apart from sites already protected under the Habitats or Birds Directives which may list seaweed or reefs with seaweed cover as features of conservation interest, there are sensitive fisheries areas under Fisheries law and OSPAR MPAs which can include seaweeds.

Another avenue to designate sites is the 'Marine Strategy Framework Directive' (MSFD). Marine Protected Areas have been identified and designated over the past few years under the MSFD in most countries with public participation. In NI two sites were proposed by members of the public and then accepted and added by government. As the large seaweeds like Egg wrack and the kelps have a keystone biodiversity or ecosystem role on the shore –'a coherent network of marine protected sites' should contain sufficient high diversity and quality seaweed areas to adequately protect such seaweed ecosystems and the ecosystem services they deliver.

Acknowledgements Photos by Ecoeye , Bernie Connolly, Geoff Jones , Donna Weimer and Karin Dubsky



Irish Seaweed Kitchen
www.irishseaweedkitchen
.ie

6 Seaweed, 'soul'-ar panels and other entanglements

Giovanna Di Chiro

Stories for connecting (when the world is falling apart)

Storytelling in the fields of Environmental Studies and Environmental Humanities under the sign of the 'Anthropocene' resounds with litanies of trauma, disaster and extirpation; it is at once doleful and apocalyptic. The typical Environmental Studies syllabus rehearses these familiar tropes of ruination and decline, and despite my best efforts to avert the collective numbness and the disabling environment associated with 'well-informed futility syndrome,' in my own classroom I am regularly accused of triggering despair and hopelessness. Endeavouring to address this ongoing pedagogical dilemma, in 2014 I developed a course at Swarthmore College focusing on the literary genre of life-narrative. I assigned texts comprised primarily of activist memoirs, autobiographies and memoir-esque novels. I reasoned that having students read life-writing produced by diverse scholars and activists who tell stories about living and acting in and through trauma would inspire 'hope'. The kind of hope I was aiming for, the hope one must embrace when the world is falling apart – 'hope in the dark,' as Rebecca Solnit puts it – is not about denial, delusion and crossing one's fingers while hoping for the best. Solnit explains:

> [Hope] is not the belief that everything was, is, or will be fine. The evidence is all around us of tremendous suffering and tremendous destruction. The hope I'm interested in is about broad perspectives with specific possibilities, ones that invite or demand that we act … You could call it an account of complexities and uncertainties, with openings.
>
> (12)

My hope was that through reading self-life-writing (auto-bio-graphy), a genre filled with accounts of the 'complexities and uncertainties, with openings' embodied in personal struggles and life choices, the students would gain a better sense of this meaning of *active* hope. The authors we read for the course reflect on how they come to see themselves as social and environmental change agents, having throughout their lives encountered difficulties, forged hard won lessons and patched together the critical tools enabling resilience, empowerment and

creativity. I was able to get the course ('Race, Gender, Class and Environment') cross-listed in the departments of Environmental Studies, English, Sociology & Anthropology, Gender & Sexuality Studies, and Black Studies. By reading life histories of scientists, humanists and social activists, I wanted students to understand how this varied assemblage of academic disciplines was deeply and creatively entangled with modern concepts of human–nature relationships and struggles for social and environmental justice.

Activist memoir, and life-writing in general, calls on readers to explore their personal histories and trajectories, so I designed one of the course assignments with an option for students to pen a chapter of their own self-life-story. I envisioned that one of the learning outcomes of the course would be for students to imagine and give voice to the idea that they themselves were endowed with historical agency, a proactive identity that might interrupt the habitual turn to despair and cynicism. Unsurprisingly, re-reading these activist stories inspired me to examine the genealogical roots of my own 'enabling entanglements' (Tsing vii), life experiences and choices that today help me to resist the hopelessness of the Anthropocene narrative, and to imagine and lean towards creating more critical, embodied, collaborative and *life-affirming* curricula, theories and community engagements in this time of great uncertainty and in the face of a damaged Earth.

In this chapter, I deploy a mixed genre of auto-eco-biography to explore the influences and experiences of collaboration, symbioses and multi-sited nature–culture entanglements that have occupied me for the past four decades. From my membership in a 'seaweed sisterhood' while working as a marine biologist in California, Hawai'i and Washington, to my community-based action research on environmental justice and urban agriculture in Massachusetts, to forging coalitions with my students and community leaders in Philadelphia to co-produce a just transition towards solar-powered economies, I have long been engaged in multiple teaching and research muddles hoping to create alliances, loving kin and community assemblages for earthly survival in the time now being called the Anthropocene. Reading (and, perhaps, writing) activist stories and life narratives helps to move us beyond the declensionist narratives so favoured by the gloomy greens or the salvation stories championed by eco-modernists, which are two of the dominant narrative tones common to the fields of Environmental and Sustainability Studies (Di Chiro, 'Environmental Justice').

In the following notes from my own underground, background and right *now* stories as well as my teaching of this course, I remember my own involvement with a seaweed sisterhood past and with current multi-sited and multi-class, -race, -gender, and -species coalitions. Through this partial auto-eco-genealogy, I reflect on stories of the research and activism that I co-create with others, how they are comprised of multi-community constellations (human and non-human) and yet how I recognise that these coalitions will be anthropocentric, although, hopefully of an enlightened kind. A multi-species, enlightened anthropocentrism (Chakrabarty), always engaged in the arts of noticing through an environmental justice lens, recognises that while acknowledging and mourning the loss and

precarity of millions of animal and plant species due to anthropogenic recklessness, some *human* populations, including many communities of colour in the U.S. living in polluted environments and facing ongoing colonialism and racial violence, profoundly and accurately consider themselves 'endangered species'. I'm interested in thinking about how my own seaweed entanglements helped me to see – and to develop the arts of noticing – the multiple, interconnected worlds comprised of different human lifeways and other species who will co-create stories of resurgence that may help us to live convivially together and to forestall, or to not go the way of, what some are predicting to be the Sixth Great Extinction on planet Earth (Kolbert).

How do we tell different kinds of stories about how we will live together, act to change the world, and build alliances for 'collaborative survival' (Tsing 28) in these times? Many activists in the climate justice movement draw on the ideas of groups such as Movement Generation and the Center for Story-based Strategy, and argue that social movement starts with your own story. Drawing on sociologist Marshall Ganz' idea of 'public narrative,' many environmental and climate justice activists are developing a strategy that 'prioritizes story and relationship, aimed at connecting people to their source of passion, to shared identity, and most of all, to hope' (Moe 49). The public narrative strategy starts with individuals telling their own stories, the story of 'Self,' and then moves to 'Us' by sharing stories of how we are entangled and what we have in common. Recognising the new dynamic that emerges in spaces when stories are shared, the story of the group shifts to co-construct a story of 'Now': the way individual and group stories become stories of a broader movement identifying what we are called to do right now and how we can take action together.

Noticing, re-membering and creating (when the world is falling apart)

Dancing on Our Turtle's Back

Stories of 'Now' told by the Indigenous and First Nations authors of several of the life narratives we read in my course embed earthwide and intergenerational trauma in critiques of ongoing settler colonialism and the advent of modern capitalism, and not in the universal humanism of the Anthropocene. In one of our course texts, *Dancing on Our Turtle's Back*, Mississauga Nishnaabeg activist and author Leanne Betasamosake Simpson argues for the need for *resurgence*: a resurgence of history, memory, and cultural knowledge to transform and 'dance a new world into being' (quoted in Klein 'Dancing the World' n. pag.). Simpson's eco-politics for addressing trauma in a damaged world express her Nishnaabeg culture's notion of sustainability: *mino bimaadiziwin* ('the good life,' or 'continuous rebirth') (Simpson *Dancing* 142). For Simpson, social movements for sustainability and environmental justice need to be 'movements to create more life, propel life, nurture life, motion, presence and emergence' (143). The practices of *creating*, argues Simpson, whether making clothes, food, shelter, stories, songs or dances were the base of Nishnaabeg society. 'Creating was

regenerative, and ensured more diversity, more innovation, and more life. In essence, Indigenous societies were societies of doing: they were societies of presence' (92). In contrast, modern empire culture, framed by the logic of advanced capitalism and consumerism, she contends, requires 'both absence and wanting things in order to perpetuate itself' (92–93).

Simpson's cultural memoir weaves together stories of Self, Us *and* Now. Her book recounts stories and practices of resistance, flourishing and creativity in the face of centuries of ongoing extraction and devastation visited upon First Nations and Indigenous communities by the Canadian and U.S. governments and corporations. But, as she says, this is not the first time Indigenous peoples have 'noticed' and lived through social and ecological collapse such as, for example, 'the construction of the St. Lawrence Seaway, the extermination of the buffalo in Cree and Blackfoot territories and the extinction of salmon in Lake Ontario'. Tribal elders from all across North America, she continues, 'have been warning us about this for generations now — they saw the *unsustainability* of settler society immediately' (Klein 'Dancing the World' n. pag.). Reading Simpson's life narratives together in class, my students and I gained an understanding of her theory of *presence*, a positionality or lifeway that hones the skills of noticing the world around us. These skills include the arts of noticing the rise of global vulnerabilities and the decline of the life-supporting capacities of earth's social and ecological systems, as well as noticing and imagining possibilities for mutual transformation and regeneration. In a hopeful tone grounded in cultural history and personal experience, Simpson exclaims: 'I think that the impetus to act and to change and to transform, for me, exists whether or not this is the end of the world' (n. pag.). But, how do we talk about survival and creativity when the world is falling apart, especially in Environmental Studies courses? What stories do we notice and bring to the surface?

The sixth extinction and 1.5 million 'missing' Black men

While reading Simpson's stories of Indigenous cultural and ecological resurgence in the face of accelerating vulnerability, my students and I noticed the coincidence of two apparently unrelated news reports, both published on 20 April 2015, in the *New York Times*. In one section of the newspaper appeared the announcement that popular science-writer Elizabeth Kolbert's *The Sixth Extinction* had been awarded the 2015 Pulitzer Prize for non-fiction. Kolbert's riveting investigation chronicles the exhaustive scientific research documenting humankind's destructive impact on the Earth's life support systems and biodiversity. In great detail she outlines the evidence from around the world showing that human activities are responsible for species extinction levels so extensive that they are ushering in the 'sixth great extinction' in the planet's history.

In a different section of the newspaper, leading with the alarming title '1.5 Million Missing Black Men,' the other *New York Times* article we noticed reported on the demographic phenomenon that in U.S. cities 'for every 100 black women in the 25 to 54 age group living outside of jail, there are only 83

black men' (as compared to the gender ratio among whites being at near parity) (Wolfers et al. n. pag.). African American men are 'missing' in such high numbers, explain the authors, because they are behind bars or suffer premature deaths from homicide, police violence and higher rates of heart and respiratory disease. The juxtaposition of these two articles in a mainstream newspaper reporting on *deaths and disappearance* – one on mass extinctions of animals and plants and one on missing Black men – does not easily register as being in the same conversation about tragedy, catastrophe or extirpation. How do we notice these two apparently unrelated stories of vulnerability or precarious existence? How do we put in conversation with each other both stories of unconscionable massive extinction of animals and plant life and the recognition and assertion that Black lives *matter*. As Anna Tsing proposes, 'What if precarity is the condition of our time — or, to put it another way, what if our time is ripe for *sensing precarity*?' (20, emphasis added). Can a new social analysis based on 'thinking through precarity' in all its manifestations and unpredictable encounters help us to imagine possible connections and assemblages of humans and nature, to help make all life possible? (20).

Encountering a seaweed sisterhood

As my students and I read the activist memoirs, autobiographies and memoir-novels throughout the course, we talked a lot about 'seeing' the world through others' eyes and paying attention to how the authors notice the complex social and ecological gyres around them. The opening chapter of Ruth Ozeki's novel-memoir, *A Tale for the Time Being*, for example, focuses on a vivid scene of seaweed-filled tidepools encountered by one of the protagonists, named Ruth. While slogging along the British Columbia seashore in rubber boots, Ruth notices a sealed freezer bag entangled among the seaweed, barnacles and coastal flotsam and jetsam. Inside the freezer bag she discovers a Hello Kitty lunchbox containing a diary written by the novel's other protagonist, a troubled Japanese schoolgirl named Nao. Disentangling the plastic bag from the jumble of seaweed fronds, Ruth reads the life-story of Nao. The stories of these two far-flung protagonists, their complicated narratives, histories and the trans-oceanic gyres in which they are 'entangled,' animates the novel. Ozeki's *Tale* activated a few fertile memories that helped me reflect on the entanglements in my own research, teaching and activism. The novel's opening scene of the jumble of seaweed, oceanic debris and personal stories conjured for me a new way to imagine the interconnected, messy and even hopeful practices of working together at this time on earth, the geologic *now*. My students were amused when I told them that I had titled the first section of my eco-activist-memoir 'A Cosmopolitics of Seaweed Symbiosis'.

While myself a student of biology at the University of California, I had migrated towards the sub-field of phycology (the study of algae) mentored by Lynda Goff, at the time one of the few women scientists teaching in UC Santa Cruz' biology department. Like many students of marine biology of my generation, I had been profoundly influenced by reading Rachel Carson's hugely popular

books *The Sea Around Us* (1951) and *The Edge of the Sea* (1955), which, along with *Silent Spring* (1962), I had read as a high school student. Carson's descriptions of coastal ecosystems of the Atlantic intertidal zone and the 'sense of wonder' for the ocean and all of nature, which, she maintained, must motivate environmental conservation, drew me to the wonders of marine biology. Other members of my growing pantheon of audacious women marine biologists who had confronted sexism and racism in the marine sciences in the mid-twentieth century included the 'shark lady,' Japanese-American ichthyologist and shark conservationist Eugenie Clark, whose book *Lady With a Spear* (1953) and many popular National Geographic specials on ocean conservation had enthralled me, and the oceanographer Sylvia Earle, the pioneering deep-sea explorer and now regular TED lecturer, and one of the most important scientific voices raising the alarm of the risks of ocean acidification and dying marine ecosystems.[1] Already an admirer of each of these marine scientists, I would soon learn that having chosen to study the co-called 'lower plants' in the field of phycology and later working as a seaweed biologist in the Pacific Northwest, I would be standing on the shoulders of another grandmother of marine botany, the 'first lady of seaweed,' Isabella 'Izzie' Abbott, considered the foremost expert on Central Coast Pacific algae and the co-author of *Marine Algae in California* (1992), among 8 other books and 160 scientific articles on seaweed taxonomy, ecology and ethnobotany.

Isabella Kauakea Yau Yung Aiona was born in 1919 in Hana, Maui, in the then Territory of Hawai'i, to a native Hawaiian mother and a Chinese father who had migrated to Hawai'i in the 1880s to work on the Kipahulu sugar cane plantation (Howe). Abbott would become the first native Hawaiian to earn a PhD in biology (UC Berkeley) and the first woman of colour to be promoted to full professorship in biology at Stanford University. She explains that she decided to study seaweed taxonomy and biology because, 'there were so few people doing it,' and, unlike the more formulaic biology of 'higher' plants, seaweed and algae are like trickster species: they are so biologically and taxonomically complex that they defy easy categorisation. 'Flowering plants mostly have the same kind of life history, so they become kind of boring,' Abbott contended. 'They make pretty flowers, they make nice smells; they taste good, many of them. But they're not like seaweeds' ('Long Story Short, with Leslie Wilcox n. pag.). Learning from her mother and aunties about how to identify, collect and cook native Hawaiian seaweed from Maui's intertidal zone, Abbott grew up loving local species such as Limu kala (*Sargassum echinocarpum*). Limu kala, Abbott would explain, is 'probably the most important seaweed in Hawai'i. People eat it, turtles eat it. And kala means "to forgive". It's used in purification ceremonies like ho'oponopono (the Hawaiian reconciliation process)' (Crites).

Knowledge about seaweed in Hawai'i had historically been the domain of women, passed from mother to daughter, and when Abbott became an expert not only in the local Hawaiian seaweed taxonomies but also in the Western Linnaean taxonomic system, she made it a point to demonstrate the equal importance and strengths of both systems. Abbott was professionally active well into her 80s (passing away in 2010 at the age of 91), and was an early critic of what she

considered to be the questionable scientific concept of alien species and alien algae (algal species that were introduced to Hawaiian shores in the ballast and hulls of ocean liners or aircraft carriers or by scientific experiments gone awry, some of which are said to be invading and killing the coral reefs) (Helmreich). As someone who had fully embodied the naturecultures of Californian intertidal seaweed and Hawaiian Limu, she argued that her taxonomic research showed that the global distribution of algal species is much more widespread and connected by oceanic eddies and currents than scientists realise. The language of 'aliens' was ignorant and arrogant in her mind: 'it assumes phycologists already know everything about the distribution of plants and they impose their own values and ignorance onto the nature of plants themselves' (quoted in Helmreich 165). Abbott's seaweed science introduced to me the intertwined notions of seaweed culture and seaweed ecology – perhaps an incipient eco-cosmopolitical consciousness. Through the eyes of a budding scientist, this early understanding would lead me always to insist on the interdependence of knowledge systems and cultures, challenging the orthodoxies of hegemonic marine science. As an undergraduate, I enjoyed being a member of an emergent seaweed sisterhood when my professor Lynda Goff would take our lab group on field trips to Stanford University's Hopkins Marine Station in Monterey Bay, where we would meet up with Dr Abbott wearing her hip waders and carting a bucket filled with various intertidal algae specimens including *Nereocystis leutkeana* (bull kelp), which she would later bake into greenish-coloured salty sweet cakes. Several years later, while working as a seaweed aquaculture biologist in Olympia, Washington, I would again have the great honour to connect with Isabella Abbott, both of us speaking on a scientific panel on 'Pacific Seaweed Aquaculture'.[2] Her enthusiasm and knowledge about the taxonomic, ecological and cultural value of seaweed would still amaze me.

As one of the perks of being admitted into the seaweed sisterhood, I was able to work with Goff as a research assistant on Hawai'i's *Moku O Lo'e*/ Coconut Island examining the curious ecology of the then newly identified marine bluegreen alga /cyanobacterium called *Prochloron didemni*. *P. didemni* is a unicellular organism living symbiotically in the gut of a tunicate, or 'sea squirt' (*Lissoclinum patella*), a filter feeding invertebrate animal itself living symbiotically in association with the invertebrate coral 'holobiont' populating the reefs surrounding the island of Oahu.[3] The coral *holobiont* refers to a symbiotic relationship between coral species (marine invertebrates from the phylum *Cnidaria*) and unicellular algae (dinoflagellates from the genus *Symbiodinium*) and is considered one of the 'great incubators of life in the sea' (Gilbert and Epel 80). Our research team collected samples of *Prochloron* cells by in effect giving 'enemas' to tunicates: while scuba diving along the reef, we used pipettes to flush out the neon green, *Prochloron* cells from the gastric tract of the tunicate bodies. Although this may not have seemed like the dream job for an aspiring marine biologist, I was mesmerised by the multi-species worlds and symbiotic interdependencies I was witnessing. In my first marine biology research experience, studying the *Moku O Lo'e*/ Coconut Island coral *holobiont*, with its assemblages of cyanobacteria, dinoflagellates, invertebrates (coral, sea squirt) and vertebrates (fish, marine mammal and human), provided me with a potent example of 'collaborative survival': a lively multi-species entanglement now threatened by coral bleaching (the expulsion of the unicellular algal symbionts due to warming and acidifying oceans), oceanic pollution and over-harvesting of marine species.[4]

Our research team was exploring the symbiotic constellations of *P. didemni* and its reef hosts in 1979 at the height of a wave of Native Hawaiian anti-militarist and anti-imperialist struggles against the large military presence in Hawai'i (with 11 military bases and over 100 military installations on the island of Oahu alone), and campaigns to shut down several U.S. Navy installations, which had since World War II carried out military exercises including ship-to-shore and aerial bombardment, amphibious napalm and rocket training, and ordnance disposal (Ireland). At the time, we were blissfully unaware of the social activism happening nearby led by Protect Kaho'olawe 'Ohana (PKO), the local Hawaiian and transnational movement fighting to stop the Navy's bombing of the neighbouring island of Kaho'olawe, although we were not completely shielded from the military's reach. In striking distance from *Moku O Lo'e*/ Coconut Island, our exquisite, tropical research site and the idyllic setting for the TV show *Gilligan's Island*, lies Kaneohe Marine Air Base, a Marine Corps facility and air station built in 1919. While the air base was no longer used for gunnery range exercises in the 1970s, we could still hear the roar of Marine helicopters and the sonic booms from the take-offs and landings of military aircraft as we scuba-dived in the warm waters of Kaneohe Bay exploring Coconut Island's multi-coloured reef. While my reef diving expeditions allowed me to notice the dazzling complexity of this marine ecosystem, what I wasn't noticing was how Hawai'i's geopolitical location had made it one of the jewels of U.S. military strategy in the Asia–Pacific region, and had helped to sustain the profligate use of natural resources and fossil fuel energy – later referred to as the Anthropocene's 'Great Acceleration' – a growing military-industrial complex that would likewise exploit and colonise many islands, territories and peoples around the world. At the time, we also did not know how seriously implicated the fossil fuel-guzzling military-industrial-complex would be in the extensive coral reef bleaching caused by climate change that scientists are observing today in the ecologically vital and culturally unique Hawaiian reefs that had so intrigued me.

As a newcomer to the seaweed sisterhood, I felt a sense of excitement to be conducting field research in Professor Izzie Abbott's ancestral stomping grounds, although it was never easy to explain to people that I was a 'real' marine biologist since I was studying cyanobacteria and not humpback whales or bottlenose dolphins, the charismatic mega-fauna that are more likely to capture the public's imagination. Only later would I learn of the path-breaking work of Lynn Margulis, who in the 1990s expounded on the concept of *symbiogenesis*, a new theory of evolution that put cyanobacteria and their unicellular, prokaryotic relatives at the centre of the world-changing story of evolution and the origins of the eukaryotic cell, positing that new levels of biotic organisation occurred through clumping, joining, gathering, collecting, miscegenation and infection (rather

than through random genetic mutation as the core mechanism of innovation and change) (Margulis and Sagan).

After graduating from college I worked for several years as a seaweed biologist and marine aquaculture specialist in Olympia, Washington, and conducted laboratory and field research to determine the optimal biological and environmental parameters within which local edible and commercially valuable intertidal seaweed species (such as *Porphyra yezoensis*) could be coaxed to grow happily on polyethylene nets floating on the surface waters of the southern Puget Sound. The goal of the project (funded by the Washington State Department of Natural Resources and the Federal Sea Grant programme) was to develop a small-scale aquaculture industry for the Puget Sound designed as a form of sustainable economic development that would boost the local economy and preserve the natural environment. As it happened, *P. yezoensis*, unlike its Japanese cousin *Nori*, would not easily submit to net-growing life in the Pacific Northwest bioregion for a host of biological, geographic, climatological, social, cultural and economic reasons.

The Pacific Northwest's typically rainy winters wreaked havoc on the seaweed's survivability, reducing the salinity of the Puget Sound's surface waters that bathed the sprouting algal gametophytes as they clung to the net's plastic fibres. Rogue logs and milling residue, having escaped from one of several mills owned by the Weyerhauser Corporation, would become entangled in the nets, break them loose from their cement-filled 50-gallon-drum anchors and set them adrift. Waterfront landowners complained to the Department of Natural Resources that the coastal aesthetics of the Puget Sound (and homeowners' living room vistas of the pristine coastal landscape) would be marred by the unsightly floating aquaculture nets. Local Japanese, Korean, Vietnamese and Pacific Island communities registered their preference for the colour, flavour and texture of the imported, commercially available varieties of seaweed, and often harvested their own plants. Members of the Makah, Quileute, Coast Salish and Skokomish communities were concerned with how the expansion of seaweed aquaculture farms would limit their access to the Puget Sound marine lands and endanger their sovereignty rights to fishing, collecting and foraging (Deloria; Norman). What to me had seemed a straightforward marine biological puzzle and an obvious environmental 'good' — how to successfully cultivate particular seaweed species in the Puget Sound to create sustainable development enterprises and preserve the ecological integrity of the marine lands — became intertwined with local politics, cultures, economies and ecologies.

At the time I would have never dreamt that I would soon become a card-carrying member of the *Amazon Scientists*, a spirited group of feminist scientific researchers at the University of Washington's School of Fisheries who had joined together in response to the widespread sexism they had all experienced working in the notoriously male-dominated field of marine fisheries. These scientists understood that being a woman in the sciences challenged the naturalisation and normativity of the gendered ideologies that assigned women and men to particular social roles and social locations. The Amazon Scientists deconstructed the

dichotomous thinking that rendered the categories 'woman' and 'scientist' incommensurable in very tangible and painful ways that were manifested in the women's own professional lives. Despite the vibrant solidarity and critical analyses afforded me through my affiliation with the Amazon Scientists, the

Figure 6.1 The author hauling seaweed nets in Puget Sound, Olympia, Washington, 1981. (Photo by Giovanna Di Chiro)

conceptual dualisms in force in fisheries and aquaculture biology – science vs. politics, woman vs. science and nature vs. society – would become incompatible with my growing feminist–scientist sensibilities, and I left the marine laboratory to pursue what I hoped would be a more interdisciplinary path. More than three and a half decades after I stepped away from the day-to-day world of fisheries biology, scientific evidence continues to mount confirming the incompatibility of sustaining the world's marine fisheries (and the human and non-human communities whose lives are entangled with them) while embedded in the nature–culture dualisms and logics of domination of modern industrial societies: the extractivist mindset at the root of overfishing, oceanic pollution and global warming have led to devastating declines in the world's fish populations and spawning grounds, and a loss of livelihood and cultural heritage for many human coastal cultures, including native communities in Hawai'i and the Pacific Northwest (Longo et al.).

Had I still been in Olympia working as a seaweed biologist in cahoots with the Amazon Scientists, I would likely have joined up with the energetic, eco-politics of the 'kayaktavists,' a diverse coalition of climate justice activists, Indigenous leaders, Asian Pacific Island artists and ocean conservationists who came together in Seattle to paddle *en masse* to protest the environmental injustices and ecological devastation created by oil drilling in the Arctic Circle. In early 2015, Filipina-American artist-environmentalist Katrina Pestaño and Allison Akootchook Warden, a Native Alaskan Iñupiaq rapper, organised a demonstration to protest Royal Dutch Shell's offshore oil rig called the Polar Pioneer, which had set up anchor near Seattle *en route* to its oil drilling expedition in Alaska's Chukchi Sea. Offshore drilling in the Arctic Ocean, the activists argued, could threaten the lives and livelihoods of Iñupiat, G'wichin, Saami and other Indigenous peoples and the seals, polar bears, walrus and other non-human species dependent on a thriving Arctic ecosystem. (Juhasz). Like the intersectional activism supporting the co-survival of human and non-human oceanic ecologies practised by these kayaktavists, poets and singers, my own experiences as a marine biologist and my growing awareness of seaweed symbioses and cultural ecologies would spark my future and ongoing participation in nature culture engagements beyond the great blue sea.

'Nature as community': from coral reefs to urban streets

Still drawn to the ideas and methods of biology but seeking what I would later term a more 'embodied ecology,' or more engaged forms of science and environmental studies that would integrate more fully my feminist studies and interests in social justice politics, I entered a graduate program at the School of Natural Resources at the University of Michigan. Focusing on environmental education, I collaborated in the early 1980s on a school-based project in Detroit with one of my advisers, William Stapp, one of the first environmental studies scholars to imagine cities and urban landscapes as important sites for environmental education and sustainable development. Prioritising youth involvement, our

urban environmental and action-based research activities included water quality monitoring and river clean-up projects, transforming vacant lots into community gardens and conducting youth-led asthma surveys in the local schools and neighbourhoods. Together with my other adviser, Bunyan Bryant, a pioneer in environmental justice scholarship, we integrated the then disparate fields of urban studies, environmental education and social justice theory co-producing curricula and educational materials focusing on action research in environmental education for the Detroit and Ann Arbor Public Schools (Bull et al.).

The opportunity to trace this eco-genealogy, along with my students, compelled me to notice and reflect on how my research and action experiences have taken me from my early affiliations with the seaweed sisterhood to my current entanglements in vibrant community-based collaboratives and environmental justice projects. The ecological knowledge about complex symbiotic, multi-species relationships in marine ecosystems that I had learned as a seaweed biologist would now inform my nature culture entanglements in urban environmental studies: working towards improving community health and environmental quality in low-income and marginalised communities, redeveloping abandoned brownfields and vacant lots to generate local businesses and build affordable housing, promoting food security and sovereignty through community gardens and urban agriculture, and working to advance a 'just transition' to community-generated, renewable energy. Although my work over the years has shifted from conversations with seaweeds and their symbionts to collaborations with urban communities and their allies, my experiences in both sites have given me a grounded education on the destructive legacy of the Western nature–culture binary so central to mainstream environmentalism and environmental studies in the U.S. One of the key theoretical reinventions of and interventions into the nature–culture binary that profoundly influenced my own praxis was the emergence in the 1980s of the theory and practice of environmental justice.

Based on the conceptual innovations of environmental justice and my developing action research work with community activists, in 1996 I wrote an essay called 'Nature as Community,' in which I argue that the growing field of Environmental Justice advocates a 'reinvention of nature' that rejects the epistemological/ontological tenet that separates the 'nonhuman natural world from nonnatural human communities' ('Nature as Community' 317). Adopting an ecological standpoint of interdependence, environmental justice activists re-integrate their environments and communities through an eco-politics of articulation. Such a re-articulation of the 'human place in nature' is a critical step in transforming Environmental Studies as we know it, but it represents only the most recent innovation in a longer history of enacted naturecultural understandings. As noted by Leanne Betasamosake Simpson in her book *Dancing on Our Turtle's Back*, which my students and I read in the course described above, many Indigenous societies possess complex environmental management systems that never imagined humans as 'other' to an exoticised 'nature,' and instead rely on ontologies of *relationality* rooted in an understanding of the interdependence among humans and the non-human world (LaDuke; Adamson). The ecological

thinking and doing introduced to my class through Simpson's life-writing contributes to the production of a revitalised, *intersectional* environmental studies that possesses the capacity to resist the climate of despair, hopelessness and 'game over' cynicism so central to the discourse and politics of the Anthropocene.

Creating action research assemblages: just sustainability as creative entanglement

The insights I acquired from environmental justice activists and Indigenous writers on intersectional environmental studies and 'collaborative survival' would continue to inspire my research and teaching. As Leanne Simpson wrote, our environmental and sustainability movements must be creative, grounded in practices of *doing* that create, propel and nurture 'more life, motion, presence, and emergence' (143). With this vision in mind, soon after moving to Swarthmore College in 2012, I participated in several community events where I met a Philadelphia-based activist named '.O'. As a Black, lesbian, Quaker community activist, .O was interested in connecting her commitment to earth-based spirituality and racial and gender justice with her work to support the needs of the people living in 'Philadelphia's harshest ghetto'.[5] .O works with the local faith community on restorative justice and community building in North Philadelphia offering programmes through *Serenity House*, a community ministry centre supported by the United Methodist Church, which 'serves and provides a sanctuary for the social, spiritual, and human development needs of the predominantly low-income African American residents facing poverty, unemployment, substandard housing and gentrification, gun and police violence, failing schools, drug and alcohol dependency, and environmental illnesses'.[6]

Resonating with the environmental justice framework I shared with her, .O and I discussed how we could build a productive partnership supporting the dreams of communities in North Philadelphia. Over the next several years, students in my courses worked together with .O and other local residents from Serenity House to forge a coalition of gardeners, climate justice activists, engineers, horticulturalists, green jobs trainers and solar system installers to build two community gardens, organise gardening and solar energy workshops, lead community teach-ins on gentrification and community land trusts, install a solar panel on the roof of the Serenity House garage and regenerate a thriving community economy supporting local foods, green jobs, durable and affordable housing, and community-generated energy. This diverse campus–community assemblage of activist researchers would later call itself the Sustainable Serenity collaborative. One partner, community resident John Bowie, was particularly excited about the introduction of solar energy to North Philadelphia neighbourhoods: 'Bringing solar panels to Serenity House helps our children learn how to be on the cutting edge of this new energy revolution; it will also be a part of their future'.[7] These sentiments shared with my environmental studies students by residents of Philadelphia's most impoverished neighbourhoods express an embodied sense of 'sustainability' and 'resilience' in the face of the uncertainties of climate change and the threats of 'habitat loss' through gentrification.

Committed to keeping the 'soul' in sustainability, our collaborative initiated a project called Serenity 'Soul'-ar to implement our vision to support energy democracy and to create green jobs through community-owned and generated solar energy in North Philadelphia. In early 2015, with the support from a local green energy training centre, Serenity Soular organised a series of community-based energy conservation workshops introducing residents to the theory and practice of home weatherisation and methods for saving on energy costs. The Sustainable Serenity collaborative also organised with a nearby neighbourhood block association to apply for and win the city's 'Coolest Block' contest enabling 22 long-time homeowners to receive full energy efficiency retrofits. These home improvements for long-term, low-income residents on this block improve the durability and energy efficiency of their houses and strengthen the neighbourhood's capacity to adapt to increasing weather extremes including hotter summers and cold, damp winters. The lower energy costs also enable homeowners to afford to remain in their homes, defying the momentum of gentrification, which has displaced hundreds of North Philadelphia residents and threatens the integrity of other historically Black neighbourhoods throughout the city.[8]

Figure 6.2 Community Solar Workshop, organized by Serenity Soular, in Philadelphia, Pennsylvania (Photo by Giovanna Di Chiro)

generated carbohydrate compounds and oxygen, which allow the coral bodies to flourish and to produce the calcification that builds the reef.

4 Later I would learn that, while teaching biology at University of Hawai'i in the early 1970s, my PhD adviser in History of Consciousness, Donna Haraway, had lived in a commune on *Moku O Lo'ei* Coconut Island. Seaweed and other entanglements, indeed. See Haraway (2016).

5 Author's interview, O, January, 2014.

6 Ibid.

7 Author's interview, John Bowie, 19 April 2014.

8 'The Problems and the Promise: Gentrification in Philadelphia,' www.philly.com/philly/news/Gentrification_in_Philadelphia.html

9 RE-volv, https://re-volv.org/

10 Crowdrise, 'Jumpstart Serenity Soular' www.crowdrise.com/serenitysoular

11 The publication in 1980 of one of the first articles on *P. didemni* by two of the PIs I worked with, who acknowledged me as one of their field collectors. See Giddings et al. (1980).

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