Introducing

The REAL Sea Lettuce Conference

Jersey, Autumn 2017

Sea lettuce in St Aubin's Bay, summer 2017

A short report of the conference

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SOS Jersey

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Initials to names:

Used in this report:

CFP – Credible Food Project
Dfl – Department for Infrastructure
JEP – Jersey Evening Post
JiT – Jersey in Transition
STW – Sewage Treatment Works
SOSJ – SOS Jersey, formerly known as Save Our Shoreline Jersey
TTS – Transport and Technical Services

At the conference

Introduction from SOS Jersey

SOS Jersey (SOSJ) have been involved for over 22 years in matters related to protecting our shoreline. We receive no funding and the problems with sea lettuce have taken up a lot of our time and effort; finally, at least some of our efforts were rewarded at the end of last summer when the Department of Infrastructure (DfI) finally admitted the high levels of nitrates in St Aubin's Bay were not 'all the fault of the French' and were maybe at least partly homegrown.

In the last five years, £115,000 has been spent on our sea lettuce problem[i] and, on 05-06 October 2017, and with very little local notice, the DfI, in collaboration with Ricardo Energy and Environment, hosted the '1st International Sea Lettuce Conference on Sea Lettuce (*Ulva* spp) Management'[ii].

The aim of the conference was 'to bring together impacted stakeholders and leading experts from varied backgrounds, and across international boundaries, building a platform upon which ideas can be shared and management strategies discussed.' Local aquaculture expert Tony Legg and SOSJ were not invited to attend, nor to speak. Nonetheless, I was able to apply for a place and attended both days of the conference.

By the time he became aware of this conference, Tony Legg was engaged at another event in the UK, so was not able to present a paper, which he was keen for contemporaries to hear and give feedback on. We hoped I could present the paper on Mr Legg's behalf, but this was not to happen either. On the plus side, Mr Legg's paper was printed, and the copies made available; if you would like to see a paper, you can download one from our site[iii]; the ideas are discussed in brief below.

The costs and benefits of the occasion are outlined in an answer to a States question by Deputy John Le Fondré[iv]. If there has been any feedback from there, as mentioned in the answer, we haven't heard it. On 21 October 2017, DfI Minister Eddie Noel was quoted in the JEP[v] as saying

> 'That was one of the things we were considering – extending our outlet in St Aubin's Bay by four miles out to sea. We now know not to do that – it would have cost us £10 million, so we have saved a tremendous amount of money.'

This assertion is erroneous: thanks to some tests done in Jersey in 2012 by the then TTS, we did know that extending the outflow would not work, so this is not money saved.

The JEP article goes on to say, '[Eddie Noel] added that it was still not known what 'triggers the blooms' of the sea lettuce in St Aubin's Bay.' We can only hope he was quoted out of context. It is clear what causes the sea lettuce overgrowth and, while it's a complex issue, there are some things we can do to help ameliorate the problem.

We had already planned our own conference before we heard of the States' one, so we held back until we saw what was discussed. However, some of the areas we wanted to cover were not touched on, so we went ahead with our own conference on 19 October 2017.

In order of speaking, we heard from Constable Simon Crowcroft of the Parish St Helier; John Baker of Jersey Action Group; Nigel Jones of Jersey in Transition; Jacqui Carrel of SOSJ; and Glyn Mitchel of The Credible Food Project. This short report summarises what we spoke about, what we would like to see, and of the launch of a new charity.

This is a short report, so do feel free to get back to me via jc@sosjersey.co.uk with any questions.

Best wishes, Jacqui Carrel, environmental scientist for SOS Jersey

Nitrates

Remember DFI's statement quoted in the introduction that it is 'still not known what triggers the blooms of the sea lettuce in St Aubin's Bay'? In Scrutiny's *Review of Nitrate Levels in Jersey's Water* (December 2016)[vi] we have this unequivocal statement (*my italics*):

> *We found that nitrate contamination is having a clear and significant impact on Jersey's public water supplies, private water supplies and on the sea lettuce problem in St Aubin's Bay.*
>
> *Whilst it is acknowledged that the prevalence of sea lettuce in Jersey is influenced by a number of different factors, we found that measures to reduce nitrate loading on land would significantly improve the sea lettuce problem.*

Other comments include:

> Nitrate pollution has been a longstanding issue and for the last 15-20 years the Department of the Environment has been working with key stakeholders to create new measures to protect Jersey's water.
>
> However, despite this, most of the Island's water bodies (streams, ground and coastal waters) are currently of 'moderate status' and, as a result, *Jersey Water cannot guarantee to meet drinking water standards for nitrate in the mains drinking water supply at all times. Furthermore, Jersey still has some of the highest levels of nitrate in the whole of Europe*.
>
> Since the introduction of the Water (Jersey) Law 1972, Jersey Water has been granted five dispensations by the Environment Minister to allow the concentration of nitrate in their water to exceed the regulatory limit of 50mg/l.
>
> However, there have been no nitrate breaches in treated water since 2013. It is our understanding that the Medical Officer at Health has indicated her disapproval for the continuous granting of dispensations and has advised the Environment Minister that the latest dispensation, which was granted on 2nd December 2016 for a five-year period, would be the last.
>
> Over the last decade the farming community has been heavily involved in helping to reduce levels of nitrates in Jersey's water… the majority of farmers are fully supportive of the WMP's objectives… to address high levels of nitrates.
>
> Voluntary initiatives are being undertaken by the farming community to reduce inputs of fertilisers and pesticides. This year the potato growing sector have begun trialling new machinery that allows for fertiliser placement and, if the trials are successful, there could be a substantial 10-15% reduction in the amount of fertiliser applied to the growing crop of Jersey Royal potatoes.
>
> *Reducing the amount of fertiliser applied to fields would not only significantly improve Jersey's nitrate problem but would also save farmers a substantial amount of money*.
>
> it is imperative that the Environment Minister ensures that all key stakeholders continue to work closely together throughout the duration of the Plan.

We strongly recommend DfI and Environment view the whole report. (You might like to, too, as it makes interesting and informative reading; the link is in the Endnotes.)

The sea lettuce problem

Sea lettuce in small quantities is normal and ecologically helpful, but in excess it is a blight and adversely affects much of St Aubin's Bay flora and fauna, local businesses and residents, other Islanders and tourists.

Sea lettuce in St Aubin's Bay, summer 2017, and attempts to clear at least some of it

The sea lettuce problem also just one symptom of something that is wrong in our soils and we'll look at that later. There are many factors contributing to what amounts to this sea lettuce paradise in St Aubin's Bay and these are summarised here:

Probable contributors to the sea lettuce blooms	**Can do something about it?**
Excessive nitrates and phosphates going into the Bay; nitrates regularly above legal limits	Yes – move to regenerative farming and gardening
An outdated sewage treatment plant	Yes, a bit – but still a few years away
An increasing population	Possibly – policy needed
Shallow standing water for long periods	Possibly – trial needed
Natural nitrate extraction using native oysters	Possibly – trial needed
High nitrate levels in surrounding seas	No – not yet, anyway
La Collette reclamation → Decreased water flow	No
Gently sloping, south-facing bay	No
Warm winter waters and plenty of sunshine	No

As you can see, there are some factors we cannot control, but we can at least work on the others, especially the nitrate load, to bring the tipping pointed needed for nitrate blooms down. We can also work on short-term measures that may help until the long-term measures kick in.

We cannot claim a cure in advance! What we can claim is that high nitrate levels (along with high levels of ammonia and phosphates) contribute a lot to the sea lettuce problem and that we can work to bring them down. At worst we will see our waters and health improve – and we can also hope to see a concomitant decrease in sea lettuce blooms.

Sea lettuce mitigation – short term

Local, internationally renowned aquaculture expert Tony Legg is working on a number of projects in the UK and EU. We believe his ideas with regards to using native oysters and pro-tem furrowing are worth listening to, discussing and properly trialling; sadly, DfI and Environment do not appear to share this view.

Mr Legg's proposals are set out in his paper Sea Lettuce Bloom Mitigation – A Unique Opportunity Using St Aubin's Bay Jersey.

Furrowing

The furrowing trial can be summarised nicely in Mr Legg's words:

> The settlement of Ulva zoospores onto wet sand is a biofouling event. This proposed trial encapsulates modern biofouling reduction principals of deter, deny and disperse by changing the drainage pattern, increasing atmospheric exposure, lowering surface energies, periodically removing biofilm and creating physical instability of the first few millimetres of this aspect of `the benthos.
>
> Present in this area are variable densities of the seagrass *Zostrea noltii*[1]; this has general protection and, if the densities exceed a certain minimum, it has specific protection under the OSPAR convention[vii]. Any trial or expanded operation would need to show that any impact on this species was neutral or positive.

Natural drainage patterns showing in St Aubin's Bay

[1] Seagrass (also 'eelgrass') beds are highly diverse and productive ecosystems, providing shelter and/or food for juvenile and adult fish, epiphytic and free-living macroalgae and microalgae, molluscs, nematodes, geese, crabs and more.

There are natural drainage patterns that start to develop across the below half tide platform that originate from the perched column of water left in the upper sand bank as the tide descends with increasing rate to a maximum at half tide. Naturally, the water spreads horizontally across the platform maintaining the ponding throughout the tidal exposure.

By creating narrow furrows parallel to the natural flow of the water down to the low tide mark, self-sustaining drainage channels can be established that duct the substantial volume of water normally retained in the area, down to the low tide mark and the gyre beyond. ['Disperse'.]

The effect of drainage in this way dries the ponding elements and creates a beneficial environment for the seagrass proliferation. The upper few millimetres of sand loses the interstitial water and ionic bound biofilm that triggers zoospore settlement. ['Deter'.]

This lowers surface energies and exposes any settled zoospores or developing discoid thalli to desiccation. ['Deny'.]

Much work has been done to create the correct drainage angles and furrow cross sections to minimise seagrass damage to less than 2% initially and probably much less than that given the potential for recovery with limited internodal damage.

The furrowing should not be confused with the failed trial run by DoE which used heavy machinery, overwide furrows, double side spoil heaps, an area with little surface water drainage, no sea grass, at the wrong part of the tidal cycle, the wrong time of year and, most importantly was above the half tide mark, which means a quite different sand profile and anoxic layer position. [Illustrated below.]

The arguments against using the furrows ('horses and walkers may trip in the furrows and get hurt', and 'the furrows will damage too much of the sea grass') are spurious.

During the stipulated times of furrowing, the furrows will only be exposed during the times when horses are not allowed on the beach or when it's dark; walkers face larger channels at St Ouen's and manage perfectly well – and walking on areas of sea lettuce is far more dangerous; the sea lettuce does far more damage than the furrows would – claims by DfI and Environment that sea lettuce does not harm seagrass are erroneous; the furrowing should in fact *aid* seagrass recovery.

The trial that was a 'fail': wrong time, wrong place, wrong type of furrows

Unlike in the picture above, the furrows would be cut at the start of a spring tide sequence, with the tides helping build the structures over about 10 days. The idea is to use Bruce anchor drawn behind a modest 4x4 vehicle to make 15cm wide furrows every 10 metres. The estimated damage to the seagrass is only 1.66%, from which it can soon recover.

The furrows would be at right angles to the shore and cut from the mid tide point to low water, creating preferential drainage channels which enable downstream movement of sand and weed. There would also be a change in oxidation which makes sand previously bound by anoxic conditions more mobile; in addition, the anoxic layer moves to a lower depth, which is beneficial for seagrass.

The proposal is to fully undertake the trial by using donated time and equipment. Monitoring would be done by volunteers under supervision from an external academic body; two have already expressed an interest. Cost-wise, we are looking at substantial savings on any of the DfI/Environment ideas. It will take 12 hours' running to cut the furrows.

The equipment simply includes access to a beach-suitable 4-wheel drive vehicle, a 25 kg Bruce anchor, a short length of chain, sample phials, a microscope (which can be a bolt on to smart phone) and a camera drone.

If the furrows need refreshing twice more in a season, that would give 48 hours of vehicle and driver time. At a notional £50/hr the cost is likely to be £2,400 a year. Compare this to the £115,000 spent in the last five years on trying to clear away the sea lettuce[viii].

Native oysters

Should the furrows work as predicted[2], some of the flushed nutrients will not be captured by sea lettuce, seagrass or sand but will pass into the gyre. The problem could be that phytoplankton would access the nutrients further out, potentially causing blooms, so Mr Legg is proposing mitigating the effects by using the native European oyster *Ostrea edulis*.

Mr Legg comments:

> *Ostrea edulis* is a keystone species that significantly enhances biodiversity and has European action plans and is an OSPAR priority species. There are indications that St Aubin's Bay is near to eutrophication and is MFD Moderate for species diversity. It is also rapidly becoming an economically important true aquaculture product due, in large part, to research undertaken in Jersey.
>
> With regard to ecosystem services, this oyster is a significant sink for nitrogen both into tissues and shell but also as contributor to the benthic[3] bacterial flora.
>
> When this was first mooted as an option in 2015, without reference to the proposer, the comment from the Minister for the Environment was, 'It will probably not work[4]', and 'It would not be appropriate to have that level of tractor and trailer activity on St Aubin's beach'.
>
> The reality is quite different: the oysters up to 20g would be grown elsewhere on intertidal sites some in Jersey but others in disease free areas of the UK, Ireland and Denmark, using seed produced in ponds in those countries. These sites are already established and are using Jersey Sea Farms ORTAC4 units… [which] forms some of the basis for the deter, deny, disperse approach.

Further details are available in Mr Legg's paper, which is referenced at the end of this report.

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[2] Initial trials are promising… and the States must agree to try these out officially – and properly – this time.
[3] The benthic layer or zone is the lowest level of a marine (or freshwater) system; it includes the sediment surface, the water just above it and some sub-surface layers, and is home to many organisms from bacteria to crustaceans and fish. The sediment of the benthic layer in St Aubin's Bay also traps nutrients discharged from Bellozanne; these nutrients are released into the water when the layer is disturbed by, for example, walking through it at low tide, or by tidal action.
[4] When I went down to watch the furrowing 'trial', I asked a member of the Société Jersiaise what was going on. The reply was, 'Furrowing. I don't know why we are doing this: it won't work.' Surely the point of a (proper) trial is to ascertain what works and doesn't and have the data to back up the conclusions?

Sea lettuce mitigation – longer term – and other benefits

We believe that longer term mitigation can be brought about by changes in farming and gardening practices, moving from current pesticides-fertiliser cycles to regenerative methods. Regenerative methods seek to bring life back to the soil and to cut out the use of synthetic fertilisers and pesticides.

The benefits of cleaner, healthier soils are profound. They include, for example (in no particular order):

> Water (and runoff) much lower in nitrates: better for health, less likely[5] to contribute to eutrophication, and less of a strain on the STW.
>
> Fresh water much cleaner: currently we have pesticides turning up in our reservoirs, with mediation 'costing in the region of £1.2 million to deliver' just for one project[ix] so our drinking water will be safer.
>
> Better soil diversity: this in turn will lead to healthier plants, which in turn will help ecosystems and our own health.
>
> Better soil structure: this not only supports better soil organism diversity and quantity, but also helps store water, keep soil temperatures down, and sequesters the greenhouse gases carbon dioxide and methane. Runoff is also decreased, and plant roots can grow deeper.
>
> More diverse crops, more yield per vergée, a greater ability to support Jersey cow herds and lower farming costs.

We'll look at now how living soils work, the problems caused by pesticides and fertilisers and some suggestions as to where to start.

How living soils work

Plants and animals need a full range of nutrients (minerals, vitamins and phytonutrients[6]) for optimal health. To make sure this happens:

- Carnivores need to eat healthy herbivores
- Herbivores need to consume healthy plants
- Plants need to grow in healthy soils
- Soils need to contain a collection of soil-dwelling organisms

It is not just one way: plants and soils need animals have to animals to help them thrive because grazing, fertilising and even trampling are essential parts of plant-soil health and growth.

[5] This will not happen overnight as we are likely to have substantial amounts of nitrates in ground water, which will take some time to clear. We do not know how much there is and how long it will take, but it will probably be a factor in keeping sea lettuce growth unnaturally high for some years. This is partly why we need to consider short term measures such as furrowing.

[6] Including vitamins A, B, C, D and K; the minerals calcium, chlorine, chromium, cobalt, copper, iodine, iron, magnesium, manganese, molybdenum, phosphorus, potassium, selenium, sodium and zinc; and the phytonutrients carotenoids, ellagic acid, flavonoids, glucosinolates, phytoestrogens and resveratrol.

Let's look first at the soil organisms and how they help plants get their nutrients – and how plants help the soil organisms. For ease of explanation, I'm showing this in a linear fashion, but it's more like a 3D web; bear in mind this is a simplified version of the whole process:

1. Plants need sunlight and water to grow; they also need nutrients, so the plant releases sugar-protein complexes called exudates into the soils around the roots
2. Soil-dwelling bacteria and fungi feed from the exudates
3. Meanwhile, bacteria and fungi break down and release minerals from rock/clay/sand and other nutrients from organic matter; at this point, the nutrients are not available to the plants until they are processed further (when the exudate signals are sent)
4. Nematodes and other microscopic organisms also feed on the bacteria and fungi; in doing so, more water-soluble nutrients are released in plant-available form
5. The nutrients are absorbed into the plants via their roots
6. The plants grow, reproduce and eventually die; their exudates (when alive) and other nutrients (when dead and decaying) are passed back to the soil directly, or via the animals that eat them
7. The dead plant material is turned into humus

This process works well in that the nutrients are sequestered (held on to) until needed; put another way, if all soil-based nutrients were water-soluble all the time (and thus bio-available for plants), it would only need some rain and many of the nutrients would be washed away, and the plants would not thrive. As it is, it's only when the plants need to grow and release their exudates that the process of releasing the minerals starts.

And that's just the nutrients! There are other systems at play in a healthy soil. Humus holds onto nutrients (10 times better than clay does), methane, carbon and water[7]. In periods of dry weather, a good soil will contain plenty of humus, which in turn holds onto water; this in turn supports better plant growth and the cycle reinforces itself, leading to better ecological and hydrological systems. Poor soil, however, does not store water, so irrigation is needed during drier periods.

The carbon and methane in humus is not just a passing mention: humus is very important for their sequestration[8] and storage – and we need more sequestration as our planet starts warming up. If plant growth decreases, there is less photosynthesis; in turn, less humus is made, fewer soil organisms are supported and less carbon is sequestered. By the same token, an unhealthy soil will not support enough of the methanotroph bacteria needed take herbivore-produced methane[9] from the atmosphere.

[7] Humus also binds toxins that are harmful to plant and soil life.

[8] Sequester/sequestration in this context means forming a chelate or other stable compound so that the substance is not bioavailable.

[9] Methane, like carbon dioxide, is a greenhouse gas; in sustainable systems, there are enough methanotrophic bacteria to feed on the methane, effectively sequestering the gas in the soil.

The problems with pesticides

The use of pesticides is predicated on the assumption that we must conquer nature, rather than working with it. In terms of farming and gardening, herbicides are used to kill unwanted plant matter, insecticides to kill unwanted insects and fungicides to kill unwanted fungi.

These pesticides can also cause death to other organisms, both directly (by poisoning) and indirectly (by causing eggshells to thin, for example, and by destroying the delicate balances of ecosystems). As a result, soils become poorer in quality and become more compacted. They are then ploughed, killing essential soil life.

This root only grew half underground as the poor soil was compacted

Plants cannot thrive because they are lacking space for their roots to grow properly, the wrong balance or lack of soil microorganisms to support them, and not enough vital nutrients and water.

Pesticides are also injurious to health in many ways, both because they act as toxins and because some act as endocrine disruptors and antibiotics. Recently, via various media, I have expressed my views on just one of the pesticides: the ubiquitous glyphosate. There is a lot to say on all of them, but this one example will do for now. It troubles me greatly that I cannot (by law) go around coffee shops to collect their used coffee grounds to add to compost…but I can go and buy a poison to spray on my plants.

Our Environment Minister has moved from saying (on Radio Jersey) that glyphosate preparations (such as Roundup) are the 'least dangerous' to (in a news release) 'safe'.

While I appreciate the need to examine all evidence and to make alternative plans with farmers and gardeners, I do not appreciate being exposed to this poison, and I know many others in Jersey and around the world are of the same mind. Here is a letter I wrote to the JEP on the subject:

> Glyphosate is a herbicide; 'cide' means 'killer'. As far as I can find, the word 'safe' has not been used in conjunction with glyphosate-based herbicide (GBH) use, but let's accept for now it isn't, as claimed by Environment, associated with cancer, and turn instead to other proven reasons we should not be using it.
>
> GBH prevents proper uptake of several vital minerals; interferes with the liver's detoxification systems and the synthesis of some neurotransmitters and steroids; harms mitochondria, which are needed for energy; is associated with Alzheimer's, ADHD and autism; and kills beneficial gut bacteria, thus contributing to anxiety, obesity and antibiotic resistance.
>
> Current methods to determine toxic load are based on extrapolation, so there is an assumption that toxicity decreases with concentration. Indeed, this is true – until we get to very low levels: at that stage glyphosate becomes a hormone and DNA disruptor, and effects are especially noticeable in foetuses and infants.
>
> The resultant damage to organs and brain development can even pass to subsequent generations.

Each ingredient in GBH is tested separately; there are no requirements to test the added 'inert' ingredients collectively. However, we must think about why they are added: it's not for bulk (as in some vitamin pills), but to enhance the action of the glyphosate. That is, the ingredients, once mixed, act synergistically.

Deputy Luce has rightly stressed that chemicals such as GBH preparations must be used legally, responsibly and according to the instructions on product labels. While we hope this is indeed what happens in Jersey, there are many documented cases elsewhere where it is not, with disastrous health and development effects on communities.

Glyphosate is just one of the poisons used in Jersey, all of which add to the toxic load on our environment and bodies. When traces of these chemicals are found worldwide in water, breast milk, and organs, the Environment department should be very worried and not trying to persuade Islanders that the use of poisons is acceptable, especially as there are good alternatives, such as using regenerative farming practices.

Will this regeneration of Jersey's environment happen overnight? Of course not, though it can be quicker than many think. Ministers need consider the low-cost, environmentally sound alternatives that are being proven to work across the world and must act now before it is too late.

Director of the Environment, Willie Peggie, replied to the letter saying, amongst other things, that "...if such reasons existed, any pesticide product such as Roundup would not be authorised or the authorisation would be revoked should such effects be discovered later." Not only does the evidence say otherwise, this is not in line with 'the least dangerous' claim by Deputy Luce, nor his exhortations to use such products strictly according to the instructions, which include using protective gear.

At the time of writing, a) EU countries have reached an impasse on whether to ban the use of glyphosates in the EU before glyphosate's EU license expires on 15 December 2017 and b) the argument is gathering pace in Jersey, with input from many parties. The debate is welcome and healthy, and needs to be extended to all areas of environmental practice. At the same time, data from companies and the States must be made available for all to see.

Last, and by no means least, pesticides are being linked both directly and indirectly with substantial decreases in insect populations. This is quite alarming and, moral issues aside, we need them as part of important ecosystems and to pollinate our plants.

An example: I have seen two close-by fields in Jersey where mixed plants have been grown in a field which has been farmed in the traditional way and one which has been treated using regenerative methods. The difference was quite astounding, with the visual impact immediate because of the number of butterflies in the latter field and the lack in the former.

Butterfly in the regenerated field

Jersey is a small Island, and one that has been poisoned too far. 'Small' can work for us, because we can (despite apparent evidence to the contrary!) make decisions more easily and move quickly on new policies.

We need to introduce new methods of farming – ones that are beyond organic: regenerative methods.

The problems with fertilisers

Plants growing on poor soils need to be given food to grow. Common practice is no longer to add vraic and composts to the soils, but to 'treat' the soils with industrially-produced NPK fertilisers. Nitrogen (N), phosphorous (P) and potassium (K) are the minerals that plants need in most quantity, so that is what is supplied in the formulations[10] along with some trace minerals… though not in the most plant-available form. And what of the other nutrients needed for proper, healthy growth? They are not there, and plant development suffers.

This means plants don't have has much nutrient density as when our grandparents were young; it also means poorer quality of meat (and health) as animals feed on these nutrient-depleted plants… and poor-quality food for you, which is maybe laced with poisons. The whole sorry saga is exacerbated by herbicides such as glyphosate which bind more of the remaining minerals, so plants, animals and humans can't absorb the minerals[11] properly.

Solutions start with our soils

First, of course, the States need to widen their soils test parameters, and listen to soil ecologists such as Glyn Mitchell who are already overseeing 'regenerative' trials with great success.

Top: a poor, compacted, lifeless soil; Bottom: a good, regenerated soil with organisms and structure

Red Tractor and LEAF training and accreditation are starting to address the issues, but they do not (yet) go far enough to addressing soil health and the concomitant issues.

The States need to speak with the farmers and assure them of States' support: it is there already in so far as farmers are paid per vergée, no matter what is done to their land.

The way to meet the challenges of polluted reservoirs, high nitrates in our drinking water and of course sea lettuce blooms will be to support farmers following the three principles of regenerative agriculture:

- Minimal soil disturbance
- Growing multiple cover crops
- Farming to encourage as much diversity as possible

We need to shift the emphasis to rewarding soil replenishment and regeneration.

[10] These elements are supplied in the form of salts, not metals, so the plants can access them. However, while phosphates don't easily get washed away, nitrates do.
[11] Such as manganese, which is needed for bones, immune function and to neutralise free radicals.

Conclusion

It's not within the remit of this short report or the job of those who spoke at the presentation to outline a comprehensive policy, but we are available for comment and advice.

Briefly, though, regenerative farming, which is being rolled out world-wide with great success, looks at putting life back into the soil through understanding and replacing microbial communities, replacing NPK fertilisers with suitable cover crops, and using no tilling and pesticides. Another benefit is we start rebalancing the hydrological cycle, which in turn helps with local and global warming.

Regenerative farming brings back the right balance of soil fauna for the purpose needed; for example, one ratio of bacteria to fungi suits grasslands and weeds, while another ratio suits tree growth. Regenerative farming supports life, health and helps sequester water, carbon dioxide and methane. We need to start making the move now and not wait until everyone else has done it.

We also need to start looking at Jersey's soil as a bank account, which, at the moment at least, is in the red. And here's a thought: if it gets worse, resultant food and water shortages will be the driver for an unhealthy society and social unrest.

We need to save Jersey for us and our children and grandchildren. You can help by sharing this report, becoming even more informed and insisting politicians and civil servants act in our interests. You can also help by spreading the word about The Earth Project Jersey, details of which are follow.

The Earth Project Jersey

The Earth Project Jersey is being launched as a charity. The Earth Project will support projects that support:

- Regenerative farming (for example, as shown by the Credible Food Project) and gardening
- A return to better health for nutritious foods, clean water and clean air
- Corporate, community and Individual efforts to help Jersey (and beyond) get back to nature and move away from the use of toxic chemicals
- Collaboration between the States, farmers, environmental groups and individuals
- Strengthening the flora and fauna in Jersey

The opportunity to take responsibility – together – for the land that feeds us is a wise investment for governments, businesses and families.

We invite farmers, landowners, and consumers alike to join in collaboration in this next agricultural revolution—a profitable revolution that starts under our feet.

Please keep a look out on Project Earth Jersey's Facebook page for developments, and contact them via that page or by emailing jc@sosjersey.co.uk.

Digital Jersey

I'd like to mention Digital Jersey here as they are doing a lot of work in Jersey regarding developing helpful technology. In relation to our subject here, Glyn Mitchell says:

> The Credible Food Charity is grateful for the time Digital Jersey has given to develop a website programme that farmers can use to assess their own soil health.
>
> The programme reduces the costs to the farmer and puts soil assessments, management and soil regeneration strategies back into their control.

I believe the development of this software is going to be an exciting and important factor in helping Jersey return its soils to a healthy state.

Links

SOS Jersey: sosjersey.co.uk and facebook.com/sosjersey

Earth Project Jersey: facebook.com/TheEarthProjectJersey

Credible food project: crediblefood.com and facebook.com/groups/287703044965617

Jersey Action Group: facebook.com/JerseyActionGroup

Jersey in Transition: facebook.com/groups/jerseyintransition

Digital Jersey: digital.je/ and facebook.com/DigitalJersey

We have put together a list of further reading and viewing; as this will be updated on an ongoing basis, we are keeping the list online here for you to view: http://sosjersey.co.uk/helpful-info/

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[i] https://www.gov.je/Government/Pages/StatesReports.aspx?ReportID=3225
[ii] Details: https://www.eventbrite.co.uk/e/public-meeting-on-the-first-international-conference-on-sea-lettuce-ulva-spp-management-tickets-38337651949#
[iii] The link to Tony Legg's paper is in this article: http://sosjersey.co.uk/international-sea-lettuce-conference-in-jersey-our-thoughts/
[iv] 4.17DEPUTY J.A.N. LE FONDRÉ OF ST. LAWRENCE OF THE MINISTER FOR INFRASTRUCTURE REGARDING THE INTERNATIONAL CONFERENCE ON SEA LETTUCE MANAGEMENT: [1(542)]. http://www.statesassembly.gov.je/Pages/Hansard.aspx?docid=CA7C1021-46C7-4893-A016-6EE60536C71D
[v] https://jerseyeveningpost.com/news/2017/10/21/sea-lettuce-we-can-learn-from-new-zealand/
[vi] http://www.scrutiny.gov.je/Pages/Review.aspx?ReviewId=254
[vii] https://www.ospar.org/
[viii] https://www.gov.je/Government/Pages/StatesReports.aspx?ReportID=3225
[ix] For example, oxadixyl; here is just one news release on it: https://www.jerseywater.je/bypass-pipeline-to-minimise-effects-of-nitrates-and-oxadixyl-in-val-de-la-mare/