CARDIFF NATURALISTS' SOCIETY

Founded 1867

NEWSLETTER No. 131

June 2024

Charity No. 1092496

LIST OF OFFICERS 2023/2024

President
Mike Dean
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Position vacant
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Treasurer
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Membership Secretary
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Indoor Meetings Secretary
Hilary Wicks
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Field Meetings Coordinator
Position vacant

Newsletter Editor
Stephen Nottingham
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Also on Council
Mary Salter, Gill Barter, Patrizia Donovan

http://www.cardiffnaturalists.org.uk

www.facebook.com/groups/CardiffNaturalists

http://cardiffnaturalists.blogspot.com

Now that Mike Dean has been elected President, there is a vacancy for Society Secretary. Anyway interested in this role, or contributing to the secretarial work, can email Mike: *secretary@cardiffnaturalists.org.uk* The society would also welcome more people to join Council at the next AGM in September 2024.

Cover photo: Jay at Forest Farm, Cardiff, by Phill Blanning.

President's Report

Mike Dean

We have just had our last Indoor Meeting of the 2023/24 session. It was a very interesting talk by Dr Rob Thomas from Cardiff University on the impact of climate change on Welsh Woodland Birds, such as Pied Flycatcher, Redstart and Wood Warbler. However, this leads me to a worry of mine, that this spell of inclement cold wet weather is going to have a detrimental impact on the breeding success of many of our garden birds, especially the tit family who only have one clutch of eggs a year. The female is unlikely to leave the nest to forage for food but remain in the nest to brood the chicks and keep them warm leading to undernourishment. Is this weather our doing or El Niño or possibly a combination of both? We are very grateful to Liz Kerley who is continuing to record the weather in North Cardiff after the loss of her husband, Brian Kerley, who provided data to the Newsletter over many years.

The winter programme of Indoor Meetings held at the Ararat Community Centre was, I believe, a success and we are now planning some Field Trips during the summer period and starting to think about a programme of talks for the Autumn Indoor Meetings. Any suggestions are always welcome. We also had a very successful Cardiff Bird Watch thanks to Linda & Rob Nottage. This year we commenced the Field Trip at Llanishen Reservoir before moving on to Forest Farm.

I am pleased that we are still able to support Cardiff University in awarding the annual Bioscience Prize. The winning student's research report is included in this Newsletter. I am always amazed at the detailed work these students are able to complete, and perhaps this should give us optimism for the future when young naturalists are able to carry such detailed monitoring of the environment.

I am very disappointed that the Morrey Salmon Project has come to a halt! I sympathise with the Museum staff who are going through a difficult time with both voluntary and compulsory redundancies. However, at the same time, I am sure they are going to have to rely on volunteers more and more in the future, and pausing this project means that we have lost the impetus and it will be difficult to get started again especially during the summer months when we would rather be outside. What is even more concerning is the suggestion they may have to close the building at Cathays due to problems with the building. This is one of the prestigious buildings of Cardiff and to abandon it and let it deteriorate is unthinkable! In my opinion, this smacks of poor management over the years.

I cannot close without mentioning the passing of Joan Andrews who was a stalwart member of CNS over the years both as a treasurer and President. It is a pity the funeral was so far away but Tricia (nee Wood) represented the Society at the funeral.

I can only hope you enjoy reading this Newsletter and that you have an enjoyable summer outside enjoying the amazing wildlife we are blessed with.

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Dr Joan Andrews (1933-2024)

The Society was deeply saddened to hear of the passing of Joan Andrews on 20th March 2024. Joan was an active and longstanding member of the Society, serving as our 116th President (2002-2004) and then as Treasurer. Over her distinguished career, she was well regarded as an academic and Doctor in the fields of Obstetrics and Clinical Gynaecology, both in London and Cardiff. Alongside her keen interest in natural history, Joan was also a pioneering traveller who liked nothing better than exploring the Himalayas or voyaging to Antarctica. After many years living in Dinas Powys, she had recently moved to Thetford to be close to family. A service was held at West Suffolk Crematorium on 4 April. Her ashes will return to Wales and be scattered near Pen y Fan on 30 May at 1 pm (LD3 8NL), followed by a get-together at the Star Inn, Dinas Powys (3-6 pm)..

Bioscience Prize 2024

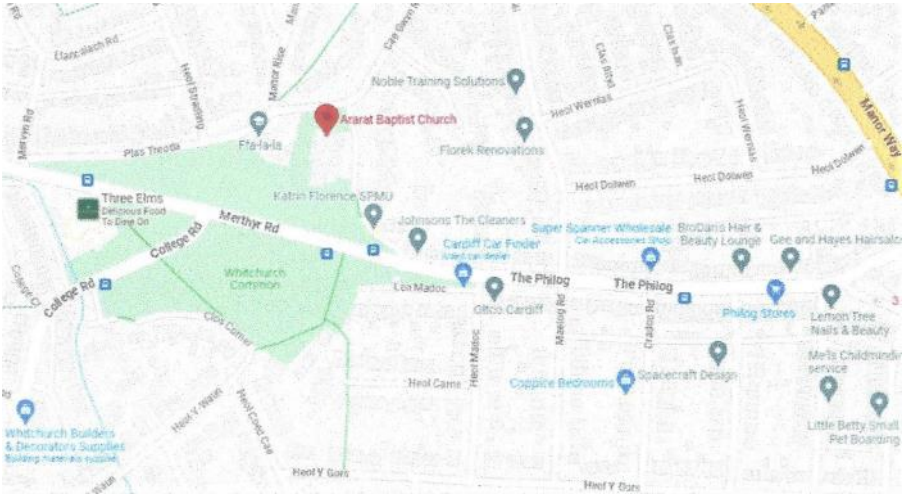
We congratulate **Liliana Tarrant Snedden** on winning the Cardiff Naturalists' Society Bioscience Prize for 2024. She has written a summary of her fieldwork report, on the effects of barrel sponge (*Xestospongia* spp.) filtration on seawater composition off the coast of Malaysian Borneo, for this issue of the newsletter (see pp 22-28). Liliana will receive her award, and talk about her research at the CNS indoor meeting on Monday 23 September 2024.

Photo of Liliana Tarrant Snedden bird ringing at Danau Girang Field Centre in Borneo.

The CNS Bioscience Prize is awarded annually, in memory of Prof Ursula Henriques and Dr Mary Gillham, to a second-year Cardiff School of Biosciences student for their outstanding field course report.

Indoor Meetings

Ararat Community Centre, next to the Ararat Baptist Church, is the venue for Cardiff Naturalists' Society indoor meetings: All meetings start at 7pm and conclude by 8.30pm. The address is: Plas Treoda, Whitchurch, Cardiff CF14 1PT.



Indoor meetings will resume on Mondays from September 2024. Dates for your diaries

23 September 2024: AGM and presentation by Bioscience prize-winning student
21 October
25 November
9 December (Xmas special)

27 January 2025 (Members' Evening); 24 February;
24 March; and 28 April.

Full details of the autumn 2024 meeting programme will be included in the next newsletter this September.

Outdoor Meetings

Saturday 22 June 2024
Rhoose Point

Linda Nottage: Meet at 10am in the free carpark at Rhoose Station. This is accessed via Station Road and across the level crossing, at Grid ref. ST063662. We can leisurely explore various areas of grassland, pools and scrub with a variety of birds, insects and flowers. We hope to see several species of orchids, and butterflies and dragonflies, depending on the weather.

Paths are a mixture of grassy, stony and paved, but no stiles. There are no toilets, but bushes offer some cover! If it is fine, we could go on to visit the old Fontygary quarry in the afternoon (bit of a scramble for access there) - bring a picnic if you wish to do that.

Further outdoor meetings are being arranged this summer, including a return to Llanishen & Lisvane Reservoirs to learn about wildlife management plans for the new woodland there.

Look out for the latest information and additions to the outdoor and indoor meeting programmes in emails to members, on social media, and on our website/blog:
http://cardiffnaturalists.blogspot.co.uk/p/programme.html

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Deadline for submissions for next newsletter:

Monday 26 August 2024

Cardiff Birdwatch - 7 January 2024

Linda Nottage

A dozen members and friends assembled on a bright but chilly morning at the Llanishen & Lisvane Reservoir site – a venue saved from development by a long Reservoir Action Group campaign organised by local residents. It is a pleasure to be able to access the site again, one of the premier bird-watching and wildlife sites in Cardiff. The Welsh Water visitor centre with café, toilets and car parking (free for 90mins), paths and picnic areas have made this an extremely popular venue. We had to compete with family groups, strollers & joggers to make our circuit of the larger reservoir—wider paths with a better-drained surface would be an improvement.

Lisvane Reservoir is an SSSI for its wintering wildfowl so could only be viewed from one side to avoid disturbance; the path around it is open in the summer. As we gathered to view the many ducks, grebes and coots, sharp eyes spotted a kingfisher perched on a nearby brick ledge above the water ready to dive on fishy prey below. It posed for several minutes, giving all a view of this little jewel. There were plenty of black-headed gulls, little grebes, coots and tufted ducks but few pochard, mallard or great crested grebes.

We scanned the rafts of tufted ducks on the far bank and eventually picked out the pair of ring-necked ducks (rare strays from American) which had been reported earlier. The greyer flanks of the drake with its vertical white streak distinguished it (even at a distance) from the common tufties. Scoping the far bank, Rob also spotted an over-wintering common sandpiper bobbing along the water's edge.

The other reported rarity at the site was a great northern diver which we identified on our circuit of the much larger Llanishen Reservoir. It was often tantalisingly nearer the far side, dived frequently and resurfaced many metres away several minutes later. A cold east wind meant we too were prompted to keep moving, especially as there were few other birds here apart from gulls.

After taking advantage of the visitor facilities, a smaller group of six agreed to reconvene in the Forest Farm carpark where we ate our picnic lunches before exploring the reserve. We visited both hides – crowded as usual with other watchers – walked by the Glamorgan Canal up to Longwood Drive and followed the Taff Trail back to our cars. It is always appealing to see the robins, tits, nuthatches and finches at close quarters as they come for the many handouts along the path. Jays and magpies were also admired from a hide. where nuts were tempting them to pose for photographs. Of course, grey squirrels too were not slow to take advantage of the food on offer.

Mallard and moorhens were prominent along the canal but a kingfisher proved elusive and no water rails were heard. The excitement came at Radyr Weir where a grey wagtail and 2 dippers posed around the top of the fish pass before disappearing downstream.

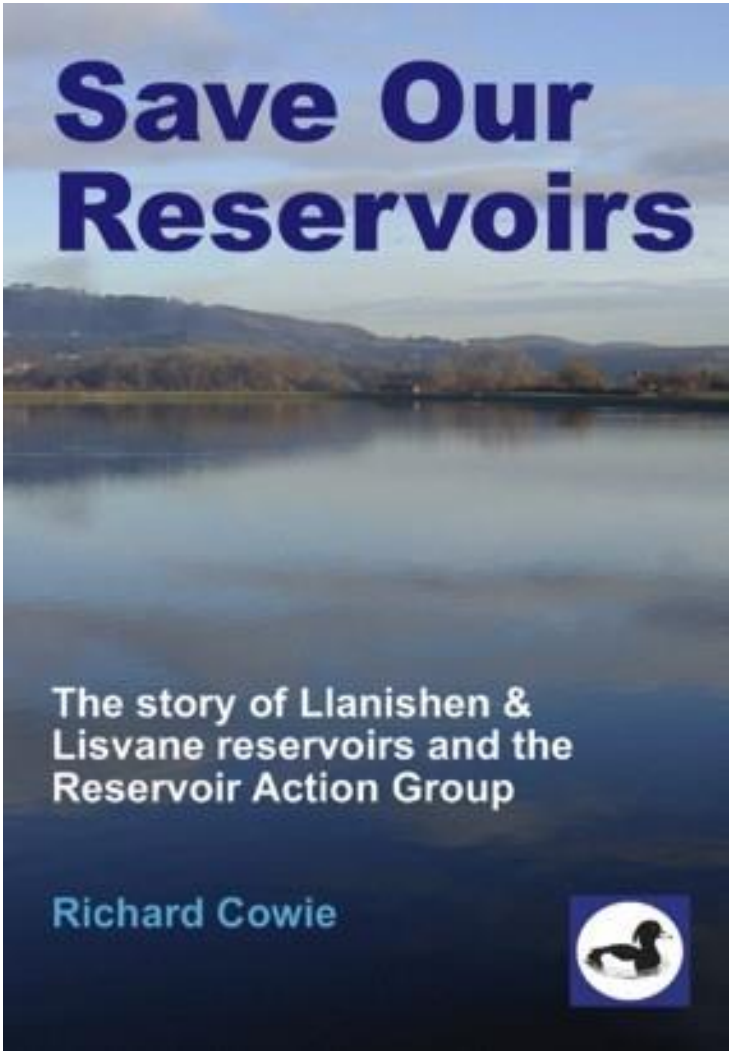
Although the early brightness was replaced by dull conditions, at least it stayed dry and with over 30 bird species including several "specials", and cheered by signs of spring with hazel catkins & budding snowdrops we were well satisfied with the day.

PS: If you would like to learn more about why and how the local residents mounted a successful 20-year campaign to prevent development of the site, CNS member Richard Cowie has compiled a full and enthralling account in his book 'Save our Reservoirs', which is reviewed on pp 12-14 by Andy Kendall.

Magpie and Blue Tit at Forest Farm.
Photos by Linda Nottage

Grey Wagtail at Llanishen & Lisvane Reservoirs. Photo by Stephen Nottingham.

Llanishen reservoir. Photo by Stephen Nottingham


Save Our Reservoirs
The story of Llanishen & Lisvane reservoirs and the Reservoir Action Group
Richard Cowie

Save Our Reservoirs by Richard Cowie

Reviewed by Andy Kendall

For anyone who has recently watched the excellent Mr Bates vs the Post Office and likes a true story of how the “little guy” has won over the big corporate entities, and also has an interest in local issues, I can highly recommend this excellent telling of the successful efforts to save the Llanishen and Lisvane reservoirs as a wildlife and amenity resource for the people of Cardiff and beyond.

First however a little personal information about the reservoirs, which puts this into perspective and gives some history of our Society.

For me, having moved from Scarborough where I learned to sail with my Grandad back in the 1970s, I had not been sailing for about 20 years when I decided in the mid 1990s to go on a starter sailing course (I felt I needed to start again properly as Grandad wasn’t the best sailor!). I sailed regularly sometimes 2 or 3 times a week at Llanishen. I gained not only my RYA level 4 certificate, but was starting to train as an instructor when the plans first came to life.

In all of this time I had been seeing the wildlife value of the site with the swans regularly nesting close to the slipway (as long as you were a neck length away when launching you were OK!), and had walked the banks, led nature walks for the local cubs and brownies, and even been snorkelling for lost glasses seeing the huge amount of underwater greenery that the birds were feeding on.

From the Society perspective our second President, Franklin George Evans (1826-1904), had been instrumental in proving that there could be enough water for the Llanishen reservoir as noted in our transactions:

"*When powers were obtained in 1860 for a new reservoir at Lisvane (constructed 1863) there was as yet very little material on which to base an estimate of the size of a reservoir, and at that time it may have been thought that the storage secured was so ample that precise calculation was unnecessary. But in 1878, when the Llanishen scheme made it once more necessary to go to Parliament, the state of things was very different. At this time there were in the Society's field a number of gauges in various positions and various altitudes, and most of the registers had been kept continuously for ten years or more; so that they afforded valuable information as to the amount and the distribution of rainfall in the district."*

The full history of the development of both of the reservoirs forms the first part of the book 'Save our Reservoirs' so I won't go into further detail, but from the history alone it's worth reading this book.

The main story begins when Western Power and Distribution owned the site and began planning permission processes to radically reduce the amount of water and build what would have been expensive waterfront properties around the edges of the site.

I've located this in our September 2001 Committee meeting:

"*Mr Howe reported the sale of Llanishen & Lisvane Reservoir to a property developer. Rumours abound regarding what the plans for the area are, but no information has come into the public domain as yet and therefore it is not yet possible for the society to formally comment. Mr Kendall reported that he had heard similar information from attending the Sailing Centre. Members were encouraged to make sure their councillors AM's and MP's are aware of the value of the amenity."*

The book relates how the Reservoir Action Group (RAG) was formed in 2001 and also how later the CNS became involved with the consultancy group in 2002.

We (CNS) had formally opposed the initial plans, but were not affiliated with RAG so we were invited to meet with the developers and their environmental advisors and whilst some in CNS committee opposed us attending any meetings with the developers some of us had the opinion that valuable information can be gained by joining such and indeed a lot of information about the way that WWT and the Wildlife Trust and bird club had already been won over became very evident by doing so. We were also able to arrange our nature study days in 2002 which began the process through which the Waxcap fungi were located (Richard led us on a walk to see them in 2004) a key element of the wildlife case that followed. However (and I have checked back on minutes and emails from the time) this was clearly where some of the dirty tricks described in the book started as it was reported by WWT that CNS were fully supportive of the plans (we were not!)

The main part of the book details the sequence of plans being put in and withdrawn and the various things that were done which degraded the site (I remember the first dropping of water level leading to almost impossible sailing as we were sheltered by the walls above the sails!) This is where the likeness to the Post office saga really gets going and it details the things that were done, said and claimed in the sequence of plans being submitted and legal challenges to refusals. It names and shames some of the groups involved and the leading people from both sides of the process. It also details the events which led up to the final refusal of planning permission, but at the same time leaving the site so degraded that it was in many ways truly now unsafe.

However this is where the saga's differ as the book details the take over by Celsa and the agreements with Welsh Water that flowed and the excellent work that has been done to create the new visitor centre and the paths that can be enjoyed by people of all ages and abilities. So in many ways a much happier ending to what was a roller coaster ride and a good read.

The book is available at the Reservoir visitor centre at £14.50 or direct from Richard at the same price plus £3.50 postage via:
https://www.llanishenrag.com/book.html

Weather Summary for North Cardiff 2023

In the previous newsletter (January 2024), we reported the passing of Brian Kerley, who had sent annual weather summaries for North Cardiff for many years. We thank his wife Liz for completing and sending us this summary for 2023.

Weather summary for 2023

The powerful jetstream which gave us such a wet end to 2022 continued into 2023 and helped to spread a dome of tropical air north over much of Europe, giving record January temperatures over a large area. There was little snow in the alps and maximum temperatures in Poland exceeded previous records by up to 5^{o}C . In Cardiff, the first half of January was mild and wet with 57.1 mm of rain on the 11th, the wettest day of the year. Flooding occurred along the Taff, with disruption to transport and power in many parts of the south-east. It was the wettest day since February 2020. In the 5 days from 8th – 13th January 128.9 mm was recorded, over 5 inches. In the 29 days from 17/12/22 to 14/1/23 389 mm (15.3") fell, representing 26.6% of average annual rainfall for north Cardiff. A sprinkling of snow fell on the 17th and frost occurred 9 days from 17th – 25th, with the coldest daytime maximum of 3^{o}C on the 21st. Temperatures returned to normal by the 26th.

February was a dry month (the driest since 1998), especially towards the end of the month when an anticyclone remained close to the UK. Huge buckling of the jetstream over the U.S.A. and Canada, the Atlantic and Europe produced unusual occurrences, with snow in Majorca and parts of California, where such events are rare. Temperatures were generally a little above average with 16^{o}C on the 14th in W. Wales.

March saw fluctuations in temperature, with a colder second week producing some snow, around 7 cm in Cardiff and 27 cm in Capel Curig, and a daytime maximum on the 8th of only 1.4^{o}C. From the 12th it became much milder and often wet, with a total of 202.2 mm, making it the wettest March since 1998.

April was damp and cool. It wasn't until the 28th that temperatures reached 18°C, in Portugal at the same time 38°C was recorded. Hail was noted on four occasions.

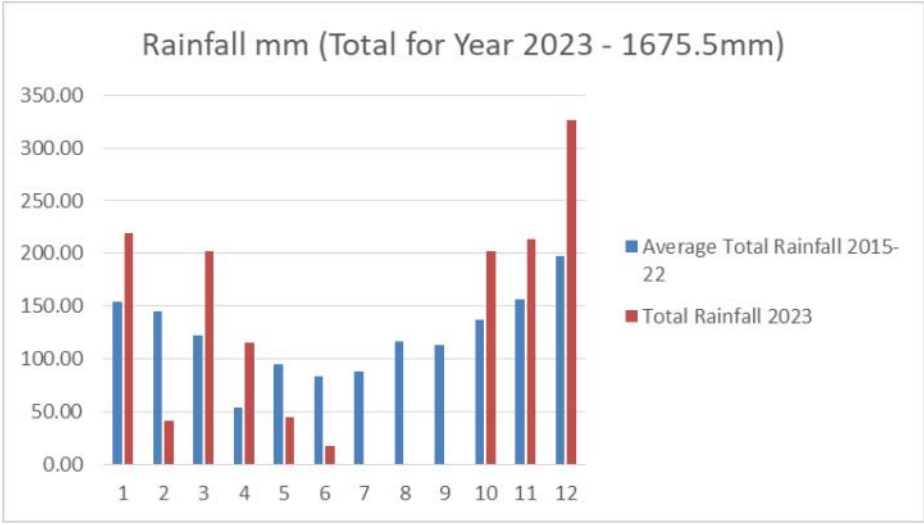
The start of May was relatively cool and damp, but from the 9th rainfall amounts dwindled and temperatures gradually started to rise. After the 9th only 0.8 mm was recorded in Cardiff, with not even a trace in the 2nd half of the month.

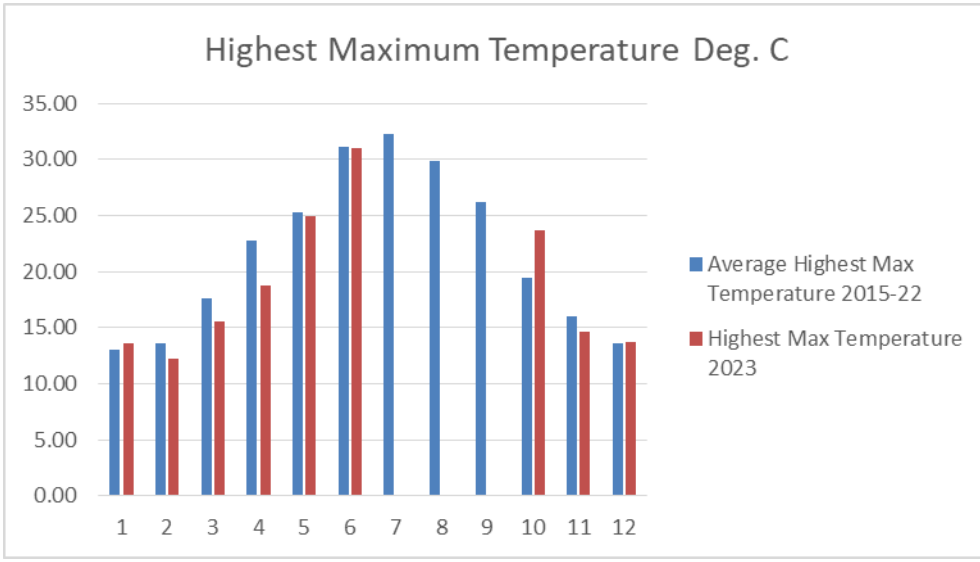
June was very warm and dry under the influence of high pressure, with 17.6 mm, the driest since 1995 - 15.9 mm. The sometimes-thundery showers that blessed most of Wales seemed to miss the S.E. coast. The highest temperature of the year, 31°C, occurred on the 13th.

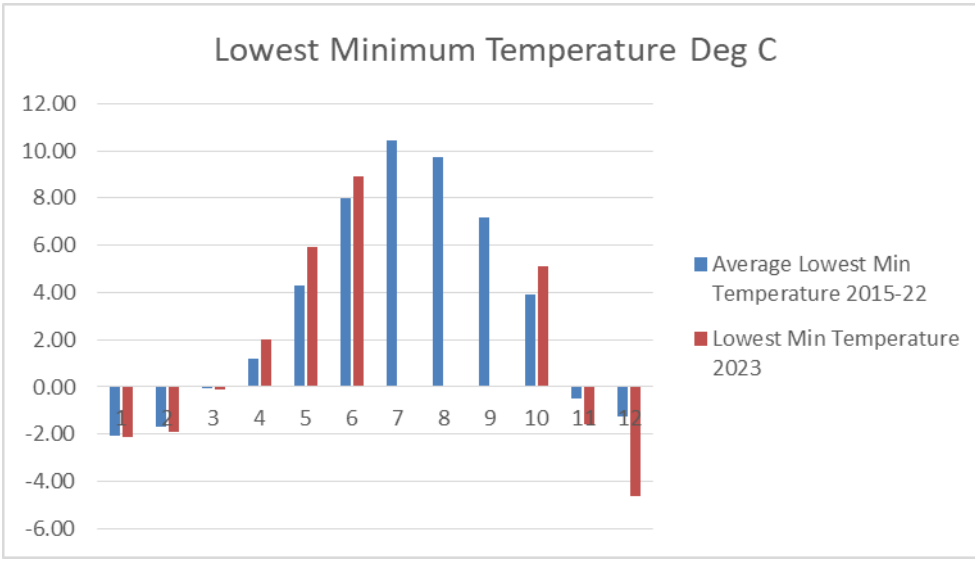
Unfortunately, insufficient data is available to give a detailed analysis for July, August and September. However, it is known that it became cooler and wetter in July with particularly wet spells occurring on the 13th/14th and again around the 22nd. August saw no great extremes of temperature or rainfall and rainfall for September was average, although unusually high temperatures for September were recorded from the 5th – 10th, peaking at 30.2°C on the 5th and 6th. October saw rainfall amounts rising but it remained mild. November was also fairly wet and mild but a frost on the 25th produced a minimum of -1.6°C.

December was the wettest month ever recorded at this location in 30 years, with 326.5 mm (previous wettest October 1998 with 322.5 mm). The wettest day was the 18th when 45.7 mm was recorded in the period 09:00 on the 18th to 09:00 on the 19th, with most of this falling at night. The first week of the month was cold with frost recorded on the first 3 days and a minimum of -4.6°C on the 2nd – the lowest temperature of the year. After that temperatures remained at or above average for the time of the year, No doubt, this very wet month was caused, in part, by the El Niño current in the S. Pacific, which together with climate change produced the string of very active depressions across the Atlantic.

Rainfall for the year was above average with a total of 167.5 mm and the wettest day gave 57.1 mm on 11th January. The highest temperature for the year was 31°C on 13th June and the lowest was -4.6°C on 2nd December. Frost occurred on 14 occasions. Once again it was a year of extreme events. The Met Office has declared 2023 to be the hottest on record globally and in Wales the second hottest in the UK, giving further evidence of climate change.




Highest Maximum Temperature Deg. C
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
1 2 3 4 5 6 7 8 9 10 11 12
Average Highest Max Temperature 2015-22
Highest Max Temperature 2023


Lowest Minimum Temperature Deg C
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
1 2 3 4 5 6 7 8 9 10 11 12
Average Lowest Min Temperature 2015-22
Lowest Min Temperature 2023

Annual Weather for North Cardiff 2023				
	Jan.	Feb.	March	April
	1	2	3	4
Total Rainfall in mm	219.2	41.0	202.2	115.9
Highest in one day in mm	57.1	11.8	16.1	23.9
Date of Highest Rainfall	11th	17th	30th	11th
Highest Maximum Temperature Deg. C	13.6	12.3	15.6	18.8
Date of Highest Temperature	10th	14th	30th	29th
Lowest Minimum Temperature Deg. C	-2.1	-1.9	-0.1	2.0
Date of Lowest Temperature	20th/21st	8th	8th	22nd
Although exposures for both rainfall & temperatures are not Met. Office standard				
the above figures are reasonably representative of the suburban conditions.				

May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
5	6	7	8	9	10	11	12
45.0	17.6				201.5	213.1	326.5
15.0	6.3				33.5	30.2	45.7
5th	19th				12th	10th	18th
24.9	31.0				23.7	14.7	13.7
24th	13th				8th	12th	21st
5.9	8.9				5.1	-1.6	-4.6
16th	3rd				15th/16th	25th	2nd
			Total Rainfall			1675.5	mm
						66.0	inches
			Long Term Average			1447.0	mm
						57.0	inches

Bioscience Prize 2024 fieldwork report:

The effect of *Xestospongia* species filtration on seawater composition and the influencing physiological and environmental factors in the Indo-Pacific

Liliana Tarrant Snedden

The adventure began at the end of June 2023, making the long journey from Cardiff to Gaya Island off the coast of Malaysian Borneo for the marine conservation field course. Arriving on the island felt like paradise, with crystal waters, warm white sand and lush forest surrounding our basecamp. My previous SCUBA diving experience had been in the chilly waters of Wales, so the water temperature of 31°C was a welcome change! The first week of the field course was spent gaining either your first or a subsequent diving qualification and also gave everyone a chance to familiarise themselves with the breadth of underwater biodiversity on the reefs. With so many species from such a broad range of taxa I initially had little idea of what to focus my project on. Yet after hearing a bit more about the reef ecosystem and possible sample methods from our lecturers, my curiosity was caught by the rather unassuming barrel sponge (*Xestospongia* spp.). Learning that these basal organisms filter seawater for nutrients and contribute to biogeochemical cycles, I wanted to find out what impact this action was having on seawater composition and subsequently the reef. As we were without internet on the island my only avenue of inquiry was to investigate this for myself.

My study aimed to explore the impact of seawater filtration by the far less studied Indo-Pacific *Xestospongia* spp., on seawater composition and evaluate how any compositional changes were influenced by different physiological and environmental factors.

Any measurable changes to seawater composition would support current understanding based on research conducted in other geographic locations and demonstrate that the *Xestospongia* spp. found in Indo-Pacific regions may also be contributing important nutrients to the coral reef ecosystem.

Background

The barrel sponges of the Indo-Pacific region are a type of porifera that belong to the genus *Xestospongia* and are yet to be definitively classified to species level. These benthic suspension feeders are thought to process significant volumes of seawater and facilitate nutrient cycling through benthic-pelagic coupling (Bak et al. 1998; Gili and Coma 1998; Fiore et al. 2013). Additionally, porifera make allochthonous carbon and nutrients available within an otherwise nutrient poor ecosystem (Yahel et al. 1998; Monismith et al. 2010; McMurray et al. 2014). Marine sponges have high adaptive plasticity and are found in a diverse range of habitats, sharing a simple porous body plan adept at filtering out prokaryotic plankton and other nutrient particles ranging from 0.1 µm to >50 µm (Reiswig 1974; Larsen and Riisgard 1994; Pile et al. 1996; McMurray et al. 2014). A marine sponge is also part of primary production pathways through multiple microbial symbiont associations and more than 52 different microbial phyla are known to associate with marine sponges (Taylor et al. 2007; Bell 2008; Webster and Thomas 2016; Villegas-Plazas et al. 2019). The sponges benefit from the microbial associations via the production of antagonistic compounds, protection from grazers, processing of metabolic waste and the acquisition or synthesis of limiting nutrients (Leal et al. 2012; De Goeij et al. 2013; Loh and Pawlik *2014;* Zhang et al. 2015).

An important aspect of the sponge and sponge holobiont is the combined contribution to marine biogeochemical cycles such as the nitrogen cycle (de Goeij et al. 2013; Villegas-Plazas et al. 2019).

Research suggests an entire nitrification cycle present within sponges, including active ammonia oxidation, which can act as both a sink or a source of bioavailable nitrogen to other organisms on otherwise nitrogen poor coral reefs (Mohamed et al. 2008; Zhang et al. 2014; Bayer et al. 2008; López-Legentil et al. 2010; Mohamed et al. 2010) (Figure 1).

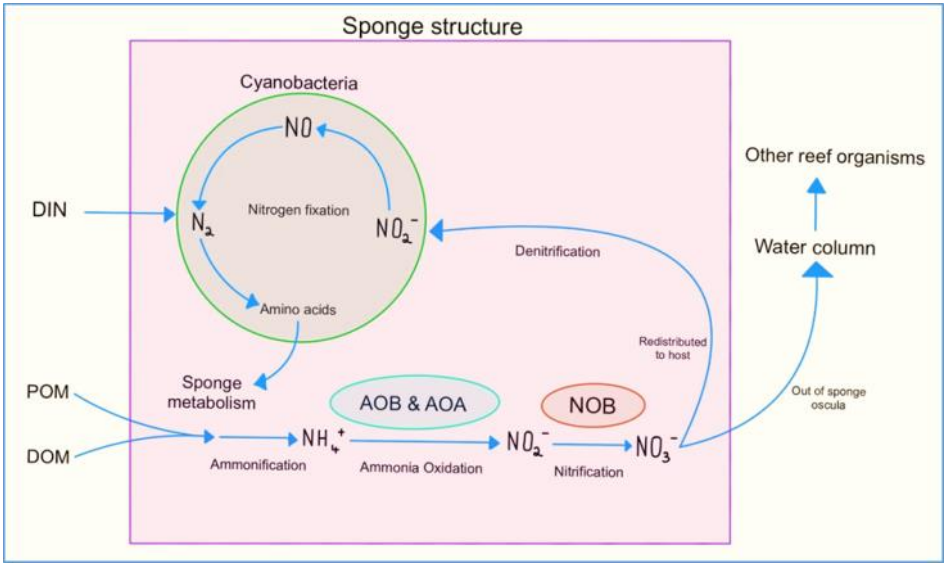


Figure 1: The nitrogen cycle within marine sponges. Particulate organic matter (POM) and dissolved organic matter (DOM) are taken in from the incurrent seawater through the sponge choanocytes. Dissolved organic nitrogen (DIN) is taken in by the symbiotic cyanobacteria resident within the sponge structure and the processes conducted by the cyanobacteria symbiotes are highlighted by the green circle. Ammonia oxidising bacteria (AOB) and ammonia oxidising archaea (AOA) convert the ammonia (NH_4^+) product of sponge metabolism into nitrite (NO_2^-), which is then oxidised further to nitrate (NO_3^-) by nitrite oxidising bacteria (NOB). {Original Figure}

In this report, I describe the change in various seawater composition variables between pre and post filtration, including salinity (‰ salinity), pH, total ammonia ($NH_3 + NH_4^+$ in mg/L), nitrate (parts per million (ppm) of NO_3 in mg/L) and phosphate (ppm of PO_4). I then explore the link between observed changes in seawater composition and several environmental factors, namely osculum area (m^2), water temperature (°C), depth (m), tidal category and location.

Materials and Methods

Samples were collected from three coral reef locations around Gaya Island while diving to between 5-15m depth. Twenty-one single chimney *Xestospongia* spp. were sampled with 25mL water samples first taken from around the base of the sponge, then from above the osculum. At each sponge environmental data was collected including depth, temperature, time, and estimated sediment coverage. Images were also taken of each sponge alongside a diver's slate to enable dimensional measurements to be calculated using ImageJ software (Figure 2; page 26). Post dive, the tidal position for each sample was recorded using the time of sample collection and public-access tide tables and all water samples tested for the aforementioned components (Tide Times and Tide Chart for Kota Kinabalu 2023).

For statistical analysis, new vectors were defined for the differences between sponge base and sponge oscula water samples. Shapiro-Wilks tests were performed on this data to test for normality. Generalised Linear Models (GLM) were then used to test for associations between quantity of total ammonia ($NH_3 + NH_4^+$ in mg/L) filtered out by the Xestospongia spp., osculum area (m^2), depth (m) and tidal category (Model 1). A second GLM was also tested for relationships between total filtered out ammonia as a function of osculum area (m^2) and location (Model 2). Model fit was evaluated each time by checking the distribution of residuals using a Shapiro-Wilks test and refinement of the model through stepwise deletions was not required.

Figure 2: Image taken of an Indo-Pacific *Xestospongia* spp. on a GoPro8, demonstrating the positioning of the diver's slate above the sponge osculum.

Results

Three of the twenty-one samples had to be excluded from further analysis due to missing data (final n = 18). The variables of water temperature and salinity remained constant at 31°C and 30‰ respectively. Sedimentation present on the surface of the *Xestospongia* spp. ranged from low to medium. The pH levels were relatively consistent at 8.3 or 8.6 for all three locations and no pH changes were observed between pre and post filtration samples.

Measurements of the dissolved inorganic components of the seawater yielded a narrow range of results. There were no significant differences in pre and post filtration seawater composition for nitrate or phosphate. However, total ammonia levels did decrease by a mean of -0.05 mg/L after filtration by the *Xestospongia* spp. suggesting the presence of active ammonia oxidation within the sponge holobiont.

Model 1 GLM analysis had normal distribution but showed no significant relationships present between the amount of ammonia filtered out by the *Xestospongia* spp., and the variables of osculum area, depth, or tide category. Location was not a significant variable in Model 2 but osculum area was considered to have marginal significance (p-value <0.1), suggesting a relationship between the size of the oscula and the observed decrease in total ammonia concentration post filtration.

Conclusions

Despite the low sample size and limited testing capacity, I was able to find some measurable differences between total ammonia levels and a marginally significant relationship between the decrease in total ammonia and osculum size. Definitive conclusions are impeded however by the small sample size, restricted sampling period and low discriminatory power of the water composition tests used. With more time and access to laboratory testing I would sample more locations, conduct repeats, and test water samples to a much higher resolution. I would be interested to see whether the trends I began to observe within my data were still present and if they increased in significance with more, higher quality data. Yet my study does show that the filtration action of *Xestospongia* spp. does have an impact on seawater composition, namely total ammonia, and the measured difference does increase with osculum area. This corresponds to published literature around the presence of active ammonia oxidation within the sponge holobiont and highlights the important role of sponges within reef communities.

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My Garden Pond

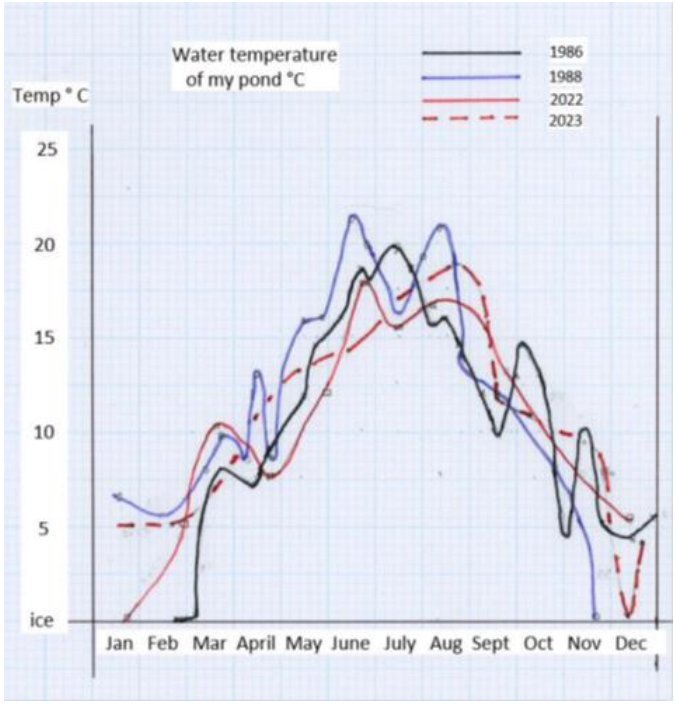
Dave Wellings

The pond was constructed around 1980 with a concrete and glass fibre resin base, with a flexible butyl liner added later. It is 2.6 by 1.5 metres and 0.5 metres deep at the centre, and faces the northeast, so only gets sunlight during the summer months. My house was built on a farmer's field with no frogs around, so the pond was initially 'seeded' with frogspawn, including from a flooded field off Sully Moors Road. These days it is not unusual to have at least 40 to 80 clumps of frogspawn. Frogs are most active in the first two weeks of February. The biggest disaster was in February 2018 when the pond froze, killing some 50 frogs. However, it was back to normal the following year.

Pond Temperature

I started recording pond temperatures in 1986, then a few times each month, now once a month. Temperatures were measured 10 to 20 cm below the surface.

In the years 1986-88, the pond did not have any weed cover and this may account for the greater variations in temperature. By 2022-23 the surface was covered with plants that insulate the water below, where the temperatures were measured.



Even though this pond is in a very shaded position, the temperatures still get to over 20°C during June to August, during the recent long hot and rain-free summers. A smaller pond in my back garden facing southwest got up to over 26°C last year and this killed everything. The water temperature varies throughout the year because of ground and air temperature; rain and snow can cause rapid changes in temperature.

Frogs eat slugs?

After visiting my garden at night with a torch and a camera, over many years, this is the only picture I have ever taken of a frog eating a slug. But that slug is big enough to be eating the frog?

Photo: Kingfisher (female) at Forest Farm. Photo by Phill Blanning.

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